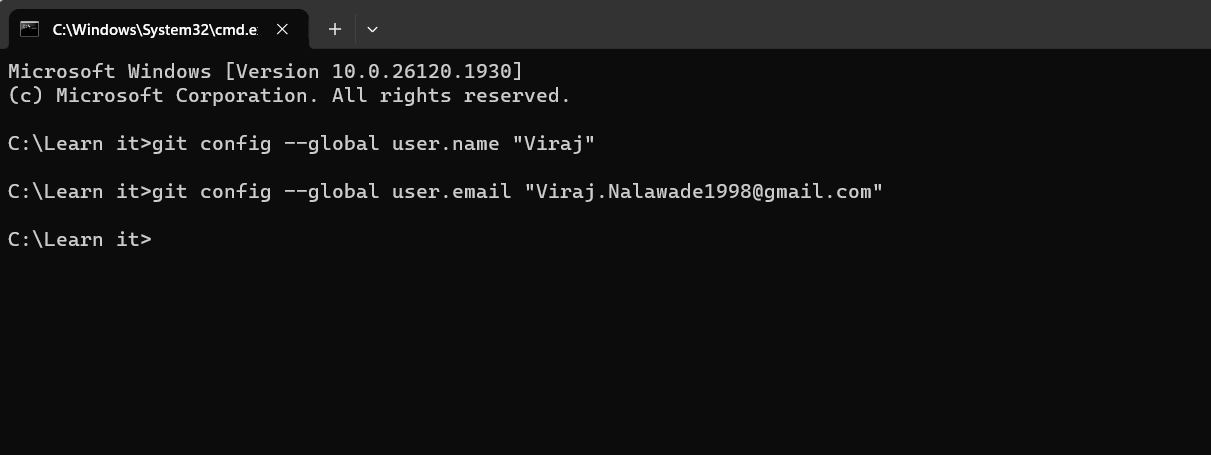
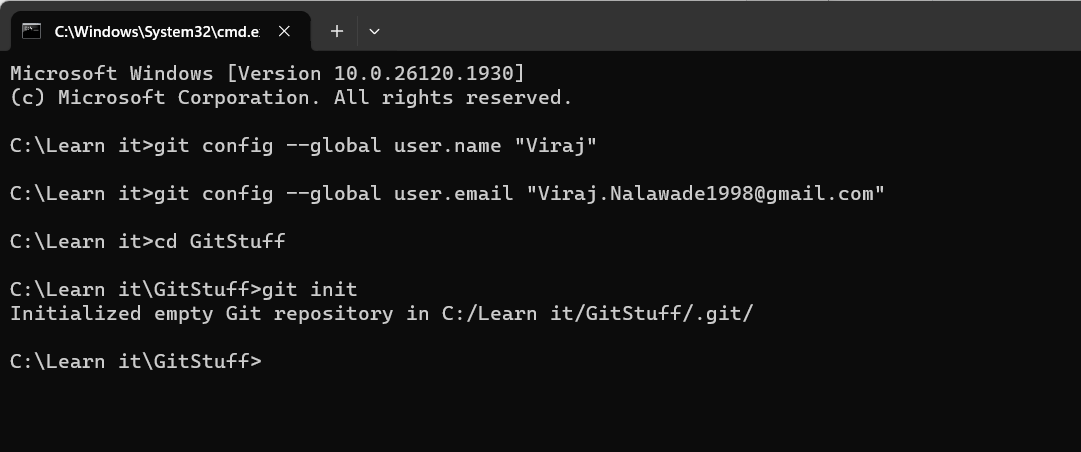
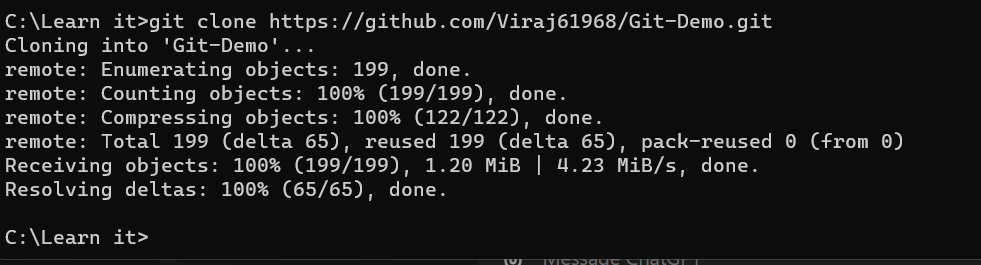
**Version Control – Git**

1. So, it a free and open source version control system. Also, it plays an important role in framework to be specific nothing related within the framework. But when you have to developed a robust project it could be project or folder or framework, so to distribute among the peers or to keep a track of the project or if changes are made then how it will notify others about the project. In such cases **Git** comes into the picture.
2. Also, there is an alternative for Git called SVN. But according to the latest trend Git is mostly used in the market.
3. So, first download Git from the website - <https://git-scm.com/downloads/win>
4. Also, the downloaded file location is - C:\Learn it
5. **GitHub** 
   1. So, if you want to pick the test where the last person left then he has to leave it one central repository from where the current working person can download the latest test case.
   2. So, GitHub is a central place where you can post your code or download it from here. Then to talk to GitHub from your local machine you need to know the Git commands. By using the Git Software we can write the command to talk to GitHub which is a central repository and take the code from there.
   3. Username – [Viraj.Nalawade1998@gmail.com](mailto:Viraj.Nalawade1998@gmail.com)
   4. Password – 84725@Viraj
   5. Website - <https://github.com/>
   6. Also, there are things which are needed to keep in mind. So, first if there are two code which is similar then it will not accept the code to push it into the GitHub which has term called “**Merge Conflict**”.
   7. Then **Reject** means - when you try to push code to a remote repository (like GitHub) and receive a **reject** message, it usually means that your local branch is out of sync with the remote branch. In other words, *Imagine, you're working on a shared document with your team. You made some changes to it and are trying to upload (push) your version to the shared folder (GitHub). But while you were editing, someone else also made changes and uploaded their version. To fix it, you need to first* ***download*** *(pull) the latest version from the shared folder, combine your changes with those, and then upload (push) your updated version. This way, everyone's changes are included.*
6. So, to create a repository just click on “**create repository**” button in GitHub and after that just give the name like “Viraj” and click on create repository button in the end and that’s it. The repository will be created.
7. Then the main is how to provide the basic command to push the code into the GitHub from Git using command prompt with basic command. So, the ref.- <https://confluence.atlassian.com/bitbucketserver/basic-git-commands-776639767.html> the website where they’ve provided with the list of basic command used. And also there are various tools available in the market to do this job but in the end the basic or core is using the basic command which is shown in the website.
8. So, first command is basically telling the git on who you’re. And the below screenshot is what it usually looks like –
9. 
10. And then if you want to initialize the folder which you created where the git is store then use command “**get init**”**.** Even though it says that initialization empty it is still showing the .git file location in it and the reason it is not seen in the folder because it is hidden.
11. 
12. After you’ve initiated the folder then you need to perform stagging > Commit > Push to GitHub.
    1. Stagging - Think of staging as gathering the changes you’ve made in a document but not yet saving them for everyone to see. Before you officially save it, you want to take a look at what changes you've made. That's what staging is preparing those changes for saving but not yet making them final. So, in technical terms **Staging allows you to review and organize changes before committing them. You might have multiple edits, and you only want to finalize some, so you "stage" only the ones you want.** So, to provide command to git for stagging is “**git add \***”.
    2. Commit - Committing is like finally saving the document with all the changes you’ve prepared in the staging area. Those changes become a permanent part of the project history, and others can see and use them. **Committing saves your work and creates a checkpoint. If you mess up later, you can always go back to this save point. It also helps others keep track of changes you’ve made.** So, for commit it is “**git commit -m “message”**”here m stands for message, and within the double quote you’ve to provided the message which is sort of a description.
13. Then, after that we need to push the code into GitHub but first you need to connect the local repository to remote server which mean is connecting the system to GitHub. The syntax for it is “git remote add origin <https://github.com/Viraj61968/Git-Demo.git>”. Also, if you join a company they will provide their origin were you can upload or push the code.
14. After that you need to push it using the “git push origin master” after that it will ask for the login credentials and after successful login it will show like the screenshot below.
15. A screen shot of a computer

    Description automatically generated
16. And to check in GitHub whether the folder is pushed or not you can go the homepage and there you will see the repository page with the name and by clicking on it, you will see all the files which you stored in the folder on the system.

**End to End working example on Git commands -1**

1. So, consider a scenario where one has created the code and also pushed it to the GitHub. And now you want to work on it So, first you will clone using the git command “**git clone** https://github.com/Viraj61968/Git-Demo.git**”** with the path, then git would clone and download it in the system.
2. Also, there is difference on when to use **clone** & **pull** 
   1. **git clone** creates a **new copy** of the repository.
   2. **git pull** updates an **existing copy** of the repository with the latest changes. In other word, it just download the updates or new code added to the repository which you first clone it.
3. 
4. So, after you’ve made some changes in the code from the eclipse IDE then to push it to the GitHub you need to the git command which you will use is “git add \*” and then “git status”. So, first command will add the updated code and then the second command will explain what are the changes made within the file which we will obtain using the second command. And the third step is “git commit -m”this is message”” which will denote that the code is ready for push. Lastly, “git push origin master” which will push the code into the GitHub. But note that these changes are in the clone file.

**End to End working example on Git commands -2**

1. So, after the changes have been made then to update those changes in the code or in the IDE you just to need to give the command “git pull origin master” here master is the branch. And here is a note after the pull has been perform it will automatically update the code in the eclipse.
2. **And if not understood just ref the Udemy Rahul Shetty course and lecture no. 206 & 207.**

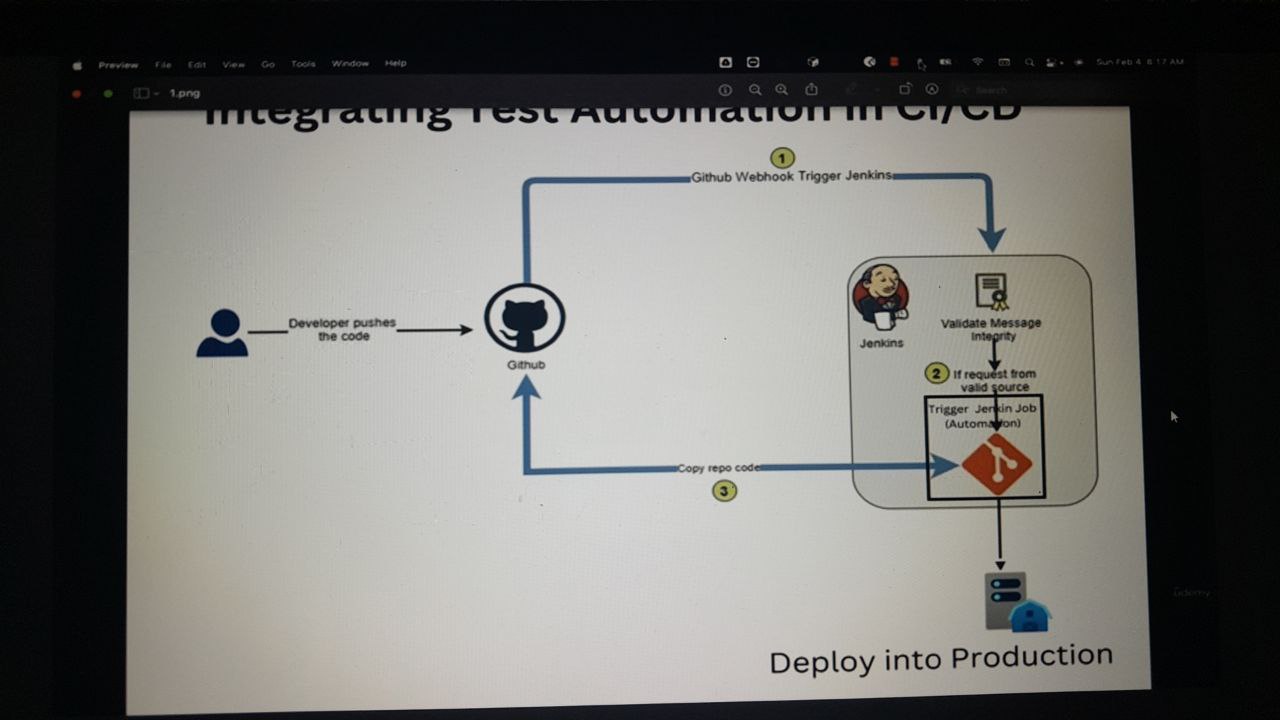
**Importance of Branching in GIT**

1. So, if there is a third person who is appointed by the company to optimize the test case then if the person started working on the code which we push to the GitHub & since we’re also working on it then it will just mess up the code and cause failure.
2. So, to avoid that the concept called **Branching** comes into the picture. So how does it work is we create a separate branch using the command called “git checkout -b <branchname>” and switch from master to the new branch. So to check which branch you’re on just enter “git branch” which will show you on which branch you’re on.
3. Then after when the changes are made within the new branch then the step from the adding to the stagging until the push is pretty much the same. But at the time of push enter the new branchname for e.g. It should develop branch and not master branch.
4. Similarly, when another person is allocated to do the same work then it is pretty much same but instead of master we’re using develop which is branchname.
5. Then after all the changes or update has been completed then the last step is to **merge.** So, to perform merge operation in Git first you need to switch to the master branch using the command “git checkout master” then pull the updated code to the branch by “git pull origin master”. Then last is to merge the code from branch to the master branch by using the command “git merge develop”.
6. Again, if you don’t understand the concept just ref. Udemy of Rahul Shetty course lecture no. 208.

**How to resolve Merge conflicts with Git**

1. So, consider a scenario where one guy from master branch create a file which contain the alphabets from A-Z. After he has completed it he stagged > commit > merge the code. Then comes a second person he pulled the code and started working and add some more code like number from 1-10. But at the same time the first person makes some changes in the file so after the changes it contain only vowels letters. And then he also stagged>commit> merge. But the second guy isn’t aware of the changes so when he try to merge there is a error which is called **Merge conflict** because there are some changes in the file which he pulled the code from and generally it shown in the IDE. And then after correcting the changes then he again the stagged>commit> merge the code at this time the code is successfully merged.
2. In others word, A **merge conflict** in Git happens when two people change the same part of a file in different ways. Git can’t automatically decide which change is correct, so it asks for help to resolve the conflict.

**What is Continuous Integration & Delivery. Understand the flow**

1. 
2. So, is a diagram which shown how CI/CD occurs. So, in the traditional projects when developer writes any code it comes to the QA first, then QA test it thoroughly and then after a few weeks it goes to the release. But now a days companies like Google or Microsoft are releasing the software in every two minutes.
3. So they’ve a concept of continuous delivery. So, when developer pushes the code then Webhooks will know that somebody pushes the code. And immediately it goes and kicks the Jenkins. So Jenkins is the place where you will deploy the job into the production or run automated test cases. Similarly if the product is to be deploy into the production then the DevOps guy creates a job in Jenkins and whenever the new code is pushed Jenkins do the job. And in the same way if you want to automate the test you will create a job in Jenkins and perform automation.
4. Then What Webhooks does is whenever someone pushes the code into the GitHub it goes and just wakes up Jenkin to do something i.e. for here it is testing. And to make sure what Jenkins should do is automation or deploy it in production this is why we need to configure before it so it will automatically perform the operation. And this is the same case for deploying it in the production. So if a new code is pushed or added then this is called **Continuous Integration** and after all the jobs are perform through Jenkins and finally the product is deploy in the production then it is called **Continuous Delivery**
5. **Also, here there is no Manual intervention** .
6. **Question** – So can you setup a high level CI/CD setup and make sure you Jenkins test automation job runs when someone pushes the code into GitHub.
   1. So it means you need to configure Webhooks GitHub triggers and you need to make sure once you receive that notification. Jenkins job of your automation test run automatically when someone pushes the code.

**Configure GitHub account and push the Selenium Framework into repository**

1. So, it pretty much the same on how to push the code or framework you’ve created in the local into the GitHub.
2. And the second is that whenever you want to access the github again from the command prompt then first do is connect the folder like “cd Gitstuff” then “git status” which will notify you want are the code which are stagged or not stagged.

**Create Selenium job with Jenkins**

1. So there is another things which is whenever you install some plugins within Jenkins it suggests you to restart the browser so to do that you need to provide the command in cmd to restart Jenkins which is the correct way.
2. So, use the Try and error method like create a test case for single feature and then pushed it to the github and make Jenkins to automate the testing. And then identify the error and try to correct it one by one.
3. So, if the error - **Failed to execute goal org.apache.maven.plugins:maven-compiler-plugin:3.13.0:compile (default-compile) on project SeleniumFrameworkDesign: Fatal error compiling: java.lang.IllegalAccessError: class lombok.javac.apt.LombokProcessor (in unnamed module @0x2b600107) cannot access class com.sun.tools.javac.processing.JavacProcessingEnvironment (in module jdk.compiler) because module jdk.compiler does not export com.sun.tools.javac.processing to unnamed module @0x2b600107 .**  Then it is missing the dependency of Lombok which you need to add it in the pom.xml file and then the build would be unstable.
4. If you're seeing "Finished: Unstable" at the end of your Jenkins job, it means that the job execution has been completed, but Jenkins has marked the build as "Unstable" due to some issues or failures encountered during the build process.
   1. Here's how you can interpret and address this:
   2. **Review Console Output**: Check the console output of your Jenkins job to understand why it's marked as "Unstable". Jenkins typically provides detailed information about what went wrong during the build process.
   3. **Fix Issues**: Identify the reasons why the build is marked as unstable and fix the underlying issues. This could include failing tests, compilation errors, or other build-related problems.
   4. **Update Build Script or Configuration**: If necessary, update your build script or Jenkins job configuration to ensure that all steps are executed successfully without causing instability.
   5. **Configure Thresholds**: Jenkins allows you to configure thresholds for marking builds as unstable or failed based on various criteria such as test results, code coverage, or static code analysis. Review and adjust these thresholds if needed.
   6. **Post-Build Actions**: Consider adding post-build actions in your Jenkins job configuration to perform additional checks or actions after the build completes, such as sending notifications or generating reports.
   7. **Monitor Future Builds**: Keep an eye on future builds to ensure that they are stable. If instability persists, continue investigating and addressing the underlying issues.
5. So, then again you need to configure or solve this error again.

