

Reference Configuration- SUSE Rancher



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Draft

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Preface

The purpose of this document is to provide an overview and procedure for implementing SUSE Rancher (<https://rancher.com/products/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.

Draft

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 Kubernetes ¹ 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 the 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 (CNCF ²) compliant, anywhere across edge, on-premise data centers, or cloud service providers. SUSE Rancher optimizes creating and managing Kubernetes clusters like:

- Rancher Kubernetes Engine (RKE (<https://rancher.com/products/rke/>) ³)
- Lightweight edge-centric K3s (<https://rancher.com/products/k3s/>) ⁴
- other Kubernetes clusters that are based upon CNCF ³ certified ⁴ Kubernetes distributions or installers

and deployed across various supported ⁵ infrastructure elements.

Once on the digital transformation journey with SUSE Rancher, some of the next focus areas are:

- Workloads

¹ <https://kubernetes.io/> ³

² <https://www.cncf.io/certification/software-conformance> ⁴

³ <https://www.cncf.io/> ⁵

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

⁵ <https://rancher.com/support-maintenance-terms/all-supported-versions/rancher-v2.5.7/> ⁶

- Determine how to launch either internally developed containerized, microservice workloads or leverage offerings from Independent Software Vendors (ISV).
- Compute Platform
 - To optimize availability, performance, scalability and integrity, assess current system platforms or acquire and utilize new variations from:
 - Independent Hardware Vendors (IHV) for physical, baremetal, hypervisors and virtual machines
 - Cloud Service Providers (CSP), which can also include baremetal, virtual machines plus hosted Kubernetes services

1.2 Scope

The scope of this document is to provide a [reference configuration \(\)](#) of SUSE Rancher. This can be done in a variety of solution stack, architectural scenarios as a fundamental component of a managing overall 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. You should 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 Business aspect

By unifying IT operations with Kubernetes, organizations realize key benefits like increased reliability, improved security and greater efficiencies with standardized automation. Therefore, Kubernetes management platforms are adopted by enterprises to deliver:

Cluster Operations

Improved DevOps efficiencies with simplified cluster usage and operations

Security Policy & User Management

Consistent security policy enforcement plus advanced user management on any Kubernetes infrastructure

Access to Shared Tools & Services

A high level of reliability with easy, consistent access to a broad set of tools and services

2.1 Business problem

Many organizations are deploying Kubernetes clusters everywhere – in the cloud, on-premises, and at the edge - to unify IT operations. Such organizations can realize dramatic benefits, including:

- Consistently deliver a high level of reliability on any infrastructure
- Improve DevOps efficiency with standardized automation
- Ensure enforcement of security policies on any infrastructure

However, simply relying on upstream Kubernetes alone can introduce overhead and risk because Kubernetes clusters are typically deployed:

- Without central visibility
- Without consistent security policies
- And must be managed independently

Deploying a scalable kubernetes requires consideration of a large ecosystem, encompassing many software and infrastructure components and providers. Further, the ability to continually address the needs and concerns of:

Developers

For those who just focus on writing code to build their apps securely using a preferred workflow, providing a simple, push-button deployment mechanism of their containerized workloads where needed.

IT Operators

General infrastructure requirements still rely upon traditional IT pillars are for the stacked, underlying infrastructure. Ease of deployment, availability, scalability, resiliency, performance, security and integrity are still core concerns to be addressed for administrative control and observability.

Beyond just the core infrastructure software layers of managed Kubernetes clusters, organizations may be also be impacted by:

Workloads

Scaling, lifecycle management, consistency of the distributed deployment of services and applications

Compute Platform

Potential inconsistencies and impacts of multiple target system platforms for the distributed deployments of the cluster elements, across:

- physical, baremetal, hypervisors and virtual machines
- pay-as-you-go, bring-your-own, or hosted Kubernetes services

2.2 Business value

By allowing operation teams to focus on infrastructure and developers to deploy code the way they want too, SUSE and the Rancher offerings helps bring products to market faster and accelerate an organization's digital transformation.

SUSE Rancher is a fundamental part of the complete software stack for teams adopting containers. It provides DevOps teams with integrated tools for running containerized workloads while also addressing the operational and security challenges of managing multiple Kubernetes clusters across any targetedd infrastructure.

