



SUSE Rancher - Getting Started

SUSE Linux Enterprise Micro 5.0, SUSE Rancher 2.5.8

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The purpose of this document is to provide an overview and procedure of implementing SUSE (R) offerings for SUSE Rancher, as a multi-cluster container management platform for organizations that deploy containerized workloads, orchestrated by Kubernetes. SUSE Rancher makes it easy to deploy, manage, and use Kubernetes everywhere, meet IT requirements, and empower DevOps teams.

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1 Introduction

On the digital transformation journey to a full cloud native landscape, utilization of microservices becomes the main approach with the dominant technology for such container orchestration being Kubernetes¹ With its large community of developers and abundant features and capabilities, Kubernetes has become the defacto standard and is included across most container-as-a-service platforms. With all of these technologies in place, both developer and operation teams can effectively deploy, manage and deliver functionality to their end users in a resilient and agile manner.

1.1 Motivation

While any developer or organization may simply start with a single, Kubernetes-based deployment, it is very common for that number of cluster instances to rapidly grow. While each of these may have specific focus areas, it becomes imperative to figure out how to use, manage, maintain and replicate all of these instances over time.

This is where SUSE Rancher leads the industry, being able to manage access, usage, infrastructure and applications across clusters, that are Cloud Native Computing Foundation (CNCF²) conformant³, anywhere across edge, on-premise data centers, or cloud service providers. SUSE Rancher optimizes creating and managing Kubernetes clusters like:

- Lightweight edge-centric K3s (<https://rancher.com/products/k3s/>)⁴
- Rancher Kubernetes Engine (RKE (<https://rancher.com/products/rke/>)⁴)
- and other Kubernetes clusters that are based upon CNCF certified⁴ Kubernetes distributions or installers

and deployed across various [supported](https://rancher.com/support-maintenance-terms) ⁴ infrastructure elements.

¹ <https://kubernetes.io/>

² <https://www.cncf.io/>

³ <https://www.cncf.io/certification/software-conformance>

⁴ <https://www.cncf.io/certification/cka/>

1.2 Scope

The scope of this document is to provide a simplified, *getting started* approach for SUSE Rancher. This can be done in a variety of solution layered stacks, to become a fundamental component of a managing multiple Kubernetes ecosystems.

1.3 Audience

This document is intended for IT decision makers, architects, system administrators and technicians who are implementing a flexible, software-defined Kubernetes management platform. One should still be familiar with the traditional IT infrastructure pillars — networking, computing and storage — along with the local use cases for sizing, scaling and limitations within each pillars' environments.

2 Architectural overview

This section outlines the core elements of the SUSE Rancher solution, along with the suggested target platforms and components.

2.1 Solution architecture

The figure below illustrates the high-level architecture of the SUSE Rancher installation that manages multiple downstream Kubernetes clusters:



FIGURE 2.1: ARCHITECTURE OVERVIEW - SUSE RANCHER

Authentication Proxy

A user is authenticated via SUSE Rancher and then, if authorized, can access both the SUSE Rancher environment and the downstream clusters and workloads.

API Server

This provides the programmatic interface backend for a user, utilizing command-line interactions with SUSE Rancher and the managed clusters.

Data Store

The purpose of this service is to capture the configuration and state of SUSE Rancher and the managed clusters to aid in backup and recovery processes.

Cluster Controller

Interacting with a cluster agent on the downstream cluster, the cluster controller allows the communication path for users and services to leverage for workloads and cluster management.

Once setup, users can potentially interact with SUSE Rancher through the web-based user interface (UI), the command-line interface (CLI), and programmatically through the application programming interface (API). Depending upon the assigned roles, group membership and privileges, a user could:


- manage all clusters, users, roles, projects
- deploy new clusters, import other clusters, or remove existing ones
- manage workloads across respective or labeled clusters
- simply view clusters or workloads, or just benefit from what is running

Important

Regardless of the deployment target, SUSE Rancher should always run on a node or cluster that is separate from the downstream clusters that it manages. Running user workloads on this SUSE Rancher cluster or nodes is not advised.

To aid in planning, training or assessing functionality like in a *proof-of-concept* deployment, SUSE Rancher can be installed on a single node running a Linux operating system as described later in this document.

