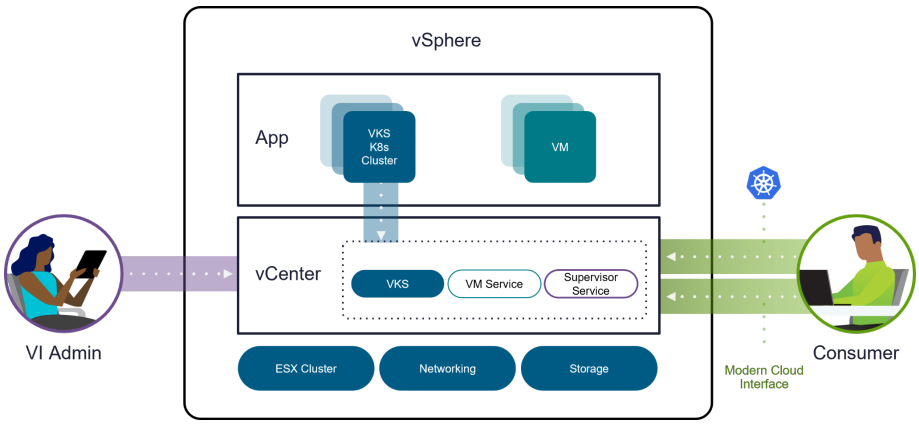
Powering Modern Applications with VMware vSphere Kubernetes Service

Running a Diverse Application Ecosystem with Confidence

At a Glance

Running modern applications on VMware vSphere Kubernetes Service (VKS) within VMware Cloud Foundation (VCF) delivers a powerful, unified platform that integrates seamlessly with VMware's ecosystem, providing enterprises with a scalable, secure, and efficient solution for modern workloads. VCF's full-stack hyper-converged infrastructure, combined with VKS's enterprise-grade Kubernetes, simplifies the deployment and management of containerized applications while leveraging VMware's trusted technologies like vSphere, NSX, and vSAN. This integration ensures consistent operations across hybrid and multi-cloud environments, making it easier for organizations to scale, secure, and manage applications without the complexity of traditional setups.

Modern applications demand flexibility, scalability, and performance, yet traditional infrastructure often imposes silos, complexity, and operational overhead. VMware vSphere Kubernetes Service (VKS), formerly Tanzu Kubernetes Grid service (TKGs), transforms this landscape by providing an enterprise-grade Kubernetes platform natively integrated with VMware Cloud Foundation (VCF). VMware vSphere Kubernetes Service empowers organizations to run a wide range of applications - AI/ML frameworks, service mesh, data streaming, distributed databases, storage, and DevOps tools - on a single, streamlined platform . With an extensive library of validated reference architectures, vSphere Kubernetes Service simplifies deployment, enhances performance, and reduces costs, meeting the needs of today's dynamic enterprises.



Proven Use Cases and Reference Architectures

Over the past years, vSphere Kubernetes Service (VKS) has rigorously validated its platform by supporting a vast array of modern workloads—from AI/ML and real-time data streaming to globally distributed databases and cloud-native microservices. This extensive experience is backed by publicly documented reference architectures, which serve as battle-tested blueprints for enterprises. Here we have a list of them:

Key Benefits

Comprehensive Platform
A comprehensive platform integrating compute, storage, networking, management, and security, with built-in Kubernetes support. It manages VMs and containers on a single platform, eliminating silos, and provides self-service and multi-tenancy for efficient governance.

Lower CapEx, Higher Efficiency
Reducing capital expenses with higher VM density leads to fewer hardware needs, while storage costs are lowered through flexible RAID, deduplication, compression, and disaggregated storage. Advanced memory and CPU management, automated workload balancing, and VM optimization tools enhance app performance.

Lower OpEx, Higher Productivity
Achieve lower operational expenses with consistent management for VMs and Kubernetes, leveraging existing tools and skills. Benefit from unified lifecycle management, faster cluster boot times, and out-of-the-box IaaS services for DevOps teams.

More Secure and Resilient
Enhance isolation with six levels for VMs and containers, minimizing "noisy neighbor" issues, alongside end-to-end data encryption. Maintain security posture with integrated dashboards, live patching, configuration drift detection, and distributed firewall options.