Developers

SUSE Rancher makes it easy for you to securely deploy containerized applications no matter where your Kubernetes infrastructure runs -- in the cloud, on-premises, or at the edge. Using Helm or the App Catalog to deploy and manage applications across any or all these environments, ensuring multi-cluster consistency with a single deployment process.

IT Operators

SUSE Rancher not only deploys and manages production-grade Kubernetes clusters from datacenter to cloud to the edge, it also unites them with centralized authentication, access control and observability. Further, it streamlines cluster deployment on bare metal or virtual machines and maintains them using defined security policies.

With this increased consistency of the managed Kubernetes infrastructure clusters, organizations benefit from an even higher level of the Cloud Native Computing model where each layer only relies upon the API and version of the adjacent layer. For example:

Workloads

Each managed cluster has defined access control and a designated Kubernetes version, so deployment containerized services can easily be scaled to other compatible clusters

Compute Platform

Utilizing the above software application and technology solutions with the server platforms offered by Hewlett Packard Enterprise ([HPE \(https://www.hpe.com/us/en/home.html\)](https://www.hpe.com/us/en/home.html)) provides many alternative for scale, cost-effectiveness and performance options that could align with local IT staff platform preferences:

- density-optimized - high performance and efficiency for big data and the most demanding workloads
- mission-critical - systems of intelligence to fuel your digital transformation in a world where time and data are the new currency and business continuity is expected
- composable - fully adaptable and ready for Hybrid-IT to future-proof your data center for today's workloads and tomorrow's disruptors
- IoT - realize the potential of the Internet of Things to provide compute at the network edge
- cloud - high-capacity, mass-compute open infrastructure with security and software to match
- and virtualized use cases.

3 Architectural overview

This section outlines the overall elements of the SUSE Rancher solution, along with the suggested target platforms and then how it can be used.

3.1 Solution architecture

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

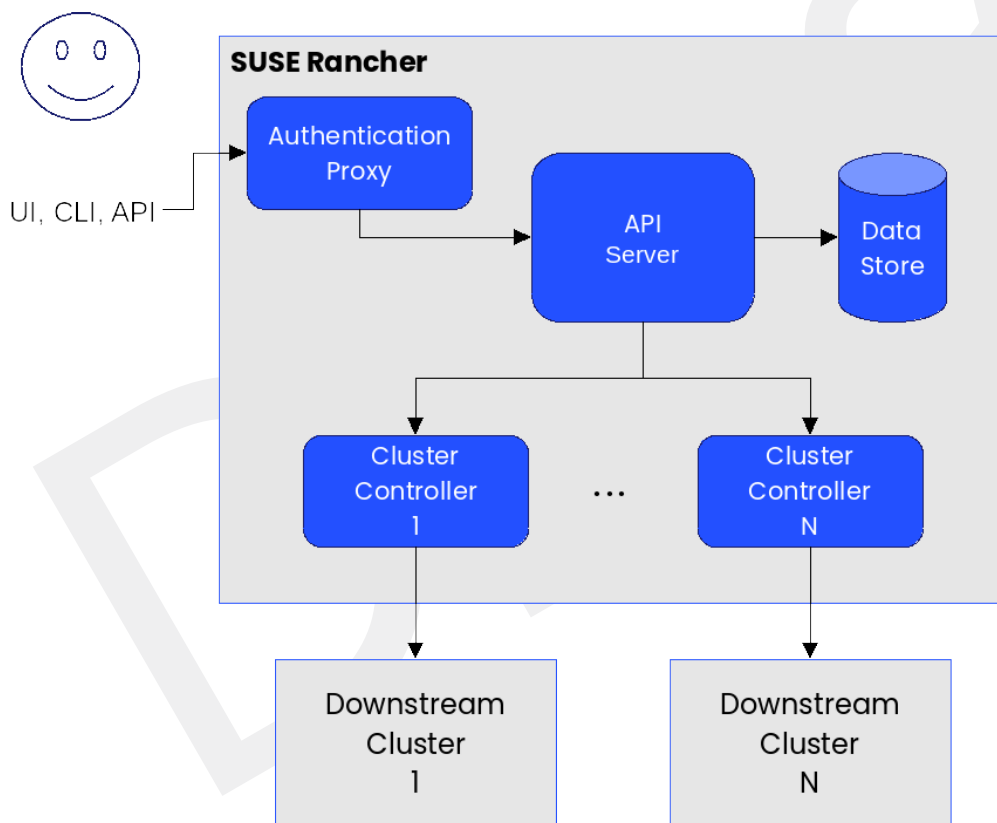


FIGURE 3.1: ARCHITECTURE OVERVIEW - SUSE RANCHER

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 user, 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

For the best performance and security, the recommended deployment is a dedicated Kubernetes cluster for the Rancher management server. Running user workloads on this cluster is not advised. After deploying Rancher, you can create or import clusters for running your workloads.



