vSphere Kubernetes Service: Design, Deploy and Operate [V9.0]

Course code: VMW_VSKSDDO

This five-day course provides you with the knowledge, skills, and abilities to achieve competence in design, configuration, and operational management of VMware vSphere® Kubernetes Service (VKS) within VMware Cloud Foundation® (VCF) environments. You will learn vSphere Supervisor deployment models, storage topologies, and namespace architecture while gaining expertise in VKS cluster lifecycle management, workload deployment, and day-2 operations. The course covers vSphere Supervisor enablement options, VM Service deployment models, services architecture, and monitoring strategies. You will learn VKS cluster provisioning using kubectl, as well as workload deployment using YAML manifest files and Helm. Through hands-on labs and real-world scenarios, you will develop practical expertise in designing scalable Kubernetes infrastructure on VCF, operating VKS clusters, and building extensible cloud-native ecosystems for enterprise workload consumption.

Who is the course for

System Administrators, Solution Engineers, Consultants, Architects, and Support Personnel

What we teach you

By the end of the course, you should be able to meet the following objectives:

- Identify the key components of a Kubernetes architecture
- Explain Volumes and persistent storage mechanisms in Kubernetes
- Explain Kubernetes networking
- Explain the concepts and components of vSphere Supervisor
- Explain the vSphere Supervisor authentication workflow using vCenter Single Sign-On
- Explain the key features of VCF Consumption CLI
- Describe the vSphere Supervisor deployment models
- Identify the vSphere Supervisor networking and load-balancing requirements
- Explain the vSphere Supervisor storage options including cross Datacenter topologies
- Outline the steps to configure vSphere Namespaces and Zones
- Explain the VCF Cloud Services enablement options
- Identify available Services in vSphere Supervisor including Velero and Extensible Services
- Explain how the vSphere Supervisor is monitored and upgraded.
- Explain the VM creation workflow with VM Service
- Outline the VM Service deployment models for Virtual Machines with configurable OVF Properties
- Explain how to deploy a vSphere Pod using kubectl and expose it through a Load Balancer IP
- Describe how building an extensible ecosystem enables organizations to deploy cloud-native applications with integrated services
- Explain how VKS Cluster monitoring functions and how standard packages are managed
- Describe VKS Cluster provisioning using TanzuKubernetesCluster and ClusterClass
- Describe the application deployment workflow using Helm
- Describe the steps for creating snapshots in VKS Cluster
- Explain the process of upgrading the VKS Version
- Outline the steps to update VKS Cluster using VCF CLI
- Explain how VKS cluster management enables platform engineers to manage VKS clusters at scale
- Outline the process for installing Istio on a VKS cluster.
- Illustrate how to visualize the Istio Service Mesh using Kiali.
- Explain how to use the Gateway API to configure traffic routing within Istio the service mesh.

Required skills

This course has the following prerequisites:

- VCF Stage-1 Training
- Working experience and knowledge of VMware vSphere®, VMware NSX®, and vSAN environments

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Course outline

1. Course Introduction

- Introduction and course logistics
- Course objectives

2. Kubernetes Overview

- Differentiate between containers and virtual machines
- Describe Docker workflow, including the build, ship, and run processes
- Explain Container Networking concepts
- Describe Container Runtime Interface (CRI) and the containerd role in Kubernetes
- Identify the key components of a Kubernetes architecture
- Describe different Kubernetes objects and their purposes
- Explain the functionality of Services in Kubernetes
- Explain Volumes and persistent storage mechanisms in Kubernetes
- Explain Kubernetes networking
- Describe Antrea, Calico, and Multus CNI plug-ins
- Describe the whereabouts IPAM plug-in
- Describe Istio Service Mesh
- Explain Helm Package Manager

3. VCF Cloud Services Overview

- Describe vSphere Supervisor
- Explain the concepts and components of vSphere Supervisor
- Explain the Services in vSphere Supervisor
- Outline the hierarchy of vSphere Supervisor folders
- Explain the identity providers supported by vSphere Supervisor
- Define the roles and permissions within vSphere Namespaces
- Explain the vSphere Supervisor authentication workflow using vCenter Single Sign-On
- Explain the key features of VCF Consumption CLI

