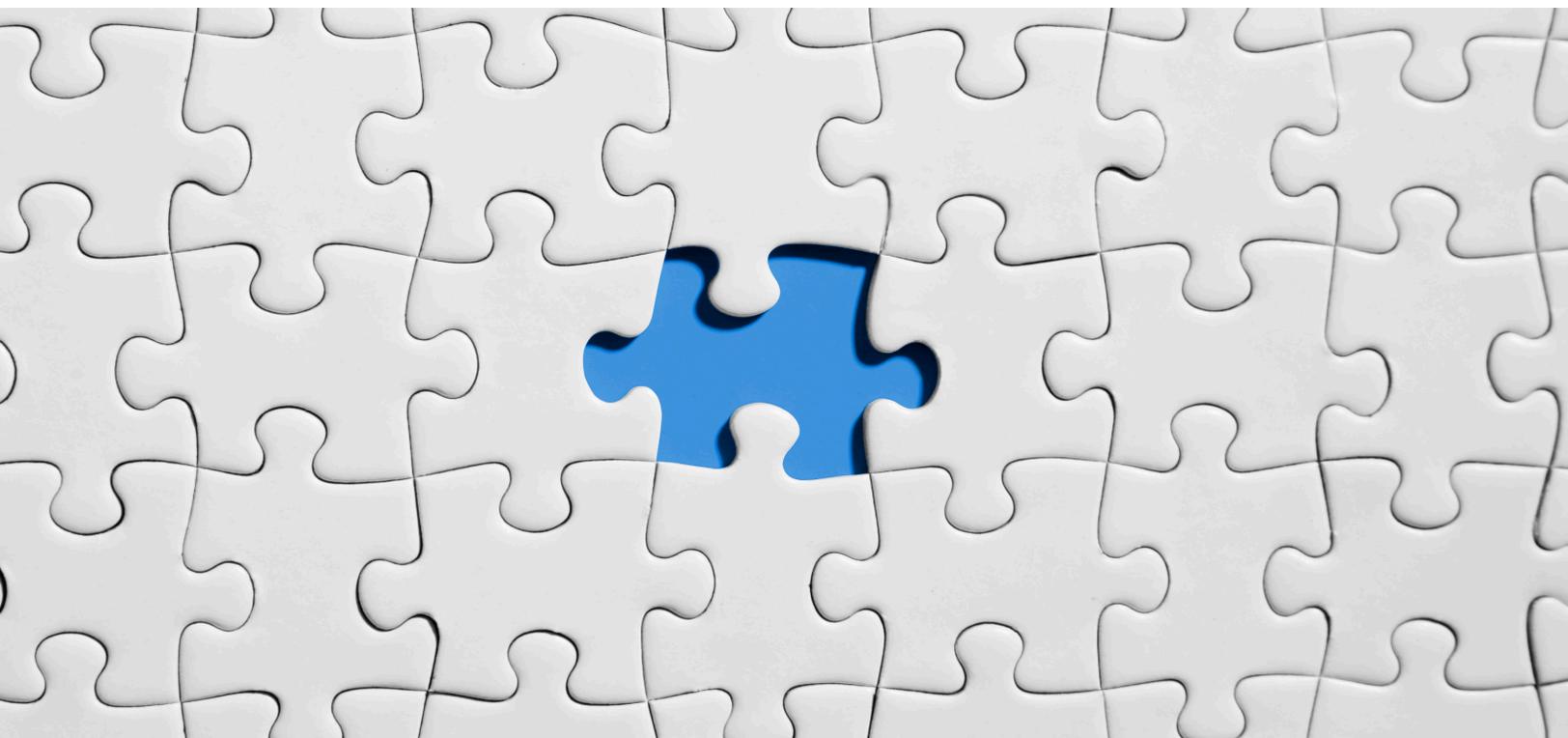


EASE OPERATIONS WITH TANZU KUBERNETES GRID



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Executive Summary

This article discusses the issues facing cloud deployment models. It gives a brief overview of how complex cloud environments can be simplified with Tanzu Kubernetes Integrated Grid deployment. This article also demonstrates how Dell Technologies PowerStore is compatible with this deployment and how it eases operability and management.

