**TESTNG FRAMEWORK SYLLABUS**

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**TESTNG FRAMEWORK SYLLABUS**

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**TESTNG FRAMEWORK INTERVIEW QUESTIONS AND ANSWERS**

## Introduction and Setting up the TestNG Environment

1. **What is TestNG? How does it differ from Junit?**

Answer: TestNG is an open-source testing framework designed for Java programming, inspired by Junit but with advanced features like parallel test execution, dependency testing, and flexible test configurations. It supports annotations similar to JUnit but provides additional features like Data Provider, Factory, and flexible configuration in the testng.xml file, making it more powerful for complex testing needs.

2. **What are some key advantages of using TestNG in test automation?**

Answer:

- Annotations are easier to understand and more powerful.

- Supports parallel execution of tests.

- Allows grouping of test cases, prioritization, and sequencing.

- Provides detailed reports and logs.

- Supports data-driven testing through DataProvider.

- Integrated with tools like Maven, Jenkins, and CI/CD pipelines.

3. **What are the most commonly used annotations in TestNG, and what do they do?**

Answer:

- Test: Marks a method as a test case.

- BeforeSuite, AfterSuite: Execute methods before and after all tests in the suite.

- BeforeTest, AfterTest: Execute methods before and after a test.

- BeforeClass, AfterClass: Execute methods before and after the first method in the class is executed.

- BeforeMethod, AfterMethod: Execute methods before and after each test method in a class.

- DataProvider: Provides data for data-driven tests.

4. **Can you explain the flow of execution in TestNG annotations?**

Answer: The order of execution is BeforeSuite, BeforeTest, BeforeClass, BeforeMethod, Test, AfterMethod, AfterClass, AfterTest, and AfterSuite.

5. **How does TestNG support parallel test execution?**

Answer: TestNG allows parallel execution by configuring the testng.xml file or using annotations. It can run test methods, classes, or test suites in parallel by setting attributes like parallel="methods", parallel="classes", or parallel="tests" and defining the thread count.

6. **How do you install TestNG in Eclipse or IntelliJ IDEA?**

Answer: In Eclipse, TestNG can be installed via the Eclipse Marketplace by searching for TestNG and installing it. In IntelliJ IDEA, TestNG is usually built-in, and you can add it as a library by navigating to File -> Project Structure -> Libraries and selecting TestNG.

7. **How do you create a TestNG project?**

Answer:

- In Eclipse, after installing the TestNG plugin, create a new Java Project.

- Add TestNG to the project by right-clicking the project and selecting "Add TestNG Library."

- Write test classes and use TestNG annotations like Test for test methods.

- Test cases can be run via the "Run As" -> "TestNG Test" option.

8. **How can you add TestNG dependency using Maven or Gradle?**

Answer: For Maven, you can add the TestNG dependency in the pom.xml file. For Gradle, you can add it in the build.gradle file. Both these tools manage project dependencies and help with automatic download of TestNG libraries.

9. **How do you configure TestNG in a project?**

Answer: Once TestNG is added to the project, you can configure test suites using the testng.xml file. The XML file allows you to define test suites, include or exclude test cases, and set up parallel execution. To run the suite, execute the XML file from Eclipse, IntelliJ, or through Maven.

10. **What is the purpose of the testng.xml file in TestNG?**

Answer: The testng.xml file is used to configure and organize the execution of test cases. It allows grouping of test cases, running them in a specific sequence, enabling parallel execution, passing parameters to tests, and selecting or excluding specific tests or groups.

Here are the revised interview questions and answers without any code and in a plain format:

**TESTNG FRAMEWORK INTERVIEW QUESTIONS AND ANSWERS**

## TestNG Annotations

1. **What is the purpose of the @Test annotation in TestNG?**

Answer: The @Test annotation marks a method as a test case in TestNG. Methods with this annotation will be executed as part of the test execution when the suite or class is run.

2. **Explain the difference between @BeforeSuite and @AfterSuite**.

Answer: @BeforeSuite is executed before all the test cases in the suite, and @AfterSuite is executed after all the test cases in the suite. These annotations are used to set up or clean up resources needed for the entire test suite, such as initializing or closing connections.

3. **What are @BeforeTest and @AfterTest used for?**

Answer: @BeforeTest is executed before any test method in the test tag of the testng.xml file, and @AfterTest is executed after all the test methods in that test tag. These annotations are useful for setting up configurations specific to a test tag.

