BEHAVIORAL QUESTIONS

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1. Tell me about yourself?

First of all, I would like to thank you for giving me this opportunity and I really appreciate for your time.
My name is Eyup Aydin, as you can see on my resume.

- I have been in **IT** industry for more than 6 years and I am currently an **SDET** on my team.
- After working in different types of industry;
    - I have gained **domain** knowledge in the communication, healthcare and banking.
    - So I am familiar with both **Waterfall and Agile** environment and highly proficient in various testing types, including like: functional, regression and smoke testing.
- I started off as a **manual tester** and eventually became proficient in **automation testing**
    - In my current project, I have specialized in **Protractor** with **JavaScript** programming language and using **Jasmine** framework
    - I have also extensive experience in **Selenium** automation using **Selenium WebDriver, JAVA, Maven, JUnit** and also **Cucumber.**
    - I have used
        - **GITHUB** for version control,
        - **JENKINS** for continuous integration/deployment,
        - **JIRA** for project management and bug tracking
        - and **SQL** for back-end testing
    - I have worked on **API** testing on my project and I used Restful, postman, and Rest Assured library
- I developed and worked with **BDD**, **TDD** and also Hybrid Data Driven
    - I developed my “testing framework” based on the **POM** which supports BDD.
    - Also, my framework supports Database testing using JDBC.
- I certified Scrum master and **AWS**
- As far as soft skill concerned, I consider myself;
    - A **positive** person, cross-functional team member
    - **Quick learner** and adaptable to changing circumstances
    - I can work well individually in a **team**
    - I always make sure that I meet the **deadline**

  (if you'd like me to elaborate on any of that, I'd be happy to go further into detail.?)
- That is pretty much about myself.

2. Describe your role?

- As an automation engineer, I developed my “testing framework” base on the POM.
- I performed various types of testing, like; functional testing, smoke testing, regression testing and back-end testing
- I am responsible, in my current project, to execute Regression test when developers add new functionality to the application or end of the sprint.
- I am also responsible to check report of Smoke test to make sure that environment is up and running first thing in the morning.
- If there are any issues, I will analyze them;
    - If it is a service issues, I will immediately contact developers
    - If it is about my scripts, I will debug my scripts
    - If it is a bug, I will reproduce it and log the defect.
- I am using JIRA as bug tracking tool. Once the bug reports were fixed by developers, I retest it and if it is passed, close it. If the defect is not fixed, I reopen it.
- Also, as a part of the Agile Scrum Team,
    - I participate in the several walkthroughs meeting for the requirement reviews and provide valuable feedback to the BA.
- Lastly, I am a cross-functional team member that is always willing to help my team in anyway to achieve our sprint goal.
- That is pretty much about my role as an automation engineer in my current project.

3. **Can you describe your daily activity?**
   - My daily activities at work, I go to work early in the morning and check result report of Smoke test to make sure that environment is up and running and the application is stable or not for the day.
   - If something goes wrong, I will send out an email to my team so they can take care of it asap before everyone comes to work, to reach maximum productivity.
   - And then I check my email if there are any important tasks or notices, also check my schedule if there are any meetings for the day and also check Jira to review what needs to be done that day in which priority.
   - Then I go to attend daily standup meeting with my scrum team to talk about what I did yesterday, what we will do today and are there any impediments in my way. This meeting takes about 15 minutes.
   - After that, I go back to my desk and start automating test cases from regression suits. And also, I automate test cases from sprint backlog after doing manually if it is passed. We are end of our sprint and we are finishing our automating, test execution, reporting, preparing for and conducting Sprint Demo
   - Also, once a week, we have Code Review meetings, to review the code. this is really helpful
   - Most fulfilling for me, is my mentoring sessions with junior testers or developers in which i train them on automation and sometimes non-technical skills. we do this as a brown bag lunch, and it really helps us increase our overall productivity, saving the company resources and money but also, gives us the valuable opportunity to get to know our coworkers and at the end of the day, the most important thing to me in my opinion, is the people I work with.

4. **Tell me about your project?**
   - I'm currently working on an application in which my team are specifically focused on search FUNCTIONALITY.
   - FRAMEWORK
     - In my framework, I was developing my testing code using JavaScript programming language and Protractor.
     - I used Jasmine to manage and centralize my dependencies which I have pom.xml
     - My framework was structured based on the POM that every page element go to one class and it makes easy to maintenance and to keep my code organized and clean.
       - Also, I have seperate classes where I keep my implemented step …
       - I created other seperate folders for my drivers, for my runners and for my useful methods.
     - My framework supports Behavior Driven Development (BDD) and scenario outline.
     - I am using Jira as bug tracking tool.
     - And I achieve continuous integration and schedule my tests using Jenkins. (I accomplished X THING, by doing Y THING, and achieved Z MEASURABLE RESULT)
       - HOW to SEND FRAMEWORK to GITHUB (version control system, keep track of new/old versions, manages files)
         - Create new repo
         - Copy git url and go to eclipse
         - Configure git repo and add the url
         - Right click project, click team, click commit and you'll be in git staging
         - NOW YOUR CODE IS IN GITHUB
   - nice little touch: achievement during this project, that really helped me grow as an automation tester, was that I discovered ISSUE X, did ACTION Y, and then measurable result Z happened.

5. **What is your biggest Accomplishment?**
   - One of my accomplishments I would say is establishing a great trustworthy relationships within the team.
   - If you are asking for technical : When I joined my last project, the application had very less "id" so I had to spend hours to locate one WebPage elements in my POM project so I communicated with developers and other team members and all together we come up with the solution which I got the access to put Id in the application by myself.
   - That was great for me it saved my and others time. So instead of spending time to locating elements I spend my time to more creating automation test scripts and executing them.

6. **Why are you looking for a job? (Why are you in the market?)**
   - I am looking for a job because my current project is ending soon. My manager told me I should start looking for new opportunities.

7. **Why did you apply for this position?**
   - After looking at the job description, I think it matches my day-to-day activity and my experience.
   - I was confident with the job description that's why I applied.
   - Also, I have done some research on the company and I am really excited about the company's product and services like...

8. **I see so many companies in your resume, why are you changing job so frequently?**
   - Since all, IT projects have start and end date, once project is completed, I had to find another position. That's why there are many companies on my resume.
   - I worked in different projects. I think it is good thing because I keep my skills up to date.

9. **Where do you see yourself 5 years from now?**
   - I want to learn as much as possible to be more technical. I would like to see myself SDET.
   - I want to be technically very competitive person 5 years from now.

10. **What is your weakness?**
    - Well, I think my weakness is that whenever I am given some responsibilities and there is a deadline for it, I work day and night, sometimes 7 days a week. This is bad for my family life, the reality is I can not sleep unless I am done with my assignments.

      GREATEST weakness?
    - My greatest weakness was that I am a very dedicated and passionate person towards my job.
    - While this may sound like a good quality to have, but you know if the team members do not share that the same passion as you, it might be very frustrated. Like, I saw people don't follow their requirements , I was always waiting the people take seriously against all problems which we face.
    - I realized that I had to take practical, realistic steps to improve upon this weakness.
    - And I think it is important that to be able to open dialogue and some kind of communication methods to ensure all team members in our scrum team have great chemistry.
    - I have organized many activities outside of work such as: coffee meeting, escape room, some barbeque organization which I love :) .
    - This helped me to connect closely my team members with their family and especially their environment and understand them better and the most importantly these helped my team members understand my passion towards the work.
    - Also, I have enrolled in some leadership courses to help me understand the dynamics of a team and how I can mentor my team members to get my mentality.
    - As a result, I have improved the chemistry of our scrum team and our projects have been released with the highest customer satisfaction.
    - I truly have had a good experience combating my weakness and I am very proactive when it comes to approaching a problem.

11. **What is your strengths?**
    - I am a very detail oriented person. I can prioritize my job according the deadline.
    - I am also very much dedicated person towards my job.
    - I am also honest person and I have the skills and expertise in QA process.
    - One of my greatest strengths is that I have a graphing skills I mean
    - For example when I saw or heard a paragraph, event, case or even if a sentence, I can easily graph it in my mind and implement it in a real life.
    - Like in my previous job, we had a review meeting and there was 3 team member, upper management asked us every team has present their opinion.
    - We separate our responsibilities and we are ready to tell one by one, but unfortunately every team member got the meeting concept wrong because the requirements are not clear and we realized that the the upper management was waiting us a presentation and one of the team member presents our project and after the first team starts to present their review, everyone looked each other and I feel that the team are little nervous and
    - We had a group for this review on slack and I wrote them don't worry about that I have a plan.
    - I just focus on the subject and prepare a template and send the team members and they prepared their parts and
    - I combined all, then we are ready within 20 minutes and then I present all easily. So my strength helps to organize the team and solve our problem and all the team members were happy for that because we finished and present it very successfully.. We were team and I believe that if you worked with a team with passion, anything can be achieved and we can each the expected result on time which means the customer satisfaction and which means company success.
    - <u>Technical Greatest strength:</u>
      - I am strongest at JS because I LOVE IT. explain why: pros, benefits, etc.
      - Explain logic of why it's your strength:
        - Closures, callback, promises are my strength because they suits my comprehensive analytical skills, my brain is wired to work this way already so JS language came very naturally and easily to me.

12. Describe a challenge you faced during your last project?

- I think, one of the biggest challenge that I faced with in my current project is that…
    - … everytime I found a bug, the developer disagreed to accept it and most of the time we had to ask BA for clarification
    - Then I realize the requirement itself was not specific enough, so I understood it differently than the developer
    - In the Sprint Retro, I said we should spend more time on requirement clarification because you know that is the key to the project success. We did so and this issue was solved.
    - Work on result more. I think, the most important problem is misunderstanding and the lack of communication in the business life. If we come together as a group and discuss it, there is nothing we can not solve. I'm really grateful and blessed to have been in the team that I was in, because we were able to collaborate and come together to solve the problem.

- The challenge I have faced is locating dynamic elements by retrieving the right HTML code from the web pages. Id's were problem; sometimes it appears on the page, while sometimes it just disappears. Then I had to put either implicit or explicit wait to locate them.

NON-TECHNICAL Challenges:

A. What to do in case of you have too much work and you can not finish for the deadline?

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- When developers don't deploy their code on time, our tester team don't have enough time for completion. And the upper management keeps asking for us for completion.
- Some of my team members simply focuses on task completion and not on the test coverage and quality of work.
- So, at the Sprint Grooming Meeting, I suggested that we should work very closely with the developer and make sure that we are communicating on daily base.
- And also, the developers prioritize the important tasks and work on them first. Any scenarios left, would be pushed to the next sprint since it is not as important as the other ones.
- Lastly, I try to prioritize my work and follow my test lead and manager whatever they see is more important I start with that.

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- One of my recent challenge is that another coworker who is also QA had to leave from company for personal reason, probably he had to go India some visa issue, and I had to take care of his task with my own since there were only two automation guy, me and Abhinav.
- And production date can not be delayed.
- So, I took responsibility, I started to made a new plan and communicated with my SM that would try my best but I need some help to reach the production goal on time. As always, communication is key to understand each other to the better team work.
- And also developers joined to test application as well. At the end, we made it on time.
- That is one of the reasons I am proud of to be a member of the scrum team. Everybody work for same goal and share the responsibility.

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- I don't really have technical challenges because I consider any issue that is technical to be a part of my job. There will always be some challenge to overcome and I ALWAYS overcome and learn. what is really challenging, in my opinion, and not always so easy to fix is: PEOPLE. again, we work 40+ hours with the same people in high stress, fast paced environments.
- often-times, they are from different cultures, countries, backgrounds, etc which can make communication extremely difficult
- naturally, conflicts erupt and I've had extensive experience in observing, and eventually learning to prevent and solve such conflicts.
- how do I do this?
- by paying attention, empathizing and above all, communicating effectively. this means, doing a lot of work with a lot of people, because conflicts generally involve two or more participants and can negatively impact the rest of the team, thereby reducing productivity.
- happy employees mean productive employees.
- I've learned through trial and error to really understand my colleagues and be able to navigate the tricky waters of office-place politics. for example, [go into specific example]

B. How do you handle conflict?

- Nothing is personal. Everyone thinks company's benefits so I would like to explain my concern and his/her explanation makes sense for me.
- Of course I can do the things which is most helpful to my company. So, I try to communicate with his/her and I would try to understand the concern. Because everyone have the same goal and wants to get job done successfully.

13. How do you handle stress?

- One of our sprint my developer deployed code very late time and I didn't have much time to get job done. But I was working so hard worked extra hours and I was finished my task on time.
- One of my team member went to India for emergency purpose and he could not come back again because of his visa issue. We need to take over his task , I had to work extra hours and I had to sleep less and finally I was finish task on time successfully.
- Also in scrum environment we working as a team. I always maintain good communication and relationship with my colleagues. So they trust me and they can communicate with me very easily. I always avoid miscommunication and my team believe me every time.
- Sometimes some requirements are not understandable so I try to figure out and I try to understand the requirements. In the beginning of the application I spend extra effort to understand functionality. Sometimes it takes time to understand.

14. Can you work under pressure?

- I don't remember any project that I worked had no pressure.
- Pressure is good thing sometimes. It forces you to work harder and smarter.
- In my current project we were migrating our operating system from Windows XP to Window 8.1. That was the change that is required corporate level. The problem is we had a major release in one month. When we migrated from XP to Windows 8.1 non of our automated scripts worked due to the change. Because we have developed the scripts in XP and QTP11. Now we are trying to run the scripts in Windows 8.1 and UFT 12.02 version. As a team we were under extreme pressure because we can't have have release before finishing the regression. As a team we were almost working 7 days a week to meet the deadline. We were successfully able to convert and run our scripts on time.

15. How soon can you start?

- I think, I can start in 2 weeks after getting offer letter and start date.

16. Can you start tomorrow?

- my team won't be happy with me if I leave tomorrow, and I don't think it is professional and I have never done that before.
- I have to transfer the automation framework knowledge to other team members before I leave.

17. How much are you expecting from us? or For how much you are willing to work us?

- My current hourly rate is $48/hr. It will be big motivation for me to have some amount of increase. (remember that 48 is depended on you confidence level. You can increase it if you want. The reason they ask you is they want to confirm the rate. They will have specific budget and consulting firm has to mark up a couple dollars to make some money. So it is always negotiable.If you say too low it means you are not confident.)

18. If you get hired, how long are you planning to stay?

- As long as there is a project to work, I am willing to stay as long as possible.

19. What do you do if I hire you?

- In first week, you know, I will get done all the paper works, getting the machines and necessary access to the project, databases etc.
- Then I will have to learn the company culture.
- I have to learn also more about my projects and my teammates.
- I think, understanding what the project is doing, it is very important if I want to be more productive.

20. May I contact your current employer for reference?

- Please go ahead if you would like to submit my resume. But I am receiving a lot of phone calls from other recruiters. I don't want to let anyone to call my employer if they are not sure to submit my resume or not. (if they say they will submit your resume then tell them you will send out asap after work.)

21. **What do you like the most about testing?**
    - Testing is fun job for me because you are very important person to the client and end users. I love testing because as end user I want to buy better product that is peas of art and defect free. Also I am helping others to make sure their product has top quality. Imagine if you are testing the safety features of the Toyota Camry you are almost saving 100 of lives by doing your job and loving your job.

22. **Why should we hire you?**
    - First of all, I've done thorough research into this position and have read your job description and combined with the information you have so helpfully provided me during this interview, I can CONFIDENTLY say that I'm well-qualified for this position. Meaning, I have all the technical and non-technical expertise, as required and preferred in the job description to not only succeed in this position but also to thrive.
    - However, this to me is the basic requirement, and I truly believe that I'm the best qualified and will exceed expectations beyond just what I have noted, because I have crucial soft skills that can't always be quantified and measured. And I believe, that at the end of the day, regardless of job description or what we do, it's the personality of your employees that really matters. In this, I am unique and stand out because I learned the value of soft skills many years ago and I have extensive experience in honing those skills.
    - - Many people can train in any technical skill within a short time frame, but training someone to communicate can be incredibly difficult. I have such skills in abundance: I'm an excellent communicator, extremely motivated AND motivating, and above all, I am the very definition of a problem-solver. Whatever it is that needs to be done to accomplish my job and more, I WILL DO IT.

    - I think you should hire the candidate that has the best qualifications for this position.
    - Since I don't know the other candidates I can represent only myself.
    - I think my experience and technical expertise will bring a lot of values and benefits to the company and the project. I think that's why you should hire me.

23. **Do you have any question for us?**
    - It's very important to ME, that I'm surrounded by good/kind, hard-working, smart people that will motivate me to also work hard and continue to improve myself. Considering that we spend more time at work with our colleagues than we do with friends or family even, it's important to me know that I can fit in with the culture of my workplace and grow as a professional there. SO, what is YOUR company culture like? what is the team like?
    - SAMPLES:
        - (if you did research), you can bring up something interesting about the company and ask them to elaborate/how it works etc
        - it's also important to me that I continually improve and try to achieve excellence in my position and the best way to do this is to continually learn. I'm always trying to learn new things or learn old things better. Do you provide trainings, seminars or anything to support the education of your employees?

1. **What is Software Testing?**
   - Process of executing a program or application with the intent of find software bugs using functional and automation tools
   - Process of validating/verifying a software program/application
   - Testers should test to break approach, not test to pass

2. **What is Software Requirements Specification?**
   - A software requirements specification is a document which acts as a contract between the customer and the supplier.
   - This SRS contain all the requirement of the end user regarding that application. SRS can be used as a communication medium between the customer and the supplier.
   - The developer and tester prepare and examine the application based on the requirements written in the SRS document.
   - The SRS documented is prepared by the Business Analyst by taking all the requirements for the customer.

3. **Software Development Life Cycle (SDLC)**
   - SDLC defines the phases in **building** of software or application.
     - Project Planning
     - Requirement Gathering (Gathering information used to plan project, Identifying risks)
     - Design (How the application will be built)
     - Coding (developing) (Based on requirements, developers will write the application)
     - Testing
     - Production (deployment)(Releasing product)
     - Maintenance (Making sure product is stable, looking at customer report on bugs and fixing it)

4. **Software Testing Life Cycle (STLC)**
   - STLC defines the phases in **testing** of software or application. In STLC process in different activities are carried out to improve the quality of the product.
     - Requirements analysis
     - Test Planning
     - Test Designing
     - Test Environment Setup
     - Test Execution
     - Test Reporting

5. **What is the difference between STLC and SDLC?**
   - The complete Verification and Validation of software is done in SDLC, while STLC only does Validation of the system. SDLC is a part of STLC.

6. **What is requirement?**
   - Requirements convey the expectation of users for the software or product
   - Process to gather requirements from client, analyze and document them is known as requirement engineering.
   - Goal of requirement engineering is to develop and maintain sophisticated and descriptive SRS ‘System Requirements Specification’ Document

7. **Where is the requirement coming from?**
   - Customers give requirements for the application
   - Talk to the End-Users – the person that will be using this application the most
   - Talk to Partners –
   - Talk to Domain Experts – coders and developers that have already build this application similar before or someone that is an expert a the type of product being built
   - Industry Analysts
   - Information about competitors

8. **When the testing starts?**
   - Testing starts from testing the requirements (not after the coding phase which seems like the most likely answer.)
   - We have to make sure the requirement is correct in first place. With the wrong requirement it is impossible to build bug free application.

9. **How to tell if the requirement is good or bad?**
   - Requirement must be (SMART)
     - Specific
       - User should be able to login-Authorized user with valid username and password should be able to login
     - Measurable
       - User should able to login very fast (in 2 second after clicking login button).
     - Attainable
     - Realistic
     - Testable
       - User should able to download the receipt very fast (in 2 second)

10. **Why we test?**
    - To build bug free application.
    - To satisfied end user and client.
    - To build great product to generate more revenue.
    - I love testing and testing is my passion.

11. **What is tester's main responsibility?**
    - To find bug as much as possible as early as possible. Make sure most of the bug gets fixed.
    - To satisfied the end user and client buy delivering bug free and user friendly application.

12. **Is 100% testing possible?**
    - We can't test the application 100% since there are unlimited scenarios that we can't even imagine.
    - Software testing is risk based activity based on priority of the functionality we can test as much as much as possible.
    - Even though 100% testing is not possible but I believe 100% customer satisfaction is certainly possible.

13. **What is testing hierarchy?**
    - Unit testing – Developers test each module or block of code during development.
    - Component Testing – Component is a standalone functionality that can work by itself. Ex. Amazon Buyer Functionality, Seller Functionality, Prime Video Functionality.
    - Integration Testing – Combine all of the Functionalities. When I integrate them, can I still use all of the functions? Make sure they all still work.
    - System Testing – End-to-End testing. Test everything from beginning to end.
    - Acceptance Testing – Hire a UAT (User Acceptance Testing) Team or Business Analyst can also do Acceptance Testing. After testing has been complete you have to get another team to do acceptance testing so they can confirm the QA teams testing was successful and have the product ready for the customer.

14. **What is positive testing?**
    - Testing the application with valid inputs. Also called "Happy Path" Testing.
    - Ex. If you login with valid username and password it is positive testing.

15. **What is 508 Compliance testing?**
    - If someone in the interview ask if what is 508 testing? Just tell them what it is. Don't say I have 5-10 years of experience in 508 Compliance testing.
    - It's a requirement for government websites.
    - All the websites that are used by and for the government. They have to make sure disabled people can use it.
    - Example: For healthcare.gov they have Compliance manager and he has a dedicated QA team that does 508 Compliance testing to make sure the website I 508 compliant for disability users.

16. What is risk based testing?

- Since 100% testing is not possible we have to do risk analysis. Based on the analysis we have to prioritize our testing activity and test high risk area first. For example:
    - The most critical functionalities
    - The most often used functionalities
    - The most complicated functionalities etc...

17. How long did it take to build this regression suite?

- It took 3 years with; 2 testers 1 manual tester + 1 automation tester
- when we run:
    - before release
    - after major bug fix
    - after major new functionality
- where we keep test scenarios and where we as a team take decision which will be executed more than once, in one sprint you test some scenarios.

18. Tell us one challenge while running regression suite?

- Failures. Because regression suite was developed so long ago and you don't know what has changed. The properties of a button may have changed.

19. How many environments you have?

- Development Environment
    - Unit testing
    - Less stable than test environment
- Test Environment
    - Manual testing happens here
    - Replicates the production environment exactly
    - Changes are deployed in intervals
    - Automated **smoke tests** are ran here
        - Runs against the test environment to make sure if the application is stable enough to perform other major testing activities.
        - Run everytime changes are deployed to Test environment
        - Can be ran in dev environment
    - Automation tests are ran here
    - Automated Integration tests run here
- Pre-production Environment
    - UAT environment
    - Demo happens here
    - load/performance testing happen here
    - Changes are deployed in big intervals
    - Automated major **regression tests** here (before release)
        - Runs against the UAT environment
        - To find out if new changes result in any defects
        - Runs after major bug fixes and every release
        - This test is decided in test plan
    - Very stable
- Production environment

20. Which part of regression test should be automated?

- Tests which are stable
- Repeated frequently
- Simple and require no tester input are good candidates for automation

21. How do you ensure that your regression tests are effective?

- The regression tests should be wide and detailed enough to allow catching defects. You can also eliminate duplicate test cases, merge test cases and automated tests as feasible.

22. **A number of critical bugs are fixed in software. All the bugs are in one module, related to reports. The test manager decides to do regression testing only on the reports module.**
    - Regression testing should be done on other modules as well because fixing one module may affect other modules.

23. **How do you run your regression? How often, how many vms, how many days, how many tests?**
    - Regression is scheduled before every release and we release twice a year (Spring release and fall release).
    - Regression also happens when there is a major bug fix.
    - Around 500 feature files and 1300 scenarios.
    - Regression tests are kicked off by jenkins. Tests are executed on the jenkins server (vm). Name of linux server is RedHat.
    - The latest run look more than 12 hours. Another answer is;
        - I have build a suite of regression tests. They are feature files with regression tag. And I have a job in jenkins that kicks of the regression tests. It uses the maven command to trigger the test. The maven command includes that tag name: mvn test -Dcucumber.options="--tags @Regression".
        - At the end of the execution, jenkins will generate HTML report with detailed tests steps and screenshots.

24. **What is Functional testing?**
    - Functional testing team can also be called manual testers it can also be done by automation team (automation functional testing). Similar to Black box testing or manual testers. Just testing the specific functionality of the application. Ex. Can user login? Can user logout? Not testing look and feel of application.

25. **What is non functional testing?**
    - Performance testing, Security testing, Ex. Can 2000 users login to the application at the same time? Can user move to next page in 1 second?

26. **What is unit testing? Have ever done unit testing?**
    - It is part of the white box testing. It's done by the developers before they deploy the code from Development environment to QA environment.
    - Since it is performed by developers I have never done unit testing yet. But I think I can learn it and do it if it is needed.

27. **What is component testing?**
    - Testing each component of the application separately. In application it could be one component. One component has stand-alone functionality. Ex. in amazon.com Seller functionality can be one component. Buyer can be another component. Also Amazon prime videos can be another component.

28. **Smoke Test;**
    - Code → Unit Testing → Integration Testing → Sanity Testing → ***Smoke Testing*** → Functional Testing
    - In our project, there are five modules like; login, view user, user detail page, new user creation and task creation
    - In these five modules, the developer will first perform the smoke testing by executing all the major functionality of modules like; user is able to login with valid login credentials or not, after login new user can be created or not, user that is created is viewed or not etc.

29. **What is black box testing? What are the different black box testing techniques?**
    - Black box testing is the software testing method which is used to test the software without knowing the internal structure of code or program.
    - This testing is usually done to check the functionality of an application. The different black box testing techniques are;
        - Equivalence Partitioning
        - Boundary value analysis
        - Cause effect graphing

30. **What is Equivalence partitioning testing?**
    - Equivalence partitioning testing is a software testing technique which divides the application input test data into each partition at least once of equivalent data from which test cases can be derived. By this testing method it reduces the time required for software testing.
    - Example: When testing a grade calculation system, a tester determines that all scores from 90 to 100 will yield a grade of A, but scores below 90 will not.
    - Which technique can be used to achieve input and output coverage? It can be applied to human input, input via interfaces to a system, or interface parameters in integration testing.

31. What is Boundary value testing?

- Test boundary conditions on, below and above the edges of input and output equivalence classes.
- For instance, let say a bank application where you can withdraw maximum Rs.20,000 and a minimum of Rs. 100, so in boundary value testing we test only the exact boundaries, rather than hitting in the middle. That means we test above the maximum limit and below the minimum limit.
- For example of my credit card: Activated date is lower boundary. Expiration date 10/2019 is is upper boundary. $0 is lower boundary for spending limit. $250000 is upper boundary for spending limit.

32. Why does the boundary value analysis provide good test cases?

- Because errors are frequently made during programming of the different cases near the 'edges' of the range of values.

33. Why we use decision tables?

- The techniques of equivalence partitioning and boundary value analysis are often applied to specific situations or inputs. However, if different combinations of inputs result in different actions being taken, this can be more difficult to show using equivalence partitioning and boundary value analysis, which tend to be more focused on the user interface.
- The other two specification-based techniques, decision tables and state transition testing are more focused on business logic or business rules. A decision table is a good way to deal with combinations of things (e.g. inputs).
- This technique is sometimes also referred to as a 'cause-effect' table. The reason for this is that there is an associated logic diagramming technique called 'cause-effect graphing' which was sometimes used to help derive the decision table

34. What is white box testing and list the types of white box testing?

- White box testing technique involves selection of test cases based on an analysis of the internal structure (Code coverage, branches coverage, paths coverage, condition coverage etc.) of a component or system.
- It is also known as Code-Based testing or Structural testing. Different types of white box testing are
    - Statement Coverage o Decision Coverage

35. In white box testing what do you verify?

- Verify the security holes in the code
- Verify the incomplete or broken paths in the code
- Verify the flow of structure according to the document specification
- Verify the expected outputs
- Verify all conditional loops in the code to check the complete functionality of the application
- Verify the line by line coding and cover 100% testing

36. What is Gray Box Testing?

- Grey box testing is the hybrid of black box and white box testing.
- In gray box testing, test engineer has the knowledge of coding section of the component and designs test cases or test data based on system knowledge.
- In this tester has knowledge of code, but this is less than the knowledge of white box testing. Based on this knowledge the test cases are designed and the software application under test treats as a black box & tester test the application from outside.

