Course Description

Course: RKE201v2
Kubernetes Administration with RKE2

Training Level:
- ❏ Intermediate

Delivery Method
- ❏ ILT

Duration:
- ❏ 3 days

Course Overview
This hands-on course provides the essential knowledge and practical skills required to install, configure, and manage production-grade Kubernetes, specifically leveraging the Kubernetes solutions offered by SUSE. Participants will explore the architectural differences between SUSE distributions like RKE2 and K3s, and gain proficiency in managing core objects, running diverse workloads, and implementing robust security through Role-Based Access Control (RBAC) and network policies. The training emphasizes real-world operations, including cluster upgrades, backup and recovery using etcd, and application management with Helm.

By the end of this course, students will be equipped to scale workloads, troubleshoot cluster-wide issues, and extend Kubernetes functionality using Operators and Custom Resource Definitions (CRDs).

This course prepares students for the SCA in Rancher Kubernetes Engine 2 exam.

Key Objectives
Attendees will be taught the following concepts and skills:
- ❏ Install and configure RKE2 clusters using server and agent nodes
- ❏ Manage Kubernetes workloads, including Deployments, StatefulSets, DaemonSets, and batch processing with Jobs and CronJobs
- ❏ Configure persistent storage using Volumes, PersistentVolumes, and the Container Storage Interface (CSI)
- ❏ Implement cluster networking and external access via Services, Ingress, and the Gateway API
- ❏ Secure the cluster environment through multi-layered API access control, RBAC, and NetworkPolicies
- ❏ Optimize resource usage by defining Quality of Service (QoS) classes, ResourceQuotas, and LimitRanges
- ❏ Execute maintenance and operations, including horizontal and vertical scaling, cluster upgrades, and etcd backups
- ❏ Manage complex applications using Helm charts and extend the Kubernetes API with CRDs and Operators

Audience
This course is primarily designed for system administrators, DevOps engineers, and cloud or platform engineers who need a technical introduction to Kubernetes administration and SUSE's specific distributions. It is also suitable for those responsible for managing production-grade container orchestration environments.

Prerequisites
Students should have a basic understanding of containerization concepts and be comfortable working within a Linux command-line environment. Prior experience with virtualization and general networking fundamentals is highly recommended.

Course Outline

- ❏ Section 1: Course Overview
- ❏ Section 2: Introduction to Containers and Container Orchestration
  - ❏ Container Fundamentals
  - ❏ The Need for Orchestration
  - ❏ Introduction to Kubernetes
- ❏ Section 3: Kubernetes Distributions by SUSE
  - ❏ Understand the SUSE Kubernetes Distributions
  - ❏ Install RKE2
- ❏ Section 4: Basic Kubernetes Objects and Commands
  - ❏ Core Kubernetes Objects and Their Relationships
  - ❏ Create Kubernetes Objects
  - ❏ Retrieve Information about Kubernetes Objects
  - ❏ Command-line Efficiency Tips and Ttricks
- ❏ Section 5: Running Workloads in Kubernetes
  - ❏ Namespaces to Group Kubernetes objects
  - ❏ Workloads and the Relationship with Pods
  - ❏ ReplicaSets and Deployments for Stateless Applications
  - ❏ StatefulSets for Stateful Applications
  - ❏ Batch Processes using Jobs and CronJobs
- ❏ Section 6: Configuration for Kubernetes Objects
  - ❏ Configuration Decoupling
  - ❏ Managing Configurations: ConfigMaps
  - ❏ Managing Sensitive Information: Secrets
  - ❏ Security Considerations
- ❏ Section 7: Scheduling in Kubernetes
  - ❏ The Scheduling Process
  - ❏ Basic Node Selection
  - ❏ Affinity and Anti-Affinity Rules
  - ❏ Taints and Tolerations
- ❏ Section 8: Resource Usage Control and Quality of Service (QoS)
  - ❏ Resources in Kubernetes
  - ❏ Resources, Scheduling, and Quality of Service (QoS)
  - ❏ Controlling Defaults and Boundaries
- ❏ Section 9: Scaling in Kubernetes
  - ❏ Horizontal Workload Scaling in Kubernetes
  - ❏ Vertical Workload Scaling in Kubernetes
  - ❏ Scale an RKE2 Kubernetes Cluster
- ❏ Section 10: Cluster Networking and Services in Kubernetes
  - ❏ The Kubernetes Networking Model
  - ❏ Services in Kubernetes
  - ❏ External Service Exposure (Ingress and Gateway API)
- ❏ Section 11: Storage in Kubernetes
  - ❏ The Need for Persistent Storage
  - ❏ Storage Abstractions
  - ❏ Provision Storage
  - ❏ The Container Storage Interface (CSI)
- ❏ Section 12: Security in Kubernetes
  - ❏ Kubernetes Security: A Multi-layered approach
  - ❏ API Access Control
  - ❏ Network Segmentation with NetworkPolicies
  - ❏ Other Kubernetes Key Security Features

SUSE Training

Information about SUSE Training can be found at:

https://www.suse.com/training/

Contact suse-training@suse.com with any questions.

- ❏ Section 13: Monitoring and Troubleshooting in Kubernetes
  - ❏ Troubleshooting and Monitoring Tools
  - ❏ Diagnosing Application Issues
  - ❏ Cluster Issues
  - ❏ Networking and Service Troubleshooting
- ❏ Section 14: Cluster Operations in Kubernetes
  - ❏ Node Lifecycle Management
  - ❏ Cluster Upgrades
  - ❏ Backups and Disaster Recovery
- ❏ Section 15: Kubernetes Application Management with Helm
  - ❏ Helm Charts and Repositories
  - ❏ Release management (Install, Upgrade, Rollback)
- ❏ Section 16: Extending Kubernetes using Operators and Customer Resource Definitions (CRDs)
  - ❏ The Need for Extensibility
  - ❏ Extending the Kubernetes API: (CRDs)
  - ❏ Kubernetes controllers and Operators