# Learn API Testing

## Norms, Practices, and Guidelines for Building Effective Test Automation

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Jagdeep Jain

Apress®

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***Learn API Testing: Norms, Practices, and Guidelines for Building Effective Test Automation***

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*I dedicate this book to my teachers, mentors,*
*and colleagues who have been instrumental in*
*the enhancement of my knowledge on the subject,*
*and also to my wife, daughter, sisters, parents, and in-laws,*
*without whose relentless support it would not have been*
*possible to manage the tight schedule of this work.*

*—Jagdeep Jain*

# Table of Contents

# About the Author

**Jagdeep Jain** has a Bachelor of Computer Science and Engineering degree and more than 15 years of rich experience in the software quality assurance and testing domain. He has worked for several product development software companies. He is a firm believer and an avid advocate of test automation. He is also the co-author of *Pro Apache JMeter* with Sai Matam.

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**Nitesh Kumar Jain** has over a decade of experience in the software testing world. He has an M.Tech in Information Technology from IIITM Gwalior, M.P. and a B.E. in Computer Science and Engineering from NIT Raipur, Chattisgarh. He is a keen technology learner with a "let's automate everything" attitude. He is also an ISTQB-certified Test Manager, Technical Test Analyst, and Agile Test Engineer. He loves to make Java/Swing-based tools that can help with anything related to software testing. He is presently working as a Lead QA at `https://watermarkinsights.com` and is constantly involved in doing quality work on framework design for UI, API, and performance test automation. His LinkedIn profile is `https://www.linkedin.com/in/nitesh-jain-958a2630/`.

**Kushagra Mittal** has a Bachelor of Technology in Computer Science degree from Amity University, Lucknow, UP. He has over nine years of experience in developing back-end solutions for multinational companies and has built products that are used by thousands of customers. He has developed microservices using Java Spring Boot and has used the Swagger UI for API documentation. He has hosted various training sessions with the University of Lucknow, UP on big data, distributed systems, and machine learning. He is an Oracle-certified Java Programmer, Oracle Cloud Infrastructure Foundation Certified Associate, and AWS Certified Developer - Associate. He is currently working as a Principal Member of Technical Staff at Oracle India Pvt. Ltd. His LinkedIn profile is https://www.linkedin.com/in/kushagra-mittal/.

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Nitin Dhawan works as a program manager and he has helped various teams in setting up scrum best practices and implementing planning, monitoring, and risk assessment modules. Currently he is working as a technical program manager and is responsible for establishing the communication channel between engineering teams by ensuring regular communication on projects/programs and status to everyone. Thanks to Nitin for reviewing the case study chapter. It was a big help to get all of the angles on how the software industry works in the scrum model.

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# Introduction

This book is intended to get beginners and intermediate-level software engineers, up and running with API testing, standard coding practices, and the standards and guidelines for better API test automation development and management.

Each chapter starts by explaining the topic it covers, allowing you to skip ahead if you are already aware of the contents.

Chapter 1 introduces APIs, what API testing is, why we need to have API testing during the software development/testing process, types of API testing, and the advantages of testing APIs.

Chapter 2 explains the different architectures used for developing a scalable software web application plus the protocols used for communicating between the client and the server and their attributes.

Chapter 3 talks about different types of authentication used in web-based software applications.

Chapter 4 covers the tools used in API testing: cURL, Postman, and RestAssured. This chapter also has information on the useful frameworks and libraries used in test automation development.

Chapter 5 introduces the test pyramid and why we need to visualize tests on each layer of a software application.

Chapter 6 walks you through the aspects of API testing and the API testing paradigm.

Chapter 7 talks about the components and guidelines for a good test script.

Chapter 8 covers things that are widely missed and never perceived later in the project life cycle phase, but if used will make test automation much better and joyful.

Chapter 9 talk about the components of the test automation framework and its design aspects. This chapter guides you through writing a test automation framework from scratch.

Chapter 10 is an extension of Chapter 9. In it, you learn how to develop the test script, execute it, and verify the results.