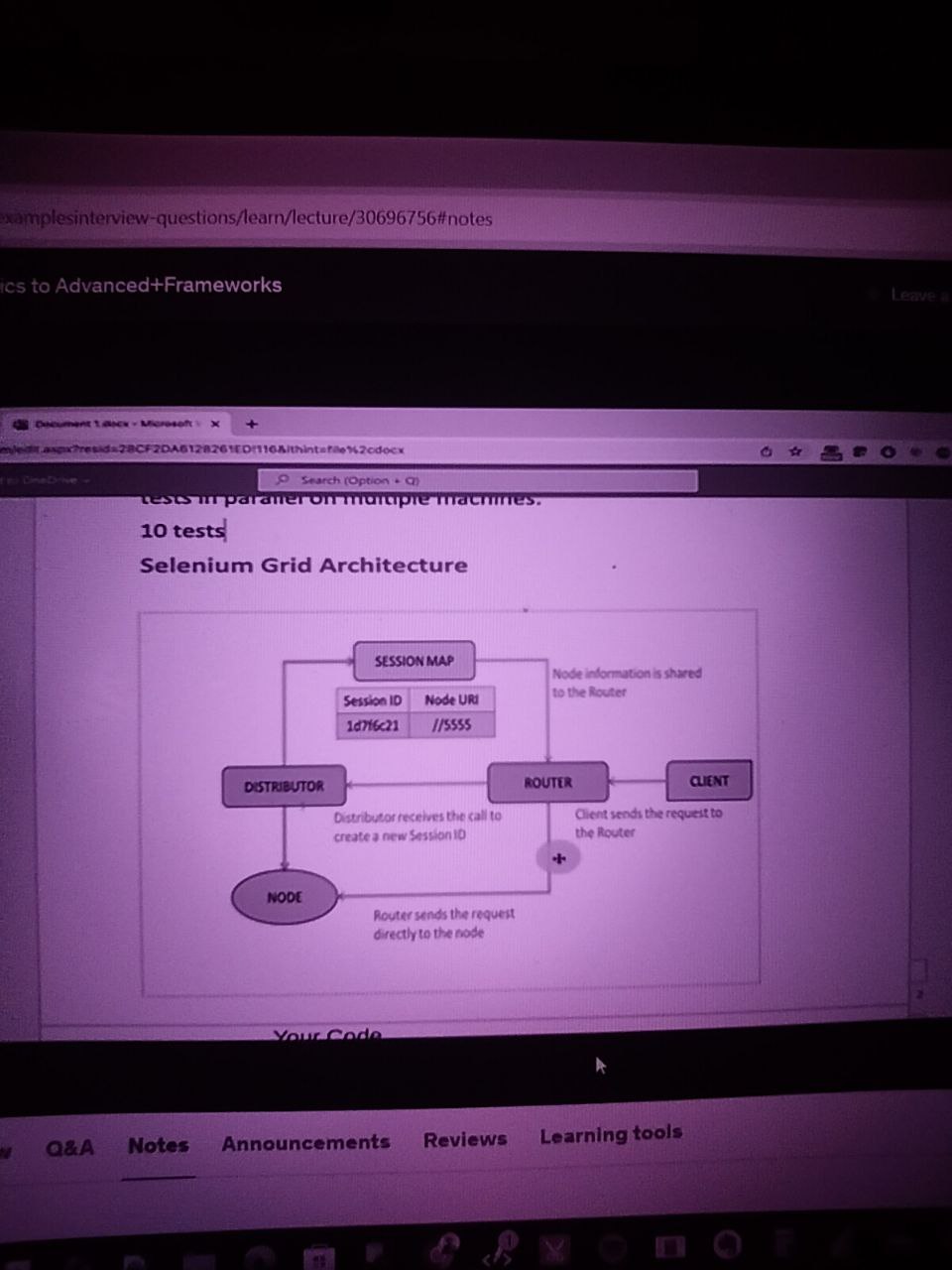
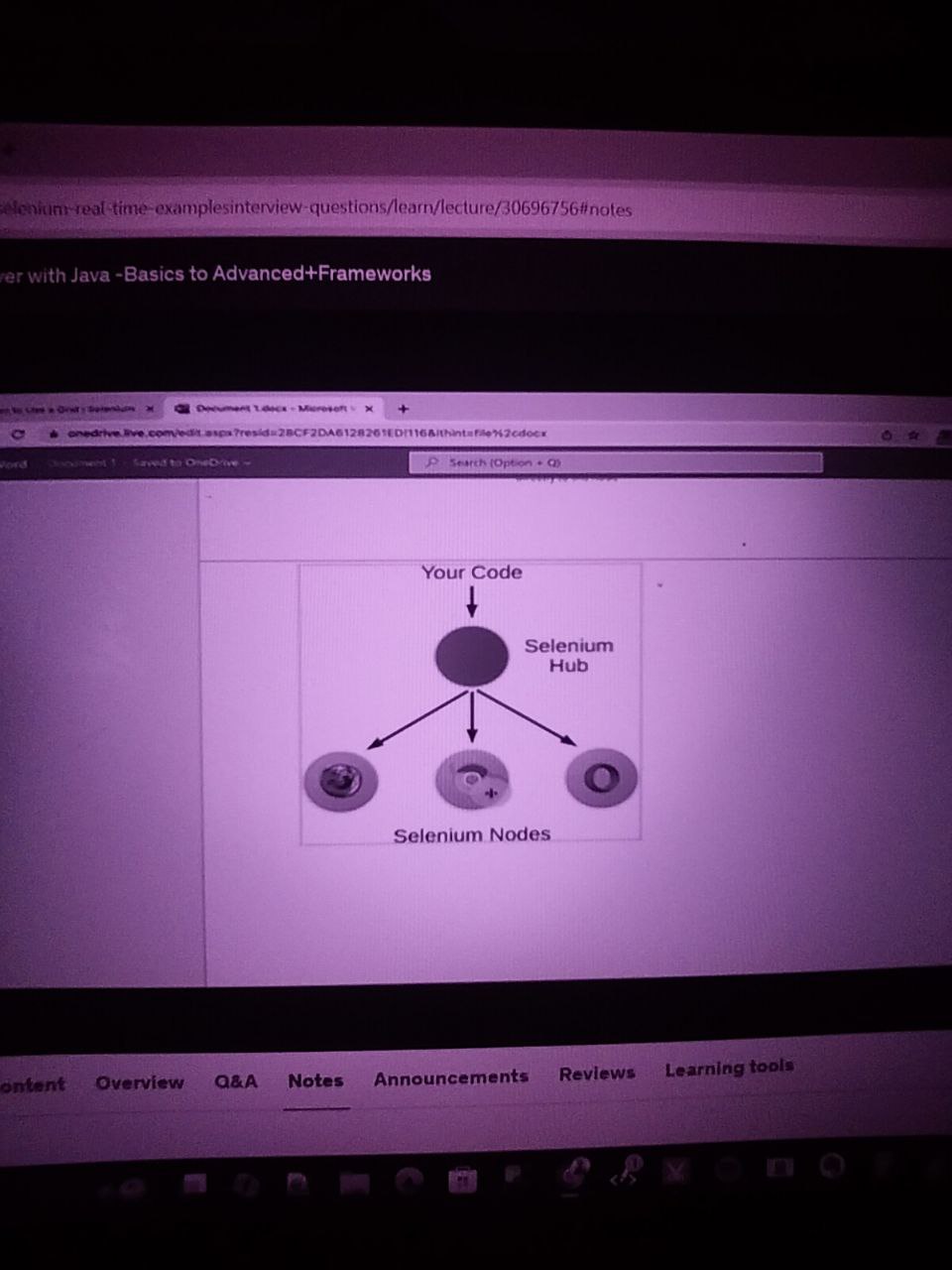
**Understand GitHub webhook trigger & configure it to activate Selenium jenkin job**

So, whenever there is a new code pushed to the GitHub the Jenkins should automatically trigger the quality test. So to do that there should be configuration

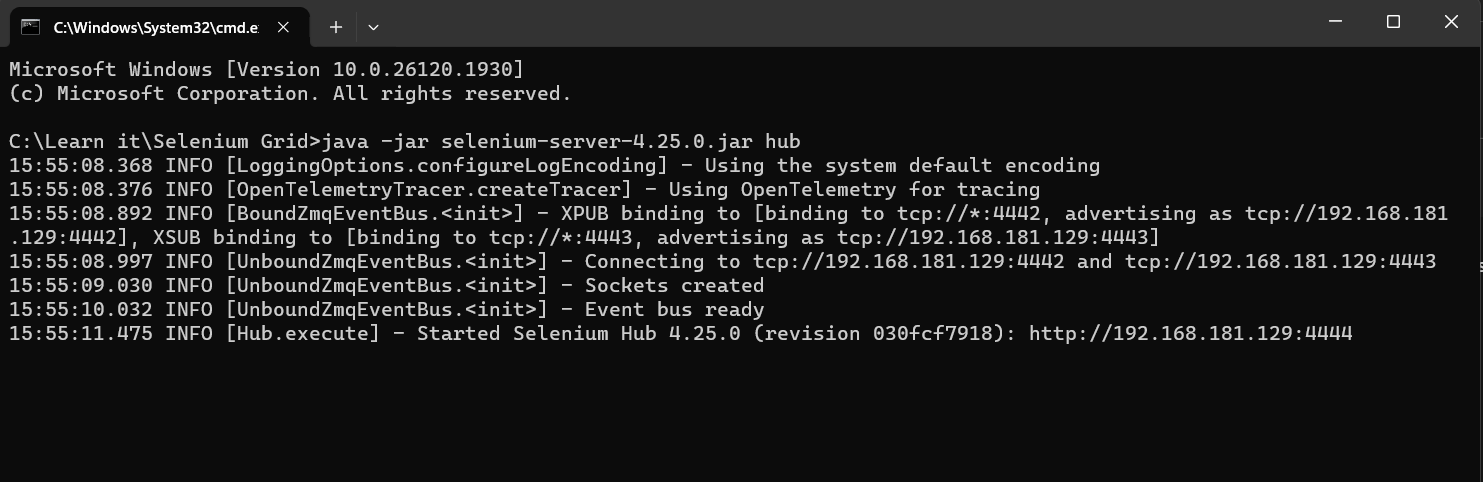
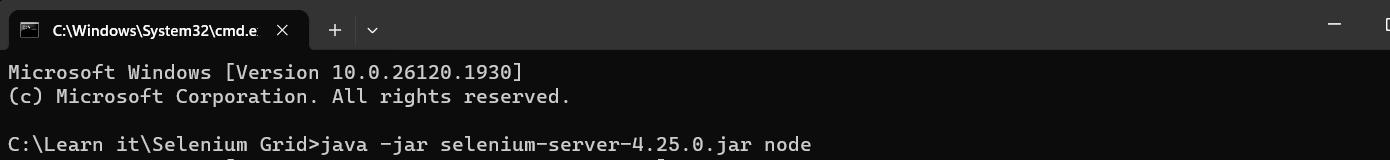
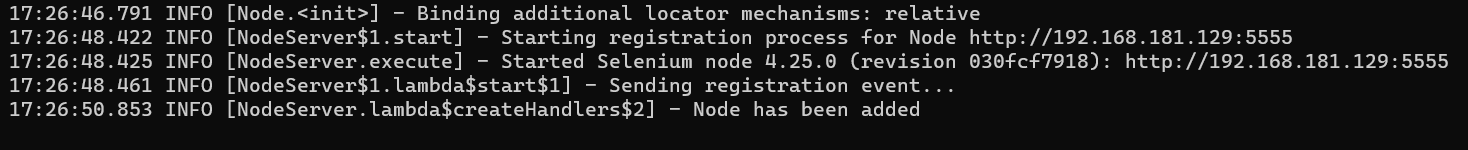
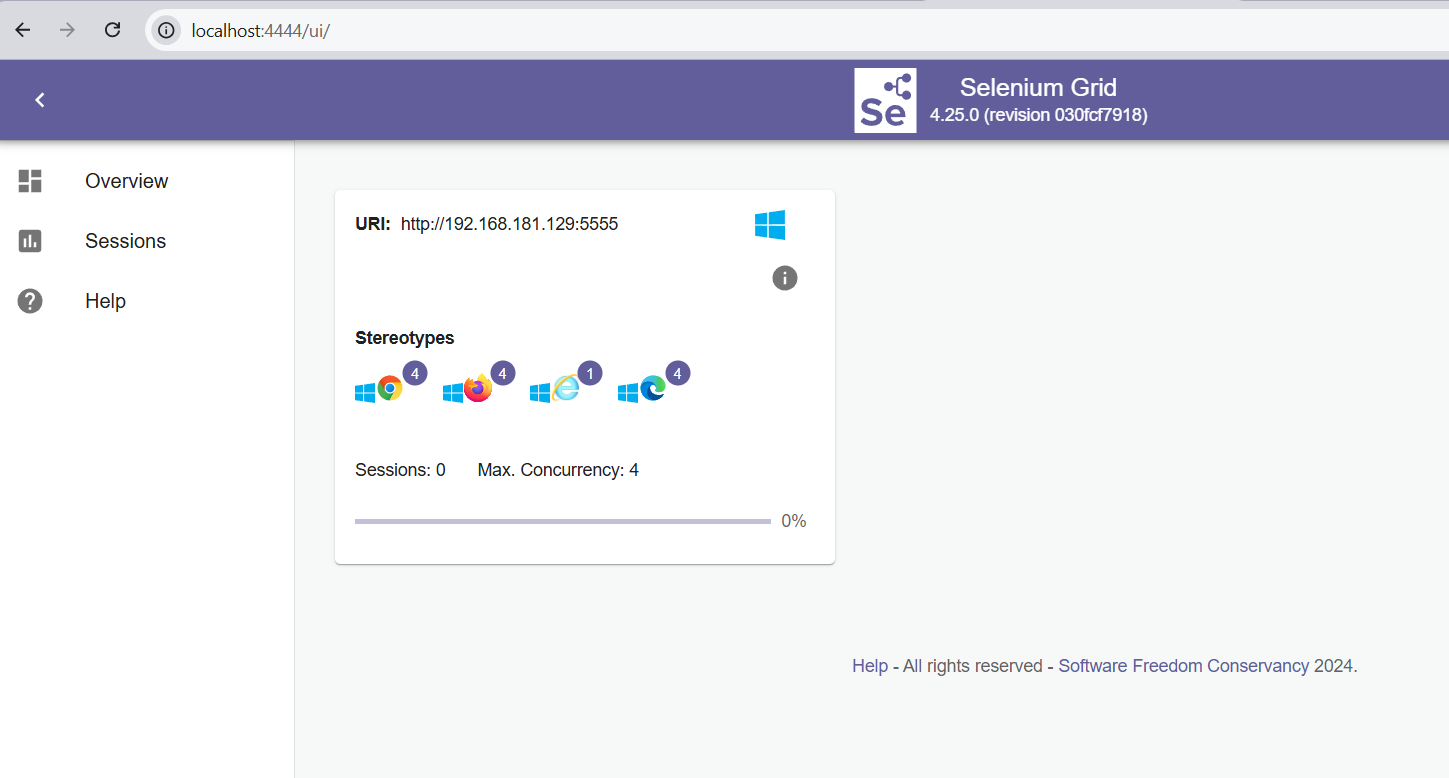
* 1. For GitHub – Just go to the Setting > Webhook > Create Webhook> And just paste the payload url.
  2. For Jenkins – So the get the payload url Dashboard > Manage Jenkins > System > GitHub section > GitHub Server > Advanced option > Select the checkbox “Specify another hook URL for GitHub configuration” and after that just copy the url. **Don’t click on save button because you need just the url.**
  3. Also, note that if you provide the localhost URL it will not trigger the Webhook. So to practice you would need the server IP or which is public i.e. which can be accessed through internet. So, for practice purpose there is a site called **ngrok** which convert your local host to a URL which accessible to the public.
  4. So, after you’ve added the url just save the webhook and whenever there is a new code push into GitHub it will automatically make Jenkins to run the automated test case.

