

# How to Manage VMs and Containers Across Hybrid Cloud

VMware Cloud Foundation

START

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# Accelerating the Modern Enterprise with Modern Applications

In a world where organizations want both the flexibility and agility benefits of private and public cloud, hybrid cloud has emerged as the ideal solution and an enabler of digital transformation. In addition to providing the ability to put workloads where they can meet specific performance and capacity requirements, hybrid cloud can also meet the security, compliance, and governance requirements of today's enterprise.

As application needs and cloud strategies align to support digital transformation, application owners are becoming more involved in cloud strategy development. The resulting shift from virtual machine (VM) only environments to ones that support containers and Kubernetes, the popular container orchestration system, continues to be a significant influencer for cloud adoption. However, organizations need a highly available, reliable, and a scalable platform to run all of their business applications, regardless of whether they rely on VMs or containers.

Existing and new cloud-native applications with containers managed by Kubernetes are best supported by infrastructure that uses the same characteristics as public cloud for consistent operations across data center, cloud, and edge environments, whereas more “traditional” tiered applications may need to remain on-premises.

This eBook looks at how you, the IT Operator, can get consistent operations for VM and container-based workloads with a single platform, VMware Cloud Foundation™ with VMware Tanzu™ that includes vRealize Cloud Management. This solution gives you the best of both worlds with the ability to manage both on-premises and cloud deployments. With full end-to-end monitoring and visibility built-in, you can deploy and manage Kubernetes-based workloads on your familiar VMware vSphere tool stack to drive agility and productivity.

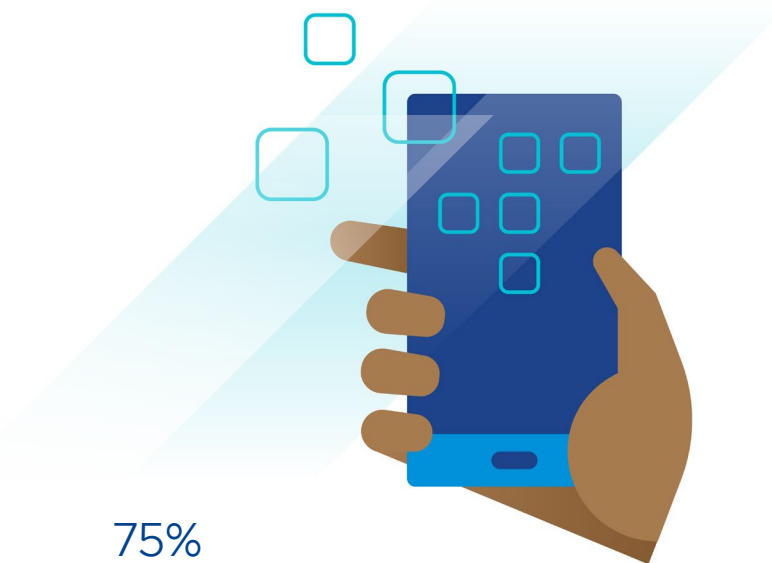
# Challenges for IT Leaders: Managing VMs and Containers

Moving from VMs to containers has become the next step for today's modern software development, especially because application architecture is becoming microservice-oriented. This creates an opportunity for you to support developers and application owners, while also creating a more collaborative partnership between developers and IT as your organization adopts new platforms for faster application development.

Traditionally, IT teams have focused on cost, operational efficiency, and risk mitigation, which means they are concerned about maintaining availability, performance, and infrastructure capacity.

On the other hand, developers focus on agility and productivity and are concerned with an application's security, performance, and usability. Developers like the freedom and agility that containers give them because they can consume infrastructure services programmatically and on-demand through API calls.

In short, IT teams can be considered infrastructure providers. And, developers can be considered consumers. As the infrastructure provider, you need a reliable and secure way to deliver rich infrastructure services directly to developers at their pace of software delivery.



75%

Growing adoption of cloud-native applications and infrastructure will increase use of container management to over 75% of large enterprises in mature economies by 2024 (up from less than 35% in 2020), May 29, 2020.

