Tell me about your roles and responsibilities in the Project:

My roles and responsibilities include understanding the User Stories, writing manual test cases based on user story, and perform manual testing and log bugs if found, once developer has fixed all the bugs for that test case then we mark test case as Done in JIRA, after that we add labels in test cases that whether the test case is Automation Candidate or not, after that we start picking test cases that have automation label and automate them using Selenium Java and push code to github. Also I fix the test scripts in case of failure. Also I attend client calls on daily basis and understanding their requirements and act accordingly, also I am involved in Sprint Planning meeting, attending daily 15 min scrum call in morning. I help my team members in case of any blockers.

Have you created a framework from scratch? Explain the architecture:

If you have, describe the framework's purpose, components (e.g., test data management, reporting, logging), and how they interact. Mention the technologies used (e.g., Selenium, TestNG, Maven). If you haven't built one from scratch, discuss your experience working with existing frameworks and your understanding of their architecture.

Which design pattern have you used in the framework?

Common patterns in test automation frameworks include Page Object Model (POM), Factory, Singleton, and Observer. Explain the pattern you used and why it was appropriate.

What is 3 Amigos?

In Agile development, the 3 Amigos refers to a meeting involving the Business Analyst (representing the business), the Developer, and the Tester to discuss user stories and acceptance criteria *before* development begins. This helps ensure a shared understanding and reduces ambiguity.

Difference between Scrum and Kanban:

Scrum is a time-boxed, iterative framework with sprints, roles (Product Owner, Scrum Master, Development Team), and events (Sprint Planning, Daily Scrum, Sprint Review, Sprint Retrospective). Kanban is a flow-based system with a focus on visualizing work, limiting work in progress (WIP), and continuous improvement. Kanban is more flexible and less prescriptive than Scrum.

Smoke vs. Sanity Testing, Regression vs. Retesting:

- **Smoke Testing:** A quick check to ensure the core functionality of the application is working after a build.
- **Sanity Testing:** A more focused test to verify that changes in a specific area haven't broken existing functionality.
- **Regression Testing:** Testing to ensure that new changes haven't negatively impacted existing features.
- **Retesting:** Testing to verify that defects that were previously found have been fixed

What are the important validations you will put on an API?

Common API validations include:

- Status codes (e.g., 200 OK, 400 Bad Request, 500 Internal Server Error)
- Response body structure and data types
- Headers (e.g., Content-Type)
- Authentication and authorization
- Error handling

Suppose you have 200 test cases and 49 tests failed; how would you collect the data of only failed test cases in TestNG? Best way?

TestNG provides reporting mechanisms. You can use listeners (like ITestListener) to capture test results. The onTestFailure() method of the listener will give you access to the failed test's information. You can then log this information to a file or generate a custom report.

What is the Maven Surefire Plugin?

The Maven Surefire Plugin is used to execute unit tests as part of the Maven build lifecycle. It generates reports of the test results.

Explain how you pick which test cases to automate?

Prioritize based on:

- Frequency of use
- Criticality to the business
- Stability of the feature
- Repetitive tasks

In what cases do we need to use implicit/explicit waits?

- **Implicit Wait:** Tells WebDriver to poll the DOM for a certain amount of time when trying to find an element. Use it when elements take a relatively consistent amount of time to appear.
- **Explicit Wait:** Waits for a specific condition (e.g., element to be visible, clickable) before proceeding. Use it for elements that load dynamically or asynchronously.

What is a NullPointerException?

A NullPointerException is thrown when you try to access a member (method or variable) of an object that is null (i.e., not referencing any object in memory).

Difference between driver.get() vs. driver.navigate().to():

Both load a URL. driver.get() waits for the page to fully load before proceeding. driver.navigate().to() doesn't necessarily wait for full page load and provides additional navigation methods (e.g., back(), forward(), refresh()).

How to handle Location popup in Selenium?

This depends on the popup. You might be able to use Alert handling (driver.switchTo().alert()) if it's a browser-level alert. If it's a webpage element, you'll need to locate and interact with it using standard Selenium methods.

How to handle dynamic dropdowns in Selenium?

Use Select class if the dropdown is a <select> element. Otherwise, you'll need to locate the dropdown element, click it to open the options, and then locate and click the desired option.

Difference Between pom.xml and testng.xml

-> To run test scripts in a Selenium framework, both pom.xml and testng.xml files play important roles, but for different purposes. The pom.xml file is used by Maven to manage dependencies, build configurations, and automate tasks, ensuring all necessary libraries (like Selenium and TestNG) are available. While you don't run the tests directly from pom.xml, it facilitates the build process and invokes TestNG when running tests through Maven (using commands like mvn clean test).

-> The testng.xml file, on the other hand, is used to define and configure test suites, classes, groups, and execution parameters for TestNG. It allows you to specify how tests should be executed and can be run directly from an IDE like Eclipse or IntelliJ. When running tests through Maven, the pom.xml will trigger the TestNG framework and execute the test scripts as defined in testng.xml.

TestNG Annotations Execution Order will be:-

-> @BeforeSuite

-> @BeforeTest

-> @BeforeClass

-> @BeforeMethod

-> @Test

-> @AfterMethod

-> @AfterClass

-> @AfterTest

-> @AfterSuite

How do you write XPath for radio buttons?

- **For a specific radio button:**

  //input[@type='radio' and @value='desiredValue']

- **Select a radio button by its label:**

  //label[text()='LabelName']/preceding-sibling::input[@type='radio']

What is the difference between findElement and findElements in Selenium?

Feature	findElement	findElements
Returns	Single web element (WebElement).	List of web elements (List).
Exception on Failure	Throws NoSuchElementException.	Returns an empty list if no elements are found.
Use Case	When exactly one element is expected.	When multiple elements are expected.

Example:

WebElement element = driver.findElement(By.id("singleElement"));

List<WebElement> elements =

driver.findElements(By.className("multipleElements"));

Explain the framework you have worked on.

Example Answer: I have worked on a **Hybrid Framework** in Selenium. This framework integrates:

- **Data-Driven Testing**: Reads test data from Excel using Apache POI.
- **Keyword-Driven Testing**: Uses keywords to map actions with web elements.
- **Page Object Model (POM)**: Encapsulates locators and methods for each page in separate classes.
- **TestNG**: Manages test execution, annotations, and reporting.
- **Maven**: Handles dependency management.
- **Extent Reports**: Generates visually rich test reports.

Provide a detailed explanation of your framework.

Answer: I have built an **Automation Framework** following these principles:

1. **POM** for maintainable locators and methods.
2. **Test Data Management** using Excel (Apache POI) or JSON.
3. **Centralized Configuration** in a config.properties file.
4. **Reusable Utilities** for common tasks (e.g., screenshots, waits).
5. **Parallel Execution** using TestNG with testng.xml.
6. **Reports**: Integrated Extent Reports for detailed logs and screenshots on failure.

Write an XPath for a given scenario.

Scenario: Write an XPath to select a button with text "Submit" inside a form with an ID loginForm.

//form[@id='loginForm']//button[text()='Submit']

Write an SQL query to retrieve the details of all employees from the emp table for a given scenario.

Scenario: Retrieve employees whose salary is greater than 5000 and belong to the "HR" department.

```
SELECT * FROM emp
WHERE salary > 5000 AND department = 'HR';
```

Explain how do you pick which test cases to automate?