4. **How do @BeforeClass and @AfterClass differ from @BeforeMethod and @AfterMethod?**

Answer: @BeforeClass and @AfterClass are executed once before and after all the methods in the test class, respectively. @BeforeMethod and @AfterMethod are executed before and after each individual test method. This helps with setting up or tearing down conditions needed for every method.

5. **What is the use of @BeforeGroups and @AfterGroups annotations?**

Answer: @BeforeGroups runs before the first method in any test group is invoked, and @AfterGroups runs after all the methods in a group have finished. These annotations are useful for setting up or cleaning up resources needed for specific groups of tests.

6. **What is the purpose of the @DataProvider annotation in TestNG?**

Answer: The @DataProvider annotation is used for parameterized testing, allowing a method to supply test data to the @Test methods. It allows running the same test multiple times with different data sets.

7. **What is the @Factory annotation in TestNG, and when is it used?**

Answer: The @Factory annotation is used to create dynamic test cases in TestNG. It allows for the creation of test methods at runtime by generating multiple instances of the same test class with different input parameters.

8. **What is the role of @Listeners in TestNG?**

Answer: The @Listeners annotation allows customizing the behavior of the test execution by using listener interfaces such as ITestListener, ISuiteListener, etc. It helps in capturing events like test start, test success, test failure, enabling additional actions like logging or reporting.

## Writing Test Cases

9. **How do you write a simple TestNG test case?**

Answer: A simple TestNG test case is written by creating a method with the @Test annotation, which will be executed when the test is run.

10. **How can you execute test cases in TestNG?**

Answer: Test cases in TestNG can be executed in multiple ways: by running the test class directly from the IDE, executing the testng.xml file, or using build tools like Maven or Gradle to execute tests from the command line.

11. **What are TestNG assertions, and why are they important?**

Answer: TestNG assertions are used to validate the expected results in test cases. They ensure that the test outcome matches the expected conditions. If the assertion fails, the test fails. Common assertions include assertEquals, assertTrue, assertFalse, assertNull, and assertNotNull.

12. **Explain the usage of assertEquals in TestNG.**

Answer: The assertEquals method is used to check if two values are equal. If they are not equal, the test will fail.

13. **When would you use assertTrue and assertFalse?**

Answer: assertTrue is used when you want to verify that a condition is true. assertFalse is used to check that a condition is false. These assertions are often used when validating boolean conditions in test cases.

14. **What is the difference between assertNull and assertNotNull?**

Answer: assertNull checks if an object is null, and assertNotNull verifies that the object is not null. These are used to validate the presence or absence of objects in tests.

15. **What is the difference between hard assertions and soft assertions in TestNG?**

Answer: Hard assertions stop the test execution if the assertion fails, meaning the remaining code in the test method will not be executed. Soft assertions allow the test to continue executing even if the assertion fails, and the test result is evaluated at the end by calling assertAll().

16. **What is the role of assertions in verifying test results?**

Answer: Assertions are used to validate that the actual results match the expected results in test cases. They play a key role in determining whether a test case passes or fails based on whether the expected behavior is met.

17. **How do you analyze test outputs in TestNG?**

Answer: TestNG provides detailed output logs and reports for each test case, showing pass/fail status, error messages, and execution time. Reports can be viewed in the console output or through HTML/XML reports generated after test execution.

Here are the most important and frequently asked interview questions and answers based on TestNG Test Configuration topics:

## Test Prioritization

1. **How can you prioritize test cases in TestNG?**

Answer: You can prioritize test cases in TestNG using the `priority` attribute in the @Test annotation. Tests with lower priority values are executed first. If no priority is specified, the test methods are executed alphabetically by method name.

2. **What happens if two test methods have the same priority?**

Answer: If two test methods have the same priority or no priority is defined, TestNG will execute them in alphabetical order by their method names.

## Test Grouping

3. **How do you group test cases in TestNG?**

Answer: Test cases in TestNG can be grouped using the `groups` attribute in the @Test annotation. You can define a group for each test and execute them together using the testng.xml file or programmatically.

4. **Can a test case belong to multiple groups in TestNG?**

Answer: Yes, a test case can belong to multiple groups by specifying multiple group names in the `groups` attribute in the @Test annotation.