Note

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 cluster is not advised.

4 Component model

This section describes the various components being used to create a SUSE Rancher deployment, in the perspective of top to bottom ordering. Once completed, the SUSE Rancher instance enables the management of multiple Kubernetes clusters, as shown in the following figure:

4.1 Component overview

By utilizing:

- Multi-cluster Management Server - SUSE Rancher
- Kubernetes Platform - K3s
- Operating System - SUSE Linux Enterprise Micro
- Compute Platform

one can create the necessary infrastructure and services to administer and manage multiple Kubernetes clusters. Further details for these components are described in the following sections.

4.1.1 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:

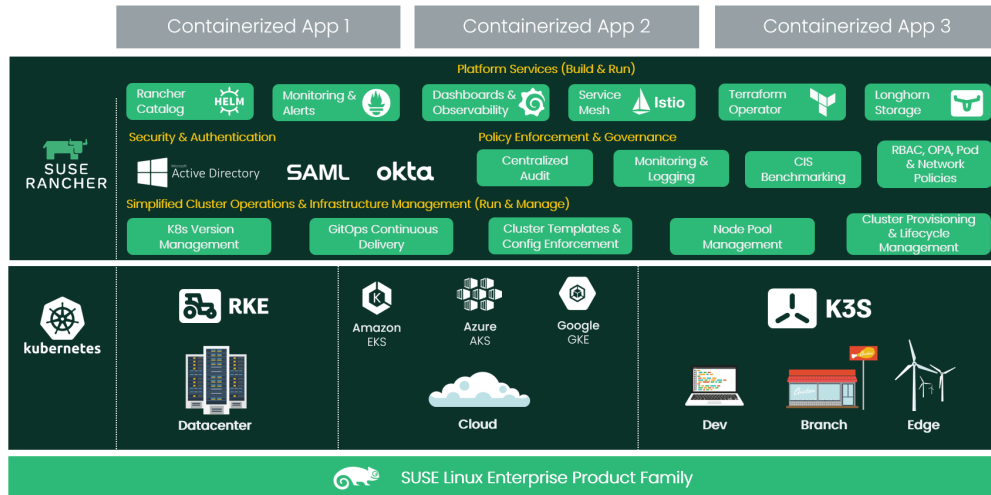


FIGURE 4.1: OVERVIEW OF SUSE RANCHER

Certified Kubernetes Distributions

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

- 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)
- for edge, branch and desktop workloads, SUSE offerings like K3s (<https://rancher.com/products/k3s/>), a certified lightweight distribution of Kubernetes.

¹ <https://aws.amazon.com/eks>

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

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

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.

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 relies upon being deployed on a Kubernetes platform, the next section describes such a suggested component layer.

4.1.2 Software - K3s

K3s is packaged as a single binary, which is about 50 megabytes in size. Bundled in that single binary is everything needed to run Kubernetes anywhere, including low-powered IoT and Edge-based devices. The binary includes:

- the container runtime
- any important host utilities like

- iptables, socat and du.

The only OS dependencies are the Linux kernel itself and a proper dev, proc and sysfs mounts (this is done automatically on all modern Linux distributions). K3s bundles the Kubernetes components:

- kube-apiserver,
- kube-controller-manager,
- kube-scheduler,
- kubelet and
- kube-proxy

into combined processes that are presented as a simple server and agent model, as represented in the following figure:



FIGURE 4.2: OVERVIEW OF K3S

K3s can run as a complete cluster on a single node or can be expanded into a multi-node cluster. Besides the core Kubernetes components, we also run

- containerd,
- Flannel,
- CoreDNS,
- ingress controller and
- a simple host port-based service load balancer.