To decide which test cases to automate, consider the following factors:

- **Repetitive Test Cases**: Frequently executed test cases (e.g., regression suites).
- **High Risk Areas**: Modules prone to failure or business-critical functionalities.
- **Time-Consuming Test Cases**: Manual execution takes too long (e.g., large data tests).
- **Stable Features**: Features with fewer changes and stable requirements.
- **Data-Driven Tests**: Tests requiring multiple inputs and combinations.
- **Cross-Browser or Platform Tests**: Validations across multiple environments.

Avoid automating:

- Tests that change frequently.
- Exploratory or usability tests.
- One-time test cases.

How do you handle multiple frames?

You can switch to frames in Selenium using driver.switchTo().frame(). There are three ways:

- By **index**: driver.switchTo().frame(0);
- By **name or ID**: driver.switchTo().frame("frameName");
- By **WebElement**:
- WebElement frameElement = driver.findElement(By.id("frameID"));
- driver.switchTo().frame(frameElement);

You have 10 links; how will you print the title of each link using Selenium? (Optimal approach)

```
List<WebElement> links = driver.findElements(By.tagName("a"));
for (WebElement link : links) {
    String url = link.getAttribute("href");
    if (url != null && !url.isEmpty()) {
        driver.navigate().to(url);
        System.out.println(driver.getTitle());
    }
}
```

Write code to find Broken Links in Selenium

```java
import java.net.HttpURLConnection;
import java.net.URL;
import java.util.List;
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;

public class BrokenLinks {
    public static void main(String[] args) throws Exception {
        WebDriver driver = new ChromeDriver();
        driver.get("https://example.com");

        List<WebElement> links = driver.findElements(By.tagName("a"));
        for (WebElement link : links) {
            String url = link.getAttribute("href");
            if (url != null && !url.isEmpty()) {
                HttpURLConnection connection = (HttpURLConnection) new URL(url
                    ).openConnection();
                connection.setRequestMethod("HEAD");
                connection.connect();
                if (connection.getResponseCode() >= 400) {
                    System.out.println(url + " is broken.");
                } else {
                    System.out.println(url + " is valid.");
                }
                connection.disconnect();
            }
        }
        driver.quit();
    }
}
```

In what cases do we need to use implicit/explicit wait?

- **Implicit Wait**: Used for all web elements globally. Good for simple scenarios where you want Selenium to wait for a specific duration before throwing NoSuchElementException.

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

- **Explicit Wait**: Used for more complex conditions like waiting for an element to be clickable, visible, or present.
- WebDriverWait wait = new WebDriverWait(driver, Duration.ofSeconds(10));
- wait.until(ExpectedConditions.elementToBeClickable(By.id("button")));

What is a NullPointerException?

- A **NullPointerException (NPE)** occurs in Java when you attempt to use a reference that points to null.
- Example:
- String str = null;
- System.out.println(str.length()); // Throws NullPointerException

How would you switch to the parent frame?

To switch to the parent frame:

driver.switchTo().parentFrame();

To switch to the top-level (default) content:

driver.switchTo().defaultContent();

Difference between driver.get() vs driver.navigate().to()

Feature	driver.get()	driver.navigate().to()
Primary Purpose	Loads a web page.	Navigates to a URL (like a browser).
Wait Behavior	Waits until the page is fully loaded.	May not wait for the page to load fully.
Chaining	Cannot navigate back/forward.	Supports navigation (back, forward).

How to handle location pop-ups in Selenium?

For location pop-ups (browser-based alerts), use:

1. **Handle via Browser Settings**:
    - Pass a profile with location access disabled.
2. **Alert Handling**:
3. Alert alert = driver.switchTo().alert();
4. alert.accept(); // Click 'Allow'

How to handle dynamic dropdowns in Selenium?

Dynamic dropdowns are handled by:

- Locating dropdown options based on visibility or dynamic updates.
- Example:

```
WebElement dropdown = driver.findElement(By.id("dropdownID"));
dropdown.click(); // Open dropdown
List<WebElement> options = driver.findElements(By.xpath("//ul[@id='dropdownOptions']//li"
));
for (WebElement option : options) {
    if (option.getText().equals("Desired Option")) {
        option.click();
        break;
    }
}
```

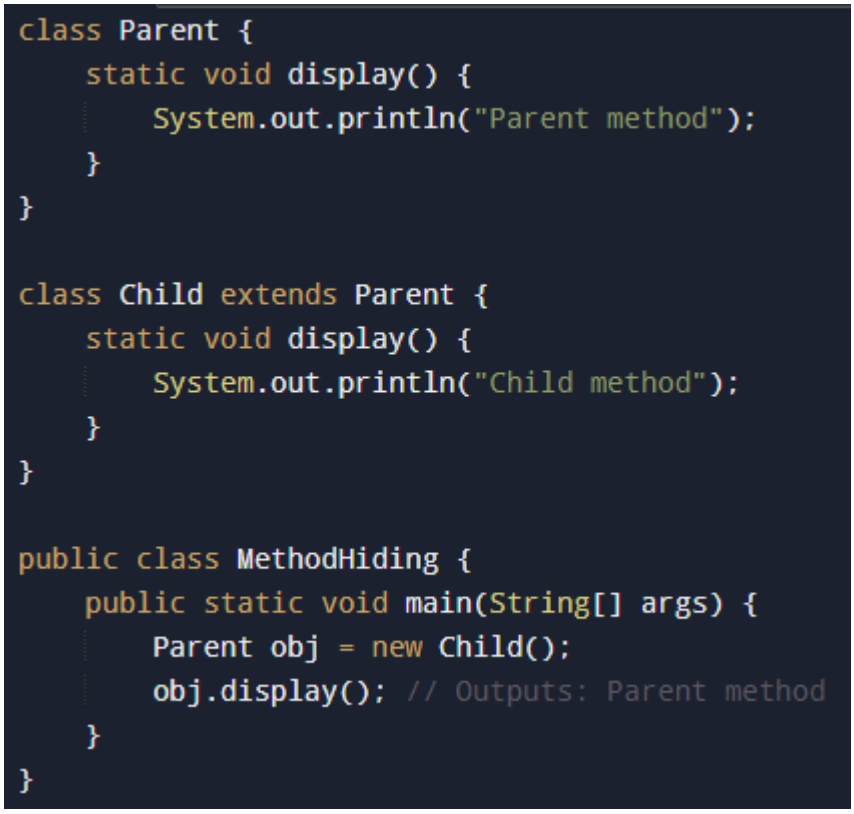
default vs public Access Modifier

Feature	Default	public
Access Level	Accessible within the same package only.	Accessible from any class.
Keyword	No explicit keyword (default behavior).	Explicitly defined as public.

What is method hiding in Java?

- **Method hiding** occurs when a **static method** in a child class has the same name as a static method in the parent class.
- Unlike method overriding, method hiding is resolved at **compile time** based on the reference type.

Example:



```
class Parent {
    static void display() {
        System.out.println("Parent method");
    }
}

class Child extends Parent {
    static void display() {
        System.out.println("Child method");
    }
}

public class MethodHiding {
    public static void main(String[] args) {
        Parent obj = new Child();
        obj.display(); // Outputs: Parent method
    }
}
```

What is Background in BDD Cucumber?

In Cucumber, Background is used to define steps that are common to all scenarios in a feature file. These steps are executed before each scenario. It helps avoid code duplication and improves readability.

Example:

Feature: User Login

Background:
  Given the user is on the login page

Scenario: Successful Login
  When the user enters valid credentials
  Then the user should see the homepage

Scenario: Failed Login
When the user enters invalid credentials
Then the user should see an error message

Here, the Background step Given the user is on the login page will execute before both scenarios.

