

# VMware Tanzu Kubernetes Grid Integrated Edition

## AT A GLANCE

VMware® Tanzu Kubernetes Grid Integrated Edition is a production grade Kubernetes-based container solution equipped with advanced networking, a private container registry, and full lifecycle management.

## KEY BENEFITS

- Eliminate lengthy deployment and management processes with on-demand provisioning, scaling, patching and updating Kubernetes clusters via simple CLI or API.
- Access the latest stable Kubernetes release from the open source community
- Provide critical enterprise features for running production workloads such as high availability, rolling upgrades, health-checks and auto-healing of the underlying virtual infrastructure
- Simplify container networking and increase security with VMware NSX-T™.
- Deploy Kubernetes both on prem on vSphere and in public clouds
- Deploy Kubernetes clusters for both stateless and stateful applications
- Secure application deployments with an integrated enterprise container registry with vulnerability scanning, image signing and auditing.
- Improve operational efficiency with monitoring, logging, and analytics through out-of-box integration with Wavefront by VMware, VMware vRealize Operations and VMware vRealize Log Insight.

## What is VMware Tanzu Kubernetes Grid Integrated Edition?

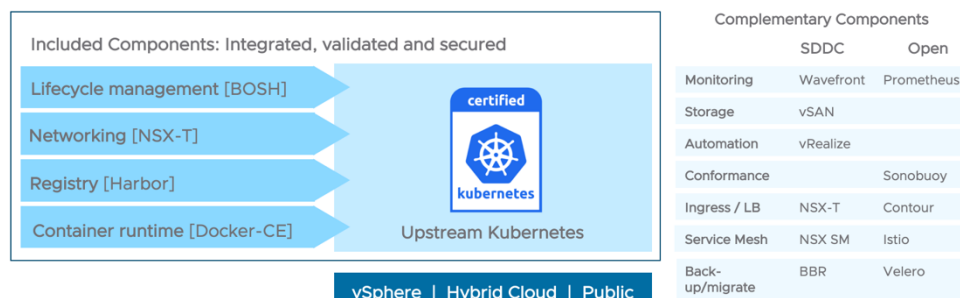
VMware Tanzu Kubernetes Grid Integrated Edition is a purpose-built container solution to operationalize Kubernetes for multi-cloud enterprises and service providers. It significantly simplifies the deployment and management of Kubernetes clusters with day 1 and day 2 operations support. With hardened production-grade capabilities, VMware Tanzu Kubernetes Grid Integrated Edition takes care of your container deployments from the application layer all the way to the infrastructure layer.

VMware Tanzu Kubernetes Grid Integrated Edition is built-in with critical production capabilities such as high availability, auto-scaling, health-checks, as well as self-healing and rolling upgrades for Kubernetes clusters. It provides the latest stable Kubernetes release, so developers have the latest features and tools available to them. It also integrates with VMware NSX-T for advanced container networking including micro-segmentation, ingress controller, load balancing and security policy. Through an integrated private registry, VMware Tanzu Kubernetes Grid Integrated Edition secures container image via features such as vulnerability scanning, image signing and auditing.

VMware Tanzu Kubernetes Grid Integrated Edition exposes Kubernetes in its native form without adding any layers of abstraction or proprietary extensions, which lets developers use the native Kubernetes CLI that they are most familiar with. VMware Tanzu Kubernetes Grid Integrated Edition can be easily deployed and operationalized via Operations Manager, which allows a common operating model to deploy VMware Tanzu Kubernetes Grid Integrated Edition across multiple IaaS abstractions like VMware vSphere®, Google Cloud Platform (GCP), Amazon Web Services (AWS), and Azure.

## VMware Tanzu Kubernetes Grid Integrated Edition Architecture

VMware Tanzu Kubernetes Grid Integrated Edition builds on Kubernetes, BOSH, VMware NSX-T, and Project Harbor to form a production-grade, highly available container runtime that operates on vSphere and public clouds. With built-in intelligence and integration, VMware Tanzu Kubernetes Grid Integrated Edition ties all these open source and commercial modules together, delivering a simple-to-use product for customers, ensuring the customers have the most efficient Kubernetes deployment and management experience possible.