4. vSphere Supervisor Deployment Models

- Describe vSphere Supervisor deployment model with NSX VPC networking
- Describe vSphere Supervisor deployment model with NSX Segment networking
- Outline vSphere Supervisor deployment model with VDS and Foundation Load Balancer
- Outline vSphere Supervisor deployment model with NSX and Avi Load Balancer
- Outline vSphere Supervisor deployment model with VDS and Avi Load Balancer
- Describe the requirements for the networking stack with NSX VPC Networking
- Outline the requirements for the networking stack with NSX Segment Networking
- Outline the requirements for the networking stack with VDS Networking
- Explain the Load Balancer options
- Outline the requirements for Avi Load Balancer
- Outline the requirements for Foundation Load Balancer
- Explain the vSphere Supervisor Zone Deployment Models
- Outline the vSphere Supervisor Zone Model Attributes
- Describe the vSphere Supervisor Control Plane Availability Models

5. VCF Cloud Services Enablement Options

- Explain how to activate the vSphere Supervisor when creating a Workload Domain
- Describe the workflow for deploying a vSphere Supervisor with NSX VPC and NSX Load Balancer.
- Explain how to connect to the vSphere Supervisor using the VCF CLI.
- Outline the deployment process for a vSphere Supervisor using an NSX segment.

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- Explain the workflow for deploying a vSphere Supervisor with VDS and the Foundation Load Balancer.
- Describe the deployment process for a vSphere Supervisor with NSX and Avi Load Balancer.
- Explain how to deploy a vSphere Supervisor using VDS and Avi Load Balancer.
- Illustrate how to deploy a vSphere Supervisor from an exported configuration.

6. vSphere Supervisor Storage Topologies
   - Describe the Storage Options for vSphere Supervisor in VCF
   - Explain the concepts and components of the Storage Topologies for vSphere Zones and vSphere Supervisor
   - Describe the integration of vSphere Storage and vSphere Supervisor
   - Outline the Data Persistence for vSphere Supervisor in vSphere Zones
   - Identify the supported topologies when running vSphere Supervisor on top of vSAN clusters
7. Configuring and Managing vSphere Namespaces and Zones
   - Explain the steps to create a vSphere Namespace on the vSphere Supervisor
   - Explain the steps to set Resource and Object Limits to a vSphere Namespace
   - Outline the steps to add Security Policies to an NSX vSphere Namespace
   - Outline the procedure to add a cluster as a vSphere Zone to a vSphere Supervisor
   - Describe the steps required to associate a vSphere Zone with a vSphere Namespace
   - Explain the workflow for removing a vSphere Zone from a vSphere Namespace and vSphere Supervisor
8. Services in vSphere Supervisor
   - Define vSphere Kubernetes Service (VKS) and its key features
   - Explain the architecture of VKS
   - Explain the VKS Cluster topology with vSphere Zones
   - Identify networking and load-balancing options for VKS clusters
   - Explain storage policy configurations for VKS clusters
   - Outline the VKS Core and Standard packages
   - Describe the integrated backup and restore solution
   - Identify considerations for vSphere Supervisor protection (backup and restore)
   - Describe the process of protecting the vSphere Supervisor Control Plane
   - Outline the design considerations for protecting VKS service clusters with Velero
   - Outline the design considerations for protecting VM service VMs with Velero
   - Identify the extensible services you can run on top of vSphere Supervisor
   - Outline the requirements for the extensible services
9. Monitoring and Lifecycle Management of vSphere Supervisor
   - Explain monitoring and managing resources in a vSphere Namespace from vCenter
   - Describe how vSphere Supervisor monitoring works
   - Explain monitoring of vSphere Supervisor from VCF Operations
   - Explain the vSphere Supervisor update Options
   - Outline the steps to configure a Subscribed Content Library for Supervisor Images
   - Outline the steps for updating the vSphere Supervisor
   - Outline the steps for setting the Default CNI for VKS Clusters
   - Explain the process of registering a Supervisor Service to vCenter Server
   - Explain the process of installing a Supervisor Service to vCenter Server
   - Explain the process of upgrading a Supervisor Service to vCenter Server
   - Explain the process of deactivating a Supervisor Service to vCenter Server
   - Outline the backup and restore methods for vSphere Supervisor
10. Managing Virtual Machines with VM Service
    - Differentiate between traditional VMs and API-driven declarative VMs
    - Explain the features of VM Service