Explain the Selenium Grid and how to set it up.

What is Selenium Grid?

- Selenium Grid allows you to run tests in parallel across multiple machines and browsers.
- It supports distributed testing, where you can execute tests on different OS and browser combinations.

How to Set It Up?

1. **Install Selenium Grid:**
   - Download the Selenium server JAR file from the official site.
2. **Start the Hub:**
   - Run the following command:
   - java -jar selenium-server-<version>.jar hub
   - Default Hub URL: http://localhost:4444
3. **Register Nodes:**
   - On a different machine or the same, run:
   - java -jar selenium-server-<version>.jar node --hub http://<hub-ip>:4444
4. **Configure Capabilities:**
   - Use desired capabilities in your code to specify the browser, version, and platform.
   - DesiredCapabilities capabilities = new DesiredCapabilities();
   - capabilities.setBrowserName("chrome");
   - capabilities.setPlatform(Platform.WINDOWS);
   - WebDriver driver = new RemoteWebDriver(new URL("http://<hub-ip>:4444/wd/hub"), capabilities);

How are you maintaining logs in your framework?

- **Log4j/Logback**: Most commonly used for logging in Java-based frameworks.

Explain the automation framework that you have designed.

Framework Type: Hybrid (combines Data-Driven, Keyword-Driven, and POM).

Key Components:

1. **Page Object Model (POM)**:
   - Encapsulates web element locators and actions in classes.
   - Improves maintainability.
2. **TestNG Integration**:
   - Manages test execution and reporting.
   - Supports parallel execution via testng.xml.
3. **Data-Driven Testing**:
   - Reads test data from external sources like Excel using Apache POI.
4. **Reusable Utilities**:
   - E.g., WaitHelper, ScreenshotHelper, ExcelReader.
5. **Logging and Reporting**:
   - Logs: Implemented with Log4j2.
   - Reports: Extent Reports for visual test reports.
6. **CI/CD Integration**:
   - Integrated with Jenkins for continuous testing.

Difference between Scenario and Scenario Outline

Feature	Scenario	Scenario Outline
Purpose	Used for a single set of data.	Used for multiple sets of data.
Keyword	Scenario.	Scenario Outline.
Data Input	Hardcoded within the scenario steps.	Provided via Examples table.
Example	gherkin Scenario: Valid login When the user enters "username" and "password"	```gherkin Scenario Outline: Valid login When the user enters "" and "" Examples:

Write XPath for an element on a webpage

If you share the website URL and element details, I can help craft an XPath. For now, here's an example:

Scenario: XPath for a button with text "Submit":

//button[text()='Submit']

Explain the most challenging scenario you came across during automation

Example Answer:

One challenging scenario was handling a dynamic table with AJAX-based updates. The table rows were generated dynamically with IDs changing after every refresh. To solve this:

1. Used XPath to identify rows based on visible text rather than dynamic attributes.
2. Introduced explicit wait to ensure rows were fully loaded before interaction.

Describe a scenario of Dev-QA tussle and how did you handle it?

Example Answer:

During testing, I reported a critical bug that the developer initially dismissed as "working as expected." To resolve:

1. Reproduced the issue with clear steps and evidence (e.g., screenshots, logs).
2. Demonstrated how the behavior deviated from the requirements.
3. Worked collaboratively to identify the root cause. Result: The issue was fixed, and trust was built through teamwork.

Among all the given locators, which locator is the fastest?

Answer:

- **ID** is the fastest locator because it is unique and directly uses the getElementById() method in the DOM.

If a method fails to find the element, which of the two methods throws eceptions?

Answer:

1. findElement throws a **NoSuchElementException** if the element is not found.
2. findElements does not throw an exception; instead, it returns an empty list if no elements are found.

What is Selenium?

Answer:
Selenium is an open-source automation testing tool for web applications. It supports multiple programming languages like Java, Python, C#, and JavaScript. Selenium consists of several components:

- **Selenium WebDriver**: Automates browser interactions.
- **Selenium IDE**: A record-and-playback tool.
- **Selenium Grid**: Allows parallel execution across multiple browsers and systems.

How to execute multiple test cases at a time in TestNG?

Answer:
You can execute multiple test cases by defining them in a testng.xml file.
Example:

```
<suite name="Test Suite">
  <test name="Test Cases">
    <classes>
      <class name="tests.TestClass1"/>
      <class name="tests.TestClass2"/>
    </classes>
  </test>
</suite>
```

Which method allows you to change control from one window to another?

Answer:
driver.switchTo().window(windowHandle);

Which annotations are executed first?

Answer:
In TestNG, @BeforeSuite is executed first, followed by @BeforeTest, @BeforeClass, and @BeforeMethod.

How many types of XPath are there in Selenium?

- **Absolute XPath**: Specifies the complete path from the root node.
  Example: /html/body/div[1]/div[2]/button.
- **Relative XPath**: Finds an element relative to another element or node.
  Example: //button[text()='Submit'].

In Selenium 4, which method allows us to take a screenshot of a specific web element?

Answer:
getScreenshotAs() method from the TakesScreenshot interface.
Example:

```
WebElement element = driver.findElement(By.id("example"));
File screenshot = element.getScreenshotAs(OutputType.FILE);
```

Which language is used in Gherkin?

Answer:
Gherkin uses plain English (or other supported natural languages) to write test scenarios.

When you only want to access a single element on a webpage, which method will you use?

Answer:
findElement() method.

Which class is used for dropdowns in Selenium?

Answer:
Select class is used for handling dropdowns.
Example:

```
Select dropdown = new Select(driver.findElement(By.id("dropdownId")));
dropdown.selectByVisibleText("Option 1");
```

Which component of Selenium is the most important?

Answer:
Selenium WebDriver is the most important component as it directly interacts with the browser for automation.

Which keywords are used in Gherkin?

Answer:

- Feature, Scenario, Scenario Outline, Given, When, Then, And, But, Examples, and Background.

How many locators does Selenium have?

Answer:
Selenium has 8 locators:

1. ID
2. Name
3. Class Name
4. Tag Name
5. Link Text
6. Partial Link Text
7. CSS Selector
8. XPath

Which exception is shown in Selenium when there is a delay in loading elements?

TimeoutException.

Write the correct syntax for an absolute path.

Answer:

/html/body/div[1]/div[2]/button

What is UI testing?

Answer:
UI (User Interface) Testing ensures that the application interface meets the requirements and works as expected. It focuses on testing graphical elements like buttons, links, text fields, and layout.

Which XPath searches dissimilar nodes in an XML document from the current node?

Answer:
Axes like preceding, following, or ancestor are used to search dissimilar nodes.
Example:

//div/following::span

What do you mean by open-source software?

Answer:
Open-source software is software with publicly accessible source code that allows anyone to view, modify, and distribute it.

Which browsers support Selenium?

Answer:
Selenium supports all major browsers, including:

- Google Chrome
- Mozilla Firefox
- Microsoft Edge
- Safari
- Opera

Which methods are present in POM to locate WebElements?

Answer:
In POM, we typically use:

- @FindBy annotation from Selenium's PageFactory.
- Regular driver.findElement() calls.

Which type of wait command waits for a certain amount of time before throwing an exception?

Answer:
Explicit Wait waits for a certain condition to occur before proceeding.

Which tool will you use to manage and organize JARs and libraries in automation?

Answer:
Maven is the most commonly used tool to manage JARs and dependencies in Java-based automation frameworks.

Which design pattern have you used in your framework?

