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SUSE Special Edition

# Enterprise Container Management

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Tom Callway  
Peter Smails

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In December 2020, SUSE completed the acquisition of Rancher Labs — the company behind Rancher, RKE, K3s, Harvester, and Longhorn. Each of these technologies will remain as free, open source projects. However, from 2021, the fully supported, commercial version of Rancher will be called SUSE Rancher.

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SUSE puts the “open” back in open source, giving customers the agility to tackle innovation challenges today and the freedom to evolve their strategy and solutions tomorrow. The company employs more than 2,000 people globally. SUSE is listed on the Frankfurt Stock Exchange.

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# Introduction

If you're exploring containers and enterprise container management (ECM) software, you've come to the right place. As part of your exploration, you've most likely come across Kubernetes, because it's impossible to talk about ECM without talking about it. Kubernetes is not just the leading container orchestration solution — it's the standard. Technology employees of all stripes love working with Kubernetes:

- » **Developers** love the extensibility of Kubernetes because it gives them maximum agility and flexibility when delivering cloud-native applications, whether on premises, in the cloud, or at the edge.
- » **Information technology operations (ITOps) teams** love Kubernetes because it helps boost productivity, reduces costs and risks, and moves organizations closer to achieving their hybrid cloud goals.
- » **CEOs and CIOs** love Kubernetes because it helps significantly increase the agility and efficiency of their software development teams, enabling them to reduce the time and complexity associated with putting differentiated applications into production.

Simply put, Kubernetes makes it easier to manage software complexity. As enterprise applications become more complex, development and operations (DevOps) teams need a tool that can orchestrate that complexity. They need a way to launch all the services dependent on these applications, making sure the apps and services are healthy and can connect to one another.

This book provides you with a basic road map to successfully develop an ECM strategy and select the appropriate Kubernetes management solution to address your needs. We include three detailed case studies from companies leading the way with Kubernetes and Rancher as their solution of choice. Our hope is that IT professionals and others who lead an organization of any size will see how other technology leaders have used Kubernetes to improve their operations.

# Foolish Assumptions

To help you get the most out of this book, we make some assumptions about you:

- » We assume that you already have some basic familiarity with containers and Kubernetes or you've at least heard the terms mentioned in passing. We do *not* assume that you know all there is to know about Kubernetes or that you've even heard of Rancher.
- » We assume that regardless of whether you head up your DevOps or IT department or work in an executive capacity, you've come to this book ready to solve a problem and you want to determine whether Kubernetes, Rancher, and other related technologies are the solutions you're seeking.

## Icons Used in This Book

This book uses the following icons to highlight paragraphs that have a little something “extra” about them:



TIP

The Tip icon calls your attention to information that may help make your Kubernetes venture lift off a little more smoothly.



REMEMBER

The Remember icon highlights information that is so important, it's worth repeating — and remembering!



WARNING

The Warning icon calls attention to pitfalls you may encounter in your Kubernetes implementation and explains how to avoid them.

## Beyond This Book

Interested in learning more? The Rancher blog ([www.suse.com/c/rancherblog](http://www.suse.com/c/rancherblog)), Rancher docs (<https://rancher.com/docs>), and Rancher community links ([www.suse.com/community](http://www.suse.com/community)) are chock-full of helpful information — and searchable!

## IN THIS CHAPTER

- » Understanding why IT teams love Kubernetes
- » Assessing your progress on your Kubernetes journey
- » Establishing who owns your strategy
- » Setting goals
- » Meeting your standardization and innovation needs
- » Training your teams

# Chapter **1**

## Creating an Enterprise Kubernetes Strategy

**T**o understand why Kubernetes is so popular, you first need to know why containers have risen dramatically in popularity. Containers provide a consistent way to package application components and their dependencies into a single object that can run in any environment. By packaging code and its dependencies into containers, a development team can use standardized units of code as consistent building blocks. The container runs the same way in any environment and gives some applications the ability to scale to any size.

Development teams use containers to package entire applications and move them to the cloud without making any code changes. Containers also simplify the process of building workflows for applications that run between on-premises and cloud environments, enabling the smooth operation of almost any hybrid environment.

So, why Kubernetes? It depends on who you ask:

- » **Enterprises** love Kubernetes because it helps software development teams make their applications more efficient, scalable, available, and portable. And with tools and practices such as continuous integration/continuous delivery (CI/CD), GitOps, automation, and configuration management, teams can reduce the time and complexity associated with putting differentiated applications into production while improving agility and time to market.
- » **Information technology operations (ITOps) teams** love Kubernetes because it helps boost productivity, reduce costs and risks, and move organizations closer to achieving their hybrid cloud goals.
- » **Developers** love the extensibility of Kubernetes, which gives them maximum agility and flexibility when delivering cloud-native applications.

Simply put, Kubernetes solves much of the complexity of managing software development at scale in a multi-cloud landscape. As enterprise applications become more complex, development and operations teams need a tool to orchestrate that complexity. They need a way to launch all the services dependent on these applications, ensuring the apps and services are healthy and can connect to one another.

## Knowing Where You Are on Your Kubernetes Journey

Building an enterprise Kubernetes strategy starts with understanding how Kubernetes can help your organization. Whether you're using it to help build the applications required to hit business goals or choosing to build the software needed to achieve your business goals, you'll need to decide which platforms Kubernetes can benefit and plan your needs for the next five to ten years.

Over the last several years, accessing Kubernetes has become much easier. Open-source tools make provisioning and upgrading a Kubernetes *cluster* (a set of nodes that enable you to run containerized applications) quick and easy. Cloud providers are



now offering Kubernetes as a hosted service. Any team using Amazon Web Services (AWS), Google Cloud Platform (GCP), or Microsoft Azure can provision a Kubernetes cluster in minutes using their respective Amazon Elastic Kubernetes Service (EKS), Google Kubernetes Engine (GKE), and Azure Kubernetes Service (AKS) services.

Organizations that run Kubernetes often approach it the same way as when they built OpenStack or other shared, centralized services. ITOps teams typically use Kubernetes to build large clusters and then offer development teams shared access to them through Kubernetes namespaces. Namespaces and cgroups enable cluster administrators to control access to cluster resources based on usage quotas and resource limits. Namespaces help deliver a reasonably well-isolated experience for each team that needs access to Kubernetes.

Other organizations have left it to individual departments or development and IT operations (DevOps) teams to decide how and where to use Kubernetes. These organizations often have dozens of clusters deployed across public clouds and company data centers.



TIP

As you document and understand where Kubernetes is running in your enterprise, make sure that you have individuals with expertise in containerization — or hire them. As you progress in building your strategy, developing a team of Kubernetes advocates across your organization will be critical to driving adoption.

## COLLABORATING ACROSS TEAMS

Tension can develop between software development teams who need to run Kubernetes in a certain way to accomplish a development goal and an IT department that prioritizes maintaining security and control over how Kubernetes gets implemented.

Development teams want flexibility. They need the tools to consume storage, security, and infrastructure as a service. The collaboration between development teams and ITOps, with the support of solutions like Rancher and Longhorn, will ensure that developers have the best solution possible to consume all these services.

*(continued)*

(continued)

On the other hand, IT teams are especially nervous about clusters that are deployed and left unpatched and unmanaged. They want to centralize the operations and policy around clusters and restrict access to only those teams that require it.

If Kubernetes and containers are going to become the primary platform for running applications across any infrastructure, ITOps (or DevOps) must collaborate with developers to build a strategy for Kubernetes that satisfies both their needs.

## Defining Who Owns Your Strategy

New technologies like Kubernetes are exciting to work with, and it isn't uncommon for many teams to try to own their company's Kubernetes strategy — individual DevOps teams, shared services groups, central IT, cloud platform, or platform-as-a-service (PaaS) groups.

