

8 DECEMBER
2020

Aan de slag met K8S op vSphere in 3...2...1

Your Link to the VMware Community.

INTRODUCTION

Viktor van den Berg
Sr. Solutions Engineer @ VMware NL
VCDX-DCV, VCIX-CMA, VCIX-NV
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✉️ vvandenberg@vmware.com
🌐 <https://www.viktorious.nl>



agenda

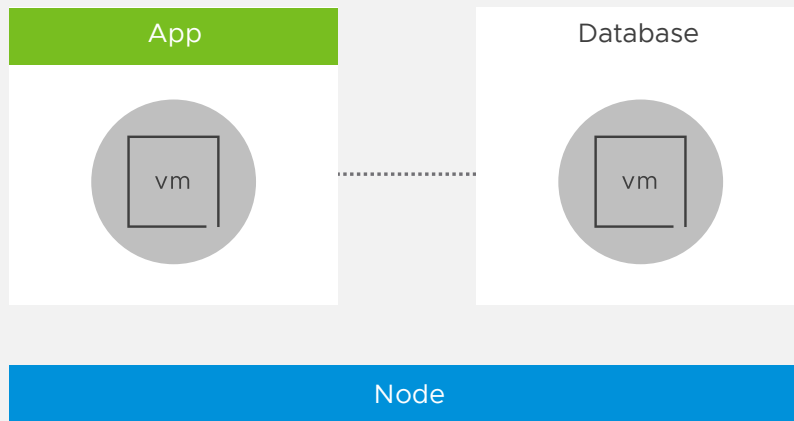
- Why vSphere with Tanzu?
- Networking Architecture
- Setup Networking
 - Setup HA Proxy
- Setup Workload Management
- Demo



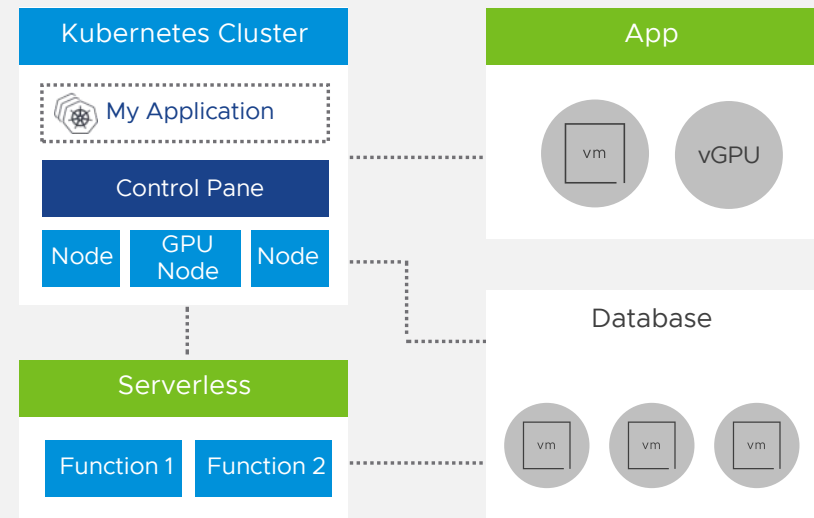
Why vSphere with Tanzu?

THE DEFINITION OF AN APPLICATION HAS CHANGED

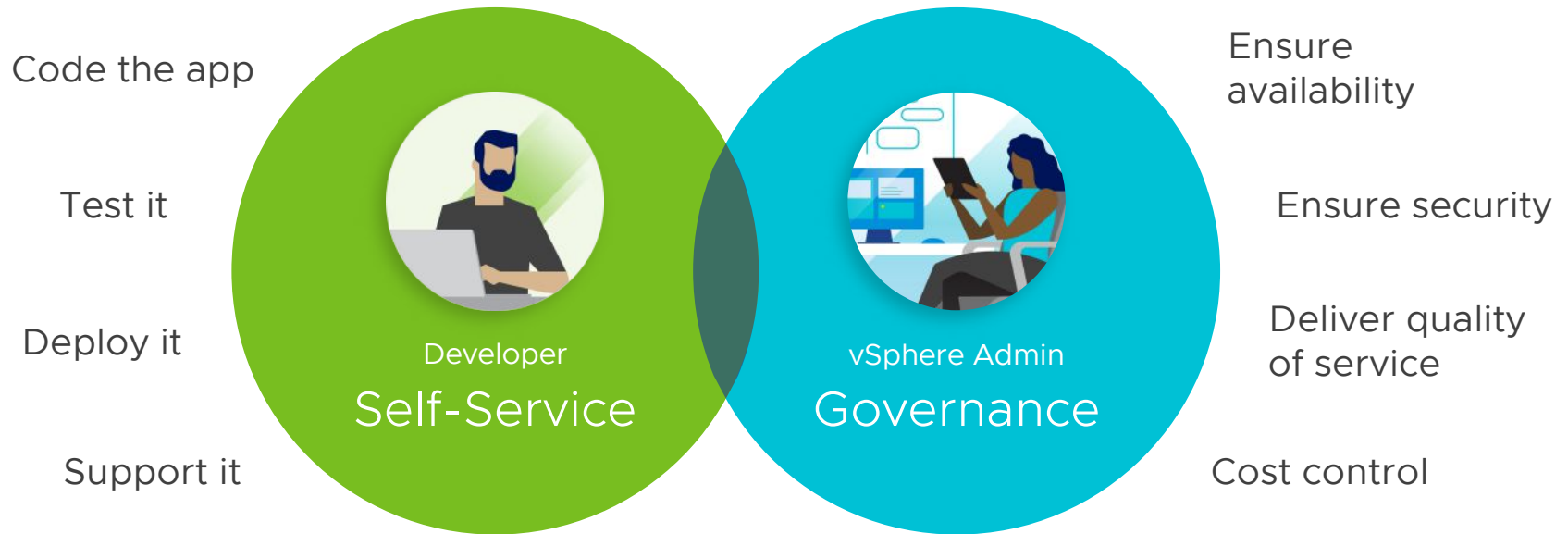
An application used to consist of a few VMs