Answer:

- **Singleton Pattern:** Ensures only one instance of WebDriver is created.
- **Factory Pattern:** Used for initializing page objects dynamically.
- **Page Object Model (POM):** Encapsulates web elements and actions in page-specific classes.

What is 3 Amigos?

Answer:
3 Amigos is a meeting where three key stakeholders (Business Analyst, Developer, and Tester) collaborate to:

- Discuss and clarify requirements.
- Define acceptance criteria.
- Ensure alignment between business goals, development, and testing.

In TestNG, how will you ensure screenshots are taken only for failed test cases?

Answer:
Use ITestListener and implement onTestFailure() to capture screenshots.
Example:

```
@Override
public void onTestFailure(ITestResult result) {
    TakesScreenshot ts = (TakesScreenshot) driver;
    File file = ts.getScreenshotAs(OutputType.FILE);
    FileUtils.copyFile(file, new File("screenshots/" + result.getName() + ".png"));
}
```

How to perform data-driven testing in Postman?

Answer:

- Use **Collection Runner** in Postman with a data file (CSV/JSON).
- Add parameterized variables in the request body or headers.
- Load the data file and run the collection.

What are the important validations you will put on an API?

Answer:

- **Response Code:** Status codes like 200, 404, 500, etc.
- **Response Time:** Validate performance.
- **Response Body:** Schema validation, field values, and data types.
- **Headers:** Content-Type, Authorization, etc.
- **Error Handling:** Proper error messages and codes.

Collect data of only failed test cases in TestNG.

Answer:
Use ITestListener's onTestFailure() and save results into a log or report file.

Print titles of 10 links in Selenium (Optimal approach).

Answer:

```
List<WebElement> links = driver.findElements(By.tagName("a"));
for (int i = 0; i < Math.min(10, links.size()); i++) {
    System.out.println(links.get(i).getText());
}
```

Handle Location Popup in Selenium

Use browser capabilities to disable location prompts.
Example:

```
ChromeOptions options = new ChromeOptions();
options.addArguments("--disable-geolocation");
```

What are different types of exceptions you faced in your framework and how you resolved them?

Answer:

- **NoSuchElementException:** Element not found due to incorrect locator or timing. Resolved by improving locators and using waits.
- **StaleElementReferenceException:** Element is no longer attached to the DOM. Resolved by reinitializing the WebElement or using ExpectedConditions.refreshed().
- **TimeoutException:** Action took too long. Resolved by setting appropriate waits and checking application performance.
- **ElementClickInterceptedException:** Another element overlapped. Resolved by scrolling to the element or using JavaScriptExecutor.

What is stale element exception? Why does it occur?

Answer:
Occurs when the WebElement becomes invalid due to DOM changes after locating it.
Resolution: Reinitialize the WebElement or use dynamic locators.

Use of text() in XPath?

Answer:
text() is used to locate elements based on their visible text content.
Example:

//button[text()='Submit']

Why is WebDriver driver = new ChromeDriver() preferred?

Answer:

- Follows polymorphism in Java.
- Allows flexibility to switch browser drivers without changing code (e.g., WebDriver driver = new FirefoxDriver();).

API Question: Tell me Bad Request response code.

Answer:
400: Indicates the request could not be understood due to malformed syntax.

Difference between PUT and PATCH?

Answer:

PUT	PATCH
Replaces the entire resource.	Updates partial data of a resource.
Idempotent.	Non-idempotent.

How will you take a full-page screenshot in Selenium?

Answer:
Using Selenium 4:

```
File screenshot = ((TakesScreenshot) driver).getFullPageScreenshotAs(OutputType.FILE);
FileUtils.copyFile(screenshot, new File("fullpage.png"));
```

What is the use of dynamic XPath? Write dynamic XPath for the "Check Availability" button on Rediffmail Create Account Page.

Answer:
Dynamic XPath is used when attributes or structure changes frequently.
Example XPath:

//button[contains(text(),'Check Availability')]

XPath axes use and functions you have used.

Answer:
XPath Axes: Navigate through nodes relative to the current node (e.g., child, parent, ancestor).
Functions:

- contains(): For partial matches.
- text(): For text-based locators.
- starts-with(): Locates elements with attributes starting with specific text.

Rest Assured Question: What is the use of Request Specification and Response Specification?

Answer:

- **Request Specification:** Define common configurations like base URI, headers, and authentication for all requests.
- **Response Specification:** Define validations for responses like status codes or response schemas.

What is the full form of REST?

Answer:
Representational State Transfer.

What is JavaScriptExecutor? Write code.

Answer:
JavaScriptExecutor executes JavaScript code within the browser.
Example:

```
JavascriptExecutor js = (JavascriptExecutor) driver;
js.executeScript("arguments[0].click();", element);
```

Different ways to click on an element in Selenium (3 ways).

Answer:

1. **Standard click:**

   element.click();

2. **JavaScriptExecutor:**

   js.executeScript("arguments[0].click();", element);

3. **Actions class:**

   Actions actions = new Actions(driver);
   actions.moveToElement(element).click().perform();

How to handle multiple windows in Selenium? Write code.

```
String parentWindow = driver.getWindowHandle();
Set<String> allWindows = driver.getWindowHandles();
for (String window : allWindows) {
    if (!window.equals(parentWindow)) {
        driver.switchTo().window(window);
    }
}
```

Write code to read data from an Excel file.

Answer:

```
FileInputStream fis = new FileInputStream("data.xlsx");
Workbook workbook = new XSSFWorkbook(fis);
Sheet sheet = workbook.getSheetAt(0);
for (Row row : sheet) {
    for (Cell cell : row) {
        System.out.println(cell.getStringCellValue());
    }
}
```

Are you comfortable working with manual testing if needed?

Answer:
Yes, I am comfortable with manual testing and use it for exploratory testing or validating edge cases.

Write an XPath for a given scenario.

Answer:
Scenario: Locate a button with text "Submit".

//button[text()='Submit']

Scenario: Locate the first name field based on placeholder "First Name".

//input[@placeholder='First Name']

Write an SQL query to retrieve the details of all employees from the emp table for a given scenario.

Answer:
Scenario: Retrieve details of employees with salary > 50000.

SELECT * FROM emp WHERE salary > 50000;

Scenario: Retrieve employees whose department is "HR".

SELECT * FROM emp WHERE department = 'HR';

What is invocationCount used for in TestNG?

Answer:

- **Purpose:** Used to execute a test method multiple times.
- **Example:**
- @Test(invocationCount = 5)
- public void runMultipleTimes() {
- System.out.println("Test executed");
- }

How would you wait for the visibility of an element in Selenium?

Answer:

Using **WebDriverWait**:

```
WebDriverWait wait = new WebDriverWait(driver, Duration.ofSeconds(10));
WebElement element =
wait.until(ExpectedConditions.visibilityOfElementLocated(By.id("elementId")));
```

How would you use AutoIT to upload a file?

Answer:

1. Create an AutoIT script to handle the OS file dialog:

```
ControlFocus("File Upload", "", "Edit1")
ControlSetText("File Upload", "", "Edit1", "C:\\file.txt")
ControlClick("File Upload", "", "Button1")
```

2. Compile the script into an .exe file.
3. Call it in Selenium using:

```
Runtime.getRuntime().exec("path_to_autoit_script.exe");
```

What is the ElementClickInterceptedException? How to resolve it?