Tip

To improve *Availability*, the SUSE Rancher backup operator can then be used to *migrate* (<https://rancher.com/docs/rancher/v2.5/en/backups/migrating-rancher/>)  from the single node to a *production* installation on a multi-node, high-availability Kubernetes cluster.

3 Component model

This section describes the various components being used to create a SUSE Rancher solution deployment.

3.1 Component overview

By utilizing:

- Software
 - Multi-cluster Management Server - SUSE Rancher
 - Linux Operating System

one can create the necessary infrastructure and services. Further details for these components are described in the following sections.

3.2 Software - SUSE Rancher

SUSE Rancher is a complete cluster and container management platform built to reside on Kubernetes itself. It addresses these challenges by delivering the following key functions, as shown in the following figure:

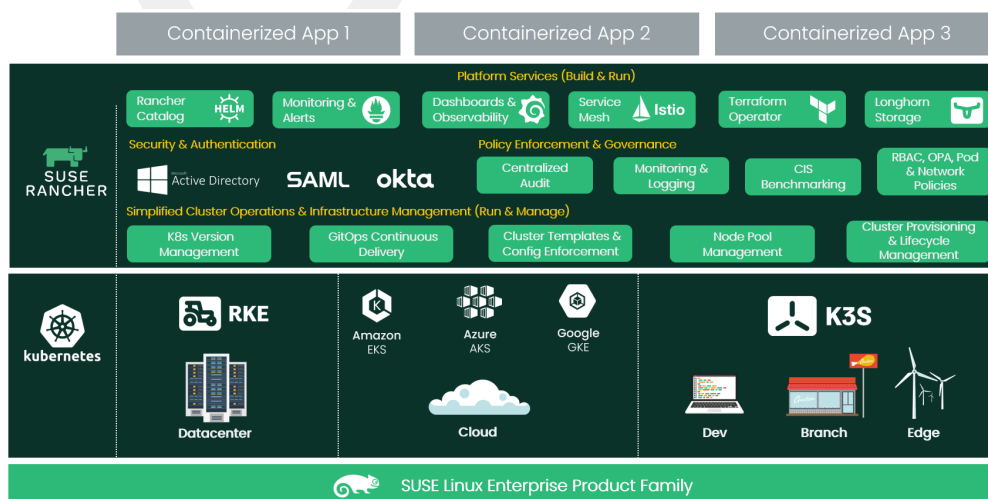


FIGURE 3.1: OVERVIEW OF SUSE RANCHER

Certified Kubernetes Distributions

SUSE Rancher supports management of any certified Kubernetes distribution. That includes:

- for development, edge, branch workloads, SUSE offerings like **K3s** (<https://rancher.com/products/k3s/>), a certified lightweight distribution of Kubernetes
- for on-premises workloads, a SUSE offering Rancher Kubernetes Engine (**RKE** (<https://rancher.com/products/rke/>), a certified Kubernetes distribution for both bare-metal and virtualized servers
- for the public cloud, hosted Kubernetes services like
 - Amazon Elastic Kubernetes Service (**EKS** ¹),
 - Azure Kubernetes Service (**AKS** ²) and
 - Google Kubernetes Engine (**GKE** ³).

Simplified Cluster Operations and Infrastructure Management

SUSE Rancher provides simple, consistent cluster operations including provisioning and templates, configuration and lifecycle version management, along with visibility and diagnostics.

Security and Authentication

SUSE Rancher incorporates and leverages various single-signon services, to automate processes and apply a consistent set of user access and security policies for all the managed clusters, no matter where they're running.

Policy Enforcement and Governance

SUSE Rancher includes audit and security guideline enforcement, monitoring and logging functions, along with user, network and workload policies distributed across all managed clusters.

¹ <https://aws.amazon.com/eks>

² <https://azure.microsoft.com/en-us/overview/kubernetes-on-azure/>

³ <https://cloud.google.com/kubernetes-engine>

Platform Services

SUSE Rancher also provides a rich catalog of services for building, deploying and scaling containerized applications, including app packaging, CI/CD, logging, monitoring and service mesh.