Two teams that often lead the Kubernetes strategy are the shared services team (responsible for supporting developers and DevOps) and the central IT team (responsible for computing platforms). Putting either team in charge of Kubernetes strategy provides the following benefits:

- » **Shared services:** The shared services team brings key insights into how an organization is modernizing its approach to application development, as well as the requirements teams have identified they need in a Kubernetes platform. They often understand other key systems that have been built for DevOps, such as CI/CD tools, development environments, data services, and application monitoring tools. Whether these teams own the strategy or simply contribute to it, they represent at the very least one of the primary consumers of containers in the organization. They should be a critical part of developing your organization's strategy.
- » **Central IT:** The central IT team, focused on cloud computing and other computing platforms, is also a logical team to lead a Kubernetes strategy. They have a strong understanding of

platform operations, infrastructure, security, multi-tenancy, and existing IT investments, and they usually have significant experience running critical projects. A project led by the IT platforms team will benefit from their understanding of the broad requirements of many different teams across a large, complex organization.



WARNING

Projects coming out of central IT often suffer from too little engagement with end users and too much influence from existing technology vendors. These teams often have very little experience with the latest application architectures and benefit enormously from working closely with teams leading innovation around application development.



TIP

Successful teams often bring together talent from across the organization and collaborate to determine requirements. Still, investing in a strategy and building a platform means working within budget constraints, so it's most common for one team to take the lead on delivering on the strategy.

## Prioritizing Your Goals

Building an enterprise container management strategy means prioritizing your goals. These goals will depend on what you're trying to accomplish. For example, if your team sets out to use Kubernetes to optimize infrastructure costs, you'll probably focus on building big clusters and trying to get as much density as possible out of them.

If your team focuses instead on using Kubernetes to accelerate innovation, you'll take a different approach, emphasizing flexibility and delivering more tooling around Kubernetes, such as monitoring and CI/CD integration. With this approach, you would have a multi-cluster strategy, with more smaller clusters. This way of working will provide higher flexibility and freedom for your developers, while at the same time giving you better availability for your apps and avoiding vendor lock-in.

To prioritize your goals, try to understand the potential of Kubernetes, and imagine how your organization may be using it in the future. In five years, for example, you may use Kubernetes to do any of the following:

- » **Create microservices-centric applications.** Kubernetes is a great way to run modern, microservices-centric applications. It offers a rich set of functionalities that allow teams to determine how different services within modern applications are run, handle unexpected events, connect with each other, and connect with other applications and application programming interfaces (APIs).
- » **Rapidly deploy Kubernetes clusters.** Today, every major cloud provider has made it easy to deploy Kubernetes clusters within minutes. Teams are continuously building new applications, deploying them to different clouds, and using Kubernetes to run them. Between clusters used for development, staging, and production, and the need to deploy Kubernetes clusters across different data centers and cloud providers, it isn't hard to imagine that even the most well-organized company is still running dozens of Kubernetes clusters.
- » **Move onto the edge.** The same modern application architectures that we think of as cloud native are now beginning to move out of the data center. Teams building software for factories, hospitals, and stores now want to run applications with rich data analytics and complex architectures as close to their customers and production facilities as possible. Running applications this way is referred to as "running on the edge."
- » **Develop for single-node devices.** Even single-node devices such as point-of-sale terminals, outdoor advertising, medical devices, 5G-enabled communication equipment, security cameras, or automobiles now benefit from the ability to deploy and run applications easily using microservices. We're witnessing the sprawl of tens of thousands of edge deployments, all running as individual Kubernetes clusters, and presenting an API that needs to be managed.

Between clusters running in different clouds, data centers, and the edge, it's almost certain that your organization will be running more than one Kubernetes cluster. Unless you know you'll only be running a single application in one location, it probably makes sense to build your Kubernetes strategy with an expectation that you'll need to be able to easily provision and manage multiple Kubernetes clusters running in many different places.

# Weighing Standardization against Innovation

Regardless of who owns your strategy, one of the critical questions that will emerge is how much standardization is possible without impacting innovation. Many teams will have experienced projects around OpenStack and PaaS that struggled to get adoption because users weren't able to get enough flexibility to deploy the next-generation applications they were building.

With Kubernetes, there is enough flexibility in the platform and the ecosystem to satisfy any team. Exposing that flexibility is critical to delivering value. Any strategy that abstracts away Kubernetes will probably face resistance from your most innovative teams. At the same time, the flexibility of Kubernetes and its ecosystem can be a hindrance to some teams looking for a platform to just run standard apps.

One of the most exciting developments in the Kubernetes space in the past few years has been the emergence of lightweight projects that run on Kubernetes but provide frameworks that simplify application management. These approaches enable containers to “scale to zero” and provide simple declarative languages to build, connect, scale, and monitor services. They can deliver a powerful experience without requiring a deep understanding of the underlying technology, which can benefit teams using CI/CD and stateless applications.

SUSE's Epinio project (<https://epinio.io>) is an example of this approach to running containers that simplify some of the complexity of Kubernetes.



REMEMBER

As you build your Kubernetes strategy, consider blending the best of a decentralized approach with enough controls and management to ensure compliance and remove repetitive tasks. Try to centralize and automate everyday tasks such as Kubernetes cluster life-cycle management, role-based access control (RBAC) policies, infrastructure management, and other Day 2 operations.

At the same time, give your teams options for where they can get access to Kubernetes clusters and whether they can use a shared cluster or a dedicated cluster. Focus primarily on maintaining

visibility into all the provisioned clusters, not necessarily forcing teams to use a set of preapproved clusters in a specified way.

## Preparing Your Teams

A critical part of any Kubernetes strategy is determining how you'll train your teams to leverage Kubernetes. If you find that your enterprise already has some staff members with expertise in containers or Kubernetes, consider how you can incorporate them into your initiative. This doesn't mean necessarily pulling them off their existing work, but perhaps they can work as part of the team setting requirements, evaluating tools, or developing policies.



TIP

Regardless of your team's skill level, you'll almost certainly have team members who need to be trained on either using or administering Kubernetes. Luckily, there is no shortage of Kubernetes training providers and online courses, including those offered by the SUSE & Rancher Community ([www.suse.com/community](http://www.suse.com/community)).

As you build your core team of early Kubernetes admins and users, consider setting a goal to train and certify as many members of your team as possible. The tests are rigorous and help you ensure that you build strong internal knowledge about using containers and Kubernetes.

After you have some initial expertise, you may want to wait to do further training until you're out of the design phase of your strategy and bringing on more teams to work with the specific implementations of Kubernetes your organization is adopting.

## IN THIS CHAPTER

- » Explaining enterprise container management
- » Fostering innovation in multiple environments
- » Providing comprehensive control and visibility
- » Ensuring robust global security and effective governance
- » Providing developers with platform choices
- » Deciding between an on-premises platform and a hosted platform
- » Understanding the value of experience

# Chapter 2

# Building an Enterprise-Grade Kubernetes Environment

Chapter 1 covers the basics of building an enterprise Kubernetes strategy that considers how your organization will use Kubernetes over the next five years. We also discuss the importance of maintaining flexibility while at the same time providing centralized controls and management when you build this strategy.

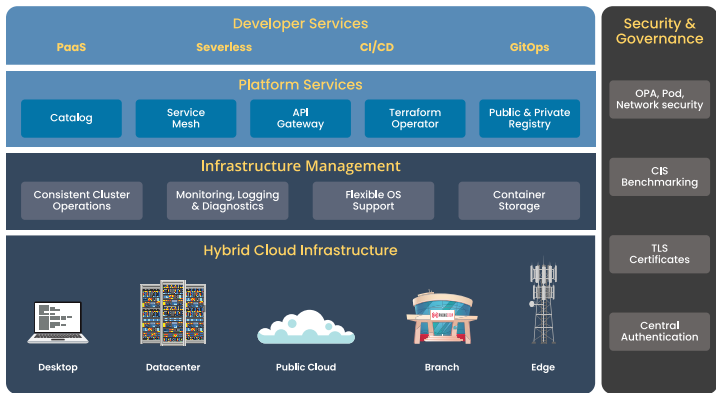
This chapter covers the next step in that process. You find out how IT operations and development teams should examine their options for managing containers at scale across their

organization. In this book, we refer to a class of software called *enterprise container management (ECM)*.