37. What is the difference between static and dynamic testing?

- Static testing: During Static testing, the code is not executed and it is performed using the software documentation.
- Dynamic testing: To perform this testing the code is required to be in an executable form.

38. What is Integration Testing?

- Integration testing is black box testing. Integration testing focuses on the interfaces between units, to ensure that units work together to complete a specific task.
- The purpose of integration testing is to confirm that different components of the application interact with each other. Test cases are developed with the purpose of exercising the interfaces between the components.
- Integration testing is considered complete, when actual results and expected results are same. Integration testing is done after unit testing. There are mainly three approaches to do integration testing:
    - Top-down Approach tests the components by integrating from top to bottom.
    - Bottom-up approach It takes place from the bottom of the control flow to the higher level components
    - Big bang approach In this are different module are joined together to form a complete system and then testing is performed on it.

39. What is Scalability Testing?

- Scalability testing is testing performed in order to enhanced and improve the functional and performance capabilities of the application. So that, application can meets requirements of the end users.
- The scalability measurements is done by doing the evaluating the application performance in load and stress conditions. Now depending upon this evaluation we improve and enhanced the capabilities of the application.

40. What is Storage Testing?

- In Storage Testing we test those functionalities of the application which is responsible for storing the data into database.
- The data entered by the end user in GUI or front end, is the same data which is stored in the database.
- The storage testing determines that the data taken from the front end of the application is stored in correct place and in correct manner in the database.

41. What is Stress Testing?

- Stress testing tests the software with a motive to check that the application do not crashes if we increase the stress on the application by increasing the large number of user working on the application.
- We can also apply the stress on the application firing the lots of process which cannot be handled by the application.
- We perform the stress testing on the application evaluate the application capabilities at or beyond the limits of its specified requirements to determine.
- Generally, this is a type of performance testing performed in a very high level of load and stress condition.

42. What is maintenance testing?

- Triggered by modifications, migration or retirement of existing software

43. What is Test Harness?

- A test harness is a collection of software and test data required to test the application by running it in different testing condition like stress, load, data- driven, and monitoring its behavior and outputs. Test Harness contains two main parts:
    - Test execution engine and Test script repository
- Automation testing is the use of a tool to control the execution of tests and compare the actual results with the expected results. It also involves the setting up of test pre-conditions.

44. What is test coverage?

- Test coverage means is how many test cases that we have and what functional area those test cases are covering.

45. What is a V-Model?

- A software development model that illustrates how testing activities integrate with software development phases.

46. Which of the following is likely to benefit most from the use of test tools providing test capture and replay facilities?

- Regression testing
- Integration testing
- System testing
- User Acceptance Testing

47. What is Acceptance testing?

- The Acceptance testing will be performed after QA testing. In my current project it is done by UAT team. After UAT team performing the acceptance testing the code will go to production.
    - Development environment(where developers write code and perform unit testing)
    - QA environment (where we test the application.)
    - UAT environment (after the code is tested QA environment it will be deployed to the UAT environment. UAT testing team will perform testing to make sure it fits the business requirement. It is also called staging environment.
    - Production environment(is when the end user can see the real application)

48. What is the difference between UAT (User Acceptance Testing) and System testing?

- System Testing: System testing is finding defects when the system undergoes testing as a whole, it is also known as end to end testing. In such type of testing, the application undergoes from beginning till the end.
- UAT: User Acceptance Testing (UAT) involves running a product through a series of specific tests which determines whether the product will meet the needs of its users.

49. What is continuous integration ?

- Developers can check–in and check–out codes into the system when making new code changes to the application.
- Whenever a developer Checks-in a new code into the system. There is a server called Continuous integration (CI) server.
- The CI server is continuously looking for new code. Once the new code is added to the application the CI server will immediately recognize that code has been checked in. (there is a tool integrated with this maybe Jenkins or something) .
- That tool will kick out the automated smoke test to check the basic functionally of the application. Then it will say weather that code affected the app negatively or not.

50. How is code deployed to production environment?

- From Local
    - check in code to Git using pull and push
    - Run unit tests
    - Deploy changes to server
        - Done by jenkins automatically every time developer checks in code.
        - After it passes deploy changes to Dev environment
- From Dev environment
    - Deploy changes to Test environment done by Jenkins
    - Can be scheduled or manually triggered
- From Test → Deploy changes done by Jenkins
- From Pre-production

51. Agile Framework?

- Role : -PO, -SM, -Team
- Ceremonies : -Sprint Planning, Daily Scrum, Sprint Review, Sprint Retro, Grooming Session
- Artifacts : -Product backlog, - Sprint backlog, -Burnout chart

52. What is Agile?

- Agile is **iterative** product **development** methodology that is alternative to the waterfall methodology.
- Scrum : Team plans for amount of work for the next sprint
- Kanban : No sprint planning, stories are picked up as is but you still have everything else

53. Why do we need Agile? Waterfall and Agile?

- Because waterfall methodologies have following disadvantage;
    - Requirement can not be change or hard to change once document is signed.
    - In waterfall before completing the one phase you can't move to the next phase. For example, before coding phase is completed testing can not be started.
    - Customer can't see what they are going to get until very late stage in development life cycle.
    - It takes longer time to go to the production. By the time product goes to the market it might be outdated already.
- Agile has following advantages:
    - The change is welcomed. For example after the sprint demo if client does not like something we can take their feedback and improve the product. Requirement change is OK.
    - Since it is iterative development process, the development team can developed piece of functionality, get feedback and improve next iteration. So the product will be continuously improve.
    - Waste is eliminated in agile with the help of scrum master. For example if I am blocked I don't have to wait and waste my time. Since team members communicates with each other efficiently we can be more productive by preventing duplicated effort.
    - Waterfall emphasizes tools and platform, like C#_.NET, but agile emphasizes people. You can have best tool but at the end people are using those tool. I believed inspired people can make amazing products even they have less money or less resources.

54. What kind of Agile methodology did you use in your previous projects?

- I have heard Extreme programming(XP) , Kanban and Scrum. But I have only worked with scrum only.

55. Scrum is an Agile framework, right? Name few other Agile frameworks.

- Yes, Scrum is an Agile framework. Few other Agile frameworks are –Feature Driven Development Test Driven Development, Kanban

56. What are the different roles in Scrum?

- Product owner is actually the stakeholder of the project.
    - He represents the project requirements before the team.
    - He is responsible to have a vision of what to build and convey his detailed vision to the team.
    - He is the starting point of an agile scrum software development project.
- Scrum team is formed by the collective contribution of individuals who perform for the accomplishment of a particular project.
    - The team is bound to work for the timely delivery of the requested product.
- Scrum master – Scrum master is the leader and the coach for the scrum team who checks whether the scrum team is executing committed tasks properly.
    - He is also responsible to increase the efficiency and productivity of the team so that they can achieve the sprint goal effectively.

57. How do you describe a scrum team?

- If you put 5 rock stars together it doesn't mean they are a team or it doesn't mean they can build great product.
- For me the team is a group of people who are sharing the same goal, moving to the same direction, who trust each other and who will effectively communicate and collaborate with each other to build great product. There should be no star individual but a star team.

58. What are the responsibilities of a Scrum Master?

- Tracking and monitoring
- Understanding requirements properly
- Work to reach the project goal
- Process checking master and quality master
- Protect the team from detachments
- Improving the performance of the team
- Lead the meetings and resolve issues
- Resolution of conflicts and impediments
- Communication and reporting

59. What is a negative test case?

- Negative test cases are created based on the idea of testing in a destructive manner. For example, testing what will happen if inappropriate inputs are entered into the application.

60. What do you understand by the term "Scrum of Scrums"?

- Let us assume an active project on which seven teams are currently working. The number of members of each team is also seven.
- Each team is responsible to lead its own scrum meeting. But, in order to coordinate and communicate with different teams, it is required to organize a separate scrum meeting.
- The scrum meeting organized to hold a coordination between scrum teams is known as the scrum of scrums.
- There is one team leader from every team, known as ambassador, who is responsible to represent his team in the scrum of scrums.

61. Shippable product/increment?

- The piece of the product is made and it keeps getting added functionality form each sprint
- The increment must align to the development team's *Definition of Done*
    - When the product increment is delivered, it needs to meet "Definition of Done"
    - Acceptance criteria is fulfilled
    - Product owner accepts the user stories
- The increment must be acceptable by the P.O-

62. What is BurnDown Chart?

- Graphic representation of the rate at which work is completed and how much work remains to be done

63. Agile experience in your most recent project?

- Our sprint is 4 weeks and we have release every 3 sprints as a release cycle
- We have 7 people in my team. 3 developers (Rahul, Naga, Chirag), 1 automation (Me) and 1 functional testers(Rosy), also 1 SM (Arin) and 1 PO (Joseph).
-
- We start a sprint with Sprint Planning Meeting and
  - we discuss about the team's priority features and product backlog items and
  - we learn the part of the application which we are going to developed.
  - Choosing story based on *velocity* and *capacity*
    - Velocity: Number of story points delivered/demo in a sprint. For example: if team planned 30 story points (Business value); worth of user stories in a sprint and able to deliver as planned then team's velocity is 30
    - Capacity: Total number of available hours for a sprint is Team's capacity. Calculates holiday and pto hours
  - This meeting is held every week and lasts for almost 1 hour. We get general idea than we do Sprint Grooming meeting for giving some estimates for the tasks.
    - Team, SM, and PO get together to ensure work items are relevant and useful
    - Ask questions to P.O of user stories
    - Re-define acceptance criteria
    - Writing new stories
    - Breaking epics into user stories
    - Understand the story to give proper estimation/to prevent under/over estimate
  - **How do you estimate?**
    Based on my experience and complexity of the story and it is something I worked on before.
- After sprint starts, we do Daily Standup Meeting
  - everyday morning and we discuss what did we do yesterday, what will we do today and is there any blocker.
  - Just we synchronize info about the sprint.
- End of the sprint, usually we do Sprint Demo/Review Meeting.
  - It is just to show customer what we build sprint (PO can put feedback)
  - As an SDET in my team, I have done presentation sometimes and go over through the functionalities in the conference room.
  - Client or stakeholders or business people they ask questions what they don't know.
- After Sprint Demo, we do Sprint Retrospective Meeting.
  - In sprint Retro, we talk about what was good in last sprint, what kind of mistakes we made.
  - We go over them and make sure that we don't make the same mistakes again.
  - If we did something good and improvements, we would continue doing it.
  - This meeting that is held at the sprint review meeting or at the end of the sprint; it lasts for 2-3 hours.

64. What is Verification and Validation?

- Verification happens during developing by testers and developers; it is a process of evaluating software at development phase and to decide whether the product of a given application satisfies the specified requirements.
- Validation by testers; is the process of evaluating software at the end of the development process and to check whether it meets the customer requirements.

65. What is Definition of Ready?

- Acceptance Criteria is cleared/reviewed
- Point/hours are given

66. What is User Story?

- (Note: basically a user story is just a requirement) User story is a short simple description minimum **shippable** product.
- It normally looks like this: As <end-user> I want to do< action> So that I can <benefit>.
- As amazon user I should able to login, so I can buy stuffs online

67. You said "shippable", what do you mean by that?

- Well, You can't really say As a user I want to put my username in the username field.
- So I can write my username in there. It has to be complete functionality. Putting user name is not a shippable functionality. But able to login is a complete functionality. That is what I mean by shippable.

68. What is an Epic?

- Epic is a big user story that you can not complete in one sprint.
- For example, as a user I want to buy online so I don't have to visit the local store. This story is too big and it can not be completed in one sprint. So we can call it Epic instead of user story. It should be divided to multiple user stories like:
- As a customer I want to be able to login so I can view my account.
- As a customer I want to be able to search for a product so I can buy them.
- As a customer I want to be able to proceed to checkout so I can pay for the item that I am going to buy.
- As a customer I want to be able to logout so I can protect my account.
- As you can see< As a customer I want to be able to buy...> can be divided to multiple user stories. The team can pick one or more user story in every sprint.

69. What is Acceptance criteria?

- Acceptance criteria is the way that we know the user story is successfully developed or not.
- Statements of requirements that are described from the point of view of the user to determine when a story is"done" and working as expected
- 3 parts examples
    - Input → valid email address
    - Process → marking messaging
    - Outcome → marketing message design matches the specs provided by marketing

70. What is parking lot?

- In Agile it means this: In meeting when you have a problem that is not really relevant to other people we should not keep discussing that item in the meeting because we are wasting other people's time.< Let's make it parking lot item > means whoever is interested in that issue can talk after the meeting.

71. What is rat hole?

- Since there is a lot of communication going on in agile team,team has to discuss a lot of stuffs. But sometimes the discussion will last too long for one topic and it is not really productive. We will say it is <rat hole> it means we should not keep taking about that issue too long and move forward.

72. What is sprint workflow?

- How a story moves from to do to done and lifecycles - what happens when something is blocked, etc.

73. What types of Test cases

- I cover different scenarios
    - Positive
    - Negative
    - Boundary Value Analysis

74. Test Case?

- Test case describes the functionality and test steps.
    - Test Case ID
    - Step number
    - Description of the functionality
    - Expected result
    - Actual Result

75. How many Test cases (in your regression suite) do you usually complete in a week?

- 10 small test cases, 7-8 medium, 2-3 large
- OR It depends on the project. In my current project Fannie Mae Whole Loan Price & Execution we have 2000 test cases. In innovation call center application we had around 700 test cases.

76. How long it will take to run your regression suite?

- It depends on the project. In my current project out of 2000 test cases in the regression suite around 1500 are already automated. If we use 12 virtual machine to perform parallel execution it takes 2 to 3 days to execute automated test cases. Also manual testers will execute some manual test cases but I am not sure how much they are executing. I believe they are only executing some important test cases only after prioritization

77. What do you do when you run your automated script or what do you when you run regression?

- First I have to execute my script. Once the script execution is completed I have to analyze the run result to see if there is any failed test cases. If there is failed test cases I have to determine if it is failed due to legitimate application issue or it is caused by some script issue. (the script can be failed due to automation code issue too) if it is caused by application issue I will try to manually reproduce it and log a defect if I can reproduce. If it is due to my script I have to fix it sometimes. But this is not the case most of the time.

78. What are the steps you take to automate?

- Learn the functionality
    - Reading requirements
    - Knowledge transfer session with B.A
    - Ask teammates
- Manually test it
    - Making sure you understand each step properly
    - Understand expected results
- Automate it
    - Create POM pages
        - Add necessary elements/methods you are going to use and add PageFactory design pattern
        - Create a driver class with Singleton pattern
- Validate the tests using TestNG Assertions

79. What percentage of position is automation vs manual?

- 90% automation 10% manual

80. When do you choose automated testing over manual testing?

- If the test cases are high priority test cases.
- If the functionality is critical functionality.
- Shakeout or smoke test test cases.
- If the test cases are too long and too difficult to execute. The regression test cases based on the priority.
- We should automate as much as possible.

81. When do you do automation in your sprint?

- When devs are done with their part
- When code is deployed to QA/test environment
- When testing framework is set up
- When all manual tests are done
- Smoke tests are passing

82. Test Plan?

- Test plan is a word document that described the testing scope
    - High level test cycle
    - Defect life cycle
    - Entrance Criteria (defines what all need to start the testing)
    - Exit Criteria (defines what the testing is finished)

83. What are the tables in test plans?

- Test design, scope, test strategies , approach are various details that Test plan document consists of.
    - Test case identifier
    - Scope
    - Features to be tested
    - Features not to be tested
    - Test strategy & Test approach
    - Test deliverables
    - Responsibilities
    - Staffing and training
    - Risk and Contingencies

84. What is the difference between a test plan and a QA plan?

- A test plan lays out what is to be done to test the product and includes how quality control will work to identify errors and defects. A QA plan on the other hand is more concerned with prevention of errors and defects rather than testing and fixing them.

85. What is a peer review?

- Peer reviews are reviews conducted among people that work on the same team. For example, a test case that was written by one QA engineer may be reviewed by a developer and/or another QA engineer.

86. How can you tell when enough test cases have been created to adequately test a system or module?

- You can tell that enough test cases have been created when there is at least one test case to cover every requirement. This ensures that all designed features of the application are being tested.
- A2-That is the reason we need to have requirement traceability matrix. We can tell how many requirement has been covered by test cases and how many still left from RTM.

87. Who approves test cases?

- The approver of test cases varies from one organization to the next. In some organizations, the QA lead may approve the test cases while another approves them as part of peer reviews.

88. Who writes test plans and test cases?

- Test plans are typically written by the quality assurance lead while testers usually write test cases.

89. What is the purpose of test design technique?

- Identifying test conditions and Identifying test cases.

90. Difference between Test case and Test script?

- Test case terminology mostly used for Manual Testing whereas Test Script mostly used for Automation Testing
- A test case is a documentation which specifies input values, expected output and the preconditions for executing the test. It's also a layout of the low-level details on how to test the scenario
- A test script in software testing is a set of instructions that will be performed on the system under test to test that the system functions as expected.

91. What should be included in a test strategy?

- The test strategy includes a plan for how to test the application and exactly what will be tested (user interface, modules, processes, etc.). It establishes limits for testing and indicates whether manual or automated testing will be used.

92. What will you do when script fails?

- In my experience, I will identify the failure,
    - if it is this due to application error, sync error, script issue or environment is down, first of all i will analyze the result by reproduce it through Jenkins run only the fail one,
    - if it is due to synchronization issue i will add extra time by using implicit, explicit and some custom expected conditions,
    - If it is script issue i will debugging (identify) my script and fix it, analyze the exceptions,
    - if it is real defect then i will log defect.

93. Test Scenario?

- Make sure that end to end functionality of application under test is working as expected
- The tester needs to put his/her foot in the end users shoes to check and perform the action as how they are using application under test
- T.S can have many test cases associated with it, Before executing the T.S we need to think of test cases for scenario
- Test Scenario: Validate the login page
    - Test Case 1: Enter a valid username and password
    - Test Case 2: Reset your password
    - Test Case 3: Enter invalid credentials
- In each test case are detailed steps and condition for execution

94. Requirement Traceability Matrix (RTM)

- RTM is used to make sure that all test cases cover the requirement or not. It is like excel sheet.

95. What can be done to develop a test for a system if there are no functional specifications or any system and development documents?

- When there are no functional specifications or system development documents, the tester should familiarize themselves with the product and the code. It may also be helpful to perform research to find similar products on the market.

96. What are the functional testing types?

- Unit Testing
- Smoke testing
- Sanity testing
- Integration Testing I
- System Testing
- Regression Testing
- UAT (user acceptance testing)

97. What is the difference between sanity testing and smoke testing?

- When sanity testing is conducted, the product is sent through a preliminary round of testing with the test group in order to check the basic functionality such as button functionality. Smoke testing, on the other hand is conducted by developers based on the requirements of the client.

98. What steps are involved in sanity testing?

- Sanity testing is very similar to smoke testing. It is the initial testing of a component or application that is done to make sure that it is functioning at the most basic level and it is stable enough to continue more detailed testing.

99. What is the difference between WinRunner and Rational Robot?

- WinRunner is a functional test tool but Rational Robot is capable of both functional and performance testing. Also, WinRunner has 4 verification points and Rational Robot has 13 verification points.

100. What is the difference between QA and testing?

- The goals of QA are very different from the goals of testing.
- The purpose of QA is to prevent errors is the application while the purpose of testing is to find errors.

101. Explain random testing.

- Random testing involves checking how the application handles input data that is generated at random. Data types are typically ignored and a random sequence of letter, numbers, and other characters are inputted into the data field.

102. What is the difference between Quality Control and Quality Assurance?

- Quality control (QC) and quality assurance (QA) are closely linked but are very different concepts. While QC evaluates a developed product, the purpose of QA is to ensure that the development process is at a level that makes certain that the system or application will meet the requirements.

103. What is the role of QA in a project development?

- QA team is responsible for monitoring the process to be carried out for development.
- Responsibilities of QA team are planning testing execution process.
- QA Lead creates the time tables and agrees on a Quality Assurance plan for the product.
- QA team communicated QA process to the team members. QA team ensures traceability of test cases to requirements.

104. What makes a good QA or Test manager?

- Knowledge about Software development process
- Improve the teamwork to increase productivity
- Improve cooperation between software, test, and QA engineers
- To improvements the QA processes.
- Communication skills.
- Able to conduct meetings and keep them focused

105. What is the difference between regression testing and retesting?

- Regression testing is performing tests to ensure that modifications to a module or system do not have a negative effect on previous releases. Retesting is merely running the same testing again. Regression testing is widely asked manual testing interview questions and hence further research to understand this topic is needed.

106. Explain the difference between bug severity and bug priority.

- Bug severity refers to the level of impact that the bug has on the application or system while bug priority refers to the level of urgency in the need for a fix.
- Usually the severity is defined in terms of financial loss, damage to environment, company's reputation and loss of life. Priority of a defect is related to how quickly a bug should be fixed and deployed to live servers.

107. What is the difference between system testing and integration testing?

- For system testing, the entire system as a whole is checked, whereas for integration testing, the interaction between the individual modules are tested.

108. Explain the difference between functional and structural testing.

- Functional testing is considered to be behavioral or black box testing in which the tester verifies that the system or application functions according to specification. Structural testing on the other hand is based on the code or algorithms and is considered to be white box testing.

109. What is difference between Pilot and Beta testing?

- The differences between these two are listed below:
    - A beta test when the product is about to release to the end user whereas pilot testing take place in the earlier phase of the development cycle.
    - In beta testing application is given to a few user to make sure that application meet the user requirement and does not contain any showstopper whereas in case of pilot testing team member give their feedback to improve the quality of the application.

110. What is Alpha testing?

- Pre-release testing by end user representatives at the developer's site.

111. What is a failure?

- Failure is a departure from specified behavior.

112. What are Test comparators?

- Is it really a test if you put some inputs into some software, but never look to see whether the software produces the correct result?
- The essence of testing is to check whether the software produces the correct result, and to do that, we must compare what the software produces to what it should produce.
- A test comparator helps to automate aspects of that comparison.

113. Describe how to perform Risk analysis during software testing?

- Risk analysis is the process of identifying risk in the application and prioritizing them to test. Following are some of the risks:
    1. New Hardware.
    2. New Technology.
    3. New Automation Tool.
    4. Sequence of code delivery.
    5. Availability of application test resources.
- We prioritize them into three categories these are:
    - High magnitude: Impact of the bug on the other functionality of the application.
    - Medium: it can be tolerable in the application but not desirable.
    - Low: it can be tolerable. This type of risk has no impact on the company business.

114. What is Silk Test?

- Silk Test is a tool developed for performing the regression and functionality testing of the application. Silk Test a tool is used when we are testing the applications which are based on Window, Java, web or traditional client/server.
- Silk Test help in preparing the test plan and management of those test plans, to provide the direct accessing of the database and validation of the field.

115. What is difference between Master Test Plan and Test Plan?

- Master Test Plan contains all the testing and risk involved area of the application where as Test case document contains test cases.
- Master Test plan contain all the details of each and every individual tests to be run during the overall development of application whereas test plan describe the scope, approach, resources and schedule of performing test.
- Master Test plan contain the description of every tests that is going to be performed on the application whereas test plan only contain the description of few test cases. during the testing cycle like Unit test, System test, beta test etc
- Master Test Plan is created for all large projects but when it is created for the small project then we called it as test plan.

116. When is a test considered to be successful?

- The purpose of testing is to ensure that the application operates according to the requirements and to discover as many errors and bugs as possible. This means that tests that cover more functionality and expose more errors are considered to be the most successful.

117. What is defect?

- When the expected result does not match the actual result, it is defect.

118. Define defect density?

- Defect density is the total number of defects per lines of code.

119. What is Defect Life Cycle (DLC)?

- New
- Assigned
- Open
- Fixed
- Retested
- Close

120. What are the categories of defects?

- Wrong: The requirements are implemented incorrectly in the application.
- Missing: When requirement given by the customer and application is unable to meet those application.
- Extra: A requirement incorporated into the product that was not given by the end customer. This is always a variance from the specification, but may be an attribute desired by the user of the product.

121. What to do when you find a defect?

- If I find a defect, before report it I reproduce the bug that I need to make sure that is a valid defect.
- If it is a small issue, I will go to the developer desk, and he can fix it right away.
- If it is a big issue, then I open my JIRA and log the defect.
- If I am not sure it is bug or not I will talk to SME (subject matter expert it means the person who knows the application better than anyone).

122. If developer says not a defect, what to do?

- I always make sure that it is a real defect that's why I reproduce it.
- I take a screenshots and give all the steps to reproduce the defect.
- Actually, one of my biggest challenges that I faced in my current project is that...

123. Can you test a program and find 100% of the errors?

- It is impossible to find all errors in an application mostly because there is no way to calculate how many errors exist. There are many factors involved in such a calculation such as the complexity of the program, the experience of the programmer, and so on. This Manual testing interview questions is the most tricky questions considered by testers.

124. What is the difference between debugging and testing?

- The main difference between debugging and testing is that debugging is typically conducted by a developer who also fixes errors during the debugging phase. Testing on the other hand, finds errors rather than fixes them. When a tester finds a bug, they usually report it so that a developer can fix it.

125. How should testing be conducted?

- Testing should be conducted based on the technical requirements of the application.

126. What is considered to be a good test?

- Testing that covers most of the functionality of an object or system is considered to be a good test.

127. When should testing be stopped?

- It depends on the risks for the system being tested. There are some criteria bases on which you can stop testing.
    - Deadlines (Testing, Release)
    - Test budget has been depleted
    - Bug rate fall below certain level
    - Test cases completed with certain percentage passed
    - Alpha or beta periods for testing ends
    - Coverage of code, functionality or requirements are met to a specified point

128. What is the difference between top-down and bottom-up testing?

- Top-Down testing begins with the system and works its way down to the unit level. Bottom-up testing checks in the opposite direction, unit level to interface to overall system. Both have value but bottom-up testing usually aids in discovering defects earlier in the development cycle, when the cost to fix errors is lower.

129. What is the average size of executables that you have created?

- This is a simple interview question about our experience with executables. If you know the size of any that you've created, simply provide this info.

130. Have you performed tests on the front-end and the back-end?

- When I test Front End I am actually testing the UI by open up the application and perform testing on UI. If I have done anything on the UI I will have to perform backend testing to see if the change has been made in the database as well. For example of Banking application:
- I open the application and transfer $1000 dollars from account A to account B. Once it is done I should able to see the confirmation page on the UI also able to see 1000 dollars is deducted from account A and it is added to the account B. This is front end testing.
- Now after performing this test cases in UI I have to connected to the database to run below query to see if the 1000 dollars is deducted from account A.
- Select * From accounts Where account_Number = A this is back end testing.

131. What is difference between Front End Testing and Back End testing?

- Front End Testing is performed on the Graphical User Interface (GUI), whereas Back End Testing involves databases testing.
- Front end consist of web site look where user can interact whereas in case of back end it is the database which is required to store the data.
- When ender user enters data in GUI of the front end application, then this entered data is stored in the database. To save this data into the database we write SQL queries.

132. What is the most difficult problem you've found during testing?

- This is a simple interview question in which you should provide an example. This is one of most tricky manual testing interview questions as your answer will decide your job. You need to answer in such a way that your problem solving skills and your job. You need to answer in such a way that your problem solving skills and your eagerness to learn new things, and your dedication towards the job will indicated by your answers.

133. What is your challenge in scrum?

- Since scrum emphasizes cross functional team (it means developer should able to test and testers should able to develop) it is hard to be part of development team as a traditional QA tester. Because generally QAs don't know how to write code. That is why I have to keep myself very competitive. Whenever I have time I am learning more coding like Java.

134.What is Automated Testing?

- The process of performing testing automatically which reduces the human intervention this is automation testing.
- The automation testing is carried out with the help of the some automation tool like QTP, Selenium, WinRunner etc.
- In automation testing we use a tool that runs the test script to test the application; this test script can be generated manually or automatically. When testing is completed then tools automatically generate the test report and report.

135.When will you automate?

- If it is taking a lot of manual effort. I run at least once manual and after that I automate it.
- Automation is good for most repetitive functionality.

136.What tests can be automated?

- Regression tests
- Smoke tests
- Functional tests
- API
- Database

137.When will you NOT automate?

- If functionality keeps changing
- If functionality is used only once during the entire project
- Ad-hoc test can not be automated.

138.What is the duration of a scrum sprint? How long is your sprint?

- In my current project our script cycle is 4 weeks. How long is your sprint here? 2 weeks or 4 weeks? (sometimes it is good to ask question. Remember you should not act like an ATM. They generally forget people only answering question. There should be a balance.)
- Our team size is 7 members. 1 SM, 1 PO, 3 developer, 1 MT, 1 AT

139.What is Velocity?