**KUBERNETES CERTIFICATION**

Certified by the Cloud Native Computing Foundation® (CNCF®) in its Kubernetes Software Conformance Certification program, VMware Tanzu Kubernetes Grid Integrated Edition lets customers run applications with the confidence that their deployment has passed test suites and is compliant with the community's specification. As more organizations adopt Kubernetes, a certified Kubernetes product like VMware Tanzu Kubernetes Grid Integrated Edition ensures portability, interoperability, and consistency between different environments.

**Kubernetes**

Kubernetes is an open source container orchestration framework. Kubernetes orchestrates containers to manage and automate resource utilization, failure handling, availability, configuration, scalability, and desired state of the application. As an application and its services run in containers on a distributed cluster of virtual machines, Kubernetes choreographs all the moving pieces, so they operate in a synchronized way to optimize the use of computing resources and to maintain an application's desired state.

**BOSH**

BOSH is an open source tool for release engineering that simplifies the deployment and lifecycle management of large distributed systems. It allows developers to easily version, package, and deploy software in a consistent and reproducible manner. BOSH can support deployments across different IaaS, such as VMware vSphere, Amazon Web Services, Microsoft Azure, Google Compute Platform (GCP), and OpenStack, and it has been used to successfully deploy and manage Cloud Foundry platform since its inception.

**VMware NSX-T**

VMware NSX-T provides advanced container networking and security features for Kubernetes clusters such as micro-segmentation, ingress controller, load balancing and security policy. It provides the complete set of Layer 2 through Layer 7 networking services that is needed for pod-level networking. With NSX-T integration in VMware Tanzu Kubernetes Grid Integrated Edition, enterprises can quickly deploy networks with micro-segmentation and on-demand network virtualization for containers and pods.

**Project Harbor**

Harbor is a trusted cloud native registry that stores, signs, and scans content, with the mission of providing cloud native environments the ability to confidently manage and serve container images. In addition to providing RBAC (Role-Based Access Control), LDAP (Lightweight Directory Access Protocol)/AD (Active Directory) support, Harbor enables enterprises with container image vulnerability scanning, policy-based image replication, as well as notary and auditing services.

**VMware Tanzu Kubernetes Grid Integrated Edition Control Plane**

A key component of VMware Tanzu Kubernetes Grid Integrated Edition, the control plane is the self-service interface responsible for the on-demand deployment and lifecycle management of Kubernetes clusters. It provides an API interface that enables self-service consumption of Kubernetes clusters. The API submits requests to BOSH which automates the creation, update, and deletion of Kubernetes clusters based on user requests.

**Key Capabilities of VMware Tanzu Kubernetes Grid Integrated Edition****Full lifecycle Management and Automation**

VMware Tanzu Kubernetes Grid Integrated Edition provides lifecycle management and automation for Kubernetes, making deployments, scaling, patching, and updating quick and easy. It provides a simple action-based command line interface and a public facing API that supports multiple use cases through the lifecycle of Kubernetes. With VMware Tanzu Kubernetes Grid Integrated Edition, IT admins can deploy multiple Kubernetes clusters in minutes. Scaling Kubernetes clusters can also be done easily via the simple CLI or API calls. Patching and updating one or more Kubernetes clusters are also made easier by VMware Tanzu Kubernetes Grid Integrated Edition through the same mechanism, making sure your clusters always keep pace with the latest security and maintenance updates. If the clusters are no longer required, the user can quickly delete them.

### High Availability

VMware Tanzu Kubernetes Grid Integrated Edition provides critical production-grade capabilities to ensure maximum uptime for workloads running in your Kubernetes clusters. With multi-AZ and multi-master/etcd support, it significantly improves high availability of your Kubernetes clusters running critical workloads in production. In addition, VMware Tanzu Kubernetes Grid Integrated Edition continuously monitors the health of all underlying VM instances and recreates VMs when there are failed or unresponsive nodes. It also manages the rolling upgrade process for a fleet of Kubernetes clusters, allowing clusters to be upgraded with no downtime for application workloads.