5. **How can you include or exclude groups when executing tests in TestNG?**

Answer: Groups can be included or excluded during test execution using the testng.xml file. You can define which groups to include or exclude using the `<groups>` tag and `<include>` or `<exclude>` elements.

## Dependency Management

6. **How do you manage dependencies between test methods in TestNG?**

Answer: You can manage dependencies between test methods using the `dependsOnMethods` attribute in the @Test annotation. This allows you to specify that a test method should only be executed if certain other methods pass.

7. **What is the purpose of dependsOnGroups in TestNG?**

Answer: The `dependsOnGroups` attribute is used to specify that a test method is dependent on one or more groups. The test method will be executed only if all tests in the specified groups are successful.

8. **What happens if a dependent test method fails in TestNG?**

Answer: If a dependent test method (using `dependsOnMethods` or `dependsOnGroups`) fails, the test method that depends on it will be skipped and marked as skipped in the test report.

## TestNG Parameters

9. **How do you pass parameters to test methods in TestNG?**

Answer: Parameters can be passed to test methods using the @Parameters annotation and defining the parameters in the testng.xml file. The parameters are injected into the test method at runtime.

10. **Can you use @Parameters with non-primitive types in TestNG?**

Answer: No, the @Parameters annotation in TestNG supports only primitive data types (e.g., String, int, boolean). For complex or custom objects, you would need to use the @DataProvider annotation.

## Skipping Tests

11. **How do you skip a test method in TestNG?**

Answer: A test method can be skipped by setting the `enabled` attribute of the @Test annotation to false, like this: `enabled = false`. The test will not be executed and will be marked as skipped in the report.

12. **Can a disabled test method still appear in the test report?**

Answer: Yes, even though the test is skipped using `enabled = false`, it will appear in the test report as "skipped."

## Timeout Attribute

13. **What is the purpose of the timeout attribute in TestNG?**

Answer: The `timeout` attribute in the @Test annotation is used to specify the maximum amount of time a test method can take to execute. If the method exceeds this time, it will be marked as failed due to a timeout.

14. **How do you set a timeout for a test case in TestNG?**

Answer: You can set a timeout by specifying the `timeout` attribute in milliseconds in the @Test annotation. For example: `timeout = 5000` means the test method must complete within 5 seconds.

15. **What happens if a test method exceeds the specified timeout in TestNG?**

Answer: If a test method exceeds the defined timeout, it will be marked as failed, and TestNG will stop its execution.

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**TESTNG FRAMEWORK INTERVIEW QUESTIONS AND ANSWERS**

## Parallel Testing in TestNG

1. **What is parallel testing in TestNG, and how does it benefit test execution?**

Answer: Parallel testing in TestNG allows multiple tests to run simultaneously, reducing execution time and increasing test efficiency. It's essential for large test suites that need faster feedback cycles.

2. **How do you set up parallel execution in TestNG?**

Answer: To configure parallel execution, use the parallel attribute in the testng.xml file. Options include "**methods**," "**tests**," "**classes**," and "**suites**." Additionally, specify thread-count to control the number of concurrent threads.

3. **What is the difference between parallel execution for methods, tests, and classes?**

Answer: Parallel execution for methods allows individual test methods to run concurrently. For tests, entire test sections defined in testng.xml run simultaneously. For classes, all test methods within a class are executed in parallel.

4. **How does thread pooling work in TestNG?**

Answer: Thread pooling in TestNG involves defining a set number of threads (thread-count) that handle test execution concurrently, ensuring balanced resource use without overwhelming the system.

## Data-Driven Testing with TestNG

1. **What is data-driven testing, and how is it achieved in TestNG?**

Answer: Data-driven testing is a method where test cases are executed with multiple data sets. In TestNG, it is achieved using the @DataProvider annotation, allowing parameterization of tests with varied input data.

2. **How does the @DataProvider annotation work in TestNG?**

Answer: @DataProvider is a TestNG annotation that supplies data to a test method in the form of an Object array, enabling multiple iterations of a test case with different data.

3. **Can you use external data files in TestNG's data-driven tests?**

Answer: Yes, data from external files such as Excel, CSV, XML, and JSON can be integrated into TestNG by reading data with libraries like Apache POI for Excel, and passing it to test methods via @DataProvider.