**Note – Need more hand – on experience because there are errors still occurring because the final result is showing – “ UNSTABLE “.**

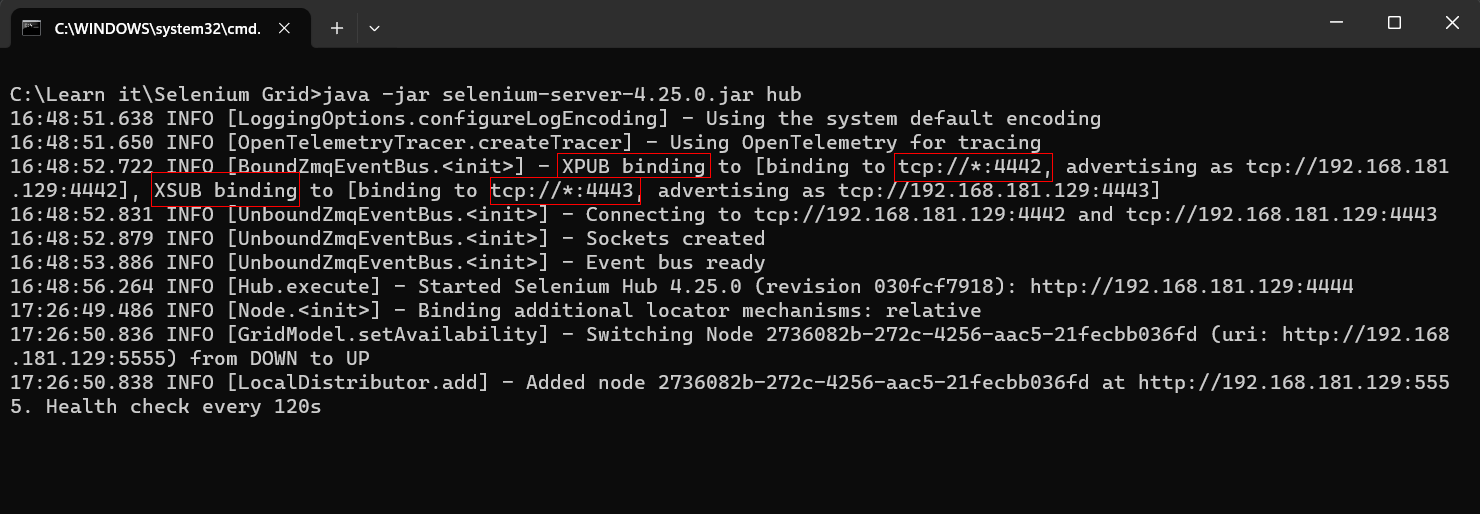
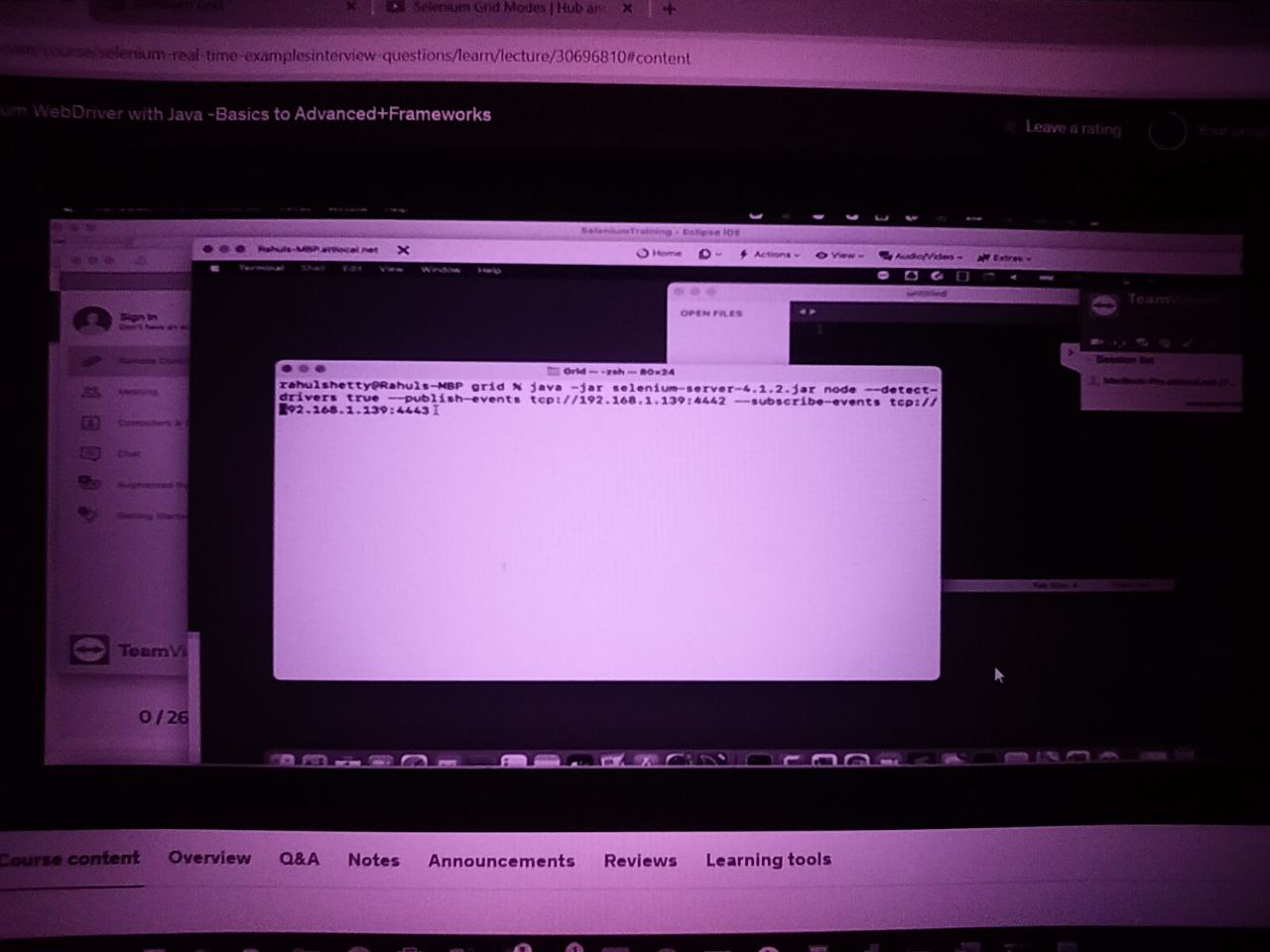
**What is Selenium Grid ?. Its advantages on bringing down execution time.**

* Selenium Grid is a smart proxy server that makes it easy to run tests in parallel on multiple machines. And the reason we’re using it because on a single machine if I run 15 test cases “parallelly” then the system would run out of memory and cause a flaky error. So, to avoid it we use Selenium Grid where we divide the test case like 3 test case per machines and what it does is it execute the test cases parallelly and it also takes the same amount of time to execute.
* Also, you execute all the test cases from a single machines only.
* Here is a breakdown on how the Selenium Grid architecture works –
  + **Client Request**: When a client sends a request, it goes to the **Router**. The router’s role is to manage the incoming requests and direct them appropriately.
  + **Session Creation**: The router forwards the request to the **Distributor**, which is responsible for creating a new **Session ID** and associating it with a **Node** (***a machine with the necessary browser and configurations)***. The **Session Map** records these session details (Session ID and Node URI).
  + **Node Assignment**: Once the Distributor assigns a session to a Node, the **Router** sends the test request to the Node based on its IP or URI.
  + **Subsequent Requests**: If there’s a follow-up request related to the same test case (e.g., if modifications are made to the test case or subsequent actions need to be performed), the router cross-verifies the **Session Map**. If the session already exists, the router bypasses the Distributor and directly routes the request to the appropriate Node.
  + **Event Bus** - Used for sending messages which may be received asynchronously between the other components, the arrows which are shown is what event bus is.
  + **New Session Queue -** Maintains a list of incoming sessions which have yet to be assigned to a Node by the Distributor. Since, Distributor handle one session at a time then the remaining request which are passed by the router is queued. And this lies between Distributor and Router.
* So, in the next page there is screenshot of the diagram of Selenium Grid.
* 

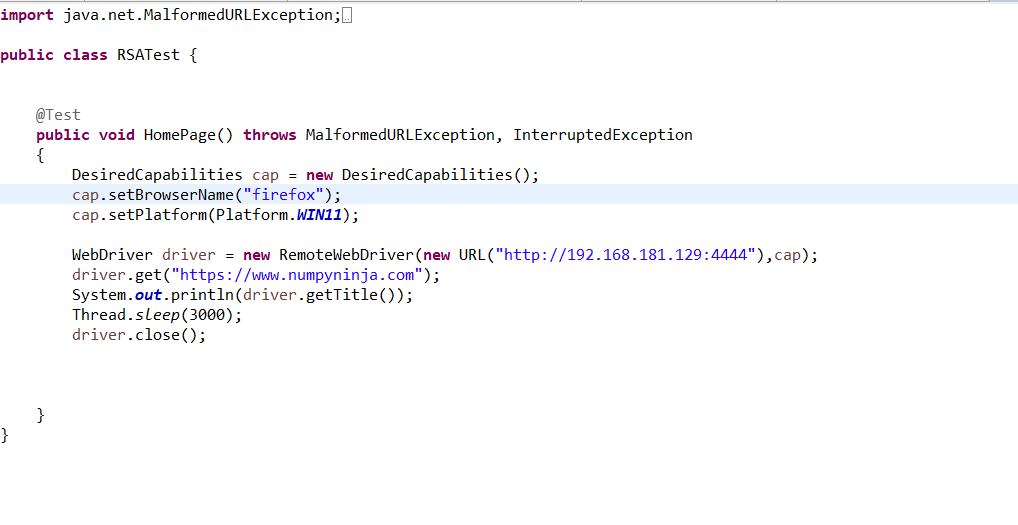
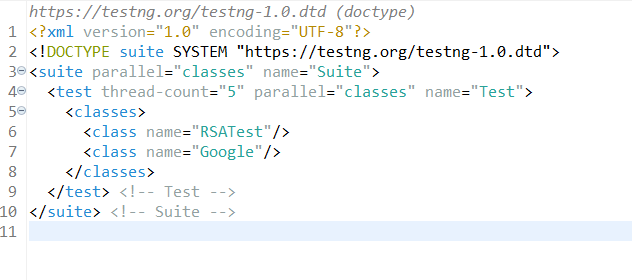
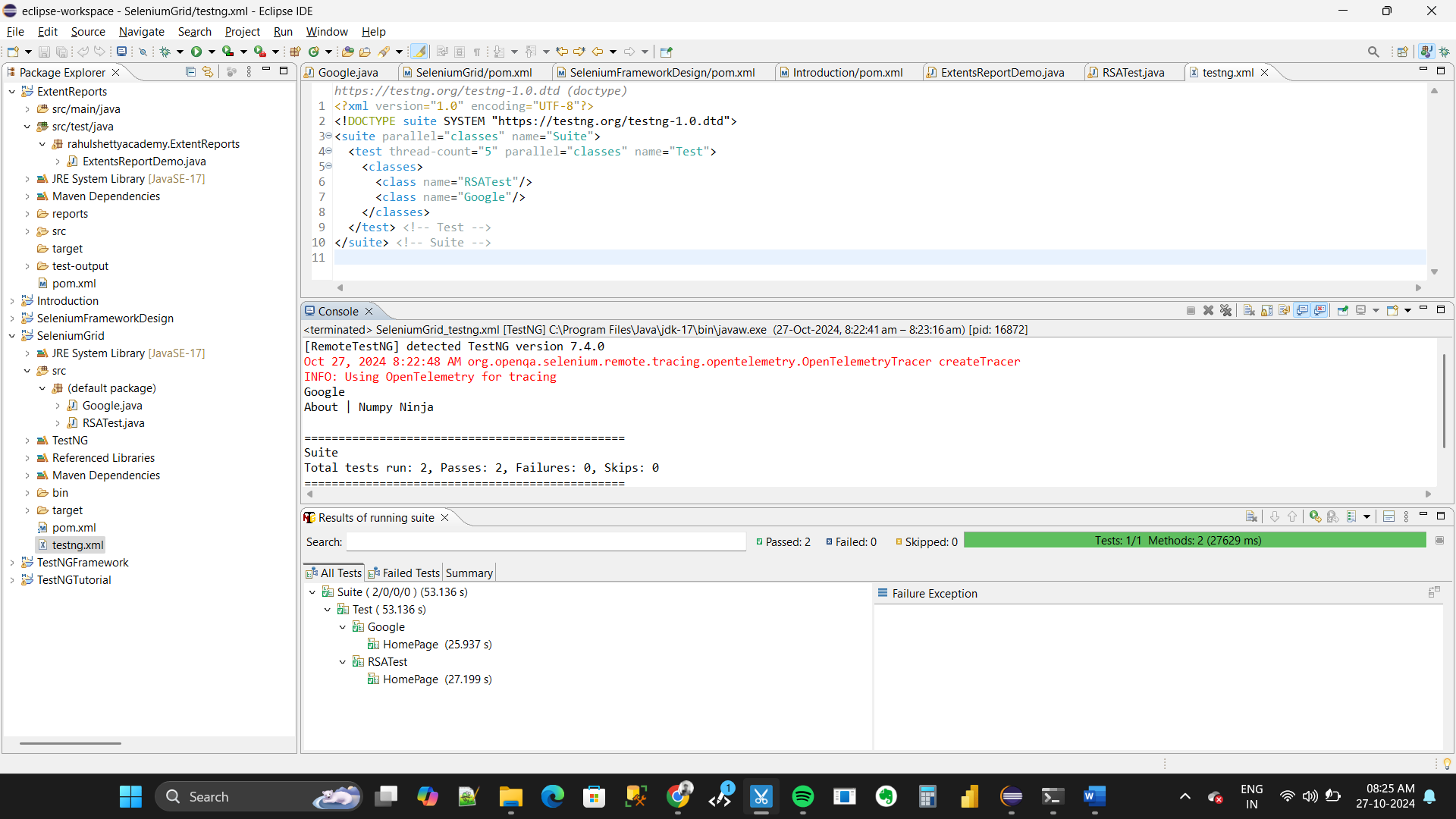
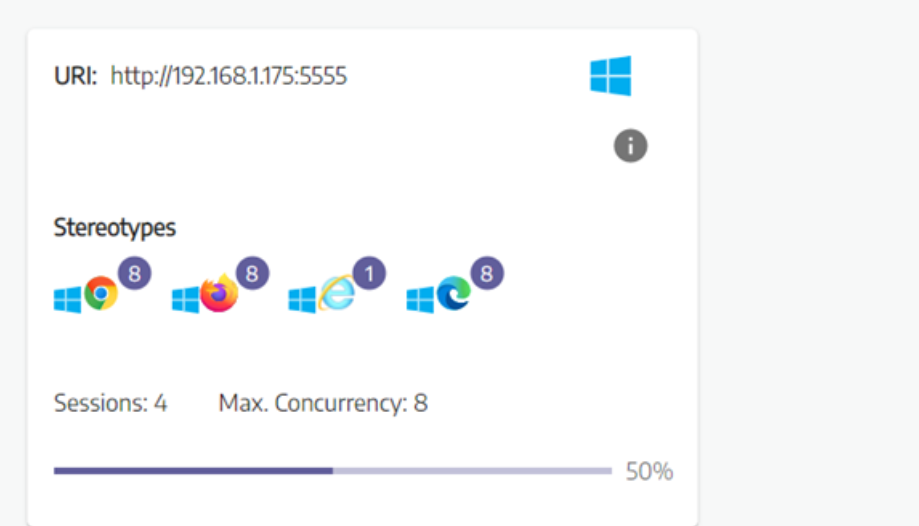
**Getting Started with Grid infrastructure Setup – Create Components.**

* So, I’ve created a folder & path - C:\Learn it\Selenium Grid where the Selenium Jar for grid, and all the driver required for invoking is also downloaded in a single folder.
* **Start the Hub -**  Which eventually Starts router, distributor, session Map, New Session Queue, Event Bus. To start you’ve to provide the syntax within the command prompt. – java -jar<SeleniumJarname> hub
  + 
  + So, now the Selenium hub is created. And if you want to know the status of the hub just go to localhost: 4444
* **Start the Node in Same Machine -**  where Hub is running – java -jar<SeleniumJarname>node. So, after you’ve started the hub open a new cmd prompt from file explorer and just enter the given syntax then it will automatically add the note into the grid.
  + 
  + 
  + 
  + So, that’s how the node is created. Even after you’re facing the issue then go the link - <https://www.youtube.com/watch?v=f5ZX6egCVt4> & ref the cross-check it.