### Advanced Container Networking and Security

NSX-T equips VMware Tanzu Kubernetes Grid Integrated Edition with an automated, software-defined network for container interfaces and Kubernetes nodes and pods. With NSX-T, all the networking components such as load balancers, edge routers, firewalls both on the edge nodes and between workloads deployed across multiple clusters are automatically deployed. You get logical segmentation between the clusters and individual namespaces for better network security and isolation.

Each networking service supported by NSX-T is deployed in a highly available, fully redundant mode, if one of these services fail, NSX-T automatically switches over to another logical instance of the same component.

VMware Tanzu Kubernetes Grid Integrated Edition also supports Kubernetes deployment with multiple edge routers selectable on a per cluster basis, which provides complete isolation and autonomy for tenants. With network profile, VMware Tanzu Kubernetes Grid Integrated Edition allows advanced network configurability. For example, Kubernetes clusters can be deployed with either small, medium or large load balancers optimized for scale and throughput requests. And Kubernetes Nodes and Pods can be deployed in either NAT or No-NAT mode, allowing customers to choose between saving precious IP address space using the NAT'ed mode, or improving traceability and visibility of the workload traffic using the No-NAT mode.

With VMware Tanzu Kubernetes Grid Integrated Edition, any of the wide range of policies in NSX can be applied to container networking. Operational tools and troubleshooting utilities such as Traceflow, port mirroring and port connection tool can also be used to fulfill the production networking requirements for containerized applications.

### Secure Container Registry

VMware Tanzu Kubernetes Grid Integrated Edition provides an enterprise-grade container registry with secure, advanced services. VMware Tanzu Kubernetes Grid Integrated Edition container registry includes user management and access control with RBAC and AD/LDAP integration, which ensures proper level of authority and access for container images. It also offers security features such as image notary service to enable content trust by letting publishers sign the image during pushing and prevent the unsigned image from being pulled. With VMware Tanzu Kubernetes Grid Integrated Edition' private registry, users can also scan container images for vulnerabilities to mitigate the risk of security breaches related to contaminated container images.

### Latest Stable Upstream Kubernetes

VMware Tanzu Kubernetes Grid Integrated Edition is developed using mainline Kubernetes and delivers the latest stable Kubernetes release to your developers so they can use the latest features and patches from the community. In addition, without adding any proprietary abstraction layer on top of Kubernetes, VMware Tanzu Kubernetes Grid Integrated Edition exposes Kubernetes in its native form, letting developers or your

development tools interact with Kubernetes using the native Kubernetes interface, and also making workloads readily portable between different clouds.

#### **Persistent Storage**

VMware Tanzu Kubernetes Grid Integrated Edition allows customers to deploy Kubernetes clusters for both stateless and stateful applications. It supports the vSphere Cloud Provider storage plugin through Project Hatchway as well as the CSI storage plugin. This allows VMware Tanzu Kubernetes Grid Integrated Edition to support Kubernetes storage primitives for volumes such as, Persistent Volumes (PV), Persistent Volume Claims (PVC), Storage Classes and Stateful Sets on vSphere storage, and also brings in enterprise-grade storage features like Storage Policy Based Management (SPBM) with VMware vSAN™ to Kubernetes-based applications.

#### **Multi-Tenancy**

To isolate workloads and ensure privacy, VMware Tanzu Kubernetes Grid Integrated Edition supports multitenancy for multiple lines of business within an enterprise. Different users from different lines of business are able to use their own Kubernetes clusters. Additionally, with NSX-T micro-segmentation, Kubernetes namespaces can be secured for multiple teams using a shared cluster.

#### **Multi-Cloud**

VMware Tanzu Kubernetes Grid Integrated Edition is supported in an on prem deployment model as well as being deployed on cloud providers. With VMware Tanzu Kubernetes Grid Integrated Edition, you can deploy containerized application with Kubernetes on-premises on vSphere, or on public clouds such as Google Cloud Platform, Amazon EC2, and Microsoft Azure.

