

# Modern Apps on VMware Cloud Foundation™

## A brief introduction to VMware Cloud Foundation with Tanzu

### Benefits of running modern apps on VMware Cloud Foundation

- Application-focused management bringing VMs and containers onto the same platform
- Efficient use and simplified management of GPUs for modern AI/ML workloads
- Enterprise-class resiliency, QoS, security, and access control for both VMs and containers
- Developer self-service APIs to boost productivity
- Rapid application deployment with full stack agility
- Enhanced infrastructure lifecycle management
- Full stack networking and intrinsic security at every layer of the stack for VM- and container-based services
- Cloud operating model extending across private and hybrid cloud

### Future proof hybrid cloud platform for modern apps

The rise of modern apps brings new challenges. When enterprises build, deploy, and manage modern apps, many of them default to the use of containers, Kubernetes, and microservices architectures. An increasing number of these modern apps are leveraging Artificial Intelligence (AI) and Machine Learning (ML), for training models, inferencing, and performing data analytics to improve business outcomes. Such workloads typically require GPU support adding cost and complexity to the infrastructure. Additionally, those modernized components must often work with existing non-containerized applications and stateful workloads like databases. The infrastructure required to power some of these apps and workloads is very expensive and complex to build and manage. As a result, IT operators struggle to deliver the benefits of the cloud model as app teams seek more agile infrastructure in the public cloud, leading to the use of multiple clouds across on- and off-premises with drastically different infrastructure and operations. Managing such heterogeneity while adhering to enterprise policies is a complex task for both IT operators and developers.

VMware Cloud Foundation with Tanzu provides a full-stack hybrid cloud platform that delivers AI-ready infrastructure to enable customers to accelerate AI/ML workloads and modern apps as well as traditional enterprise apps. Based on a proven and comprehensive software-defined stack including VMware vSphere®, VMware vSAN™, VMware NSX-T Data Center™, and VMware vRealize® Suite, VMware Cloud Foundation provides a complete set of secure software-defined services for compute, storage, network security, Kubernetes management, and cloud management. The result is agile, reliable, efficient cloud infrastructure that offers consistent operations across private and public clouds. In addition, VMware Cloud Foundation contains built-in automated lifecycle management to simplify the administration of the software stack, from initial deployment, to patching and upgrading.

## Key benefits



### Developer self-service APIs to boost productivity

Many IT organizations rely on slow ticketing systems to provide infrastructure services to developers because it is the only way to provide governance over developer applications and processes. VMware Cloud Foundation provides a self-service private cloud, enabling the ability to manage at the namespace level so that admins can set policies, quota, and role-based access to a namespace once. Developers can then self-service into the namespace within the predefined boundary.

With Kubernetes embedded into the control plane of vSphere, developers can create and consume cloud resources such as Kubernetes clusters, volumes (including persistent volumes for stateful applications), and networks with VMware Cloud Foundation Services (Figure 1) using Kubernetes and RESTful APIs that they are familiar with. This reduces the time and effort it takes for infrastructure provisioning and scaling so that developers can focus on building apps. Meanwhile, IT operators maintain visibility into those cloud resources created by developers through the VMware interfaces that they are familiar with.

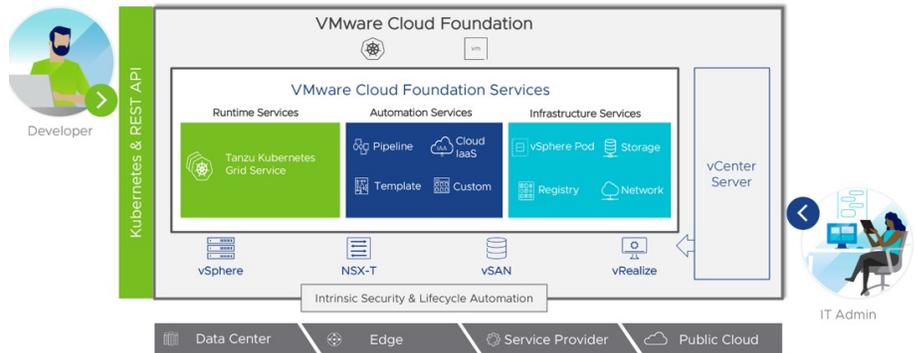


Figure 1: VMware Cloud Foundation Solution Architecture



### Application-focused management bringing VMs and containers onto the same platform

With VMware Cloud Foundation, customers get unified visibility of virtual machines (VMs), containers, and Kubernetes clusters in vCenter. Containers and Kubernetes clusters are treated as first-class citizens like VMs from a vCenter perspective.

The Kubernetes concept of a namespace is integrated into vSphere and becomes the unit of management. By grouping resource objects such as VMs and containers into logical applications via namespaces, Virtual Infrastructure (VI) admins who previously managed thousands of VMs can now manage just dozens of application namespaces, resulting in a massive increase in scale and reduction in cognitive load.



### **Enterprise-class resiliency, QoS, security, and access control for both VMs and containers**

All policies to optimize for performance, resilience and availability that have been available to VMs are also available to containers and Kubernetes clusters. Admins can define QoS, security policies, firewall rules, encryption settings, availability and backup rules, and access control rules at namespace level, reducing the time it takes to manage and troubleshoot applications.

NSX-T has been designed as the pod networking for VMware Cloud Foundation with Tanzu. NSX-T provides the full stack networking and security to vSphere with Kubernetes including distributed switching and routing, distributed firewalling, load balancing, ingress control and more. Integrations with Kubernetes enables context-aware security policies with namespace isolation.