Answer:

- **Cause:** Another element is overlapping the element you're trying to click.
- **Solutions:**
-
    - Use JavaScriptExecutor to click:

      ((JavascriptExecutor)driver).executeScript("arguments[0].click();", element);

Ensure element is visible or scroll into view:

- Actions actions = new Actions(driver);
- actions.moveToElement(element).click().perform();

What are the challenges you faced while working with a framework?

Answer:

- **Dynamic elements:** Resolved using dynamic XPath and waits.
- **Test data management:** Integrated Apache POI for Excel.
- **Cross-browser compatibility:** Used Selenium Grid for parallel execution.
- **Reporting:** Enhanced with Extent Reports for custom logs.

What is the normalize-space function in XPath?

Answer:

- Removes leading and trailing whitespaces and replaces consecutive spaces with a single space.
- **Use Case:** For text-based locators where extra spaces may exist.
- //button[normalize-space(text())='Submit']

How do you disable images in Selenium?

Answer:
Disable images by setting browser preferences.
Example for Chrome

```
ChromeOptions options = new ChromeOptions();
Map<String, Object> prefs = new HashMap<>();
prefs.put("profile.managed_default_content_settings.images", 2);
options.setExperimentalOption("prefs", prefs);
WebDriver driver = new ChromeDriver(options);
```

Difference between Action vs Actions in Selenium?

Action	Actions
Represents a single user action (e.g., click).	A class used to build a chain of actions.
Example: Action clickAction = actions.click(element).build();	Example: Actions actions = new Actions(driver);

How do you deal with dynamically changing element attributes in Selenium?

Answer:

- Use dynamic XPath with partial match:
- //div[contains(@id, 'dynamic_part')]
- Leverage relative locators (Selenium 4).
- Introduce waits for stability.

Purpose of using the ThreadLocal class in Selenium?

Answer:

- Maintains separate WebDriver instances for parallel execution in threads.
- Prevents thread interference.
  Example:

```
private static ThreadLocal<WebDriver> driver = new ThreadLocal<>();
public static WebDriver getDriver() {
    return driver.get();
}
```

API Status Codes: 200, 400, 410, 403 Differences

- **200 (OK):** Request succeeded.
- **400 (Bad Request):** Client-side error, invalid request syntax.
- **410 (Gone):** Resource no longer available.
- **403 (Forbidden):** Access is denied

7. How do you write a test case in Postman to validate the status code?
Postman test script:

```
pm.test("Status code is 200", function () {
   pm.response.to.have.status(200);
});
```

How would you perform data-driven testing in Postman?

- Use **Postman Runner** with a data file (CSV/JSON).

  Link variables in the collection:

  ```
  {
     "username": "{{username}}",
     "password": "{{password}}"
  }
  ```

Difference between HEAD and OPTIONS API methods?

HEAD	OPTIONS
Returns headers without the body.	Returns allowed HTTP methods for a resource.

Have you worked with JMeter? Basics related to ThreadGroup, Listeners

ThreadGroup: Defines the number of users and requests.

Listeners: Capture and visualize test results (e.g., View Results Tree, Summary Report).

How would you handle dynamic elements in Selenium that do not have stable locators?

Handling dynamic elements in Selenium that do not have stable locators requires employing various strategies. Here are several approaches to tackle this issue:

1. Use of Dynamic XPath:

For dynamic elements, the XPath can be written in a way that accommodates changes in attributes or parts of the element. For example, using the contains() or starts-with() functions helps when the attributes of the elements change slightly.

Example:

```
//button[contains(@id, 'submit')]
```

This XPath is more flexible than one that matches the exact ID, as it will find the button even if part of the ID changes dynamically.

2. Use of Relative Locators (Selenium 4):

Relative locators are a powerful feature in Selenium 4, where you can find elements based on their proximity to other elements.

Example:

```
WebElement element =
driver.findElement(RelativeLocator.with(By.tagName("button")).toRightOf(By.id("submit"))
);
```

This locates the button relative to another element with the ID "submit".

3. Explicit Waits with Conditions:

Dynamic elements can appear at any time, and using an **explicit wait** helps ensure that the test waits for the element to appear, be clickable, or meet some other condition.

Example:

```
WebDriverWait wait = new WebDriverWait(driver, Duration.ofSeconds(10));
WebElement element =
wait.until(ExpectedConditions.elementToBeClickable(By.xpath("//button[@class='dynamic']
")));
```

4. CSS Selectors with Partial Matches:

Like XPath, **CSS selectors** can also be used with partial matches for dynamically changing attributes.

Example:

```
button[class*='submit']
```

This selector will find buttons whose class contains 'submit' anywhere in the string.

5. Use JavaScriptExecutor:

In cases where locators are unstable or unreliable, using **JavaScriptExecutor** to directly interact with elements can be a good alternative. For example, you can simulate a click or get the element’s properties through JavaScript.

Example:

```
JavascriptExecutor js = (JavascriptExecutor) driver;
js.executeScript("arguments[0].click();", element);
```

6. Handling IFrames:

If dynamic elements are embedded inside **iFrames**, you need to switch to the iframe before interacting with the elements inside.

Example:

```
driver.switchTo().frame("iframeName");
WebElement element = driver.findElement(By.id("dynamicElement"));
```

7. Retry Mechanism:

In case of temporary element instability (e.g., elements loading asynchronously), implementing a retry mechanism can be helpful. If an element is not found on the first attempt, the script retries after a short delay.

What strategies would you implement to ensure the stability and reliability of your automated tests?

Ensuring the stability and reliability of automated tests is crucial for maintaining a robust testing process. Below are strategies you can implement:

1. Use Robust and Stable Locators:

Always prefer stable attributes for locating elements, such as IDs, name attributes, or unique data-* attributes. Avoid relying on fragile or frequently-changing attributes like classes or styles.

- **Example:** Use data-id attributes or unique aria-labels where possible.

2. Implement Explicit Waits:

Using **explicit waits** ensures that your tests wait for an element to become visible, clickable, or meet other necessary conditions before interacting with it. This avoids issues related to timing or elements that take time to load.

- **Example:** Wait for an element to be present or visible before interacting with it.

3. Leverage Page Object Model (POM):

The **Page Object Model** is a design pattern that promotes the creation of classes for each page, encapsulating elements and actions. This improves test maintenance, reusability, and makes the tests more readable.

- **Example:** A page class that contains methods like login(), addItemToCart(), etc., keeps the locators and actions separate from test scripts.

4. Keep Tests Independent:

Each test should be independent of others, ensuring that failure in one test does not affect others. You can achieve this by **isolating test data**, resetting states, and avoiding dependencies between tests.

5. Implement Retry Logic for Flaky Tests:

For tests that are occasionally unstable due to network or timing issues, implementing a **retry mechanism** can help. Tools like **TestNG's retry analyzer** can help rerun failed tests a specified number of times before marking them as failed.

6. Use Data-Driven Testing:

Data-driven testing allows running the same test with different sets of input data, improving test coverage without duplicating code. Tools like **Apache POI** (for Excel) or **CSV files** are commonly used to pass test data.

7. Integrate Continuous Integration (CI):

Integrating your tests with a **CI/CD pipeline** (such as Jenkins, GitLab CI) ensures that tests run automatically on each commit. This helps in detecting issues early and provides immediate feedback to developers.

8. Version Control for Test Scripts:

Store your test scripts in a **version control system** (such as Git) to manage changes, track revisions, and collaborate efficiently with team members. It also helps in keeping track of which versions of tests work with which versions of the application.

9. Log and Report Test Results:

Using tools like **ExtentReports** or **Allure Reports**, log detailed information about test execution (including steps, screenshots, and failure reasons). This helps in debugging and identifying root causes quickly.