Modern applications are distributed systems



DIFFERENT PRIORITIES FOR MODERN APPS

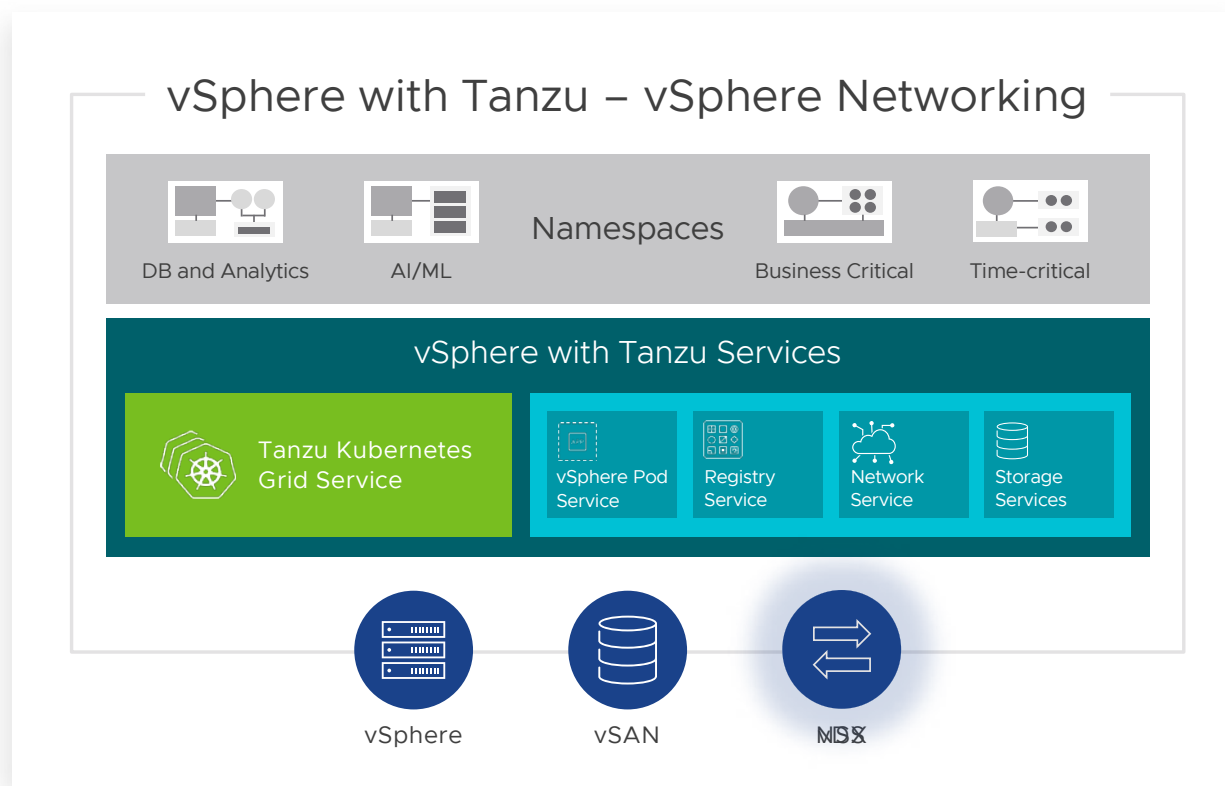


SIMPLIFIED DEPLOYMENT AND CONSUMPTION

vSphere with Tanzu



Developer



vSphere Admin

TANZU TRIAL IS INCLUDED IN VSPHERE 7 UPDATE 1

vm vSphere Client Menu Search in all environments admin_vbe@VIKTORIOUS.LOCAL

Namespaces 0

Workload Management Free Evaluation

Workload Management brings Kubernetes and Tanzu to vSphere.

You can enable Workload Management on any number of clusters. Each cluster will have a 60 day evaluation period.

Already have a Tanzu edition license?

[ADD LICENSE](#)

Basic Information

First Name

Last Name

Work Email

Company (optional)

Country

Phone Number

> Help us learn more about your experience with Kubernetes (optional)

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I have read and accept the [VMware End User License Agreement](#)

[GET STARTED](#)

This Evaluation supports

- Namespaces that allow application centric management
- Creation of Tanzu Kubernetes clusters
- Self-service for developers

Learn more

- Have a look at the [product documentation](#)
- [Click here](#) for real world examples and demonstrations

Recent Tasks Alarms



TANZU VSPHERE NETWORKING VERSUS NSX

1. vCenter Server and Network Select a vCenter Server and a network to enable a cluster

Warning: You must configure an HA Proxy instance with your vSphere environment before you setup Workload Management. You cannot complete the Workload Management setup without an HA Proxy instance. [Learn more](#) X

To enable Workload Management on a cluster, select the vCenter Server system that hosts the cluster.

Select a vCenter VCENTER.VIKTORIOUS.LOCAL (SUPPORTS NSX-T)

Select the networking stack that will provide connectivity to the Workload Management platform.

Select a networking stack option

- NSX-T
Supports vSphere Pods and Tanzu Kubernetes clusters.
- vCenter Server Network
Supports Tanzu Kubernetes clusters.

[NEXT](#)

With NSX-T

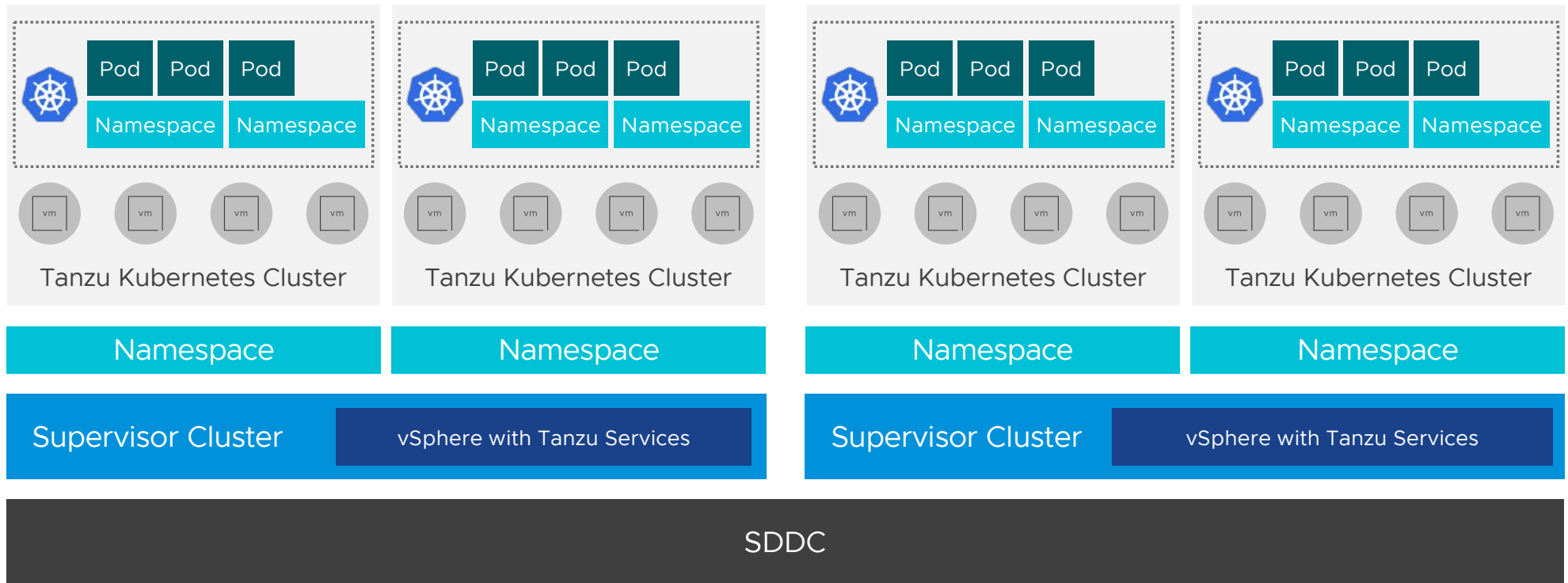
- Support for native PODs
- Support for Harbor (container registry)
- Automated deployment (through VCF)

Without NSX-T aka “vSphere Networking”

