vSphere 7

Creating a developer self-service platform (Part 1)

Frank Denneman

Chief Technologist CPBU

2021

©2021 VMware, Inc.

Interactive Roadshow

Chat functionality and Q&A parts

Please use the chat function to ask questions

©2021 VMware, Inc.

Agenda

Build or Pull Containerized Workload?

Creating Self-Service Consumable Pools of Resources

Consumption Strategy

©2021 VMware, Inc.

Build or Pull Containerized Workloads?

©2021 VMware, Inc.

Containers Displacing Commercial Off-the-Shelf Software (COTS)

According to IDC Predictions

500 Million

Cloud-native applications expected over the next 5 years

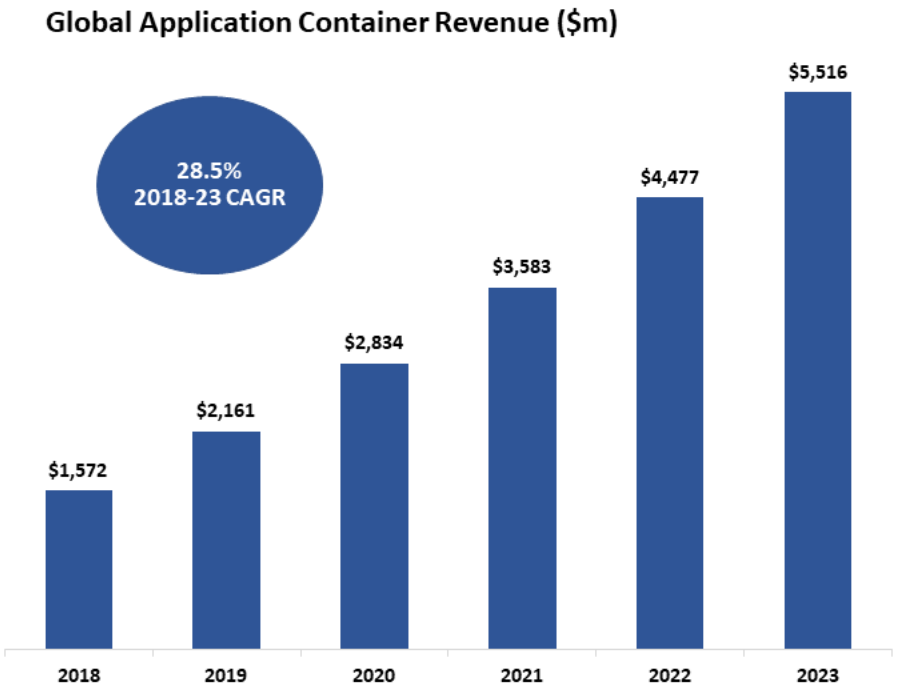
Build or pull?

©2021 VMware, Inc.