As SUSE Rancher can be deployed on a single node, some simple prerequisites for the underlying operating system are needed and will be described in the [Chapter 4, Deployment](#) section.

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4 Deployment

This section describes the process steps for the deployment of the SUSE Rancher solution. This simplified target stack begins as a functional *proof-of-concept*, has tips on migration towards *production*, provides *scaling* guidance and includes the base preparations required from the underlying layer.

! Important

This single-node configuration is for development and testing environments only. Since there is only one node and a single container, if the node goes down, there is no copy of the etcd data available on other nodes and you will lose all the data of your Rancher server.

4.1 Deployment overview

The deployment stack is represented in the following figure:



FIGURE 4.1: SUSE RANCHER DEPLOYMENT STACK

4.2 SUSE Rancher




The underlying Linux operating system can be:

- A cloud-host virtual machine (VM)
- An on-premise VM or a bare-metal server node

Preparation(s)


To meet the solution stack prerequisites and requirements, SUSE operating system offerings, like [SUSE Linux Enterprise Micro](https://www.suse.com/products/micro/) (<https://www.suse.com/products/micro/>)  can be utilized.

1. Ensure these services are in place and configured for this node to use:

- Domain Name Service (DNS) - an external network-accessible service to map IP Addresses to hostnames
- Network Time Protocol (NTP) - an external network-accessible service to obtain and synchronize system times to aid in timestamp consistency
- Software Update Service - access to a network-based repository for software update packages. This can be accessed directly from each node via registration to
 - the general, internet-based [SUSE Customer Center](https://scc.suse.com/login) (<https://scc.suse.com/login>)  (SCC) or
 - an organization's [SUSE Manager](https://www.suse.com/products/suse-manager/) (<https://www.suse.com/products/suse-manager/>)  infrastructure or
 - a local server running an instance of [Repository Mirroring Tool](https://documentation.suse.com/sles/15-SP2/single-html/SLES-rmt/#book-rmt) (<https://documentation.suse.com/sles/15-SP2/single-html/SLES-rmt/#book-rmt>)  (RMT)



Note

During the node's installation, it can be pointed to the respective update service. This can also be accomplished post-installation with the command-line tool named [SUSEConnect](https://www.suse.com/support/kb/doc/?id=000018564) (<https://www.suse.com/support/kb/doc/?id=000018564>) .

2. On the target node with a default installation of SUSE Linux Enterprise Micro operating system, log into the node either as root or as a user with sudo privileges and enable the required container runtime engine

```
sudo transactional-update pkg install docker
sudo reboot
```

```
sudo systemctl enable --now docker.service
```

- Then validate the container runtime engine is working

```
sudo systemctl status docker.service  
sudo docker ps --all
```

Deployment Process

While logged into the node, as root or with sudo privileges, install SUSE Rancher:

1. Run the following installation command

```
sudo docker run -d --restart=unless-stopped -p 80:80 -p 443:443 --privileged  
rancher/rancher
```



Tip

This process deploys an auto-generated, self-signed security certificate for the SUSE Rancher service. Other *Security* certificate authority options are described in the "Install/Upgrade Rancher on a Kubernetes Cluster" in the SUSE Rancher *product documentation* (<https://rancher.com/docs/rancher/v2.x/en/>) .


2. Once the previous command completes, from a client system connect via a web browser to the SUSE Rancher node via **IPAddress** or **HostName** and accept the service certificate (if deemed valid).

- Enter a new admin password



Important

On the second configuration page, also ensure the "Server URL" is set to the **IPAddress** or **HostName** of this deployed SUSE Rancher node.

After this successful deployment of the SUSE Rancher solution, review the *product documentation* (<https://rancher.com/docs/rancher/v2.x/en/>)  for details on how downstream Kubernetes clusters can be:

- deployed (refer to sub-section "Setting up Kubernetes Clusters in Rancher") or
- imported (refer to sub-section "Importing Existing Clusters"), then

- managed (refer to sub-section "Cluster Administration") and
- accessed (refer to sub-section "Cluster Access") to address orchestration of workload, maintaining security and many more functions are readily available.