All of these components are optional and can be swapped out for your implementation of choice. With these included components, you get a fully functional and CNCF-conformant cluster so you can start running apps right away. K3s is now a CNCF Sandbox project, being the first Kubernetes distribution ever to be adopted into sandbox.

Learn more information about K3s at <https://k3s.io> 

Given that K3s relies upon being deployed on a Linux operating system, the next section describes that target component layer.

4.1.3 Software - SUSE Linux Enterprise Micro

SUSE Linux Enterprise Micro combines the assurance of enterprise-grade security and compliance with the immutability and portability of a modern, lightweight operating system. The top 4 features are:

Immutable OS

Immutable design ensures the OS is not altered during runtime and runs reliably every single time. Security signed and verified transactional updates are easy to rollback if things go wrong.

Security and Compliance

Fully open source and built using open standards, SUSE Linux Enterprise Micro leverages SUSE Linux Enterprise common code base, to provide FIPS 140-2, DISA SRG/STIG, integration with CIS and Common Criteria certified configurations. Includes fully supported security framework (SELinux) with policies.

Architectural Flexibility

Both Arm and x86-64 architectures are supported so you can deploy edge applications with confidence across multiple architectures.

Kubernetes-Ready

You can easily combine SUSE Linux Enterprise Micro with the latest cloud-native technologies including SUSE Rancher, Rancher Kubernetes Engine, Longhorn persistent block storage, and K3s, the world's most popular Kubernetes distribution for use in low resource, distributed edge locations.

As a result, you get an ultra-reliable infrastructure platform that is also simple to use and comes out-of-the-box with best-in-class compliance. Furthermore, SUSE's flexible subscription model ensures enterprise assurance for any edge, embedded or IoT deployment without vendor lock-

in. A free, evaluation copy can be [downloaded \(https://www.suse.com/download/sle-micro/\)](https://www.suse.com/download/sle-micro/) or if the organization already has subscriptions, both install media and updates can be obtained from [SUSE Customer Center \(https://scc.suse.com/login\)](https://scc.suse.com/login).

With the flexibility of SUSE Linux Enterprise Micro, multiple compute platform variants can be considered, as outlined in the next section.

4.1.4 Compute Platform Options

Leveraging the enterprise grade functionality of the operating system mentioned in the previous section, many compute platforms can be the foundation of the deployment:



Note

[HPE Servers Support & OS Certification Matrices \(https://techlibrary.hpe.com/us/en/enterprise/servers/supportmatrix/suse_linux.aspx\)](https://techlibrary.hpe.com/us/en/enterprise/servers/supportmatrix/suse_linux.aspx) outlines the minimum version of SLE required for installation, yet later service pack releases may also be used.



Tip

Any [SUSE YES \(https://www.suse.com/yessearch/\)](https://www.suse.com/yessearch/) certified platform can be used for the nodes of this deployment, as long as the certification refers to the major version of the underlying SUSE operating system required by its release.

Server product-line and model options abound in the [HPE portfolio \(https://www.hpe.com/uk/en/servers.html\)](https://www.hpe.com/uk/en/servers.html), including:


HPE Synergy Servers

HPE Synergy, the first Composable Infrastructure, empowers IT to create and deliver new value easily and continuously. This single infrastructure reduces operational complexity for traditional workloads and increases operational velocity for the new breed of applications and services. Through a single interface, HPE Synergy composes compute, storage and fabric pools into any configuration for any application. It also enables a broad range of workloads — from bare metal, to virtual machines, to containers, to operational models like hybrid cloud and DevOps. HPE Synergy enables IT to rapidly react to new business demands with the following components:

Even with the broad certification and support model across the range of available HPE platform models, the following table summarizes which might be a best-practice selection for the various deployment types and sizes (*Small*, **Medium**, *Large*, **XLarge**).



Note

HPE Servers Support & OS Certification Matrices (https://techlibrary.hpe.com/us/en/enterprise/servers/supportmatrix/suse_linux.aspx)  outlines the minimum version of SLE required for installation, yet later service pack releases may also be used.



Tip


Any SUSE YES (<https://www.suse.com/yessearch/>)  certified platform can be used for the nodes of this deployment, as long as the certification refers to the major version of the underlying SUSE operating system required by its release.