- No support for native PODs
- No support for Harbor
- HA Proxy is required





HIGH LEVEL ARCHITECTURE






TANZU VSPHERE NETWORKING VERSUS NSX

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[NEXT](#)

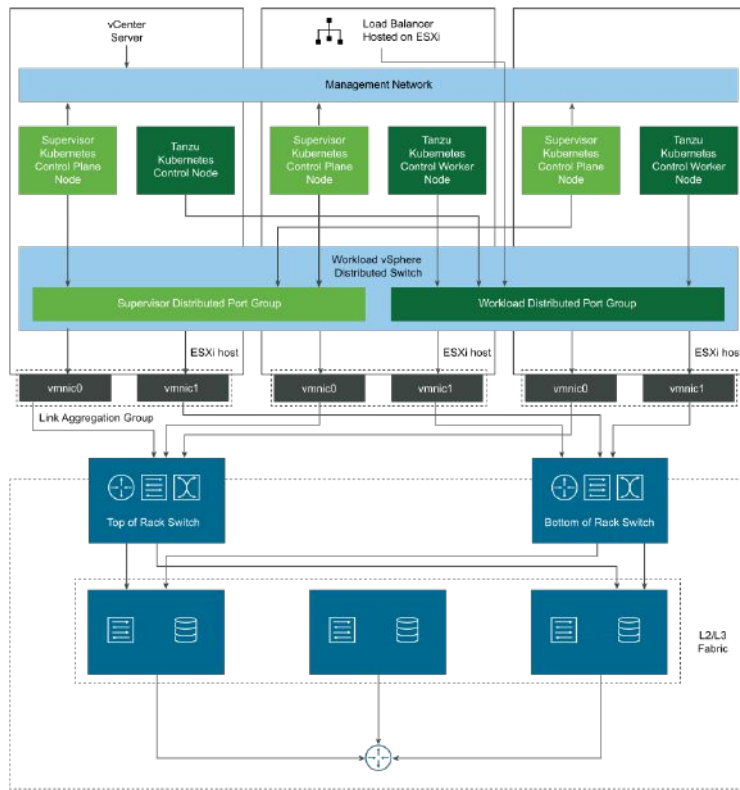




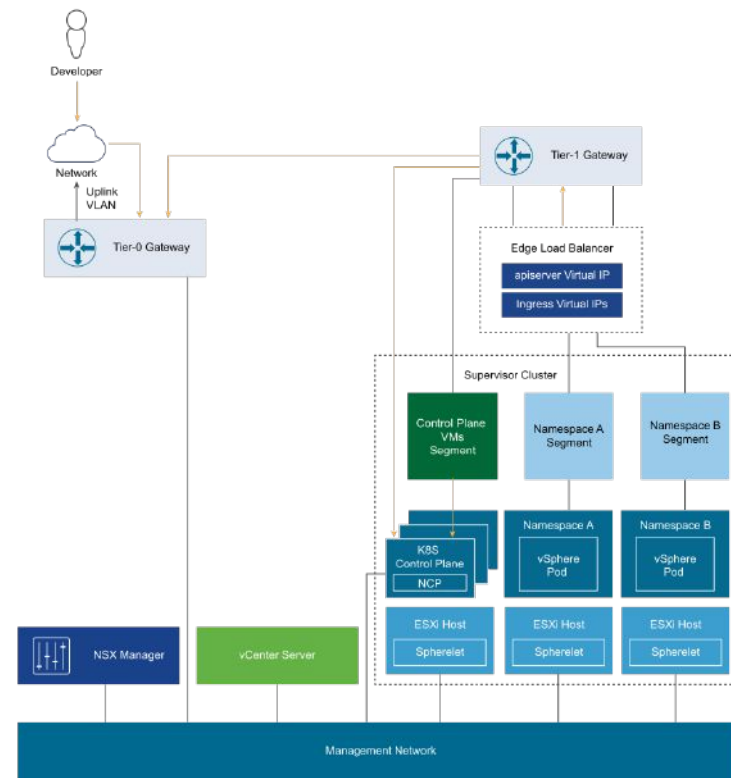
Networking architecture

NETWORKING ARCHITECTURES COMPARED

vSphere Networking



NSX



REQUIREMENTS FOR VSPHERE /W TANZU /W VSPHERE NETWORKING

Requirements for vSphere with Tanzu with vSphere Networking

- vSphere 7.0U1
- vCenter Server
- 3 ESXi hosts, 4 ESXi hosts if using vSAN
- 1 HA Proxy load balancer
- At least two networking segments (VLANs)

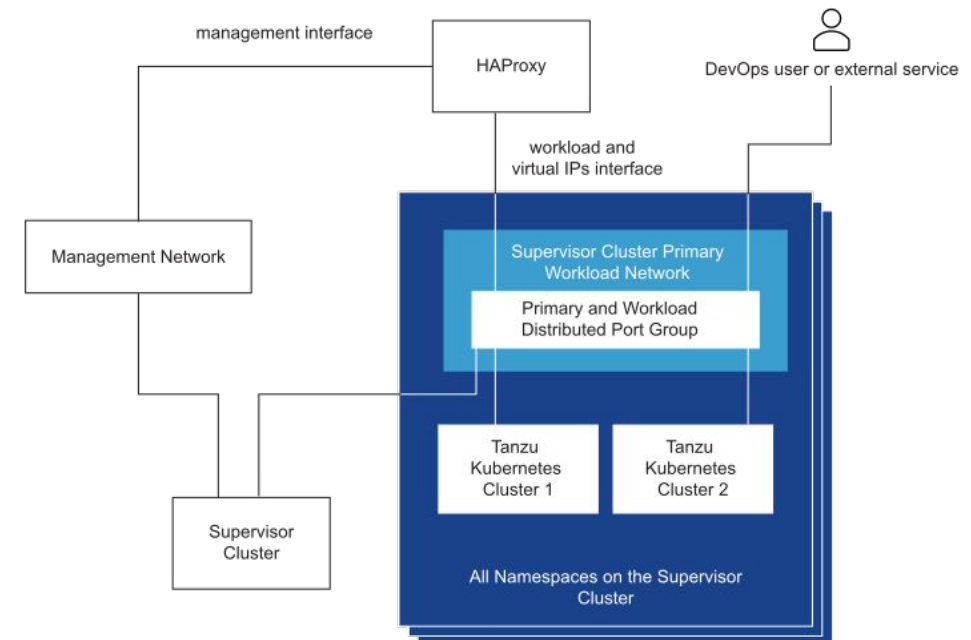


VSPHERE NETWORKING

HA Proxy is required for load balancing

Configure required network segments:

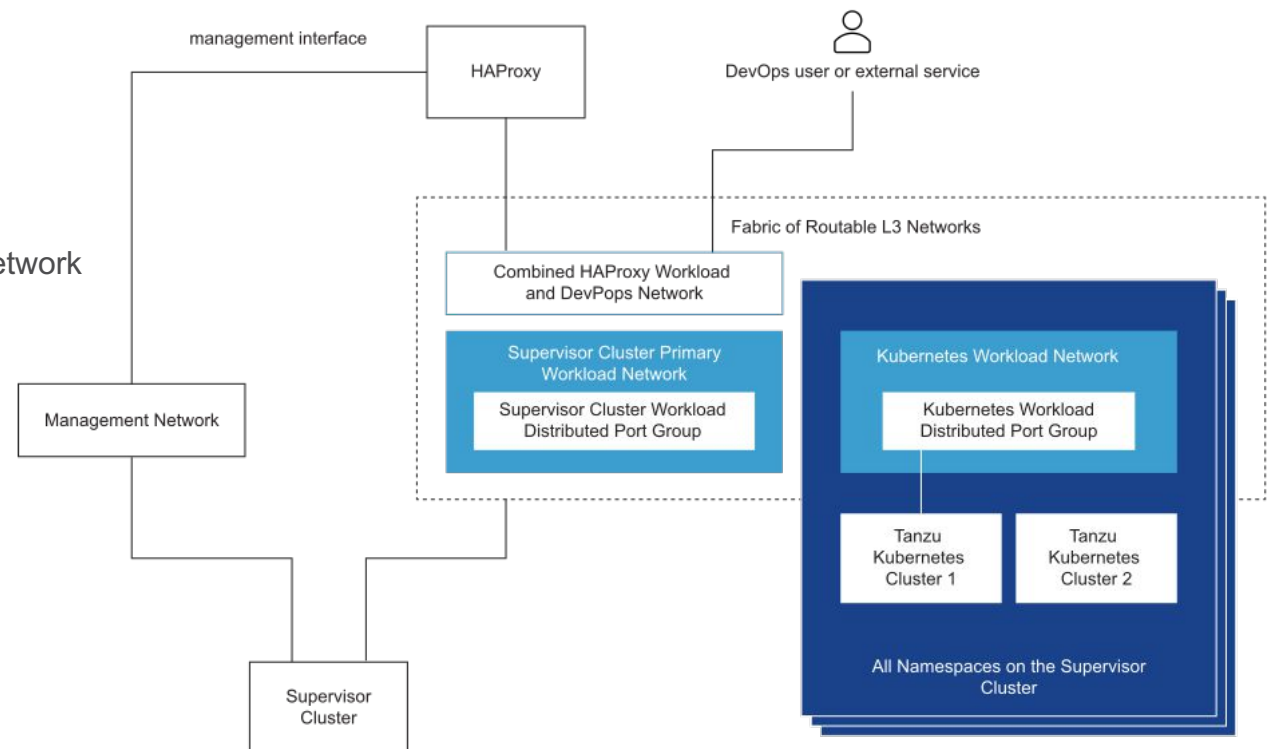
1. Topology with One Workload Network



VSPHERE NETWORKING

HA Proxy is required for load balancing
 Configure required network segments:

1. Topology with One Workload Network
2. Topology with an Isolated Workload Network

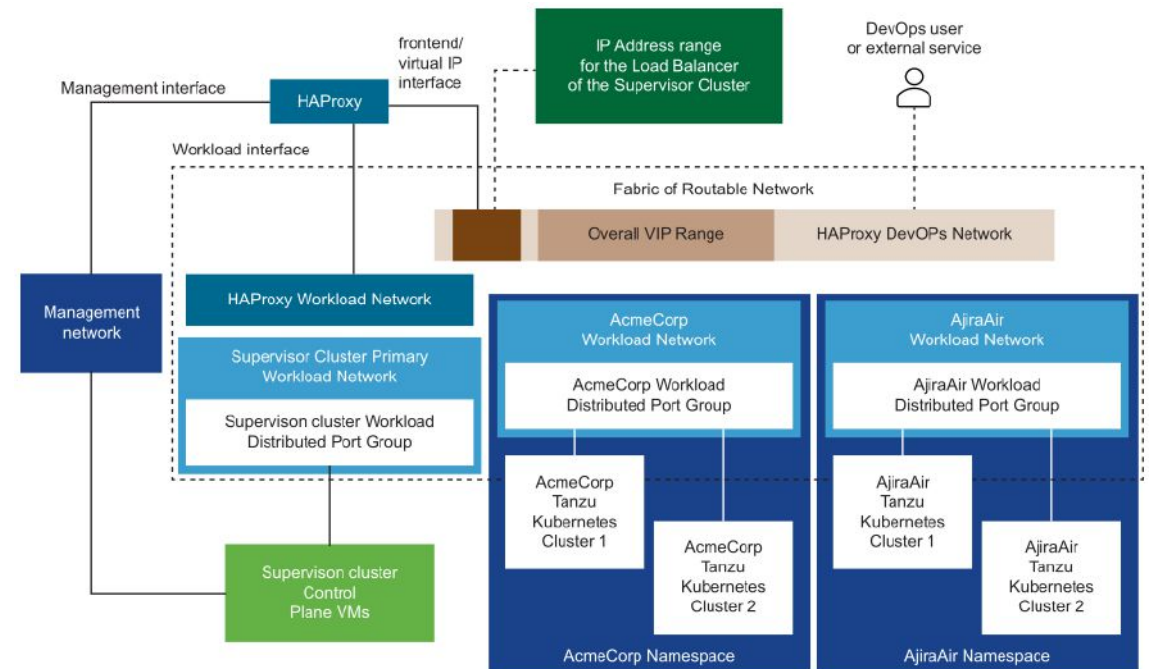


VSPHERE NETWORKING

HA Proxy is required for load balancing

Configure required network segments:

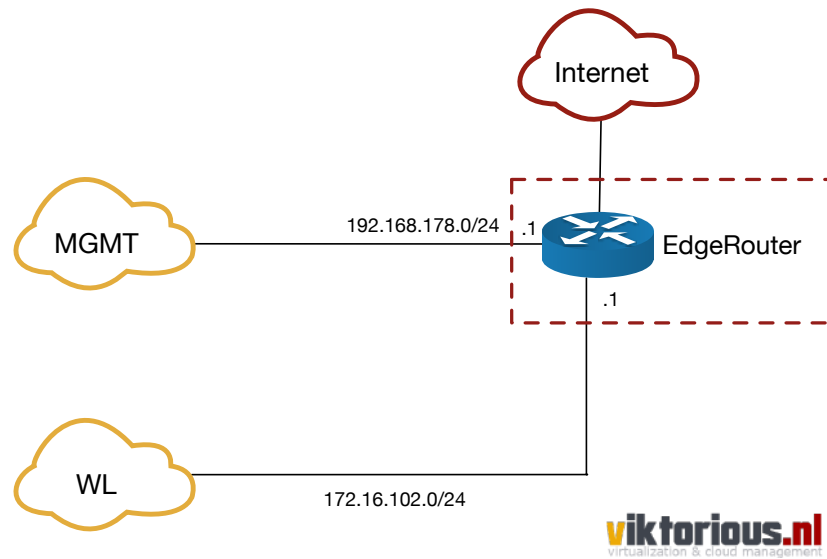
1. Topology with One Workload Network – 2 NICs
2. Topology with one (or more) Isolated Workload Network(s) – 2 NICs
3. Topology with a separate FrontEnd network – 3 NICs





Setup networking

CREATE NETWORK SEGMENTS



DEPLOY & CONFIGURE HA PROXY

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haproxytech / vmware-haproxy Watch 5 Star 12 Fork 1