4. **How does data from a database integrate with TestNG test cases?**
Answer: Database data can be loaded by establishing a database connection, retrieving required data via SQL queries, and passing the data into tests through a @DataProvider.

## TestNG Assertions and Validations

1. **What are TestNG assertions, and why are they essential?**

Answer: Assertions in TestNG validate test outcomes by checking if actual results meet expected values, essential for verifying correctness of test execution.

2. **Describe the difference between hard and soft assertions**.

Answer: Hard assertions halt execution upon failure, whereas soft assertions continue running the test, allowing multiple checks within the same test before reporting failures.

3. **How would you use SoftAssert in TestNG?**

Answer: SoftAssert allows multiple assertions in a single test by creating a SoftAssert object. Results are collated, and assertion failures are reported at the end using assertAll().

## TestNG XML Configuration

1. **What is the purpose of the testng.xml file?**

Answer: The testng.xml file is used to define and configure test suites, including specifying test classes, test groups, and parameters, enabling organized and flexible test execution.

2. **How do you include and exclude specific tests in testng.xml?**

Answer: Tests can be included or excluded in testng.xml using the <include> and <exclude> tags within test classes or methods, allowing selective execution.

3. **How do you pass parameters through testng.xml?**

Answer: Parameters can be passed via <parameter> tags within testng.xml, and retrieved in test methods with @Parameters, enabling customized test input without modifying code.

## TestNG Listeners, Reporters, and Logs

1. **What are TestNG Listeners, and why are they used?**

Answer: Listeners in TestNG are interfaces that monitor test execution events. They are used for custom logging, taking screenshots on failure, and integrating with reporting tools.

2. **Describe the role of ITestListener.**

Answer: ITestListener captures events such as test start, success, failure, and finish. It can be used to log or perform specific actions like screenshots on test failures.

3. **How does the IReporter interface enhance TestNG reporting?**

Answer: IReporter generates custom reports by allowing users to manipulate test results, which can then be used to create more detailed reports than the default TestNG reports.

4. **How can you integrate TestNG with a logging framework?**

Answer: TestNG can be integrated with logging frameworks like Log4j or SLF4J for improved logging. Loggers can be configured within listeners or test methods to capture detailed logs throughout test execution.

5. **How do you capture screenshots on test failures in TestNG?**

Answer: Screenshots on failure can be captured by implementing ITestListener's onTestFailure method, where a screenshot utility is triggered whenever a test fails.

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**TESTNG FRAMEWORK INTERVIEW QUESTIONS AND ANSWERS**

1. **What are the built-in reports available in TestNG?**

Answer: TestNG provides built-in HTML and emailable reports. The HTML report gives a detailed view of test execution with a breakdown of passed, failed, and skipped tests. The emailable report is generated as a single file for easy sharing and includes basic execution results.

2. **How can you generate custom reports in TestNG?**

Answer: To create custom reports, TestNG integrates with external reporting libraries like Extent Reports and Allure. Extent Reports provide detailed logs, screenshots, and charts, while Allure offers advanced features for visualizing test reports with dynamic filtering.

3. **What are TestNG Listeners, and why are they used?**

Answer: Listeners in TestNG allow customization of test execution by capturing events like test start, test success, and test failure. TestNG listeners include ITestListener, ISuiteListener, and IReporter, which can be used to add custom logic, such as logging and reporting.

4. **How can you handle expected exceptions in TestNG?**

Answer: Expected exceptions in TestNG can be handled using the expectedExceptions attribute in the @Test annotation. This enables a test to pass if a specified exception is thrown, useful for validating exception handling code.

5. **How do you validate exception messages in TestNG?**

Answer: The expectedExceptionsMessageRegExp attribute is used to validate specific exception messages in TestNG. This ensures that a test passes only if the expected message appears when an exception is thrown.

6. **How can you retry failed tests in TestNG?**

Answer: Failed tests can be retried using IAnnotationTransformer and IRetryAnalyzer interfaces. IRetryAnalyzer is used to implement retry logic by setting the retry count, and IAnnotationTransformer modifies test behavior at runtime to enable retries.

7. **What is the role of dependsOnMethods and dependsOnGroups in TestNG?**

Answer: dependsOnMethods is used to set dependencies between individual test methods, while dependsOnGroups manages dependencies between groups. This ensures that certain tests run only after specific dependent tests have passed.