### **Rapid application deployment with full stack agility**

In VMware Cloud Foundation, a workload domain is a policy-based resource construct with specific availability and performance attributes. It combines compute (vSphere), storage (vSAN), networking (NSX-T), and cloud management (vRealize Suite) into a single consumable entity. Workload domains greatly speed up the instantiation of Kubernetes, deploying both the underlying infrastructure and Kubernetes components in an automated fashion. Workload domains also allow IT operators and developers to securely sandbox and allocate the right infrastructure for containers alongside VMs. For example, a customer can have a workload domain with Kubernetes clusters for a modern app, and another workload domain for databases or VDI apps, which have different infrastructure requirements.



### **Enhanced infrastructure lifecycle management**

VMware Cloud Foundation offers automated lifecycle management on a per-workload domain basis. Available updates for all components are tested for interoperability and bundled with the necessary logic for proper installation order. The update bundles are then scheduled for automatic installation on a per-workload domain basis. This allows the admin to target specific workloads or environments (development vs. production, for example) for updates independent from the rest of the environment.



#### **Full stack networking and intrinsic security at every layer of the stack**

At the container image layer, Tanzu Kubernetes Grid includes a best-in-class container registry with built-in vulnerability scanning, image signing, and auditing.

At the compute layer, vSphere provides comprehensive built-in security for protecting data, infrastructure, and access that is operationally simple. Policy-driven security provides VM- or pod-level encryption to protect unauthorized data access both at rest and in motion.

At the network layer, NSX-T delivers micro-segmentation and granular security to the individual VM or pod workload, enabling a fundamentally more secure data center. Security policies travel with the workloads, independent of where workloads are in the network topology.

At the storage layer, vSAN offers data at rest and data in transit encryption at the cluster level. Storage Encryption is built for compliance requirements and offers simple key management with support for all Key Management Interoperability Protocol (KMIP) compliant key managers.

At the management layer, vRealize solutions automate manual tasks to eliminate human error, provide monitoring and auditing the full stack, and provide self-driving operations to quickly remediate issues as they are identified.



#### **Cloud operating model extending across private and hybrid cloud**

The same core software-defined infrastructure stack leveraged in private cloud deployments of VMware Cloud Foundation is also the underpinning technology of VMware based public clouds like VMware Cloud™ on AWS and other VMware Cloud Provider™ Program partners, as well as VMware Cloud on Dell EMC. With VMware Cloud Foundation powered clouds offering consistent infrastructure and operations, customers can begin to shift to a different way of operating IT, where service delivery is better aligned to the service consumption needs of the business. Adopting a cloud operating model represents a move toward application modernization and new application architectures that enable digital initiatives.

## Resources

- Learn more about VMware Cloud Foundation on the [website](#)
- Check out Cloud Foundation [Blog](#), [Twitter](#), and [YouTube](#) for the latest updates on Cloud Foundation
- Want to try Cloud Foundation for yourself? Visit the [VMware Cloud Foundation Hands-On Lab](#)



## Efficient use and simplified management of GPUs for AI/ML workloads

AI/ML workloads are gaining mainstream enterprise adoption as organizations adopt new data driven business models to gain competitive advantage in their markets. These workloads can help improve customer experience as well as increase operational efficiency. Typically involving training models, inferencing and data analytics, all of which are compute intensive, these workloads typically require GPU support and its efficient utilization to reduce costs.

VMware Cloud Foundation with Tanzu now supports the latest NVIDIA Ampere GPUs. By virtualizing GPUs and with multi-instance management support, these GPUs can be shared across multiple instances to deliver that increased optimization of resources and reduced costs. IT admins can quickly and easily provision self-serve capabilities to Data scientist and DevOps teams when building AI/ML data pipelines using these vGPUs with VMware Cloud Foundation and the NVIDIA AI Enterprise Suite (Figure 2) to address the issue of complexity of management of these resources.

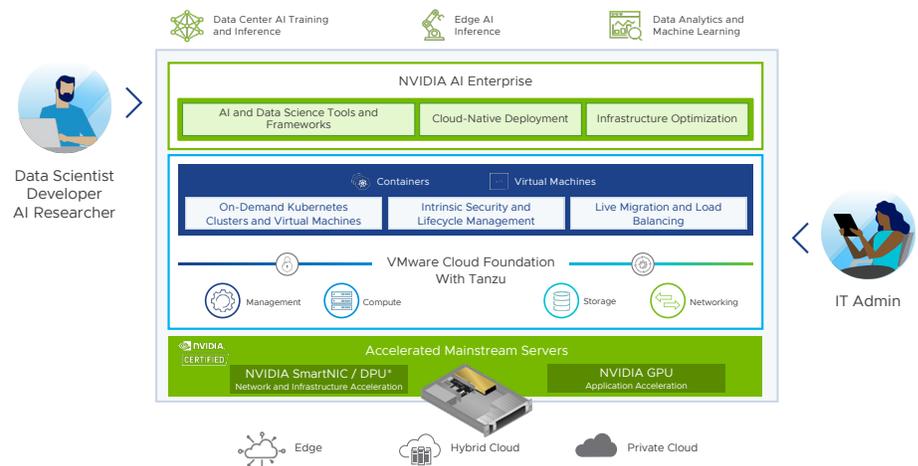


Figure 2: VMware Cloud Foundation AI Ready Enterprise Platform

## VMware Cloud Foundation takeaways

- **Easy to deploy** and run integrated cloud infrastructure, including compute, storage, networking, security, and cloud management services for modern applications on the same platform as for traditional applications.
- **Boosts developer productivity**, allowing app teams to access cloud resources they are already familiar with through industry standard APIs.
- **Simple to operate and future proof hybrid cloud strategy** that is consistent and compatible across on- and off-premises environments with the ability to deploy VMs, containers, and any next-generation application needs.