# Introducing Enterprise Container Management

An ECM platform is a software platform that provides management capabilities for a multi-cluster Kubernetes environment and the containerized applications running within it. An ECM platform also provides the tools and application programming interfaces (APIs) needed to integrate with the Cloud Native Computing Foundation (CNCF) ecosystem projects that help developers and operations teams to be effective.

An ECM platform contains functional layers that work in concert to deliver all the capabilities you need to build and manage a Kubernetes infrastructure and the workloads running on it (see Figure 2-1). The following sections describe the role each layer plays and discuss why that layer's role is important.



**FIGURE 2-1:** The anatomy of an enterprise container management platform.

The rest of this chapter discusses the key components of an ECM platform and what to look for when choosing a solution. You see examples of how Rancher, the world's most popular open-source ECM platform, can help implement your Kubernetes strategy in your enterprise.



# Enabling Innovation Everywhere

Possibly the most powerful benefit of Kubernetes is its transformational ability to enable innovation everywhere. The CNCF runs a software conformance program to certify Kubernetes offerings. Conformance ensures that vendor and community versions of Kubernetes support the required APIs.

Using certified distributions, organizations can develop applications and then deploy and run them anywhere — from desktop to data center, the cloud, and the edge. Using certified distributions is, therefore, an innovation driver: You're using standard APIs and open-source software practices.



REMEMBER

Be sure that your Kubernetes distribution is certified by the CNCF. This certification ensures that the distribution is consistent with upstream Kubernetes and quickly supports the latest features being developed in the community.



WARNING

In the world of Kubernetes distributions, one size does *not* fit all. Don't be fooled by vendors saying that all you need is “their” distribution. Be smart: Select the best distribution for the job based on where your application will be running.

Here are some places where you may run your applications.

## Public clouds

To reduce the time and complexity of deploying Kubernetes, many organizations choose to deploy their clusters using public-cloud-based infrastructures such as Amazon Web Services (AWS), Google Cloud Platform (GCP), and Microsoft Azure. Most public cloud providers have developed their own certified Kubernetes distributions optimized for that cloud. However, operators still choose a multi-cloud approach to minimize reliance on a sole infrastructure solution. So, it's important that your ECM platform supports Kubernetes in any public or private cloud environment and treats popular hosted distributions like Amazon Elastic Kubernetes Service (EKS), Google Kubernetes Engine (GKE), and Azure Kubernetes Service (AKS) as first-class citizens.

As of Rancher 2.6, users have full life-cycle management of EKS, GKE, and AKS clusters. This includes configuring and provisioning, infrastructure and resource management, monitoring

and logging, communication, scanning, security and upgrading directly from Rancher’s unified platform experience and intuitive user interface (UI). Table 2-1 shows how Rancher 2.6 supports full life-cycle management of these hosted Kubernetes distributions.

**TABLE 2-1 Rancher 2.6 Provides EKS, GKE, and AKS Cluster Support**

Life-Cycle Management	Features Required	EKS/AKS/GKS with Rancher 2.6	EKS/AKS/GKE Only
Configuration and provision	Enterprise Kubernetes management	Consistent provisioning of any clusters via Rancher enhanced import proficiency of existing EKS/AKS/GKE clusters	Standard console Third-party tools
Manage	Infrastructure management	Enhanced configuration of underlying infrastructure	Standard console Third-party tools
	Visualize Kubernetes resources	Rancher cluster-level user experience (UX) explores all Kubernetes resources	Kubectrl Third-party tools
	Integrated monitoring and logging	Enhanced monitoring (Prometheus) Enhanced logging (Fluentbit/Fluentd)	Manual install Provider specific
	Simplified service mesh	Rancher-supported Istio	Manual install Provider specific
Secure	Centralized tooling and visibility	Centralized role-based access control (RBAC) policy Centralized auth Center for Internet Security (CIS) scanning Open Policy Agent (OPA) Gatekeeper	Kubernetes native Provider specific

Life-Cycle Management	Features Required	EKS/AKS/GKS with Rancher 2.6	EKS/AKS/GKE Only
Upgrades	Push-button Kubernetes upgrades	Rancher graphical user interface (GUI)/ API upgrades of created and imported clusters	Standard console Third-party tools
Apps	Easy access to CNCF tools and third-party apps	Rancher certified packages  Custom Rancher catalogs  Helm Kubectrl	Helm Kubectrl Provider specific

## On-premises and hybrid cloud

ECM platforms are used alongside certified Kubernetes distributions that enable operators to provision clusters. Which distribution operators choose to use depends on the environment that clusters are deployed in and what features operators may require for the deployment of their containers. For example, some distributions offer extended compliance and security features within their distributions, whereas others may have enhanced monitoring and observability capabilities integrated.



TIP

SUSE offers Rancher Kubernetes Engine (RKE) for on-premises data center or hybrid cloud use cases. RKE is a CNCF-certified Kubernetes distribution that runs entirely within containers. This approach solves the common frustration of installation complexity with Kubernetes by removing most host dependencies and presenting a stable path for deployment, upgrades, and rollbacks.

RKE2 is a fully conformant certified Kubernetes distribution focused on security and compliance. It leverages components of RKE, with no dependency on the Docker container runtime. With its integrated Federal Information Processing Standards (FIPS) compliance, RKE2 is a perfect option for those organizations focused on security, because it brings government-grade security to the enterprise and the cloud-native community. In combination with SUSE NeuVector, RKE2 supports your infrastructure and workloads with their additional levels of security.

## The edge

Enterprises are increasingly pushing the boundaries of Kubernetes by exploring how to run next-generation 5G, machine learning (ML), and artificial intelligence (AI) workloads at the edge. More organizations are deploying workloads at the edge, so new solutions like Harvester — a cloud-native hyperconverged infrastructure solution — are emerging from ECM platform providers. These solutions give operators the ability and flexibility to manage both the virtual machine and Kubernetes workloads in traditionally resource-constrained and challenging environments.

As a result, Kubernetes-powered applications are popping up everywhere, including retail stores, banks, cars, trains, ships, oil rigs, and wind farms — just to name a few. The inherent complexity and resource overhead of Kubernetes, however, makes “full-size” distributions too big to operate or too complex to manage in these potentially resource-constrained environments.

Today, for these edge environments, Rancher supports a lightweight, highly available, CNCF-certified Kubernetes distribution, called K3s, which is built to run production workloads in unattended, resource-constrained, remote locations, or inside Internet of Things (IoT) appliances. First created by Rancher Labs (acquired by SUSE in 2020) and then donated to the CNCF in 2020, K3s is packaged as a single, less-than-50MB binary that reduces the dependencies and steps needed to install, run, and auto-update a production Kubernetes cluster.

## Maintaining Central Control and Visibility

Leading ECM platforms support multi-cloud and multi-cluster use cases and excel at simplifying cluster operations and making them consistent across substrates. Many also include advanced observability tools with minimal additional configuration required.

### Simplified cluster operations

You may be wondering whether you're likely to be managing hundreds, thousands, or even millions of containers across your

entire infrastructure. If left unchecked, such *container sprawl* can become a big problem.



TIP

When shopping for an ECM platform, here are some of the key features and capabilities to look for that will help manage cluster sprawl.

## Intuitive user interface

An ECM platform needs to enable users to easily provision multiple Kubernetes clusters from core to cloud to edge and make those clusters accessible to all users at any stage in the clusters' life cycles. Look for solutions with an intuitive UI that gives you complete access to everything you need to deploy and manage Kubernetes workloads while still giving power users full access via command-line interface (CLI) tools.

## GitOps capabilities

GitOps is a DevOps framework that takes best practices used in application development and applies them to the automation of infrastructure. These best practices include continuous integration/continuous deployment (CI/CD), automated version control, improved collaboration, and compliance.

It uses Git as a single source of truth for declarative infrastructure and applications. GitOps allows developers to accelerate application deployments and operations tasks to Kubernetes using familiar tools. GitOps is great because it's self-healing: With Git as the source of truth, unintentional modifications will be reverted back to keep sync with Git.