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Sign up

master 1 branch 2 tags Go to file Code

corrieb Add a document on Virtual IP management with troubleshooting guide (... 0e58c46 10 hours ago 98 commits

ansible	Do not generate new certs if one already exists	2 months ago
docs	Add a document on Virtual IP management with troubleshooting guid...	10 hours ago
example	Disable DHCP and correct hostname in metadata	2 months ago
hack	Do not route workload and frontend networks via the gateway	2 months ago
.dockerignore	Initial commit	3 months ago
.gitignore	Initial commit	3 months ago
Dockerfile	Updated licenses to reflect HAProxy	3 months ago
Dockerfile.mTLS	Updated licenses to reflect HAProxy	3 months ago
LICENSE	Initial commit	4 months ago
Makefile	Use link files for early ethernet device initialization	2 months ago
README.md	Add a document on Virtual IP management with troubleshooting guid...	10 hours ago
kickstart.json	Add swap partition to HAProxy OVA	3 months ago
packer.json	[haproxy-ova] HAProxy 2.2.2	3 months ago

About
No description, website, or topics provided.
Readme
Apache-2.0 License

Releases 2
v0.1.8 (Latest) on 6 Oct
+ 1 release

Packages
No packages published

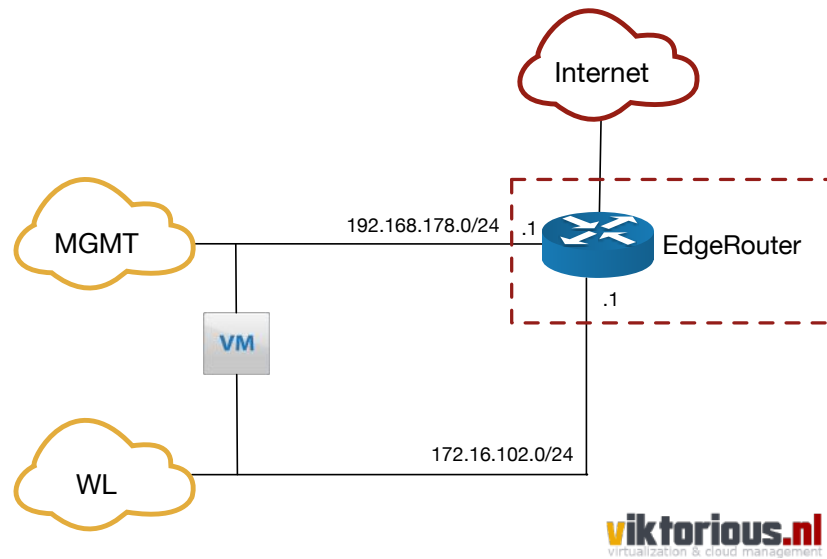
Contributors 4
akutz Andrew Kutz
brakthehack Brian Rak

<https://github.com/haproxytech/vmware-haproxy>

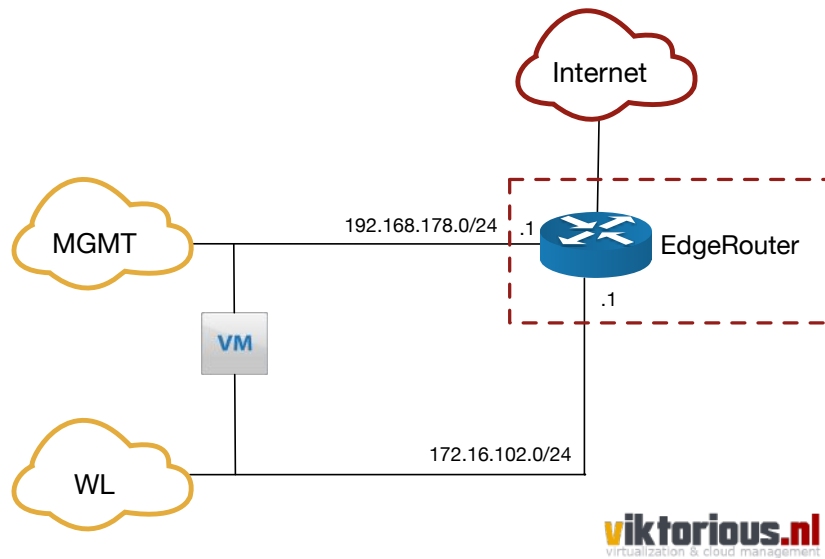


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DEPLOY & CONFIGURE HA PROXY



DEPLOY & CONFIGURE HA PROXY



Deploy OVF Template

- 1 Select an OVF template
- 2 Select a name and folder
- 3 Select a compute resource
- 4 Review details
- 5 License agreements
- 6 Configuration

Configuration

Select a deployment configuration

Default

Frontend Network

Description

Deploy the Appliance with 2 nics: a Management network (Supervisor -> HAProxy dataplane) and a single Workload network. Load-balanced IPs are assigned on the Workload network. NOTE: Deployment will ignore all "frontend" options

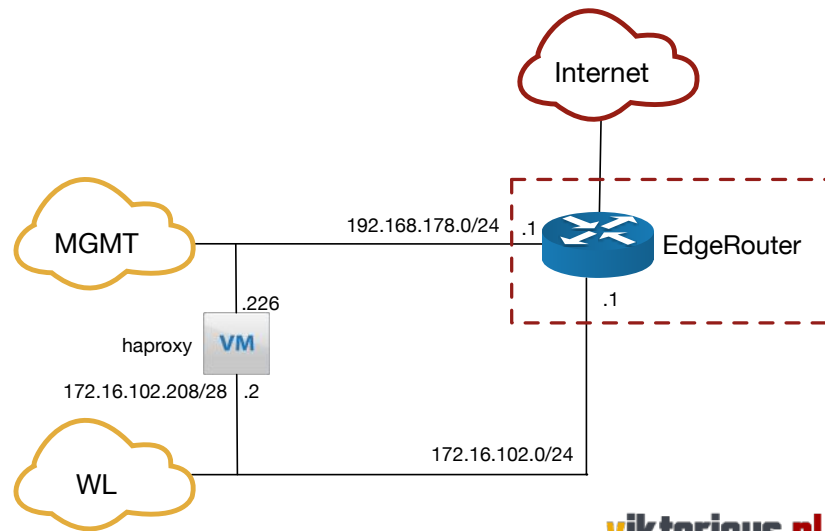
Select networks

Select a destination network for each source network.