*Gartner, Forecast Analysis: Container Management (Software and Services) Worldwide*

## VMS AND CONTAINERS: WHAT'S THE DIFFERENCE?

The primary difference between VMs and containers is that containers provide a way to virtualize an OS so that multiple workloads can run on a single OS instance. VMs, on the other hand, virtualize the hardware to run multiple OS instances. The speed, agility, and portability of containers make them an ideal tool to help streamline software development. VMs and containers can co-exist and today many containerized workloads continue to run on VMs.

## BENEFITS OF CONTAINERS

- Development teams can move at a much faster pace with containers running microservices and developing cloud-native applications
- Applications can have better uptime with automated orchestration of containerized application services
- Transition from development servers to production environments is more consistent and predictable
- Container images can be smaller more efficiently use resources than VM images

This requires a solution that provides a self-service experience, with API consumable services, and enables programmatic release automation to give developers confidence that code will make it securely into production across hybrid cloud. Because you will need to maintain and manage both VMs and containers with Kubernetes across on-premises and public cloud, a new set of challenges is created.

### Management complexity

Containers and Kubernetes are still new to most IT teams. Kubernetes orchestrated container workloads may be more complex. As such, existing operational processes and tools may not support container/cluster management and deployment.

### Skill gaps / shortages

The lack of resources and expertise for specialized technology is creating a management burden that demands different skill sets. This requires retraining IT staff or hiring high-demand professionals with new infrastructure skills in containers and Kubernetes, potentially creating a skills shortage.

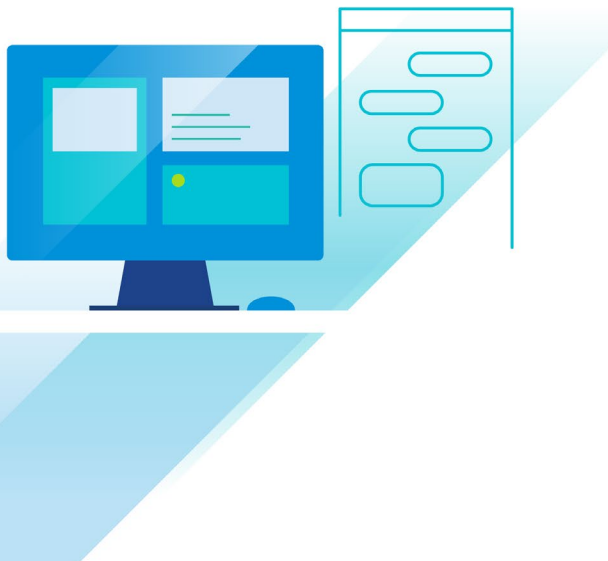
### Maintain governance

Ensuring that end users and stakeholders are following IT policies and governance to minimize business risks, is more complex with different application types across multiple environments.

### Deployment times

Developers use CI/CD tools and development sprints that consume resources via API in order to maximize developer productivity. Deploying and managing clusters that support on-demand and programmatic infrastructure consumption is a significant undertaking.

You need a tool that manages your VMs and containerized applications while providing monitoring and visualization with a single, unified dashboard. 