TIP

Look for an ECM platform that can apply GitOps best practices to your infrastructure and application code, allowing you to increase velocity and improve reliability across your clusters at scale. For example, Rancher, when used with SUSE's project Fleet, lets operators apply GitOps principles at scale. Fleet enables them with the ability to deploy and manage up to a million clusters while also being lightweight enough to confidently manage single clusters. By using GitOps, users can implement self-healing capabilities while defining their clusters within their infrastructure stacks to simplify the management of their diverse environments through the configuration-as-a-code approach to multi-cluster management.



TIP

For more on scaling Kubernetes, see “Scaling Fleet and Kubernetes to a Million Clusters” on the SUSE blog ([www.suse.com/c/rancher\\_blog/scaling-fleet-and-kubernetes-to-a-million-clusters](http://www.suse.com/c/rancher_blog/scaling-fleet-and-kubernetes-to-a-million-clusters)).

## Flexible load-balancing configuration

Load balancing may be an important part of your application deployment, so any ECM platform should make it easy to select the best ingress controller for your use case. Some examples of ingress controllers include HAProxy, NGINX, and Traefik.



REMEMBER

You want the flexibility to use the load-balancing configuration that works best for you and your environment.

## Support for Secrets and ConfigMaps

Secrets and ConfigMaps are two powerful Kubernetes resources. Your ECM platform should allow you to define and update both types visually and then select how to map them into workloads — either as environment variables or volumes. A good ECM also supports the use of Secrets management tools like Vault to secure your passwords and certificates.

## Rolling updates of worker nodes

As more business-critical applications become containerized, zero downtime maintenance becomes an operational imperative. The best ECM platforms support rolling updates of multiple worker nodes, making it easy for operators to select and configure an upgrade strategy so that Domain Name System (DNS) and Ingress experience zero downtime during cluster updates.

## Monitoring, logging, and diagnostics



TIP

Monitoring, logging, and diagnostics are critical to maintaining cluster health. Look for an ECM platform that lets you quickly add these services to operationalize your clusters.

For example, Rancher works with any monitoring and logging systems that integrate with Kubernetes. For an out-of-the-box experience, it includes a built-in monitoring stack based on Prometheus and Grafana alongside the Banzai Cloud logging solution based on Fluentbit to deliver insight, live monitoring data, and centralized aggregated logging. If you already use

third-party monitoring platforms like Datadog, ELK, or Sysdig, you can launch them easily from Rancher’s app catalog.

## Flexible operating system support

Whether you want to create and tear down development/test environments or “lift and shift” legacy applications to the cloud, your ECM platform needs to provide flexible operating system (OS) support that includes both Linux and Windows. This way, you can bring the benefits of Kubernetes to all your existing and new containerized applications.



TIP

For more information about how Rancher supports launching Kubernetes on Windows nodes, check out <https://rancher.com/docs/rancher/v2.6/en/cluster-provisioning/rke-clusters/windows-clusters>.

## Container-attached storage

With more stateful applications such as database applications becoming containerized, persistent storage has become an important feature for any ECM platform. As a result, numerous open-source and proprietary persistent storage solutions have become popular in the Kubernetes ecosystem.

Today, Rancher provides out-of-the-box integration with a persistent storage solution, Longhorn, making it easy to provision, secure, and back up highly available container-attached storage in your Kubernetes environment with just a few clicks. Like K3s, Longhorn is now a CNCF-run open-source project.



TIP

To read more about how Rancher integrates with Longhorn to create vendor-neutral persistent storage, see “Longhorn Cloud-Native Storage for Kubernetes” at [www.suse.com/products/longhorn](http://www.suse.com/products/longhorn).

# Ensuring Global Security and Governance

From integrating with popular authentication tools and services to configuring an enterprise-grade RBAC capability, any ECM platform must ensure the security of your single, multi-cluster, or edge-scale Kubernetes environment.

In addition to platform-level security, your ECM platform should provide easy access to the vibrant ecosystem of container security technology vendors. These vendors offer specific security capabilities that are worth evaluating as part of your broader implementation of Kubernetes. For example, SUSE's NeuVector container security platform integrates seamlessly with Rancher, as do other leading security tools, including Aqua Security and Prisma Cloud.

The following sections cover some of the specific security capabilities to look for in an ECM platform.

## Centralized authentication and role-based access control

Your ECM platform should provide centralized authentication and RBAC for all your Kubernetes clusters and users, enabling users to connect to any cluster with one set of credentials stored in the authentication service of your choice — from Active Directory to GitHub to OpenLDAP. Administrators can then grant user/group access to any cluster or project by leveraging custom resource definitions (CRDs) and custom controllers for RBAC.



TIP

For more on centralized authentication, check out <https://rancher.com/docs/rancher/v2.6/en/admin-settings/authentication>. And for more on RBAC, check out <https://youtu.be/VGqJ-QvhkIw>.

## Transport Layer Security certificates

Your ECM platform should be able to store Transport Layer Security (TLS) certificates to keep them safe. Subsequently, users can deploy resources that use a certificate without being given a copy of the certificate and private key. After it's installed, a certificate's private key should be held securely by the ECM platform.



TIP

For more on TLS certificates, check out <https://rancher.com/docs/rancher/v2.6/en/k8s-in-rancher/certificates>.

## Center for Internet Security benchmarking

The more clusters you manage, the higher your risk of security exposure. To avoid noncompliant clusters, look for an ECM



platform that provides cluster templates, which enable you to apply cluster settings uniformly across many clusters to prevent configuration drift.

Additionally, look for an ECM platform that provides the ability to automatically scan clusters against CIS, which offers more than 100 benchmarks for validating the security of your clusters.

## Open Policy Agent, pod, and network policies

The OPA Gatekeeper project is a policy enforcement mechanism that forces Kubernetes clusters to run and access designated privileges and resources. Gatekeeper helps you ensure compliance with legal and organizational policies by providing the ability to define custom policies using native Kubernetes CRDs.



TIP

Look for an ECM platform that uses OPA as a threat prevention mechanism by enabling controlling policies for images, Ingress, pods, and namespaces. Integration with flexible policy engines like Kubewarden ([www.kubewarden.io](http://www.kubewarden.io)) is a big plus.

## Leveraging Open, Flexible Platform Services

The following sections detail what to look for when considering open, flexible platform services.

### App catalog

Helm is one of the most popular tools to package and deploy applications into your cluster safely. Look for an ECM platform that extends Helm charts to simultaneously install and upgrade certified applications in multiple clusters from a global application catalog. If you're exploring a multi-cloud or multi-provider solution, this feature ensures flexibility while also giving you confidence that your applications stay consistent.



TIP

For more on deploying applications from catalogs, check out <https://rancher.com/docs/rancher/v2.6/en/helm-charts>.

## Service mesh

Service mesh is designed to eliminate developers' need to write specific code for key application services, including fault tolerance, canary rollouts, A/B testing, monitoring and metrics, tracing and observability, and authentication and authorization. Look for an ECM that integrates with service mesh technologies, including Istio, and traffic/telemetry visualization tools like Jaeger and Kiali.

## Application programming interface gateway

A microservices-based architecture running on Kubernetes may have 10 to 100 or more services. Look for an ECM platform that supports an API gateway to provide a unified entry point for external consumers, independent of the number and composition of internal microservices.

## Automation and configuration management as code

An ECM platform needs to leverage automation and configuration management as code by integrating with a wide variety of open-source solutions and different methodologies for flexibility and agility. Your ECM platform should support or integrate with solutions based on GitOps methodology, such as Fleet or ArgoCD, to provide better management at scale. It's also important to have an API to integrate not only with continuous integration pipelines, but also with automation and configuration management tools like Terraform and Ansible. Rancher ships with Fleet, providing GitOps operations, and integrates with Terraform, with modules for RKE, Rancher, and the SUSE stack.



TIP

For more on Terraform and Rancher, check out <https://youtu.be/p5XQRxd2M5U>.

## Public and private registry support

Your ECM platform should support deployment from any public registry. If you also use private registries, you should be able to load the authentication data into your ECM platform when you

deploy workloads that use containers from a private registry and securely pass the authentication information to Kubernetes for use when pulling the images.

## Giving Developers a Choice of Platforms

Kubernetes is a powerful engine with a rich ecosystem of tools around it. As such, no one best way exists for operators to leverage Kubernetes. Instead, the key is to provide developers the flexibility to use the platform they want.