Source Network	Destination Network
Management	DVS-VLAN0 (MGT) ▾
Workload	DVS-VLAN102 (WL) ▾
Frontend	Browse ... ▾

3 items

DEPLOY & CONFIGURE HA PROXY



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Virtualization & Cloud Management

2. Network Config	6 settings
2.1. Host Name	The host name. A fully-qualified domain name is also supported. <input type="text" value="haproxy.local"/>
2.2. DNS	A comma-separated list of IP addresses for up to three DNS servers. <input type="text" value="192.168.178.1"/>
2.3. Management IP	The static IP address for the appliance on the Management Port Group in CIDR format (Eg. ip/subnet mask bits). This cannot be DHCP. <input type="text" value="192.168.178.226/24"/>
2.4. Management Gateway	The gateway address for the workload network. This is also the default gateway for the appliance. <input type="text" value="192.168.178.1"/>
2.5. Workload IP	The static IP address for the appliance on the Workload Port Group in CIDR format (Eg. ip/subnet mask bits). This IP must be outside of the Load Balancer IP Range. <input type="text" value="172.16.102.2/24"/>
2.6. Workload Gateway	The gateway address for the workload network. <input type="text" value="172.16.102.1"/>

3. Load Balancing	4 settings
3.1. Load Balancer IP Ranges, comma-separated in CIDR format (Eg 1.2.3.4/28,5.6.7.8/28)	The IP ranges the load balancer will use for Kubernetes Services and Control Planes. The Appliance will currently respond to ALL the IPs in these ranges whether they're assigned or not. As such, these ranges must not overlap with the IPs assigned to the appliance or any other VMs on the network. <input type="text" value="172.16.102.208/28"/>
3.2. Dataplane API Management Port	Specifies the port on which the Dataplane API will be advertised on the Management Network. <input type="text" value="5556"/>
3.3. HAProxy User ID	Specifies the user ID used to authenticate to the Dataplane API. <input type="text" value="admin"/>
3.4. HAProxy Password	Specifies the password used to authenticate to the Dataplane API. (6-128 characters) Password <input type="password" value="*****"/> Confirm Password <input type="password" value="*****"/>

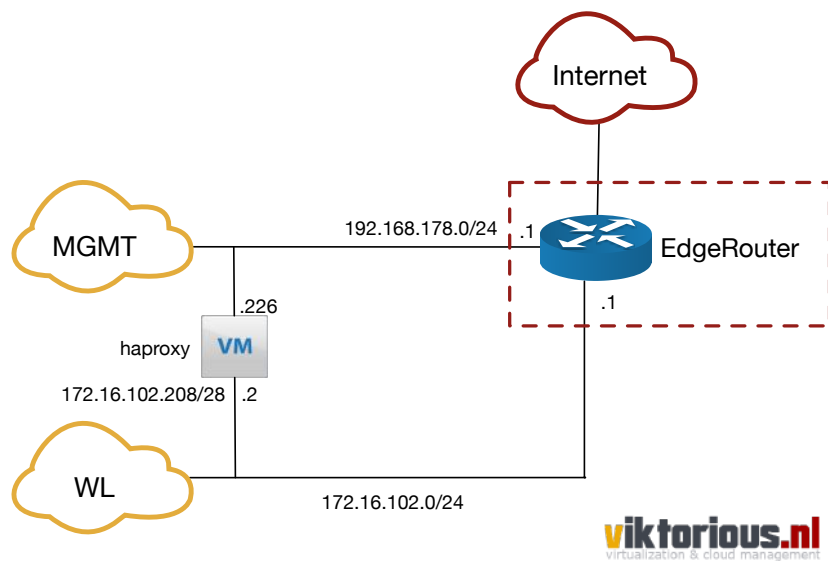
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Enable Workload Management

ENABLE WORKLOAD MANAGEMENT



Load Balancer Configure load balancer for workloads created on this cluster

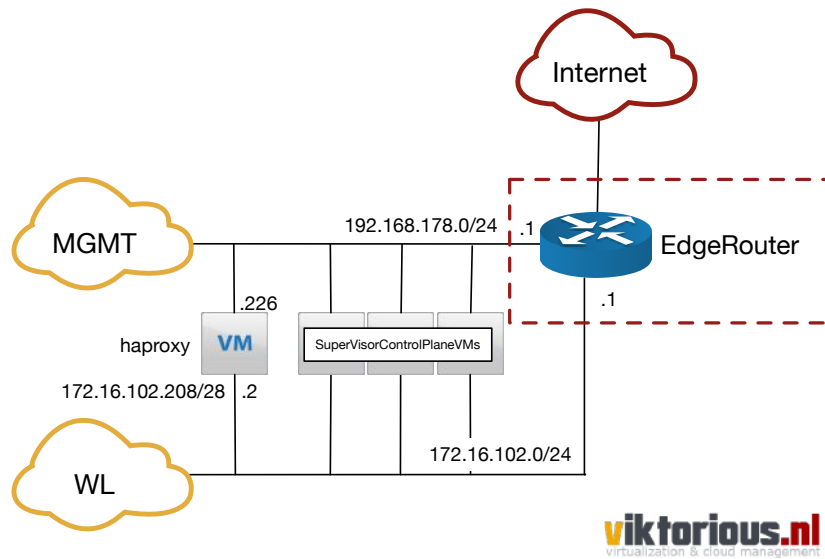
You must configure a load balancer to support the network connectivity to workloads from client networks and to load balance traffic between Tanzu Kubernetes clusters. The type of load balancer supported is HAProxy.

[VIEW NETWORK TOPOLOGY](#)

Name*	haproxy
Type*	HA Proxy
Data plane API Addresses(s)*	192.168.178.226-5556 <small>Separate multiple addresses by commas.</small>
User name*	admin
Password*	*****
IP Address Ranges for Virtual Servers*	172.16.102.208-172.16.102.223 <small>Separate multiple ranges by commas.</small>
Server Certificate Authority*	-----BEGIN CERTIFICATE----- MIIDpTCCAo2gAwIBAgIJAJqDS4x

[NEXT](#)

CONFIGURE WORKLOAD MANAGEMENT



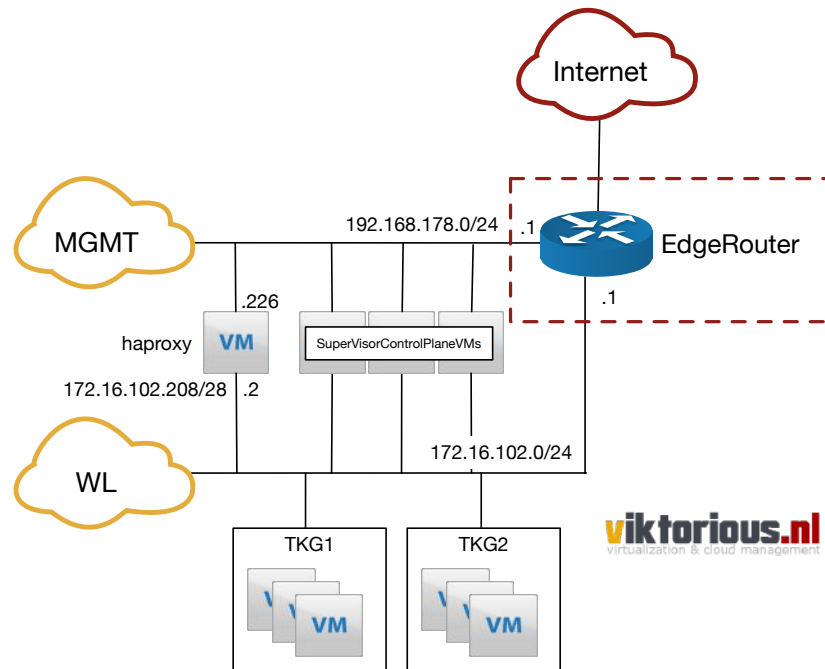
6. Management Network Configure Management network for the Control Plane and Worker nodes

The Workload Management consists of three Kubernetes control plane VMs and the Spherelet process on each host, which allows the hosts to be joined in a Kubernetes cluster. The cluster where you set up Workload Management is connected to a management network supporting traffic to vCenter Server. [VIEW NETWORK TOPOLOGY](#)

Network	DVS-VLAN0 (MGT)
Starting IP Address	192.168.178.171
Subnet Mask	255.255.255.0
Gateway	192.168.178.1
DNS Server	192.168.178.1
DNS Search Domains (Optional)	E.g. domain.local
NTP Server	192.168.178.1

[NEXT](#)

CONFIGURE WORKLOAD MANAGEMENT



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Virtualization & cloud management

Workload Network ✕

This network is assigned to workloads on this Supervisor Cluster.