Artificial Intelligence and Machine Learning

vSphere Kubernetes Service simplifies the deployment and scaling of AI/ML workloads, offering seamless integration with VMware vSphere and Tanzu Platform for efficient resource management and GPU acceleration. This ensures scalable, high-performance machine learning operations, making it easier for enterprises to adopt and manage complex AI solutions.

- **Kubeflow on VMware vSphere Kubernetes Service**
  Streamline ML workflows on an AI-ready platform with VMware vSphere 7 and VMware vSphere Kubernetes Service (Reference Architecture).
- **Ray Integration with Kubeflow**
  Scale distributed AI training with Ray on VMware vSphere Kubernetes Service (Reference Architecture).
- **Dask on VMware vSphere Kubernetes Service**
  Enable large-scale data analytics with Dask (Reference Architecture).
- **Codeium Enterprise on VMware Private AI Foundation with NVIDIA**
  Deploy AI-driven code acceleration with NVIDIA (Reference Architecture).
- **KubeFATE**
  Power federated learning on VCF with VMware vSphere Kubernetes Service (Reference Architecture).

Service Mesh

vSphere Kubernetes Service streamlines service mesh deployment, enhancing microservices with traffic control, security and observability, all within VMware's ecosystem for reliable cloud-native operations.

- **Istio on VMware vSphere Kubernetes Service**
  Enhances microservices with Istios' traffic management, security (mTLS), and observability on vSphere Kubernetes Service (Blog | Video Walkthrough).

Data Platforms and Storage

vSphere Kubernetes Service supports scalable, high-performance storage solutions, optimizing data management through vSphere policies. This enables efficient and reliable storage operations, ideal for handling large-scale data in enterprise environments.

- **MinIO Object Storage**
  Run scalable, S3-compatible storage on VCF with vSphere Kubernetes Service (Reference Architecture).
- **Cloudian HyperStore**
  Deploy enterprise-grade object storage on VCF (Reference Architecture).

Data Streaming Platforms

vSphere Kubernetes Service enhances real-time data streaming with high throughput and low latency, providing a resilient and scalable infrastructure for platforms like Kafka and RabbitMQ. Its integration with VMware's ecosystem ensures unified management, streamlining operations for streaming workloads.

- **Confluent Kafka on VMware vSphere Kubernetes Service**
  Achieve real-time, high-throughput data streaming (Reference Architecture).
- **VMware Tanzu RabbitMQ**
  Deliver reliable messaging with performance validated alongside Kafka (Reference Architecture, Performance Study).

Distributed Databases

vSphere Kubernetes Service delivers a high-performance, scalable environment for distributed databases, integrating with vSphere for data persistence and VMware NSX for multi-cloud high availability. This combination ensures both speed and resilience for database operations.

- **Redis on VMware vSphere Kubernetes Service**
  Support high-performance, in-memory data stores (Reference Architecture).
- **Active-Active Geo-Distributed Redis**
  Enable low-latency, global applications with VMware NSX (Reference Architecture).
- **Flink and K8ssandra**
  Run real-time stream processing and Cassandra-based workloads (Reference Architecture).

DevOps and Continuous Delivery

vSphere Kubernetes Service streamlines automated deployments and continuous delivery workflows, ensuring consistency across hybrid and multi-cloud environments. Its unified management experience enhances operational efficiency for DevOps teams managing complex application lifecycles.

- **Argo CD on VMware vSphere Kubernetes Service**
  Implement GitOps-driven continuous delivery in single or multi-cloud setups (Private Cloud | Multi-Cloud).

Conclusion

These documents showcase how vSphere Kubernetes Service enhances modern applications by providing a unified, scalable, and resilient Kubernetes platform. From powering AI/ML with Kubeflow and Ray, to enabling real-time streaming with Kafka and RabbitMQ, to supporting distributed databases like Redis and storage solutions like MinIO, vSphere Kubernetes Service integrates with VMware's ecosystem to deliver enterprise-grade performance, security,

and management. For DevOps tools like Argo CD, vSphere Kubernetes Service simplifies continuous delivery across private cloud and multi-cloud setups, making it an invaluable asset for modern application development and deployment.