For some developers, the answer may be an entirely curated user experience around Kubernetes that incorporates ecosystem tools and delivers a UI to simplify workload management; this is referred to as *platform as a service* (PaaS). A potential drawback to PaaS is limited functionality or lack of flexibility.

Alternatively, developers may have a more do-it-yourself mindset, requiring your ECM platform to integrate with adjacent technologies. These technologies could include the container engine, overlay networking, automation tooling, container registries, service mesh, monitoring, logging, CI/CD, and application catalogs.



REMEMBER

The best ECM platforms support a variety of developer experiences. Some developers work best with a UI that simplifies workload but restricts functionality; others prefer to do more of the integration work themselves and, therefore, work best with an ECM platform that provides more flexibility.

The following sections describe several of the most popular developer experiences.

### Platform as a service

The intention of a PaaS is to eliminate manual IT configuration and help accelerate innovation by getting applications to market faster. Developers can serve themselves and get apps to the cloud in minutes instead of weeks while staying within IT guidelines or relying on scarce IT resources to perform manual configuration each step of the way.

## Serverless

*Serverless* application architectures abstract away server management tasks from the developer and enhance development speed and efficiency by dynamically allocating and managing compute resources. Function as a service (FaaS) is a runtime on top of which a serverless architecture can be built.



TIP

For more about serverless frameworks for Kubernetes, see “Running Serverless Applications on Kubernetes with Knative” on SUSE’s blog at [www.suse.com/c/rancher\\_blog/running-serverless-applications-on-kubernetes-with-knative](http://www.suse.com/c/rancher_blog/running-serverless-applications-on-kubernetes-with-knative).

## Continuous integration/continuous delivery

The demands of modern software development, combined with the complexities of deploying to various infrastructures, can make creating applications a tedious process. As applications grow and development teams become more distributed and diverse, releasing software quickly and consistently becomes more difficult. To address these issues, teams must automate their build, test, and release processes using CI/CD pipelines.



TIP

Look for a ECM platform that supports popular CI/CD pipeline tools like Jenkins to simplify all aspects of the application delivery process. For more on Rancher’s CI/CD support, check out <https://rancher.com/docs/rancher/v2.6/en/project-admin/pipelines>.

## Choosing the Best Deployment Option for Your Needs

Before you can choose your ECM platform, you should consider where you’ll gain the most benefit from running it. The various solutions on the market have different advantages depending on where they’re installed. You may want to host your ECM platform within your data center to ensure optimal security. Or, if you don’t have the infrastructure or people resources required to host your ECM, you may choose a public-cloud-hosted option. Ideally, your ECM platform gives you the option to do either.

Rancher, for example, can be deployed on-premises. Rancher is also available in a hosted version so you don't have to operate the Rancher control plane and can instead focus exclusively on the Day 2 operations of your Kubernetes clusters.



REMEMBER

The right ECM platform for you depends on how you intend to operate it. You may prioritize security, or you may want to streamline resources.

## Learning from Experience

Adopting new technology across a large organization is never easy. As technologists, we get excited when new approaches emerge that can create amazing experiences for our customers. Many people who have been working in technology for the last 20 years see Kubernetes and containerization as the third phase in a process that started with the emergence of virtualization and expanded with cloud computing.

As you adopt an ECM platform, be sure to learn from your organization's past successes and failures in adopting other technologies. If you have team members who were instrumental in rolling out VMware or AWS in your organization, incorporate them into your project and see what insights they can provide to your organization.

Pay special attention to the teams who are already running apps on Kubernetes. Use their expertise to validate that your preferred ECM platform won't introduce constraints that would keep them from adopting it. Focusing on the early adopters will help you avoid oversimplification and delivering a platform that deviates from mainstream Kubernetes adoption.

As you begin to deploy your ECM platform, know that you aren't alone, and pay special attention to learning from other organizations adopting Kubernetes. The Kubernetes community is growing rapidly. You can find a wealth of real-world advice from teams who have gone through rolling out Kubernetes at either a project- or company-wide level.



## IN THIS CHAPTER

- » Following Schneider Electric's container-migration journey
- » Analyzing what containers have done for Continental
- » Checking out TrueLayer's open banking platform using containers

# Chapter 3

## Looking at Case Studies

Reading about high-level strategic approaches and the benefits of a particular platform is undoubtedly useful. Still, nothing beats a detailed description of how customers benefit from the technology and hearing their insights.

This chapter contains case studies of companies of different sizes, from various industries and locations, to illustrate how beneficial Kubernetes and Rancher can be to an organization's digital transformation.

### Schneider Electric

Schneider Electric, founded in the 1800s, is a world-leading provider of energy and digital automation solutions for efficiency and sustainability.

Believing access to energy and digital services is a basic human right, Schneider creates integrated solutions for homes, commercial and municipal buildings, data centers, and industrial infrastructure. By putting efficiency and sustainability at the heart of its portfolio, the company helps consumers and businesses make the most of their energy resources.

Head of Global Infrastructure Strategy Anthony Andrades is guiding the company through a period of significant transformation. He's building Schneider's strategic vision and analyzing everything the business does from an innovation perspective. His analysis encompasses how Schneider's estate of data centers operates, the diverse ways applications are built and run, asset obsolescence, configuration, and cost. Andrades is also responsible for managing the cultural shift associated with large-scale digital transformation. According to Andrades, "After a quarter of a century of technical evolution, we're embarking on one of the most important transformations in our history. By modernizing all our legacy systems to create a cluster of cloud-native microservices, we are becoming more agile and innovative."

## Seeing why Schneider Electric chose containers

Schneider Electric had already entered the cloud ecosystem in 2013, with a couple of business-driven projects running quietly in Amazon Web Services (AWS) and Microsoft Azure. When the success of these projects became known, Andrades was drafted to build on this success and create an enterprise-grade cloud strategy. By 2016, the company had expanded its global AWS footprint and its mission to migrate its infrastructure to the cloud had begun.

The team became aware of Kubernetes a year earlier in 2015 and quickly identified it as a cost-effective way to create the microservices-based, service-oriented architecture that large digital enterprises, like Google, had pioneered. There were some pockets of excellence where Kubernetes was already running, but the picture wasn't consistent. Access control was a major issue. Several customer development teams needed access to clusters, but this was uncontrolled, which, in some cases, resulted in the suspension of Docker usage until a rules-based platform as a service (PaaS) was put in place.

The team was already familiar with Rancher, so in early 2018, Andrades carried out an initial successful proof of concept (PoC) with Rancher Labs (acquired by SUSE in 2020) and Rancher's security partner, Aqua. Soon after, the team started using SUSE Rancher on top of Kubernetes to provide the access control,



identity management, and globalized performance metrics that don't ship with Kubernetes.

SUSE Rancher performed so well that Schneider chose it to underpin its container-management platform. In June 2019, the platform was deployed to run 20 nodes, and the painstaking process of application modernization began.

## Understanding the problems Schneider Electric is solving

After an extended period of technical evolution, Schneider Electric knew it needed to adopt a strategy that transformed legacy technology and embraced the cultural shift required to reorient its business.

### Legacy transformation

Like many established businesses, Schneider has been through 25 years of transformation. Over time, the company has built and deployed thousands of separate services and applications running on Windows Server or Red Hat that must be reengineered or rebuilt before migrating to the cloud.

Andrades's primary objective is to complete the transformation and migration of all applications within five years. This is no small feat when you consider the volume of applications involved and how different applications require different modernization approaches. In late 2019, the team started the painstaking process of analyzing the entire estate of applications, categorizing each one according to the most appropriate and efficient way to modernize and migrate.

For some key applications, the transformation will be done in stages; the application will be "lifted and shifted" to the cloud, optimized, and made available as a service. Teams will then redesign the application later. Others may be decommissioned entirely and rebuilt as microservices. Static web servers, for example, can easily be converted into S3 buckets. Where two-tier applications are concerned (web front end running a user interface [UI] with a relational database in the back end), the UI would run in a container and the database would be ported to Amazon Relational Database Service (RDS).

