

Red Hat Ansible Automation Platform

*Modernize your organization with
automation and Infrastructure as Code*

Luca Berton



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Dedicated to

*My son **Filippo** - the joy of my life*

About the Author



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Acknowledgement

I would like to express my gratitude to my son, family, and friends who make life worth living and whose support and encouragement have made this work possible.

I also want to extend my appreciation to all those whom I have worked with over the years and who shared their ideas for this book. Thank you all for the knowledge you have shared.

Preface

Welcome to the world of the Ansible Automation Platform. As technology continues to evolve, the need for efficient and scalable automation solutions becomes increasingly critical. This book is your comprehensive guide to mastering the Ansible Automation Platform, offering a hands-on approach to help you navigate the complexities of modern data center management.

In the dynamic landscape of modern technology, where the pace of change is relentless, and demands for efficiency, scalability, and reliability continue to rise, the role of automation has become paramount. As organizations grapple with the complexities of managing diverse IT environments, the Ansible Automation Platform emerges as a powerful ally, offering a versatile and robust solution to streamline operations, enhance deployment processes, and automate critical tasks. This book serves as an expansive and in-depth guide, meticulously crafted to empower both novices and seasoned professionals on their journey to mastering the intricacies of the Ansible Automation Platform. This book is designed to be a practical and comprehensive resource for both beginners and experienced professionals seeking to harness the full potential of the Ansible Automation Platform. We invite you to dive in, explore, and elevate your automation capabilities. Our intent is not only to provide a roadmap but to instill a sense of curiosity and empowerment. The Ansible Automation Platform, with its vast capabilities, beckons readers not just to consume knowledge but to participate in the evolution of their automation strategies actively. We invite you to embark on this journey, armed with curiosity and a commitment to mastering the Ansible Automation Platform, as we collectively navigate the ever-evolving landscape of IT automation.

Thank you for joining us on this exciting adventure!

Chapter 1: Getting Started with the Ansible Automation Platform – Begin our journey with a solid foundation, understanding the technology, typographic usage, and the crucial role Ansible plays in modern data center management. This chapter introduces us to the Ansible Automation Platform, covering its architecture, language, and the creation of playbooks and content, setting the stage for key learnings ahead.

Chapter 2: Ansible Automation Platform Architecture – Dive deep into the core of the Ansible Automation Platform. Explore its architecture and understand the Ansible Controller, Automation Hub, and Execution Environment. Gain insights into how these

components interact in common use case scenarios, setting the groundwork for a robust automation infrastructure.

Chapter 3: Platform Installation Scenarios – Embark on the installation journey, exploring various scenarios and deployment options. From single-machine setups to high-availability clusters, this chapter guides us through prerequisites, requirements, and installation scenarios, providing a comprehensive understanding of Ansible Automation Platform deployment.

Chapter 4: First Steps – Navigate the Ansible Controller Dashboard with ease. Learn essential system administrator tasks, including Ansible Controller settings, CLI usage, job management, and best practices for configuring the dashboard. This chapter empowers us to efficiently manage our automation platform from a system administrator’s perspective.

Chapter 5: Settings and Authentication – Organize permissions effectively with Role-Based Access Controls. This chapter covers the creation and management of access using users and teams. Explore external authentication sources and integrate Ansible Tower with LDAP, Azure Active Directory, and SAML authentication for enhanced security.

Chapter 6: IT Operations – Take control of system metrics and logging architecture. Learn how to connect Ansible metrics to Grafana, aggregate logging with tools like Splunk, and implement backup and restore strategies. Gain valuable insights into maintaining the health and performance of our Ansible Automation Platform.

Chapter 7: App Deployments – Unlock the power of automation in deploying cloud-native applications using containers. Dive into Ansible playbook development, automation of application deployments, and the distribution of applications in containers, streamlining our deployment workflows.

Chapter 8: Hybrid Cloud and Kubernetes – Explore how the Ansible Automation Platform simplifies hybrid cloud environments. Learn to build, provision, and manage applications across different cloud providers, leverage Kubernetes for container orchestration, and scale containerized applications seamlessly.

Chapter 9: Automate IT Processes – Discover the art of automating IT processes to enhance efficiency and security. This chapter covers the management of network and IT processes, automation of installations, upgrades, and day-to-day tasks, as well as responding to security threats with automated scripts.