- Velocity is the rate at which team progresses print by sprint.
- I can also say that it cannot be compared to two different scrum teams.

140.What do you know about impediments in Scrum? Give some examples of impediments.

- Impediments are the obstacles or issues faced by scrum team which slow down their speed of work.
- If something is trying to block the scrum team from their getting work “Done” then it is an impediment.
- Impediments can come in any form. Some of the impediments are given as
    - Resource missing or sick team member
    - Technical, operational, organizational problems
    - Lack of management supportive system
    - Business problems
    - External issues such as weather, war etc
    - Lack of skill or knowledge
- Solution: Teamwork, work hard, communicate well, online connect, mentoring and training

141.What is the difference and similarity between Agile and Scrum?

- Agile is a broad spectrum, it is a methodology used for project management while Scrum is just a form of the Agile that describes the process and its steps more concisely.
- Agile is a practice whereas scrum is a procedure to pursue this practice.
- The similarity that → Agile involves completing projects in steps or incrementally. The Agile methodology is considered to be iterative in nature. Being a form of Agile, Scrum is same as that of the Agile. It is also incremental and iterative.

142.What is increment? Explain.

- An increment is the total of all the product backlogs items completed during a sprint.
- Each increment includes all the previous sprint increment values as it is cumulative.
- It must be in the available mode in the subsequent release as it is a step to reach our goal.

143. What is the "build-breaker"?

- The build-breaker is a situation that arises when there is a bug in the software.
- Due to this sudden unexpected bug, compilation process stops or execution fails or a warning is generated.
- The responsibility of the tester is then to get the software back to the normal working stage removing the bug.

144. What do you understand by Daily Stand-Up?

- The daily stand-up is an everyday meeting (most preferably held in the morning) in which the whole team meets for almost 15 minutes to find answer to the following three questions –
    - What was done yesterday?
    - What is your plan for today?
    - Is there any impediment or block that restricts you from completing your task.
- The daily stand-up is an effective way to motivate the team and make them set a goal for the day.

145. What do you know about Scrumban?

- Scrumban is a Scrum and Kanban-based model for the software development.
- This model is specifically used for the projects that need continuous maintenance, have various programming errors or have some sudden changes.
- This model promotes the completion of a project in minimum time for a programming error or user story.

146. State some of the Agile quality strategies?

- Iteration
- Refactoring
- Dynamic code analysis
- Short feedback cycles
- Reviews and inspection
- Standards and guidelines
- Milestone reviews

147. Do you know about Agile Manifesto & its Principles? Explain in brief.

- This is the theory which most of agile/scrum roles aspirant should be on tips.
- Four manifesto values and 12 principles should be explained as much as possible as part of this question.
- Even if it's not explained in 100% accurate manner it should be fine but intentions of values and principles should come out e.g.
- Manifesto
    - Individuals and interactions over processes and tools
    - Working software over comprehensive documentation
    - Customer collaboration over contract negotiation
    - Responding to change over following a plan
- Guiding Principles
    - Customer Satisfaction
    - Welcome Changing Requirements
    - Working Software is Delivered Frequently (Weeks rather than months)
    - Close, Daily Cooperation between Business People and Developers
    - Project are built around motivated individuals, who should be trusted
    - Face-to Face Conversation is the best form of communication
    - Working software is the primary measure of progress
    - Sustainable development, able to maintain a constant pace
    - Continuous attention to technical excellence and good design
    - Simplicity - The art of maximizing the amount of work not done - is essential
    - Best architectures, requirements and designs emerge from self-organizing teams
    - Regularly, the team reflects on how to become more effective, and adjusts accordingly

148. What is the use of burn-up and burn-down charts?

- The burn-up chart illustrates the amount of completed work in a project whereas the burn-down chart depicts the amount of work remained to complete a project.
- Thus, the burn-up and burn-down charts are used to trace the progress of a project.

149. Is there any drawback of the Agile model? If yes, explain.

- Yes, there are some drawbacks of the Agile model, some of them are like;
    - It is not easy to make a prediction about the effort required to complete a task. It becomes more problematic in case of large projects as it becomes difficult to get an idea of the total effort required.
    - At sometimes, it's not possible to properly focus on the design and documentation of the project
    - In case the requirements of the client are not understood properly, the final project will not meet the customer requirements. Thus, it will lead to the customer dissatisfaction.
    - Only the leader who has considerable experience in Agile methodologies is capable to take important decisions. The team members with little or no experience are not involved in decision-making, thus they don't get chance to advance their knowledge.

150. Define Zero Sprint and Spike in Agile.

- Zero Sprint can be defined as the preparation step of the first sprint in Agile.
    - There are some activities that are required to be done before actually starting the project.
    - These activities are considered as the Zero sprint; the examples of such activities are – setting the environment for development, preparation of backlogs etc.
- Spike is the type of story that can be taken between the sprints.
    - Spikes are commonly used for the activities related to the design or technical issues such as research, design, prototyping, and exploration.
    - There are two types of spikes – functional spikes and technical spikes.

151. What is the role of the Scrum Master?

- The scrum master is the leader as well as coach of the Scrum team.
- The SM is responsible to serve and protect the team from any kind of block that could affect the performance.
- The main role of the SM is to motivate his team to achieve the sprint goal.
- He is focused to build a self-organized and motivated team where each member is familiar with the implementation of Agile and Scrum principles and applications.
- The SM keeps a proper check on the scrum team if they are executing committed tasks properly.
- He is also responsible to increase the efficiency and productivity of the team so that they can achieve the sprint goal effectively.

152. What do you know about a story point in Scrum?

- A story point in Scrum is the unit for the estimation of total efforts that are required to perform or complete a particular task.

153. What is the role of Sashimi in Scrum methodology?

- Sashimi plays an important role in Scrum methodology.
- Sashimi is a technique used by Scrum to check the completion of all the functions created by the developers.
- Using this technique, all the requirements such as analysis, designing, coding, testing and documentation that are used in the constitution of a product are checked and only after that the product is displayed.

154. What do you understand by the term Agile testing?

- Agile testing is a software testing practice that is fully based on the agile principles of software development. It is an iterative methodology where the requirements are the outcome of collaboration between the product owner and team. The agile principles and applications are applied to meet the customer requirements by successful completion of the project.

155. Is it ever suggested to use waterfall over Scrum? If yes, explain when.

- Yes, sometimes it is suggested to use waterfall model over Scrum.
- It is done when the customer requirements are simple, well-defined, fully understood, predictable, and are not subjected to change until the completion of the project.

156. Why does Scrum encourage the use of automated testing for projects?

- Scrum encourages the use of automated (automated performance or automated regression) testing to make the fastest possible delivery of the project. *you may explain some tools that you have used for automating*

157. Explain some common matrices for Agile.

- Velocity – Velocity is the average number of points from last 3-4 sprints. It is measured by the summation of the all approved estimates of the stories. It gives an idea of the capacity, progress etc.
- Cumulative Flow Diagram – With the help of it, an inspection is done over the uniform workflow. In this diagram/graph, the x-axis represents time whereas the y-axis represents the number of efforts.
- Work Category Allocation – it is an important factor that gives a quick information of the time investment i.e. where the time is being invested and which task should be given priority as a factor of time.
- Time Coverage – It is the time that is given to a code during testing. It is calculated in percentage as a factor of the number of lines of code called by test suite and the total number of relative lines of code.
- Business Value Delivered – It is a term which denotes the working efficiency of the team. The business objectives are assigned numerical values 1,2,3.. and so on, as per the level of priority, complexity, and ROI.
- Defect Removal Awareness – It is the factor that helps the team to deliver a quality product. The identification of an active number of defects, their awareness, and removal plays an important role in delivering a high-quality product.
- Defect Resolution Time – It is a procedure through which the team members detect the defects (bugs) and set a priority for the defect resolution. The procedure of fixing errors/bugs or defect resolution comprises of multiple processes such as clearing the picture of defect, schedule defect fixation, completing defect fixation, generation, and handling of resolution report.
- Sprint Burndown Matrix – The sprint burndown chart is a graph to represent the number of non-implemented or implemented sprints during as Scrum cycle. This matric helps to track the work completed with the sprint.

158. Name some methodologies and development where you have used Agile model.

- Some of the methodologies and development where Agile model can be used are –
    - Crystal methodologies
    - Lean software development
    - Dynamic development and Feature-driven development

159. What do you know about “Planning Poker” technique?

- Planning poker, also known as Scrum Poker, is a card-based agile technique that is used for planning and estimation. To start a session of planning poker technique, the agile user story is read by the product owner.
- The steps performed in the poker planning technique are –
    - Each estimator has a deck of poker cards with the values such as 0, 1, 2, 3, 5, and so on, to denote story points, ideal days or something else that the team uses for estimation.
    - Each estimator has a discussion with the product owner and then privately selects a card on the basis of their independent estimation.
    - If the cards with same value are selected by all estimators, it is considered as an estimate. If not, the estimator discusses the high and low value of their estimates.
    - Then again, each estimator privately selects a card and reveals. This process of poker planning is repeated to reach a general agreement.

160. Share your experience as Scrum M/Product O/Agile team member and what were your primary responsibilities?

- The trick in this question is whether while explaining you are showing self-organizing and self-motivational team.

161. What was the length of sprints/iterations in your project?

- The idea here is to judge in which kind of environment you have worked. There will be definitely follow up question like was this length fixed in the beginning and never changed? Have you tried with more than this length or less than that?

162. How have you done user story mapping & estimation of stories in your projects?

- Have you used any estimation technique like planning poker, t-shirt, sizing etc? Whatever technique you used in your project just mention it very clearly.

163. How is agile testing methodology different from other testing methodologies?

- The agile testing methodology involves the division of whole testing process into multiple small segments of codes. In every step, these segments of codes undergo testing.
- There are a number of additional processes involved in agile testing methodologies such as team communication, strategic modifications for optimal results and many others.

164.What is the biggest challenge you faced in your project while handling the Scrum team members?

- Challenges generally faced in the initial stages of scrum is stabilizing the velocity, team members conflicts, sticking to time-boxing etc..
    - Application should be stable enough to be tested. o Testing always under time constraint
    - Understanding the requirements. o Domain knowledge and business user perspective understanding.

165.Which tests to execute first?

- Testing the Complete Application. o Regression testing.
- Lack of skilled testers. o Changing requirements.
- Lack of resources, tools and training

166.Do you have a Scrum Master certification?

- If you are a certified scrum master, just share the details of your certification like certification exam, score obtained, and the year of passing the certification exam. In case you don't have a certification, mention and highlight your experience in the particular field. Also, let the interviewer know if you are planning to invest in the certification in the near future.

167.Do you hold any agile certification? Why did you choose this certification?

- Agile and Scrum methodologies are used to complete a project at earliest.
- Implementing agile principles results in customer satisfaction whereas scrum is known for its flexible feature as per the requirements.

168.Have you worked with offshore team before?

- No I don't work ...
- Offshore basically means that the team is situated in a different country, but is still employed by your company.

169. What are the common ui test automation tools?

170.What is concurrent user hits in load testing?

- When the multiple users, without any time difference, hits on a same event of the application under the load test is called a concurrent user hit. The concurrency point is added so that multiple Virtual User can work on a single event of the application. By adding concurrency point, the virtual users will wait for the other Virtual users which are running the scripts, if they reach early. When all the users reached to the concurrency point, only then they start hitting the requests.

171.What is Testware?

- It is the subset of software which helps in performing the testing of application.
- Testware are required to plan, design, and execute tests. It contains documents, scripts, inputs, expected results, set-up and additional software or utilities used in testing.
- Testware is term given to combination of all utilities and application software that required for testing a software package. It is special because it has;
    - Different purpose
    - Different metrics for quality and
    - Different users

172.How does a client or server environment affect testing?

- There are lots of environmental factors that affect the testing like speed of data transfer data transfer, hardware, and server etc while working with client or server technologies, testing will be extensive.
- When we have time limit, we do the integration testing. In most of the cases we prefer the load, stress and performance testing for examine the capabilities of the application for the client or server environment.

1. **How can we find all the links on a web page?**
   - All the links are formed using anchor tag 'a' and all links will have href attribute with url value. So by locating elements of tagName 'a' we can find all the links on a webpage.

2. **How to verify tooltip text using protractor?**
   - Tooltips web elements have an attribute of type 'title'. By fetching the value of 'title' attribute we can verify the tool tip text in protractor.

```
element(by.id("some")).getAttribute("title").then(function(tooltip){
        console.log(tooltip)
});
```

   Read WebElement get commands in Protractor

3. **What are the different mouse actions that can be performed?**
   - click(element)
   - doubleClick(element)
   - contextClick(element)
   - mouseDown(element)
   - mouseUp(element)
   - mouseMove(element)
   - mouseMove(element, long xOffset, long yOffset)
   - dragAndDrop()

4. **Write a code to wait for an alert to appear?**
   - Waiting for an alert to appear on a page can be performed using explicit wait in protractor.

```
browser.wait(ExpectedConditions.alertIsPresent(), 30000)
```

   Read Implicit and Explicit Waits in Protractor

5. **Write a code to wait for a particular element to be visible on a page using protractor ?**
   - Visibility means that the element is not only displayed but also has a height and width that is greater than 0. You can use visibilityOf function to check the visibility of the element

```
let EC = ExpectedConditions;
let condition = EC.visibilityOf(element(by.id("hidden")))
browser.wait(condition, 30000)
```

6. **How to wait for element to be available in angular applications ?**
   - The application may load some elements late and your script needs to stop for the element to be available for next action.
   - In below protractor code, the script is going to wait maximum 30 seconds for the element to be available. Feel free to change the maximum number per your application needs.

```
browser.wait(ExpectedConditions.presenceOf(element(by.id("element-id"))), 30000)
```

7. **Testcase failed saying "ElementNotVisible", but when analyzed manually element is visible ? How to Handle it ?**
   - There are couple of things which may cause this issue.
     - *Element may not be visible in automation due to the speed of selenium.*
     - *If you closed a hidden division pop up, and tried to perform action, then there is a chance that hidden division popup' animation went over which could cause this issue.*
     - *There is could be an another element which has same xpath or locator in some other page*
       Example : Consider you have a element which has xpath as //button[@id='abc'] on page X, by clicking some tab on xpage navigates the user to Y page, Now there is an element on Y page which have xpath same as //button[@id='abc']. But when you launch your application, application may be directly landed on page Y. So with this scenario, if you try to perform on element on Y page it could throw an Error.

8. **Is there a way to do drag and drop in selenium?**
   - You can perform drag and drop using the browser.action() in protractor

```
// perform drag and drop
browser.actions().dragAndDrop(
        element(by.id("drag1")),
        element(by.id("div2"))
).perform();
```

9. **Return Javascript execution result in protractor Jasmine?**
   - We need to return from your javascript snippet to return a value, so: js.executeScript("document.title'); will return null, but

```
js.executeScript("return document.title');
```

   will return the title of the document.

10. **Can Protractor handle windows based pop up?**
    - Protractor is a web automation testing tool which supports only web application testing. Therefore, windows pop up cannot be handled using Protractor.
      Read Handle alerts and popups

11. **Return Javascript execution result ?**
    - We need to return from your javascript snippet to return a value, so: browser.executeScript("document.title"); will return null, but: browser.executeScript("return document.title"); will return the title of the document.
      Read JavaScript Executor methods in Protractor

12. **What are the advantages of Automation framework in Protractor ?**
    - Re-usability of code
    - *Maximum coverage*
    - *Recovery scenario*
    - *Low cost maintenance*
    - *Minimal manual intervention*
    - *Easy Reporting*
    - *Logging for debugging*
    - *Easy Coding*

13. **What is an XPath?**
    - Xpath or XML path is a query language for selecting nodes from XML documents. XPath is one of the locators supported by Protractor.
    - Selenium webdriver supports only Xpath 1.0 ,selenium does not support Xpath 2.0, 3.0

14. **How to fetch the current page URL in Protractor ?**
    - Using getCurrentURL() command we can fetch the current page URL-

```
browser.getCurrentUrl().then(function(url){
        console.log("Web page url is : " +url )
});
```

      Read get Page Url and Title in protractor

15. **Is there a way to click hidden LINK in web driver?**

```
var Block1 = element(by.id("element ID"));
JavascriptExecutor js1=(JavascriptExecutor)driver;
js1.executeScript("$("+Block1+").css({'display':'block'});");
```

      Read JavaScript Executor methods in Protractor

16. **Suppose developer changed the existing image to new image with same xpath. Is test case pass or fail?**
    - Pass

17. **How to handle alerts and confirmation boxes?**
    - We can switch to the alert using switchTo().alert() method in protractor

```
let abc:Alert = browser.switchTo().alert();
// typescript assigns the type dynamically, so don't have to provide type explicitly
let abc = browser.switchTo().alert();
abc.accept()
abc.dismiss()
abc.getText()
abc.sendKeys()
```

      Read Handle javascript alerts in protractor jasmine

18. **What is the order of fastest browser implementation for Protractor ?**
    - HTMLUnitDriver is the fastest browser implementation as it does not involves interaction with a browser, This is followed by Firefox driver and then IE driver which is slower than FF driver and runs only on Windows.

19. **How to get typed text from a textbox?**
    - Use get Attribute ("value") method by passing arg as value, getAttribute() method will return a promise which contains string

```
element(by.xpath("xpath of box")).getAttribute ("value")).then(function(textValue){
        console.log(textValue)
});
```

20. **What are the prerequisites to run Protractor?**
    - JDK, WebDriver (selenium standalone jar file), browser, application to be tested.

21. What are the web page Elements in Web Applications?

- Link Button Image,
- Image Button
- Edit Box
- Check box
- Drop down box
- Combo box
- Web table /HTML table
- Frame

o Image Link,
o Text box
o Text Area
o Radio Button
o List box

22. What is the difference between browser.close() and browser.quit() command?

- **close():** Protractor's close() method closes the web browser window that the user is currently working on or we can also say the window that is being currently accessed by the WebDriver. The command neither requires any parameter nor does is return any value.
- **quit():** Unlike close() method, quit() method closes down all the windows that the program has opened. Same as close() method, the command neither requires any parameter nor does is return any value.

23. What is ElementFinder ?

- The ElementFinder is nothing but elements present in the webpage, we will get this as result of element(by.locator("locator value"))
- ElementFinder can be used to build a chain of locators that is used to find an element.
- An ElementFinder does not actually attempt to find the element until an action is called, which means they can be set up in helper files before the page is available.
  Read WebElement and Element finder in protractor

24. What is WebElement in Protractor?

- When we perform any action on the ElementFinder, protractor converts it into WebElement and perform the operation.
- We can convert the ElementFinder into WebElement using getWebElement() command present in the protractor. Every method calls this method internally before performing operation on the webpage object

```
karthiq.chercher@gmail.com
// below code convert the Element finder to WebElement before performing
// click operation
element(by.id("sampletext")).getText()
// getWebElement
element(by.id("sampletext")).getWebElement()
```

25. Check If An Element Exists in Protractor ?

- Get the all the matches for that locator and the value should be more than 0 if it is zero then there no such element in the web page
- You can use below protractor code snippet to check if a element with id 'element-id' exists on web page.

```
element.all(by.id("element-id")).count().then(function(totalMatches){
        if(totalMatches>0){
                console.log("element is present")
        }else{
                console.log("element is not present")
        }
})
```

26. How to disable a test case in Jasmine With Protractor ?

- To disable the test case we use the make the it block in to xit block in jasmine

```
xit("test description)
```

27. Explain what is Time-Out test in Protractor?

- The Time-Out test in Protractor is nothing but time allotted to perform unit testing. If the unit test fails to finish in that specific time limit, protractor will abandon further testing and mark it as a failed.

28. How To Check If An Element Is Visible With Protractor?

- We can use isDisplayed() method to check whether a element is visible or not. You can check whether an element is visible or not using below code.

```
element(by.id("element-id")).isDisplayed().then(function(displayed){
        if(displayed){
                console.log("element is Visible")
        }else{
                console.log("element is not visible")
        }
})
```

29. How to Focus On A Input Element On Page using protractor ?

- Doing focus on any element can be easily done by clicking the mouse on the required element. However when you are using selenium you may need to use this workaround instead of mouse click you can send some empty keys to a element you want to focus.

```
let webElement  = element(by.id("element-id"));
//Send empty message to element for setting focus on it.
webElement.sendKeys("");
```

Read WebElement Commands in Protractor

30. How to Overwrite Current Input Value in editable field On Page using protractor ?

- The sendKeys method on WebElement class will append the value to existing value of element. If you want to clear the old value. You can use clear() method.

```
let webElement = element(by.id("element-id"));
webElement.clear();
webElement.sendKeys("new input value");
```

31. How to Mouse over Action To Make Element Visible Then Click?

- When you are dealing with highly interactive multi layered menu on a page you may find this useful. In this scenario, an element is not visible unless you click on the menu bar.
- So below code snippet will accomplish two steps of opening a menu and selecting a menu item easily.

```
browser.actions.moveToElement(menuElement).moveToElement(element(by.xpath("xpath-of-menu-item-element"))).click().perform()
```

32. How to Extract CSS Attribute Of An Element in protractor ?

- We can get any CSS property of a webelement using getCSSValue in protractor. For example, to get background color of an element use below snippet

```
browser.get("https://google.com")
element(by.name('q')).getCssValue("font-size").then(function(fontSizeValue){
        console.log("Font size is : " +fontSizeValue);
})
```

33. Get Size of an Element in protractor ?

- getSize() method present in protractor determines the size of an element, size consists of two values width and height which are sum of respective attributes
- Width = margin-left + margin-right + padding-left + padding-right + actual width;

```
browser.get("https://google.com")
element(by.name('q')).getSize().then(function(elementSize){
        console.log("Width of the element : "+elementSize.width);
        console.log("Height of the element : "+elementSize.height);
})
```

Read WebElement size in Protractor

34. How to check whether method is displayed in webpage or not ?

- isDisplayed() method in Protractor verifies and returns a boolean value based on the state of the element whether it is displayed or not.

```
browser.get("https://google.com")
element(by.name('q')).isDisplayed().then(function(displayFlag){
        console.log("Displayed flag is : "+displayFlag);
})
```

35. How to check whether whether element is enabled or not ?

- isEnabled() method in Protractor verifies and returns a boolean value based on the state of the element whether it is enabled or not.

```
browser.get("https://google.com")
element(by.name('q')).isEnabled().then(function(enabledFlag){
        console.log("Enabled flag is : "+enabledFlag);
})
```

Read WebElement States in Protractor

36. How to check whether a dropdown is selected or not in angular applications ?

- For testing angular application, we would be using protractor browser automation tool.
- isSelected() verifies if an element is selected or not, isSelected() method returns boolean value, true if the element is selected and false if it is not.

```
browser.get("https://google.com")
element(by.xpath("//input[@id='selected'] [value='Bangalore']")).isSelected().then(function(selectedFlag){
        console.log("Is element selected : "+selectedFlag);
})
```

Read WebElement Selected or not in Protractor

37. How to Find All Links On The Page using protractor ?

- A simple way to extract all links from a web page.

```
browser.get("https://google.com")
element.all(by.tagname("a")).count().then(function(allLinks){
        console.log("Number of links in page  : " +allLinks);
});
```

38. How to Execute A JavaScript Statement On Page in protractor ?

- If you love JavaScript, you are going to love this. browser.execute() can run any javascript code snippet on browser during your testing.
- In case you are not able to find a way to do something using web driver, you can do that using JS easily.

```
browser.execute("javascript code");
```

39. How to Get HTML Source Of A Element On Page using Javascript in protractor ?

- If you want to extract the HTML source of any element, you can do this by some simple Javascript code.

```
browser.executeScript("return document.getElementById('" + elementId + "').innerHTML;");
```

40. How To Switch Between Frames using Protractor?

- Multiple iframes are very common in recent web applications. You can have your webdriver script switch between different iframes easily by below code sample

```
browser.switchTo().frame(element(by.xpath("//iframe[@src='demo.html']")).getWebElement());
```

41. What is the difference between "GET" and "NAVIGATE" to open a web page in protractor ?

- Get method will get a page to load or get page source or get text that's all whereas navigate will guide through the history like refresh, back, forward.
- For example if we want to move forward and do some functionality and back to the home page this can be achieved through navigate() only.
- browser.get() will wait till the whole page gets loaded and browser.navigate() will just redirect to that page and will not wait

42. Difference between flex and flash application.?

- In flash there is no code just based on creativity(design) we will complete the work(time consuming process) whereas flex contain some small functions which is integrated with mxml,PHP..(no tool is there to develop flex we want to use the properties of css and style sheet)

43. How to stop Page Loading, when element is loaded ?

- We can stop page loading by sending Keys.ESC to body element in protractor.

```
element(by.tagName("body")).sendKeys(Keys.ESC);
```

44. Why do we go for automation testing ?

- *Manual testing of all workflows, all fields, all negative scenarios is time and cost consuming.*
- *It is difficult to test for multilingual sites manually.*
- *Automation doesn't require human intervention, we can run automated test unattended(nightly regressions).*
- *Automation increases speed of test execution.*
- *Automation helps increase test coverage.*
- *Manual testing can become boring and hence error prone.*

45. How do you accept and cancel alert in protractor ?

- We can accept the alert using accept methods present in the Alerts class. But before accepting the alert we have to switch the control to the alert in protractor

```
browser.switchTo().alert().accept()
```

- To close or cancel the alert we have to switch to the alert using switchTo().alert() method and then we have to use dismiss() method to cancel the alert using protractor

```
browser.switchTo().alert().dismiss()
```

46. How do you set value to prompt alert in protractor ?

- We can use sendkeys method present in the alert class to set value in the p type of alert in protractor

```
browser.switchTo().alert().sendKeys("xyz")
```

47. How do you execute a spec file both in chrome and firefox ?

- We can execute same file in multiple browsers using the shardTestFiles , we have to set this parameter as false and we have to enable the chrome and firefox browsers in Multi-capabilities block.

```
shardTestFiles: false,
multiCapabilities: [{
  'browserName': 'chrome',
} , {
  'browserName': 'firefox',
}]
```

48. Can we set global variables in Protractor ?

- We can set global variable in protractor using params present in the conf file.
- Normally we set urls, usernames, passwords in this params

```
params: {
        login: {
          email: 'default',
          password: 'default'
        }
}
```

49. What are the testing frameworks available for protractor ?

- Jasmine : Jasmine is the most preferred test framework when Protractor is installed.
- Mocha : Mocha is a JavaScript test framework which runs on Node.js. If you wish to use Mocha as your test framework, you will have to set it up with your Protractor

50. What is Jasmine ?

- Jasmine is JS testing framework, we can use jasmine along with framework to test the web application.
- It has features like beforeEach, afterEach, beforeAll, afterAll, it block and we can combine it blocks and describe blocks

51. How do you handle dropdowns in protractor ?

- In selenium we have Select class to handle the dropdowns
  - I find the select tag and create a object from it → Ex; Webelement element=driver.findElement(by.id("blah");
  - ex;Select list=new Select(element)
  - I can use 3 methods
    - SelectByVisibleText() - select option based on test displayed. Takes String param
    - SelectByIndex() -selects option based on the count.Takes int param
    - SelectByValue() - selects option based on the value of the value attribute.Takes string param
    - getFirstSelectedOption() - returns option that is selected
    - getAllSelectedOption() - returns all the options which are selected (multiple options are possible)
    - getOptions() → Returns all options in a list of webelements
- in protractor doesn't have such helper classes.
- To select a value in dropdown, we have to click the dropdown and then we should click the option inside the dropdown.

52. What is conf file ?

- Conf file is the starting point of the protractor execution, conf file helps user to set the browser and pre-execution steps in protractor. We will configure grid details in protractor

53. How do you exclude a spec file in protractor ?

- We can exclude test files using exclude parameter in conf.js file. Exclude parameter will be useful when you do not want to run only few tests or a folder.
- Exclude also accept Array as parameter values, also responds to regular expression.

```
exclude: ['D:\\Protractor Demo\\specs\\dummytest.js']
```

54. How do you open firefox in protractor, which is installed in custom path ?

- Sometimes the firefox might be installed in some custom path, in those cases firefoxPath in the conf.js file helps us to set the path to the firefox.exe file.
- This woud be very useful if you are trying to perform version testing.

```
firefoxPath: "C:/Program Files/Mozilla Firefox/Firefox 54/firefox.exe",
```

55. What is maxInstances in protractor ?

- Maximum number of browser instances that can run in parallel for this set of capabilities. This is only needed if shardTestFiles is true in conf.js file

56. What is Typescript ?

- Typescript is a programming language, and it is superset of Javascript. Typescript provides syntaxes like Java/Python but also it provides javascript function.
- End of the day Typescript is converted into javascript and executed with protractor.
- It is easy to learn typescript than javascript.