**Create Selenium TestNG tests with Desired capabilities & remote webdriver class.**

* So, if you’re setting Selenium Grib on another machine then you’ll need to download the Selenium Server grid & also create a folder in which grid & all the necessary drivers should be there.
* So, after you’ve set the folders then open the cmd and enter the syntax to set the node but since you’re on different machine and the hub is created on different machine then in such case you need to provide the internet transfer protocol with the basic command like **[java -jar selenium-server.4.25.0.jar node –publish-event –tcp://ip.4442 –subscribe-event-tcp://ip.4443].** And to make the transfer you need to have the transfer port which is provided when the hub is created for ref. see the below screenshot.
  + 
* So, in the command which is written in bold is basically registering the hub on external machine and to do that there we’re provide tcp ports in which there are two types publish and subscribe which is highlighted in red box in the screenshot above.
* 

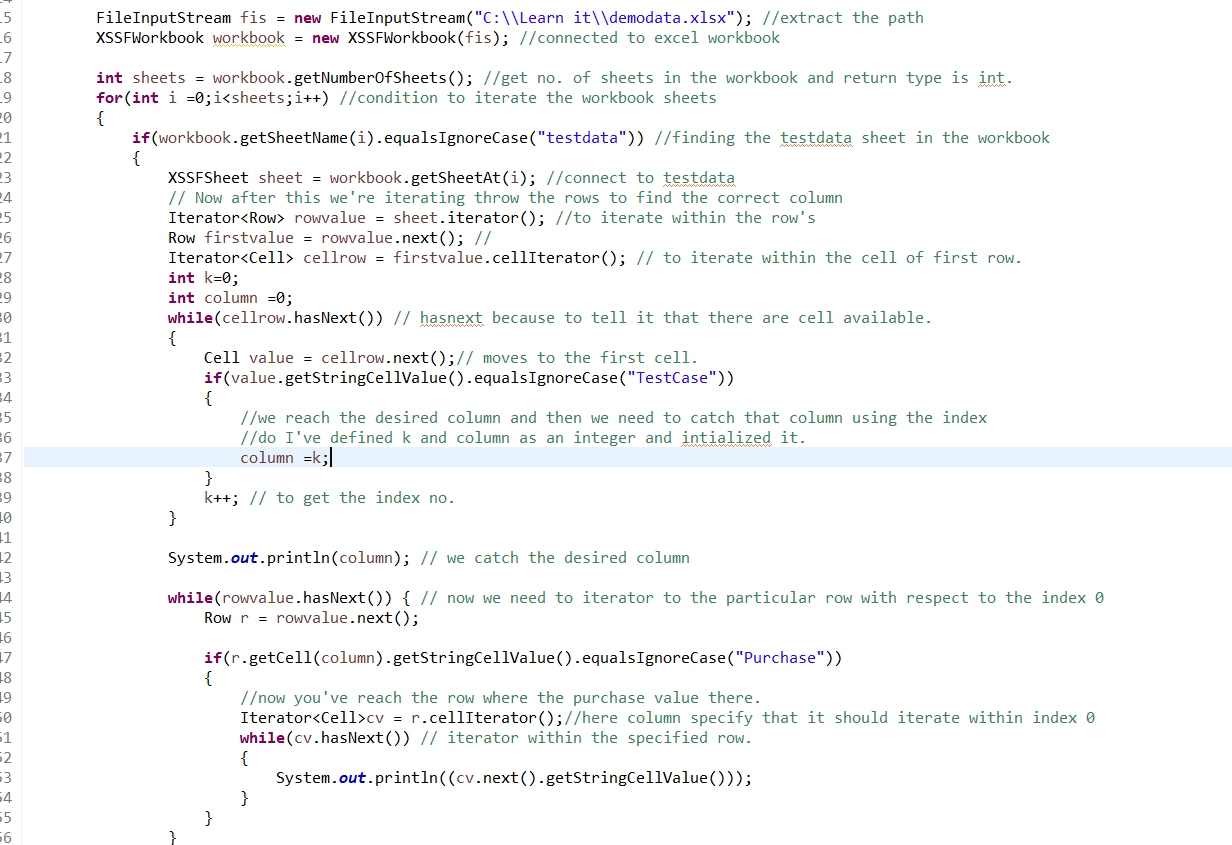
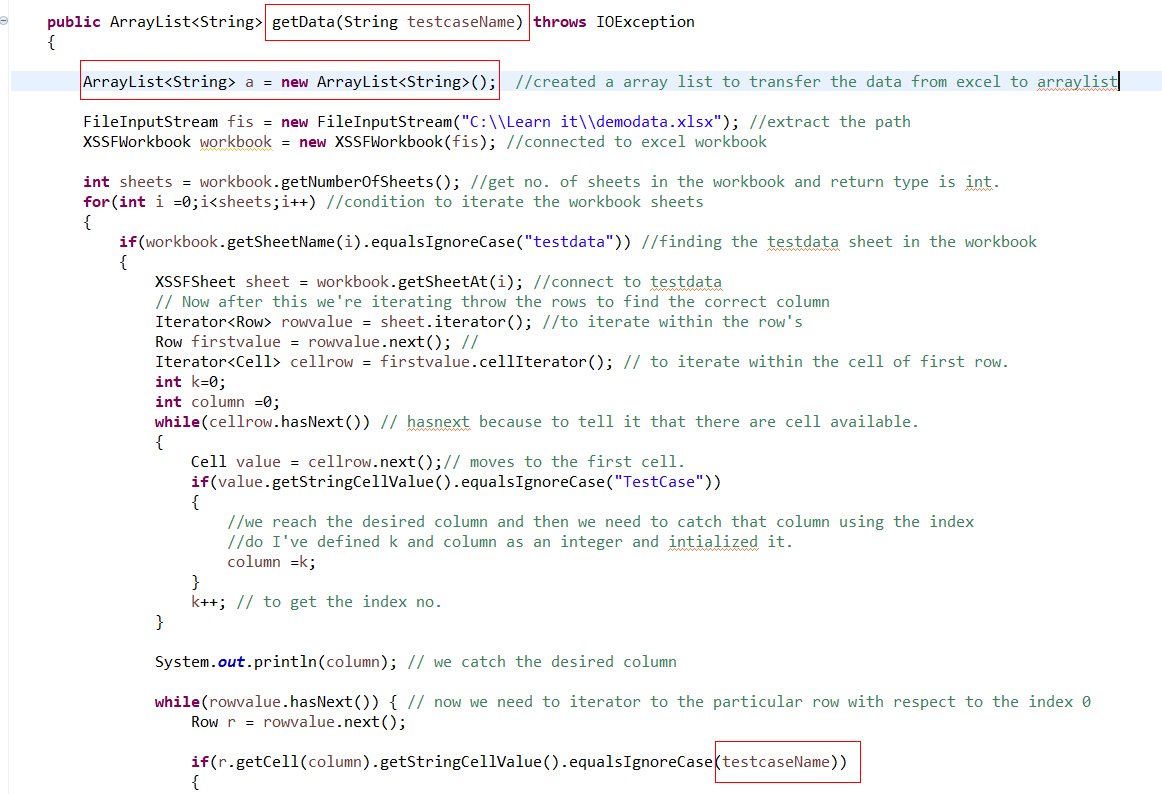
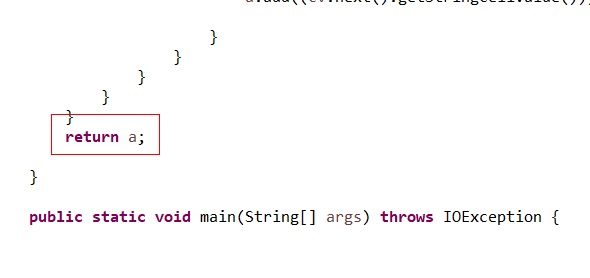
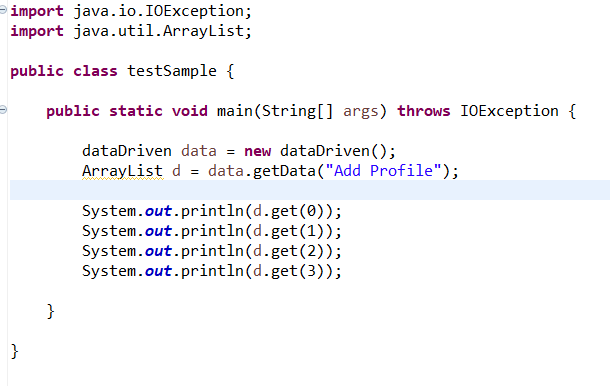
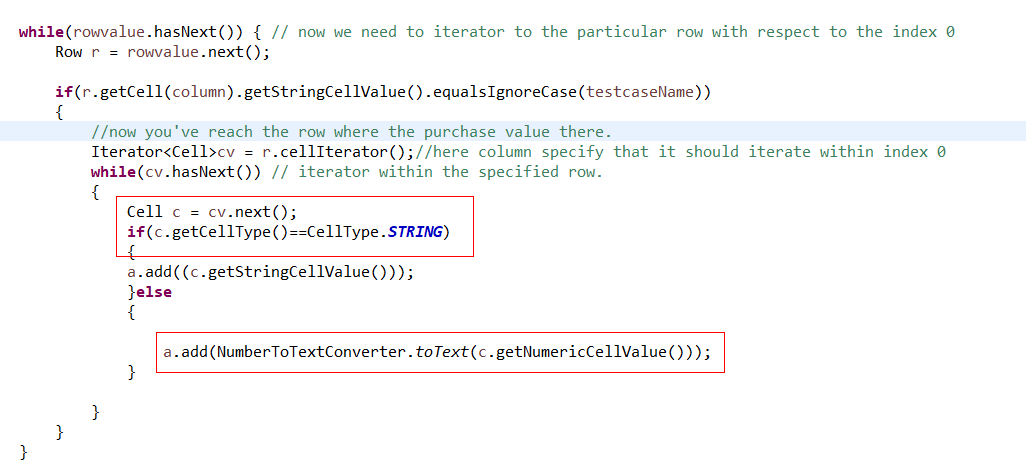
**Create Selenium TestNG tests with Desired capabilities & remote webdriver class.**

* So, at first I was trying to execute test case but there was an error. So I started the project from scratch and also added the jar file in pom.xml file and not selenium jar in build path. Then the rest was pretty much the same regarding create two test case because of parallel testing.
* 
* **Also,** here the main thing to notice is there are some cases were you can’t import URL package when added as an argument in RemoteWebDriver but in the above screenshot as you can see we’ve added the package of java.net.url
* 
* **Also,** here we’ve specify the platform also, just to be sure were running it on windows. And also I’ve added Thread.sleep just to be ensure that the page is loaded before closing the browser.
* Then another thing to notice is in xml file there wasn’t any error this time when the project was convert.
* 
* 
* 
* So, here I’ve shown how does it look in the localhost:4444 because my session was timeout then I’ve provided a screenshot of another machine where the test was conducted on local machine and after it has been successful this is how it looks on the webpage.

**What is Apache POI API –**

1. So, Apache POI API is a bridge which connects the Test case to Excel & what we’re doing here is basically Data driven testing. And also, the API is an open source one.
2. Then next thing is about adding maven dependencies –
   1. Poi—ooxml
   2. Poi

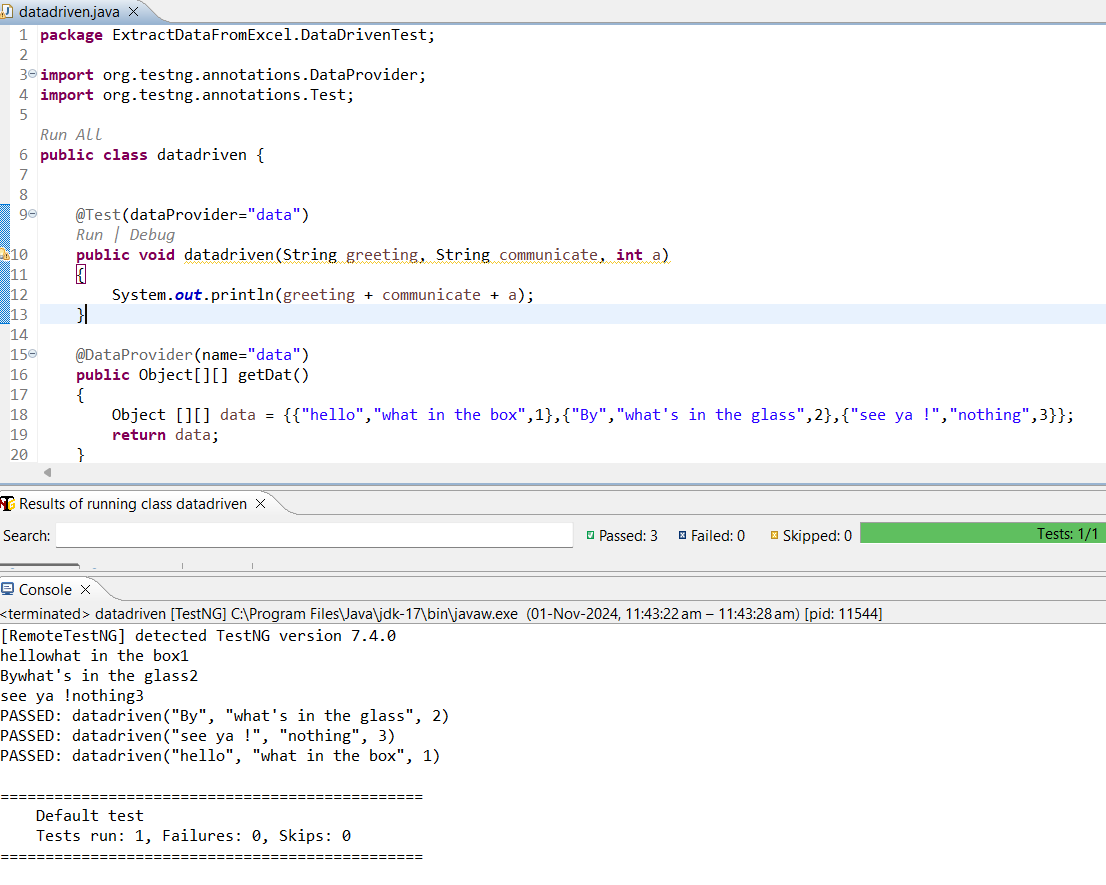
**Strategy to Access Excel Data**

1. **Create Object for XSSFWorkbook class** – So, this is class from poi dependencies which connect to the excel to drive the data but an important thing to note here is that you need to create an object to use the method for extracting the data from excel.
2. **Get Access to sheet** 
   1. 
3. **Get Access to all rows of Sheet**
4. **Access to specific row from all rows**
5. **Get Access to all cells of Row**
   1. 
6. **Access the Data from Excel into Arrays** 
   1. So, the changes which I made here are first, I created a separate method and within I’ve pasted the code which I created in the main method and within it I’ve create an Arraylist in which the data or cell value from the Excel will be pasted and which I’ve highlighted in red box and how I’ve passed it to the array just using the .add(string e) method. And another thing is that I’ve created a variable which needs to be use as an argument when using the method, So you don’t have to hardcode the method.
   2. Then, to print out the values or data from the array, I’ve used the method to pass the value or data to a variable & since the return type of the method is Arraylist it will store all the values and to print it out the values I’ve used the .getIndex() method.
   3. 
   4. 
   5. 
7. ***There aren’t any method based on column in POI api is only based on row.***
8. So, there is an important to note which is that since now we were extracting the values from excel which was string only but if there is a case when the data or value is an integer then the script throws an error. So, to correct we add a condition to check first whether the cell value is a string or not, if it is then just executed the method and if not then you need to use the method **.getNumericCellValue** and since it is extracting an integer then to convert it to a String we use the method **NumberToConverter.toText** which convert the value to text. The reason we’re doing this is because when we defined ArrayList we defined it that it should store only values as a String. So, below are the screenshot which shows what are the changes made.
   1. 

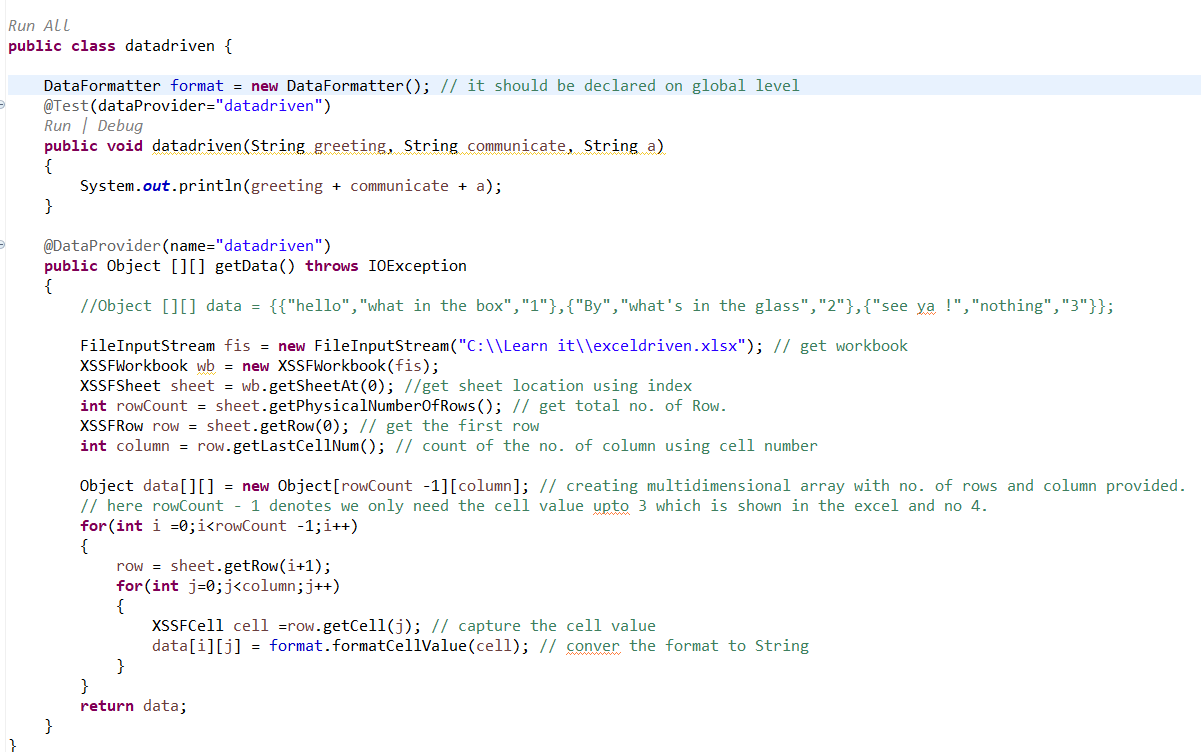
**Importance of TestNG Data Provider and Excel Integration for better Data driven**

1. @DataProvider –
   1. So, when just use the dataprovider annotation from testng in this you usually hard the inputs or values but in real time scenario the companies prefer to extract data from excel or json or etc except hardcoding.
2. @Test
   1. After you create dataprovider then pass the values into the one test script and image that the data provider has 3 sets of values for login credentials. So to execute it you use the for loop and when the test is pass it wouldn’t show 3 test case passed but instead only 1.
3. So, to overcome this advantages we need to merge TestNG data provider + Excel Integration for better data driven.

**Understand Data provider and how it sends data in Multidimensional array**

1. 
2. So, here we’re creating a multi dimensional array where we provide the a string of data, also we’ve set the return as **Object** because is the superclass of data type in other words it accept all kind of data whether it is an integer or string. And we’ve created the method in which the array is set and that method which is shown within @Dataprovider annotation.
3. Then with the help of @Test annotation we’re using the data from the dataprovider annotations.
4. There is an another which you should notice is that we’re parametrizing the method so that we could use it in another method.
5. So, next is instead of hardcoding the inputs we’re just extract the data from excel and parse it as an input.