Chapter 10: Wrap-Up – As we conclude this journey, recap the basics, install scenarios, role management, integration, authentication, and use cases. Reflect on key administration

practices and express our gratitude for joining us on this exploration of the Ansible Automation Platform.

Whether you're a seasoned automation professional or just starting, this book provides a roadmap to mastering the Ansible Automation Platform and leveraging its capabilities to transform the way you approach IT automation. Let's embark on this exciting journey together!

Development Environment

The code provided in this book is compatible with any text editor or integrated development environment (IDE). An IDE is a software tool that offers comprehensive features for software development, such as code editing, debugging, compilation, and project management.

The base environment for reproducing the code examples of this book:

- A text editor: graphical (VS Code, Atom, Geany, etc.) or terminal (VIM, Emacs, Nano, Pico, etc.).
- A workstation with either the `ansible` or `ansible-core` installed packages.

We recommend using Visual Studio Code as the preferred IDE, which can be freely downloaded at <https://code.visualstudio.com>.

Conventions Used in the Book

Throughout the book, we encounter numerous examples and terminal commands. The Ansible language primarily utilizes YAML and INI formats for syntax. When not specified in the text, assume the file format is YAML. The code adheres to the latest YAML specification. YAML, known for its simplicity, readability, and broad compatibility with programming languages, allows for a concise representation of complex data structures. It is widely used for configuration files and data exchange, similar to JSON but with Python-style indentation and a more compact format for lists and dictionary statements.

The INI format is frequently used for inventory and the Ansible configuration file. It is a straightforward configuration file format utilizing key-value pairs and sections for storing settings and preferences in a human-readable manner.

Many terminal commands are standard Linux commands, indicated inline (e.g., `ansible [command]`) or in a code block (with or without line numbers). For instance:

```
$ echo Hello World
```

The provided terminal commands follow POSIX conventions and are compatible with Unix-like systems, including Linux, macOS, and BSD. Each command assumes usage by a standard user account when prefixed with the **\$** (dollar) symbol or by the root user when prefixed with the **#** (number sign) symbol.

Each Ansible resource (playbook, role, plugin, and collection) adheres to the latest Ansible best practices, validated with the latest release of the Ansible Linter.

However, it's worth noting that specific code snippets intentionally diverge from best practices to reproduce specific behaviors or use cases accurately. This ensures a comprehensive understanding of Ansible, encompassing ideal techniques and real-world scenarios.

Code Bundle and Coloured Images

Please follow the link to download the
Code Bundle and the *Coloured Images* of the book:

<https://rebrand.ly/70ltl91>

The code bundle for the book is also hosted on GitHub at

<https://github.com/bpbpublications/Red-Hat-Ansible-Automation-Platform>.

In case there's an update to the code, it will be updated on the existing GitHub repository.

We have code bundles from our rich catalogue of books and videos available at **<https://github.com/bpbpublications>**. Check them out!

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CHAPTER 1

Getting Started with the Ansible Automation Platform

Introduction

This chapter introduces us to the Ansible Automation technology and tools. We are going to approach the evolution of automation for the enterprise audience of the Ansible Automation Platform.

Structure

In this chapter, we will discuss the following topics:

- Brief introduction and reference
- Overview of Ansible Automation Platform
- What is Ansible
- Ansible architecture
- Ansible language
- Create Ansible Playbooks and Content

Objectives

After studying this chapter, you should be able to understand what Ansible is, its architecture, and how to write Ansible code. These are the foundation of the Ansible Automation Platform that we are going to learn in the following chapters.

Brief introduction and reference

Welcome to this book about the Ansible Automation Platform. We are going to explore the most interesting automation platform in the market. Ansible is the automation technology adopted by many organizations worldwide.

Worldwide analysts see growth in the adoption of automation technologies in every industry and sector. **Infrastructure and operations (I&O)** leaders are rethinking how infrastructures are utilized and managed. Gartner predicts 70% of organizations to implement infrastructure automation by 2025¹. A prediction of a digital revolution with automation is mentioned in the *European DevOps software tools forecast, 2021–2025* of IDC². All the major information technology analysts agree that automation is going to play a central role in the IT infrastructure of tomorrow.