57. What is directConnect in protractor conf.js file ?

- directConnect is a conf.js file parameter, If true, Protractor will connect directly to the browser Drivers at the locations specified by chromeDriver and firefoxPath.
- Only Chrome and Firefox are supported for direct connect.

```
directConnect: false/true,
```

58. How do you set the geckodriver path in protractor ?

- geckoDriver location is used to help find the geckodriver.exe file. This will be passed to the Selenium jar as the system property webdriver.gecko.driver.
- If the value is not set when launching locally, it will use the default values downloaded from webdriver-manager.
  geckoDriver: 'D:/Eclipse progs/driverserver/geckodriver.exe',

60. Drop down

```
element.all(by.tagName("option")).each(function(item){
            item.getAttribute("value").then(function(text){
                if(text==c){
                    item.click();
                }
            })
        });
```

- **Methods :** count(), first(), last(), get(), each(function(){})
- `cssContainingText('.text-inverse','hello world'))`

61. Alert

- Alert is a small message box which displays on-screen notification to give the user some kind of information or ask for permission or warning
  - We cannot identify alerts using inspect tools
  - We cannot just locate alerts.
  - It is not a Window.
  - It will not allow to perform any other operation WebPage unless it is taken care of.
  - We will need to switch to alert window via: browser.**switchTo**().**alert**()
- Alert Methods:

```
browser.switchTo().alert().getText();
browser.switchTo().alert().accept();
browser.switchTo().alert().dismiss();
browser.switchTo().alert().sendKeys();
```

62. Multiple Windows & Popups

- When application opens up a new pop-up window or tab, Selenium/protractor will not automatically pass control to that page.
- We have to pass control to the new tab/window perform our desired actions and then pass control back.
- To get the current (active) window/tab GU ID:
  - browser.**getWindowHandle**();
- To get all windows/tabs GU IDs:
  - `browser.getWindowHandles();`
  - Once you get the the window handles, it returns you art array as seen. we can loop through this array and do other operations as well.
- To switch control over to the target window/tab GU ID:
  - `browser.switchTo().window(guid);`

63. iFrame, switchTab

- iFrame is nothing but another webElement in html page, which displays another part of webpage.
- You **won't be able to interact with it via the DOM**. We have to **switch into frame** to see the elements present in the frame. Protractor throws NoSuchElementFound Exception unless we switch to the iframe
- Using locator:
  browser.switchTo( ).frame(browser.driver.**findElement**(by.**tagName**('iframe'));
- If using element array finder, then make sure to use .getWebElement to convert.
  browser.switchTo( ).frame(**element**(by.**tagName**('iframe')).**getWebElement**());
- Using Index: (not preferred as order can change)
  // switch to 1st frame
  browser.switchTo( ).frame(1);
- If nested iFrames, then to go back to outer iframe, use:
  browser.switchToParentFrame();
- To switch back to default page:
  browser.switchTo( ).defaultContent();

64. Setup & Tear Down

- Jasmine has 4 global function to manage for setup and teardown in test suites and They helps to find where we did mistakes
- **SETUP; (**when we have some initial steps before you actually start validation we will put it in a **setup method)**
    - beforeAll → executes only **once** before any of the `it` block and before any of the beforeEach functions & beforeEach → executes before any spec in the describe block containing `it`.
- **TEARDOWN;** (if you have any steps like any automation steps once that complete functionalities done you will put in the **tearDown method**.)
    - afterAll & afterEach

65. Assertions to validate Protractor tests (Expectations & Matchers)

- **Matchers** → Each matcher implements a Boolean comparison between the actual value and the **expected** value. It is responsible for reporting to Jasmine if the **expectation is true or false**.
    - `expect(instance).toBe(instance);`
    - `expect(number).toBeGreaterThan(number);`
    - `expect(number).toBeCloseTo(number, decimalPlaces);`
    - `expect(mixed).toBeFalsy();`
    - `expect(mixed).toBeNull();`
    - `expect(mixed).toBeUndefined();`
    - `expect(mixed).toEqual(mixed);`
    - `expect(number).toBeLessThan(number);`
    - `expect(mixed).toBeDefined();`
    - `expect(number).toBeNaN();`
    - `expect(mixed).toBeTruthy();`
    - `expect(array).toContain(member);`
- Negating Matchers Any matcher can evaluate to a negative assertion by adding the **not** in front of it.
  E.g: expect(2+5).**not**.toEqual(4);

66. POM (Page Object Model)

- It helps make the code more
    - **Readable**
    - **Maintainable**
    - **Reusable**
- Page Object Model is a design pattern to create **Object Repository for web UI elements**.
- F or each web page in the application, there should be corresponding page file. (e.g: loginpage)
- We also store our reusable functions in this page-object files.
- Simple format of the Page Object model is:

```
var HomePage = function(){
    ...code...
} module.exports = new HomePage();
```

67. What are the advantages of using POM

- *Object Repository:* You can create an Object Repository of the fields segmented page-wise. This as a result provides a Page Repository of the application as well. Each page will be defined as a java class. All the fields in the page will be defined in an interface as members. The class will then implement the interface.
- *Functional Encapsulation:* All possible functionality or operations that can be performed on a page can be defined and contained within the same class created for each page. This allows for clear definition and scope of each page's functionality.
- *Low maintenance:* Any User Interface changes can swiftly be implemented into the interface as well as class.
- *Programmer Friendly:* Robust and more readable. The Object-oriented approach makes the framework programmer friendly.
- *Low Redundancy:* Helps reduce duplication of code. If the architecture is correctly and sufficiently defined, the POM gets more done in less code.
- *Efficient & Scalable:* Faster than other keyword-driven/data-driven approaches where Excel sheets are to be read/written

68. What are the disadvantages of using POM?

- *High Setup Time & Effort:* Initial effort investment in development of Automation Framework is high. This is the biggest weight of POM in case of web applications with hundreds/thousands of pages. It is highly suggested that if this model is decided to be implemented, then it should be done parallel to development of the application. Refer V-Model for Software Development Life Cycle.
- *Skilled labor:* Testers not technically sound or aware of programming best practices are a nightmare in this case. Perhaps this is the biggest mistake to make, employing unskilled labor in hopes of training them during implementation. Unskilled testers need to undergo a Training Boot Camp to be ready for such an undertaking. Also the Architecture of the framework should be defined clearly and completely before development in order to avoid any loopholes in later stages. Every application is different and it may require the automation framework to be significantly tailored towards it.
- *Specific:* Not a generic model. Automation Framework developed using POM approach is specific to the application. Unlike keyword-driven/data-driven frameworks, it is not a generic framework.

✓ Irrespective of the disadvantages, POM is perhaps the most efficient and highly recommended approach towards any web application. As the framework matures it is perhaps easier to modify it into a hybrid framework from a POM approach than from other keyword/data driven approaches.

69. Who is going to review your code

- In our team we(testers) review each others Tests.

70. What is test automation and what are the benefits?

- Using software to execute tests.
    - No human interaction
    - Fast, Reliable, Repeatable, reusable,
    - Scalable and cost reduction
    - Data driven testing

1. **Java Virtual Machine**
   - JVM is an abstract machine. It actually runs by Java code.

2. **Are JavaScript and Java the same?**
   - Java is an OOP programming language while Java Script is an OOP scripting language.
   - Java creates applications that run in a virtual machine or browser while JavaScript code is run on a browser only.
   - Java code needs to be compiled while JavaScript code are all in text.
   - They require different plug-ins.

3. **Java Runtime Environment**
   - JRE is what we need to run a Java program and contains set of libraries and other files that JVM uses at run time. JRE = JVM + Library Classes

4. **Java Development Kit**
   - JDK is what we need to compile Java source code and contains JRE, development tools.
   - JDK = JRE + Development tools

5. **Object Oriented Programming (OOP)**
   - OOP is a programming language model organized around around object rather than actions;
     - It makes development and maintenance easier
     - It provides data hiding
     - It provides ability to simulate real-world.
   - OOP language follow 4 principles:
     - Encapsulation: We can hide direct access to data by using private key and we can access private data by using getter and setter method.
     - Abstraction: It is a process of hiding implementation details and showing only functionality to the user. Abstraction, lets you focus on what the object does instead of how it does it.
     - Inheritance: It is used to define the relationship between two classes. When a child class acquires all properties and behaviours of parent class known as inheritance. Child class can reuse all the codes written in parent class. It provides the code reusability.
     - Polymorphism: It is an ability of object to behave in multiple form. The most common use of polymorphism is Java, when a parent class reference type of variable is used to refer to a child class object.
       E.g.: WebDriver driver = new ChromeDriver();
       We use method overloading and overriding to achieve Polymorphism.

6. **What is the concept of Abstraction?**
   - In OOP, abstraction is a process of hiding the implementation details from the user, only the functionality will be provided to the user.
   - In other words, the user will have the information on what the object does instead of how it does it.
   - In Java, abstraction is achieved using Abstract classes and interfaces.
   - For example: when you login to your bank account online, you enter your user_id and password and press the login. What happens then, how the input data sent to the server, how it gets verified are all abstracted away from you.

7. **Difference between Abstraction and Encapsulation?**
   - Abstraction lets you focus on **what** the object does instead of **how** it does it.
     Encapsulation means hiding the internal details of how the object does something.
   - Abstraction is used for hiding the **unwanted** data and giving relevant data.
     Encapsulation means hiding the code and data, and to protect the data from outside.
   - Abstraction can achieved by using Abstract class and Interfaces
     Encapsulation can achieved by using “private” keyword.

8. **What is encapsulation and how did you use it?**
   - Data: hiding by making variables private and providing public getter and setter methods.
   - in my project i created multiple POJO/BEAN classes in order to manage test data and actual data.
   - EX: I take JSON from API response and convert to object of my POJO class all variables are private with getters and setter.

9. **Difference between Abstract Class and Interface?**
   - A class that is declared with abstract keyword, is known as abstract class. It can have abstract and non-abstract methods.
   - An Interface is a blueprint of a class. It is a template and it is declared with interface keyword. It can have abstract methods, default methods, static methods and public final static variables
   - When we want to use Abstract class, we use “extend” keyword.
     When we want to use Interface, we use “implement” keyword.
   - Abstract class and interface both are used to achieve abstraction
     Both cannot be instantiated, we cannot create an object.

10. **What is immutable ?**
    - Immutable means that once the constructor for an object has completed execution that instance can't be altered.
    - This is useful as it means you can pass references to the object around, without worrying that someone else is going to change its contents.
    - Especially when dealing with concurrency, there are no locking issues with objects that never change. E.g.

```
class Foo {
    private final String myvar;

    public Foo(final String initialValue)
    {
        this.myvar = initialValue;
    }

    public String getValue()
    {
        return this.myvar;
    }
}
```

11. **What is Polymorphism?**
    - Polymorphism is a very important concept in OOP because;
      - it enables to change the behavior of the applications in the run time based on the object on which the invocation happens.
      - by Polymorphism; one object can have different forms
    - Two types → Compile Time which is Static and Run Time Polymorphism which is related with child and parent class.
    - Polymorphism is implemented using the concept of Method overloading and method overriding. This can only happen when the classes are under the parent and child relationship using inheritance.

12. **Difference between Polymorphism and Inheritance**
    - Like in real world, Inheritance is used to define the relationship between two classes. It is similar to Father-Son relationship. In Java, we have Parent class (also known as super class) and child class (also known as subclass). Similar to the real-world, Child inherits Parents qualities, methods and codes.
      - A child class can reus all the codes written in Parent class and only write code for behavior which is different than the Parent.
      - Inheritance is actually meant for code-reuse.
    - On the other hand, Polymorphism is an ability of object to behave in multiple form.
      - It is classified as overloading and overriding.
    - By the way, they are actually related to each other, because its inheritance which makes Polymorphism possible, without any relationship between two class. It is not possible to write polymorphic code.
      - Dynamic Polymorphism → Overriding
      - Static Polymorphism → Overloading

13. **What is static binding vs dynamic/runtime binding?**
    - Static binding is overloading and dynamic binding is method overloading

14. What is Access modifier and what are the different access modifiers?

- Java provides a number of access modifiers to set access levels for classes, variables, methods, and constructors.
    - Visible to the package, the default. No modifiers are needed.
    - Visible to the class only (private).
    - Visible to the world (public).
    - Visible to the package and all subclasses (protected).

15. Difference between Public, Private and Protected modifier in Java?

- In Java, access modifier which specifies accessibility of class, methods and variables. There are four access modifier in Java namely Public, Private, Protected and Default.
- The difference between these access modifies is that;
    - The most importantly is the level of accessibility.
    - Public is accessible to anywhere
    - Private is only accessible in the same class which is declared
    - Default is accessible only inside the same package
    - Protected is accessible inside the same package and also outside the package but only the child classes.
- We cannot use private or protected modifier with a top-level class.
- We should also keep in mind that access modifier can not applied for local variable public, private or protected in Java.

16. Difference between a Constructor and a Method?

- Constructor doesn't have a return type and constructor's name must be same as the class name.
    - Constructor is called automatically when a new object is created. Constructor is invoked implicitly.
    - The Java compiler provides a default constructor if we don't have any constructor.
    - Constructors are not inherited by child classes
- Method have a return and the method's name may or not be same as the class name
    - Method is invoked explicitly.
    - Method is not provided by compiler in any case.
    - Methods are inherited by child classes.

17. Difference between method Overloading and method Overriding?

- First and most important difference between overloading and overriding is that,
    - in case of overloading, method name must be the same but the parameters must be different;
    - in case of overriding, method name and parameters must be same
- Second major difference between method overloading and overriding is that;
    - We can overload method in the same class but method overriding occurs in two classes that have inheritance relationship.
- We can not override static, final and private method in Java but we can overload static, final and private method in Java.
- In method overloading, return type can be same or different. In method overriding, return type must be same or covariant type.

18. Difference between Set, List and Map in Java?

- Set, List and Map are 3 important interface of Java collection framework.
    - List provides *ordered* and indexed collection which *may contain duplication*.
    - Set provides *un-ordered* collection of unique objects. Set *doesn't allowed duplication*.
      List and Set are both extend collection interface.
    - Map provides a data structure based on Key Value. Key is always unique, value can be dupl.

19. When to use List, Set and Map?

- If we need to access elements frequently by using index, then List is a way to go ArrayList provides faster access if we know index.
- If we want to store elements and want them to maintain an order, than go for List again. List is an ordered collection and maintain order.
- If we want to create collection of unique elements and don't want any duplicate than choose any Set implementation. (HashSet…)
- If we want store data in form Key and Value than Mapis the way to go. We can choose from HashMap, Hashtable...

20. How do you find if ArrayList contains duplicates or not?

- Well, I think, quick way of checking if an ArrayList contains duplicates or not is to convert that ArrayList into Set. Since Set does not allow duplicates. So, when I converted it, Set will be smaller than original Array/ArrayList if ArrayList contains duplicates.

```
List inputList = Arrays.asList (array input…);
Set inputSet = new HashSet (inputList);
If (inputSet.size()<inputList.size()){
        return true;
}else{return false;}
```

- Compare each element of Array to all other elements and returns true if it founds duplicates.

```
for(int i=0; i<input.length;i++){
        for(int j=0; j<input.length;j++){
                if (input[i].equals(input[j]) i!=j){
                        return true;
                }
        }
}
```

21. What is Array?

- An array is a container object that holds a fixed number of values of a single type. The length of an array is established when the array is created. After creation, its length is fixed. You have seen an example of arrays already, in the main method of the "Hello World!" application. This section discusses arrays in greater detail.
- Each item in an array is called an element, and each element is accessed by its numerical index. As shown in the preceding illustration, numbering begins with 0. The 9th element, for example, would therefore be accessed at index 8.
- **Advantage of Java Array**
  - Code Optimization: It makes the code optimized, we can retrieve or sort the data easily.
  - Random access: We can get any data located at any index position.
- **Disadvantage of Java Array**
  - Size Limit: We can store only fixed size of elements in the array. It doesn't grow its size at runtime. To solve this problem, collection framework is used in java.

22. Difference between Arrays and ArrayList in Java?

- Array is a part of core Java programming and has special syntax
  ArrayList is part of collection framework and implement List interface
- Major difference is that; Array is a fixed length data structure, so we can change length of Array one created, ArrayList is re-sizeable.
- The other major one is that Array can contain both primitives and objects. ArrayList can only contain objects. It cannot contain primitive types.
- Also, we can compare Array and ArrayList on how to calculate length of Array or size of ArrayList. We use length for an Array, we use size() method for an ArrayList.

Array	ArrayList

int[ ] arr = {6,9,1};
• arr.length
• Arrays.sort(arry); //import java.util.Arrays
• Java also provides a convenient way to search, but only if the array is already sorted.
Arrays.binarySearch(arry, value);
• string[ ] [ ] marry = new string [3] [2];
• Arrays.asList(arry);
• Arrays.toString(arry);
• Arrays.deepToString(arry); //for multidimensional
	ArrayList list = new ArrayList();
	• list.add(obj);
	• list.add(index position, obj);
	• list.remove(obj);
	• list.set(index position, new obj); //replace object
	• list.isEmpty(); //boolean
	• list.size();
	• list.clear();
	• list.contains(obj);
	• list.get(int index);
	• list.toArray();
	• Sorting → Collection.sort(list);

23. How do you sort an object that you created?

- I implement Comparable interface and override compareTo method.
- Then whenever I store my objects into a List then use Collections.
- Sort it will be able to sort.
- Also I can store my objects into a TreeSet or TreeMap. → Ex: NEXT PAGE

24. What is thread-safe or Synchronized?

- A sequential or single threaded program has single flow - synchronized:
- Means that two threads can not execute the method or access the variables at the same time and the JVM takes care of enforcing that.
- it is used to achieve thread-safety

25. Difference between Hashtable and HashMap in Java?

- Both Hashtable and HashMap implements Map interface and both are Key and Value.
- HashMap is not thread-safe while Hashtable is a thread-safe collection.
- Second important difference is performance since HashMap is not synchronized. It performed better than Hashtable.→ Collections.synchronizedMap(...Map…);

26. Difference between Error and Exception in Java?

- Both Error and Exception are derived from Throwable in Java.
- Error represent errors which are generally can not be handled.
  For examples: OutOfMemoryError, NoClassDefFoundError
- On the other hand, Exception represent errors which can be catch and dealt.
  For examples> IOException, NullPointerException
- Exception is divided in two categories checked and unchecked Exception. Checked Exception require a mandatory try-catch code block to handle it.
  Unchecked Exception mostly represent programming errors (NullPointerException or RuntimeException)

27. Difference between RuntimeException and CheckedException in Java?

- Exception are divided in two categories Runtime (unchecked) Exception and CheckedException.
- Main difference between RuntimeException and CheckedException is that, it is mandatory to provide try-catch to handle CheckedException while in case of RuntimeException is not mandatory.
- Some of the most common Exception like NullPointerExceptio, ArrayIndexOutOfBound, ClassNotFoundException, IOException.

28. Difference between throw and throws in Java?

- throw and throws are two keyword related to Exception feature of Java programming language.
- throw keyword is used to throw an exception explicitly, on the other hand,
  throws keyword is used to declare an exception which means it works similar to the try-catch block.
- If we see syntax wise than throw is followed by an instance of Exception class throws is followed by exception class names.
  throw new ArithmeticException (“Arithmetic Exception”);
  throws ArithmeticException;
- throw keyword is used to method body, while
  throws is used in method signature to declare the exception.

29. How would you handle Exception?

- try-catch blocks is placed around the code that might generate an exception. Every try block should be followed either by catch or finally block.
- the finally block follows a try block or a catch block. Finally block always executes, no matter what happened.
- throws keyword. If a method does not handle a checked exception, the method must declare it using the throws keywords which appears at the end of method’s signature.
- throw keyword. We can throw an exception by using the throw keyword inside method body
- final is a keyword and used to apply restrictions on class, method and variable. (final class cannot be inherited, final method cannot be overridden and final variable value cannot be changed.)
- finally is a block and used to place important code, it will be executed whether exception is handled or not.
- finalize is a method and used to perform clean up processing before object is garbage collected.

30. Difference between Object and Class?

- Class is a blueprint or template which you can create as many objects as you like
  Object is a member or instance of a class
- Class is declared using class keyword,
  Object is created through new keyword mainly.

31. StringBuffer and StringBuilder

- StringBuffer is synchronized, StringBuilder is non-synchronized
- StringBuilder is more efficient than StringBuffer
- Constructor;
  - StringBuilder() → created an empty string with the initial capacity of 16.
  - StringBuilder(str str) → created an StringBuilder the specified string.
  - StringBuilder(int length) → created an empty string with the specified capacity as length.
- Method;
  - StringBuilder str = new StringBuilder("Hello");
    str.append("Java"); //Hello Java
    str.insert(1,"Java"); //HJavaello
    str.replace(1,3,"Java"); //HJavalo
    str.delete(1,3); //Hlo
    str.reverse(); //olleH

```
string str = "Hello";
string reversed = " ";
for (int i = str.length()-1; i>=0 ; i--){
        reversed += str.charAt(i);
} sysout(reversed);
```

32. Important String Methods;

Method	Description
char charAt(int index)	returns char value for the particular index
int length()	returns string length
String substring(int beginIndex)	returns substring for given begin index
String substring(int beginIndex, int endIndex)	returns substring for given begin index and end index
boolean contains(CharSequence s)	returns true or false after matching the sequence of char value
boolean equals(Object another)	checks the equality of string with object
boolean isEmpty()	checks if string is empty
String concat(String str)	concatinates specified string
String replace(char old, char new)	replaces all occurrences of specified char value
String replace(CharSequence old, CharSequence new)	replaces all occurrences of specified CharSequence
static String equalsIgnoreCase(String another)	compares another string. It doesn't check case.
String[] split(String regex)	returns splitted string matching regex
String[] split(String regex, int limit)	returns splitted string matching regex and limit
String intern()	returns interned string
int indexOf(int ch)	returns specified char value index
int indexOf(int ch, int fromIndex)	returns specified char value index starting with given index
int indexOf(String substring)	returns specified substring index
int indexOf(String substring, int fromIndex)	returns specified substring index starting with given index
String toLowerCase()	returns string in lowercase.
String toLowerCase(Locale l)	returns string in lowercase using specified locale.
String toUpperCase()	returns string in uppercase.
String toUpperCase(Locale l)	returns string in uppercase using specified locale.
String trim()	removes beginning and ending spaces of this string.
static String valueOf(int value)	converts given type into string. It is overloaded.

33. What is finalize()?

- The finalize() method of an object is called by the Garbage Collector before it removes the object from memory (when there are no references to that object).
- You can write the object cleanup code in the finalize method.
- We can call the finalize() method;
    - MyObject m = new MyObject();
    - m.finalize();
    - m = null;
    - System.gc()
- `protected void finalize() throws Throwable {}`
    - every class inherits the `finalize()` method from java.lang.Object
    - the method is called by the garbage collector when it determines no more references to the object exist
    - the Object finalize method performs no actions but it may be overridden by any class
    - normally it should be overridden to clean-up non-Java resources ie closing a file
    - if overriding `finalize()` it is good programming practice to use a try-catch-finally statement and to always call `super.finalize()`. This is a safety measure to ensure you do not inadvertently miss closing a resource used by the objects calling class
    - `protected void finalize() throws Throwable { try { close(); // close open files } finally { super.finalize(); } }`
    - any exception thrown by `finalize()` during garbage collection halts the finalization but is otherwise ignored
    - `finalize()` is never run more than once on any object

34. What is system.gc()?

- A request to JVM to run Garbage collector to free up memory
- Doesn't always work

35. final vs finalize vs finally

- final is a keyword and used to apply restrictions on class, method and variable.
    - final Class CAN'T be Inherited
    - final Method CAN'T be Overridden
    - final Variable value CAN'T be changed.
- finally is a block and used to place important code, it will be executed whether exception handled or not
- finalize is a method and used to perform clean-up processing before Object is Garbage collected.\

36. What's the difference between IS-A and HAS-A relationship?

- IS-A is based on inheritance → This thing is a type of that thing
- HAS-A relationships are based on usage
    - Ex: class A HAS -A B if code in Class A has a reference to an instance of class B
    - Public Horse{
      Private Halter myHalter;
      Public void jump(){
      Sysout"im jumping"
- You are calling a Halter instance variable to use jump method that is coming from horse class - what this does is that it is means that Horse HAS-A Halter
- Horse class has a Halter, because Horse declares an instance variable of type Halter.
  When code invokes tie() on the Horse object's Halter instance variable -}
- Abstract class have constructors while interface don't have one

37. What is Iterator and difference between for each loop?

- Iterator works with arrayList and not array.
- It will help us Iterate through the elements.
- Difference is with iterator you can make changes(remove item) to the list while iterating.
- within for each loop we can not make changes to our list

38. Treeset vs TreeMap

- TreeSet: Can contain only unique values - is sorted in ascending order
- TreeMap: can contain only unique keys. - keys are sorted in ascending order

39. Java Collection Framework

- Two types of Collection (Be careful not to mix them up)
    - java.util.**Collection** - interface from Set and List extend (not implement)
        - **Set** (Unique things) - DOES NOT ALLOW DUPLICATES. Classes that Implement Set;
            - **HashSet** → Use when you don't want any duplicates and you don't care about order when you iterate through
                - Unordered and Unsorted
            - **LinkedHashSet** → Ordered version of HashSet and Use over HashSet when you care about iteration order
            - **SortedSet**
            - **TreeSet** → Elements will be in ascending order, according to the natural order of the elements
                - Can also customize constructor to implement your own rules of the natural order
        - **List** (list of things) - cares about the index. Classes that implement List;
            - **LinkedList** → Ordered by index position and elements are doubly-linked to one another
                - It is a good choice for implementing stack and queue
                - Iterates more slowly than arraylist but fast insertion and deletion
            - **Vector** → Same as ArrayList BUT vector methods are synchronized (thread-safe)
            - **ArrayList** → Fast iteration and Fast random access and ordered(by index)
                - Also unsorted (but can invoke Collections.sort() to sort it)
    - java.util.**Collections** - a class that holds static utility methods for use with collections; Includes add, remove, contains, size, and iterator, etc.
        - **Map** (things with unique ID) → Important: none of the Map-related classes and interfaces extend form Collection. The implementation classes of Map are thought of “collections”, not Collection. Classes that implement Map;
            - **Hashtable**
                - Same as HashMap BUT HashTable methods are synchronized (REMEMBER. ONLY METHODS ARE SYNCHRONIZED, NOT CLASSES OR VARIABLES)
                - Hashtable won't let you have anything NULL(NO NULLS AT ALL)
            - **LinkedHashMap**
                - Maintains insertion order(or optionally, access order)
                - Slower than Hashmap for adding/removing elements but FASTER ITERATION
            - **HashMap** → Unsorted and Unordered & Allows one null KEY and multiple null values in a collection
                - KeySet()
                - Map.keySet() - returns a set of Keys
                - Map.keySet().size - return # of keys
            - **SortedMap** → TreeMap
- The implementation classes of Set,List, and Map can NEVER be both sorted but unordered, can be all other combinations.

40. How to convert float to String?

- float f = Float.parseFloat("25");
- String s = Float.toString(25.0f);

41. Let's say you have a "int b=3; and int a=4;" how can you swap them?

```
void swap(int a, int b) {
   int temp = a;
   a = b;
   b = temp;
   // a and b are copies of the original values.
   // The changes we made here won't be visible to the caller.
}
```

42. Do you know typecasting? What is casting?

int n=100;
double d=n; //implicit casting
short sh=(short)d; //explicit casting
byte > short > int > long
short sh2=35;
int n2=sh2;
byte b=(byte)n2;
	int > Integer
	short > Short
	double > Double
	int i=10;
	Integer n=i;
	Integer num=200;
	Wrapper classes.