**Get Excel dependencies and connect from java code to excel**

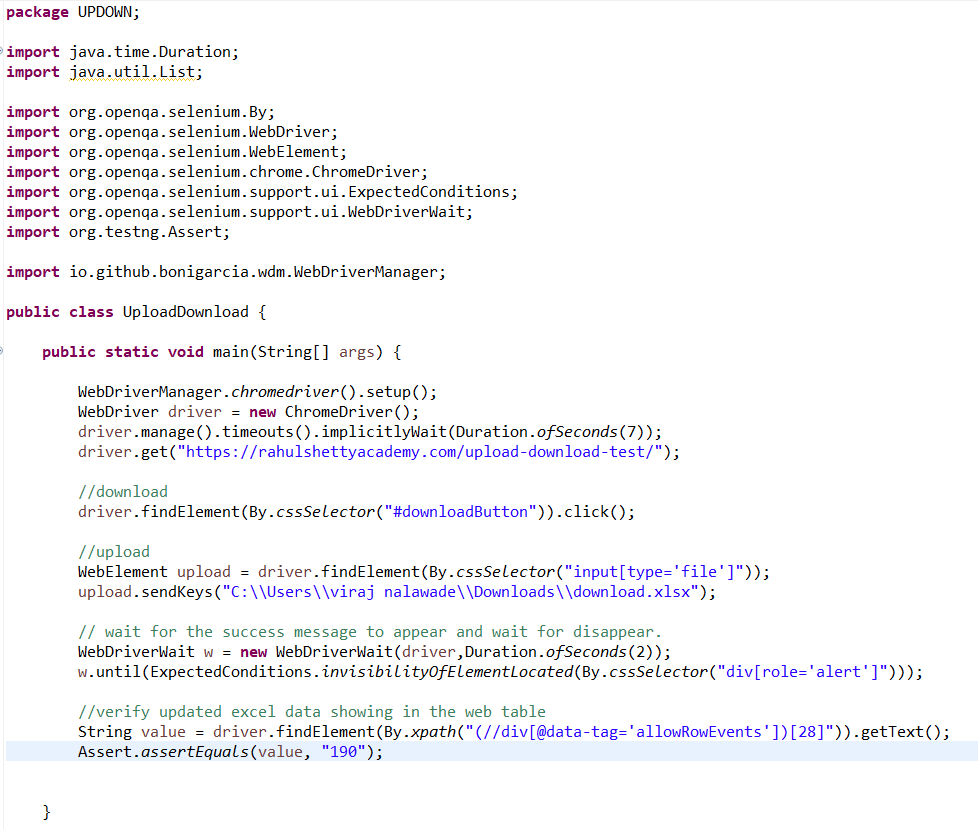
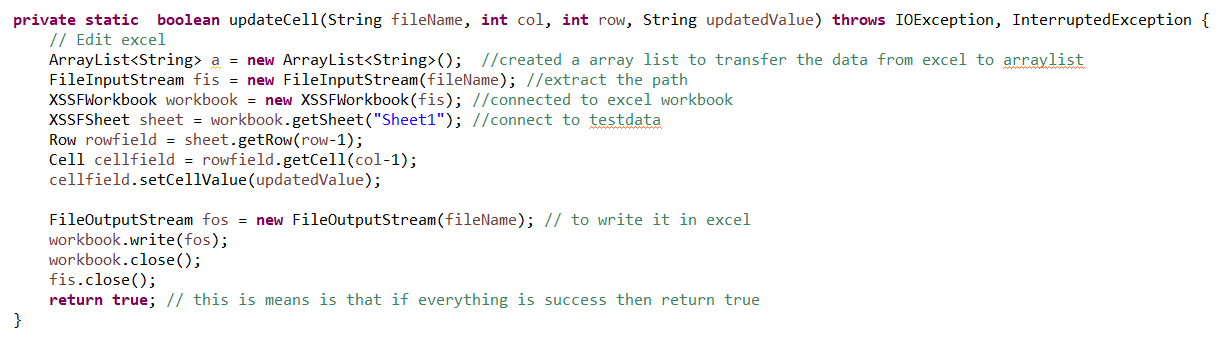
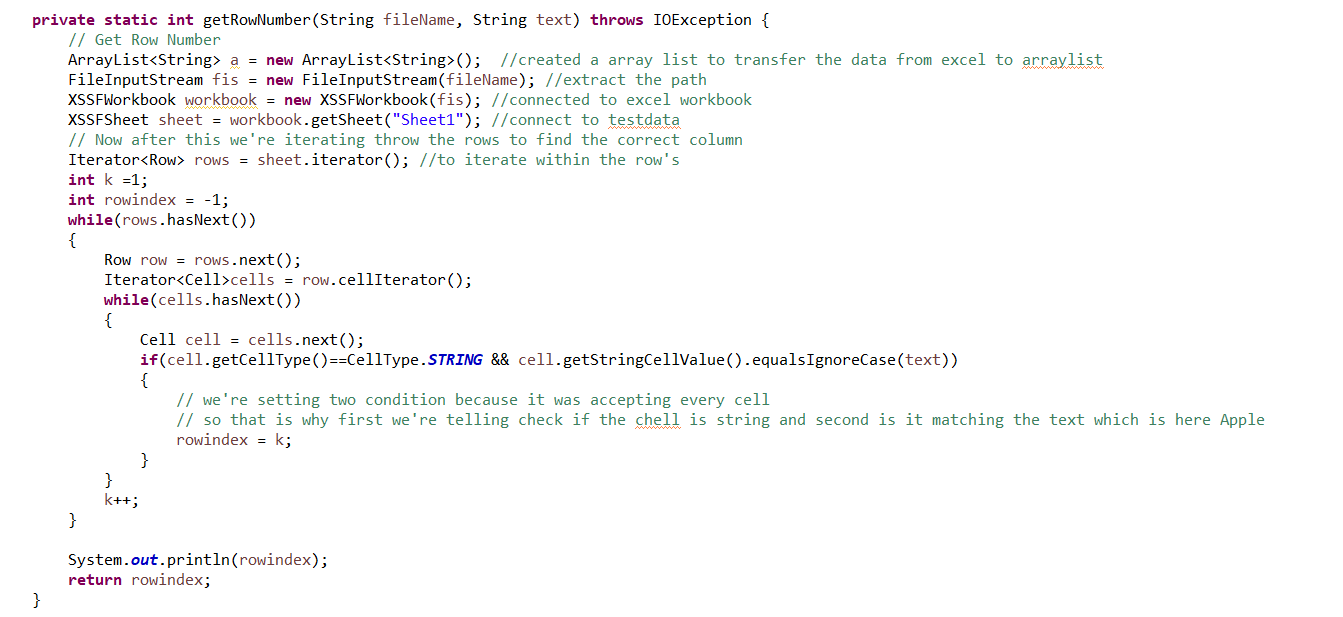
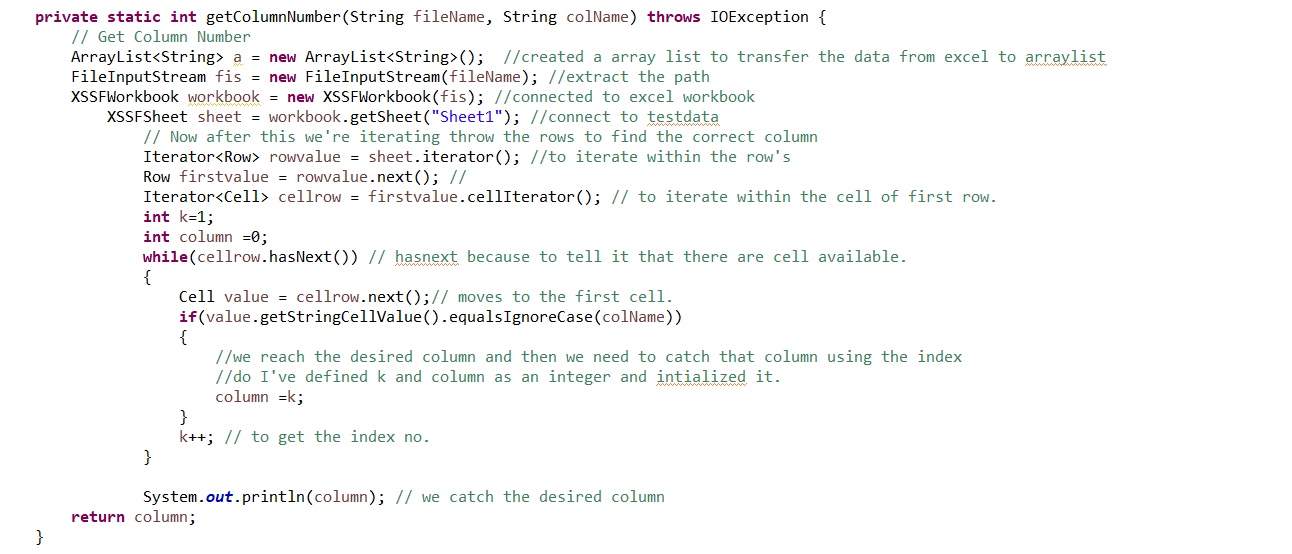
1. 
2. So, the dependencies we’re using are Apache poi and poi ooxml. So, here we’re create a test were we can extract the data from excel and provide the input into the test instead hardcoding the inputs. It is pretty much the same but the main thing to notice is that we’re using for loop since within 0th row were extract 3 cell values of the that particular row. That is why we have created two for loop first inner loop and the second is outer loop in which the outer loop will iterate for 3 times since there are only 3 rows and the inner loop will iterate for 3 times for 1 iteration of the outer loop since we’re extracting 3 cell values of the excel.
3. Also, if there are any other format in the excel for example be it an integer then we’re using .formatCellValue to convert it to the String. And the rest is basically same.

**Note – So, if you create a method and the suggestion from eclipse is not displayed then within the suggestion you need to select fix setup and within it you need to select the jar which needs to be imported. And the reason why the import package suggestion is not displayed is because the jars have been corrupted.**

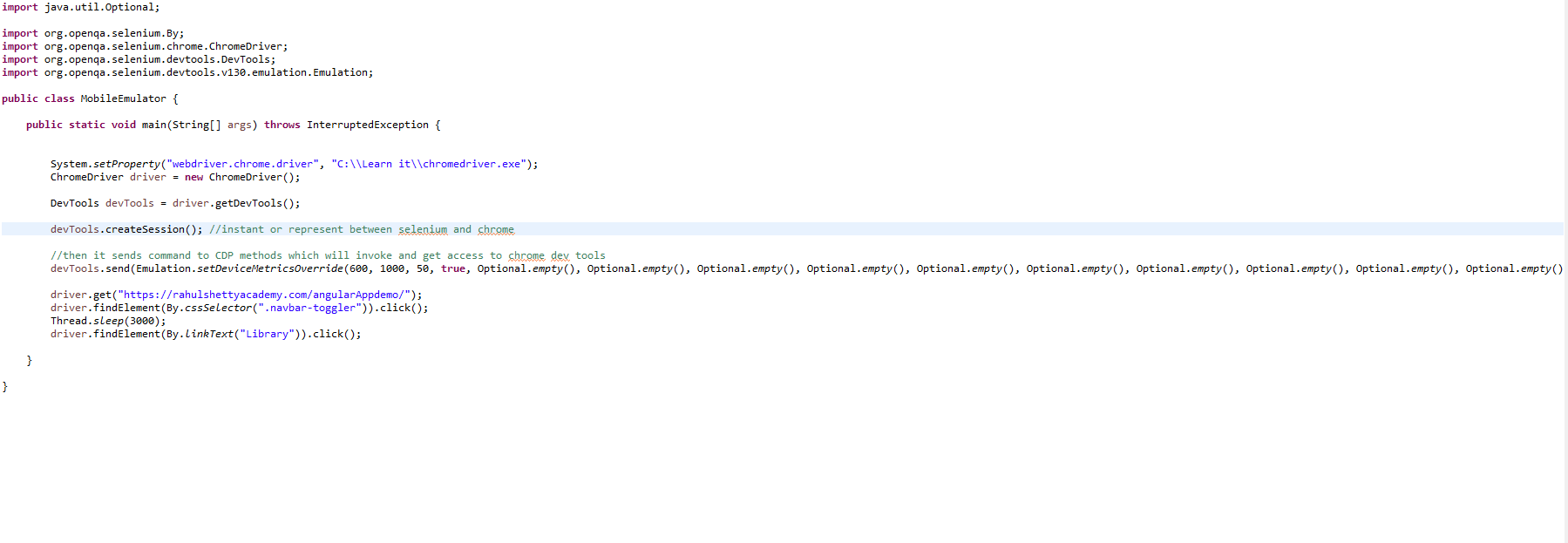
**Upload Download functionalities with Selenium using external excel files**

1. So, the automation for downloading a file is kind of same where you find the locator and add the .click() method. And then the selenium does its job by downloading the file.
2. The main thing is now which uploading so when you click on upload button it opens the dialog box of the local machine which selenium doesn’t support because it isn’t a part of the web. So to automate the upload we first capture that button as a Webelement and store it in a variable. Then we use that variable + the method .sendkeys in which we parse the downloaded file path. And that is how selenium perform uploading.
3. 

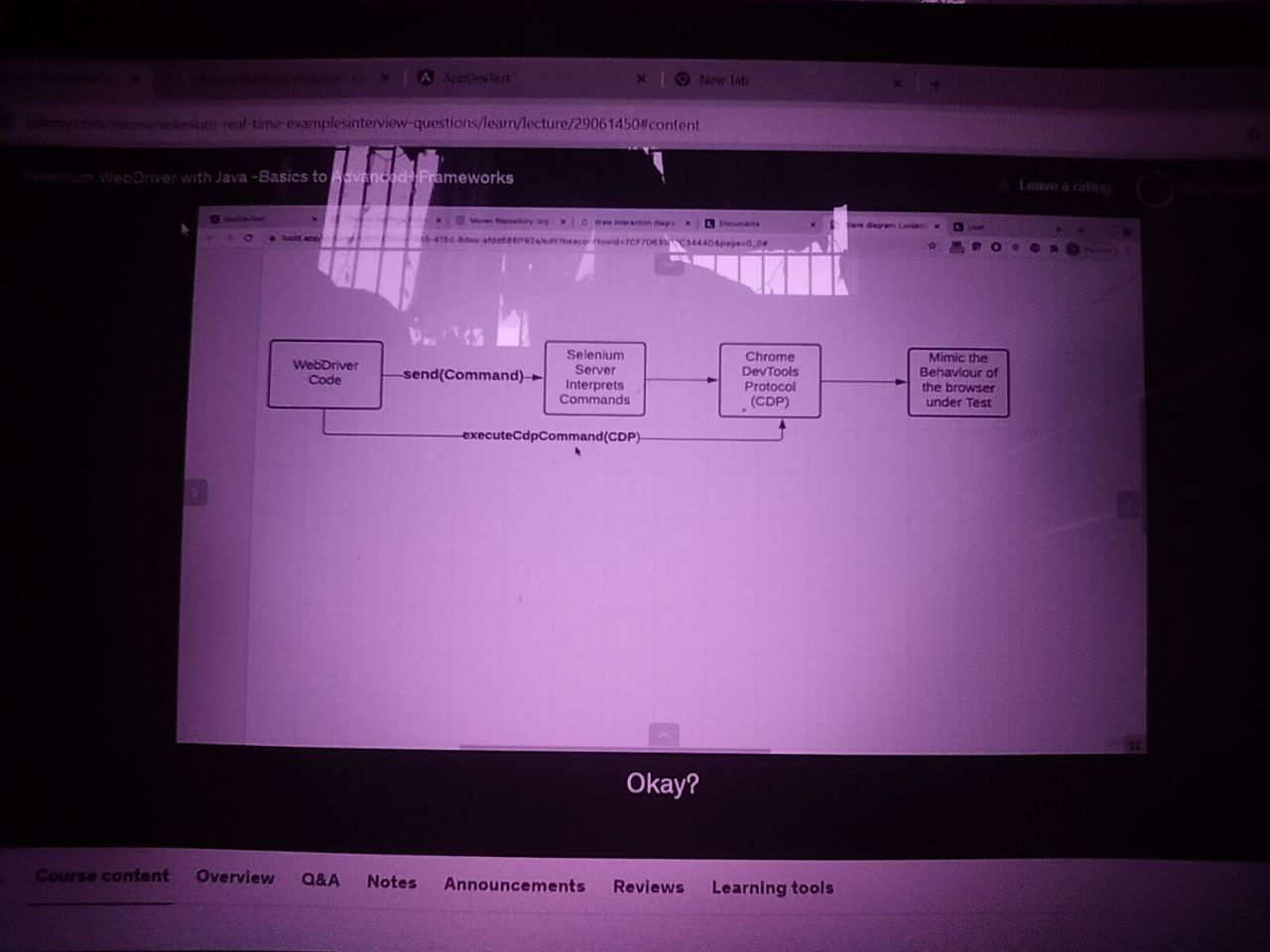
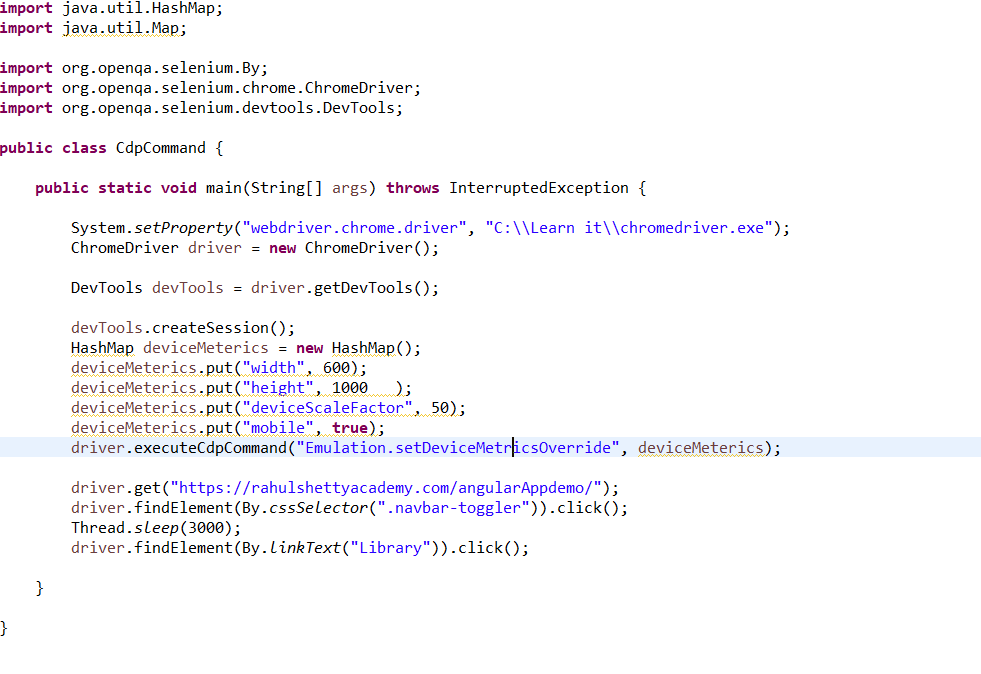
**Handle synchronized toast messages with explicit wait for appears and disappear**

1. 
2. So, here we’re checking whether the toast message is visible and it is disappear after some time or not. So, instead of validating the visibility I’ve here just validate whether it disappear after some time or not.
3. And the next is thing is I’ve validate the amount which I’ve updated in the excel and checked whether it updated on the website or not. So first I captured the element after it is upload then use the Assertion method to validate between actual and expected value.
4. Also, ref the **lecture 235** of udemy selenium course on how to extract the value from **webtabel** or the generic locator so even if there are changes the selenium will traverse and grab the value for validation.
5. So, below is the screenshot on how to extract the row and column of the specific cell values. Also, how to edit the excel sheet and save it in other words on how to makes changes in it and upload the file.
6. So, the only difference between finding the row number and col number is that the no. of while loop. Like for Row it is two and for Column it is one.
7. 
8. So, here we assigned (row – 1) why because the Selenium row value which we get is 4 because it doesn’t start from 0 so that is why we have created an condition. And the same is for (col – 1) because when the value is extract from excel it doesn’t starts from 0 instead it starts from 1 but when we try to provide input in it from selenium it starts from 0 so make it even we’re doing creating such conditions.
9. 
10. 
11. So, current trends is that not only you need know the programming and concepts but also how to google or use tools to solve the specific problems.

