# Preface

We are living in a world of such big and rapid changes. In the IT industry, things such as **DevOps**, **the cloud**, **digital transformation**, **containers**, and **Kubernetes** have emerged in the last few years and dramatically changed the way we develop, build, test, and deploy applications.

Among the big set of new technologies, only a few of them have become a sort of *consensus* in the industry, including the cloud, containers, and Kubernetes. Over the last few years, the authors of this book have worked with many customers that are on this cloud and container adoption journey – *almost all of them have adopted some sort of Kubernetes distribution and one or more cloud providers*. Most of them are *experiencing the benefits* of this adoption but also have to deal with *many new challenges*, such as *maintaining standard environments, keeping them secure, and keeping costs under control.*

That is why we decided to focus this book not *only* on OpenShift, which is one of the market leaders in enterprise Kubernetes, but *also* on **multi-cluster management**. This book is the result of *years of experience in the field*, designing architectures and deploying and operating OpenShift clusters, which we have tried to turn into words, pages, and chapters!

We are going to cover in this book answers to questions such as, *what are the different architectural choices I have with OpenShift? How do I design the right architecture for my case? What are the different personas related to OpenShift, their main responsibilities, and their challenges?* We will also walk through **OpenShift deployment, trou-**

**bleshooting, network, and security**. **CI/CD** and **GitOps** are also covered in this book with some *practical examples* that you can use to learn how they can help you to increase the maturity level of your build and deployment process. Finally, we will go over some tools, such as **Advanced Cluster Management** and **Advanced Cluster Security**, that will help you to *manage and secure multiple OpenShift clusters from a central standpoint.*

# Who this book is for

This book is intended to be helpful for any professional that is involved with Kubernetes and OpenShift. It is especially useful for software engineers, infrastructure operators, developers, site reliability engineers, and security engineers, but should also be relevant to enterprise architects and CXO decision makers. Are you interested in knowing more about OpenShift architecture, deployment, security, GitOps, pipelines, multi-cluster management, and security? *If so, this book was carefully made for you!*

# What this book covers

*Chapter 1*, *Hybrid Cloud Journey and Strategies*, discusses the main challenges of public cloud adoption and explains what OpenShift is, and why it can help to deal with those challenges to achieve success in the business, culture, and technical aspects of hybrid cloud adoption.

*Chapter 2*, *Architecture Overview and Definitions*, walks through the main concepts related to Kubernetes and OpenShift architecture to help you decide on the best path you may take.

*Chapter 3*, *Multi-Tenant Considerations*, helps you to work with multi-tenancy on OpenShift to provide multiple environments to multiple teams, with proper isolation for every case.

**Chapter 4**, *OpenShift Personas and Skillset,* looks at changes that can be made in a company structure to help people adapt to their roles and responsibilities.

**Chapter 5**, *OpenShift Deployment,* is a complete hands-on guide to installing and using OpenShift.

**Chapter 6**, *OpenShift Troubleshooting, Performance, and Best Practices,* demonstrates some of the most common issues with OpenShift usage.

**Chapter 7**, *OpenShift Network,* explores OpenShift's network layers, such as the Open vSwitch, as well as the north-south and east-west traffic concepts, and the different types of TLS configurations for OpenShift routes.

**Chapter 8**, *OpenShift Security,* presents some of the most important concepts of security such as container security, authentication and authorization, identity providers, **Role-Based Access Control** (**RBAC**), certificates, etcd encryption, container and network isolation, the Red Hat container catalog for image certification, and vulnerability protection.

**Chapter 9**, *OpenShift Pipelines – Tekton,* introduces OpenShift Pipelines, a Kubernetes native CI/CD pipeline tool based on Tekton. This chapter contains the main concepts, the installation process, and a hands-on lab to learn using a practical approach.

**Chapter 10**, *OpenShift GitOps – ArgoCD,* expands the deployment capabilities by adding GitOps and ArgoCD. This chapter covers GitOps concepts, OpenShift GitOps installation, and a hands-on lab.