--> **Auto-boxing** --> is a process when you take a primitive value and assign into wrapper class object

```
int i=10;
Integer n=i;
Integer num=200;
Integer num2=new Integer(400);//NO BOXING
```

--> **Un-boxing** -> is a process when you take Wrapper class object and convert to primitive.

```
Integer num2=new Integer(400);
Integer num=200;
int i=num2;
```

Assigning a value of one type to a variable of another type is known as **Type Casting.**

43. What is the output for this program?

```
for (int i = 0; i < 3; i++) {
        for (int j = 3; j >= 0; j--) {
            if (i == j)
                continue;
            System.out.println(i + " " + j);
        }
    }
```

```
0 3
0 2
0 1
1 3
1 2
1 0
2 3
2 1
2 0
```

---------- Output

44. What is the method?

- Collection of statements that are grouped together to perform an operation. When you call the System.out.println() method, for example, the system actually executes several statements in order to display a message on the console.
- A method is a set of code which is referred to by name and can be called (invoked) at any point in a program simply by utilizing the method's name. Think of a method as a subprogram that acts on data and often returns a value. Each method has its own name.

45. How do you use an abstract class in your project give me an example

- These concepts are commonly used in framework development. Abstract class is used in defining a common super class while writing Page Object Model layer of the framework. We usually create an abstract class named BasePage to have all common members for every page written in this class e.g getPageTitle().
- Then each Page class (HomePage, LoginPage, DashboardPage etc.) inherit from BasePage. Sometimes one may need to change the behavior of methods implemented in superclass. So subclass has freedom to override that method where we use polymorphism. This is how we use Abstract class in real projects.

46. What is the difference between pass-by-value and pass-by-reference?

- ***Passing by value*** means that the value of the function parameter is copied into another location of your memory, and when accessing or modifying the variable within your function, only the copy is accessed/modified and the original value is left untouched. Passing by value is how your values are passed on most of the time.
- ***Passing by reference*** means that the memory address of the variable (a pointer to the memory location) is passed to the function. This is unlike passing by value, where the value of a variable is passed on. In the examples, the memory address of myAge is 106. When passing myAge to the function increaseAgeByRef, the variable used within the function (age in this example) still points to the same memory address as the original variable myAge (Hint: the & symbol in front of the function parameter is used in many programming languages to get the reference/pointer of a variable).

SELENIUM

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1. **What is Selenium and what is composed of?**
   - Selenium is a suite of tools for automated web testing. It is composed of;
     - Selenium IDE(Integrated Development Environment); a firefox plugin that works for recording and playing back.
     - Selenium RC(Remote Control) (1.0) ; is a test tool and is used to work on JS to automate the web application. (2004)
     - WebDriver (2.0); is a web automation framework and allows you to execute your tests in different browsers. (2011)
     - Selenium Grid; allows tests to run in parallel across multiple machines.

2. **What are the advantages of Selenium?**
   - Selenium is open source and free to use without any licensing cost
   - It supports multiple languages like Java, Ruby, Python, C#...
   - It supports multi-browser testing
   - It has a good amount of resources and helping community
   - It supports many operating systems like Windows, Mac, Linux …
   - Interact with the web application

3. **What are the disadvantages of Selenium?**
   - Selenium supports only web based applications, does not support windows based application
   - No built in reporting tool, it needs third party tools for report generation activity
   - Can not work with graphics, captchas, barcodes, shapes
   - It does not support file upload facility.
   - Hard to master, requires developer level knowledge
   - Hard to write good locators
   - Hard to synchronize

4. **What are the limitations of Selenium?**
   - We cannot test desktop application
   - We cannot test web services
   - Ewe have to use external libraries and tools for performing tasks like testing framework (TestNG, JUnit), reading from external files (Apache POI for excel)
   - Automating Captcha is not possible using Selenium
   - It does not support file upload facility.

5. **What types of testing you automate with Selenium?**
   - functional tests (positive/negative, UI)
   - smoke tests
   - regression tests
   - integration tests
   - end to end testing
   - data driven

6. **What we don't do with selenium?**
   - Performance, load, stress testing, manual ad hoc testing, (These test are done by experts trained in these tools)
   - Pure database testing (if we only test the db itself),
   - Unit tests..., look and feel based testing (color shapes,...),
   - static testing

7. **What is in the Selenium tool set?**
   - Selenium IDE → implemented as a Chrome and Firefox extension, and allows you to record, edit, and debug tests.
   - Selenium RC → to write automated web application UI tests in any programming language
   - Selenium WebDriver → execute your tests against different browsers
   - Selenium GRID → run your tests on different machines against different browsers in parallel.

8. **What version of Selenium do you use right now?**
   - JDK (JAVA) - 1.8 → I like it because of ⇒ Try catch error handling you may add multiple catches.
   - ECLIPSE - 4.7.3a
   - SELENIUM – 3.12.0
   - TESTNG - 6.13.1
   - MAVEN - 3.5.3
   - GIT - 2.17.1
   - Chrome Browser - 67.0.3 • IE - 11
   - Opera - 53
   - Mozilla – 61.0.1

9. **Implicit Wait vs Explicit Wait?**
   - Implicit wait is a type of wait which waits for a specified time while locating an element before throwing "NoSuchElementException". As by default selenium tries to find elements immediately without any wait. So, it is good to use implicit wait. This wait applied to all elements of the current driver instance.
     Explicit wait is a type of wait which is applied to a particular webelement until the ExpectedCondition specified is met.
   - Implicit wait is simply; if condition is met before the timeout, it will continue to next step, if condition is not met within timeout throw "No Such Element" exception.
     Explicit wait → sometimes we need to wait for a certain event/condition such as element is visible, clickable, enabled....
   - driver.manage().timeouts().implicitlyWait(5,TimeUnit.SECONDS);
     webDriverWait wait = new WebDriverWait (driver, 5);
     wait.until (ExpectedConditions.visibilityOf(element);
   - **Expected conditions that can be used in explicit waits?**
     - visibilityOf(element), elementToBeClickable(element), alertIsPresent()

10. **What is fluentWait?**
    - Let's say you have an element which sometime appears in just 1 second and some time it takes minutes to appear. In that case it is better to use fluent wait, as this will try to find element again and again until it find it or until the final timer runs out. Example is AJAX or JQuery
    - Subtype of explicit wait but you can override the conditions
    - Wait<WebDriver>wait=new FluentWait<Webdriver>(driver).withTimout(5,timeUnit.seconds).pollingEvery(100,timeunit.milliseconds).ignoring(NoSuchElementException.class);

11. **What are various ways of locating an element in Selenium?**
    - In selenium locator is a means of finding an element in the html :
    - Id, name, className, xpath, css, linkText, partialLinkText, tagName

12. **Why I cannot find element?**
    - Locator changed
    - There is an iframe
    - Waiting time:: page is loading slowly §Element is dynamic:: locator
    - Page is not fully loaded/opened
    - Page changes and that element does not exist anymore

13. **How to highlight element?**
    - Selenium WebDriver doesn't have highlight action.
    - But we can use JavaScript to do it
    - JavascriptExecutor js = ((JavascriptExecutor) driver);
      String bgcolor = element.getCssValue("backgroundColor");
      for(inti=0;i< 10;i++){
      changeColor("rgb(0,200,0)",
      element,driver);//1
      changeColor(bgcolor, element,driver);//2
      }

14. What is Xpath?

- Xpath is used to find the location of any element on a webpage using html structure.
- We could navigate through elements and attributes in an XML document to locate web Elements such as textbox.
- button. checkbox, Image etx... in web Page

15. Absolute (/) and Relative (//) Xpath?

- Syntax: → //tagname[@attribute=`value`]
- Absolute xpath starts with single slash (/), starting from root element and all the way to the element.
- Relative xpath starts with double slash (//), starting selection matching anywhere in the document.

16. How do you handle dynamic elements?

- Find the static part of the id and write a locator(xpath or css) → And then use Startswith, contains, EndsWith
- contains( ) → //*[contains(@name=`btn`)]
- start-with( ) → //label[start-with(@id, `message`)]
- text( ) → //td[text() = `usedId`]
- or & and → //input[@type = `submit` AND @name = `login`]

17. How to test dynamic web page?

- There is no one size fits all solution to this problem. We have to understand the application very well
    - Use explicit waits where necessary.
    - Use custom xpaths and css locators
        - Xpath: contains, starts with, ends with, contains text.
        - By finding the element in relation to another stable element using parent, child, sibling relationships

18. How to test dynamic table?

- Use custom xpaths and css locators
    - Xpath: contains, starts with, ends with, contains text.
    - By finding the element in relation to another stable element using parent, child, sibling relationships
- I have utility methods that work with table. I have method that takes a table webelement and returns all the column names. I have a method that takes a table, number and returns all the data in that row.

19. How can we move to parent element using xpath?

- Using (..) expression in xpath, we can move to parent element

20. How can we move to nth child element using xpath?

- **There are two ways:**
    - using square brackets with index position
      For ex: div[2] will find the second div element
    - using position ( ) method
      For ex: div[position()=2] will find the second div element

21. Difference between xpath and css selector?

- with xpath, we can search elements backward or forward..
  while css works only in forward direction
- Xpath can work with text, css cannot work
- Xpath has more combination and can search by index
  css cannot search by index, but css is working faster than xpath.

22. Difference between close() and quit() command?

- driver.close() → used to close the current browser
- driver.quit() → used to close all the browser instances

23. What is framework?

- In test automation, framework is the blueprint of test automation.
- It includes your folder structures, where to save you function library, test results, test data, resources.
- It is essential because when you are working on a automation project everyone will have a guideline to follow and our script will be easier to maintain.

24. Talking about HTML reporting during the interview?

- I use multiple methods of reporting in my framework, driver script writes pass/fail to the test cases excel sheet,
- Reporter utility object writes to UFT report, also I have developed a custom HTML reporting engine.
- It sends HTML code to the Notepad and creates a nice HTML report document that non-technical people can easily understand and use.

25. What is Selenium Framework?

- It is a code structure that helps to make code maintenance easy, code readability and code reuse.
- There are mainly 3 type of frameworks created by Selenium WebDriver to automate test cases:
  - **a. Data Driven Framework**
    - It is one of the most popular automation framework in the market
    - All of our test data is generated from some external files like excel (or scenario outline in feature file) (or TestNG Data Provider)
    - Selenium WebDriver is a great tool to automate web-based applications. But it does not support read and write operations on excel files. Therefore, we use third party APIs like Apache POI
  - **b. Keyword Driven Framework**
    - Keyword driven testing is a scripting technique that uses data files to contain the keywords related to the application being tested.
    - Keywords are written in some external files like excel file and Java code will call this file and execute test cases.
  - **c. Hybrid-Driven Framework**
    - A combination of the DDF and KDF is commonly said to be HDF.
    - Both the test data and test action are kept in external files.

26. What if there is a dynamic popups that comes up randomly

- Use try/catch with alert

27. How to maximize a web page?

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

28. In some cases maximize() will not work --> so what will be the way around?

- Actions or change version.
- ChromeOptions options = new ChromeOptions();
  options.addArguments("--start-maximized");

29. What is the key class in Selenium?

- Gives us option for pressing keys from keyboard
- Key.ENTER
- MUST BE PASSED TO SendKeys() method
- Ex; .sendkeys("charger" + keys.ENTER)

30. What is Thread.sleep()?

- Slows down selenium to catch up
- Throws exception so must handle it or throw it

31. How did you use overloaded Methods in Selenium?

- When asserting if two values are equal I use → `Assert.assertEquals(actual,Expected) from TestNG`
- You can put in the parameters String, Objects, int, boolean values

32. Why we get NoSuchElementException?

- Check if locator is correct
- Check if timing is correct
- Check if element is hidden inside an iframe

33. How to handle frames in Selenium?

- Frames - used to embed a html page into another
- Steps
  - Locate the iframe
  - Switch to another iframe
    - driver.switchTo().frame();
      - ➢ .frame() - takes string, Integer, webElement, name or id directly as parameter
      - ➢ driver.switchTo().frame(webElement);
      - ➢ driver.switchTo().frame();
        1. Now you are in the 2nd frame, if you want to find an element outside of the 2nd frame (that you're currently on) - throws NosuchElementException
        2. Need to switch back to previous frame
           a. driver.switchTo().parentFrame() → Goes one level up
           b. driver.switchTo().defaultcontent() → Goes to the very top
        3. Can switch using count
           a. driver.switchTo(0) → Counts anything that is not the default frame
      - ➢ These methods might give you different results based on what browser you are using

34. How to handle multiple frames?

- If there are 4 frames, you have to go through each from consecutively to reach certain frame. Cant jump to the 3rd frame from 1st frame.

35. How you handle js alerts?

- If the alert on the browser comes from JavaScript, we use the Alert class.
- Alert alert = driver.switchTo.alert();
  alert.accept();
  alert.dismiss();
  alert.sendKeys()
  alert.getText()

36. How you handle browser pop ups?

- **void dismiss()** → clicks on the "Cancel" button as soon as the pop up window appears.
- **void accept()** → clicks on the "Ok" button as soon as the pop up window appears.
- **String getText()** → returns the text displayed on the alert box.
- **void sendKeys(String stringToSend)** → enters the specified string pattern into the alert box.

37. How you handle windows/ OS pop ups?

- Selenium doesn't support windows based apps, it is an automation testing tool that supports only web application testing.
- We could handle windows based popups in Selenium using some third party tools such as AutoIT, Robot class
- **driver.getWindowHandle();** → This will handle the current window that uniquely identifies it within this driver instance.
- **driver.getWindowHandles();** → To handle all opened windows

38. How to handle Headless browser

- Headless browser: browser that does not open, it runs as a background service / program.
- Example is htmlunitdriver -from selenium
  - WebDriver=new htmlunitdriver()
  - Not very stable
- Phamtonjsbrowser
  - More stable
  - browser=new phantomjsbrowser()

39. What is the difference between driver.get(). And driver.navigateto() ?

- driver.get() → To open an URL and it will wait till the whole page gets loaded
- driver.navigateto() → To navigate to an URL and it will not wait till the whole page get loaded

40. How to handle multiple windows/tabs?

- Selenium stays on one window
- If you open a window and then 5 tabs popped open, selenium is focused on the first window
- If you are on a new window and you tell selenium to print an element on the default window, it will still work even that user's focus is on the new window
- Must switch to new window
    - Use windowHandle()
    - Driver.getWindowHandle()
        - Everytime Selenium opens a browser, it's going to give an index ID for the page - called Handles
        - Returns the handle/id of current page (as a string)
    - driver.switchTo().window(string handle)
    - driver.getWindowHandles() - for multiple windows
        - Returns a Set of window handles
    - Switch using titles
        - ```
          for(string handle: driver.getWindowHandles()){
                  driver.switchTo().Window(handle)
                  if(driver.getTitle().equals(targetTitle)
                  Break;
          }
          ```

41. How to find all links in the page?

- List<WebElement> list = driver.findElements(By.tagName("a"));

42. findElement vs findElements?

- FindElement -> this method returns first WebElement !
    - gives Exception if the element not found
- FindElements -> returns List <WebElement>;
    - does not give Exception if the element not found as a result list has null values

43. Difference between isDisplayed(), isEnabled(). And is Selected() method in selenium WebDriver?

- IsDispalyed()àverify the presence of a web element within the web page. ⇒ If found → true, If not found → false
- isDisplayed()àcheck for the presence of all kinds of web elements available
- isEnabled() verify if the web element is enabled or disabled within the web page.
- isEnabled() is primarily used with buttons
- isSelected() verifies if the web element is selected or not
- isSelected() used with radio buttons, dropdowns and checkboxes.

44. How to check if element is present/visible/enable/ and to check text present?

- 1. To check Element Present:
  ```
  if(driver.findElements(By.xpath("value")).size() != 0){
  System.out.println("Element is Present"); }else{
  System.out.println("Element is Absent"); }
  ```
- 2. Or
  ```
  if(driver.findElement(By.xpath("value"))!= null){
  System.out.println("Element is Present"); }else{
  System.out.println("Element is Absent"); }
  ```
- 3. To check Visible:
  ```
  if(driver.findElement(By.cssSelector("a > font")).isDisplayed()){
  System.out.println("Element is Visible"); }else{
  System.out.println("Element is InVisible"); }
  ```
- 4. To check Enable:
  ```
  if(driver.findElement(By.cssSelector("a > font")).isEnabled()){
  System.out.println("Element is Enable"); }else{
  System.out.println("Element is Disabled"); }
  ```
- 5. To check text present
  ```
  if(driver.getPageSource().contains("Text to check")){
  System.out.println("Text is present"); }else{
  System.out.println("Text is absent"); }
  ```
  ```

45. Do you use JavaScriptExecutor?

- This helps me write my own JavaScript. JS has way more control than selenium.
- JavaScriptExecutor jsExecutor=(JavaScriptExecutor)driver; → Using this class we can send JS commands to the browser
    - executeScript(); performs the command
    - Inside the parameter is where you put JS code
- jsExecutor.executeScript("alert('WARNING: This is a useless message');" → This code will bring up a JS popup
- You can also put 2 parameter is .executeScript("js code",element);
    - Used for scrolling (selenium is not good with scrolling, you can say a challenge is when i was working on terms and condition page, where you have to read the page before clicking on continue.
    - When i tried using selenium and actions class it didn't work, so i used javaexecutor) and clicking an element;

46. For Scroll down:

- `WebDriver driver = new FirefoxDriver(); JavascriptExecutor jse = (JavascriptExecutor)driver; jse.executeScript("window.scrollBy(0,250)", "");`
- OR, we can do as follows: → `jse.executeScript("scroll(0, 250);");`

47. For Scroll up:

- `jse.executeScript("window.scrollBy(0,-250)", ""); OR, jse.executeScript("scroll(0,-250);");`

48. How to use actions class?

- Actions class lets us do advanced mouse and keyboard operations:
- Control the mouse
- Class that provides methods for advanced user interactions
    - Hovering o Double clic o Right click
    - Scroll o Drag and drop o mix/match operators
- Actions action=new Actions(driver)
- Action methods
    - click() o hold() o build()
    - perform() o keydown() o moveToElement(element)
    - dragAndDrop(source,target).perform()
    - sendKeys() - different from the one we usually use
        - Lets you do the sendkeys operation on different elements
        - Regular sendkeys that comes from webelement will throw an exception on something that is not input text.
        - The long way is
            - `actions.moveToElement(source).clickAndHold().moveToElement(target).release().perform();`
- Actions won't work unless perform() is used
- If you are chaining methods you must use build() before perform()

49. How to Drag And Drop ?

- Actions action = new Actions(driver);
- action.clickAndHold(driver.findElement(By.xpath("//*[@id='draggable']")))
  .moveToElement(driver.findElement(By.xpath("//*[@id='droppable']")))
- .release() .build()
- .perform();

50. What is the syntax for double click action ?

- To perform any actions against web element using actions class, we need to locate the element first:
- WebElement el = driver.findELement
- Actions actions = new Actions (driver).perform actions.doubleClick(el).perform()
- ___actions.moveTo(el).perform actions.doubleClick.perform
- ___ actions.moveTo(el).doubleClick().build.perform()

51. File download and upload

- Download
  - Selenium itself cannot verify file downloads,can click on download link but can't go outside the browser and open the downloaded file
  - Other tools need to be used for that - Robot and autoIT
- Upload
  - Selenium handles the upload, but does it differently compared to actual user
  - Steps
    1. Find the element that triggers the upload window
    2. Find the path of the file you want to upload
       a. Store into a String
          - Ex: String → file="C:\\Users\\Andy\\Desktop\\folder1\\file.key";
          - Then driver.findElement(upload button).sendkeys(file);

52. How check the selected value in dropdown?

- Select carsList = new Select(el)
  carList.getFirstSelectedOption()
  assertequals("some text",carList.getFirstSelectedOption().getText())

53. How check the multiple selected values in dropdown?

- Select carsList = new Select(el)
- carList.getSelectedOptions(): returns the the selected options a list (List<webelement>)
- for each : carList.getSelectedOptions()

54. How to work with dropdown without the select tag?

- If the dropdown list has no select tag, we cannot use the select class
- Treat the dropdown list and its options as separate elements, locate every element separately
- To select an option:
  - 1. Find and click on the list
  - 2. Find and click on the option

55. What if there's no select tag?

- You have to select the label for the dropdown separately as a webelement.
- Then manually use click method

56. What is the syntax for switching frame ?

- Frame is a html document inside another html document.
- Web driver handles one page/html document at a time. To control another frame we always need to switch
- Driver.switchTo.frame(webelement → find the iframe and pass as a param
- Driver.switchTo.frame(string) → find the id or name of the iframe and pass as a param
- Driver.switchTo.frame(int) → find the index and pass as a param

57. What is the syntax for switching windows ?

- To handle separate tabs/windows we have to switch to that tab
- Web driver handles one page/html document at a time.
- To control another tab we always need to switch
- To be able switch we need to get the window handle first using
  getWindowHandles() method driver.switchTo.window(String)èwindow handle
  for each loop : driverGetWIndowHandles:
  Driver.switchTo.window("handle")
  Ifdriver.getTitle==expectedtitle
  Break

58. What is the syntax for uploading a file?

- Public void fileUpload(Stirng path){ WebELement upload = driver.findELement; Upload.sendKeys(path)}
- We need to locate the upload button in html.
- The element will have tag input.
- Then we do sendKeys by passing the path to file which we want to upload

59. Sometimes sendKeys does not work

- Robot or AutoIT
- library==jar file==dependency

60. Sometimes sendKeys/path does not work

- Building a dynamic path for a file inside our project Path to the project location:
- String projectDir= System.getProperty("user.dir")
  Path of the file in the project::
- String file= "src/test/resources/test_data/myfile.txt"
  Element.sendKeys(projectDir+file)

61. How to input text in the text box without calling the sendKeys()?

- //Use javascriptExecutor
  JavascriptExecutor JS = (JavascriptExecutor)webdriver;
- //To enter username
  JS.executeScript("document.getElementById('User').value= 'www.google.com'");
- //To enter password
  JS.executeScript("document.getElementById('pass').value=' tester'");

62. How to press ENTER key on text box in Selenium WebDriver?

- To press Enter key using Selenium WebDriver,
- We need to use Selenium Enum keys with its constant Enter
- Driver,findElement(By.xpath("xpath")).sendKeys(Keys.ENTER);

63. Have you done any cross browser testing?

- Yes, Always mention that you have a control file for keywords like browser type, main url, username, password, environment.

64. How you resolve certification issue?

- CHROME, IE → DesiredCapabilities capability = DesiredCapabilities.chrome();

65. How would you verify the position of the Web Element on the page?

- element.getLocation();
- WebElement class has a get Location method with returns the top left corner of the element

66. Page Factory class?

- Page Factory class comes with Selenium.
- And it is used whenever we create page object classes.
- It's purpose is to initialize webElements that were defined in the class.

67. Explain me your test execution flow with cucumber.

- Runner > Feature file > Scenario > Steps > Step def > Selenium code using POM

68. What tools are you using to test UX and Restful webServices?

- UX -> User Experience. First ensure UX is acceptable manually.
- After that since it is UI testing, I use Selenium WebDriver to automate it.
- RESTFul API Automation -> RestAssured Library, PostMan for manual tests.

69. What exceptions do you know in Selenium?

- I often have NoSuchElementException
- StaleElementException
    - The element has been deleted entirely.
    - The element is no longer attached to the DOM.
    - How we handle StaleElementException;
        - Element is not attached to DOM → 'try-catch block' within 'for loop'
        - Or 1. Refresh the page and try again for the same element.
        - 2. Wait for the element till it gets available
- Timeoutexception

70. ASSERT(hard assert) VS VERIFY(soft assert)

- Hard assert throws an AssertException immediately when an assert statement fails and test suite continues with next @Test. If Assert steps fails, execution of test stops at that point! and will go to next test if present!
    - (Example: just simple Assert.assertTrue(boolean);)
- Soft assert collects errors during @Test Soft Assert does not throw an exception when an assert fails and would continue with the next step after the assert statement. If Verify steps fails, it will report a fail but will continue execution!
    - Example: SoftAssert soft=new SoftAssert(); //for soft create object
    - soft.assertTrue(boolean);
    - soft.assertAll(); //put at the end it will report what is failing!

71. What are the verification point available in Selenium ?

- In selenium IDE, We use Selenium Verify and Assert Commands as Verification points
- In Selenium WebDriver, There is no built-in features for verification points, it totally depends on our coding style. Some of the Verification points are
    - to check for page title
    - to check for certain text
    - to check for certain element(text box, button, drop down, etc.)

72. How To resize browser Window Using Selenium WebDriver?

- To resize the browser window to particular dimensions, we use 'Dimension' class to resize the browser window.
- //Create object of Dimensions class
  Dimension d = new Dimension(480,620);
- //Resize the current window to the give n dimension
  driver.manage().window().setSize(d);

73. Verify text exists?

- VerifyTextPresent - returns TRUE if the specified text string was FOUND somewhere in the page; FALSE if otherwise.
- VerifyTextNotPresent - returns TRUE if the specified text string was NOT FOUND anywhere in the page; FALSE if it was found.

74. How to handle Web Tables/grid?

- Table - tag used for table - data is arranged in a grid format -
    - th -tag for column name - Example –

```
<tr>
    <th>FirstName</th> - column names on the very top row
    <th>Lastname</th>
    <th>Age</th>
```

- </tr> - tr -tag used to indicate a row, applies to whole column - td- tag to indicate a column in a row
    - -Example-

