Reference Implementation - SUSE Rancher

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Preface

The purpose of this documentation is to provide a reference implementation of deploying SUSE Rancher as a 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

Kubernetes has become the container orchestration standard. Most cloud and virtualization vendors now offer it as standard infrastructure. SUSE Rancher users have the choice of creating Kubernetes clusters with {pn_RKE1} ({an_RKE1}), lightweight edge-centric K3s, on premise or in cloud Kubernetes services, such as GKE, AKS, and EKS. SUSE Rancher users can also import and manage their existing Kubernetes clusters created using any Cloud Native Computing Foundation (CNCF (https://www.cncf.io/) certified (https://www.cncf.io/certification/cka/) Kubernetes distribution or installer.

1.1 Background

Even on the journey to a full Cloud Native Landscape, classic IT pillars are still valid considerations for the underlying infrastructure. General requirements include the need for a small, purpose-built operating system with a container runtime engine and a container orchestration platform to distribute workloads across a target, clustered instance. The dominant technology for container orchestration is Kubernetes (https://kubernetes.io/). With its large community of developers and a plethora of features and capabilities, Kubernetes has become the defacto standard and is included across most container-as-a-service platforms. With all of these attributes in place, both developer and operation teams can effectively deploy, manage and deliver functionality to their end users in a resilient and agile manner.

Note

As a further reference, the National Institute of Standards and Technology's (NIST) Definition of Microservices, Application Containers and System Virtual Machines (https://csrc.nist.gov/publications/detail/sp/800-180/draft) describes the important characteristics of application containers.

1.2 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

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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 (CNCF (https://www.cncf.io/certification/software-conformance/)) compliant, anywhere from edge, core, on-premise, or cloud.

1.3 Scope

The scope of this document is to provide a quick-start, reference implementation of SUSE Rancher. This can be done in a variety of solution stack, architectural scenarios as a fundamental component of an overall Kubernetes ecosystem.

1.4 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.

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3 Requirements

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3.1 Functional requirements

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4 Architectural overview

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4.1 Solution architecture

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4.2 Networking architecture

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5.1 Component overview

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5.1.1 Software component description

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5.1.1.1 FixMe - Component relationship (if necessary)

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5.1.2 Hardware component description

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6 Deployment

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6.1 Deployment overview

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6.2 Hardware deployment configuration

Leveraging the enterprise grade of the following software components being deployed, many hardware platforms are enabled and can readily be used.

Tip

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

Further, by reviewing the minimum requirements for each of the software layers, in conjunction with the target solution deployment context, the processor, memory, disk and networking aspects can be determined.

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6.3 Software deployment configuration

SUSE (https://www.suse.com)®, the Open Open Source Company, works with an ecosystem of partners and communities to deliver enterprise-grade, open source software-defined infrastructure and application delivery solutions backed by superior service and support. The leading Linux operating system meets the most widely-adopted enterprise Kubernetes management platform . SUSE and Rancher are now one company!

Innovate Everywhere

> Our goal is to give you the freedom to innovate everywhere — from the data center, to the cloud, to the edge and beyond. We are driven by the power of many: everything we do is empowered by the skills, creativity and vision of our employees, partners, customers and community.

By utilizing three products from the SUSE portfolio:

- Operating System - {pn_SLEMicro}
- Kubernetes - K3s
- Multi-cluster Management - SUSE Rancher

one can build the necessary infrastructure and service to administer and manage multiple Kubernets clusters. These layered components are described in the following sections.

6.3.1 Operating System Deployment

SUSE Linux Enterprise Micro is built from ground up for edge applications. It leverages the enterprise-hardened technology components of SUSE Linux Enterprise and merges that with what developers want from a modern, immutable OS platform. 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/) or if the organization already has subscriptions, both install media and updates can be obtained from SUSE Customer Center (https://scc.suse.com/login).

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To accomodate many options of underlying physical or virtualization hosts, this operating system supports a vast breadth of platforms and component resources. Further, it provides the core functionality for the next layer of Kubernetes-based infrastructure software.

The installation process is described and can be performed, per the product documentation, by following:

- the {pn_SLE-Micro_InstallationDocURL}[Installation Quick Start] for
  - manual installation
  - raw image deployment
- or {pn_SLE-Micro_AutoYaSTDocURL}[AutoYaST Guide] for unnatttended 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.

6.3.2 Kubernetes Deployment

This design leverage the K3s Kubernetes distribution. K3s is a highly available, CNCF certified Kubernetes distribution capable of deploying any Kubernetes production workload. K3s is packaged as a single binary with minimal software dependencies. This signficantly reduces the expertise and effort required install, run, and maintain a production ready Kubernetes cluster.

For this deployment, a single server installed with the SLE 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. This will be only slightly more complex that the one-line, 45 second (curl -sfL https://get.k3s.io | sh -) minimal installation method of K3s.

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 {porfolioName} Server, on the 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.

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At the time of writing, the most current, supported version of K3s for SUSE Rancher is 1.20.4. Verify the supported versions at: https://rancher.com/support-maintenance-terms/

The primary steps for deploying this three node K3s cluster are: 1. Ensure the first server has one extra IP address configured. This will be used as the primary address for accessing the K3s API server. 2. Download the appropriate version of the K3s binary from: https://github.com/rancher/k3s/releases/latest 3. Download the installation script from: https://get.k3s.io 4. Install K3s with etcd enabled

6.3.3 SUSE Rancher Deployment

SUSE Rancher is a complete solution for managing Kubernetes clusters and Kubenetes applications. It addresses the operational and security challenges of managing multiple Kubernetes clusters and applications across any infrastructure. SUSE Rancher streamlines Kubernetes cluster management on bare metal servers, private clouds, and vSphere environements; from the datacenter to the edge. SUSE Rancher unites all of your Kubernetes clusters with global security policies, centralized authentication, access control and observability.

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. Additional, 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.

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7 Deployment considerations

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8 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

- FixMe - Using SUSE Rancher enables you to 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.

Modernize

Bring applications and data into modern computing

- FixMe - Using SUSE Rancher enables you to 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.

Accelerate

Accelerate business transformation through the power of open source software

- FixMe - Using SUSE Rancher enables you to 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.

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9 References

WHITEPAPERS

- 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

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

WEBSITES

- 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/))
    - K3s - https://rancher.com/products/k3s/ (documentation (https://rancher.com/docs/k3s/latest/en/))
    - SUSE Linux Enterprise Micro (SLE Micro) - https://www.suse.com/products/micro/ (documentation (https://documentation.suse.com/sle-micro/5.0/))

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A Appendix

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10 Appendix A: Bill of Materials

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Role	Qty	Component	Notes
{nodeRole}	6	{vendorIHV} {node-Platform} {nodeMod-el}	Configuration: • 1x {nodeCPU} {nodeCPUDesc} • 4x {nodeRAM} {nodeRAMDesc} • 2x {nodeDisk} {nodeDiskDesc} • 2x {nodeNIC} {nodeNICDesc}
{swRole}	6	{vendorISV} {sw-Product})	Configuration: • 1x {swSKU} {swDesc}

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