8. **How do you group tests in TestNG and run specific groups?**

Answer: Test grouping is done using the groups attribute in the @Test annotation. Specific groups can be included or excluded in the testng.xml file, which is useful for organizing tests by functionality or priority.

9. **What is @DataProvider, and how is it used for data-driven testing?**

Answer: @DataProvider is an annotation that allows data-driven testing by parameterizing tests with multiple sets of data. It uses an Object[][] array to provide data to the test method, enabling multiple executions with different inputs.

10. **How can you integrate TestNG with external data sources like Excel, CSV, or databases?**

Answer: You can read data from external files such as Excel, CSV, JSON, and XML by integrating Apache POI (for Excel) or libraries like OpenCSV. Databases can be connected through JDBC to facilitate data-driven testing with dynamic inputs.

11. **What are Hard and Soft Assertions in TestNG?**

Answer: Hard assertions like assertEquals and assertTrue terminate the test immediately if they fail, while soft assertions allow tests to continue running even if an assertion fails. SoftAssert can verify multiple assertions at the end of a test.

12. **What is the purpose of the testng.xml file?**

Answer: testng.xml is a configuration file that defines test suites, test groups, and parameterized values in TestNG. It provides flexibility for running multiple test classes, excluding or including tests, and organizing test execution.

13. **How do you run TestNG tests in parallel?**

Answer: Parallel execution is configured in the testng.xml file using the parallel attribute, which can be set at the suite, test, class, or method level. The thread-count attribute controls the number of threads to optimize performance.

14. **What is @Parameters, and how is it used in TestNG?**

Answer: @Parameters is used to pass values from testng.xml into test methods, enabling parameterization without using @DataProvider. It is useful for setting up configurations like browser or environment variables.

15. **How can you run TestNG tests with Maven?**

Answer: TestNG tests can be run with Maven by configuring the Maven Surefire Plugin in the pom.xml file. This allows TestNG test suites to be executed as part of the Maven build process.

16. **How do you configure TestNG with Jenkins for CI/CD pipelines?**

Answer: In Jenkins, create a job that runs TestNG tests by executing Maven or Gradle commands. Jenkins can display test results, and plugins can integrate TestNG reports into the Jenkins dashboard.

17. **How can you execute cross-browser testing in TestNG?**

Answer: Cross-browser testing can be set up by parameterizing browser types with @Parameters or @DataProvider and using Selenium WebDriver for browser automation. Selenium Grid enables parallel execution on multiple browsers and devices.

18. **How does Selenium WebDriver integrate with TestNG?**

Answer: Selenium WebDriver integrates with TestNG for UI tests. TestNG annotations such as @BeforeClass and @AfterClass manage browser setup and teardown, and TestNG reporting provides results for WebDriver-based tests.

19. **How do you use TestNG Listeners to capture screenshots on test failures?**

Answer: TestNG listeners, particularly ITestListener, can capture screenshots on test failures by overriding the onTestFailure method. Screenshots can be saved to a specific directory and included in reports.

20. **What are TestNG Emailable Reports?**

Answer: Emailable reports provide a single-file summary of the test results that can be shared with team members or stakeholders. They include details of passed, failed, and skipped tests, suitable for communication.

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**TESTNG FRAMEWORK INTERVIEW QUESTIONS AND ANSWERS**

## TestNG Best Practices

Question: **How should TestNG test cases is organized?**

Answer: Test cases should be grouped by functionality, and packages should be used for organizing tests by modules. Utilize setup and teardown methods like @BeforeClass and @AfterClass for better structure.

Question: **What naming conventions do you follow for TestNG tests?**

Answer: Use descriptive names that reflect the purpose and outcome of each test. For example, testLoginSuccess or verifyUserCreation.

Question: **How do you optimize TestNG test execution time?**

Answer: Use parallel execution, limit dependencies, reduce setup and teardown steps, and avoid redundant code to optimize execution time.

Question: **How can flakiness be reduced in TestNG tests?**

Answer: Use explicit waits instead of hardcoded waits, avoid shared states, and make sure each test runs independently.

Question: **What strategies do you follow to maintain and scale test frameworks?**

Answer: Use modular designs, reusable components, and consistent coding practices. Ensure that the framework supports adding new tests with minimal changes.