```
<tr>
    <td>Danny</td>-actualdataontheveryfirstrow
    <td>Smith</td>
    <td>29</td>
</tr>
```

- Some tables have tbody -Used to indicate the data of the table, usually does not include column names (th)

75. How do you find a text in a webpage?

- //tagname[contains(text(),'text')] - contains certain test
- //tagname[.='text'] - contains exact text - sometimes doesn't work Selenium

76. How to get all the preceding siblings of Apple?

- Xpath: "//ul/li[contains(text(),'Apple Mobiles')]/preceding-sibling::li"
- This will give "Samsung Mobiles"

77. How to get all the following siblings of Apple?

- Xpath: "//ul/li[contains(text(),'Apple Mobiles')]/following-sibling::li"
- This will give all the preceding siblings (Nokia Mobiles, HTC Mobiles, Sony Mobiles, Micromax mobiles)

78. How to use Excel?

- FileInputStream ExcelFile = new FileInputStream(path);
  excelWBook = new XSSFWorkbook(ExcelFile);
  excelWSheet = excelWBook.getSheet(sheetName);
  cell = excelWSheet.getRow(rowNum).getCell(colNum);

79. How do you like Selenium version 3? Is Selenium 3 drastically different from Selenium 2?

- Selenium 3 has bug fixes from selenium 2 also it is more mobile automation focused.
- We aim for Selenium 3 to be "a tool for user-focused automation of mobile and web apps".
- Here is the summary of the change.
  - For WebDriver users, its more of bug fixes and drop-in replacement for 2.
  - Selenium Grid bug fixes are done as well.
  - Selenium project will not actively support only the WebDriver API.
  - By a quirk of timing, Mozilla have made changes to Firefox that mean that from Firefox 48 you must use their geckodriver to use that browser, regardless of whether you're using Selenium 2 or
  - As we know Selenium 3.0 is the latest version of Selenium Jar

MAVEN

---

1. **What is Maven?**
   - A build tool and command prompt tool that called POM xml file that calls my runner class and manages my dependencies
   - Command Prompt - mvn archetype;generate
     - Creates project
   - Choose a # - press enter
   - Choose a # - press enter
   - GroupId; Com.nameOfProject (usually a reversed domain name, like com.example.foo
   - ArtifactID; test-maven-project
     - Version - enter
     - Package - enter
     - Y; enter

2. **Why Maven? How it helps you developing your project effectively?**
   - You have downloaded the needed jar files to run selenium. If these jar files updated, we need to download for each project again.
   - You shared your project with other ppl. After a while, you have updated one jar file in your project. It will not run, because there is no jar file. Manager doesn't know the jar file. Maven have a solution for this one.

3. **What is a Maven artifact?**
   - An artifact is a file, usually a JAR, that gets deployed to a Maven repository.
   - A Maven build produces one or more artifacts, such as a compiled JAR and a "sources" JAR.
   - Each artifact has a group ID (usually a reversed domain name, like com.example.foo), an artifact ID (just a name), and a version string. The three together uniquely identify the artifact.
   - Example: <groupId>org.seleniumhq.selenium</groupId>
     <artifactId>selenium-java</artifactId>
     <version>3.11.0</version>
   - A project's dependencies are specified as artifacts.

4. **Explain me the maven lifecycle?**
   - ✓ Commands can only run in the same directory where the specific pom xml file is located
   - 3 built-in build lifecycles
     - Default → Handles your project deployment
     - Clean → Handles project cleaning
     - Site → Handles creation of project's site documentation

5. **A build lifecycle is made up of phases**
   - Validate → Validate the project is correct and all necessary information is available
   - Compile → Run the source code of the project (checking if there is any error or not, if not→ build success)
     → Target folder is created and Reports will be stored here
   - Test
     - Test the compiled source code using a suitable unit testing framework.
     - Should not require the code to be packaged or deployed
     - Mvn -D(VariableName)=testname → Run specific tests based on the parameter
   - Package → Take the compiled code and package it in a distributed format, like JAR
   - Verify → Runs any checks on results of integration tests to ensure quality criteria are met
   - Install → Install the package into local repo, for use as dependency
   - Deploy → Done in the build environment, copies the final package to the remote repository for sharing with other devs and projects

6. **How do you convert maven project to eclipse project?**
   - Mvn eclipse

7. How java projects are made?

1. Create folders/packages
2. Add libraries/dependencies
3. Create class files
4. Compile
5. Run tests
6. Deploy

8. Where do you find your dependencies/libraries?

- Mvnrepository.com
- Update project if maven not working
    - When you have dependencies inside your pom file and you use update, maven will pull the JAR files from internet and add it to your project

9. What is .m2 folder?

- Where your jar files/repositories are saved in your computer

10. What is POM xml file?

- A file that manages the whole project
- When you run a maven command, everything should be done through the pom.xml

11. Versions of tools?

- RestAssured Library release date: 2015

12. Log4j?

- Used by any application
- Example: LOG4J2 → From Apachel
- Records activity
- Dev will look at the logs,look at the time, go to the ip address and see what going on if there was a bug
- Loggers are very important part of applications and it keeps each step/event happened with timestamp
- Normally logs are written programmatically into .log file
- There are ready tools/libraries to add to any framework or application.
- In java, the most famous logging library/framework is LOG4J from apache

13. Purpose of logs?

- Help us debug the issues that you may have with application.
- Sometimes when a bug is found in application, developers firstly check the logs. In order to see which steps the user was taking and application did not behave as expected.
- Logs MAY help you find the source of the problem (in application perspective, not testing)

14. What is the role of logs in Test automation?

- We are looking at console or html report to see the status of our test runs. If anything fails, we find from there.
- If we implement logging into our framework, it will be another way of looking at automation execution steps and will help us find the problem whenever our test fails.

1. What is TestNG?

- You have 500 test cases→ We create a Java Package and 500 Class for each test cases
  Client asked you run only 40 of them for smoke test → We handle it in Jasmine with it blocks and reporting mechanism.
- TestNG is a testing framework
- Centralized controller: manage run different test cases then create reports, logs
- Batch execution: 100 test cases and run them one-by-one
- Optional execution: we can skip some test cases

2. What is assertions in TestNG?

- We run the test and title test case failed. It will not affect the other test cases so we don't want our script to stop.
  - Critical → stop/failure ⇒ Assert
    - It takes one boolean argument and String message. It Asserts that a condition is true. If it isn't, an AssertionError, with the given message, is thrown.
  - Non-critical → failure/continue ⇒ SoftAssert
    - Soft Assert does not throw an exception when an assert fails and would continue with the next step after the assert statement.

3. Difference between JUnit and TestNG

- Annotations; JUnit: @Test, @BeforeClass, @AfterClass, @Before, @After, @Ignore
  TestNG: @Test, @BeforeTest, @BeforeClass, @BeforeSuite, @BeforeMethod
  @AfterTest, @AfterClass, @AfterSuite, @AfterMethod
- Both are testing framework to help us running automation scripts.
- TestNG provide htm report
- TestNG has @Dataprovider annotation same as Cucumber Scenario Outline for Data Driven Testing.
- In TestNG, we can do parallel testing but JUnit doesn't support to parallel test, so we use sauceLab for it.
- TestNG support group test but JUnit doesn't support
- TestNG and JUnit both of them have parameterize testing but TestNG parameterized test configuration is very easy to configure. There are two ways to achieve parameterization in TestNG;
  - @Parameters and TestNG xml file
  - @DataPrivider

FEATURE	JUNIT	TESTNG
Purpose	General unit testing	Focus on Integration testing for Enterprise projects
IDE support	yes	Yes
Maven support	yes	Yes
setup/teardown for test	@Before / @After	@BeforeMethod / @AfterMethod
setup/teardown for class	@Before / @After	@BeforeClass / @AfterClass
setup/teardown for suite	no	@BeforeSuite / @AfterSuite
setup/teardown for test groups	no	@BeforeGroups/ @AfterGroups
setup/teardown for test	in annotations	In annotations and/or XML file
Parameterised tests	Yes, but in a limited way	Yes
Test groups	Yes with Categories (new feature)	Yes
Test for Exceptions	Yes	Yes
Timeouts in tests	Yes	Yes
Test order	Non-Deterministic or alphabetical	Can be defined in detail with dependencies
Dynamic test input	No	Yes with DataProviders
Can run tests of the other library	No	Yes, TestNG can run JUnit tests
Assumptions before running a test	Yes	No
Dependency injection for tests	No	Yes, with Google Guice
Ignore/disable test	Yes	Yes
Parallel testing	No	Yes
Test listeners	No	Yes
Test reporters	No	Yes

4. Cross Browser and Parallel Test

- In my current project, we use sauceLab for cross browser testing. But my previous project I used testng.xml file.
- Basically, inside the suite there are 3 keys (name, thread-count, parallel) and I created 2 different tests, one of them is for Chrome and the other one is for Firefox.
- There is also parameter annotation and include name and value; name is browser and value is Chrome.

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE suite SYSTEM ...>
<suite ...>
   <test name="ChromeTest" ... >
      <parameter name="browser" value="chrome"/>
          <classes>
           <class name="testsuite..."/>
          </classes>
   </test> <!-- First Test -->
   <test name="FireFox" ... >
      <parameter name="browser" value="FireFox"/>
         <classes>
           <class name="testsuite...."/>
         </classes>
   </test> <!-- Second Test -->
</suite> <!-- Suite -->
```

CUCUMBER & GHERKIN

---

1. **Tell me more about Cucumber, how did you guys decide to start using Cucumber ?**
   - In the past few years, more and more IT teams follow Agile methodology in their development process to adapt to the rapid changes of the market. This is also a challenge for the test team in managing test cases and test scripts which can be changed when the requirements are updated monthly. Finding a suitable testing method from the beginning is one of the keys to the success of an Agile software project.
   - Many Agile teams have successfully applied Behavior-Driven Development (or BDD) approach in testing process using the Cucumber tool. So what is Cucumber? And why is it one of the good approaches in Agile projects, used together with BDD?
   - Cucumber is a tool for running automated acceptance tests written in a behavior-driven development style. One of its wonderful main features is the ability to execute plain-text functional description (written in language named Gherkin) as automated tests. Here is an example:

     Feature: Update password
     Scenario: Admin user can update user password
     Given I am in the HR system with an Admin account
     When I update password of another user
     Then I receive a message for updating password successfully
     And user's password is updated to the new password
   - This great feature has played a primary role in supporting the BDD approach with the following **advantages**:
     - Writing BDD tests in Ubiquitous language, a language structured around the domain model and used by all team members including developers, testers, BAs, etc.
     - Building bridges between the technical and nontechnical members of a software team
     - Allows interaction directly with the developers' code, but written in a language that business stakeholders can understand
     - Last but not least, Cucumber is an Automated Acceptance Test Tool which running tests written in a behavior driven development (BDD) style.
   - **Cucumber Tool helps to improve communication between technical and non-technical members in a project.**

2. **Tell me what are the most important things in Cucumber, what makes it unique ?**
   - Features file, Step Defs, Runner Classes

3. **What are the components of Cucumber BDD framework?**
   1. Feature files
     - Consists of scenarios that test a certain feature or functionality
     - Feature is main story while scenarios are the test cases to the story(feature)

   2. Cukes Runner
     - A class that strictly runs the tests, generates codes for step definition
     - @smoketest
     - Cukesrunner → IN CUCKESRUNNER I HAVE A FEATURE LOCATION THAT SHOWS WHERE MY FEATURE ARE LOCATED

   3. Step definition
     - A class that made of steps that starts with Gherkin language
     - Make sure the step definition is in the same package as cukes Runner, or child package (not parent or sibling)
   - FOR NON TECH PPL TO UNDERSTAND
   - DEPENDECY - BDD IS A DEPEN
   - MVN REPOSITORY IN THE POM.XML FILE
   - CUCUMBER BDD FROM CUCUMBER.IO
   - Combine techs of tdd
   - Behavior driven
   - Express the flow - customer behavior → Dont focus on the elements

4. **What is Gherkin?**
   - Language used by feature files
   - Feature, Scenario,Given, Then, When, And, But, BackGround,Scenario Outline,

5. What does @CucumberOptions do?

- Tag used to customized ther running of the cucumber tests
- Inside @CucumberOptions you can add:
    - dryRun
    - Plugin
        - "Pretty"
            - Adds more info in the console → Gives you tag, scenario, method info.
            - "html:target/cucumber-report" → Generates html report located in target/cucumber-report folder - "json:target/cucumber.json
        - Tags
            - Tags must be located in feature path
            - Can add multiple tags...tags= "@Dog,@Cat"
        - Features - location of where feature files are
        - Glue - where to look for step definition steps.hook class is part of glue too.

6. How to see your reports in cucumber?

- My framework generates cucumber-reports folder in the target folder which contains the reports.
- When we run the tests on Jenkins, Jenkins saves the report of every run.
- Home page of the Jenkins job always points to the last run reports.
- All the reports for previous runs can be found under the build number.

- Go to target folder
- Open with system explorer
- Go to target>cucumber-report>index - shows the tests you ran

7. How to run Cucumber with JUnit?

- Add cucumber -junit dependency
- Adding @RunWith(Cucumber.class) on top of cukesRunner class

8. How to run Cucumber with Testng?

- Add cucumber -testng dependency
- Make CukesRunner extend to AbstractTestNGCucumberTests

9. What are Hooks in cucumber?

- Cucumber hook allows us to better manage the code workflow and helps us to reduce the code redundancy. We can say that it is an unseen step, which allows us to perform our scenarios or tests.
- Class that uses
    - @Before → runs before each cucumber scenario
    - @After → runs after each scenario (It will always run no matter if scenario passes or fails)
- Class must be in same package as stepdefinition
- I implemented screenshots insidehook class
- HookClass will not run if dryRun=true
- I use Scenario as a parameter in my before/after method

10. How do you take screenshots in cucumber?

- In my Aftermethod i use a code:
- I use TakeScreenShot interface
- You can store screenshot as a byte or file
    - @After public void tearDown(Scenario scenario) {
      if(scenario.isFailed()) {
      //taking a screenshot
      final byte[] screenshot = ((TakesScreenshot)
      Driver.getDriver()).getScreenshotAs(OutputType.BYTES);
      //adding the screenshot to the report
      scenario.embed(screenshot, "image/png"); }

11. What happens we you run your runner class with no tags?

- All the feature files will run from top to bottom but only the feature files that are located in the @CucumberOptions “features=”

12. How to run a Cucumber with DDT?

- I use Cucumber tables:
    - |Home|
    - |Emails|
    - |Documents|
    - |Projects|
- You get a the method with (DataTable arg1)
- In the parameter DataTable you can change it to
  List<YourType>,List<List<E>>,List<Map<K,v>>,and Map<K,v>
- Prints in order for list
- No order for map

13. How do I limit the types of variables I can pass?

- In the gherkin parenthesis you can add (Collaboration|Sales|Marking,etc)
- Ex: @When("^I hover over the (Collaboration|Sales|Marketing|Activities|Support|All) menu$")
- public void i_hover_over_the_Collaboration_menu(String menu) {

```
switch(menu) {
        case "Sales":
                BrowserUtils.hover(dashboard.sales);
                break;
        case "Marketing":
                BrowserUtils.hover(dashboard.marketing);
                break;
        case "Support":
                BrowserUtils.hover(dashboard.support);
                break;
        case "Collaboration":
                BrowserUtils.hover(dashboard.collaboration);
                break;
        case "Activities":
                BrowserUtils.hover(dashboard.activities);
                break;
        case "All":
                BrowserUtils.hover(dashboard.all);
                break;
};
```

14. What if you have a scenario that has two parameters (limiting parameter, table parameter)?

- Example :
    - Scenario: Verify Collaboration menu options
    - Given I logged into suiteCRM
    - When I hover over the Collaboration menu
    - Then the following menu options should be visible for Collaboration:
      |Home| |Emails| |Documents| |Projects|
    - In this scenario i have a table, I want to limit collaboration to just collaboration and the other menus categories
- Solution:
    - @Then("^following menu options should be visible for
    - (Collaboration|Sales|Marketing|Activities|Support|All):$")
    - public void following_menu_options_should_be_visisble_for_Collaboration(String menu,List<String> options) {
    - String menu represents the 5 menu options ((Collaboration|Sales|Marketing|Activities|Support|Al)
    - List<String>options represents the tables; |Home| |Emails| |Documents| |Projects|

15. How do I use cucumber scenario for DDT?

- In my current project i use Scenario Outline with Examples
- In my scenario feature file, whenever im using a variable as a data driven i use “<variable>”
- Then in Examples:
  - |variable| - column name
  - |data1| - row1
  - |data 2| - row 2
  - |data3| - row3

16. What is Scenario Outline? vs Scenario?

- Scenario in cucumber runs once.
- Used for data driven testing
- Have the same cucumber steps but we provide data after the scenario as a table using keyword examples

17. What is Background?

- Cucumber has their own before method
- The one in hooks is for java
- A step that runs BEFORE a scenario inside the feature file
- Can only put on top, before all scenarios
- Cannot put pipelines in backgrounds (Only in scenario outline)

18. How to use Maps in cucumber?

- Using a nonScenario Outline
- Scenario: Create contact using a map
    - Given I logged into suiteCRM
    - When I create a new contact:
        | first_name | John |
        | last_name | Smith
        | cell_phone | 801-888-8889 |
    - Then I should see contact information for "John Smith"
    - Left side is key and right is value - 2 columns only
- Using a Scenario Outline
    - Scenario Outline: Create contact using a map
    - Given I logged into suiteCRM
    - When I create a new contact:
        | first_name | <first_name> |
        | last_name | <lname> |
        | cell_phone | <cell_phone> |
        |office_phone|<office_phone>|
    - Then I should see contact information for "<first_name> <lname>"
    - Examples: |first_name|lname|cell_phone|office_phone|
    - |Michael|Jackson|1234567890|2345678891| |Bonnie|Garcia|4569871234|4567890987|
- In step def i write;
    - @When("^I create a new contact:$")
      public void i_create_a_new_contact(Map<String,String>contact) {
      // open the create contact dialog
- Works for both scenario

19. How to use POJO in cucumber?

- Create contactBean class
    - Add all variables
    - Add the getter/setters
- Create bean feature file
- Create a table with first row containing the variables in the contactBean class
    - Add values under the table
    - Implement method with parameter (List<ContactBean>contacts)
- Scenario: Create contact
    - Given I logged into suiteCRM
    - When I save a new contact:
        | firstName | lastName | department | officePhone | cellPhone | email |
        | Steve | Gates | IT | 3456758888 | 1234329999 | SteveGates123@gmail.com |
    - Then I should see contact information for "Steve Gates"

20. Data driven

- Test data is separated from code and stored into external sources: Cucumber Examples table, Excel files, CSV files, Database.
- If the amount of data is not that huge, then I use Cucumber Scenario outline with Examples table.
- And other times I maintain test data in Excel files, and i use Apacha POI library to read and write data
- If data comes from a database, or I need to do database validation, I use SQL queries along with JDBC library in java.

21. Data Driven Testing

- *WHEN:* Whenever a functionality or a module in an app requires testing with multiple sets of data(Parametrization), Multiple inputs then we need to perform data driven testing and automation.
- These scenarios are one of the things That must be automated.
- *HOW:* Test data is separated from code and stored into external sources: Cucumber Examples table, Excel files, CSV files, Database.
- *BENEFIT:* More organized, Data centralized, Collaboration on test data - it can come from BA, MTs etc

22. How can we create data driven framework using TestNG?

- By using @DataProvider annotation, we can create a Data Driven Framework
- @DataProvider(name=”getData”) Public Object[][] getData(){
  Object [][] data = new Object[2][2]; Data[0][0] = “firstUid”;
  Data[0][1] = “FirstPWD”;
  Data[1][0] = “SecondUid”;
  Data[1][1] = “SecondPWD”;
  Return data; }

23. How to run a group of test case using TestNG?

- @Test (groups={“smokeTest”,”FunctionalTest”})
  Public void loginTest(){
  System.our.println(“Logged in successfully”);
  }

24. How to create Group of Groups in TestNG?

- These groups are called metagroups.
- Example: you might want to define a group all that includes smokeTest and FunctionalTest. Let’s modify our testing.xml file:

```
<groups>
    <define name=”all”>
        <include name =”smoke Test”/>
        <include name = “functionalTest”/>
    </define>
    <run>
        <include name = “all”/>
    </run>
</groups>
```

25. How to run test cases in parallel using TestNG?

- We can use “parallel” attribute in testng.xml to accomplish parallel test execution in TestNG
- The parallel attribute of suite tag can accept four values:
  - Classes → All the test cases inside a java class will run parallel
  - Methods → All the methods with @Test annotation will execute parallel
  - Instances → Test cases in same instance will execute parallel but two method of two different instances will run in different thread.

```
<suite name=”softwaretestingmaterial” parallel=”methods”>
```

26. How to exclude a particular test method from a test case execution?

- By adding the exclude tag in the testing.xml

```
<classes>
        <class name="TestCaseName">
        <methods> <exclude name="TestMethodNameToExclude"/> </methods>
        </class>
</classes>
```

27. How to exclude a particular test group from a test case execution?

- By adding the exclude tag in the testing.xml

```
<groups>
        <run>
        <exclude name="TestGroupNameToExclude"/>
        </run>
</groups>
```

28. How to ignore a test case in testng?

- To ignore the test case we use the parameter enabled = false to the
- @Test annotation

  @Test(enabled=false)

29. What are the different way to produce reports for TestNG results?

- TestNG offers two ways to produce a report
  1. Listeners implement the interface org.testng. TestListener and are notified in real time of when a test starts, passes, fails, etc…
  2. Reporters implement the interface org.testng.reporter and are notified when all the suites have been run by TestNG.
- The IReporter instance receives a list of objects that describe the entire test run

30. What is the use of @Listener annotation in TestNG?

- configure reports and logging.
- widely used listeners : ITestListener interface.
- It has methods like onTestStart, onTestSucess. onTestFailure, on TestSkipped...
- we should implement this interface creating a listener class of our own,
- Next we should add the listeners annotation (@Listeners) in the class

31. What Is a Regular Expression, Regexp, or Regex?

- A regular expression is a special text string for describing a search pattern.
- You can think of regular expressions as wildcards on steroids.
- You are probably familiar with wildcard notations such as *.txt to find all text files in a file manager. Regex equivalent is.*\.txt.

32. How to write regular expression in testing.xml file to search @Test methods containing”smoke” keyword?

- Regular expression to find @Test method containing keyword “smoke” is an mentioned below

```
<methods>
        <include name=".*smoke.*"/>
</methods>
```

33. What is the time unit we specify in test suites and test cases ?

- We specify the time unit in test suites and test cases is in milliseconds.

34. What is the use of @Test(invocationCount= someInteger)?

- @Test(invocationCount=10)

  Public void testcase(){}
- //the invocation count attribute tells how many times TestNG should run a test method

35. What is the use of @Test(threadPoolSize=someInteger)?

- The threadPoolSize attribute tells to from a thread pool to run the test method through multiple threads
- Note: this attribute is ignored if invocation count IS NOT SPECIFIED

36. What does the test timeout mean in testing?

- The maximum number of milliseconds a test case should take
- @Test1(threadPoolSize=3,invocationCount=10,timeOut=10000)
  public void test() {}
- : // in this example: the function test1 will be invoked ten times from three different threads, Additionally, a tim-out of ten seconds guarantees that none of the threads will block on this thread forever.

37. What are @Facory and @DataProvider annotation?

- @Factory → executes all the test methods present inside a test class using a separate instance of the class with different set of data
- @DataProvider → a test method that uses dataProvider will be executed the specific methods multiple number of times based on the data provided by the dataProvider.

38. annotations - priority

- Doesn't matter what number you start Ex: @Test(priority=0)
- DependsOnMethods="test method name" You Can add multiple test names
- If the first one fails, the 2nd test won't run at all
- If the first method failed, your report will show that the 2nd test will be skipped

39. parallel execution in testNG

- In xml file write;
- parallel="tests"thread-count="4"
- Thread-count is how many browser do you want to open same time
- In xml file you can add .* to run everything
- Ex:<package name=".*"></package>
- Testng has it own reports -When you run xml, it gives you the report in test-output folder
- Contains the test report in html

40. Framework Tools : Cucumber BDD framework

- Junit, Cucumber Java, Maven
- Selenium, HTML reporting with screenshots Log4j,
- JDBC, Rest Assured, Apache POI, Git, Jenkins

41. Framework Tools: TestNG+Selenium

- Java, Maven, TestNG,
- Selenium, Extend Reports with screenshots Log4J,
- JDBC, Rest Assured, Apache POI, Git, Jenkins

42. How does your framework generate reports?

- Our Cucumber BDD framework generates HTML reports.
- The report shows the pass/fail coverage for feature files, tags, steps
- The report contains all the steps for each test The report has screenshots for failures

43. What do you use for logging?

- I use Log4J for logging. I always log important steps in the test execution. That helps me to debug when there is a failure.
- Log4J is not a replacement for HTML reports.
- <dependency>
  <groupId>org.apache.logging.log4j</groupId>
  <artifactId>log4j- core</artifactId>
  <version>2.11.0</version>
  </dependency>

44. How does the FEATURE FILE WORK?

- **Feature** → description of what is being tested @tags. Sample feature file;
    - Feature: login functionality → Background:
    - Given I am on the login page → Scenario: 1, Scenario: 2
    - The background runs before both of the scenarios
- **Scenario** → description of the scenario being test
    - Given I am on the login page
    - And I enter username and password
    - When I click on the submit button
    - Then I should be able to see the profile picture
    - But the submit button should not be displayed
- **Given** → a precondition
- **When** → condition that triggers the expected result Then —> expected condition

45. What is test base Class ? and How do you implement in your framework ?

- Test Base class is class where I have most used methods in my tests.
- My test classes extend the Test Base class and thus have access to those methods. This helps me us make my code reusable
- Before/after test methods wait/synchronization utility methods.
    - SwitchToWindow(title)
    - WebDriver driver;

46. How to rerun the failed tests again in TestNG?

- In my TestNG framework, failed tests are reported in the testng_failed_.xml file in the target folder.
- We can add this file in the pom file so that maven will try to run the failed tests every time.
- If will only run when there are failures in the test.

47. How to rerun the failed tests again in Cucumber?

- we use the re-run option in the CukesRunner.
- Add the rerun to cukes runner.
- This option will create a file with a list of failed tests
- Create a second runner class which points to file with a list of failed tests
- Add the second runner in the pom file

48. How to rerun the failed tests again in Jenkins?

- In Jenkins there are plugin that re run the failed tests Unit cases.
- So you can configure your Maven build execution on Jenkins using the option:
- Dsurefire.rerunFailingTestsCount=2

49. How to run tests selectively cucumber?

- tags keyword the cukesrunner
- feature keyword the cukesrunner
- tags and features can also be passed using the command line
- mvn test -Dcucumber.options="--tag @smoke”

50. How you integrate Selenium with Jira?

-

51.

1. **What is API?**
   - It means connectivity. I mean API is the messenger that takes requests and tells a system what you want to do and then returns the response back yo you.
   - API is the acronym for Application Programming Interface (which is software intermediary) that allows how applications to talk to each other.

2. **API vs Webservices?**
   - API: *browser*: Selenium WebDriver, *database*: JDBC, *MsOffice*: Apache POI
   - Webservices: if an API uses internet for communications, it is a webservices. *All webservices are API.
   - No UI (user interface) → web application with UI and we use Selenium Webdriver
   - We use:
     - SOAP → XML
     - REST → JSON, XML, TEXT
     - Postman, Rest Assured Library

3. **What is SoapUI? and how did you use it in your current project?**
   - SOAP UI is the leading open source cross-platform API Testing tool
   - SOAPUI allows testers to execute automated functional, regression, compliance, and load tests on different Web API.
   - SOAPUI supports all the standard protocols and technologies to test all kinds of API's.
   - SOAPUI interface is simple that enables both technical and non-technical users to use seamlessly.

4. **Name of some commonly used HTTP methods in REST based architecture?**
   - Create → POST (send data to the server)
   - Read → GET (retrieves data from given server using a given URI)
   - Update → PUT (Replaces all current representations of the target resource with the uploaded content)
   - Delete → DELETE (Removes all current representations of the target resource given by a URI.)