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5 Summary

Using components and offerings from SUSE and the Rancher portfolio streamlines the ability to quickly and effectively engage in a digital transformation, taking advantage of cloud native resources and disciplines. Using such technology approaches lets you deploy and leverage transformations of infrastructure into a durable, reliable enterprise-grade environment.

Simplify

Simplify and optimize your existing IT environments

- Using SUSE Rancher enables you to simplify Kubernetes cluster deployment and management of the the infrastructure components.

Modernize

Bring applications and data into modern computing

- With SUSE Rancher, the digital transformation to containerized applications can extended, in a distributed computing context, to benefit from the ability both to manage many target clusters, for each of the respective user bases and to facilitate the actual workload deployments.

Accelerate

Accelerate business transformation through the power of open source software

- Given the open source nature of SUSE Rancher and the underlying software components, you can simplify management and make significant IT savings as you scale orchestrated, microservice deployments anywhere you need to and for whatever use cases are needed in an agile and innovative way.

6 References

WHITE PAPERS

- A Buyer's Guide to Enterprise Kubernetes Management Platforms - <https://info.rancher.com/enterprise-kubernetes-management-buyers-guide>
- How to Build an Enterprise Kubernetes Strategy - <https://info.rancher.com/how-to-build-enterprise-kubernetes-strategy>

BOOKS







- Kubernetes Management - <https://info.rancher.com/kubernetes-management-for-dummies-rancher-and-suse-0-0>

TRAINING

- SUSE - <https://training.suse.com/>
- Rancher - <https://rancher.com/training/>

WEBSITES

- SUSE - <https://www.suse.com>
- SUSE Customer Center (SCC) - <https://scc.suse.com/login>
- Products
 - SUSE Rancher - <https://rancher.com/products/rancher/> (documentation (<https://rancher.com/docs/rancher/v2.x/en/>))
 - Rancher Kubernetes Engine (RKE) - <https://rancher.com/products/rke/> (documentation (<https://rancher.com/docs/rke/latest/en/>))
 - K3s - <https://rancher.com/products/k3s/> (documentation (<https://rancher.com/docs/k3s/latest/en/>))
 - SUSE Linux Enterprise Micro (SLEMicro) - <https://www.suse.com/products/micro/> (documentation (<https://documentation.suse.com/sle-micro/5.0/>))
 - SUSE Linux Enterprise Server (SLES) - <https://www.suse.com/products/server/> (documentation (<https://documentation.suse.com/sles/15-SP2/>))

- SUSE Manager - <https://www.suse.com/products/suse-manager/>  (documentation (<https://documentation.suse.com/suma/4.1/>) )
- SUSE Repository Mirroring Tool (RMT) - <https://www.suse.com/products/server/>  (documentation (<https://documentation.suse.com/sles/15-SP2/single-html/SLES-rmt/#book-rmt>) )
- Projects
 - Rancher Kubernetes Engine Government (RKE2) - <https://github.com/rancher/rke2>  (documentation (<https://docs.rke2.io/>) )

Glossary

- Document Scope

Getting Started

A guide with the basic steps to quickly and simply deploy the one layer of the referenced component of the SUSE portfolio, with generalized pointers to other required dependency elements.

Reference Architectures ¹

A guide with the general steps to deploy and validate the structured solution components from both the SUSE and partner portfolios. This provides a shareable template of consistency for consumers to leverage for similar production ready solutions, including design considerations, implementation suggestions and best practices.

Best Practice

Information that can overlap both the SUSE and partner space. It can either be provided as a standalone guide that provides reliable technical information not covered in other product documentation, based on real-life installation and implementation experiences from subject matter experts or complementary, embedded sections within any of the above documentation types describing considerations and possible steps forward.

- Factor(s)

¹ link: [Reference Architecture \(https://en.wikipedia.org/wiki/Reference_architecture\)](https://en.wikipedia.org/wiki/Reference_architecture) 

Availability²

The probability that an item operates satisfactorily, without failures or downtimes, under stated conditions as a function of its reliability, redundancy and maintainability attributes. Some major objectives to achieve a desired service level objectives are:

- Preventing or reducing the likelihood and frequency of failures via design decisions within the allowed cost of ownership
- Correcting or coping with possible component failures via resiliency, automated failover and disaster-recovery processes
- Estimating and analyzing current conditions to prevent unexpected failures via predictive maintenance

Security³

Security is about ensuring freedom from or resilience against potential harm, including protection from destructive or hostile forces. To minimize risks, one must manage governance to avoid tampering, maintain access controls to prevent unauthorized usage and integrate layers of defense, reporting and recovery tactics.