Chapter 11 introduces API documentation developed using the Swagger UI and how to read documentation that will be useful in writing test scripts.

Chapter 12 covers a case study of a shopping cart application of a hypothetical company. A hypothetical character will walk you through the real-life testing working on a Scrum project.

You should have a prior knowledge of the Java programming language and understand the basics of Maven, Tomcat, and Docker. In addition, an awareness of the Spring Framework is good. I use design patterns (Factory pattern, Singleton pattern) and solid design principles in this book so you will gain knowledge on best coding practices.

This book is useful for API testing aspirants and developers/architects. Project managers and non-technical team members will also greatly benefit from reading this book.

The test scripts developed in this book are hosted on GitHub. Any source code or supplementary material referenced by the author in this book is available to readers on GitHub via the book's product page, located at `http://www.apress.com/978-1-4842-8141-3`. For more detailed information, visit `http://www.apress.com/source-code`. For any queries or valuable feedback, feel free to get in touch with me, Jagdeep Jain, at `jagdeep.jain@gmail.com`.

## CHAPTER 1

# Introduction to API Testing

This chapter introduces application programming interfaces (APIs) and API testing. API testing is an important aspect of software testing activities during the development of typical services-based software. It involves testing the application's business components, usually represented as an API, before the UI is developed. A microservice is an API that deals with a single requirement.

By the end of this chapter, you'll have a good idea of the different types of API testing, the need for them, and the advantages of testing at the API level. If you're already familiar with API testing, you may proceed to the next chapter.

## What Is API Testing?

An API abstracts the application layer and provides the resource(s) for consumption by the client. APIs are the backbone of any typical web application, multi-tier web application, or mobile application that hides the inside details of the system, such as how an online payment is processed for a consumer.

APIs are the middle tier of an application and they deal with the back end, usually via an ORM (Object-Relational Mapping) or any other tool, or directly with the database and with the front end. The API acts as an agent

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between the back end and the front end. The API reads the data from the back end based on the user requirement/request and sends the response to the front end.

For APIs that do not have a front end, the owner of such an API provides a service-based model to their users, such as a payment gateway, weather forecasting, etc.

Figure 1-1 shows a typical service-based software application architecture. It has a database at the back end, APIs in the middle tier, and requests made from a browser or mobile application. We will discuss this setup in detail in the next chapter.

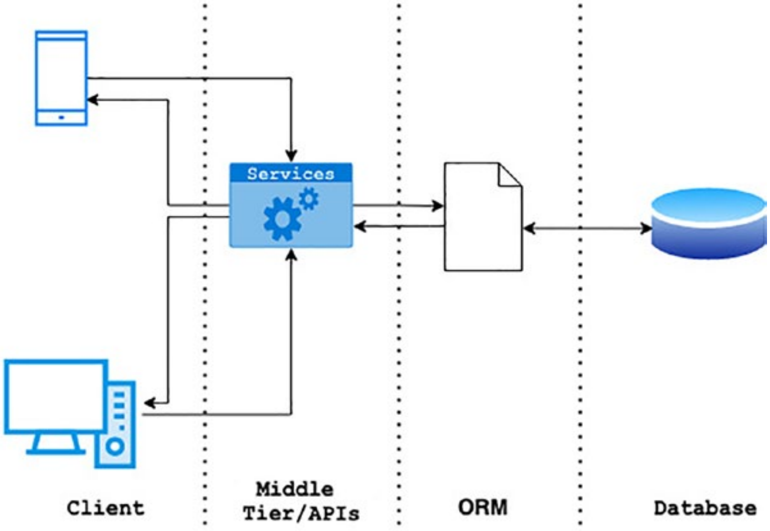

***Figure 1-1.*** *Web-based software application*

A typical web application[1] can be an e-commerce application, where the user wants to see various product offerings and then buy a product as per their needs. Requests are typically made from the front end/GUI. The middle tier has various components in the form of APIs, such as an API

[1] https://en.wikipedia.org/wiki/Multitier_architecture