Introduction

Industries of all type have developed ever-changing demands for services; there is more data, more applications, more devices, and more users. Data ownership is gradually shifting from IT to the business units driving them to switch their preference toward the cloud to meet the holistic needs of their fast-growing organization. Most organizations have their own private cloud as well as public cloud to cater to their needs. However, the ideal scenario of an organization having only one public cloud vendor is far behind the reality with most of them having multiple public clouds for several reasons, such as unique application service/support due to mergers/acquisitions or shadow IT.

Opting for a cloud solution is a fast track to digitally transforming an organization's reach, be it the workforce or the infrastructure itself. The organization's IT becomes more consultative than the operative model it used to be while also opening the door to more innovation and developments in mobile applications which in turn addresses and increases value to the customer.

Background

Introduction to VMware Tanzu

VMware is a leader in the field of cloud computing and sales and support of virtualization software as well consistent innovation and customer satisfaction. While VMware once promised to help customers run any application on any cloud, keeping that promise is becoming increasingly complicated. The main issue is that Enterprises are facing a greater diversity of the applications. Along with existing traditional apps –those made to be sold to either a company or the general public – there are Cloud Native applications as well.

Customers running these diverse range of applications typically don't limit themselves to the one public cloud like we had mentioned. They run it across multiple clouds both private and public which adds to the complexity. The answer to this is VMware Tanzu which leverages the expertise and technology of VMware to enable customers to run their motive in three simple steps: Build, Run and Manage.

It allows the customer to Build modern applications, Run a common framework across multiple clouds with the help of Kubernetes, a container-based application and helps to Manage this entire footprint from a single point of control to ease operations for the customer.

Introduction to Containers

What's the big deal about containers?

Every company craves speed and agility in the Internet age. As an architect or software developer, nothing ever seems to fast enough for our users. Moreover, speed is addictive. Once you get a taste of it, whether it's from the event, deployment, or operation, you want more. In recent years, more and more developers are preaching "develop and test at the speed of Docker" with the intent to achieve speed with safety. The rationale is often that containers are indeed helping companies across industries accelerate software development and deployment at scale, while reducing costs and saving time for IT departments.

Here's how: before the arrival of containers, one of the most important resource drains within the software development lifecycle was discrepancy between the varied application hosting

environments along the deployment pipeline. Anywhere along the pipeline from a developer's laptop, to test, staging, and eventually, production, there might be any number of configuration differences that would cause the appliance to run improperly. It could take hours or even days, to recognize and hunt the basic cause for these discrepancies, a terrible waste of time and resources.

Containers are revolutionizing this process by providing very good environmental fidelity. With the portable nature of containers, you are, by definition, running your system under a uniform environment, all the thanks to production! The high adoption rate for containers as a crucial part of software development has proven containers should be a fundamental part of any enterprise application development and hosting strategy. Containers not only facilitate an application modernization roadmap; they prepare one's IT environment for the longer term.

We're at an inflection point with containers, almost like where virtual machines were roughly 10 years ago. There's an great deal of momentum behind the technology as developers, architects, and operations personnel are discovering the advantages it provides. Specifically, containers provide convenient development and packaging tools for developers that spread into IT and operations, dramatically lessening the discrepancies, hence increasing the speed and accuracy of software releases. That's something we, as an industry, haven't had before.

Barriers faced while using Containers

Now that we've established the validity and benefits of container usage, let's take it a step further by discussing how they're typically utilized in a production environment. With the arrival of microservices, it's commonplace to possess tens, hundreds, or maybe thousands of container instances running across multiple hosts to support a specific production workload.

It's one thing to spawn a couple of container instances by hand when we're developing software, but to use containers at scale, during a production environment, we must consider how the following list of requirements is often accomplished:

- Scheduling of container instances: which instance of the VM (or bare metal) should host the new container instance to maximize and optimize system resources?
- Monitoring of containers: when a container fails (and it will), what's going to stop the errant instance and restart another healthy instance?
- When the load increases, what's doing the load balancing by automatically starting more instances of container to require on the additional traffic?
- What if your company needs zero downtime deployment?