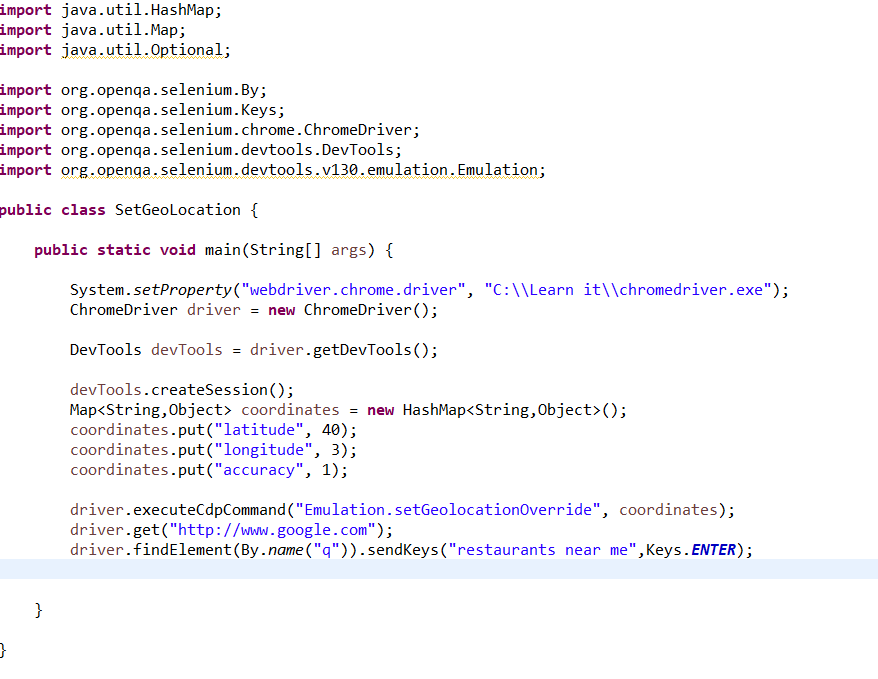
**What are Chrome Dev tools ? Why do we need this for Selenium testing ?**

1. Chrome Dev tool – It is nothing but a developer tool which you’ll see in your Chrome browser after you right click and inspect so that is Chrome developer tool. In that you see the elements, HTML elements of your web application. You can also see various console logs like network, security and many more. Generally people use this to debug their application and see how that is behaving.
2. Chrome Dev Tools protocol [CDP] – this provide tools to inspect instrument debug on your Chrome DevTools, So can have all the Chrome Dev tool information. Then to access it the Chrome team has developed an API name Chrome DevTool protocol. Link - <https://chromedevtools.github.io/devtools-protocol/tot/Network/> . So basically this protocol exposes all the method events for you to perform and manipulate any actions on this Chrome DevTool.
3. So, selenium 4 introduces powerful commands which are wrapper around the CDP Domains to grants access to Chrome DevTools directly from your automated test.
4. To access the methods of Chrome Dev tools protocol we created object of ChromeDriver and not Webdriver because CDP isn’t supported. Also, when using ChromeDriver it support or invoke only Chrome or Edge and not firefox.
5. So, next we use the object which we created to get the method which is .getDevTools. It allows you to send the built-in Selenium commands to CDP. First we need to create a session which connects the selenium to CDP then we use .send method to enter the command which we want to automate in chrome dev tools. And also note that when entering the protocols for CDP there are options provided as per the chrome version so check it before using the command.
6. Also, the main this within the commands there are parameters which needed to be entered and some of them are options which we can differentiate. So, the difference is shown in the parameter of the command only like Optional words will be specified on the parameters. Next if you don’t use the Optional parameter then provide Optional.empty(); [it basically defines that the value isn’t null but absent] in it.
7. 

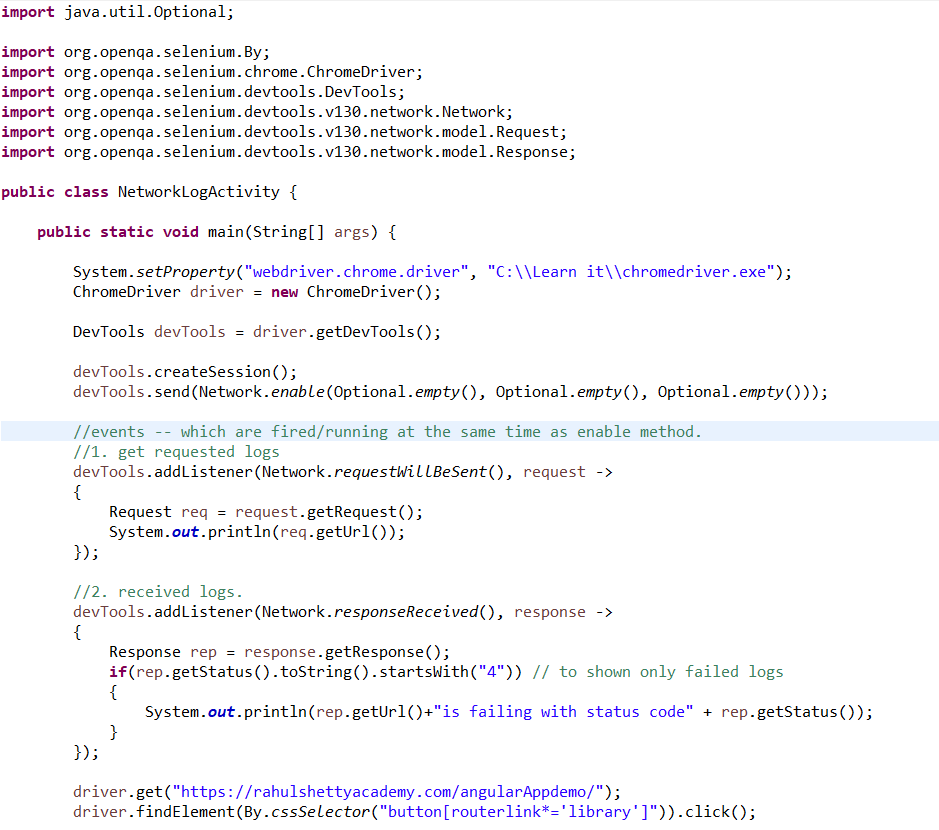
**Importance of execute CDP command to construct the own CDP functions**

1. So, here we are looking how to create a CDP functions if there isn’t a one provided in Selenium. So, as per the screenshot shown below we’re using executeCdpCommand(commandname, provideparamterusingHashMap). Method which directly connects to CDP.
2. 
3. 

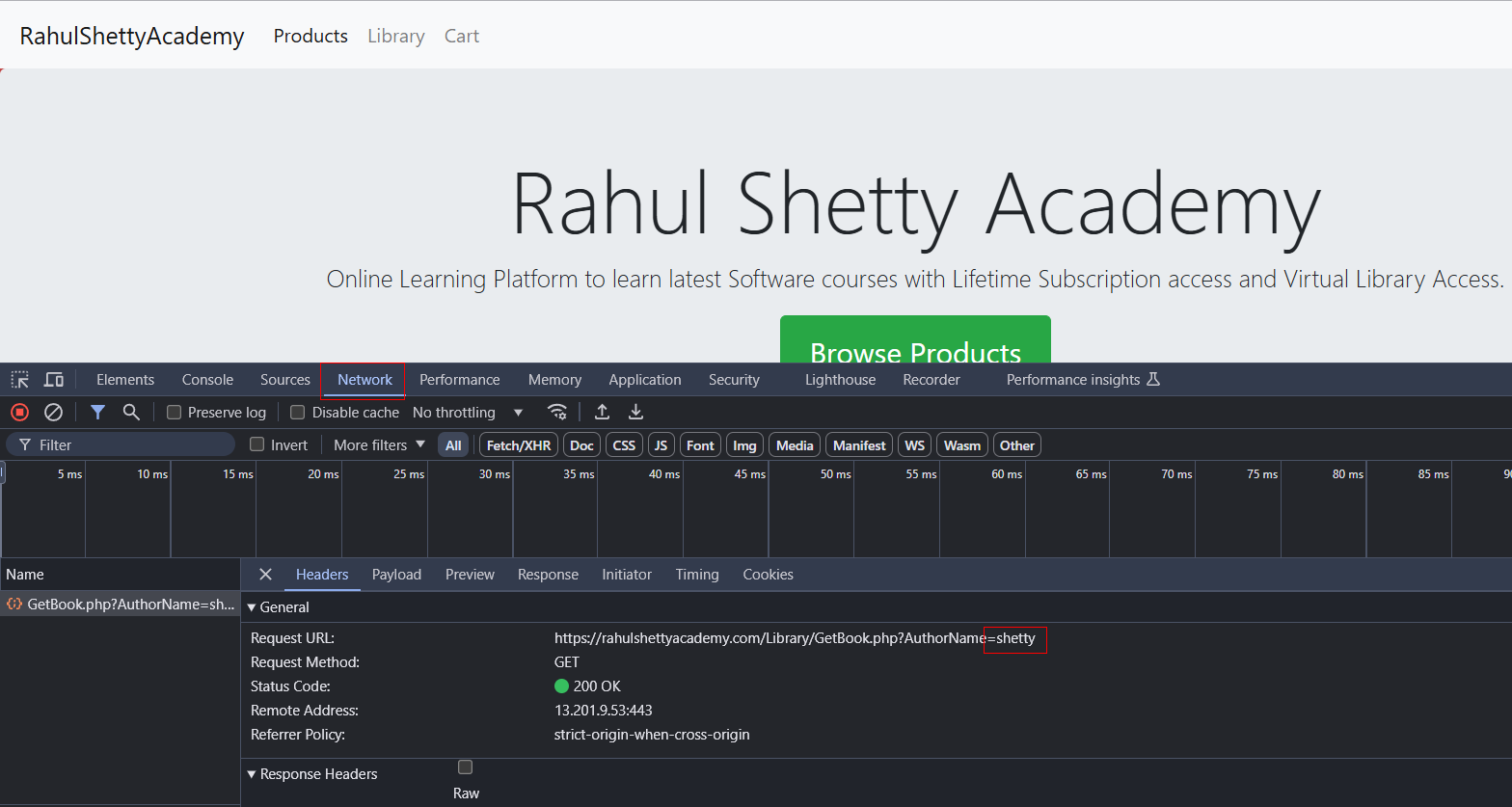
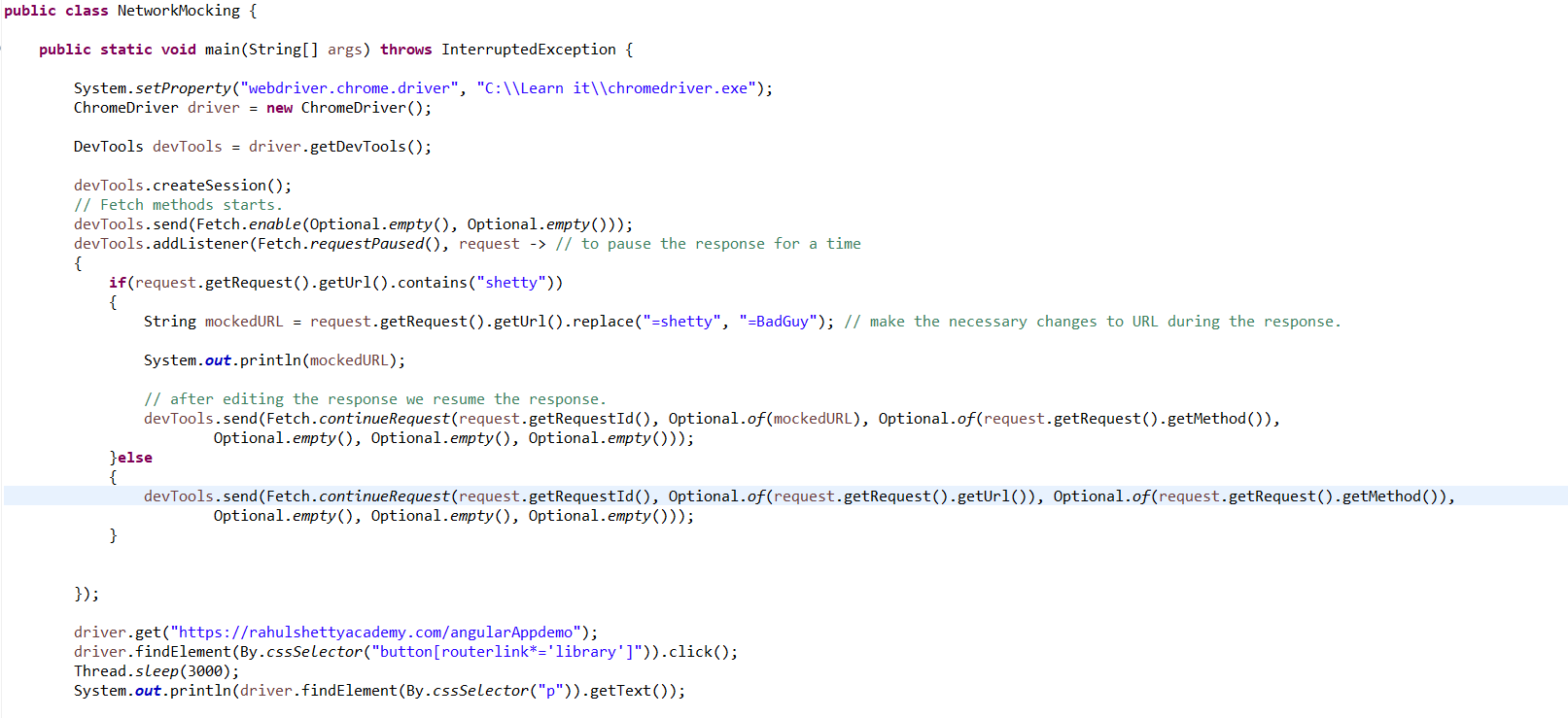
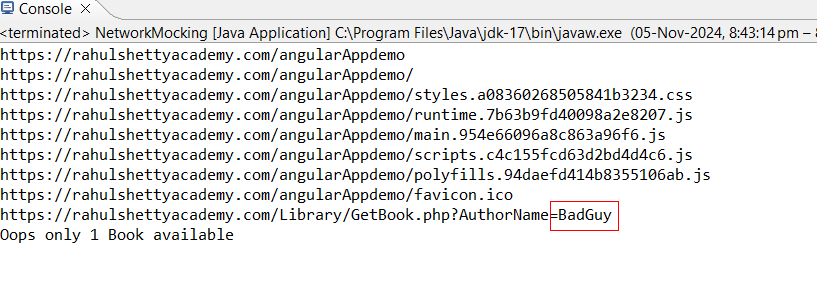
**Localization Testing with Selenium 4 using ChromeDevTools Protocol**

1. So, if you want to test whether if your web application is changing the language based upon the country where they’re logged in, i.e. localization testing. So, now you can mimic the browser behaviour of Chrome and you can actually test that from your local system only with the help of CDP.
2. So that’s how you can confirm whether your browser is behaving as expected or not. And this how you can tweak the geolocation with selenium.
3. 