# VMs and Kubernetes: Get the Best of Both Worlds with VMware

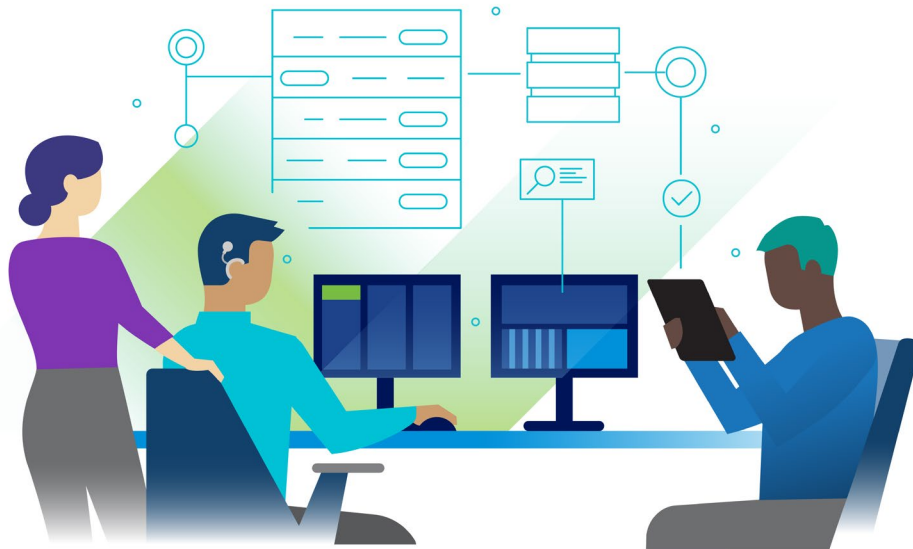
With VMware Cloud Foundation with Tanzu that includes vRealize Cloud Management tools now optimized for Kubernetes, you don't have to choose between VMs and containers because you can manage both on a single platform. This solution enables you to run Kubernetes clusters using VMware Tanzu™ Kubernetes Grid™ (TKG) on top of vSphere. TKG is a Kubernetes-based container solution with advanced networking, a private container registry, life cycle management, monitoring and self-service. TKG simplifies the deployment and operation of Kubernetes clusters, so you can run and manage containers at scale on private and public clouds.

## WHAT IS KUBERNETES?

Kubernetes is an open-source container orchestration platform for managing and automating application deployment and scaling.

## WHAT IS VMWARE TANZU KUBERNETES GRID?

VMware Tanzu Kubernetes Grid is VMware's Kubernetes distribution—built on open source technologies, packaged for enterprise adoption. A Tanzu Kubernetes cluster is deployed using VMware Tanzu Kubernetes Grid.



# Consistent Operations for Consistent Kubernetes Management

vRealize® Operations™, a component of vRealize Cloud Management, delivers self-driving consistent operations for Kubernetes management across on-premises, cloud, and edge environments with a unified, AI-powered platform. It self-optimizes infrastructure performance and capacity management of Kubernetes infrastructure alongside traditional virtual infrastructure and speeds remediation when issues occur for rapid troubleshooting. vRealize Operations brings a higher overlay level of Kubernetes management and monitoring and is able to monitor many Kubernetes solutions including VMware TKG (native TKG integration), but also non-vSphere platforms such as Amazon Web Services(AWS), Microsoft Azure, or Google Cloud Platform(GCP). Ultimately, it reduces the complexity of managing Kubernetes and expands the operational visibility to containers while supporting modern applications across any environment.

vRealize Operations allows developers to focus on consumption and monitoring applications at the application layer, while infrastructure and operations (I/O) teams focus on monitoring VMs and Kubernetes clusters at the infrastructure layer. You can extend your existing investments in VMware products and gain full end-to-end visibility into business applications for both VM-based or container-based workloads while minimizing staff retraining and reducing data center and cloud complexity. As a result, you can reduce costs while improving operational efficiency and increasing developer productivity and agility. This ensures that your IT investments are future-ready to support your organization's cloud and application modernization initiatives – driving a competitive advantage.

When you're ready, vRealize Operations gives you the capabilities you need. Let's take a look at some of the key features and OOTB content to get you started.



# Key Features for vRealize Operations Kubernetes Management

## Workload management in vSphere 7 cluster for auto-discovery

When you enable Workload Management for native vSphere® 7 with Kubernetes integrations, features are natively built into the vCenter adapter in vRealize Operations. It will automatically discover the Supervisor clusters, Namespaces, Pods, and your Tanzu Kubernetes clusters, eliminating manual process of discovering these objects (Figure 1). If you are looking for a simple way to manage your Kubernetes, vRealize Operations and vSphere 7 with Kubernetes is the easiest way to implement.