Still, think you'll manage this with in-house expertise?

This is often why a container orchestration framework like Kubernetes is introduced for this functionality to specialize in running our applications, safely, and reliably.

Introduction to Kubernetes

Kubernetes orchestrates the open-source containers for automating, management, deployment and scaling of the applications, managing and servicing both declarative configuration and automation. Its rapidly scalable ecosystem is widely used for its services, support and user-friendly tools.

Kubernetes plays a vital role as the bridge to the future of storage and application development by being a major layer of the deployment model when compared to what it was in the past few years, as shown in Figure 1.

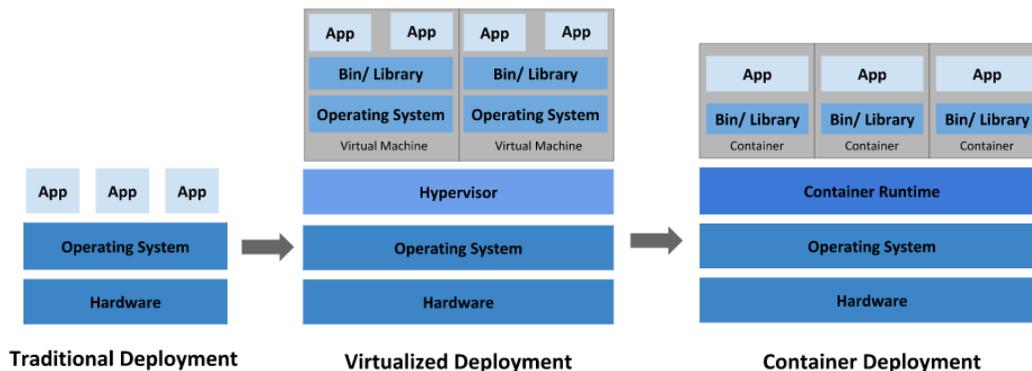


Figure 1: The timeline of deployment models

(Source: kubernetes.io/docs)

Imagine them as lightweight virtual machines. When a developer used containers to develop applications and deploy the same for usage there may come a time when the demand increases, and the only option is to scale the resources. As a result, instead of a handful of containers the developer will have to handle hundreds of the similar grey containers we see in Figure 1. With Kubernetes, the developer need only focus on one of the pods of the container and let the dedicated set of containers – called Master node – know how many need to be deployed and it takes care of the rest. This enables developers and admins to focus on other innovations for the organization.

The Tanzu and Kubernetes Overlap

VMware has the appropriate ecosystem and the right expertise to help you maintain and modernize the existing applications and at the same time create modern cloud-native applications side by side. But the major question is where will you run those applications? That's when Kubernetes comes into the picture.

Kubernetes can be on vSphere in your data center, across your public cloud, or at the edge as seen in Figure 2. It is always open source distribution with consistent cluster lifecycle management. Kubernetes can be compared to a basic utility, i.e. electricity and creating multiple containers creates something like the PowerGrid that we see for electricity which will help customers light up their application. With this we can easily identify that the next issue would be how we manage this.



Figure 2: Deployment of Kubernetes on Edge, Core and Cloud with consistent Lifecycle Management

(Source: VMwareCloudNativeApps/Youtube)

Here the Tanzu mission control comes into picture creating an overlap with Kubernetes making it a more powerful system. With the help of the Tanzu mission control the user will have total command over all the Kubernetes clusters and containerized applications which will help to solve the problem. To secure the footprint we can also automate policy enforcements and unlock the full potential of Kubernetes for your organization. The architects simply must design flexible footprints that address the demands of various teams or applications that are running on the containers.

Leveraging the use of self-service resources makes developers more self-sufficient and will make IT more consultative than operative. The operators will make the best use of the deployment and manage the ever-growing needs without any concerns about security, moving the organization one step closer to realizing their digital transformation goal.