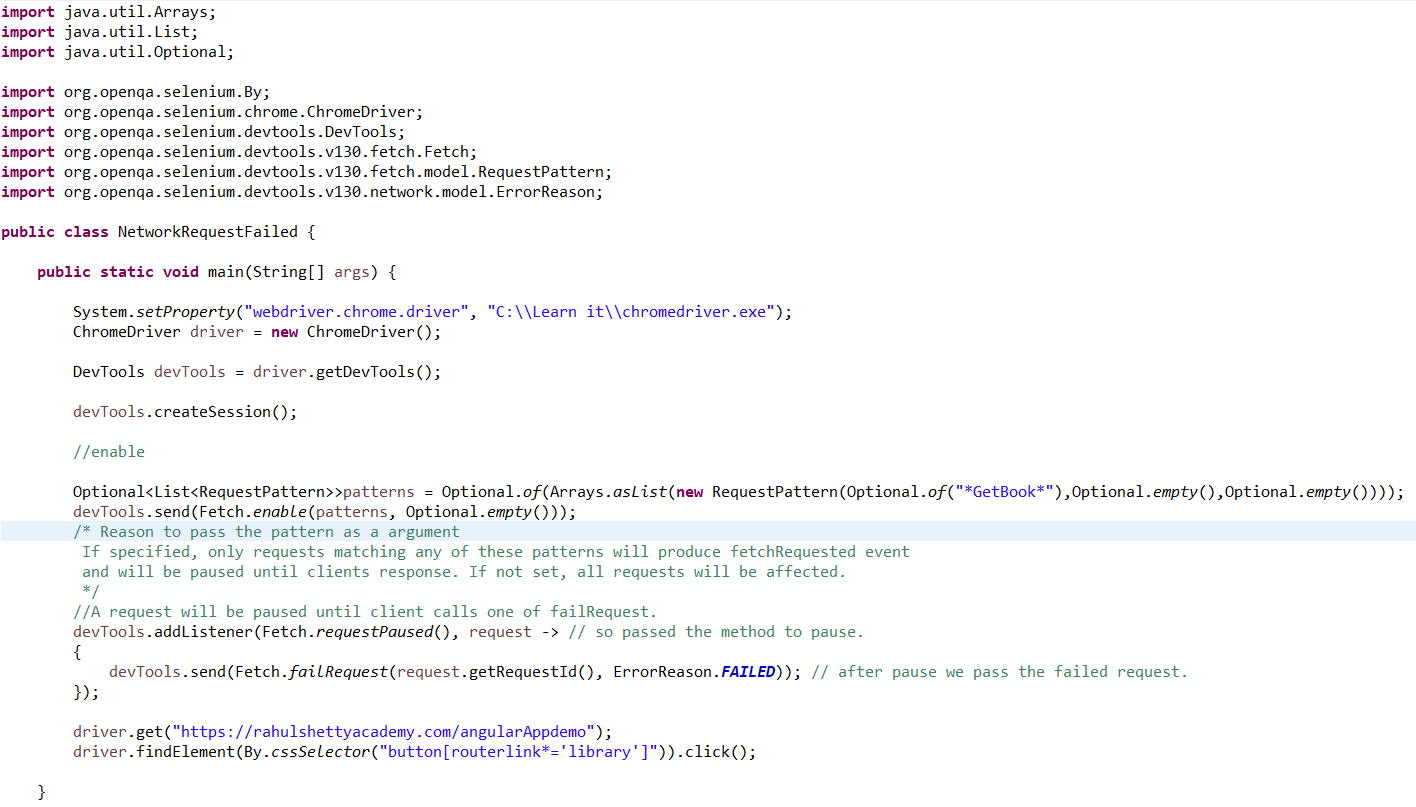
**How to extract Network Responses and status codes with Selenium CDP listeners**

1. So, here we should be able to get all the API log responses like what all activities happened on your webpage. In other words, to know the issue you will actually debug from the networking tool and see which API call got failed or which API call got 404 or what API call is actually making the test fail. So, here you can log API request call, response call and you can get each and every API response into your selenium, you’ll be able to print and log all the response code also.
2. So, let’s say tomorrow your test is failed you can simply open the log file and see which API request is failed. Based upon that you can understand why the UI rendering is failing. So, if you can log that response code in your file from Selenium instead of replicating the issue or saying it as a flaky you can open the log file and see what exactly happened and why the test is failed by reading your network logs.
3. 

**Intercept Network/API responses with Selenium Chrome dev tools –**

1. So, if you want to mock network request with Selenium on Chrome Dev Tools integration, you can do by mocking your response or request. In other word, what it meant was that if you execute or login in with the general URL you will get the same data but if you want to test a specific scenario in which the general URL the doesn’t show, then in such case you the companies have different account for but in this case we can mock it at the time of execution only.
2. So, to do that we’re using the Fetch domain from CDP and within it we’re using the method to mock the response.
3. 
4. 
5. 

**How to test failed Network request calls with Selenium CDP commands**

1. So, here we are failing the network request completely instead of giving the success back. The reason is because sometimes when the request calls are failed then you should display some custom message on your screen like “Oops our servers are having problem to get the data please try again “. So, there are some custom messages you want to validate in your webpage. And now you can perform the action using CDP with Selenium.
2. 

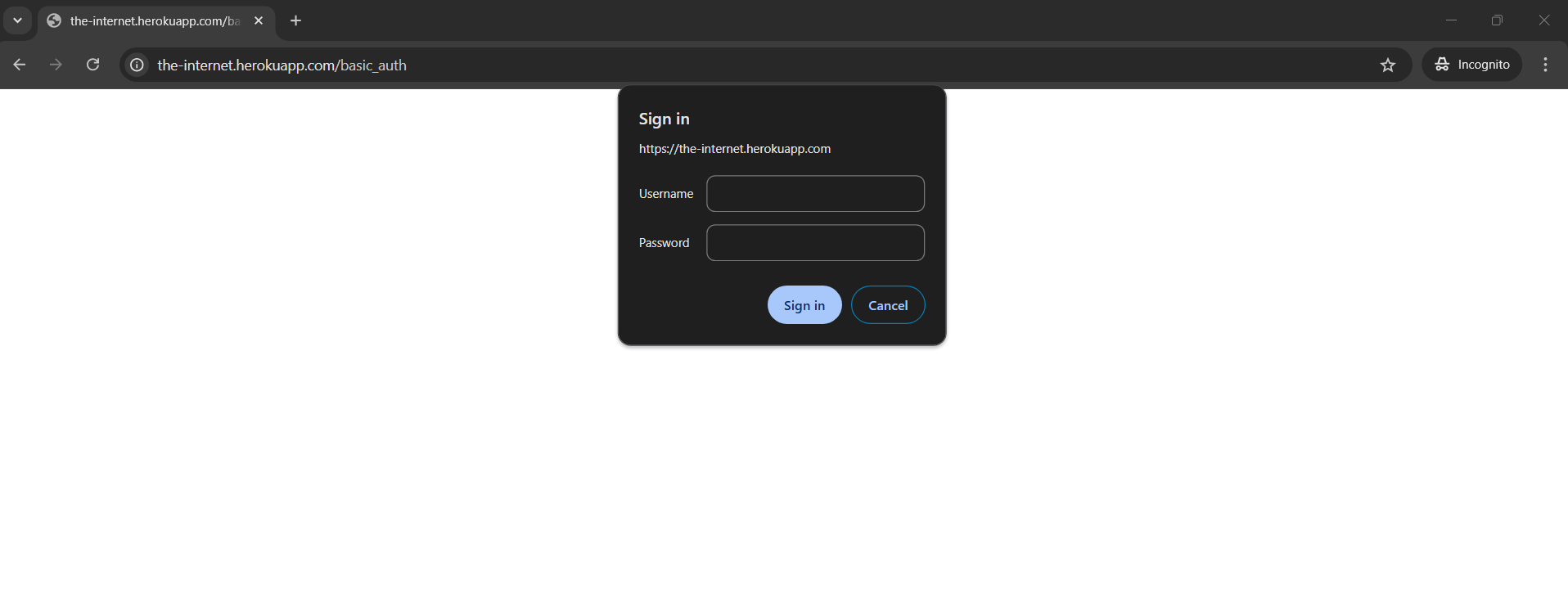
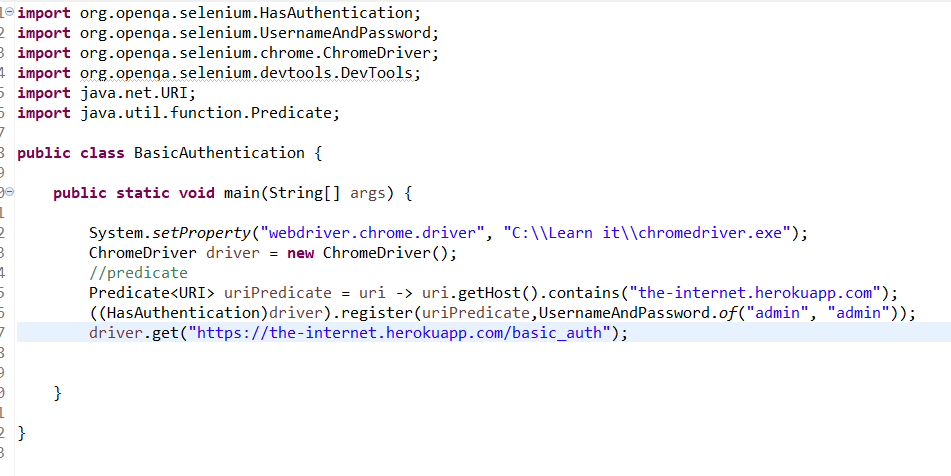
**Blocking unwanted Network request calls to speed up the execution with Selenium**

1. So, when we block the network request what it means is that you will not see this request on your browser. In other word, these request calls will not be made at all.
2. The main difference between network failed and blocking is when a network failed then we are seeing how the application is behaving when the request calls are failed. Are we getting proper error messages or not. For verification we do network fails. But with network block there is a functional logic around it, you can stop loading CSS out of it or even the images which takes few second to load on the page and driver.get method will not resume until all the components on that page are loaded. So if there are multiple images on the application which takes few second if the network is good they will load immediately but if you have a bad network they’ll take more than 5-10 seconds, But automation does require image loading at all if your performing functional validation and if those images are making execution slower then you can go ahead and block all of them.
3. 

**How to emulate network speed with Selenium Chromedevtools Integration**

1. When developing and testing web applications, it’s crucial to understand how they perform under various network conditions. For instance, users might be on slower connections or high-latency networks, such as 3G, in rural areas or while traveling. Testing under these scenarios helps identify issues like slow load times or missing resources, ensuring a consistent user experience regardless of network quality. By using Network.emulateConditions.
2. When a network request fails (e.g., due to timeout or DNS issues), Chrome’s Network.loadingFailed event is triggered. By listening to this event, you can capture valuable information about the failure.
3. Example-
   1. Imagine you're testing a mobile e-commerce app that has a complex page with images, scripts, and multiple API requests (e.g., product information, recommendations, and user data). Users accessing this app might be on various networks, including slower mobile connections.
   2. Goals of the Test
   3. Ensure essential content loads first: Even on a slow network, critical content (like product images, descriptions, and prices) should load before non-essential resources (e.g., recommendation banners or analytics scripts).
   4. Handle slow network errors gracefully: If some parts of the page can’t load due to a slow or unstable connection, users should still be able to view core elements without broken images or incomplete content.
   5. Capture error information for debugging: If an asset fails to load, capturing details about the error helps pinpoint areas for improvement, like compressing images or using smaller files.
4. 

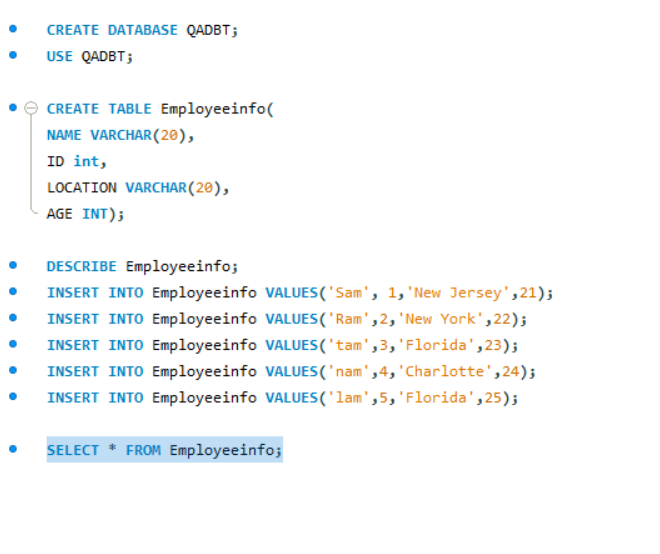
**Working with Basic Authentication using Selenium uriPredicate Integration.**

1. 
2. So, when you try to access any website internally in your company sometimes a popup like this to enter the username and password. So, to enter the website you need to provide username and password. So, this Basic Authentication request. And here Basic mean the URL is expecting username and password to get the response and if you don’t provide one then you won’t get the response back. Also, if you click on cancel you will not get the data.
3. Next if you want to automate it you need to register first and then hit the URL. So, there is a class called “has authentication “which you need to cast around the driver so the driver what you are using support the authentication and if you don’t provide the casting then the driver will not have any knowledge about basic authentication. And after casting if it hits the URL it check whether there any authentication or not and if there is one then you need to provide the username and password. So there is class called UserNameAndPassword in which we pass username and password as a argument.
4. A Predicate is a functional interface from the java.util.function package, introduced in Java 8. It represents a single argument function that returns a boolean value — essentially, it tests a condition on an input and returns true or false based on whether the input meets the specified criteria. The Predicate interface is primarily used with lambda expressions and method references, which makes it very useful in filtering, validation, and conditional checks.
   1. Predicate - Used to evaluate a condition or "predicate" on an object of type T and returns a boolean (true or false). Commonly used for filtering, validating, and checking condition.
   2. Consumer - Represents an operation that accepts a single argument of type T and performs some action on it but does not return any result. Commonly used when you want to perform an action on each element, like printing, modifying, or saving elements without expecting a return value.
5. 

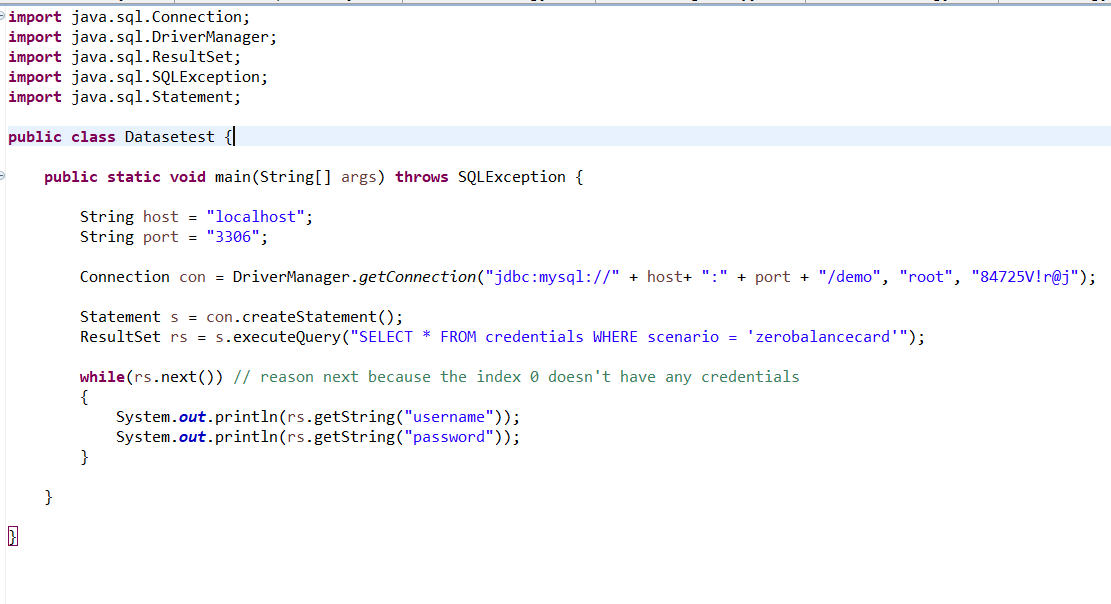
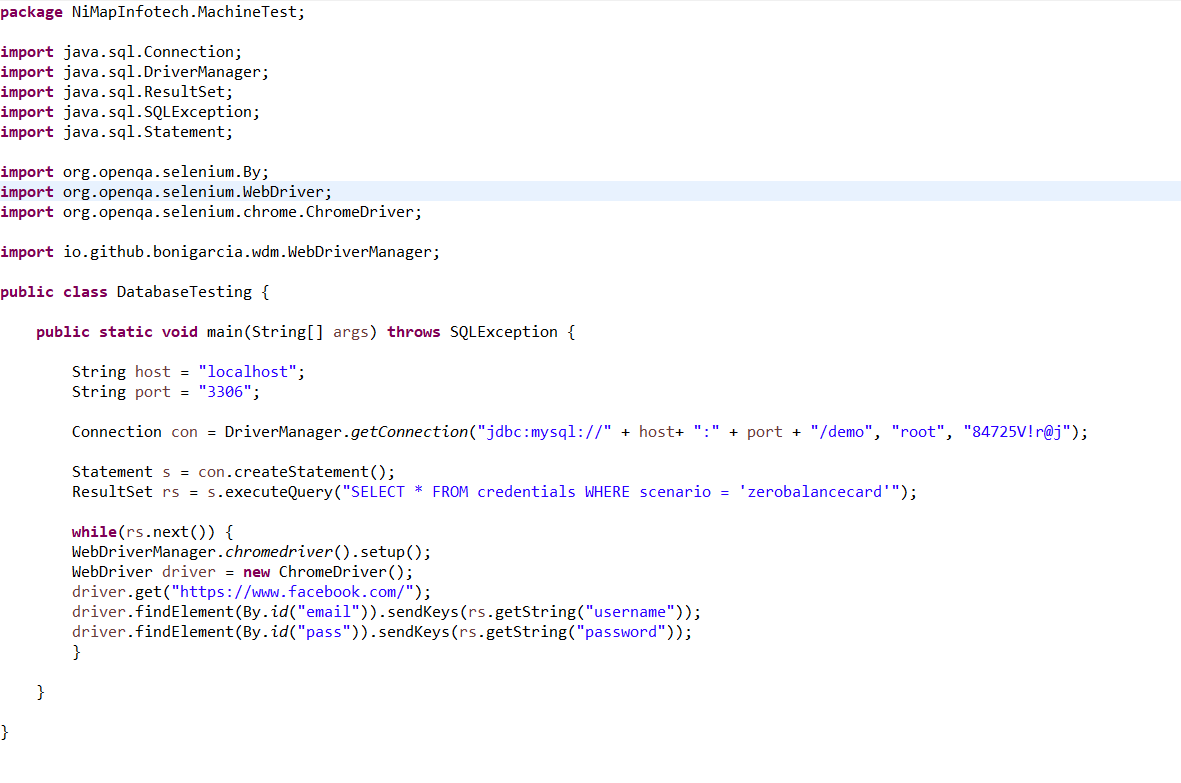
**How to log javascript errors from Selenium Script to console for debugging**

1. So, like how we capture the reason why HTTP. So, as the application is not just made with HTTP request calls you will have some java script functions also which will be acting on your webpage. And if there is an error because of Javascript which you can see in the Chrome Dev tools.
2. And if it fails & you simply raise a bug and ask developer to look into it. But instead using Selenium you can collect the exact error what you are seeing in the console. So you will give more information to the developer.
3. 