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- Explain the architecture of VM Service
- Explain the VM creation workflow with VM Service
- Explain the VM deployment process
- Explain the process of deploying a VM with configurable OVF properties in vSphere Supervisor
- Describe vSphere Pod storage and networking
- Outline the steps to create a vSphere Namespace and configure resource limits
- Explain the steps for creating VM Classes
- Explain how to deploy a vSphere Pod using kubectl and expose it through a Load Balancer IP

11.Multi-Tenancy in VCF

- Describe Multi-Tenancy in VCF
- Explain the VCF Private Cloud experience for each persona
- Explain the relationship between vSphere Supervisor instances, Regions, and Zones
- Describe the different types of Organizations in VCF Automation
- Outline the steps to create an Organization
- Explain the steps to create Content Libraries
- Describe how to set up Projects and Namespaces within an Organization

12. Consuming VCF Cloud Services for building an Extensible Ecosystem

- Describe how building an extensible ecosystem enables organizations to deploy cloud-native applications with integrated services
- Explain the steps for deploying Contour Ingress Controller to manage external access
- Explain the steps for deploying Harbor Image Registry for managing container images
- Outline the steps for deploying Argo CD service on Supervisor for GitOps continuous delivery
- Outline the deployment and management of Virtual Machines using VCF Automation
- Describe the deployment and management of VKS Clusters through VCF Automation
- Describe management of Harbor image repositories via projects
- Explain various ways to connect to VKS Clusters
- Explain the steps for deploying and consuming container-based applications using VCF Automation

13. VKS Cluster Deployment using Kubectl

- Explain how Kubernetes software distribution for VKS clusters is managed using vSphere Kubernetes releases (VKrs)
- Describe VKS Cluster provisioning using TanzuKubernetesCluster
- Describe VKS Cluster provisioning using ClusterClass
- Outline the steps to create a Subscribed Content Library
- Outline the steps for publishing a Local Content Library
- Outline the steps for VKS Cluster Provisioning with Calico CNI
- Explain the process of fetching the VKS Cluster admin kubeconfig from vSphere Supervisor
- Explain the process of connecting to the VKS Cluster using VCF CLI
- Explain the process of integrating VKS Clusters with Private Container Registry
- Outline the steps to integrate Harbor with a v1beta1 API cluster

14. Monitoring and Lifecycle Management of VKS Clusters

- List the supported Standard Packages for VKS Clusters
- Outline the requirements for Installing Packages on VKS Clusters
- Explain the process of Managing VKS Standard Packages
- Describe how VKS Cluster monitoring works
- Outline the step for Enabling Monitoring for VKS Clusters
- Explain monitoring of VKS Cluster from VCF Operations
- Explain monitoring and managing resources in a vSphere Namespace from vCenter

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- Explain monitoring of VKS Cluster from VCF Automation
- Explain monitoring of VKS Cluster using kubectl

15. Deploying Workloads on VKS Clusters using Helm
- Describe the application deployment workflow using Helm
- Explain how Docker images and Helm charts are managed in OCI registry on Harbor
- Outline the steps for deploying an application using Helm
- Outline the steps for upgrading an application using Helm

16. VKS Cluster Day-2 Operations
- Describe Volume Snapshots
- Describe the lifecycle of a Volume Snapshot and Volume Snapshot Content
- Outline the steps to Install and Deploy vSphere pvCSI Webhook
- Outline the steps to Install and Deploy External CSI Snapshot Webhook
- Outline the steps to Restore a Volume Snapshot
- Explain the process of registering a New VKS Version
- Explain the process of upgrading the VKS Version
- Outline the steps to update VKS Cluster using VCF CLI

17. VKS Cluster Management and Istio Service Mesh
- Explain how VKS cluster management enables platform engineers to manage VKS clusters at scale
- Describe VKS cluster management architecture
- Describe how VKS cluster management delivers centralized visibility across the entire VKS cluster fleet
- Explain how consistent policies are enforced across clusters through VKS cluster management
- Explain how VKS clusters can be backed up using VKS cluster management
- Describe how VKS standard packages are deployed and managed through VKS cluster management
- Describe the functionality and key components of the Istio Service Mesh
- Outline the steps required to install Istio on a VKS cluster
- Explain the process for deploying the Kiali dashboard
- Illustrate how to visualize the Istio Service Mesh using Kiali
- Explain how to use the Gateway API to configure traffic routing within Istio the service mesh
- Describe the steps for collecting Istio support bundle files

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