Name

Set as Primary network for Supervisor Cluster workloads (i)

Port Group (i)

Filter

Port Group	Distributed Virtual Switch
<input type="radio"/> DVS-VLAN0 (MGT)	dvSwitch01
<input type="radio"/> DVS-EdgeUplink1-Overlay	dvSwitch01
<input type="radio"/> DVS-VLAN200 (Transit)	dvSwitch01
<input type="radio"/> segment01-uplink	dvSwitch01

1 - 4 of 12 items | < > 1 / 3 > |

Layer 3 Routing Configuration

Gateway (i)

Subnet (i)

IP Address Ranges (i)
Example: "0.0.0.0 - 0.0.0.255, 0.0.1.0 - 0.0.1.255".

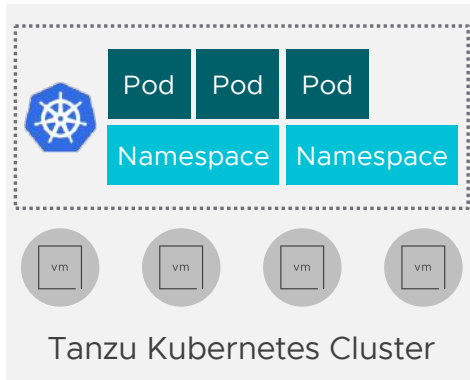
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The result

CREATE A NAMESPACE AND TKG CLUSTER



Namespace

Supervisor Cluster vSphere with Tanzu Services

Supervisor Cluster vSphere with Tanzu Services

SDDC

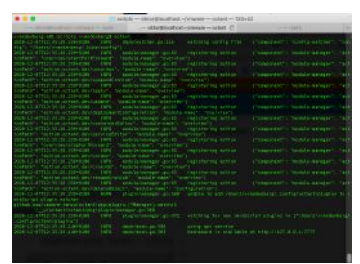


SIMPLIFIED DEPLOYMENT AND CONSUMPTION

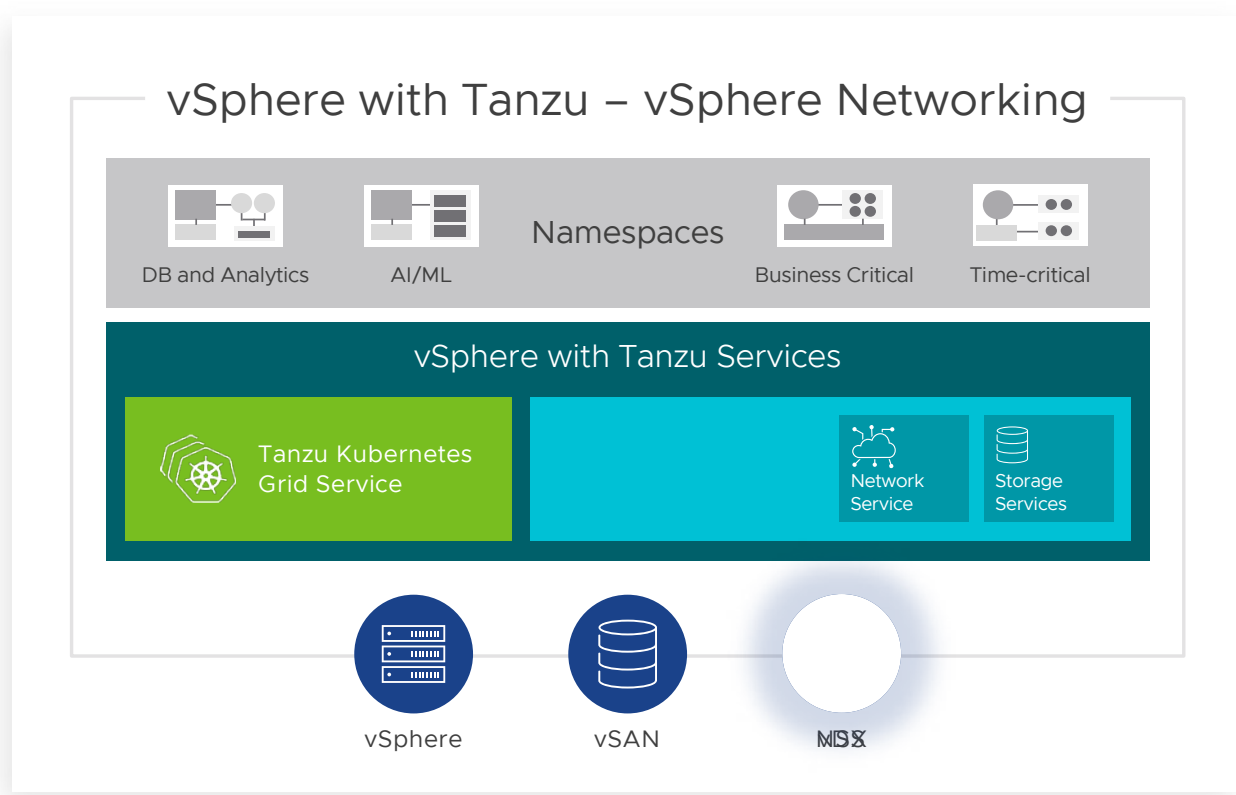
vSphere with Tanzu



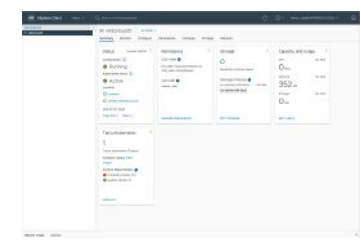
Developer



Kubectl/API



vSphere Admin



Webclient



CREATE A NAMESPACE AND TKG CLUSTER

Create a namespace (vSphere WebClient)

The screenshot shows the vSphere WebClient interface for a namespace named 'victorious01'. The interface is divided into several sections:

- Status:** Shows the namespace is 'Running' and 'Active'. It includes details like 'Created 12/6/20', 'Location: vcenter.victorious.local', and 'Link to CLI Tools'.
- Permissions:** Shows 'Can view' and 'Can edit' permissions for the user 'admin_vbe'.
- Storage:** Shows 'Persistent Volume Claims' and 'Storage Policies' (sp-vsphere-with-tanzu) with 'No limit'.
- Capacity and Usage:** Shows CPU (0 MHz), Memory (352 MB), and Storage (0 MB) usage.
- Tanzu Kubernetes:** Shows 1 cluster, 'Content Library' (TKG01), and 'Control Plane Nodes' (1 Unhealthy Node, 1 Healthy Node).