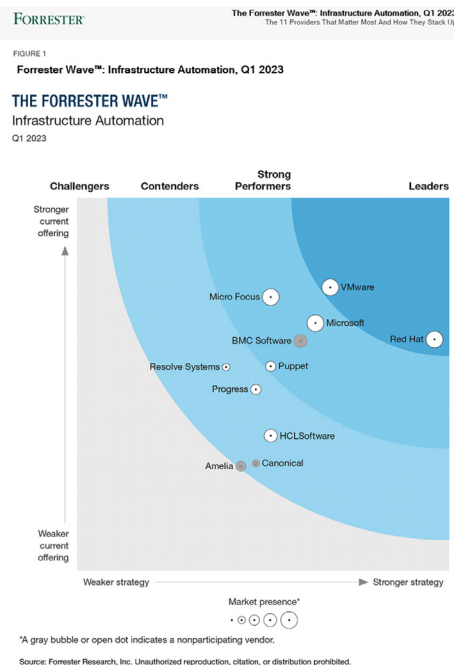


Figure 1.1: Forrester Wave™ Infrastructure Automation report.

¹ <https://www.gartner.com/en/newsroom/press-releases/2022-10-03-gartner-survey-finds-85-percent-of-infrastructure-and-operations-leaders-without-full-automation-expect-to-increase-automation-within-three-years>

² <https://www.idc.com/getdoc.jsp?containerId=EUR148592321>

Red Hat, specifically focused on the Ansible Automation Platform, has been named a leader in the Q1, 2023 *Forrester Wave™* infrastructure automation report, as shown in Figure 1.1. The competition was between the top 11 vendors: *Amelia, BMC Software, Canonical, HCL Software, Micro Focus, Microsoft, Progress, Puppet, Red Hat, Resolve Systems, and VMware*. The evaluation of each vendor on 30 different criteria ranging from a comprehensive breadth of native capabilities to integrations and ecosystems.

Overview of Ansible Automation Platform

Ansible Automation Platform is a comprehensive IT automation platform designed to simplify and accelerate complex IT tasks across hybrid and multi-cloud environments. It combines the power of Ansible Automation with enterprise-grade features, such as role-based access control, workflow automation, and analytics, to help organizations automate their IT processes and streamline their operations. Please refer to the following figure:

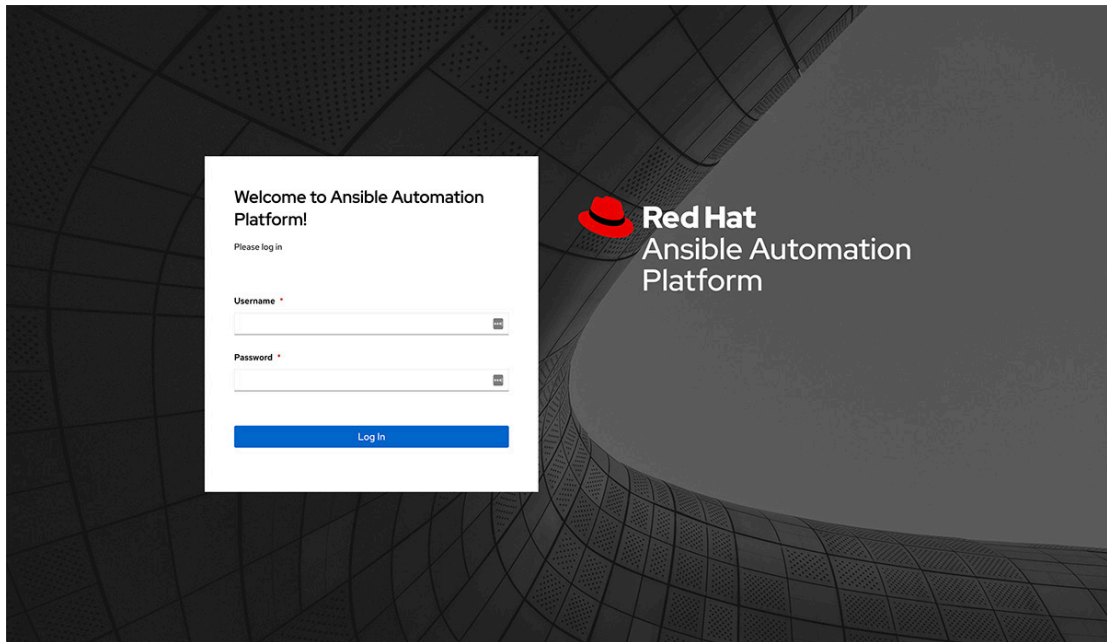


Figure 1.2: The login screen of the Ansible Automation Platform

The platform consists of several components, including the Ansible Core, which is the automation engine that executes Ansible Playbooks; the Ansible Automation Controller, which is a web-based GUI that provides a centralized interface for managing Ansible Playbooks, roles, and inventory; and the Ansible automation hub, which is a hub for finding, reusing, and sharing Ansible resources and content.