10. Handle External Dependencies:

In case your tests interact with external systems (e.g., APIs, databases, third-party services), make sure to mock these dependencies during testing or use controlled test environments to ensure reliability.

11. Perform Cross-Browser Testing:

Ensure your tests are executed across different browsers (e.g., Chrome, Firefox, Edge) to identify browser-specific issues early. Selenium Grid can be used for parallel execution.

12. Regular Test Maintenance:

Review and update tests regularly to ensure that they remain valid, particularly when the application undergoes changes. This includes adjusting locators, test logic, and data-driven configurations.

What is the advantage of Selenium WebDriver?

Selenium WebDriver offers several advantages:

- **Cross-Browser Support:** It supports multiple browsers like Chrome, Firefox, Safari, Edge, etc.
- **Programming Language Support:** It supports several programming languages such as Java, Python, C#, Ruby, and JavaScript.
- **Ease of Use:** Selenium WebDriver offers simple and intuitive APIs for automating web browsers.
- **Browser-Specific Features:** It interacts directly with browsers (without the need for a proxy) for faster and more accurate results.
- **Cross-Platform Compatibility:** It can be run on Windows, Mac OS, and Linux environments.

What are the different types of locators supported by Selenium WebDriver?

The different types of locators supported by Selenium are:

- **ID**: driver.findElement(By.id("element_id"))
- **Name**: driver.findElement(By.name("element_name"))
- **Class Name**: driver.findElement(By.className("element_class"))
- **Tag Name**: driver.findElement(By.tagName("tag_name"))
- **Link Text**: driver.findElement(By.linkText("link_text"))
- **Partial Link Text**: driver.findElement(By.partialLinkText("partial_link_text"))
- **XPath**: driver.findElement(By.xpath("xpath_expression"))
- **CSS Selector**: driver.findElement(By.cssSelector("css_selector"))

Explain the concept of TestNG and how it is used with Selenium for test automation?

TestNG is a testing framework inspired by JUnit but with more powerful features, such as annotations, parameterization, parallel test execution, and test configuration. In Selenium, TestNG is used for:

- **Running test cases:** TestNG enables you to run multiple test cases in parallel or sequentially.
- **Annotations:** @Test, @BeforeMethod, @AfterMethod, etc., define test flow.
- **Data-Driven Testing:** You can use @DataProvider to feed different test data to tests.

How do you perform mouse and keyboard actions using Selenium WebDriver?

Selenium WebDriver provides the **Actions class** to perform advanced user interactions like mouse movements, clicks, drag-and-drop, etc., and keyboard actions like typing and pressing keys.

Example:

Actions actions = new Actions(driver);
actions.moveToElement(element).click().build().perform();

Keyboard actions:

actions.sendKeys(Keys.ENTER).perform();

What are the advantages and limitations of Selenium for test automation?

Advantages:

- Open-source and widely used.
- Supports multiple browsers and programming languages.
- Integration with other testing tools and frameworks (TestNG, Jenkins, Maven).

Limitations:

- Does not support mobile app automation directly (but can be used with Appium).
- Limited support for capturing screenshots in non-browser environments.
- Requires a stable internet connection for remote grid execution.

How do you handle SSL certificates and security-related issues in Selenium?

Selenium WebDriver provides options to handle SSL certificates:

- In Chrome, you can disable SSL verification using:
- ChromeOptions options = new ChromeOptions();
- options.addArguments("--ignore-certificate-errors");
- WebDriver driver = new ChromeDriver(options);
- Similarly, in Firefox, you can configure Profile to accept SSL certificates.

Can you automate testing for mobile applications using Selenium? If yes, how?

Yes, mobile application testing can be automated using **Appium** (which is built on top of Selenium). Appium allows you to automate both Android and iOS applications.

How do you manage test data and test configurations in Selenium tests?

You can manage test data and configurations by:

- Using external files such as **Excel**, **CSV**, or **JSON** to store test data and configurations.
- Using **TestNG parameters** or **@DataProvider** for data-driven testing.
- For configurations, you can use properties files or environment variables.

What is Page Object Model (POM), and why is it used in Selenium automation?

Page Object Model (POM) is a design pattern that promotes the creation of separate classes for each web page in the application. Each page class contains the elements and actions (methods) associated with that page. POM is used to:

- Improve maintainability by separating test logic from UI actions.
- Reduce code duplication by reusing page classes.
- Make tests more readable and manageable.

How do you handle exceptions and errors in Selenium WebDriver scripts?

You can handle exceptions by using try-catch blocks. Selenium provides various exceptions, such as NoSuchElementException, TimeoutException, ElementNotVisibleException, etc., which you can catch and handle accordingly.

Example:

```
try {
   WebElement element = driver.findElement(By.id("elementId"));
} catch (NoSuchElementException e) {
   System.out.println("Element not found");
}
```

How to take a screenshot in Selenium?

You can take a screenshot using the TakesScreenshot interface in WebDriver.

Example:

```
File screenshot=((TakesScreenshot)driver).getScreenshotAs(OutputType.FILE);
FileUtils.copyFile(screenshot, new File("screenshot.png"));
```

Data provider in TestNG?

@DataProvider in TestNG is used to pass different sets of data to a test method. It allows the execution of the same test with multiple sets of data.

Example:

```
@DataProvider(name = "testData")
public Object[][] data() {
   return new Object[][] {
      {"testdata1", "expectedResult1"},
      {"testdata2", "expectedResult2"}
   };
}
```

```
@Test(dataProvider = "testData")
public void testMethod(String inputData, String expectedResult) {
    // Test logic
}
```

How to validate if links are valid or not on the webpage?

You can validate links by:

1. Extracting all links using XPath or CSS selectors.
2. Sending HTTP requests to check if the link returns a valid response code (e.g., 200 OK).

Example:

```
List<WebElement> links = driver.findElements(By.tagName("a"));
for (WebElement link : links) {
    String url = link.getAttribute("href");
    HttpURLConnection connection = (HttpURLConnection) new URL(url).openConnection();
    connection.setRequestMethod("HEAD");
    connection.connect();
    int responseCode = connection.getResponseCode();
    System.out.println(url + " - " + responseCode);
}
```

How do you manage drag and drop activity in Selenium?

You can use the Actions class to perform drag-and-drop actions.

Example:

```
WebElement source = driver.findElement(By.id("source"));
WebElement target = driver.findElement(By.id("target"));
Actions actions = new Actions(driver);
actions.dragAndDrop(source, target).build().perform();
```

What is the use of the testng.xml file?

The testng.xml file is used to configure the test execution:

- It defines the test suites, test cases, groups, and parameters.
- It allows for parallel execution of tests.
- It helps in managing test execution order, exclusions, and grouping tests.

.What is StaleElementException? Why does it occur with the use of text() in XPath?

- **StaleElementException** occurs when an element is no longer attached to the DOM. This often happens if the page is refreshed or dynamically modified, and the element reference is no longer valid.
- When using text() in XPath, if the DOM is updated and the element is modified or replaced, the reference to that element may become stale. To resolve this, we can relocate the element again before interacting with it.

Why is WebDriver driver = new ChromeDriver() more preferred?

- **WebDriver driver = new ChromeDriver();** is preferred because it is a simple, clean way of initializing a new instance of the Chrome browser to automate tests. The ChromeDriver is part of the Selenium WebDriver package and is specifically built to interact with Chrome browser, providing better compatibility and performance for automation tasks.

Do you know about Cucumber and TestNG? Explain about it?