#### **vRealize Log Insight Integration for Log Management and Analytics**

VMware Tanzu Kubernetes Grid Integrated Edition comes with out-of-box integration with VMware vRealize® Log Insight™ to provide visibility into the core layers of the container platform, allowing pinpoint traceability and monitoring by intelligent data tagging. VMware Tanzu Kubernetes Grid Integrated Edition aggregates, tags, and ships all logs to Log Insight with searchable tags such as cluster, pod, namespace and container. Log Insight integration is centrally managed with Operations Manager. It allows SSL encryption of log data in transit, as well as log limiting/throttling to prevent overflow or loss of data to the Log Insight endpoint.

#### **vRealize Operations Management Pack for Container Monitoring**

With VMware vRealize Operations Management Pack for Container Monitoring, Virtual Infrastructure Administrators can get complete Kubernetes topology of Namespaces, Clusters, Replica Sets, Nodes, Pods, and Containers for monitoring Kubernetes clusters instantiated by Tanzu Kubernetes Grid Integrated Edition. The OOTB dashboard not only provides an overview of the Kubernetes eco-system, but also helps in troubleshooting by highlighting the Key Performance Index and alerts for various objects pertaining to Kubernetes clusters that are monitored. The management pack extends the monitoring capability of vRealize Operations Manager to provide insights to the Tanzu Kubernetes Integrated Edition based Kubernetes clusters to the Virtual Infrastructure administrator.

#### **Tanzu Observability Integration for Kubernetes Analytics, Monitoring and Alerting**

VMware Tanzu Kubernetes Grid Integrated Edition delivers built-in integration with Tanzu Observability for complete visibility into Kubernetes. The VMware Tanzu Kubernetes Grid Integrated Edition -- Wavefront integration offers sophisticated, customizable analytics-driven dashboards and alerts. It gives SREs, DevOps, and developer teams real-time visibility into the health and performance of Kubernetes clusters, nodes and pods down to

individual containers and their resource utilization. Wavefront can also alerts on Kubernetes KPIs, which are configurable to send to chosen alert targets whether by email, PagerDuty or other DevOps tools.

VMWARE TANZU KUBERNETES GRID INTEGRATED EDITION FEATURE LIST	
KEY FEATURES	BENEFITS
On-demand provisioning	<ul style="list-style-type: none"> <li>• Accelerates the deployment of Kubernetes clusters</li> <li>• Eliminates manual steps for deploying Kubernetes clusters</li> <li>• Minimizes mistakes and shortens time-to-value</li> </ul>
On-demand scaling	<ul style="list-style-type: none"> <li>• Scales up and down the cluster capacity easily</li> <li>• Eliminates manual steps and mistakes</li> <li>• Optimizes resource utilization</li> </ul>
On-demand patching	<ul style="list-style-type: none"> <li>• Centralizes and speeds up patching and updating of multiple Kubernetes clusters</li> <li>• Keeps Kubernetes clusters up-to-date and secure</li> </ul>
Rolling upgrades	<ul style="list-style-type: none"> <li>• Minimizes workload downtime by rolling upgrading a fleet of Kubernetes clusters</li> </ul>
Automatic health check and self-healing	<ul style="list-style-type: none"> <li>• Prevents issues with proactive monitoring of the health of all nodes</li> <li>• Ensures desired responsiveness of the application services by recreating failed/unresponsive nodes</li> </ul>
Multi-AZ	<ul style="list-style-type: none"> <li>• Improves high availability of the clusters by evenly spreading the cluster nodes across multiple AZs and support Kubernetes failure-domains</li> <li>• All NSX-T networking services are deployed in a fully redundant mode •</li> <li>• Enables enterprises to target Kubernetes deployments into a placement zone to meet particular data affinity, governance and performance requirements</li> </ul>
Multi-Master/etcd	<ul style="list-style-type: none"> <li>• Improves the high availability of the Kubernetes management plane by deploying multiple masters into multiple AZs to address any AZ outage or master nodes outage</li> <li>• Automatically creates load balancers to distribute API requests across multiple API servers. With health check monitoring, API requests get routed to only the healthy nodes, while BOSH takes care of resurrection of the unresponsive nodes</li> </ul>