In Kubernetes, development teams can deploy multiple clusters, each configured to specific application requirements. In Rancher, the infrastructure team can run each of these bespoke environments side-by-side via one intuitive platform. Crucially, when used with other solutions, such as Aqua, SUSE Rancher becomes a secure and compliant environment for teams — both internal and external — to collaborate. With access control easily configurable in SUSE Rancher, the infrastructure team can allow collaborators unhindered access to the platform. This approach significantly boosts team innovation.

The project is in its infancy, but Andrade already sees benefits daily. He has a mammoth task ahead: If he is to reach his five-year migration goal, he must automate a host of basic processes, such as role-based access control (RBAC), namespace as a service (NaaS), authentication, application catalog, and more. SUSE Rancher takes care of these functions, dramatically reducing the deployment workload. According to Andrade, developers don't need to worry about security or operational processes. They can bring their pipelines and repositories with them and run their workloads seamlessly while SUSE Rancher and Aqua guardrail the security controls.

Andrade and the team appreciate that they don't need to worry about the underlying infrastructure. If a problem occurs, they receive a notification. If they want to check the clusters' status quickly, they can check the dashboard to ensure that everything is "green." They no longer must keep checking performance, workload status, or resource usage — SUSE Rancher removes the manual burden. This, Andrade believes, has freed teams to think more creatively.

Over the last year, the team has successfully migrated four key applications and is now managing them in clusters via the SUSE Rancher platform. This success has prompted the team to extend its use of the SUSE Rancher platform and double the number of nodes running in the cloud.

## **Cultural transformation**

In addition to leading the technical transformation, Andrade is responsible for managing the cultural shift among Schneider's development teams that a move to containers and the cloud requires.

For some who have been working in technology for the last couple of decades, a shift to a cloud-native existence is a big one. Long-ingrained development methodologies, baked into the fabric of the infrastructure, are as hard to modernize as the technology itself — particularly when it may appear that the technology is replacing significant parts of the job.

Andrades's focus, therefore, is to excite and galvanize the company around the opportunity every developer has to build new, disruptive skills. The range of experience spans experts through to complete novices. His mission is to globalize the existing pockets of excellence by bringing the company together to hear their stories and take a closer look at how they're succeeding with Kubernetes. By sharing detailed technical expertise and best practice, along with a sense of long-term value, Andrades and his team believe they'll carry the business along the journey with them.

The benefits include the following:

- » Reduced deployment and management time with automation
- » Improved security posture with Aqua integration, RBAC, and NaaS
- » Increased rate of innovation
- » Established a growing business case for Kubernetes in the European energy sector

## What's next for Schneider Electric?

Schneider Electric's relationship with SUSE looks set to continue to grow in the future. The team recently renewed its support contract and has doubled its usage of the SUSE Rancher platform. This deepening of the relationship illustrates the confidence that Andrades and his team have in the platform, the support they receive, and the long-term value the alliance will bring to Schneider, its customers, and the wider European energy sector.

# Continental AG

Continental AG develops pioneering technologies and services for the sustainable and connected mobility of people and their goods. Founded in 1871, it offers safe, efficient, intelligent, and affordable solutions for vehicles, machines, traffic, and transportation. Headquartered in the German city of Hanover, Continental has grown exponentially during the last 150 years to become a global brand. The manufacturing giant is now present in 585 locations in 59 countries and markets and has 232,000 employees worldwide.

Continental's manufacturing infrastructure team exists to capitalize on the most disruptive technologies, serve application teams better, and drive innovation. With 12 years of experience working as their Infrastructure Team Lead, Roland Paxián took a long-term and global view of technology innovation. Three main objectives drive his strategy: creating efficiency, maintaining the highest quality standards, and achieving these goals in a systematic and networked way. Paxián believes this strategy helps Continental transform novel ideas into mass production faster. According to Paxián, "Manufacturing processes are under scrutiny as companies seek to gain market share through digital transformation. The process of modernizing machinery in harmony with operational software is not a simple one. Adopting a microservices-based containerization strategy removes some of the complexity."

## Seeing why Continental chose containers

Continental has always been a forward-thinking organization and, naturally, digital transformation and modernization are a major focus. However, in manufacturing, the practical implications of modernizing the now decades-old architecture — estates of legacy machinery and all the software that runs within them — cannot be underestimated.

Continental had run a virtualized infrastructure for many years, which suited them well, but management and maintenance became problematic over time. If teams wanted to implement a new feature or upgrade an application, this would be time and resource-intensive.

When containers emerged, the team saw an opportunity to streamline infrastructure management and started to investigate. It took a few years for a serious discussion to begin around the value of containerization, but when it did, it wasn't long before Kubernetes was identified as the most flexible way to get the containerization strategy off the ground.

In 2018, plans started to crystallize. At that time, the primary consideration was whether to move applications to the cloud or remain in the data center. Without a doubt, running Kubernetes in the cloud would be relatively simple; it was easy to spin up clusters in AWS and Azure. However, it became clear that latency would be an issue where some critical applications were concerned. Factory machinery requires millisecond response times, so some systems would need to remain in the data center. As such, Continental needed a hybrid cloud and on-premises methodology.

If the team wanted to use Kubernetes on-premises and in the cloud, it would need to engineer and support its own solution — something that would've taken time. Kubernetes offered the right container orchestration methodology, but Paxián and his team needed a way to run multiple clouds and on-premises deployments side-by-side in one platform. That's where SUSE Rancher came in.

After a short PoC in 2019, which saw the team evaluate several Kubernetes management options, SUSE Rancher emerged as the most suitable platform to help modernize and unify Continental's legion of manufacturing applications. Since Continental formally selected SUSE Rancher in late 2019, growing demand has come from Continental's many manufacturing teams. Paxián's focus is shifting to make the platform safely available to hundreds of application development teams across the world.

## **Understanding the problems Continental is solving**

Continental faced two challenges. First, it wanted to develop the infrastructure platform, and then it tried to roll out the service to hundreds of teams of developers in 45 locations worldwide. Partnering with Rancher helped the company achieve these objectives.

## Legacy transformation

The primary driver for adopting a cloud-native, container-centric strategy was the urgent need to transform Continental's manufacturing infrastructure into an agile, cloud-native, and platform-based architecture. It had to be heterogeneous — flexible enough to run on-premises and cloud workloads together with any vendor, via a central UI.

For Continental's application developers, the change couldn't come soon enough. Application deployment and maintenance had become resource-intensive over the years. Everything was handled manually, from design to build to deployment and management — and this rigorous process repeated for each new development. The infrastructure team would encounter a host of problems if it needed to implement a new feature or simply upgrade an application. If an application developer needed an environment to develop something new, it would take time to fulfill the request, which slowed the pace of innovation.

Importantly, many production lines run 24 hours a day, seven days a week. If a line needed to be upgraded or an issue resolved, taking it out of service would cost the company dearly. Paxián needed an environment that would allow him to develop and maintain manufacturing applications without affecting productivity.

Managing his Kubernetes-based infrastructure platform in SUSE Rancher, Paxián has created a highly agile and scalable application framework, which has removed complexity and significantly reduced management overheads. His new containerized architecture allows him to run applications in separate clusters, with development, test, and production environments already in place. If they need a place to spin up new containers to try new ideas, they can create them in minutes.

If an application needs to be updated, a feature needs to be added, or maintenance needs to be performed, this can be done using SUSE Rancher without halting production lines. The team no longer requires costly maintenance downtime during upgrade periods. Updates are centralized and installed in a couple of clicks, which has reduced the management burden and improved overall productivity. Paxián estimates management time has been reduced by 75 percent. Because the platform promotes a cloud-native approach to building and deploying new services,

applications can be created as microservices. These microservices are highly portable between on-premises and cloud environments, making resource allocation and scaling more predictable.

## **Creating a global infrastructure platform**

Now that Paxián and his team have developed the infrastructure platform, their focus is on rolling out the service to hundreds of teams of developers in 45 locations worldwide. The project has progressed rapidly. Now thousands of developers can access the new containerized platform via a single pane of glass.