TABLE 4.1: HEWLETT PACKARD ENTERPRISE PLATFORM MATRIX FOR DEPLOYMENT TYPES

System Platform	Baremetal	Hypervisor	Virtual Machine
Synergy	SY480, SY660	SY480, SY660	



Note

A sample bill of materials, in the *Appendix A, Appendix*, cites the necessary quantities of all components, along with a reference to the minimum resource requirements needed by the software components.

5 Deployment

This section describes the process steps to deploy each of the components needed to create the SUSE Rancher solution. The content ordering is listed from the bottom layer upto the top.

5.1 Deployment overview

The deployment stack is represented in the following figure:

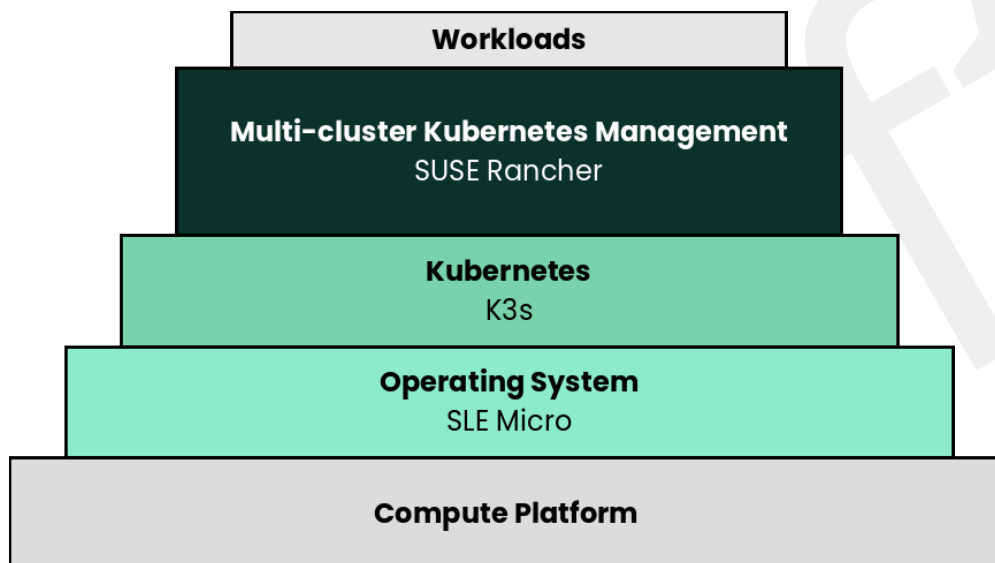


FIGURE 5.1: SUSE RANCHER DEPLOYMENT STACK

and details are covered in the following sections.

5.1.1 Compute platform deployment configuration

FixMe

The sample configuration resides all within a single Hewlett Packard Enterprise Synergy Frame consists of three control nodes, arranged in a high-availability fashion to host the required OpenStack services and at least a single compute node to host virtualized workloads on the KVM hypervisor. The number and type of nodes can easily be expanded to scale out the SUSE Rancher cluster, even across multiple Hewlett Packard Enterprise Synergy Frames by leveraging the integration with Hewlett Packard Enterprise OneView.

Given the integration with Hewlett Packard Enterprise OneView, many of these attributes will be discovered, once a node is selected for inclusion into the deployment.

- Once a model has been selected, review the documentation for each node role around minimal resources required, the disk layout and the networking setup. At this point, you can effectively setup the necessary items in the Hewlett Packard Enterprise OneView, including:
 - Settings → Addresses and Identifiers (Subnets and Address Ranges)
 - Networks → Create (associate subnets and designate bandwidths)
 - Network Sets → Create (aggregate all the necessary Networks)
 - Logical Interconnects → Edit (include the respective Network Sets)
 - Logical Interconnect Groups → Edit (include the respective Network Sets)
 - Server Profile Templates → Create
 - OS Deployment mode → could be configured to boot from PXE, local storage, shared storage
 - Firmware (upgrade to the latest and strive for consistency across node types)
 - Manage Connections (assign the Network Set to be bonded across NICs)
 - Local Storage (create the internal RAID1 set and request additional drives for the respective roles)
 - Manage Boot/BIOS/iLO Settings
 - Server Profile → Create (assign the role template to the target model)

1. Add Servers and Assign Server Roles

- Utilize the Discover function to link SUSE Rancher and Hewlett Packard Enterprise OneView to see all of the available nodes that can be assigned to their respective roles:
- Then drag and drop the nodes into the roles and ensure there is no missing configuration information, by reviewing and editing each node's server details
- Manage Cloud Settings - setup DNS/NTP, designate Disk Models/NIC Mappings/Interface Model/Networks

- Manage Subnet and Netmask - edit Management Network information, ensuring a match exists to those setup in Hewlett Packard Enterprise OneView
- Choose servers on which the operating system will be installed. Given the small number of initial nodes in this deployment, each can be installed with the SUSE Linux Enterprise Micro operating system using the ISO media and the Hewlett Packard Enterprise iLO virtual media methodology.