**Chapter 11**, *OpenShift Multi-Cluster GitOps and Management,* deep dives into hybrid/multi-cloud concepts and the main concerns about adopting multiple clusters. This chapter describes what Red Hat Advanced Cluster Management is, its installation, and how to use it to manage multiple Kubernetes clusters from a central console.

*Chapter 12*, *OpenShift Multi-Cluster Security*, expands the concepts from *Chapter 8*, *OpenShift Security*, focusing on multi-cluster security concerns. This chapter covers the Red Hat Advanced Cluster Security tool features, such as risk management, vulnerabilities, violation, policies, compliance, and configuration management, along with installation, configuration, and usage instructions.

*Chapter 13*, *OpenShift Plus – a Multi-Cluster Enterprise Ready Solution*, introduces Red Hat Quay as an enterprise image registry option, and it also discusses the benefits of the OpenShift Plus offering as a great option for enterprises looking for consistency and portability in a hybrid/multi-cloud environment.

*Chapter 14*, *Building a Cloud-Native Use Case on a Hybrid Cloud Environment*, introduces a complete practical example. This chapter transposes all the concepts in the book using a step-by-step hands-on guide to show how to build and deploy an application using most of the features covered throughout the book: OpenShift Pipelines (Tekton), OpenShift GitOps (ArgoCD), Advanced Cluster Management, Quay, and Advanced Cluster Security.

*Chapter 15*, *What's Next*, offers suggestions for the next steps to take to keep learning and going even deeper into OpenShift through training and certifications.

# To get the most out of this book

Throughout this book, you will run commands and use command-line tools. We recommend you use a Mac or Linux workstation, such as Fedora or Ubuntu – although some of the CLI tools also have versions for Windows, the command examples used in this book assume the usage of a Linux workstation, and Mac should also work fine.

For some sections of this book, an AWS account is necessary; however, it should not be difficult to adapt the examples for other cloud

providers. You can sign up for a free trial on AWS here: **https://aws.a-mazon.com/**.

| Command-lines used in the book | OS requirements |
|---|---|
| OpenShift Client | Windows, macOS, and Linux (Mac and/or Linux preferred) |
| OpenShift Installer | macOS and Linux |
| CodeReady Containers (CRC) | Windows, macOS, and Linux (Mac and/or Linux preferred) |

Although we have done our best to make this book as didactic and inclusive as possible, you will probably get more out of it if you already have a basic knowledge of containerization and Kubernetes – no advanced knowledge is needed though.

# Download the color images

We also provide a PDF file that has color images of the screenshots/diagrams used in this book. You can download it here: **https://packt.link/C8KLC**.

# Download the example code files

You can download the example code files for this book from GitHub at **https://github.com/PacktPublishing/OpenShift-Multi-Cluster-Management-Handbook**. If there's an update to the code, it will be updated on the existing GitHub repository.

We also have other code bundles from our rich catalog of books and videos available at **https://github.com/PacktPublishing/**. Check them out!

# Conventions used

There are a number of text conventions used throughout this book.

**Code in text**: Indicates code words in text, database table names, folder names, filenames, file extensions, pathnames, dummy URLs, user input, and Twitter handles. Here is an example: "For this step, we are going to use the **quarkus-build** pipeline, which you will find in the **chapter14/Build/Pipeline/quarkus-build.yaml** file."

A block of code is set as follows:

```
SELECT
      COUNT(DISTINCT Column1) AS Count_column1,
      System.TIMESTAMP() AS Time
FROM Input TIMESTAMP BY TIME
GROUP BY
      TumblingWindow(second, 2)
```

Code output or a command line entry is set as follows:

```
npm install applicationinsights
```

**Bold**: Indicates a new term, an important word, or words that you see onscreen. For example, words in menus or dialog boxes appear in the text like this. Here is an example: "After you have created the AWS credential, access the **Infrastructure | Clusters** feature and click on the **Create cluster** button."

*TIPS OR IMPORTANT NOTES*

*Appear like this.*

# Get in touch

Feedback from our readers is always welcome.

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