With the Ansible Automation Platform, organizations can automate their IT infrastructure and application delivery, enforce security and compliance policies, and collaborate and

share their automation content with their teams. It supports a wide range of IT operations use cases, including configuration management, application deployment, network automation, and security automation.

IT leaders use every day the Ansible Platform to implement **Infrastructure as Code (IaC)**, **Configuration as a Code (CaC)**, Policy as a Code, Code Pipelines, Orchestration (K8s), DevSecOps, self-healing infrastructure, and event-driven automation.

The first release of the Ansible Automation Platform was in 2020, previously known as **Ansible Tower**. Ansible Tower gives every IT department the ability to securely store inventories, credentials, projects, and playbooks and manage **role-based access control (RBAC)** in a RESTful API and web user interface. The Ansible Tower is based on the open-source AWX project supercharged with much commercial integration with many enterprise-grade technologies.

The automation controller was completely redesigned since release 2.0, implementing a new container design.

The platform is expanded with additional components that integrate together for a great automation experience.

The main components of the Ansible Automation Platform are:

- **Automation controller:** The control plane for the Ansible Automation Platform.
- **Automation hub:** Find, use, and extend Ansible resources.
- **Automation execution environments:** Packaged as containers, portable environments for executing Ansible playbooks and roles.
- **Automation mesh:** Automate at scale in a cloud-native way.
- **Ansible content collections:** Ready-to-use certified modules.
- **Ansible content tools:** Tools to create custom Automation execution environments.
- **Red Hat insights for Ansible Automation Platform:** Acquire statistics and metrics on our automation savings.

IT Professionals and organizations take advantage of the full experience with the Red Hat Ansible Automation Subscription and all the connected resources. It also includes the full power of Red Hat's award-winning Customer Portal in the Standard business day (8 AM to 5 PM) or Premium 24x7. It is possible to try the Red Hat Ansible Automation Platform with the 60-day trial self-supported subscription, which includes a subscription to Red Hat Enterprise Linux, Red Hat Insights for Red Hat Ansible Automation Platform, Red Hat Smart Management, and Red Hat Ansible Automation Platform hosted services on Red Hat Hybrid Cloud Console. Independent developers take advantage of the Red Hat Developer Subscription for Individuals (SKU RH00798) program. It is a single subscription renewable every year that allows them to install on a maximum of 16 Red Hat Enterprise

Linux systems, physical or virtual, regardless of system size. Those 16 nodes might be used for demos, prototyping, QA, small production uses, and cloud access.

What is Ansible

Ansible is an open-source software platform for automating and managing IT infrastructure, including deploying applications and configuring systems. It allows us to write playbooks, which are sets of tasks in YAML (a human-readable language) that describe how to perform tasks on one or more remote servers. The first release of Ansible was on February 20, 2012. *Michael DeHaan* created the Ansible tool and started advertising the first initial community. Please refer to the following figure:



Figure 1.3: The Ansible logo

Ansible uses a client-server architecture, with a central control server (the Ansible control machine) and managed nodes (the servers that we want to automate tasks on). The control machine connects to the managed nodes over SSH (a secure network protocol) and runs the playbooks on them.

One of the key benefits of Ansible is that it uses a simple, easy-to-learn syntax and does not require any special programming skills. This makes it an appealing choice for IT professionals who need to automate tasks but may not have much programming experience.

Ansible can be used to automate a wide range of tasks, including the deployment of applications, the configuration of systems, the provisioning of cloud infrastructure, and the management of security and compliance. It is commonly used in DevOps (a software development methodology that emphasizes collaboration between development and operations teams) to automate the build, test, and deployment of applications.

The Ansible Automation Platform includes a full installation of Ansible underneath the Ansible Automation Controller.

The Ansible open-source project and community are supported by Red Hat (part of IBM). Red Hat actively works with other organizations and individuals committed to open-