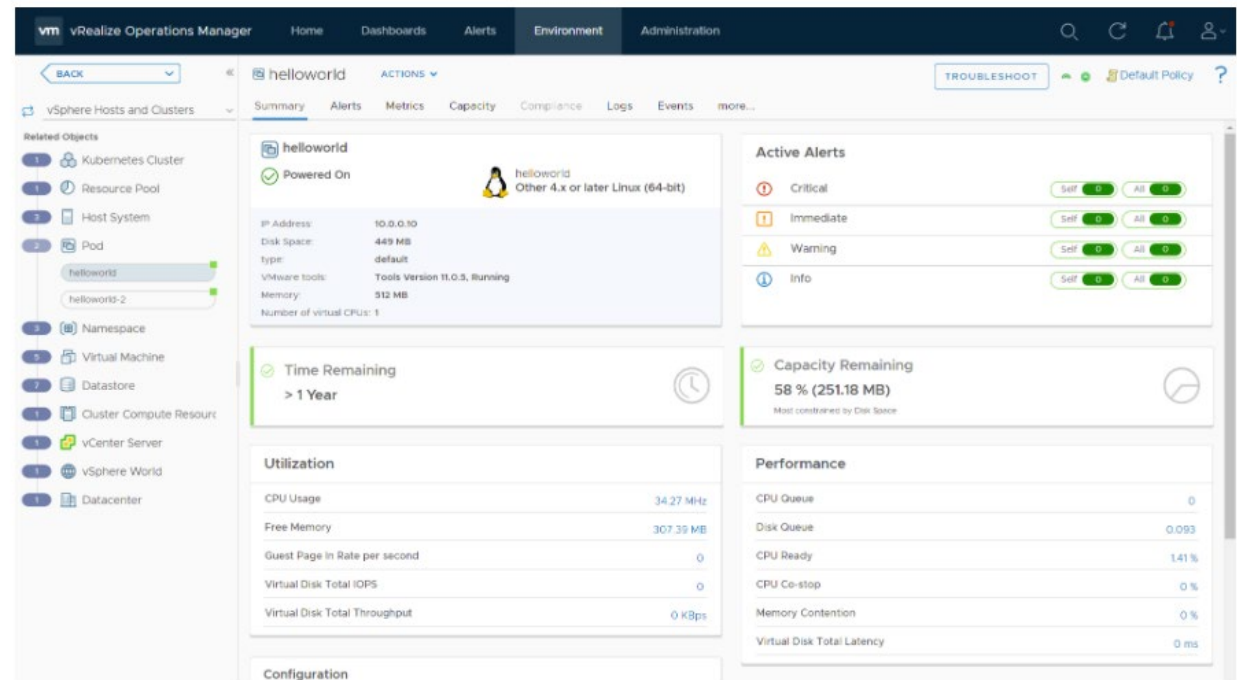


FIGURE 1. Workload management auto discovery

# Key Features for vRealize Operations Kubernetes Management

## Workload management inventory dashboard for faster troubleshooting

The native integration in vRealize Operations also includes new dashboards, alerts, reports, and views designed to provide information on the Workload Management environment as well as detailed information for the new object types. One new dashboard is the Workload Inventory dashboard, where you can easily view the relationships between the container world and the vSphere infrastructure, making it easier to troubleshoot and investigate usage from a single dashboard (Figure 2).