5. **HTML Status Codes?**
   - 1xx → Informational
   - 2xx → Success (request was accepted successfully) (200→ Ok, 201→ Created, 202→ Accepted, 204→ No Content)
   - 3xx → Redirection
   - 4xx → Client Error (400-Bad Request, 401-Unauthorized, 403-Forbidden, 404-Not Found, 405-Method not Allowed)
   - 5xx → Server Error (500-Internal server Error, 502-Bad Gateway, 501-Not implemented, 503-Service Unavailable)

6. **What first thing you check when you get response?**
   - Status quote (200 always mean Ok)
   - We always check the 404 means not found
   - rest-assured.io==> for automation to find the ECS machine in search type remote Desktop

7. **Http methods and request types**
   - Get does not requires body
   - Put requires body means UPDATE information
   - Post requires body means CREATE information
   - Delete does not requires body
   - GET -> READ , POST -> CREATE, PUT -> UPDATE, DELETE -> DELETE
   - POST VS PUT

8. **Parameters api**
   - 2 TYPES:
     - PATH PARAMETER(VALUE WILL BE PART OF URL) QUERY/REQUEST
     - PARAMETERS (KEY+ VALUE FORMAT)
   -

9. **API/Webservices with RestAssured Library?**
   - import static io.restassured.RestAssured.* ;
   - URI uri = new URI(“ ... / methods(get,post)”)

- GET;
  Response response = given().accept(ContentType.JSON).when().get(URI);
  response.then().assertThat().statusCode(200).and().assertThat().ContentType(ContentType.JSON);
- POST;
  Response response = given().ContentType(ContentType.JSON).with().accept(ContentType.JSON)
  .and().body(JSONbody).when().post(URI);
  response.then().assertThat().statusCode(200);

- import static org.hamcrest.Matchers.* ;
  then().assertThat().body("Id",Matchers.equalTo(123));
- JsonPath json = JsonPath(JSONbody);

```
json.getString("key");
json.getInt("key");
json.getList("key1.key2");
```

10. Serialization and Deserialization

- Serialization; when we MAP a Java object to API JSON format (CONVERT JAVA OBJECT TO JSON);
  - Java object (POJO(Plain Old Java Object), BEANS) → MAP it to API JSON/XML
  - When we have an object from a class and MAP it to a JSON format in our RESTful API
  - ```
    {       make: "Toyota",
            Model: "Camry"          }
    Car car = new Car();
            car.setMake("Toyota");
            car.setModel("Camry");
    given().body(car).when().post(uri)
    ```
- Deserialization; API JSON/XML → MAP it to Java Object (JSON TO JAVA OBJECT)
  - Car car2 = new Car();
    car2=when().get(uri).body.as(car.class)
    car.setMake("Toyota");
    car.setModel("Camry");

11. What is EndPoint?

- <protocol>://<service-name>/<ResourceType>/ResourceID → URI (Uniform Resource Identifier)
  Base URI / resource ? Parameters
  (http://www.google.com/search?source=book…) → ? → query parameters

12. How do you verify a value in your Response body?

- For exp: verify ID contains correct number
  1. *Hamster Matcher* is assertion library.
     then().assertThat().body("Id",Matchers.equalTo(123));
  2. Parse into JsonPath and use getInt(), getList(), getString() methods to read Id value.
     And, I can use JUnit Assertion:
     String body = ...thenReturn().body().asString();
     JsonPath json = new JsonPath(body);
     assertEquals(123,json.getInt("Id"));
  3. De-serialize into a (POJO) object (or Object Mapping)
     POJO myPojo = … when().post(url).thenReturn().body().as(Pojo.class);
     assertEquals(123,myPojo.getId( ));
     And, I can use JUnit Assertion.

13. Authorization vs Authentication

- Authentication is user and password
- Authorization has types:
  - no Authorization
  - Basic Authorization
  - Bearer Token
  - Inherit Auth from parent

14. Types of API's Authentication

1. Basic
    ```

- Pre-emptive
  - If a service is configured to be pre-emptive, it will not request credentials from a client even though it requires it.
  - If a request doesn't contain credentials, it will return 401 UnAuthorized status code.
- Challenged
  - When request reaches the API then API will tell that it requires credentials then client will provide credentials.

2. Digest
   - It is more encrypted than basic. https...

15. RESTful Web Service / API

- REST stands for Representational State Transfer
- RESTful is referred for web services written by applying REST architectural concept.
  - In RESTful, web service http methods like GET, POST, PUT, DELETE can be used to perform CRUD operations.

16. What is the advantage of using SOAP?

- REST allows a greater variety of data formats, whereas SOAP only allows XML.
- Coupled with JSON (which typically works better with data and offers faster parsing), REST is generally considered easier to work with.
- Thanks to JSON, REST offers better support for browser clients.
- REST provides superior performance, particularly through caching for information that's not altered and not dynamic
- It is the protocol used most often for major services such as Yahoo, Ebay, Amazon, and even Google.
- REST is generally faster and uses less bandwidth. It's also easier to integrate with existing websites with no need to refactor site infrastructure. This enables developers to work faster rather than spend time rewriting a site from scratch. Instead, they can simply add additional functionality.

17. Difference between SOAP and RESTful web services?

- RESTful supports JSON, XML, TEXT, however SOAP supports only XML
- REST is faster than SOAP based web services

18. What is URI, purpose and format?

- URI stands for Uniform Resource Identifier
- The purpose of URI is to locate a resource on the server hosting the web service.
- A URI is of the following format:
  - <protocol>://<service-name>/<ResourceType>/<ResourceID>

19. What WebServices do you use in your project?

- I use Restful which is Representational State of Transfer and it communicates with XML and JSON but my current project uses JSON

20. What is XML?

- In computing, Extensible Markup Language (XML) is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.

21. What is JSON?

- It is JavaScript Object Notation (is a minimal, readable format for structuring data.)
- It is used primarily to transmit data between a server and web application, as an alternative to XML.
- Basically a lightweight version of XML
- In Key: Value format
- Key is always in double quotes and value if string its double quotes and if numbers no quotes
- It is purely based on http protocol - so it hits the link on the browser and see the results

22. Do you know swager????

- similar to xml schema but for json

23. json vs gson

- JSON is a format which has key and values
- GSON is a process of converting
    - from java to json(serialization),
    - from json to java(deserialization)

24. How and where are you sending request?

- Since i am using Rest, it has endpoints. My developers create public urls and requests are sent to that url

25. Do you use any non-web services API

- - I use Selenium API for browser, JDBC for database, and RestAssured for API

26. How do you test API in your project?

- In my current project we are testing not only our companies api but other external api.
    - For example we use linkedIN api to easily transfer the authorized end user's info to our database.
- As a tester we send a API request and verify the status code, response body and checking the endpoints of the api url is working as expected
    - For example in my project, I also do Positive/Negative testing of API 57
- Positive - i am sending valid requests, headers, parameters, and json body and verify that response is 200/201
- Negative- i am sending invalid requests, headers, parameters, and body, expecting to the status to not be 200

27. How do you test rest api?

- I verify if each REST API endpoint is working as expected.
- I use POSTMAN for manual API testing and use RESTASSURED library in Java for automation.
- I send POST,PUT,GET, DELETE type of requests and verify response status code and response body, header.
- I also do positive and negative testing of API.
- When I do positive testing, I send valid request parameters , valid headers, valid request json body and verify that response status code is 200 successful and Json response body data is also matching the expected.
- When I do negative testing, I send invalid request parameters , or invalid headers, or invalid request json body and verify that response
- status code is not 200 and Json response body contains error message.

28. Do you have API documentation website for your API?

- Yes we use swagger for our api documentation and this is where the description and guidelines of API endpoints are

29. Can All API endpoints use all of the Http protocols?

- It depends, My API developer decides if that url works with GET,POST,PUT, or DELETE requests

30. How do you manually test your API?

- I use Postman → it is a REST API client tool that test the REST API URL

31. What tools for api testing you use?

- Postman for manual testing
- Rest Assured library

32. What are the types of Request in Rest API?

- There are Get,Post,Put, and Delete requests
    - Get read data
    - Post creates data
    - Put updates data
    - Delete deletes data

33. What are headers in REST API?

- I am using Accept.(Content Type.JSON) type - checks what I am receiving should be in JSON or XML format
- And ContentType.(Contenttype.Json) - checks what i am sending should be in JSON format

34. What is RestAssured Library?

- A non web service api that's BDD format and helps integrate java code using deserialization and serialization to extract data from the json and transform it into a java object in order to store, verify, and validate the data to the expected one.

35. How are you using Enum in your project?

- I am using content Type to make sure that my response type is JSON format

36. What methods are you using to verify the size of the response data?

- I use Matchers from Hamcrest
    - hasitems()
    - equalTo()

37. What is JsonPath?

- Another way to validate response body
- JsonPath j=response.jsonpath;

38. How would I write a method where I need parameter with limit of 100 and path parameter of employee id = 100?

- I would write ;
    - .and().params("limit",100)
    - .and().pathParams("employee_id", 110)

39. How would I use Response interface?

➢ Reporting

- Mvn Verify will run tests even if it fails (it ignores the failure)
    - Waits for all the test to finish
    - It ignores failure b.c we have this in our build configuration
        <testFailureIgnore>true</testFailureIgnore>
    - Verify is a Maven lifecycle that comes after test
- Mvn test will stop running the test if something fails
- The original html report we get is not that great, we need statistical data
- Ex; "html:target/cucumber-report" → Like how many test are pass/failing percentages
- We going to use *Cucumber Sandwich* (this is a dependency file in pom xml) for more statistical data reporting
- In cukesrunner add; "json:target/cucumber.json"
    - It's a html report from a JSON file → How this report works is the Json file is used to generate the report
    - Version 3.15 (from the vid)
    - Add a new build xml in pom (its already in your pom file, the one called TestProject)
        - You will only get this json reporting(cucumber report with graphs and statistics. This report will be only local for YOU to see, not for Jenkins) ONLY if you execute MVN Verify
        - BUT YOU WILL ALWAYS GET A JSON FILE(different from cucumber report) AFTER RUNNING THE TEST, EVEN W.O VERIFY
            - This JSON file is very important for Jenkins - for the cucumber report plugin
- TestProject build:
    - <id>execution</id>
    - <phase>verify</phase> - this is why html (json) report will only generate when using verify
    - <goals>
    - <goal>generate</goal> </goals>
    - The report will also give you a json file
    - To run tests using verify, right click pom file and click on maven build…
        - You can also add parameters (like runner variable and value which is the xml file) - Type in goals: verify
- To run this in the command line
    - Go to location of pom file and type mvn verify
    - Syntax is mvn<lifecycle/goal>

- Order of Execution using mvn verify
    1. Run against the pom file
    2. Pom file runs the xml file
    3. Xml runs the cukesrunner file
    4. Cukesrunner runs the cucumber feature file/test
- Does json cucumber report show screenshot?

40. What is Backend-API?

- It is where application logic code is. Your conditions etc.
- How to test?
    1) Manually → Using tools like Postman etc. By sending requests and verifying responses.
    2) Automation → Java+RestAssured Library

41.

1. **What is tag is used in HTML code?**
   - Div Element(s) The tag is nothing more than a container unit that encapsulates other page elements and divides the HTML document into sections.
   - Web developers use elements to group together HTML elements and apply CSS styles to many elements at once.

1. **What is AngularJS?**
   - The problem was spending a lot of time to update the document object model (DOM) which helps us to manipulate the HTML and code.
   - So we need to do a lot of to manage it ourselves without AngularJS, after a while, this gets really difficult to deal with and it can become just overwhelming.
   - So, AngularJS has a framework of JS that lets us bind our model (which is the data includes JS objects and variables) to the view the HTML or in reality the DOM (Document Object Model) the representation of the HTML and the browser's memory.
   - So the objects and the data are connected, ties or binding to the thing that lets the browser paint or render on to the screen the web page with MV*.
   - So, with AngularJS, if we could just update one side and the other side updated automatically with using
     - Dependency Injection
     - Scope Services
     - Digest Loop
     - Directives
     - Templates
   - That's the concept and that's the what AngularJS does.

2. **Dependency Injection?**
   - This term is related with AngularJS.
   - Simply, it is just
     - Giving a function an object
     - Rather than creating an object inside a function, you pass it to the function
   - Think about we define an object using a function.
   - Then inside of our object, we add a first and last name before we create a new object, it is a construction of course.
   - Then we create a new function and think about we create a new object inside this function, it works.
   - But my first function is dependent to my new object because it is inside of my second function. It is a dependency. If something were to change about a new object, we have to change inside the function. It makes for, really complicated or difficult to deal with code.
   - So instead of this, we use dependency injection. If we create our new object outside the function and pass it to the function, we will get the same result and so our function is not dependent the new object

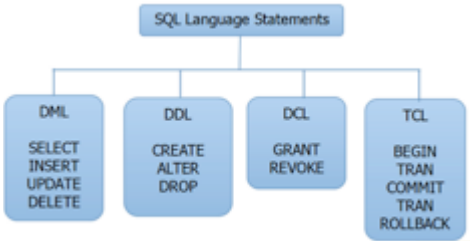
3. **Directives?**
   - Directive: An instruction in AngularJS to manipulate a piece of the DOM.
     - ng- dash. Like ng-app, ng-model
   - This could be “Add a Class”, “Hide This”, “Create This”, etc.
   - I can also say that, AngularJS gives us to create our own custom directives
   - We may have manually changed what was going on in the DOM, in memory representation of the HTML.
   - AngularJS prefers that we use directives, because it makes much more powerful and much more flexible, much more easier to do.
   - So we are directing what is going on in the DOM, we are directing that things change on the web page.

4. **Single Page Application (SPA)?**
   - Single Page Apps is an important part of AngularJS, one html page and dynamically updates it, so it does not require to reload the web page.
   - It is more faster, more useful, more powerful and easy to deploy.
   - SPA is using AJAX method, which is asynchronous JS XML. Exchange the data without refresh the whole page.
   - I can add also another important information about SPA, thanks to AngularJS’s dependency injection because we can use
   - Multiple Controller and multiple views with using single page application. SPA involves several fundamental concepts.
   - Routing: ng-route it is a module. It is a router, help us route whatever is in the hash, and then run the proper code and grab the proper HTML.
   - Templates, and Controllers

1. **Do you know SQL?**
   - Yes, I am very comfortable with writing SQL Queries and DDL and DML commands.
   - Currently working with Oracle database that is running in AMAZON CLOUD SERVER.
   - DDL (Data definition language) : CREATE , ALTER, DROP, TRUNCATE..
   - DML(Data manipulation language): SELECT, DELETE, INSERT, UPDATE

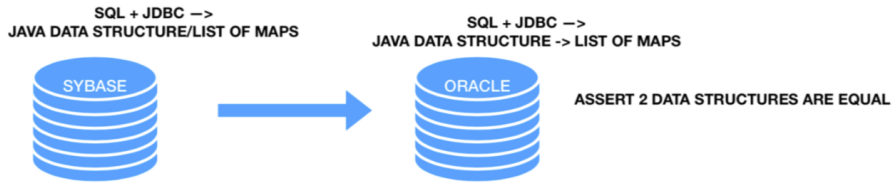
2. **SQL?**
   - Structured Query Language. Used for managing and manipulating data in db.
   - Provide statements for a variety of tasks
     - Querying data
     - Inserting, updating ,deleting rows in a table
     - Creating, replacing, altering, and dropping objects
     - Controlling access to the database and its objects
     - Database consistency and integrity

3. **What are the categories of SQL statements?**

1. DML (Data Manipulation Language) ● DML statements affect records in a table. These are basic operations we perform on data such as selecting a few records from a table, inserting new records, deleting unnecessary records, and updating/modifying existing records. 2. DDL (Data Definition Language) ● DDL statements are used to alter/modify a database or table structure and schema. These statements handle the design and storage of database objects. 3. DCL (Data Control Language) ● DCL statements control the level of access that users have on database objects. 4. TCL (Transaction Control Language) ● TCL statements allow you to control and manage transactions to maintain the integrity of data within SQL statements.	

4. **Tell me about TCL?**
   - SQL language is divided into four types of primary language statements: DML, DDL, DCL and TCL.
   - Using these statements, we can define the structure of a database by creating and altering database objects, and we can manipulate data in a table through updates or deletions.
   - We also can control which user can read/write data or manage transactions to create a single unit of work.

5. **What kind of Database testing are you doing?**
   - I am mostly doing Database validations.
   - I make changes or insert data (create loan) in the front end and validate in the database. Data in front end matches the db
   - I also make changes using RESTapi and verify that changes are successful in Database as well.
   - I also support DB migration process. My code connects to Sybase (legacy database) using JDBC then Connects to Oracle (NEW DB) then compare records to make sure data was migrated successfully.



6. **Versions**
   - Java 8 → 2014 present
     Java 7 → 2011 - 2014
     Java 6 → 2006 - 2011
     Selenium 3.5.3

7. **RDBMS**
   - Relational Database Management System
   - Data is organized into tables that are related to each other
     - How are they related?
       - Primary Key (unique and not NULL) and Foreign Key (duplicate and NULL)
     - What type of database system you have expertise with?
       - RDBMS, such as SQL and Oracle

8. **Database Schema?**
   - It is like a diagram with all tables and column names, data types and PK, FK and how tables are related to each other

9. **SQL clause?**
   - SELECT and FROM

10. **What are constraints?**
    - Properties that table column must comply with.
    - Columns have constraints that defined how data can be stored.
      - Primary Key: unique and NOT NULL
      - Foreign Key: duplicate and NULL and cannot add data which is not in PK
      - Unique Key: only unique value
      - Null: can have null
      - Not null: can not have null

11. **Data types in SQL?**
    - Number
    - Integers
    - char → char(20): 20 years spaces are taken from memory
    - varchar → varchar(30): 5 spaces from memory
      varchar2
    - boolean
    - date
    - currency

12. **Capabilities for SQL select statements**
    - Projection → Select the columns in a table that are returned by a query
    - Selection → Selects the rows in a table that are returned by a query
    - Join → Brings together data that is stored in different tables by specifying the link between them

13. **DML (Data Manipulation Language) vs DDL (Data Definition Language)**

DML command actions can be restored.	DDL command actions cannot be restored / undone.
Commands: • SELECT from tablename; (read) • INSERT into tablename values (...); (add) • UPDATE tablename SET value WHERE location; • DELETE from tablename WHERE location; (rows) • MERGE	Commands: • CREATE table tablename (column1, column2 …); • ALTER table tablename modify value; • TRUNCATE table tablename; (delete whole table data) • DROP TABLE; (delete whole table with structure) • RENAME • COMMENT

14. **PL / SQL functions and Triggers in Oracle?**
    - A trigger is triggered automatically when a DML statement is executed.
    - There are 2 types of functions:
      - Procedure (like a void method in Java)
      - Function (like a non-void (return) method in Java)

15. JOIN (INNER) JOIN

- is used when retrieving data from multiple tables and will return only matching data

16. LEFT (OUTER) JOIN

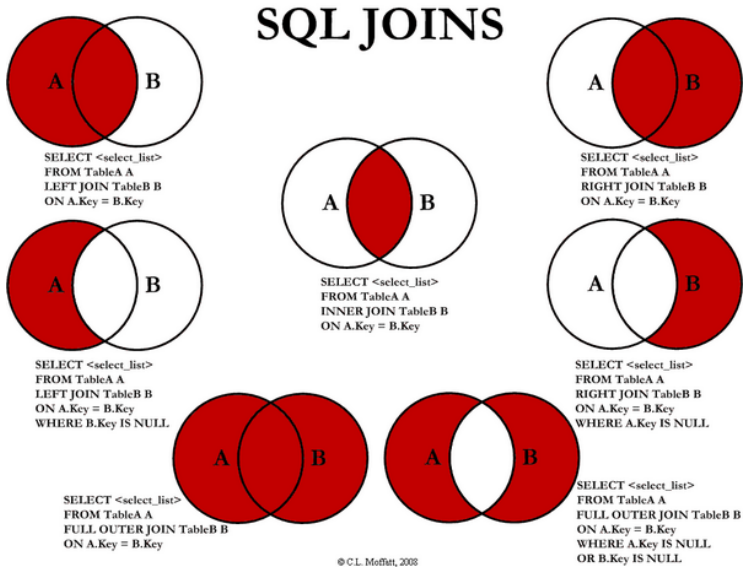
- is used when retrieving data from multiple tables and will return left table and any matching right table records.

17. RIGHT (OUTER) JOIN

- is used when retrieving data from multiple tables and will return right table and any matching left table records.

18. FULL (OUTER) JOIN

- is used when retrieving data from multiple tables and will return both table records, matching and non-matching.



19. UNION

- Union combines the resultSets of two queries ((1)select from column-names from table-name {UNION} (2) select column-name from table-name)

20. How to find top 3 high paid employees?

- In mySQL **oracle has ROWNUM
- SELECT salary, first_name, last_name
  FROM employees
  ORDER BY salary DESC
  LIMIT 3;

21. How to find duplicate names in employees?

- SELECT first_name, COUNT (first_name)
  FROM employees
  GROUP BY first_name
  HAVING (COUNT(first_name>1);

22. How to find employees whose salaries are below the average?

- SELECT first_name, salary
  FROM employees
  WHERE salary<= (SELECT AVG(salary) FROM employees);

23. How to find maximum salaries in each department?

- SELECT first-name, MAX(salary)
  FROM department d LEFT OUTER JOIN employee e
  ON (d.department_id = e.department_id)
  GROUP BY department_id;

24. How to find lowest salaries?

- SELECT first_name, last_name, salary, job_id
  FROM employees
- WHERE salary = (SELECT MIN(salary) From employees);

25. How to find second highest salary of employees?

- SELECT MAX(salary)

FROM employees
WHERE salary NOT IN (SELECT MAX(salary) FROM employees);

26. SQL Developer

- Development environment (manual testing the database using the queries)
- 2.1 -2009 3.0 - 2011
- Release 4.0 - 2013(latest)
- Has a Migration release(1.2) → provides users with a single point to browse data in third-party DB and to migrate from these DB to Oracle
- Supports Window, Linux and Mac OS x

27. Writing SQL Statements

- Keywords are uppercased while columns and table names are lowercase
- Statements are not case-sensitive
- Clauses are usually placed on separate lines
- Keywords cannot be abbreviated or split across lines

28. Arithmetic Expressions

- You use the operators in any clause (except the From clause)
- With Date and Timestamp - can only use addition and subtraction
- Add (+), Subtract (-), Multiply (*), Divide (/)

29. Working with Dates

- Default date display format is DD-MON-RR
- Sysdate function
    - Returns date and time Select sysdate
      From dual;

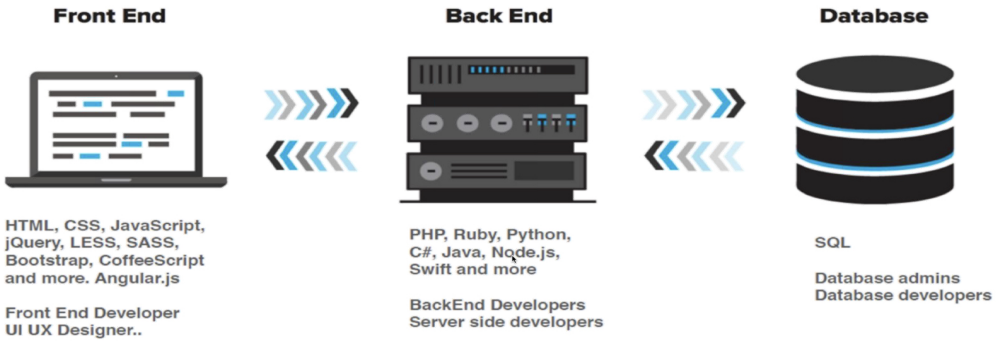
30. Do you have experience with SQL?

- Yes I have worked with relational databases and i am very comfortable with DDL and DML commands

31. Back-end test framework

- Using RESTASSURED in my framework in order for the process of Deserialization and serialization to occur that way you store json response into a java collection data structure and assert the data with the expected value (also stored in java data structure)
- I use postman for manual testing first BEFORE I INVOKE MY FRAMEWORK

2. Bac-end Testing



3. Have you done any backend/database testing?

- Yes, I have lots of experience with working with databases.
- And I am very comfortable with writing SQL queries.
- I have experience with working on Relational Databases like Oracle, MySQl, SQL Server.
- Have you worked with non-relational databases?
- I don't have hands on experience but I know that it is like JSON format

- Database and I have good experience with working with JSON files.
- And I am a quick learner

4. **Database testing framework**
   - For manual testing Iuse SQL developer for producing SQL queries
   - FOR AUTOMATION; I use JDBC library to integrate java by getting a CONNECTION from oracle database then creating STATEMENTS using SQL queries and then storing the data into a RESULTSET object.

5. **How can we connect db?**
   - Connection connection = DriverManager.getConnection(URL, user, password);
     Statement statement = connection.createStatement();
     ResultSet resultset = statement.executeQuery("query");
     resultset.close();
     statement.close();
     connection.close();
     After connection;
     DatabaseMetaData db = connection.getMetaData();
     After resultSet;
     ResultSetMetaData rs = resultSet.getMetaData();
   - If failure to connect will throw an exception:
     - SQLException (bad URL or credentials)
     - ClassNotFoundException (JDB driver not in classpath)

6. **What is metadata?**
   - MetaData Data about Data
   - ResultSetMetaData rsmd = rs.getMetaData(); int columNum=rsmd.getColumnCount();

7. **Dependency for jdbc**
   - <dependency>
     <groupId>oracle</groupId>
     <artifactId>ojdbc6</artifactId>
     <version>11.2.0.3</version>
     </dependency>

8. **Data Structures and Why we need it**
   - Data structures are way of organizing data for efficient
   - manipulation: Insertion , searching, reading , deletion of data.
   - I always use java data structures for reading data and storing data from our application, database, or API.

9. **What is the Procedure?**
   - A stored procedure is a group of SQL statements that has been created and stored in the database.
   - A stored procedure will accept input parameters so that a single procedure can be used over the network by several clients using different input data.
   - A stored procedures will reduce network traffic and increase the performance. If we modify a stored procedure all the clients will get the updated stored procedure. Sample of creating a stored procedure

```
CREATE PROCEDURE test_display
AS
   SELECT FirstName, LastName
   FROM tb_test;
EXEC test_display;
```

1. **What is GitHub?**
   - Version control system
   - Keeps track of new/old version of documents
   - Manages/stores set of files

2. **What is repository?**
   - Folder where the files are saved and
   - It may contain single, collections of files, or single projects.

3. **What is Remote & Local Repository?**
   - *Remote Repository*: Host on server(GITHUB) → Our changes go from local to remote repo
   - *Local Repository:* Typically on your computer → Our changes are done here consist of Working Directory, index and HEAD

4. **What are Git commands?**
   - Add: add to staging area
   - Commit: add from working directory and local repo
   - Push: add to remote repo
   - Pull: take changes from remote to working directory
   - Clone with url: clones url into directory
   - Git version: give you version of git
   - Git status: shows you what branch you're on, any changed files that aren't tracked
     - Origin: name of remote
     - Master: name of branch
   - Git add:
     - Adding to staging area
     - Recursive add
     - Adds everything
   - Git commit -m: "message will apply for all files"
   - Git push: origin nameOfBranch
   - Git ignore:
     - Notepad.gitignore
     - In the notepad add files you don't want to add to staging area
     - YOU MUST PUSH THE .GITIGNORE FILE TO REPO IN ORDER FOR THE FILES YOU WANT TO IGNORE TO BE IGNORED ON GIT
     - Some files don't matter and shouldn't be pushed to git
   - Remove file-git
     - GIT ADD REMOVE POM
     - COMMIT THAT
     - AND PUSH Creating own branch
   - checkout branch -git
     - Git checkout -b nameOfBranch master

5. **How do I use Git in terminal?**
   - create new repo-git
   - echo "# SqlMentor" >> README.md