- **Cucumber:** Cucumber is a tool used for behavior-driven development (BDD). It uses Gherkin language to write test scenarios in natural language (Given-When-Then) that are easy to understand for both developers and non-developers. It helps automate acceptance criteria by allowing collaboration between developers, testers, and business stakeholders.
- **TestNG:** TestNG is a testing framework inspired by JUnit but designed to cover a broader range of testing categories, including unit testing, integration testing, and end-to-end testing. TestNG provides features such as:
    - Annotations (@Test, @BeforeClass, @AfterMethod, etc.)
    - Grouping of test cases
    - Data-driven testing with @DataProvider
    - Parallel test execution
    - Configurable reports.

If we want to execute one functionality in common, what is the best way to use?

The best way to execute one functionality in common is to use **Page Object Model (POM)**, where each page of the application is represented as a class with methods that interact with the elements on that page. This allows you to reuse functionality in different test cases without duplication, and changes to a page's structure will only require updates in the POM class, not across the entire test suite.

Usage of scenario outline in Cucumber:

The **Scenario Outline** in Cucumber allows you to run the same test scenario with multiple sets of data. It uses the **Examples** table to supply different input values and expected outputs for the same scenario.

```
Scenario Outline: Add two numbers
   Given I have two numbers <num1> and <num2>
   When I add the numbers
   Then the result should be <sum>

Examples:
   | num1 | num2 | sum |
   | 5    | 3    | 8   |
   | 10   | 15   | 25  |
```

How to run the specific test cases in Cucumber that need to be run on a daily basis?

You can use **tags** in Cucumber to specify which tests should be run. For example:

```
@DailyTests
Scenario: Some daily test case
   Given ...
   When ...
   Then ...
```

You can then run the tests with the tag @DailyTests by specifying it in the command:

```
cucumber -t @DailyTests
```

Page Object Model for a Login Page

Here's an implementation of the **Page Object Model** (POM) for a login page with a username, password, and login button. It includes methods for both valid and invalid login scenarios.

```
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;

public class LoginPage {
    WebDriver driver;

    // Locators for elements on the page
    By usernameField = By.id("username");
    By passwordField = By.id("password");
    By loginButton = By.id("loginBtn");
    By errorMessage = By.id("errorMsg");

    // Constructor to initialize the WebDriver
    public LoginPage(WebDriver driver) {
        this.driver = driver;
    }

    // Method to enter username
    public void enterUsername(String username) {
        driver.findElement(usernameField).sendKeys(username);
    }

    // Method to enter password
    public void enterPassword(String password) {
        driver.findElement(passwordField).sendKeys(password);
    }

    // Method to click the login button
    public void clickLoginButton() {
        driver.findElement(loginButton).click();
    }

    // Method to get the error message
    public String getErrorMessage() {
        return driver.findElement(errorMessage).getText();
    }

    // Valid login method
    public HomePage validLogin(String username, String password) {
        enterUsername(username);
        enterPassword(password);
        clickLoginButton();
        return new HomePage(driver);  // Redirects to HomePage after successful login
```

```
    }

    // Invalid login method
    public void invalidLogin(String username, String password) {
        enterUsername(username);
        enterPassword(password);
        clickLoginButton();
    }
}
```

Explanation:

- The LoginPage class contains methods to interact with the username field, password field, and login button.
- The validLogin() method performs a successful login and redirects to the HomePage.
- The invalidLogin() method simulates an unsuccessful login attempt.
- A method getErrorMessage() is used to capture error messages in case of invalid login.

Do you create 100 page objects for 100 pages?

While it's ideal to create a separate page object for each page in your application (1:1 mapping), it's not always necessary to have exactly 100 page objects. If multiple pages share common elements, you can create a generic page object for those pages and reuse it.

For instance:

- If several pages share the same login form, you can have a single LoginPage object.
- You can also create **BasePage** classes with common methods like click(), sendKeys(), etc.

Thus, while creating 100 page objects is possible, **page object reuse** and **abstracting common actions** can help keep the framework manageable.

Implement a TestNG listener to take a screenshot of a failed test case

```java
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.OutputType;
import org.openqa.selenium.TakesScreenshot;
import org.testng.ITestListener;
import org.testng.ITestResult;
import org.apache.commons.io.FileUtils;
import java.io.File;
import java.io.IOException;

public class TestListener implements ITestListener {
    WebDriver driver;

    public TestListener(WebDriver driver) {
        this.driver = driver;
    }

    @Override
    public void onTestFailure(ITestResult result) {
        TakesScreenshot screenshot = (TakesScreenshot) driver;
        File srcFile = screenshot.getScreenshotAs(OutputType.FILE);
        try {
            FileUtils.copyFile(srcFile, new File("screenshots/" + result.getName() + ".png"));
        } catch (IOException e) {
            e.printStackTrace();
        }
    }
}
```

Cucumber feature file for a search functionality in an e-commerce application

Feature: Search functionality in E-commerce website

Scenario: Searching for a product by category
Given I am on the homepage of the e-commerce website
When I select the "Electronics" category from the filter
And I enter "Laptop" in the search box
And I click the "Search" button
Then the search results should display products in the "Laptop" category
And the category filter should be "Electronics"

Handling shared test data between multiple Cucumber scenarios

You can use **Cucumber hooks** (like @Before and @After) or **Scenario-level variables** to share test data between scenarios. If the test data needs to be shared, you can store it in a **static variable** or a **singleton class** for access across scenarios.

```
public class SharedTestData {
    public static String username = "testuser";
    public static String password = "password123";
}
```

ElementClickInterceptedException - Explanation and Resolution

What is it?

- This exception occurs when an element is **obscured by another element** (like a modal, overlay, or popup) and cannot be clicked.

How to resolve:

- Wait for the element to become clickable using explicit waits.
- Scroll the element into view.

```
WebDriverWait wait = new WebDriverWait(driver, Duration.ofSeconds(10));
WebElement element = wait.until(ExpectedConditions.elementToBeClickable(By.id("button")));
element.click();
```

Handle Stale Element Exceptions in Selenium

What is it?

- This occurs when a reference to an element is no longer valid, typically due to the DOM being refreshed or updated after finding the element.

How to handle:

- Re-locate the element after encountering a stale element exception.

```
WebDriverWait wait = new WebDriverWait(driver, Duration.ofSeconds(10));
WebElement element = wait.until(ExpectedConditions.presenceOfElementLocated(By.id("elementId")));
```

Purpose of the Actions Class in Selenium and Double-click Action

The **Actions class** is used for performing complex user gestures like mouse movements, drag-and-drop, clicking multiple elements, and more.

Example for double-click:

```
Actions actions = new Actions(driver);
WebElement element = driver.findElement(By.id("someElement"));
actions.doubleClick(element).perform();
```

Handling file uploads and downloads in Selenium WebDriver

- **File Upload:** Use the sendKeys() method to simulate file uploads.

```
WebElement uploadElement = driver.findElement(By.id("upload"));
uploadElement.sendKeys("C:\\path\\to\\file.jpg");
```

- **File Download:** Use browser settings to automatically handle file downloads or use a tool like **AutoIT** for more complex scenarios.