- Deployment Flavor(s)

Proof-of-Concept⁴

A partial or nearly complete prototype constructed to demonstrate functionality and feasibility for verifying specific aspects or concepts under consideration. This is often a starting point when evaluating a new, transitional technology. Sometimes it starts as a Minimum Viable Product (MVP⁵) that has just enough features to satisfy an initial set of requests. After such insights and feedback are obtained and potentially addressed, redeployments may be utilized to iteratively branch into other realms or to incorporate other known working functionality.

² link: Availability (https://en.wikipedia.org/wiki/Minimum_viable_product) 

³ link: Security (<https://en.wikipedia.org/wiki/Security>) 

⁴ link: Proof of Concept (https://en.wikipedia.org/wiki/Proof_of_concept) 

⁵ link: Minimum Viable Product (https://en.wikipedia.org/wiki/Minimum_viable_product) 

Production

A deployed environment that target customers or users can interact with and rely upon to meet their needs, plus be operationally sustainable in terms of resource utilization and economic constraints.

Scaling

The flexibility of a system environment to either vertically scale-up, horizontally scale-out or conversely scale-down by adding or subtracting resources as needed. Attributes like capacity and performance are often the primary requirements to address, while still maintaining functional consistency and reliability.

A Appendix

The following sections provide a bill of materials listing for each component layer.

A.1 Compute Platform Bill of Materials

| Role | Qty | SKU | Component | Notes |
|--------|-----|-----|--|--|
| System | 1 | n/a | <ul style="list-style-type: none">• Virtual Machine,• Single Board Computer (SBC) or• Industry Standard Server | <p>Configuration</p> <ul style="list-style-type: none">• see installation resource requirements (https://rancher.com/docs/rancher/v2.x/en/installation/requirements/#hard- |

| Role | Qty | SKU | Component | Notes |
|------|-----|-----|-----------|--|
| | | | | ware-re- quire- ments) ↗ |

A.2 Software Bill of Materials

| Role | Qty | SKU | Component | Notes |
|-----------------------|-----|------------|---|--|
| Operating System | 1 | 874-007864 | SUSE Linux Enterprise Micro, <ul style="list-style-type: none"> • x86_64, • Priority Subscription, • 1 Year | Configuration: <ul style="list-style-type: none"> • per node (up to 16 cores, stackable) |
| Kubernetes Management | 1 | R-0001-PS1 | SUSE Rancher, | Configuration: <ul style="list-style-type: none"> • per instance, includes up to 3 |

| Role | Qty | SKU | Component | Notes |
|-------------------------|-----|------------|---|--|
| | | | <ul style="list-style-type: none"> • x86-64, • Priority Subscription, • 1 Year | Kubernetes nodes |
| Consulting and Training | 1 | R-0001-QSO | Rancher Quick Start, <ul style="list-style-type: none"> • Go Live Services | Terms: <ul style="list-style-type: none"> • Review of client architecture • Bi-weekly cadence calls for 12 weeks • On-demand consulting (24 hours) • Two developer workshops |



Note

For the software components, other durations of support terms are also available.

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```
Availability=1@ FCTR=1@ FLVR=1@ GS=1@ PoC=1@ Production=1@ Scaling=1@ Security=1@  
focusRancher=1@ layerSLEMicro=1@ Appendix=1 Arch0v=1 BP=1 BPBV=1 CompMod=1  
DepConsiderations=1 Deployment=1 GFDL=1 Glossary=1 HWComp=1 HWDepCfg=1 LN=1 RA=1  
References=1 Requirements=1 SWComp=1 SWDepCfg=1 env-daps=1 iK3s=1 iRKE1=1 iRKE2=1 iRMT=1  
iRancher=1 iSLEMicro=1 iSLES=1 iSUMa=1
```

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