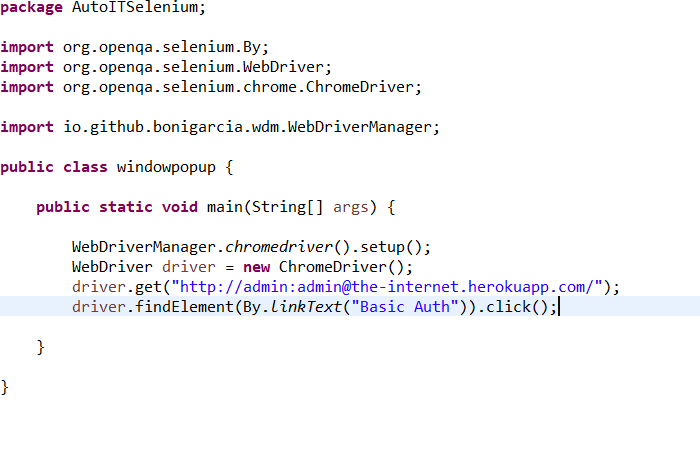
**Steps to connect Database to Selenium Testcases**

1. In Selenium automation, a JDBC (Java Database Connectivity) connection is used when there's a need to interact with a database during testing.
2. In the approach with JDBC, Selenium directly interacts with the database to query data in real time, without first extracting it into Excel or JSON files. This real-time access ensures that any updates made in the database are immediately reflected in the query results.
3. If you were to extract data to an external file like Excel or JSON, you would capture a "snapshot" of the data at that moment. Any updates in the database afterward wouldn't automatically reflect in these files unless you refresh them by re-running the extraction process.
4. So, were using MySQL server for JDBC - <https://www.youtube.com/watch?v=Sfvpgu9ID2Q> . Ref the link on how to install My SQL.
5. So, I’ve now install MySQL installer and create a service with password – 84725V!r@j > create a database > create Table > Insert the data into the table.
6. 

**Integration of Database with JDBC Api.**

1. So, to integrate JDBC were are using the my-sql-connector jar and to download it just ref the link - <https://mvnrepository.com/artifact/com.mysql/mysql-connector-j> & download the latest jar. And then just add the jar file into the java project in classpath.
2. Now the next thing is to form a connection that is using the method called DriverManager.*getConnection*(url, "root", "84725V!r@j ");. So, here root is username and 84725V!r@j is the password to gain an access to the database of mysql and the main this is url. So, now for URL there is basic syntax for it which is **“jdbc:mysql://”+host+”:”+port “/databasename”;** . So this is the basic syntax for url and in place of host we just mention the localhost and port which enter 3306 which is default and you see at the time when you’re installing mysql installer. And databasename is pretty basic which you can get it from mysql where you have create the database.
3. So below is the screenshot on how to extract the credentials from mysql with username and password access.
4. 
5. So, the reason we have used **rs.next()** because at index 0 there isn’t any credentials available so it will throw an error and why while loop ?. So it will just printout all the credentials if there is any by just going next & next. And if you don’t then it will throw an error.
6. **Also, an important note is that at the time of providing the crendentials like password make sure that there isn’t any extra space in it or else it will throw an error saying access denied.**
7. 

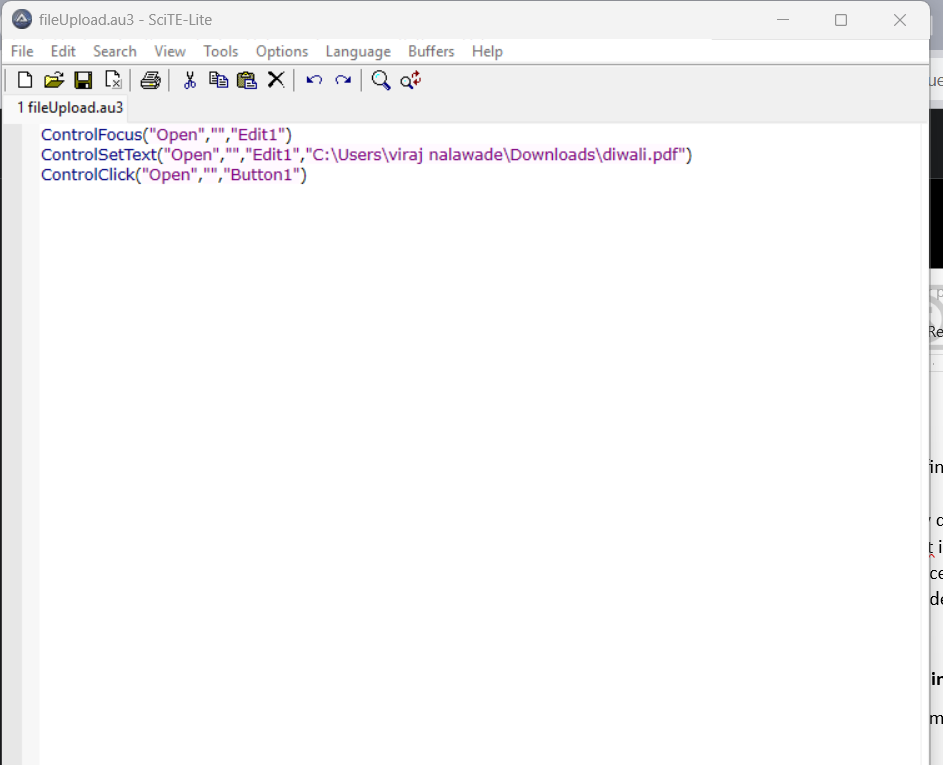
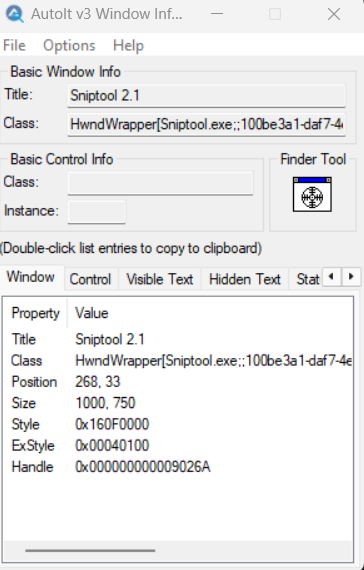
**Handling Window Authentication Pop Up**

1. So, as we know that we can handle basic authentication using Chrome Dev Protocol but there is also an another way to deal with it. The way is making changes in the URL, so the syntax for it is <http://Username:Password@URL>. So, this is syntax were we provide the credentials directly into the mail and then the authentication is taken care of. And you’re login into the page.
2. So, below is the screenshot on how to use the URL syntax to handle basic authentication.
3. 

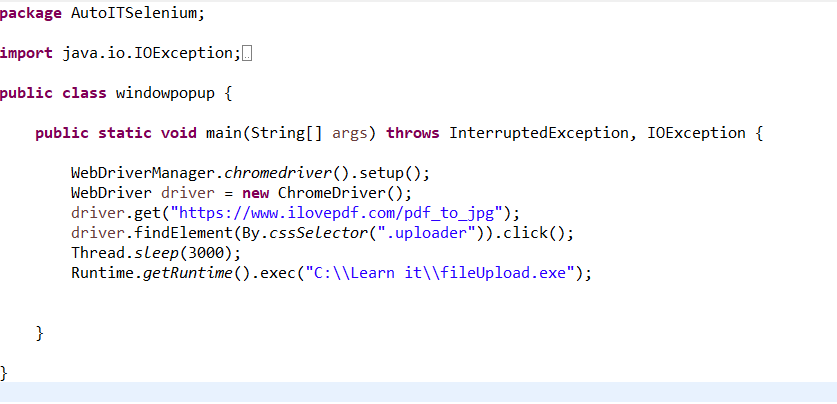
**What is AutoIT ? Installation details ?**

1. So, consider a scenario where you’ve to upload the file but you can automate upto clicking on upload button using selenium but after that the window which will open is part of local machine & not web, so to perform the operation like select the file and click on open button we use **AutoIT** tool. Within which we provide the steps or in this it is called script, and then all the operation upto the clicking on open button will be handled by AutoIT.
2. So, the path where auto IT is install - C:\Program Files (x86)\AutoIt3\SciTE. And if you want to download it again here is the link for ref. - <https://www.autoitscript.com/site/autoit/downloads/>
3. And also there is a tool to inspect or to find the element of windows – Au3info. And it is also available in the same folder.
4. AutoIt is a scripting language specifically designed for automating the Windows GUI. In the context of test automation, AutoIt is often used in combination with tools like Selenium WebDriver. While Selenium excels at automating web applications, it cannot handle OS-level interactions like dealing with file upload/download dialogs.

**Inspecting the window objects and converting into AutoIT code.**

1. So, there is a tool for the inspect the element of window which can be use by AutoIT during automation. So, below are the screenshot How to enter the syntax in AutoIT editor for automation and also application inspecting tool.
2. 
3. 

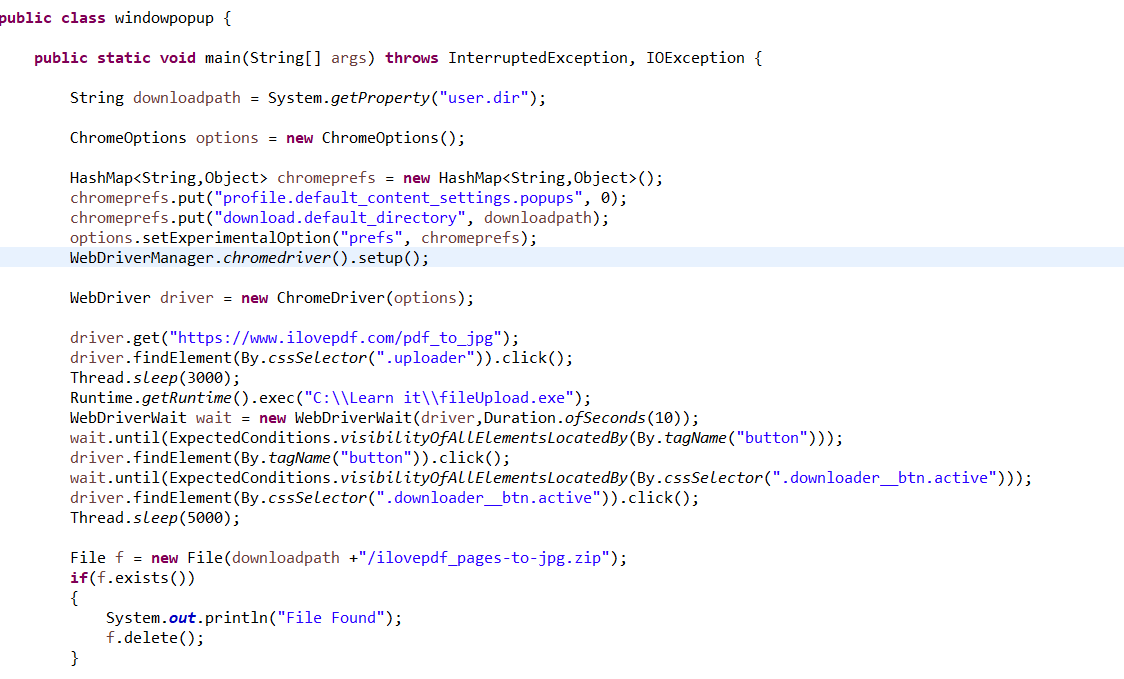
**End to End example on uploading File with AutoIT Selenium**

1. So, to integrate the AutoIT .exe file first you need to write or enter the scritp upto the step where you press the button. And then to integrate the .exe file which you have created from AutoIT editor then we need to use a method called **Runtime.getRuntime.exex(“location of .exe file”)** , So this java method and not selenium because it doesn’t accept .exe file so to integrate we are using java method.
2. 

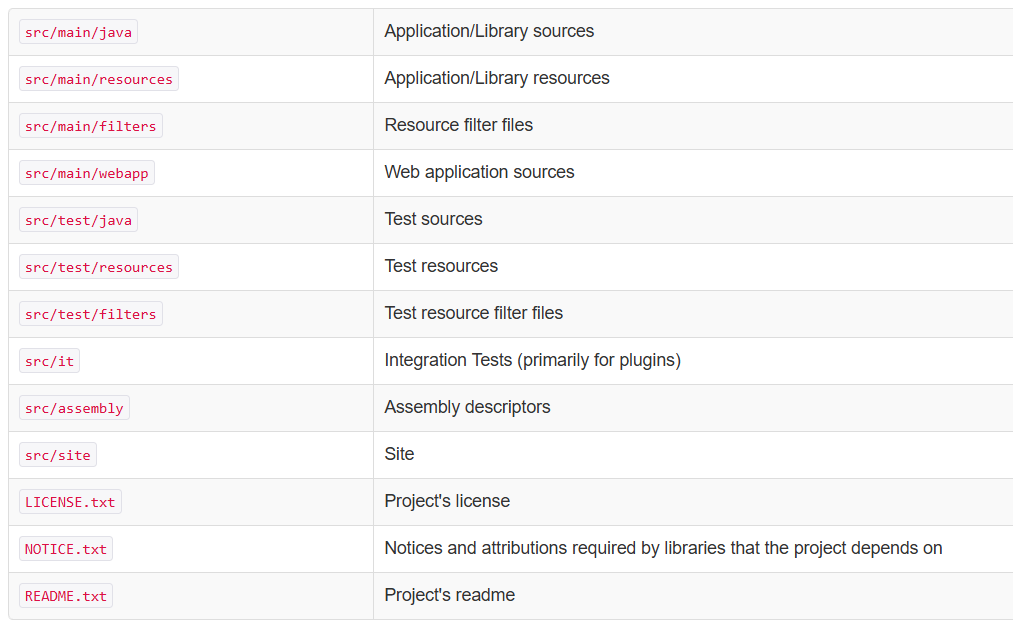
**Steps to complete the flow to download file from Application with Selenium**

1. So, below is the screenshot on how to download the file. Here, we using the **File Class** & also we’re adding file path as a argument, in which after we’ve downloaded the file we’re verifying whether the file actually downloaded or not. So, to verify it we’re using **.exist** method.
2. 

**Chrome driver options to configure download path of browser.**

1. So, there is a problem if you share the code or upload it to the Jenkins then the file which will be downloaded which will be on different machine since the Jenkins are running on different machine. But at the time of verify we’ve hardcode the file path & but actually the file which is downloaded has different file path.
2. 
3. So the code explain below to download it to the project path–
   1. **HashMap<String,Object> chromeprefs = new HashMap<String,Object>();** - This creates a HashMap named chromeprefs to store Chrome preferences, with keys as String and values as Object.
   2. **chromeprefs.put("profile.default\_content\_settings.popups", 0); -** This line sets Chrome's pop-up blocker to allow downloads automatically without showing a pop-up.
   3. **chromeprefs.put("download.default\_directory", downloadpath);** - This sets the default download directory for Chrome. The downloadpath variable should contain the path where you want files to be saved.
   4. **ChromeOptions options = new ChromeOptions(); options.setExperimentalOption("prefs", chromeprefs); -** Here, a ChromeOptions object named options is created. The setExperimentalOption method is used to apply the chromeprefs settings to Chrome.

**Importance of Maven in Framework development**

1. **Central repository to get dependencies** – So, whenever we upload or add jar to the selenium projects and when we share it among the people then there is a problem if later down the line if that jar doesn’t support the version then instead of updating the jar or uploading the updated jar within it you just copy and paste the xml line of code in pom.xml file of Maven which automatically downloads the update jar files into the projects.
2. **Maintaining common structure across the organization** – So, there are different ways people structure their project and it is common among the people. But to be consistent there is common template/structure for the project. So, below is the screenshots of the layout and meaning.
   1. 
   2. 
3. **Flexibility in Integration with Continuous Integration Tool –** So, When you’ve created 20+ test case you can’t executed it by right clicking on it. Instead we use CI tool like Jenkins which executes all the test case and provide the result. And for CI it needs a build management tool like Maven. That is why we use Maven.
4. **Plugins for Test framework execution –** There are plugin for execution like TestNG.
5. **Terminologies for executing maven project –**
   1. Clean – It all the error or previous build, in other word clear history and ready for execution.
   2. Compile – It highlights the error in the code before execution.
   3. Test – It just execute the test case.