```
git init
git add README.md
git commit -m "first commit"
git remote add origin https://github.com/Andylam224/SqlMentor.git
git push -u origin master
```

   - push an existing repo-git
     - `git remote add origin https://github.com/Andylam224/SqlMentor.git`
       `git push -u origin master`
   - Default editor

    - Press escape then
        - Press shift ":x!" → Saves and exit
        - ":q!" → No save and exit

6. What is pull request?

- Git merge fetch_head --allow-unrelated-histories
    - Resolved an issue for pulling an non-fast-forward issue

7. How do you resolve conflict on git?

- your repository → cd ~/<repo_directory>
- Pull recent version repo → git pull
- Checkout the source branche → git checkout <feature_branch>
- Pull destination branch into the source branch → git pull origin <destination_branch>
- Fix conflicts and then commit the result.

8.

1. **What is JIRA?**
   - Project management tool and helps tracks defects
     - Allows for planning and time management
     - Tracks due dates/assignment
   - Tester only in backlog, and active sprints

2. **For bug tracking what tools do you use?**
   - JIRA treats all work inside it as an Issue
   - So, in JIRA to create a defect would be to create an issue of the type “Bug”.
   - Defect reporting :
     - Defect ID
     - Defect title
     - Defect description (steps to reproduce)
     - Environment information
     - Screenshot(attachment)
     - Severity
     - Assign it to Developer

3. **What is Active Sprint Board?**
   - *Workflow:* To do>In Progress(can have blocked in here too)>Review(Tech lead review the code before moving to done>Done
   - *Blocked:* Go to story and click on options and click on more options> blocked
     - Write a comment about why it is blocked
     - Scrum master will have to deal with ASAP
     - Nothing should be in the block for more than a day
     - Once it's fixed you can change to blocker resolved

4. **What are the Jira terms?**
   - Issue → We you need to do and fix
   - Types of Issue
     - Story
     - Task
     - Bug
     - Epic

5. **What's the difference epic and tickets?**
   - Epic are written by B.A, tickets are created by testers
   - Description box
     - Example reporting a bug
     - You write in the box
       - What is the bug about
       - What functionality is breaking
       - What are the steps of recreating the bug (with necessary data)
       - Attach report and screenshot of bug
       - Expected results
       - Actual results

6. **How do you automate User Stories from JIRA?**
   - Look at description - Agile story
   - Create feature file and save file as jira story.feature
     - Add scenario located in Acceptance criteria
   - Run cukesRunner with dryRun=true
   - Implement the methods

- BEFORE AUTOMATING THE TEST CASES IN JIRA ALWAYS MANUAL TEST IT FIRST

7. How you integrate Selenium with Jira?

- Selenium does not have a built in integration with Jira.
- But there are plugins that integrate selenium testing framework with jira.
    1. Xray (jira plugin, Jenkins plugin)
    2. Zephyr (jira plugin)

1. **What is JENKINS?**
   - Continuous Integration and Deployment tool. 3 components of Jenkins
     - 1. Code change → Devs makes changes to the application code
     - 2. Test → CI tool automatically picks up the changes and tests the application
     - 3. Deploy → CI tool deploys the application with changes

2. **What is Jenkins job?**
   - Everything is done by creating a job
   - A task that Jenkins performs based on its schedule
   - Made of several steps
   - Can have a trigger that determines when it runs
   - Reports the results of the run automatically

3. **What is continuous Integration?**
   - CI is a development practice that requires developers to integrate code into a shared repository several times a day.
   - Every time the software's code is changed, it is built and tested automatically

4. **What is continuous deployment?**
   - Code changes are automatically built, tested, deployed, and prepared for a release to production
   - Each check-in is then verified by an automated build, allowing teams to detect problems early.

5. **Do you maintain Jenkins?**
   - It is done by Special Team, environment team, architecture team
   - But i provide them information of my tests and configuration info and also the emails to send notifications.
     - Git path
     - Mvn code ; goals - compile, or verify -drunner=xml, etc
     - Time schedule for certain tests
   - If you run your regression test on jenkins, how do you execute it if it automatically runs?

6. **What goes in the regression test?**
   - Depends on the team, test plan, scope, and business value

7. **How many jobs in Jenkins?**
   - I personally set up 2-3 jobs for automated tests
     - 1 for smoke → Smoke is running daily 2,3 times a day , making sure that all environments are up and running
     - Full regression (running manual and automated tests)?
       - Before each production release(after 3 sprints)
       - Only very stable test cases are stored in full regression
       - Updating functionality
     - Minor regression
       - Runs at the end of sprint
       - Tests that are related to certain modules and functionalities
       - I use tags to specify which module to run

8. **How is code deployed to your environment?**
   - Devs write the code, test it then is deployed in jenkins from dev to test environment
   - **What if it doesn't?**
     - Talk to your developer and ask them to deploy it

9. **How do you search by tags?**
   - You can use ctrl-h to open search tool in Eclipse and put the tag name in there and
   - What kind of file it is, like feature.file

10. How schedule a build in Jenkins?

- In Jenkins, under the job configuration we can define various build triggers.
- Simple find the ‘Build Triggers’ section, and check the ‘ Build Periodically’ checkbox.
- With the periodically build you can schedule the build definition by the date or day of the week and the time to execute the build.
- The format of the ‘Schedule’ textbox is as follows:
    - MINUTE (0-59), HOUR (0-23), DAY (1-31), MONTH (1-12), DAY OF THE WEEK (0-7)
- How do you do scheduling in Jenkins? How will you schedule test to be executed every 3 hours?
    - H 3*** If you want to schedule your build every day at 7h00, this will do the job : 0 7 * * *

11. What is build pipeline in Jenkins?

- Job chaining in Jenkins is the process of automatically starting other job(s) after the execution of a job.
- This approach lets you build multi-step build pipelines or trigger the rebuild of a project if one of its dependencies is updated.

12. How do you maintain your smoke tests job on jenkins?

- I have configured the job to get the code from git, run the tests by passing a mvn command, generate reports and send email. I do not go and change the job configuration. Once set up, it always works.

SELENIUM GRID & SauceLabs

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1. **What is Selenium Grid?**
   - Gives you the ability to run your automated tests in different browsers(and their different versions) and platforms(basically Operating systems and their versions.Window, Linux, Mac) VISGRID
   - This tool is useful if you have lots of Tests (over 500)
   - Instead of doing WebDriver driver=new Chromedriver()
   - Do WebDriver driver=new RemoteWebDriver(url,capabilities) → Contains 2 parameters in constructors

2. **When do you use Selenium Grid?**
   - Selenium Grid can be used to execute same or different test scripts on multiple platforms and browsers concurrently so as to achieve distributed test execution

3. **How does Selenium Grid work?**
   - Grid is a set up that consists of Hub and nodes
   - Hub is a central machine that all nodes connect to
     - Has IP address and port number, Then you link the Hub to Nodes
   - Has a main machine which is called a Hub and multiple nodes (the machines that actually run your tests)
   - The order of execution is;
     - Your code>remote driver>Selenium Hub>Selenium nodes (might be multiple ones)
       - You asked your Selenium Hub to run your tests
         - Then selenium hub will find a node that is linked to the hub and run your test from there
       - You can have as many nodes as you want but only one hub

4. **How do you set up your selenium grid?**
   - Hub is a different server machine and each node is a seperate server machine
   - Our hub and nodes will be set up in Amazon AWS Ec2 machines (ideally)
   - You can ask your hub to run tests and then the hub will find a node and run your test from there
   - We can also have hub and multiple nodes in same machine or server
   - Each node registers to the HUB with a certain configuration and HUB is aware of the browser available on the node
   - When a request comes to the HUB for a specific browser(with Desired capabilities object), the HUB, if found a match for the requested browser, redirects the call to *that* particular GRID Node and then a session is established bidirectionally and execution starts

5. **Where are the cross browser/platform running?**
   - It is running in Amazon AWS machine where Jenkins is installed. But normally, company jenkins is used by developers team, devops, deployment team, and QA automation team
     - It is not recommended there
   - Ideally is Jenkins>Github>Maven>Runner class>Selenium Hub and run in one of the nodes that is configured in different server
     - In your hooks class, instead of having you webDriver point to a local driver, change it to a RemoteDriver(); and have it point to the cloud machine that has the hub

6. **What are the challenges in multi browser testing?**
   - Something is not clicking
   - Not visible
   - Some items look different in one browser than another browser

7. **What browsers are you testing?**
   - Chrome - FireFox - IE/Edge - Safari - Opera

8. **What is a hub in Selenium Grid?**
   - A hub is server or a central point that controls the test executions on different machines

9. What is node in Selenium Grid?

- Node is the machine which is attached to the hub, There can be multiple nodes in Selenium Grid.

10. How do you automate multi browser testing?

- 1. Change the browser to something else in my properties file in my framework
    - When I want to run my tests in different browser
    - Ex; “Browser=chrome” to “Internet Explorer”
    - This method works if your tests are less than 500 tests
- 2. In my framework, I implemented Selenium Grid and I can run tests in different cloud machines using different browsers

11. What to do with failed tests?

- Look at the automation execution report
- Find out the reason of failure
- Try to do steps manually,
    - If manual is passing then automation issue → so you fix, re-run and see if its passing
    - If its application issue
        - Create a defect
            - While the defect is being fixed, i am testing manually using Ad-hoc test
    - If the defect is not a showstopper then you run other tests and automate
        - If it is, you have to wait, cant do any further testing
    - When rerunning, i use @ReRun tag to test only the test you want to rerun

12. What is Ad-Hoc test?

- Performed without proper planning and documentation
- Defects found using this method are hard to replicate since there no test cases aligned for those scenarios
- Performed after formal test execution

13. SauceLabs - cloud Grid service. Access to multiple Platforms with multiple browsers

- Provides cloud machine so you can run a lot of
- Does parallel testing well

14. How to test with SauceLabs?

- Usually, we do “WebDriver driver=new FireFoxDriver();
- Now we going to do;
    - DesiredCapabilities caps=DesiredCapabilities.firefox();
      caps.setCapability(“platform”,”Windows 7”);
      caps.setCapability(“version”,”38.0”);
    - WebDriver driver=new RemoteWebDriver(new URL(“http://YOUR_USERNAME:YOUR_ACCESS_@ondemand.saucelabds.com:80/wd/hub”,ca ps)

15. Steps to run your tests in saucelabs/Any ready selenium Grid

- ✓ Create desiredCapabilities object and specify with type of OS, browser you want your tests to run with selenium Grid.
    - DesiredCapabilities caps=DesiredCapabilities.firefox();
      caps.setCapability(“platform”,”Windows 7”);
      caps.setCapability(“version”,”38.0”);
- ✓ Create RemoteWebDriver with HUB url:
    - WebDriver driver=new RemoteWebDriver(new URL(URLOFHub),caps);
- ✓ Create sauceLabsDemo class
    - In @BeforeTest
        - DesiredCapabilities(comes from Selenium)
          caps=DesiredCapabilities.firefox();(chooses which browser)
          caps.setCapability(“platform”,”Windows 7”);
          caps.setCapability(“version”,”38.0”);
    - String URL=”http://YOUR_USERNAME:YOUR_ACCESS_@ondemand.saucelabds.com:80/wd/hub”
        - This is Selenium Hub address

- URI= unified resource identifier
- URL=unified resource locator

16. How do you report using SauceLabs?

- I link to my JIRA server

17. How do you set up Selenium Grid in AWS?

- 1. 2 cloud servers (Ec2)
  - 1 will be HUB
  - 1 will be node
- 2. In machine 1, download Selenium StandAloneServer
  - It is needed in order to run Remote Selenium WebDriver
    - A lot of configuration
    - Use command line
      - Set up HUB;

        java -jar selenium-server-standaline-3.5.3.jar - role hub http://localhost:444/grid/console
      - Set up node1

        java -jar selenium-server-standalone-3.5.3.jar -role node - hub http://locahost:4444/grid/register
      - Node2

        java -jar selenium-server-standaline-3.5.3.jar -role node -hub http://localhost:4444/gird/register -port 7777
- 3. You can also use Visgrid
  - Download in machine 1
  - Open jar file
    - Set max session to 10
    - Start hub
    - Port 4444 (where your hub is. You can change it but remember it)
  - Click Create node
    - Choose a browser for the node
    - Type in number of instances
    - Click Add
      - Open browser in ec2 machine
      - Type: localhost:4444 (this is seleniumGrid hub) (Now we just powered up our HUB)
      - Click on console
      - Refresh the page
      - Now it Show nodes (all in the same machine)
      - Add another node(now it will show 2 nodes)
  - Now go to another machine and create nodes from there and link it to HUB
  - Before going to machine 2
    - Go to aws console
    - Go to the instance that hold your hub
      - Click on security groups = launch wizard
      - Go to inbound
        - Add the port number of hub (which is 4444) and save it
  - Go to machine 2
    - Download same jar file of visgrid you used for 1st machine
    - Download jdk (in order to open the file)
    - Open jar> start hub>create node>click Override HUB(we don't need this hub since we have another one on the first machine)>add machine 1 ip address and port number: 4444>add

18. How do you run your tests in multiple threads parallely?

- Thread is like one process or instance of application run
- 4ways
  - 1. We can create multiple cukesrunner with different tags
    - Ex. cukerunner has tag “@Test”
    - Smokerunner has @smoke
    - Regression runner has @Regression

- 2. Create testng xml and add those runner class under one test
  - Add all 3 runners in one xml
  - Then next to verbose=2(on top of xml file) add “parallel=”classes” thread-count=”10”>
- 3. Then make sure our driver opens a remote WebDriver that is point to hub
  - Add the code in driver class
- 4. Run the testng xml by itself or using maven.

19. Linux Commands (case-sensitive)

- reboot → reboots system
- man → gives you instruction of the command - Ex: “man reboot”
- mikdir → Creates directory(folder)
- cd → Change directory
- Ls → List directory content
- pwd → Print name of the current working directory. It gives you the exact location; Ex: /home/Andy/Desktop
- ll → Long list format
- ls-la → Prints files and hidden file
- clear → Clear screen
- cd.. → Goes to the parent file (not the root file)
- cd/ → Goes to the parent root file
- cd~ → Goes to the home of the user file
- grep → Prints a line matching a pattern
- df-h → Prints the disk space usage
- top → Displays linux tasks (like task manager)

- **How to create an account**
  - User → useradd Andy
  - Group → groupadd Cybertek

- **Adding a user into group**
  - useradd -G Cybertek Andy
  - id Andy → prints details for this individual (shows it Andy has cybertek)

- **Configuration/changing the network**
  - vi /etc/sysconfig/network
  - crontab → Sets a timer for your file to run (build schedule like jenkins)

- **Setting permissions**
  - chmod → Change file mode bits
    - Order is owner, group, others
      - If the file is folder, d is in the front
      - If not a folder there is no d
  - chmod 777 → Gives access to owner,group, and others; Very dangerous; DON'T USE
    - r- read
    - W-write
    - X-execute
    - rwxrwxrwx (777)
  - chmod 644 → Give access to owner (read and write),group(read only),others(read only)
    - -rw-r--r--
    - Default access and Standard

- How to find an file using grep (if you know the name of file)
  - grep ‘name of test failed file’ /home/Andy/Test1/TestScenario (location) > /home/Alex/AutomationFile
    - Now the file is inside this location; /home/Alex/AutomationFile
  - Find any file that has ‘ name’
  - grep ‘fail scenario’ *

1. **Do you work with AWS?**
   - I am working with EC2 instances.
   - Basically, that is my virtual machines.
   - When I have Selenium Grid, I have different virtual machines and each machine I am running separately.
   - For instance, to minimize the time for regression tests, it is really efficient, it saves a lot of time to our company

2. **What is AWS?**
   - AWS is providing cloud VM. Create an EC2 instance.
   - I can use this instance with remote desktop. Actually, after lunch my instance I just use like a regular computer.

3. **What is base page?**
   - We store our common functionalities in a base class and later we extend that base class and use in other class.

How to build your framework from scratch

- Testing Framework - guidelines and rules used for creating and designing test cases

1. **Set up Environment ; install JDK, MAVEN, ECLIPSE IDE**
2. **Create Maven project**
    a. ArtifactID - name of your project
    b. GroupID - identifies your project uniquely across all projects
3. **Add Dependencies from Maven Repository**
    a. Selenium Java
    b. Cucumber Sandwich
    c. JRE System library 1.8 in <properties>
    d. TestNG
    e. WebDriverManager_BoniGarcia
    f. Cucumber Java
    g. Cucumber TestNG
    h. Apache POI.XML
    i. APACHE POI
    j. JDBC
    k. Restassured
    l. Gson
    m. Log4j
4. **Create framework Structure (packages)**
    a. Pages
        i. Webelements and methods
    b. Beans
        i. Custom classes
    c. Runner
        i. Cuckesrunner - generates codes and stores html report to target
        ii. Smoke
        iii. Regression
    d. StepDefinitions
        i. Actual codes and hook class
    e. Tests
        i. Data driven tests
    f. JDBC
    g. API
    h. Utilities
        i. ConfigurationReader
        ii. Driver class (Singleton)
        iii. browserUtils
        iv. DBUtils
        v. ApiUtils
    i. Configuration.properties
    j. Testng_runner.xml
        i. One of the runner class

    Call the packages with com.app.utilities

5. **Create feature folder with feature file (.feature) in resources**
        File executable specification written in a gherkin language
6. After you finish writing your scenario, run your cukesRunner with dryRun=false, this will give you implementation code that you will store in StepDefinition class
7. **How to run your code?**
    a. Use runner class - run codes and generate cucumber report and html reports
8. **Send framework to github**
    a. Create new repo

b. Copy git url and go to eclipse
c. Configure git repo and add the url
d. Right click project, click team, click commit and you'll be in git staging
e. NOW YOUR CODE IS IN GITHUB

9. Next is JENKINS INTEGRATION

a. Jenkins
   i. Open source automation server
   ii. Helps to automate the non-human part of the software development process
   iii. Allows continuous integration
   iv. Development practice that requires dev to integrate code into a shared repo at reg intervals
   v. Port is 8081 localhost

b. To run your project in jenkins
   i. Login to jenkins account
   ii. Create project - freestyle
   iii. Install plugins -cucumber report and git
   iv. Under source code management choose git and past git url
   v. Build trigger - choose build periodically
   vi. Invoke top-level maven
      1. Maven version ; MAVEN_HOME
      2. Goals ; clean verify -Drunner=smoke_runnerxml
   vii. Under post-build actions
      1. Choose cucumber reports
      2. Choose editable email notify
   viii. Editable email notification
      1. Attach build log ; choose build log
      2. Click advanced settings
   ix. Failure-Any
      1. Click advanced
      2. Recipient list - email address who will receive the report. Add comma if multiple
      3. Click add trigger - like failure always
      4. Attach build log; select attach build log
      5. Save
   x. Final Step
      1. Click build now and test will run and gives your cucumber report

Describe me your Framework

MY FRAMEWORK and how to explain to interviewer - Andy Lam and little bit of Alex
//based on **Data Driven and Behavior Driven** - Hybrid framework
//**Maven** - build tool and not only for dependency management but also as a command prompt tool using the pom xml file, i also have specific **xml file** that run my smoke,
//regression, and functionality tests
//**Java** as programming language - working frontend,backend(api), and database i use **Java Collection framework** to store data and compare
//i also have a **properties file** that stores sensitive/reusable data - url, password, browser
//and i use **Testng** testing tool to control flow and assert data, after formatting data to java, in order to find defects
I also created **Driver class** in utility package that uses **singleton pattern** to create and use only one universal webdriver

FRONT END ; **selenium webdriver**, and in my framework i am using **Page object model** as my design pattern; - create page objects;identify webelements and
//and store as a webelement variable ,POM = REUSABILITY OF ELEMENT/METHODS BASED PAGE OBJECT

//i also use **Page Factory design pattern** to instantiate my webelements using @FindBy - easier/convenient
//utility; browser util - where static reusable code that makes your life easier, to make codes for automating browser easier;

BACK END (Api)
//using **RESTASSURED** in your framework in order for the process of **Deserialization** and **serialization** to occur
//that way you store **json response** into a java collection data structure(/i produce high level pojos and map objects) and assert the data with the expected value (also stored in java data structure)
//i also have a api utility class - reusable codes -method where one line creates a pojo
//i use **postman** for manual testing first BEFORE I INVOKE MY FRAMEWORK

DATABASE testing
//manual i **sql developer** for producing sql queries
//FOR AUTOMATION ;I use **JDBC library** to integrate java by getting a **CONNECTION** from oracle database
//then creating **STATEMENTS** using SQL queries and then storing the data into a **RESULTSET** object.
//I use java data structures to use store data inside and compare them

//and since im using **DATA DRIVEN and CUCUMBER BDD** framework, all of these tests are stored inside **feature files**
//i have **RUNNER classes** that helps generate codes from **FEATURE FILE** and implement them into a file called b
//also have **HOOK class** that implements my codes that run before and after all my tests - this is where i invoke my **TAKESCREENSHOT** interface which triggers when i use scenario interface(when scenario fails)
//take a picture when youre are on the step that failed
//S.D - this is where i stored my codes that based on **gherkin language** expected value
DDT
//if the im working with small amounts of test data im going to operate with **scenario outlines**, this where i create **examples** and store datas using pipeline
//if there large amount of test data its usually in a external file (excel) so i use **Apache POI** to **INVOKE DDT EXCEL AUTOMATION** and read from excel file and store the data
//into java data structure

//i also have a logging tool called **log4j2** to log my codes that are basically high risk

//and lastly for my reports,, in my framework i use **Rerun.txt code** in cucumber "rerun:target/rerun.txt" generated by cucumber sandwich library
//this will store my failed cucumber feature files
//then i also have **failedScenario runner class** which has the location of failed scenarios (rerun.txt)

//i create a failedScenario xml file
//so whenever i have failed feature files i use mvn command ; **mvn -Drunner=failedScenarios. xml** file to run my failed tests
//reporting - i used html report that's located in target folder which is called cucumber-reports -"html:target/cucumber-report"
Parallel testing - used **cucumber jvm-parallel plugin** to generate runners and **maven fail-safe plugin** to run the tests

For **continuous integration (jenkins)**
//devops takes care of configuration
//have github path
//but the tool is invoked my a mvn command - mvn verify -drunner=smoketest.xml that is provided by the tester - xml file
//for reports each build will have a cucumber report that give graphical information of test and screenshot

Talk about cucumber report after the build

1. **What is Page Object Model**
    a. Reduces code redundancy and organizes code
    b. Helps identify elements and store it as a page object variable
    c. You can link it to where it was stored
    d. Added PageFactory design pattern
2. **Selenium WebDriver as my automation tool**
    a. Manual test it first by:
        i. Front end
            1. Functional testing
        ii. Back-end
            1. Database- SQLDeveloper IDE
            2. API - Postman
    b. Integrate Selenium with:
        i. Maven
            1. Test package
            2. Utility package
                a. UI
                b. DB
                c. API
            3. Configuration file
                a. Properties
            4. Driver class
                a. Singleton design pattern
                    i. Have a private constructor
        ii. Cucumber BDD
            1. Facilitate the collaboration during the BDD process
            2. Enables explaining the story and the acceptance criteria in easy language.
        iii. Git - source control
        iv. Jenkins
        v. Java
            1. Collections Framework
            2. Apache POI
            3. JDBC
            4. Rest-Assured
3. **Java for writing code**
4. **Behavior Driven Development**
    a. Developing together with the customer to ensure it meets the right standards for the customer
5. **Data Driven Development**
    a. Executing same test case against different sets of data
    b. Test flow should not change based on data
6. **Cucumber reporting**
    a. Target folder
    b. Jenkins

What are the steps you take to automate?

1. Learn the functionality
    a. Reading requirements
    b. Knowledge transfer session with B.A
    c. Ask teammates
2. Manually test it
    a. Making sure you understand each step properly
    b. Understand expected results
3. Automate it
    a. Create POM pages
        i. Add necessary elements/methods you are going to use and add PageFactory design pattern
        ii. Create a driver class with Singleton pattern
    b. Validate the tests using TestNG Assertions

JUnit

- Annotations
    - @BeforeClass → Run once before any of the test methods in the class
    - @AfterClass → Run once after all the tests in the class have been run
    - @Before → Runs before @Test
    - @After → Runs after @Test
    - @Test → Test method to run
    - @Ignores → Used if you want to ignore some statements during test execution

TestNG

- Annotations
    - Priority
        - Doesn't matter what number you start or if its consecutive
        - Ex: @Test(priority=0)
    - DependsOnMethods=”test method name”
        - Can add multiple test names
        - If the first one fails, the 2nd test won't run at all
        - If the first method failed, your report will show that the 2nd test will be skipped
            - If the 2 methods depend on each other, why not combine into one single test?
                - B.c in each test method, we are testing different functionality
                - We want to test the smallest piece possible in one test
                    - Functional testing
    - Enabled
        - @Test(priority=0, enabled=false) → This skips a test
            - It will be picked up by testNG and will be on the report
    - @BeforeClass vs @BeforeMethod → BM - will run every time you have a test
        - BC - will run before everything else, even before @BeforeMethod
    - Groups
        - Ex: @Test(priority=0, groups=”smoke”) → If you add groups, sometimes @Before and @After dont work,so put AlwaysRun=true in the before and after
        - Can be added in xml file
    - Parameter annotation
    - @Optional annotation
        - Lets you run a specific test w.o invoking the xml
    - Parallel execution in testng
        - In xml file write; → parallel=”tests” thread-count=”4”
        - Thread-count is how many browser do you want to open same time
        - Batch running
            - In xml file you can add .* to run everything
            - Ex: <package name=”.*”></package>
    - Testng has it own reports
        - When you run xml, it gives you the report in test-output folder
            - Contains the test report in html

Current JOB: Follett

Area: Education

About Company: Everything in education from curriculum to school information systems. 2 million students overall and 240 school districts. A subsidiary, X2 Development Corporation was acquired in 2010 who owned Aspen.

Steve Follett - CEO/President at Follett Corporation and Owner

Address: 75 Sgt William B Terry Dr, Hingham, MA 02043 (Route 3A through Quincy)

Clients: Boston Public Schools (52500 students, 118 schools), 450k MA students in 115 school districts

Entry: July 2014pp

Project Summary: SIF - 450000 students, 115 districts, BPS 52500 students with 118 schools

Responsibilities: Joined the team after a year they started on the big SIF project. My team's responsibility was specifically to work on the state reports tool. We are currently working on SIMS as a team. There are four teams in total.

We are not allowed to change any data even if we find mistakes those cause errors. The list of the errors are shared on the application with the users after each regression.

We are working on tools that does not allow user to enter incompatible data but that's not always possible because most data is taken from non-report area/fields. For some cases we require the user to enter the same data in the reports section manually like attendance.

There are a lot of conditions to meet and we need to know the data handbook and error lists very well. Until first SIMS we receive lots of errors from regression because of transferred in/out students.

Other issues are incompatible course codes like 9th grade Algebra 1 and MS Algebra1, teacher qualifications entered wrong. Multiple qualifications for teachers teaching multiple different type of classes, etc.

I take data from the state via RestAPI, convert to JSON and then map via POJO to make sure we have the same keys.

When a new functionality, a new field or a new error item is added, I check that manually and try to automate it.

If there are any issues, I will analyze them:

-If it is a service issue, I immediately contact my manager. Excel file is full blank when downloaded. API does not get the data. Like they make a change in their system but does not update us on time.

-If it is about my scripts, I will debug my scripts. StaleElement, waits, pop-ups. It works in my environment but does not run on Jenkins.

-If it is a bug, I reproduce it and log the defect. Local ID not right based on state handbook criteria but still submitted.

Our team is also Operations and Maintenance (O&M)

Group ID: sims.doe.aspen

Artifact ID: acceptance tests

Team Size, Members: 8 members; 4 devs (one team lead), 2 QA Engineer, 1 BA, 1 Scrum Master. 4 teams in total. Test Manager leads all QAs (11 in total).

BA James, Scrum Master Sanela, Aju team lead, Ivan dev, Raju dev, PhuCong QA, Ryan Test Manager

Team Name: "Karaman" and changes every quarter (6 sprints).

Sprint Planning 1: WED 10am-11.00am (one week before the Sprint) pointing 1-2-4-8-16 (24 to 28 points in total) (1 user story has about 3-5 acceptance criteria)

Sprint Demo: TUE 10am-12pm (all teams) (every two weeks)

Sprint Grooming: WED 10am-12pm (same day with the Sprint) BA shares “requirements - acceptance criteria”, prioritize (same day Sprint begins), SM opens backlog

Sprint Retrospective: FRI 10am-11am (every two weeks)

Daily Stand-up: Every day 9:45am for 15 minutes

Release: Every 6 sprints there is a release

How many test cases/scenarios/feature files: 2-3 test cases per sprint, 150 feature files, 400 scenarios

My smoke test

2 feature files, 2 scenarios each, 5 mins

smoke tests run once a day.

My regression

150 feature files

400 scenarios

3 years ; 1 tester worked 3 years, second worked 2 years

How often is your smoke test, how long does it take and tests what? Every morning at 5am, around 5 minutes, creates 5 students in two browsers with the necessary fields, checks if it is accurately saved from both UI and database, then populate the report from the browser and also download as an excel file and then compare.

How often is your regression test, how long does it take and tests what? Once a week 1am, half an hour, all districts every day, only SIMS. Validation regression tests on the weekends, 5 separate EC2 machines, parallel testing for each school, submission, validation, cross-validation and certification. Our test validates with SCS.

Sample Scenario: Given the SIMS report is downloaded and the file type is an Excel File type, then the first column title must be “LASID”, and every cell in the first column must be alphanumeric, and every cell in the first column must be 9 digits, and all LASID numbers must be unique.

Sample Test Case: Given the user is logged in, when the SIMS report is executed, then every cell in the first column must be 9 digits, and also alphanumeric.

Must Have: pre-condition, steps, test data, expected result, actual result

Edge Case Scenario: null, negative numbers, empty list/string, duplicate control, checking the limits, extreme cases (length, size)

Risk based testing: when there is no time to do whole regression testing, you only test the parts that matters, that is related

Testing without requirements: Production defects usually don’t have any requirements and I talk to developer to understand the situation better and then test it.

Challenging Test Case:

1) FTE calculation: FTE stands for full-time equivalency and that was something the school data people have to enter manually based on each staff member’s workload. This number has to be exactly 1.0 and FTE must be entered separately for each job assignment they have. Every single class section and each course session have separate FTE and this was a lot of work for users that involves some high level math. This was a huge issue during reporting term and this error can be populated only when the full report is run. This was a specific problem to only one type of report called EPIMS and usually noticed very late and cause a lot of frustration among the schools where we had to come up with a solution. I wrote a method that calculates those values automatically based on the number of hours they are teaching, prep time in a week including their other responsibilities. It was a very long method but it was making sure the numbers are calculated correctly and then we never had that problem.

2) Student attendance numbers did not match in the reports. I couldn’t figure it out because several schools have different total number of school days. There was no pla

ce for me to get that number and it was hard coded on the state files. The attendance tool was out of our project scope and did not have any immediate solution to get that number other than trying to get that number from the UI. I then realized that wasn't an option, either because many schools have different calendar setups. That was the time when I learned a lot about our application since I didn't really need to go to different pages other than the report pages. I told my manager about the problem and also the developers. We reported the issue to the attendance team as well. Then, the developers in my team added a new field for the total number of school days in the reports section and that's how we fixed the issue until all schools entered that value.

Example for Overloading method: Several overloaded methods in BrowserUtils for waits. Explicit waits by locator or WebElement.

Example for Overriding method: Below

Example for inheritance/abstraction: Top bar and sidebar pages are abstract classes and some of the methods are abstract because we have different implementations based on where they are and where they click it. School/District functions are populated differently on the dropdown menus.

Stories: Some of my methods that I wrote for test cases are used by developers. An example would be a method that validates teacher's qualifications with the course he/she teaches. If they are not compatible, the assigned course is not saved and the user is forced to create the appropriate qualifications for the teacher.

Sample Cucumber Scenario:

Given Yavuz is at the table with the best interview committee

When Yavuz answers their questions well and shows them how he can be a very good fit to the team and the company

Then Yavuz will be offered a position in the company

And Everybody will live happily ever after

If you at some point ask me when to automate this is one case that I don't.

Thought Bug:

Grade average calculation, quarter, semester. Has to be applied in not only calendar/terms but grading as well

Environment: Testing, development, production

Previous JOB:

Area:

Client:

Environment:

http://www.requirementsnetwork.com/business-functional.htm