VMware Tanzu Kubernetes Grid Integrated Edition

VMware Tanzu Kubernetes Grid Integrated Edition (formerly known as VMware Enterprise PKS) is a Kubernetes-based container solution that is integrated with Cloud Foundry BOSH and Ops Manager. The same is represented in Figure 3.

Tanzu Kubernetes Grid Integrated Edition (TKGI) facilitates deployment and operation of Kubernetes clusters so you can run and manage containers at scale on private and public clouds. With TKGI, it is possible to provision, operate, and manage Kubernetes clusters using the TKGI Control Plane.

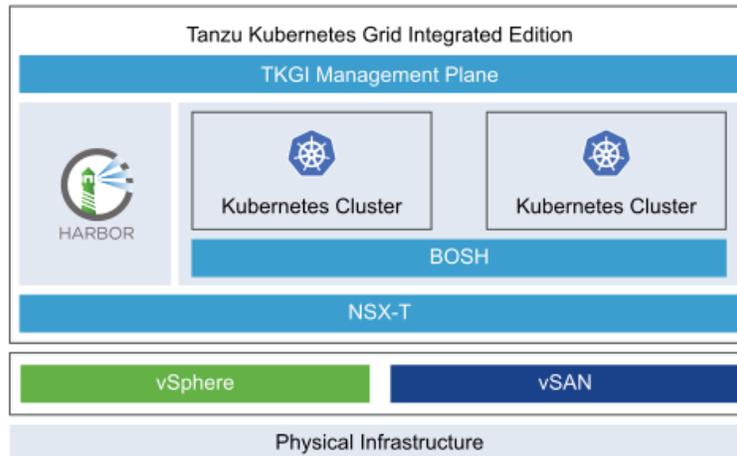


Figure 3: The Architecture of Tanzu Kubernetes Grid Integrated Edition

(Source: docs.vmware.com)

Implementation options for Tanzu Kubernetes Grid

TKGI can be implemented in three best known options as follows:

1. Standalone Tanzu Kubernetes Grid, a deployment for a multi-cloud Kubernetes footprint both on-prem and public cloud.
2. VMware Tanzu Kubernetes Grid service for vSphere, a tightly integrated Kubernetes experience available with VMware Cloud Foundation 4.0.
3. VMware Tanzu Mission Control, a hosted Tanzu Kubernetes Grid implementation for public cloud environments.

Ease with the VMware Tanzu Kubernetes Grid

Power your modern applications with VMware Tanzu Kubernetes Grid.

- Simplify Kubernetes for developers – Run the same K8s across data center, public cloud and edge for a consistent, secure experience for all development teams. Keep your workloads properly isolated and secure.
- Ease Day 1 and Day 2 operations – Get an absolute, easy-to-upgrade Kubernetes runtime with pre-integrated and validated components. Deploy and scale all clusters without downtime. Apply security fixes quickly.
- Align with open-source – Run your containerized applications on a certified Kubernetes distribution, supported by the global Kubernetes community.

Tanzu Kubernetes Grid Key Capabilities

TKGI unlocks a lot of benefits and capabilities to the users, including:

- Consistent Kubernetes everywhere: Use your existing data center tools and workflows to offer developers secure, self-serve access to conformant Kubernetes clusters in your VMware private cloud and extend an equivalent consistent Kubernetes runtime across your public cloud and edge environments.

- Automated multi-cluster operations: Simplify operations of large-scale, multi-cluster Kubernetes environments, and keep your workloads properly isolated. Automate lifecycle management to scale back your risk and shift your focus to more strategic work.
- Validated integrated services: Streamline the deployment and management of local and in-cluster platform services, i.e. networking, logging, storage services, to more easily configure, monitor and maintain a production-ready Kubernetes environment.
- Enterprise-wide management: As you scale your Kubernetes footprint, keep your operational burden low through integration with VMware Tanzu Mission Control. Get global visibility across teams, clusters and workloads. Automate multi-regional configuration and policy management.
- Kubernetes on vSphere: Extend your enterprise-ready Kubernetes operating model across data centers and clouds through integration with vSphere with Tanzu, available as part of vSphere 7 and VMware Cloud Foundation 4 stack.
- Expert support: Get 24x7 production support from VMware Global Support Services. Access guidance from the Kubernetes community and the broader cloud native ecosystem.