Vendor Application Container Market Development

From 1.6 billion in 2018 to 5.5 billion USD by 2023

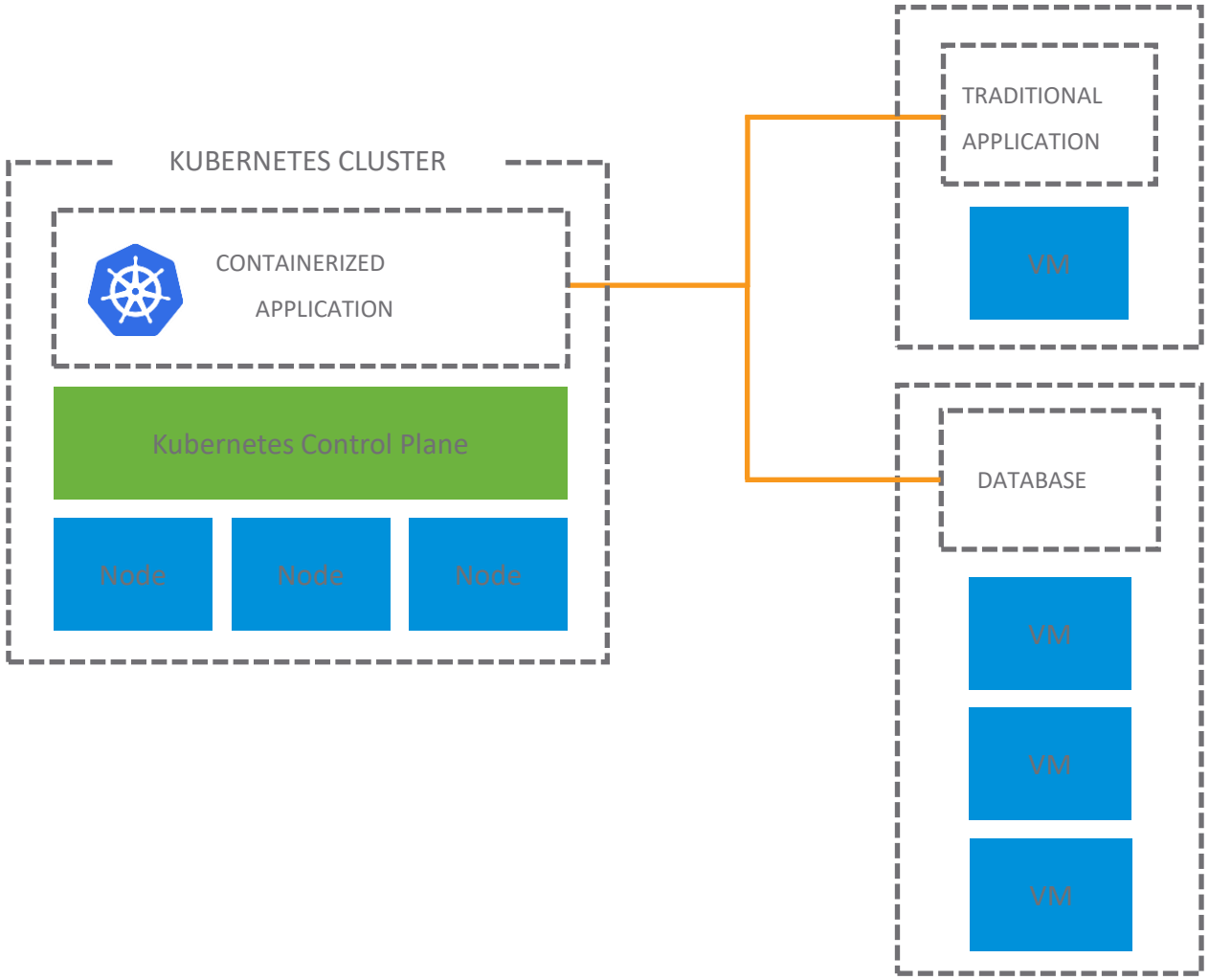
214	Total vendors tracked
10	Vendors with $25m+ in 2018E total application container revenue
7	Vendors with $15m-25m in 2018E total application container revenue
33	Vendors with $5m-15m in 2018E total application container revenue
164	Vendors with $0-5m in 2018E total application container revenue



Source: 451 Research

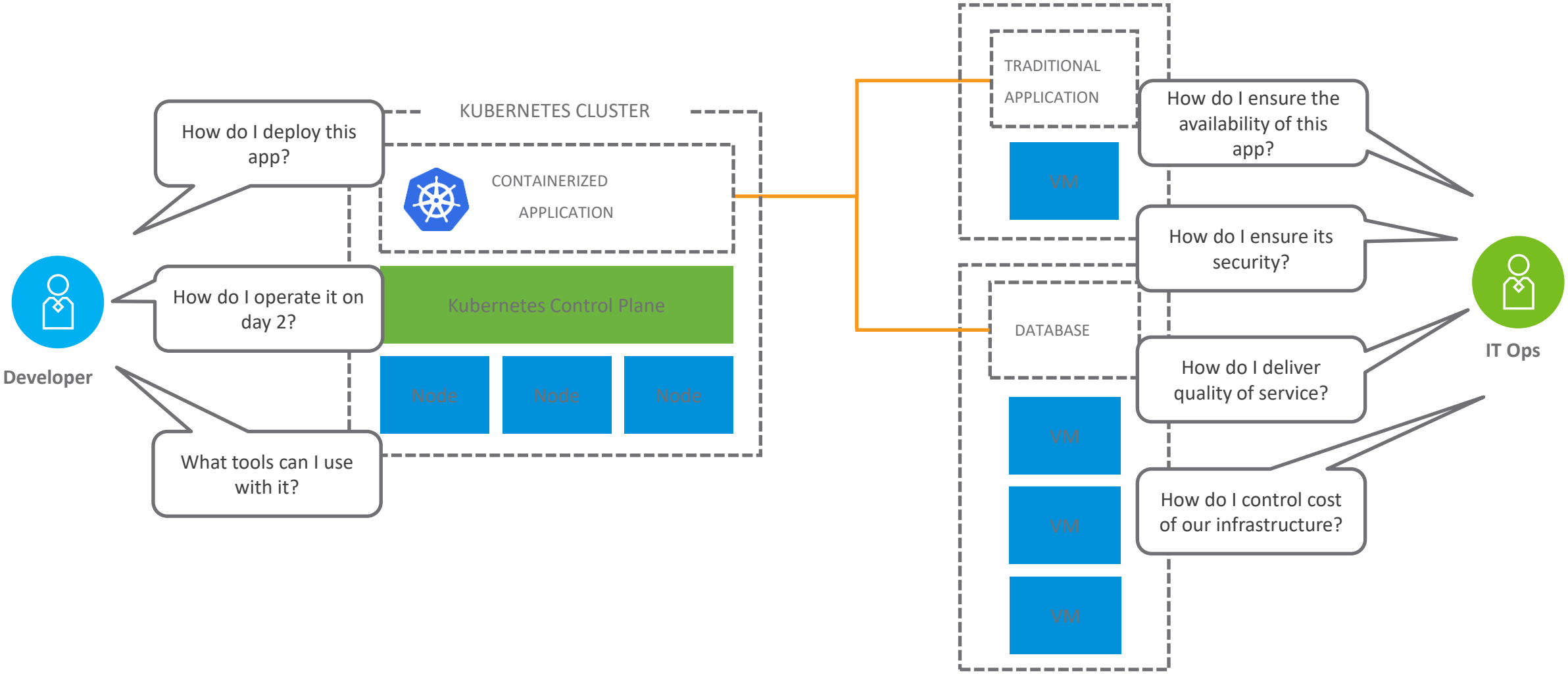
©2021 VMware, Inc.