## Advanced TestNG Features

Question: **What is the purpose of the invocationCount attribute?**

Answer: It specifies how many times a test should run. Useful for load testing and validating consistency across test runs.

Question: **How do you use timeout in TestNG?**

Answer: The timeout attribute sets a time limit for test completion, marking tests as failed if exceeded.

Question: **How is parallel execution configured in TestNG?**

Answer: Parallel execution is configured in the testng.xml file with the parallel attribute set to methods, classes, or suites.

Question: **How do you enforce test order in sequential execution?**

Answer: Use the dependsOnMethods or dependsOnGroups attributes to define dependencies, ensuring proper order.

Question: **How do you use Selenium Grid with TestNG?**

Answer: Configure WebDriver for remote execution and set up nodes in Selenium Grid to enable distributed execution.

## TestNG with BDD Frameworks

Question: **How is TestNG integrated with Cucumber?**

Answer: Implement Cucumber tests in TestNG by annotating Cucumber classes with TestNG annotations, allowing tests to run in a TestNG environment.

Question: **How do you create Gherkin scenarios with TestNG?**

Answer: Write feature files in Gherkin language to define scenarios and map them to TestNG methods for execution.

Question: **How do you generate reports when using Cucumber with TestNG?**

Answer: Configure report generation with plugins like Cucumber Reports or Extent Reports in the test configuration.

Question: **Can you run TestNG tests within BDD frameworks?**

Answer: Yes, by using Cucumber as a BDD framework in TestNG, you can manage both frameworks together.

## Debugging and Troubleshooting TestNG

Question: **How do you troubleshoot failed tests in TestNG?**

Answer: Enable logging, use the Reporter.log() method, and analyze stack traces in logs to identify issues.

Question: **How do you debug TestNG tests in an IDE?**

Answer: Use the debug mode, set breakpoints, and inspect variable values in Eclipse or IntelliJ.

Question: **What are common TestNG issues and their fixes?**

Answer: Common issues include misconfigurations in testng.xml and dependency issues. Double-check your test setup and configuration files to resolve these.

Question: **How do you manage test dependencies in TestNG?**

Answer: Use @DependsOnMethods and @DependsOnGroups annotations to control test dependencies and order.

# TESTNG FRAMEWORK INTERVIEW QUESTIONS AND ANSWERS

## Advanced Parallel Execution Strategies

Question: **How can you optimize parallel execution for large test suites?**

Answer: Split suites into multiple groups, use thread-safe classes, and avoid shared data where possible.

Question: **How do you prevent deadlocks during parallel execution?**

Answer: Avoid shared resources, use thread-safe code, and allocate resources dynamically to avoid contention.

Question: **How do you run TestNG tests on cloud platforms?**

Answer: Configure WebDriver for remote execution and specify platform capabilities in TestNG for cloud platforms like BrowserStack.

## Handling TestNG Issues

Question: **What are typical setup issues in TestNG, and how do you resolve them?**

Answer: Setup issues often stem from missing dependencies or incorrect project configurations. Verify dependencies and check the testng.xml setup.

Question: **How are dependency conflicts handled in Maven or Gradle?**

Answer: Specify dependency versions and exclude conflicting libraries where necessary in pom.xml or build.gradle.

Question: **How do you fix misconfigurations in testng.xml?**

Answer: Ensure correct syntax, attribute names, and valid paths to referenced methods, classes, and groups.

Question: **What strategies do you use to handle large test suites in TestNG?**

Answer: Use test grouping, prioritize critical tests, and divide tests into modules to manage and execute efficiently.

## Additional Key Topics

Question: **What are commonly used annotations in TestNG?**

Answer: Common annotations include @BeforeSuite, @AfterSuite, @BeforeClass, @AfterClass, @BeforeMethod, @AfterMethod, and @Test for organizing test flow.

Question: **How do you handle common errors in testng.xml?**

Answer: Debug syntax and check attribute names, method references, and group names for any misconfigurations.

Question: **What techniques are used to optimize cloud-based TestNG executions?**

Answer: Use parallel execution, avoid unnecessary setup steps, and ensure efficient resource allocation for quicker executions.

Question: **How do sequential and parallel executions differ, and when are they used?**

Answer: Sequential execution runs tests in order and is useful when tests have dependencies. Parallel execution runs concurrently and is suitable for independent tests to save time.

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