VMware Tanzu Kubernetes Grid Integrated on Dell Technologies PowerStore

PowerStore is Dell Technologies' groundbreaking mid-range storage portfolio. An all-flash data storage appliance, PowerStore helps eliminate traditional tradeoffs between performance, scalability and efficient storage. Its intelligent and adaptable infrastructure transforms and helps fast track both traditional and modern workloads. There are two PowerStore models; PowerStore T and PowerStore X.

Each of the PowerStore X model nodes are embedded with vSphere hypervisor to help run applications, hassle-free. At the same time, it can be used as a normal external array for storage, which contributes mainly in providing block-volume access to servers over Fiber channel or iSCSI.

The newly upgraded vSphere has numerous added features. including integration of TKGI to drive adoption of Kubernetes through familiar tools to the users. Dell Technologies PowerStore has Virtual Volumes (vVols) whose integration is a key component for the solutions adoption. It provides a more granular approach towards use with Kubernetes (as with VMware Cloud Native Storage). Each of the vVols we see represents a persistent volume in the Kubernetes.

With the help of the vVols we will be able to eliminate LUN management, ease the operation, accelerate the process of deployment and enable utilization of all the functionality of the array.

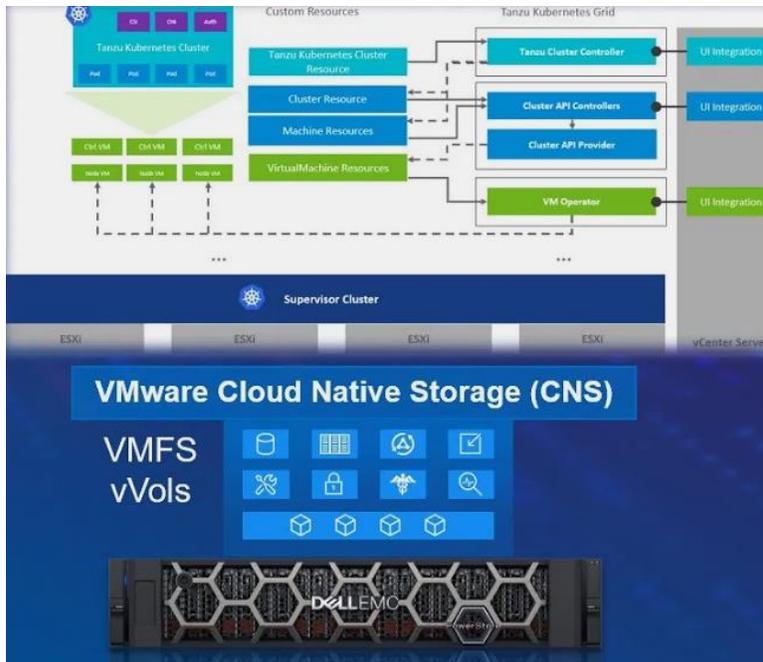


Figure 4: Tanzu Kubernetes Grid on PowerStore X

Source: (volumes.blog/itzkirsblog)

In our integration model we make use of the Kubernetes embedded within vSphere to build a Tanzu Kubernetes Grid (TKG) service, which helps us to deploy multiple Kubernetes clusters on top of the vSphere. A more detailed view is provided in Figure 4. The system is engineered to simplify the day one and day two operations with the help of TKG package’s open source technologies and automation tooling to help users get the system back up and running as normal and as fast as possible with a scalable, multi-cluster Kubernetes environment.

The key takeaway is that there's great flexibility within the Tanzu portfolio when it involves where applications are run and how they're managed. This flexibility comes with multiple decision points during the planning process of both modern infrastructure and modern applications – which means there's no right answer when determining how to adopt VMware Tanzu ‘just right’ scenarios.

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