A Modern Application Architecture



©2021 VMware, Inc.

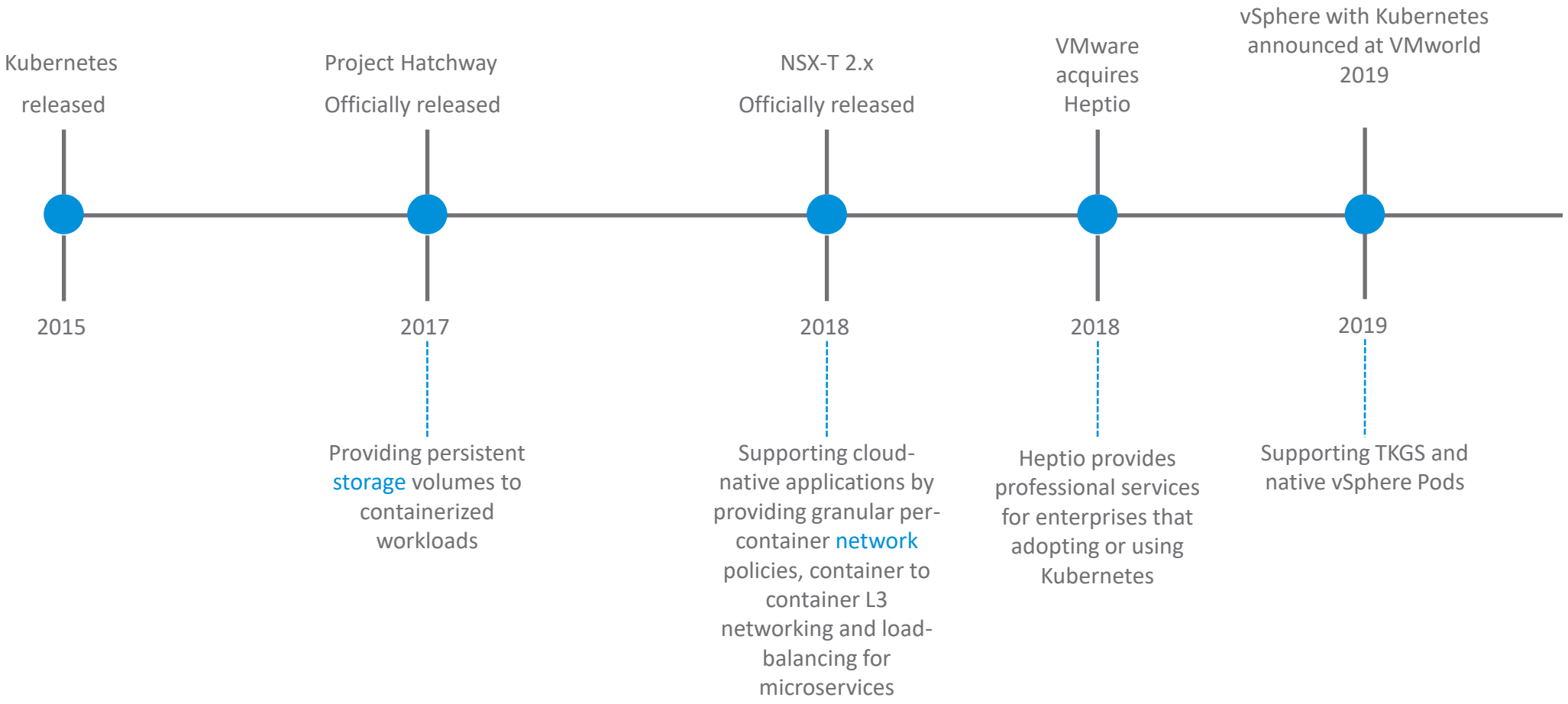
A Modern Application Architecture



©2021 VMware, Inc.