5.1.2 Operating System Deployment

On each compute platform node, install the noted SUSE operating system. Plan on leveraging and utilizing the following core infrastructure components and services:

- 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/) 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 installation, the node can be pointed to the respective update service. This can also be accomplished post-installation with the command-line tool, [SUSEConnect \(https://documentation.suse.com/sle-micro/5.0/single-html/SLE-Micro-installation/#article-installation\)](https://documentation.suse.com/sle-micro/5.0/single-html/SLE-Micro-installation/#article-installation).

Deployment Process

Follow these steps

- Download the [SUSE Linux Enterprise Micro \(https://www.suse.com/download/sle-micro/\)](https://www.suse.com/download/sle-micro/) product (either for the ISO or Virtual Machine image)
- The installation process is described and can be performed with default values aside from your local network addressing, per the product documentation. Simply follow:
 - the [Installation Quick Start \(https://documentation.suse.com/sle-micro/5.0/single-html/SLE-Micro-installation/#article-installation\)](https://documentation.suse.com/sle-micro/5.0/single-html/SLE-Micro-installation/#article-installation) for
 - manual installation
 - raw image deployment
 - or [AutoYaST Guide \(https://documentation.suse.com/sle-micro/5.0/single-html/SLE-Micro-autoyast/#book-autoyast\)](https://documentation.suse.com/sle-micro/5.0/single-html/SLE-Micro-autoyast/#book-autoyast) for unattended installations



Tip

An additional consideration is, for the first node deployed, to create an additional IP address on the host network interface card. This can be used for the SUSE Rancher access, which may also become managed by a load-balancer if a multi-node cluster becomes the base.

5.1.3 Kubernetes Deployment

For this deployment, a single server installed with the SUSE Linux Enterprise Micro immutable operating system will support a single instance of K3s. For maximum flexibility, K3s will be deployed in a manner that would allow expanding the single-node cluster into a highly available, three-node Kubernetes cluster at a later date.

While it is highly recommended that Kubernetes workloads (in this case the SUSE Rancher) be isolated from the Kubernetes control-plane and data-plane; this design will maintain all functions, including the SUSE Rancher, on this server node. In this specialized case, the SUSE Rancher workload is a known quantity and no other workloads will be run on this Kubernetes cluster. For this reason the SUSE Rancher cluster is more closely aligned with appliance model best practices.

Deployment Process

The primary steps for deploying this single node K3s cluster are:

1. (Optional) Provide the server with one extra IP address that will be used as the primary address for accessing the K3s cluster API server. This will allow the cluster to scale beyond a single server node. It is not needed if there will be an external load balancer used to access the cluster, or if the cluster will never be expanded beyond a single server node.
 - If needed, use the `ip a` command to determine the interface name (i.e. `eth0`) and CIDR netmask notation (i.e. `/24`) of the network interface that will be configured with the extra IP address
 - Set the following variable with the IP address and CIDR notation that will be used to access the Kubernetes API server:

```
SECOND_IP=""
```

- e.g., `SECOND_IP="10.111.2.100/24"`



Note

If the target interface is not `eth0`, substitute the name of the interface in place of `"eth0"` in the commands below.

```
sudo cp -np /etc/sysconfig/network/ifcfg-eth0 ~/ifcfg-eth0.`date +"%d.%b.%Y.%H.%M"`
cp -p ~/ifcfg-eth0.`date +"%d.%b.%Y"``* ~/ifcfg-eth0
echo "IPADDR_2=${SECOND_IP}" >> ~/ifcfg-eth0
diff /etc/sysconfig/network/ifcfg-eth0 ~/ifcfg-eth0
```