Of course, some applications are engineered for the cloud and others are engineered to reside on-premises, closer to production lines. Running in Rancher, the new infrastructure platform provides a consistent framework for application development while allowing teams to configure and secure them for specific conditions. It then allows teams to deploy to any environment and run these clusters side-by-side via the SUSE Rancher UI.

This has major benefits for distributed teams. Having a flexible approach allows teams to develop applications with the manufacturing use case clearly in mind and in compliance with local regulations. Teams can choose, for example, to use data centers in highly regulated regions or where processing must take place within the production lines themselves.

In just six months, the team rolled out the platform to nine regions in Europe and Asia. Paxián believes this is critical for an organization like Continental with a global workforce. For the first time, teams that may be separated by geography and business unit can work together in a unified and consistent way. More important, they can do it safely, within a rules-based domain. By adopting a platform approach to infrastructure management, Continental has created a scalable, agile framework where collaboration and cooperation can reign. This result would've been impossible before.

The impact of Continental's strategy has been marked. By working together under a common methodology, projects are completed faster and developments are consistent and created according to defined rules. The platform is accessible 24 hours a day, seven days a week, with access tightly monitored in SUSE Rancher.

The benefits include the following:

- » Reduced migration time by 80 percent
- » Reduced management time by 75 percent
- » Reduced upgrade time by 80 percent
- » Reduced costs moving on-site server applications to data center/cloud
- » Global management platform for 45 regions

## Looking ahead: Continental's long-term cost reductions

In manufacturing, it's common to find large and resource-intensive servers running next to shop floors. Designed for use with specific machinery, these servers are expensive to run and environmentally outdated. In the long term, by engineering manufacturing applications to be more cloud-native, the infrastructure team will reduce these costs by moving applications to the cloud and the data center.

Where compute resources are still needed in production lines, Internet of Things (IoT) solutions like K3s will allow the team to run lightweight versions of Kubernetes directly on machinery. Hardware transformation always takes time, but Paxián believes by putting the right infrastructure in place now, the path to wider transformation will be smoother.

## TrueLayer

TrueLayer is a leader in the open banking and fintech space. It provides a platform used to build financial experiences in apps and websites that securely connect bank data, verify account ownership, and process payments instantly. The 5-year-old company has pioneered an application programming interface (API)-centric open banking methodology, operating across multiple sectors, including digital banking, wealth management, trading and investment, e-commerce, and iGaming. The company works with some of the biggest names in the fintech industry.



Nutmeg, an online investment management service, sought a way to transform its payment process to enable investors to get their money to market faster. With TrueLayer's open banking solution, Nutmeg was able to cut out the intermediary and enable its customers to fund their accounts seamlessly, without the interference — and expensive fees — associated with traditional debit and credit card processing.

Online car retailing platform Cazoo is using TrueLayer's PayDirect platform to offer instant payments powered by open banking — removing costly card and interchange fees and delivering instant transaction confirmations. It has also implemented instant seller payments, via TrueLayer, which authenticates a seller by comparing the account holder name to their bank details in just three clicks. With their seller's details prepopulated and verified, Cazoo can pay them instantly via TrueLayer and eliminate the risk of failed transactions arising from invalid bank details.

With European firms across every sector embracing the open banking philosophy, TrueLayer's technology team, led by Director of DevOps Alessio Casco, needed to be able to move quickly and to innovate at pace. The team looked to Kubernetes to spearhead its containerization plans, but the lack of an orchestration platform held them back. By working with SUSE Rancher, TrueLayer has simplified its technology infrastructure, enabling it to spearhead the open banking revolution.

## Seeing why TrueLayer chose containers

From the start, TrueLayer recognized containers would be key to building a robust and agile environment for open banking. Open in nature, Kubernetes naturally became the team's preferred containerization solution. Not only would Kubernetes require less system resources than traditional hardware or virtual machine-based environments, but it would also enable the company to become more efficient and increase innovation velocity. However, lacking a centralized management methodology, the company's developers battled with time-consuming manual scripts and frustrating maintenance processes.

Casco wanted to give his developers the power to create their own environments themselves, safely in a managed environment that

allows complete visibility. This is where TrueLayer’s journey to SUSE Rancher began.

## Making the journey to SUSE Rancher

In 2019, the team began the search for the perfect container management platform. There were several contenders, including Amazon Elastic Kubernetes Service (EKS), Red Hat OpenShift, and SUSE Rancher, each with its own unique qualities. Casco created a scorecard detailing TrueLayer’s list of requirements, from cost effectiveness to feature set, and pitted each provider head-to-head.

OpenShift, though a feature-rich option, failed to make the cut due to its high price point. Casco says: “It was like, ‘guys, we’re a start-up. How can you ask us for £1.3 million?’”

The DevOps team was keen to trial Amazon EKS, having had prior experience working with it and because the company’s entire architecture runs in AWS. At the time, however, EKS didn’t have the right functionality for the team’s needs.

Casco comments, “SUSE Rancher allows us to self-host our clusters, which is essential. This means we can make a host of changes to the cluster that we can’t in EKS.”

When trials concluded in January 2020, TrueLayer selected SUSE Rancher. There were two crucial reasons for this:

- » **SUSE Rancher is 100 percent open-source — of significant importance to the team.** Being completely open means TrueLayer can use any mix of technology, side-by-side, on the same platform. It also means the team can switch out solutions and make changes in a contractive and controlled way, as the market and technical innovation evolves. The ability to flex with market changes, in a heterogeneous way, made SUSE Rancher a game-changer.
- » Casco saw value in the burgeoning community sitting behind the platform, which gives him access to insight and best practices, as well as a faster route to resolve issues. Having a groundswell of cross-sector advice and access to existing knowledge was a major differentiator in the eyes of Casco and his team.

# Understanding the problems TrueLayer is solving

With open banking changing the face of financial services and payments, TrueLayer's DevOps team needed a central management process.

## Preparing for an open banking future

A relatively new phenomenon, open banking is beginning to take its rightful place in the financial services mix. A recent report conducted by TrueLayer and YouGov showed that although debit and credit cards remain the most popular ways to pay (50 percent of purchases over £200), digital wallets such as Apple Pay, Google Pay, and PayPal are fast becoming the norm.

In a recent article, Francesco Simoneschi, TrueLayer's CEO, wrote, "The problem is cards, which weren't designed for online and have been retrofitted into current online payment flows. Newer digital approaches, such as Google Pay or Apple Pay, paper over those cracks but don't change the fundamentals."

Casco claims open APIs are the answer. "Many banks face unpicking decades of processes that can't easily be accessed. Open APIs might seem alien to some traditional banks, but they hold the secret to the kind of frictionless banking customers want."

Open banking relies on open APIs able to interface with myriad personal data locked in bank accounts that vary wildly in nature and location. In creating its open banking platform, TrueLayer knew it must underpin it with technologies that matched this philosophy. Only by creating an open, API-centric architecture could TrueLayer accelerate its vision.

Like TrueLayer, SUSE Rancher is an API-first product. Everything Casco can do via SUSE Rancher's central UI can also be done via the RESTful API. This opens endless possibilities for programmatically interacting with TrueLayer's clusters, from provisioning hosts, to installing Kubernetes, to deploying workloads via kubectl, to controlling applications launched via the Application Catalog.

## Bringing control to a growing Kubernetes infrastructure

With automation a major benefit, the SUSE Rancher platform has revolutionized how TrueLayer's DevOps team operates. In SUSE Rancher, the team manages its five Kubernetes clusters in a vastly more efficient way. Compared to working with raw Kubernetes, the team can now automate what used to be laborious, hands-on processes, creating major resource savings and more time to innovate. Maintenance time has been dramatically improved; the team now resolves cluster issues 40 percent faster than before, while SUSE Rancher's support team is on hand to streamline the process.

Casco says, "Making changes could be hit-and-miss in the old methodology. Many scripts couldn't be tested properly; in a sense we had to shoot and hope for the best. With automation, this is much easier, and far more predictable, which has radically simplified the management process."