Deploy a Tazu Kubernetes cluster (kubectl)

```
victor@localhost ~/vmware -- ssh victor@192.168.178.75 -- wsl: Inc/scripts -- victor@localhost ~/vmware -- octant -- /OneDrive - VMware, Inc/scripts -- --bash --
allVersion: run.tanzu.vmware.com/v1alpha1
kind: TanzuKubernetesCluster
metadata:
  name: tkg-cluster-1
  namespace: victorious01
spec:
  distribution:
    version: v1.16
  topology:
    controlPlane:
      count: 1
      class: best-effort-small
      storageClass: sp-vsphere-with-tanzu
    workers:
      count: 3
      class: best-effort-small
      storageClass: sp-vsphere-with-tanzu
vanderberg@01:scripts vanderberg$ kubectl apply -f tkgl.yaml

kubectl vsphere login --server 172.16.102.209 -u
admin_vbe@victorious.local --insecure-skip-tls-verify

kubectl apply -f tkg1.yaml

kubectl vsphere logout

kubectl vsphere login --server 172.16.102.209 --tanzu-
kubernetes-cluster-name tkg-cluster-1 --tanzu-kubernetes-
cluster-namespace victorious01 --vsphere-username
devops@victorious.local --insecure-skip-tls-verify
```



- cluster01
 - esxi01.victorious.local
 - Namespaces
 - victorious01
 - tkg-cluster-1
 - tkg-cluster-1-control-plane-jdg9c
 - tkg-cluster-1-workers-zdshk-8468845bd9-5vz6
 - tkg-cluster-1-workers-zdshk-8468845bd9-bcs86
 - tkg-cluster-1-workers-zdshk-8468845bd9-sv4p9
 - SupervisorControlPlaneVM (1)
 - SupervisorControlPlaneVM (2)
 - SupervisorControlPlaneVM (3)

cluster01 ACTIONS

- Summary
- Monitor
- Configure
- Permissions
- Hosts
- VMs
- Namespaces
- Datastores
- Networks
- ...

Namespaces vSphere Pods

NEW NAMESPACE Filter

Namespaces	Cluster	Config Status	CPU (Used Limit)	Memory (Used Limit)	Storage (Used Limit)
(v) victorious01	cluster01	Running	0 No Limit	352 MB No Limit	0 No Limit

1 item



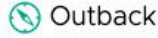
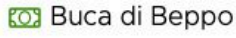


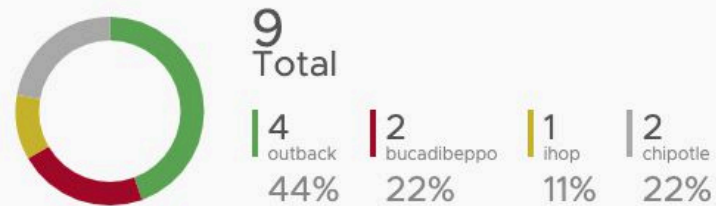
DEPLOY APPS TO TKG CLUSTER & MONITOR K8S

```
..victor@localhost-vmware -- ssh viktor@192.168.178.75  ..ware, inc/scripts -- viktor@localhost-vmware -- octant  ~/OneDrive - VMware, Inc/scripts -- -bash +
vvanderberg-ali:scripts vvanderberg$
kubectl apply -f yelb.yaml
```



Welcome to Yelb, the only hub for healthy food recommendations!

 IHOP	 Chipotle	 Outback	 Buca di Beppo
Pancakes , for a powerful start!	Burritos , for a mid-day break!	Blooming onion , what else?	Lasagne , this is heaven!
VOTE	VOTE	VOTE	VOTE



Number of page views so far:
7

App Server: [yelb-appserver-7cb8446b7b-7fksg](#)

DEPLOY APPS TO TKG CLUSTER & MONITOR K8S

```
..viktor@localhost-vmware -- ssh viktor@192.168.178.75  ..ware, inc/scripts -- viktor@localhost-vmware -- octant  ~/OneDrive - VMware, Inc/scripts -- -bash +
vvanderberg-a11:scripts vvanderberg$
kubect1 apply -f yelb.yaml
octant
```

Workloads

redis-server



yelb-appserver



yelb-db



yelb-ui



Cluster Overview

Namespaces

Name	Labels	Status	Age
default		Active	1d
kube-node-lease		Active	1d
kube-public		Active	1d
kube-system		Active	1d
kubedoom		Active	9h
projectcontour		Active	12h
vmware-system-auth		Active	1d
vmware-system-cloud-provider		Active	1d
vmware-system-csi		Active	1d
yelb01		Active	12h

Items per page 10 1 - 10 of 10 items

antreaagentinfos.clusterinformation.antrea.tanzu.vmware.com/v1beta1

Name	Labels	Age
tkg-cluster-1-control-plane-jdg9c		1d
tkg-cluster-1-workers-zdshk-8468845bd9-5vz6		1d

DEPLOY APPS TO TKG CLUSTER & MONITOR K8S

```
..victor@localhost-vmware -- ssh viktor@192.168.178.75 ..ware, inc/scripts -- viktor@localhost-vmware -- octant ~/OneDrive - VMware, Inc/scripts -- -bash
vvanderberg-a11:scripts vvanderberg$
kubect1 apply -f yelb.yaml
octant
kubect1 port-forward kubedoom-dc68dbc54-n8qmv 5900:5900
```



49 AMMO	100% HEALTH	<table border="1"><tr><td>2</td><td>3</td><td>9</td></tr><tr><td>5</td><td>5</td><td>7</td></tr></table> ARMS	2	3	9	5	5	7		0% ARMOR	<table border="1"><tr><td>BULL</td><td>49</td><td>/</td><td>200</td></tr><tr><td>SHEL</td><td>0</td><td>/</td><td>50</td></tr><tr><td>ROKT</td><td>0</td><td>/</td><td>50</td></tr><tr><td>CELL</td><td>0</td><td>/</td><td>300</td></tr></table>	BULL	49	/	200	SHEL	0	/	50	ROKT	0	/	50	CELL	0	/	300
2	3	9																									
5	5	7																									
BULL	49	/	200																								
SHEL	0	/	50																								
ROKT	0	/	50																								
CELL	0	/	300																								

LEARN MORE K8S

Useful resources:

- Learn Kubernetes - <https://kubernetes.io/docs/tutorials/kubernetes-basics/>
- William Lam - <https://www.virtuallyghetto.com/>
- Cormac Hogan - <https://cormachogan.com/>
- Frank Denneman - <https://frankdenneman.nl/2020/11/06/vsphere-with-tanzu-vcenter-server-network-configuration-overview/> (network config HA Proxy / vSphere networking)
- Viktor van den Berg ☺ - <https://www.viktorious.nl/>

Kubernetes Demo Applications:

- Yelb, Kubedoom and more - <https://www.virtuallyghetto.com/2020/06/interesting-kubernetes-application-demos.html>
- VMware app examples - <https://docs.vmware.com/en/VMware-vSphere/7.0/vmware-vsphere-with-tanzu/GUID-E217C538-2241-4FD9-9D67-6A54E97CA800.html>





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