- Ensure the only difference between the original `ifcfg-eth0` file and the updated `~/ifcfg-eth0` is the extra `"IPADDR_2"` line, then run the following commands:

```
sudo mv ~/ifcfg-eth0 /etc/sysconfig/network/ifcfg-eth0
sudo systemctl restart network.service
```

```
ip a
```

- The original server IP address and the additional IP address should be shown with the correct CIDR notation

2. Find the appropriate version of the K3s binary

- At the time of writing, the most current, supported version of K3s for SUSE Rancher is v1.20.4+k3s1. Verify the supported versions at: <https://rancher.com/support-maintenance-terms/>, under the "Rancher Support Matrix"
- Set the following variable with the desired version of K3s

```
K3s_VERSION=""
```

- e.g., K3s_VERSION="v1.20.4+k3s1"

3. Install K3s with embedded etcd enabled:

```
curl -sfL https://get.k3s.io | INSTALL_K3S_VERSION=${K3s_VERSION}  
INSTALL_K3S_EXEC='server --cluster-init --write-kubeconfig-mode=644' sh -s -
```

- Monitor the progress of the installation: watch -c "kubectl get deployments -A"
 - The deployment is complete when all deployments (coredns, local-path-provisioner, metrics-server, and traefik) show at least "1" as "AVAILABLE"
 - Use Ctrl + c to exit the watch loop after all pods are running

5.1.4 SUSE Rancher Deployment

As SUSE Rancher server is a native Kubernetes application, it will run on the single-node K3s cluster. In instances where a load balancer is used to support the K3s cluster, deploying two additional K3s cluster nodes will automatically make SUSE Rancher highly available. SUSE Rancher uses the K3s etcd key/value store to persist its data, which offers several advantages. Providing highly-available storage isn't needed to make SUSE Rancher highly available. In addition, backing up the K3s etcd store protects the cluster as well as the installation of SUSE Rancher.



Note

These deployment steps are specific to K3s. They can be executed from any host or node that has the kubectl tool and the KUBECONFIG file for the K3s cluster.

The steps described here are for deploying SUSE Rancher with self-signed security certificates. Other options are to have SUSE Rancher create public certificates via Let's Encrypt (only with a publicly resolvable hostname for the SUSE Rancher server) and to provide preconfigured, private certificates. See <https://rancher.com/docs/rancher/v2.x/en/installation/install-rancher-on-k8s/#3-choose-your-ssl-configuration> for more information.

Deployment Process

The primary steps for deploying SUSE Rancher are:

1. Create the Helm Chart custom resource for cert-manager:

- At the time of writing, the most current, supported version of cert-manager is v1.0.4
- Set the following variable with the desired version of cert-manager

```
CERT_MANAGER_VERSION=""
```

- e.g., `CERT_MANAGER_VERSION="v1.0.4"`

- Create the cert-manager Helm Chart custom resource manifest

```
cat <<EOF> cert-manager-helm-crd.yaml
apiVersion: helm.cattle.io/v1
kind: HelmChart
metadata:
  name: cert-manager
  namespace: kube-system
spec:
  chart: cert-manager
  targetNamespace: cert-manager
  version: ${CERT_MANAGER_VERSION}
  repo: https://charts.jetstack.io
EOF
```

- Create the cert-manager CRDs and apply the Helm Chart resource manifest:

```
kubectl create namespace cert-manager
```

```
kubectl apply --validate=false -f https://github.com/jetstack/cert-
manager/releases/download/${CERT_MANAGER_VERSION}/cert-manager.crds.yaml
sudo mv cert-manager-helm-crd.yaml /var/lib/rancher/k3s/server/manifests/
```

- Monitor the progress of the installation: watch -c "kubectl get deployments -A"

- The deployment is complete when all deployments (cert-manager, cert-manager-cainjector, cert-manager-webhook) show at least "1" as "AVAILABLE"
- Use Ctrl + c to exit the watch loop after all pods are running

2. Create the Helm Chart custom resource for SUSE Rancher:

- Set the following variable to the hostname of the SUSE Rancher server instance

```
HOSTNAME=""
```

- e.g., HOSTNAME="suse-rancher.sandbox.local"



Note

This hostname should be resolvable to an IP address of the K3s host, or a load balancer/proxy server that supports this installation of SUSE Rancher.