This, in turn, creates a seamless experience for the company's rapidly expanding list of customers. An increase in development velocity is clear evidence of this. SUSE Rancher allows TrueLayer to deploy improvements and new products more rapidly, as well as to upgrade to the latest version of Kubernetes much more easily than before. As a result, the company can stay on top of security and compliance regulations, critical for a start-up in the fintech space.

"If a new version comes out tomorrow, we know SUSE Rancher will test and release it in a very short timeframe, which was something we couldn't count on with other solutions," Casco concludes.

## Enabling a multi-cloud future

As a company built on open-source, flexibility was key for TrueLayer. Unlike many other Kubernetes management platforms, SUSE Rancher is 100 percent open-source, which allows the start-up to have full control over its clusters, while knowing it has the support of SUSE Rancher behind it. With this in mind, the company has started looking forward to how its cloud architecture will evolve.

Although all its systems are currently hosted on AWS, TrueLayer is planning to shift to a multi-cloud strategy to capitalize on specific clouds for particular needs. SUSE Rancher recognizes that forward-thinking organizations are looking to diversify their cloud operators, which is why the platform has been built to enable customers to deploy on multiple environments.

SUSE Rancher is designed to support hybrid and multi-cloud environments. The SUSE Rancher team has long recognized the need for organizations to manage multiple Kubernetes clusters across different public clouds and private data centers. Rancher 2.0 was built to work with all Kubernetes clusters. SUSE Rancher 2.6 brings full life-cycle management of Azure Kubernetes Service (AKS) and Google Kubernetes Engine (GKE), adding to existing support for Amazon EKS.

Full life-cycle management on all major hyperscalers enables customers to take advantage of the unique benefits of each public cloud's Kubernetes service, while leveraging the consistent management, advanced features, and automation provided by SUSE Rancher.

The benefits include the following:

- » Forty percent reduction in cluster maintenance time
- » Developers freed from manual processes
- » Faster update cycle

## What's next for TrueLayer?

Plotting its multi-cloud strategy isn't all that's on TrueLayer's road map. As the open banking industry expands, so will TrueLayer — the company is already planning to expand internationally in Europe and Asia. With SUSE Rancher, this is no longer a daunting proposition for TrueLayer — the manual processes of old would've made this a difficult, time-consuming task. But SUSE Rancher will allow Casco and the team to expand services at a moment's notice, anywhere in the world.



## IN THIS CHAPTER

- » Downloading Rancher products
- » Exploring the Rancher documentation and other training resources
- » Joining the Rancher community via Slack and YouTube
- » Earning Rancher and Kubernetes certification
- » Scheduling a demo with a Rancher and Kubernetes expert

# Chapter **4**

## Ten Ways to Get Started with Kubernetes and Rancher

**S**USE, which acquired Rancher Labs in 2020, provides plenty of resources to help you get started with Kubernetes and Rancher. This chapter highlights the resources available via Rancher's website and beyond, including the SUSE & Rancher Community, Rancher Slack, Rancher's YouTube channel, and free Cloud Native Computing Foundation (CNCF) webinars. SUSE also provides training and certification opportunities. The last section of this chapter explains how to arrange for a demo with a Rancher and Kubernetes expert.

## Read the Rancher Documentation

Great open-source projects have great technical documentation, and Rancher is no different. The Rancher docs site is free for everyone to access and covers everything from Rancher 2.x to Rancher Kubernetes Engine (RKE) and K3s. Get started at <https://rancher.com/docs>.

## Download and Install Rancher

To install Rancher in any Kubernetes cluster, follow the Rancher quick-start guide at <https://rancher.com/quick-start>.

After installing Rancher, you can access the Rancher user interface (UI) by opening a browser and going to the hostname or address where you installed Rancher. The UI will guide you through setting up your first cluster.

## Download and Install K3s

Advanced users may want to deploy a lightweight Kubernetes distribution on low-resource hardware. Rancher Labs pioneered the development of K3s for this purpose. K3s was donated to the CNCF in August 2020. To install K3s, follow the simple quick-start guide at <https://k3s.io> or read the technical documentation at <https://rancher.com/docs/k3s/latest/en>.

## Install Longhorn Using Rancher

Storage shouldn't be complicated; with Longhorn, it's not. Longhorn gives your teams a reliable, simple, and easy-to-operate persistent storage solution for any Kubernetes cluster. Deployed with a single click from the Rancher application catalog, Longhorn provides you the ability to secure, provision, and back up your storage across any Kubernetes cluster.



Like K3s, Longhorn started life as a Rancher Labs project but was donated to the CNCF in October 2019. To find out more about Longhorn, visit <https://longhorn.io> or read the Longhorn technical documentation at <https://longhorn.io/docs>.

## Join the Rancher Users Slack Community

Join the Rancher Users Slack at <https://slack.rancher.io> to ask questions and learn from other community members, share your experiences using Rancher, and stay up to date on future events and training sessions.

## Check Out the Rancher YouTube Channel

If you're starting out and you don't have much time to read documentation, check out Rancher's huge library of recorded meetups, Master Classes, Office Hours videos, and introductory training on Rancher's YouTube channel at [www.youtube.com/c/rancher](http://www.youtube.com/c/rancher).

## Join the Rancher Community

The Rancher Community can help you develop the practical skills and knowledge you need to deliver cloud-native applications confidently. This global, diverse community of aspiring and accomplished cloud-native practitioners — including application developers and testers, release and DevOps engineers, and application and infrastructure operators — is eager to learn but doesn't have time to waste.

The Rancher Community is home to Academy classes such as “Up and Running: Rancher” and “Up and Running: K3s,” as well as introductory classes on Kubernetes, Rancher, Kubernetes security, and more. Sign up for this free community at [www.suse.com/community](http://www.suse.com/community).

# Sign Up for a Cloud Native Computing Foundation Webinar

The CNCF regularly runs free webinars covering the following topics:

- » Application and development
- » Continuous integration/continuous delivery (CI/CD)
- » Customizing and extending Kubernetes
- » Machine learning and data
- » Observability
- » Security identity and policy
- » Serverless
- » Service mesh
- » Storage

Sign up for the next CNCF webinar at [www.cncf.io/online-programs](http://www.cncf.io/online-programs).

## Attend a Rancher Rodeo

Rancher Rodeos are free, in-depth online workshops designed to give DevOps and IT teams the hands-on skills they need to deploy and manage Kubernetes everywhere.

During these virtual hands-on workshops, Rancher's technical experts introduce Rancher, Docker, and Kubernetes and walk through the steps for deploying a Kubernetes cluster.

Sign up for a Rancher Rodeo at [www.suse.com/events](http://www.suse.com/events).

## Schedule a Demo

Discuss your requirements with a Rancher and Kubernetes expert by completing the online form at <https://rancher.com/request-a-demo>.

# Compare the market-leading Kubernetes management platforms, including Rancher

Forward-thinking organizations are adopting platforms like Rancher to help streamline the deployment and management of their Kubernetes clusters.

In this latest Buyer's Guide, we compare Rancher with the three competitive Kubernetes management platforms: Red Hat OpenShift, VMware Tanzu and Google Anthos.

Some of the capabilities we review include:

- Ease of install, configuration and maintenance
- Multi-cloud and multi-cluster support
- Security policy and user management
- Storage and edge support



DOWNLOAD THIS FREE GUIDE AT: [RANCHER.COM/BUYERSGUIDE](https://rancher.com/buyersguide)

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# Build an enterprise-grade Kubernetes environment

As enterprise applications become more complex, development and operations teams need a tool to orchestrate that complexity. Kubernetes is that tool, allowing enterprises to deploy, scale, and manage containerized applications anywhere. But aligning your business to take full advantage of Kubernetes requires careful consideration. This handy guide walks you through that process, from evaluating where your company stands now, to what to look for when selecting a Kubernetes management platform, to real-world examples of how Kubernetes can drive innovation from core to cloud to edge.

## Inside...

- Assess your progress on the Kubernetes journey
- Identify the best Kubernetes management platform for your use case
- Learn from real-world examples of what other companies have done
- Understand how Rancher can help you become more agile and competitive



**Tom Callway** is Senior Director of Product Marketing. **Peter Smails** is Senior Vice President and Chief Marketing Officer.

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