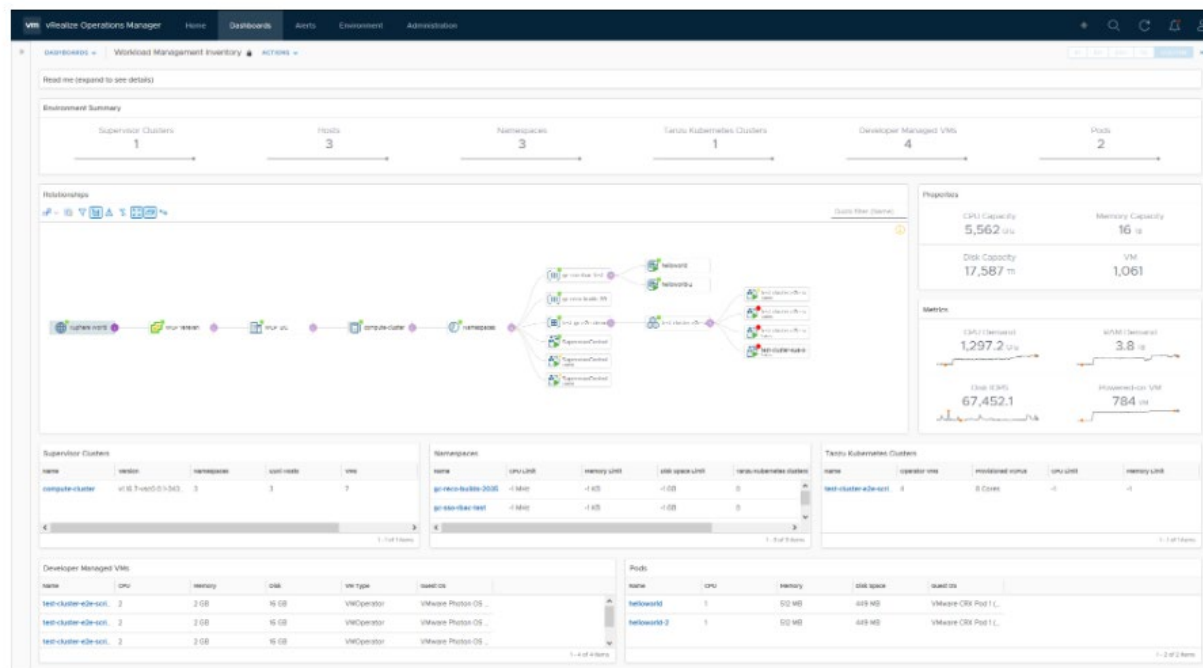


FIGURE 2. Workload management inventory dashboard



# Key Features for vRealize Operations Kubernetes Management

## Workload configuration dashboard reduces risk

The Workload Management Configuration is another great dashboard, which provides configuration details for your Workload Management environment. You can manage configuration drift and reduce risk related to outdated or incompatible versions and configurations (Figure 3).