- Create the SUSE Rancher Helm Chart custom resource manifest

```
cat <<EOF> suse-rancher-helm-crd.yaml
apiVersion: helm.cattle.io/v1
kind: HelmChart
metadata:
  name: rancher
  namespace: kube-system
spec:
  chart: rancher
  targetNamespace: cattle-system
  repo: https://releases.rancher.com/server-charts/stable
  set:
    hostname: ${HOSTNAME}
EOF
```

- Apply the Helm Chart resource manifest:

```
kubectl create namespace cattle-system  
sudo mv suse-rancher-helm-crd.yaml /var/lib/rancher/k3s/server/manifests/
```

- Monitor the progress of the installation: `watch -c "kubectl get pods -n cattle-system"`
- The installation is complete when all pods have a status of "Completed" or a status of "Running" with the number of "READY" pods being "1/1", "2/2", etc.
- Use Ctrl + c to exit the watch loop after all pods are running
- (Optional) Create an SSH tunnel to access SUSE Rancher:



Note

This optional step is useful in cases where NAT routers and/or firewalls prevent the client web browser from reaching the exposed SUSE Rancher server IP address and/or port. This step requires that a Linux host is accessible through SSH from the client system and that the Linux host can reach the exposed SUSE Rancher service. The SUSE Rancher hostname should be resolvable to the appropriate IP address by the local workstation.

- Create an SSH tunnel through the Linux host to the IP address of the SUSE Rancher server on the NodePort, as noted in Step 3:

```
ssh -N -D 8080 user@Linux-host
```

- On the local workstation web browser, change the SOCKS Host settings to "127.0.0.1" and port "8080"



Note

This will route all traffic from this web browser through the remote Linux host. Be sure to close the tunnel and revert the SOCKS Host settings when you're done.

3. Connect to the SUSE Rancher web UI and configure SUSE Rancher:

- On the client system, use a web browser to connect to the SUSE Rancher service
 - e.g., <https://suse-rancher.sandbox.local>
- Provide a new Admin password



Important

On the second configuration page, ensure the "Rancher Server URL" is set to the hostname specified when creating the SUSE Rancher HelmChart custom resource and the port is 443.

- e.g., suse-rancher.sandbox.local:443

6 Deployment considerations

FixMe - Elaborate further on best practices and day2 considerations for the deployments.

Draft

7 Summary

Using components and offerings from SUSE and the Rancher portfolio streamlines your 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 your 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 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.

8 References

WHITEPAPERS

- 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

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- SUSE Customer Center (SCC) - <https://scc.suse.com/login>
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 - 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/>))
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 - 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

Reference Configuration

A guide with the basic steps to deploy the layered stack of components from both the SUSE and partner portfolios. This is considered a fundamental basis to demonstrate a specific, tested configuration of components.

Reference Architecture¹

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.

- Deployment Flavor

Proof-of-Concept²

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 (MVP³) 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.

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

² link: Proof of Concept (https://en.wikipedia.org/wiki/Proof_of_concept) 

³ link: Minimum Viable Product (https://en.wikipedia.org/wiki/Minimum_viable_product) 

A Appendix

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A.1 Appendix A: Bill of Materials

Role	Qty	SKU	Component	Notes
Enclosure	1	FixMe	Hewlett Packard Enterprise Synergy 12000 Frame	Houses the infrastructure used for the solution
Network	2	FixMe	Hewlett Packard Enterprise Virtual Connect 40Gb SE F8 Module	Provides network connectivity into and out of the frames
Compute Platform	1-3	FixMe	Hewlett Packard Enterprise Synergy SY480 Compute Module	FixMe
Operating System	1-3	874-007864	SUSE Linux Enterprise Micro,	Configuration: <ul style="list-style-type: none">• 1x per node (up to 16)

*

Role	Qty	SKU	Component	Notes
			<ul style="list-style-type: none"> • x86_64, • 1-16 Cores, • Priority Subscription, • 1 Year 	cores, stackable)
Kubernetes	1	R-0001-PS1	SUSE Rancher, <ul style="list-style-type: none"> • x86-64, • 1 Instance, • Priority Subscription, • 1 Year 	Configuration: <ul style="list-style-type: none"> • includes up to 3 nodes of K3s • includes up to 3 nodes of Rancher Kubernetes Engine • includes up to 3 nodes of Rancher Kubernetes Engine Government



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