Advanced container networking and security	<ul style="list-style-type: none"> <li>Increases developer and ops productivity by simplifying networking management and enhancing security</li> <li>Optimizes native container networking including automatic provisioning, micro-segmentation, ingress controller, load balancing and security policies</li> <li>Achieves better tenant isolation by supporting multiple Tier 0 routers</li> </ul>
Secure container registry	<ul style="list-style-type: none"> <li>Minimizes application breaches with enhanced container security</li> <li>Simplifies container image management and enhances security through image replication, RBAC, AD/LDAP integration, notary services, vulnerability scanning, and auditing</li> </ul>
Latest Stable Kubernetes Release	<ul style="list-style-type: none"> <li>Enhances developer productivity by letting developers access the most up-to-date Kubernetes features and tools</li> <li>Allows workloads to be portable between environments</li> </ul>
Native Kubernetes Support	<ul style="list-style-type: none"> <li>Increases developer productivity by offering them the native Kubernetes CLI and full YAML support</li> <li>Exposes Kubernetes in its native form with no proprietary extensions to prevent vendor lock-in</li> </ul>
CNCF Certified Kubernetes Distro	<ul style="list-style-type: none"> <li>Complies with the community's specification</li> <li>Ensures portability, interoperability and consistency between different environments cross-clouds</li> </ul>
VMware Tanzu Kubernetes Grid Integrated Edition Management Console	<ul style="list-style-type: none"> <li>Provides a unified installation experience for deploying to vSphere</li> <li>Provides a graphical user interface that assists with the configurations (like networking, Ops Manager Deployment, SSL certificate, BOSH director, Tanzu Kubernetes Grid Integrated Edition Control Plane, and Harbor) when deploying to vSphere</li> <li>Monitor and manage the operation of Tanzu Kubernetes Grid Integrated Edition deployments, as well as perform upgrades and patch the individual components</li> </ul>
Enterprise Authentication	<ul style="list-style-type: none"> <li>Integrates with existing LDAP at VMware Tanzu Kubernetes Grid Integrated Edition control plane level in terms of cluster creation, scale and update</li> <li>Integrates with existing LDAP system down to the Kubernetes cluster level to simplify credential management with native Kubernetes RBAC</li> </ul>
Multi-tenancy	<ul style="list-style-type: none"> <li>Provides individual users with their own Kubernetes clusters</li> <li>Secures workloads between tenants</li> <li>Provides complete network traffic isolation and autonomy for tenants to bring their own IP address ranges</li> </ul>

Persistent Storage	<ul style="list-style-type: none"> <li>• Deploys Kubernetes clusters for both stateless and stateful applications</li> <li>• Supports vSphere Cloud Provider storage plugin which is part of Kubernetes through Project Hatchway as well as CSI plugin</li> </ul>
Multi-cloud	<ul style="list-style-type: none"> <li>• Runs on vSphere, GCP, Amazon EC2 and Azure</li> <li>• Optimizes workload deployment in multi-cloud environments by providing a single consistent interface to deploy and manage Kubernetes</li> </ul>
Integration with Wavefront by VMware	<ul style="list-style-type: none"> <li>• Offers real-time visibility into the operations and performance of containerized applications running in the Kubernetes clusters</li> <li>• Allows developers and dev ops to do APM (Application Performance Monitoring &amp; Management)</li> </ul>
Integration with vRealize Log Insight	<ul style="list-style-type: none"> <li>• Delivers highly scalable log management with actionable dashboards, analytics, and broad third-party extensibility</li> <li>• Enables deep operational visibility and faster troubleshooting</li> </ul>
Integration with vRealize Operations	<ul style="list-style-type: none"> <li>• Delivers complete Kubernetes topology of Namespaces, Clusters, Replica Sets, Nodes, Pods, and Containers for monitoring Kubernetes clusters instantiated by Tanzu Kubernetes Grid Integrated Edition</li> <li>• Provides an overview of the Kubernetes ecosystem, and brings attention to KPIs and alerts for various objects pertaining to monitored Kubernetes clusters</li> <li>• Extends the monitoring capability of vRealize Operations Manager to provide insights to the Tanzu Kubernetes Grid Integrated Edition based Kubernetes clusters to the Virtual Infrastructure administrator</li> </ul>