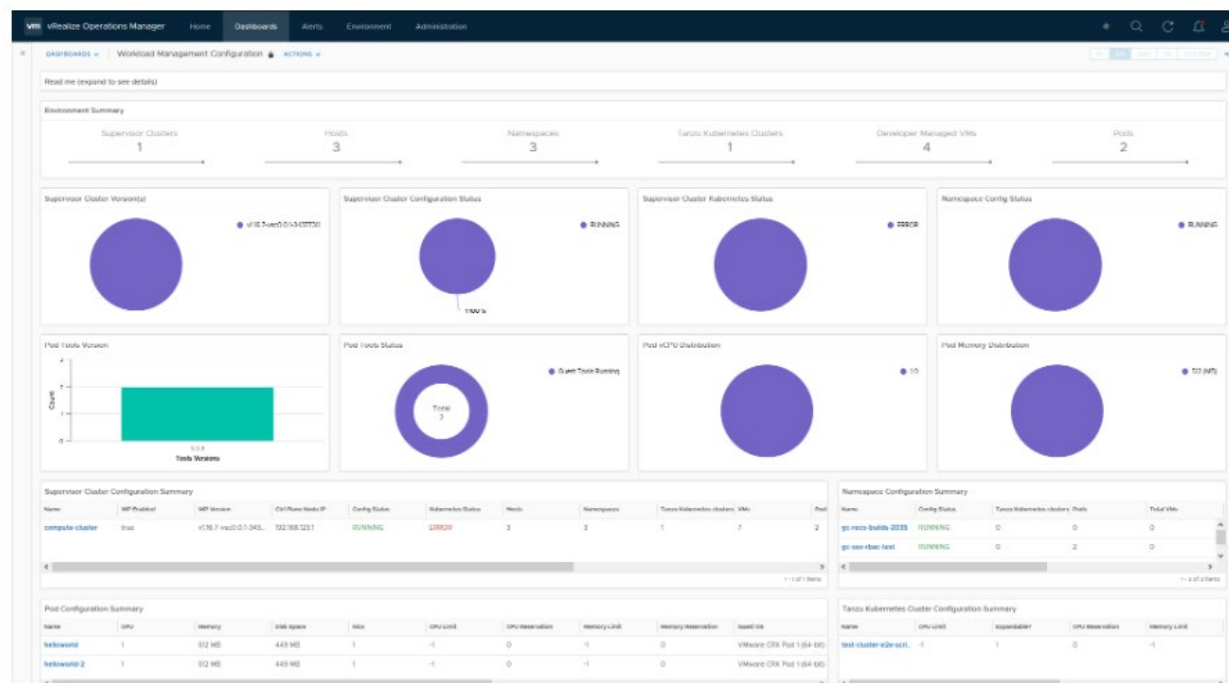


FIGURE 3. Workload configuration dashboard

# Key Features for vRealize Operations Kubernetes Management

## Monitoring Kubernetes with vRealize Operations across hybrid cloud

As you spin up private and public cloud environments with vRealize Operations, you can run Kubernetes APIs and get visibility into any Kubernetes platform that runs on top of vSphere with VMware Cloud Foundation, including TKG or Red hat OpenShift.

Finally, with vRealize Operations on the full-stack VMware Cloud Foundation with Tanzu platform, you can monitor Tanzu Kubernetes cluster with full stack observability, from upstream Kubernetes, meaning applications on non-vSphere platforms such as AWS, Azure, or GCP with management packs, SDDC infrastructure, all the way down to the physical infrastructure (Figure 4). This gives you the peace of mind to run your business applications with zero blind spots and complete control.

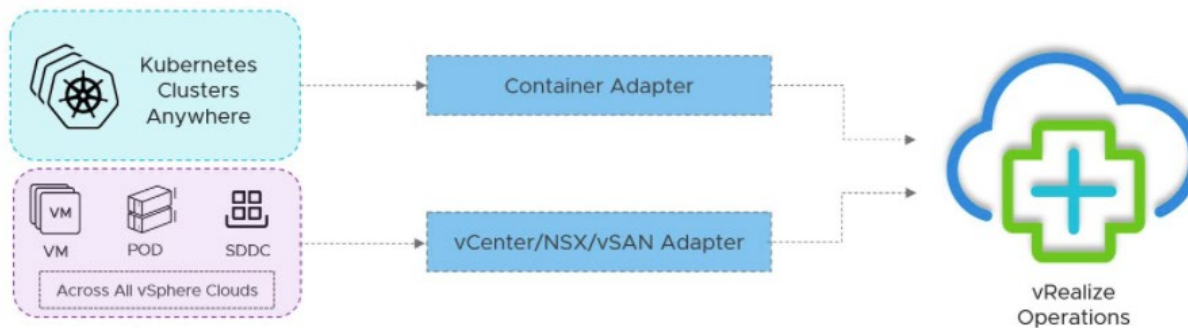


FIGURE 4. Upstream Kubernetes full stack observability

# Be Ready to Lead the Charge in Driving Future Innovations

As organizations turn to hybrid cloud as an enabler of digital transformation, they need a highly available, reliable and scalable platform to run business applications, regardless of whether they rely on VMs or containers. With VMware Cloud Foundation with Tanzu including vRealize Cloud Management, you can easily discover Kubernetes objects on the new platform. Once discovered, you can leverage powerful AI and predictive analytics in vRealize Operations to provide monitoring, troubleshooting, and capacity management for these new constructs. This provides you with the best of both worlds when managing VMs and container-based workloads across your hybrid cloud – you can support developers with faster feature development and ensure that IT operations is ready to lead the charge in driving future innovations.

To learn more about vRealize Operations Kubernetes Monitoring, visit [hybrid cloud management](#).

## ADDITIONAL RESOURCES

[Kubernetes Monitoring in vRealize Operations: What to monitor](#)

[Kubernetes Monitoring in vRealize Operations: How to Monitor](#)

[Container Operations with vRealize Operations](#)

[Monitor Tanzu Kubernetes clusters using vRealize Operations](#)



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