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API Fundamentals and Testing

2 days to master your Gateway to Robust Applications

FA-0525 · 2 days

DevOps, Cloud & Infrastructure · Cybersecurity · Automation, RPA & Power Platform

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Introduction

In the modern software development landscape, APIs (Application Programming Interfaces) are the backbone of communication between different software systems. Understanding and effectively testing APIs is crucial for ensuring that applications perform as expected and provide a seamless user experience.

This course aims to equip you with the knowledge and skills needed to master API fundamentals and testing. Unlike traditional academic courses, this training is hands-on, focusing on practical applications and real-world scenarios, guided by industry veterans with over 30 years of experience.

Learning outcomes

By the end of this course, participants will be able to:

- Understand the basics of APIs and their role in software architecture.
- Differentiate between various types of APIs such as REST, SOAP, and GraphQL.
- Utilize HTTP protocols and methods for effective API communication.
- Design and execute comprehensive API test cases.
- Use popular API testing tools and automation frameworks.
- Integrate API tests into CI/CD pipelines.
- Perform advanced API testing techniques including parameterization, mocking, and load testing.
- Identify and mitigate common API security vulnerabilities.
- Implement best practices for API testing and reporting.

Prerequisites

Participants should have:

- Basic understanding of web development concepts.
- Familiarity with HTTP protocols and methods.
- Experience with any programming or scripting language.
- Basic knowledge of software testing principles.

Training outline

1. 1. API Fundamentals

What is an API?

- Definition and significance
- Role in software architecture
- Real-world examples and applications

Types of APIs

- REST: Principles, usage, and examples
- SOAP: Overview and comparison with REST
- GraphQL: Introduction and benefits

HTTP Protocol

- Methods: GET, POST, PUT, DELETE
- Status codes: 1xx, 2xx, 3xx, 4xx, 5xx
- Headers: Purpose and usage
- Request and response structure

2. 2. API Testing Concepts

API Testing vs. Functional Testing

- Differences and similarities
- Importance of API testing in the software lifecycle

Types of API Tests

- Functional testing: Validating functionality
- Performance testing: Assessing speed and scalability
- Security testing: Ensuring data protection
- Reliability testing: Checking API stability

Test Case Design

- Identifying test scenarios
- Writing effective test cases
- Examples of test cases for different endpoints

3. 3. Tools and Technologies

API Testing Tools

- Postman: Installation and basic usage
- SoapUI: Key features and setup
- REST Assured: Overview and examples

Automation Frameworks

- Introduction to JUnit, TestNG, and Pytest
- Writing automated tests for APIs
- Examples and best practices

CI/CD Integration

- Importance of CI/CD in API testing
- Integrating API tests into Jenkins, GitLab CI, etc.
- Automating test execution and reporting

4. 4. Hands-On API Testing

Creating and Sending API Requests

- Practical exercises with Postman and SoapUI
- Validating responses and handling errors

Working with API Documentation

- Reading and interpreting Swagger/OpenAPI documentation
- Generating documentation for APIs

Error Handling and Debugging

- Common issues in API testing
- Techniques for troubleshooting and resolving errors

5. 5. Advanced API Testing Techniques

Parameterization

- Using dynamic data in API tests
- Implementing parameterized tests in Postman and automation frameworks

Mocking and Virtualization

- Setting up mock servers and virtual services
- Using tools like WireMock and MockServer

Load and Performance Testing

- Introduction to JMeter and LoadRunner
- Conducting stress tests and analyzing results

6. 6. Security Testing

Common API Vulnerabilities

- SQL injection, XSS, CSRF, and more
- Techniques for identifying and mitigating vulnerabilities

OAuth and Authentication

- Understanding OAuth 2.0 and JWT
- Testing APIs with different authentication mechanisms

7. 7. Best Practices and Strategies

API Testing Best Practices

- Guidelines for effective API testing
- Test data management and version control

Test Reporting

- Generating detailed test reports
- Interpreting metrics and results

Collaboration and Communication

- Effective communication with development teams
- Documenting and reporting API issues

This comprehensive training will provide you with the skills and confidence needed to handle API testing in real-world scenarios, ensuring that your applications are robust, secure, and performant.

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