Fluent Waits in Selenium

What is it? A **FluentWait** allows you to define the frequency with which Selenium will check for the condition, as well as ignoring specific exceptions (like NoSuchElementException) while waiting for an element to appear.

```
FluentWait<WebDriver> wait = new FluentWait<>(driver)
    .withTimeout(Duration.ofSeconds(30))
    .pollingEvery(Duration.ofSeconds(5))
    .ignoring(NoSuchElementException.class);
WebElement element = wait.until(driver -> driver.findElement(By.id("someElement")));
```

JMeter Test Plan with 50 Threads to Hit a Sample API Endpoint

1. **Create a Test Plan** with 50 threads (virtual users).
2. **Add HTTP Request** for the API endpoint.
3. **Add an Assertion** to check response time is under 2 seconds.
4. Add **Listeners** to capture results like View Results Tree and Summary Report.

Configure an Azure Pipeline to Trigger Automated Tests

1. In **Azure DevOps**, go to **Pipelines** and create a new pipeline.
2. **Add tasks** to install dependencies, run tests (e.g., Selenium scripts), and publish results.
3. Use the mvn test command to run the tests in your framework.
4. Set up **Triggers** for the pipeline to run on code commit.

Integrating Azure DevOps with Test Framework

- Create a service connection to your repository in **Azure DevOps**.
- Use **Maven** or **Gradle** build tasks to trigger test execution.
- Publish the test results and logs as pipeline artifacts.

Purpose of Azure Pipelines and How They Can Be Configured to Run Test Suites Automatically

Azure Pipelines is a cloud-based continuous integration and continuous deployment (CI/CD) service that helps automate the building, testing, and deployment of applications. It can bconfigured to run automated test suites after every code commit, ensuring that new code does not break existing functionality.

How to configure it to run test suites automatically:

1. **Create a Pipeline**: In Azure DevOps, create a new pipeline that connects to your version control system (GitHub, Azure Repos, etc.).
2. **Define Tasks**:
    - **Install dependencies**: Use tasks like Maven or npm to install dependencies for your framework.
    - **Run Tests**: Add a task to execute your tests (e.g., mvn test for Maven projects).
    - **Publish Test Results**: Add a task to publish the test results, such as using the Publish Test Results task for JUnit or NUnit results.
3. **Set Up Triggers**: Configure triggers to run the pipeline automatically whenever there is a code change (e.g., on push to the main branch).
4. **Post-test Actions**: You can configure the pipeline to send notifications, generate reports, or deploy the application based on the results.

What is OAuth2.0:

This is an Authorization mechanism, not an Authentication mechanism.

OAuth stands for Open Authorization as this is an open standard.

OAuth2.0 is a protocol, or we can call it a framework as well.

Purpose: OAuth2.0 is used to authorize 3rd party applications to access resources of a user on behalf of the user.

Roles in OAuth2.0:

1. Resource Owner: Person who owns the resources.
2. Client: 3rd party application that wants to access Resource owner resources. So, it should have the Access token of the Resource owner.
3. Authorization Server: Authorization server helps the client in obtaining the access token of the Resource owner.
4. Resource Server: Once the client has the Access Token, it can use the access token to access Resource owner's protected resources.

How OAuth2.0 flow works?

- First, the Client should be registered against the OAuth server to obtain a client id and client secret.

- Now, the client will make an Authorization Request to the Authorization server with the client id and client secret.

4. Resource Server: Once the client has Access Token it can use the access token to access Resource owner's protected resources.

How OAuth2.0 flow works?

- First Client should be registered against OAuth server to obtain client id and client secret
- Now client will make Authorization Request to Authorization server with client id and client secret
- Now Resource owner needs to enter credentials to Authorize 3rd party applications to access Resource Owner resources
- Once the Resource owner grants permission, the Authorization server will issue an Authorization code
- Now, the client needs to hit the Token endpoint to obtain an Access Token by passing the Authorization Code received in the previous step
- With the Access Token, the client can now access the protected Resources of the Resource owner

How will you parse complex JSON files using REST Assured?

In REST Assured, parsing complex JSON can be done using **JsonPath**. You can extract values from the JSON response and then process them as needed.

Example:

```
import io.restassured.path.json.JsonPath;
import io.restassured.response.Response;

public class ParseJson {
    public static void main(String[] args) {
        // Assume we have a complex JSON response from an API
        Response response = RestAssured.get("https://api.example.com/getDetails");

        JsonPath jsonPath = response.jsonPath();

        // Parsing a complex JSON structure
        String value = jsonPath.get("parentObject.childObject[0].subChildField");
        System.out.println("Parsed Value: " + value);
    }
}
You can navigate through nested JSON objects using JsonPath expressions like parentObject.childObject[0]
    .subChildField
```

.

Explain Authentication and Authorization in API testing.

- **Authentication**: It is the process of verifying the identity of a user or system. Common methods include Basic Authentication, OAuth, and API keys.
- **Authorization**: It determines whether the authenticated user has permission to access a resource. It ensures that users can only perform actions within their level of access.

In REST Assured:

- **Basic Authentication**:
- RestAssured.given()
- .auth().basic("username", "password")
- .get("https://api.example.com/protected");
- **Bearer Token (OAuth)**:
- RestAssured.given()
- .header("Authorization", "Bearer yourAccessToken")
- .get("https://api.example.com/protected");

What is Object mapper in REST Assured?

Object Mapper is used for converting Java objects to JSON and vice versa. In REST Assured, you can use **Jackson ObjectMapper** or **Gson** to map complex Java objects to JSON and JSON back to Java.

Example:

```java
import com.fasterxml.jackson.databind.ObjectMapper;

public class ObjectMapperExample {
    public static void main(String[] args) throws Exception {
        MyClass obj = new MyClass("Test", 25);
        ObjectMapper objectMapper = new ObjectMapper();

        // Convert Java Object to JSON
        String json = objectMapper.writeValueAsString(obj);
        System.out.println(json);

        // Convert JSON back to Java Object
        MyClass newObj = objectMapper.readValue(json, MyClass.class);
        System.out.println(newObj.getName());
    }
}
```

Explain PoJo concept.

POJO (Plain Old Java Object) is a simple Java object with properties (fields), getters, setters, and a constructor, used for mapping data between JSON and Java objects.

What are listeners in TestNG?

Listeners in TestNG allow you to intercept and customize test execution behavior. They can be used to perform actions before/after tests, such as logging, reporting, or taking screenshots.

Common listeners:

- ITestListener: Listens for test execution events (onStart, onFinish, onTestSuccess, onTestFailure).
- ISuiteListener: Listens for suite start and finish events.
- ITestResult: Used to analyze the result of the tests.

Example:

```
public class MyTestListener implements ITestListener {
   public void onTestFailure(ITestResult result) {
      System.out.println("Test Failed: " + result.getName());
   }
}
```

How will you resolve the conflicts on GitHub?

To resolve conflicts in GitHub:

1. **Fetch the latest changes** from the remote repository using git fetch.
2. **Switch to your branch** and try to merge the main branch into it: git merge main.
3. Resolve conflicts manually by editing the files marked as conflicted.
4. After resolving, **commit the changes**: git commit -m "Resolved merge conflicts".
5. **Push the changes** back to the repository: git push.

What is the Git Stash command used for?

The git stash command temporarily saves your uncommitted changes (modifications, additions, and deletions) so that you can work on something else without committing or losing your work. You can retrieve it later using git stash apply.

What Challenges did you face while designing your automation framework?

Challenges faced while designing an automation framework might include:

- **Selecting appropriate tools** (e.g., Selenium, TestNG, Rest Assured, etc.).
- **Managing dynamic and complex elements** with robust locators.
- **Handling dependencies** like waiting for elements to load.
- **Ensuring cross-browser compatibility**.
- **Integrating with CI/CD pipelines** for continuous testing.
- **Handling large volumes of test data** in data-driven testing.