VMware efforts for supporting Kubernetes

A lot of work happened behind the scenes



©2021 VMware, Inc.

vSphere 7
with Tanzu

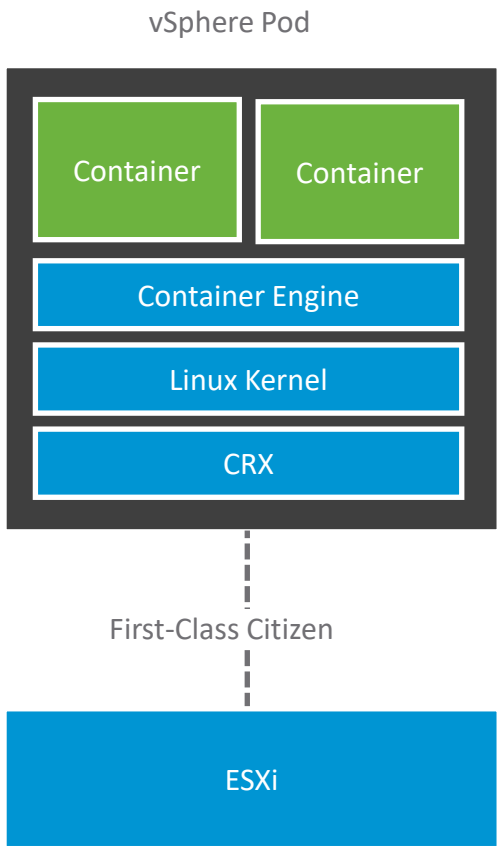
Tanzu
Kubernetes
Grid Service
(TKGS)

©2021 VMware, Inc.

vSphere Pod

A Lightweight take on virtual machines

vSphere 7
with Tanzu



©2021 VMware, Inc.

Self-Service Platform for developers

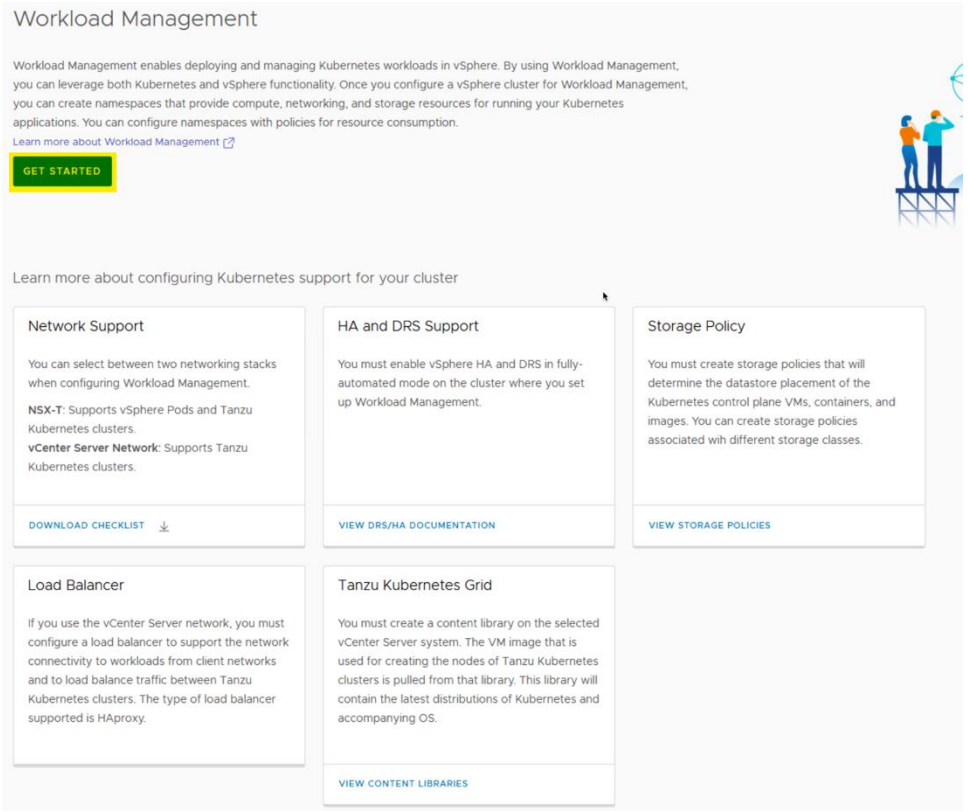
Infrastructure centrally managed by Ops teams

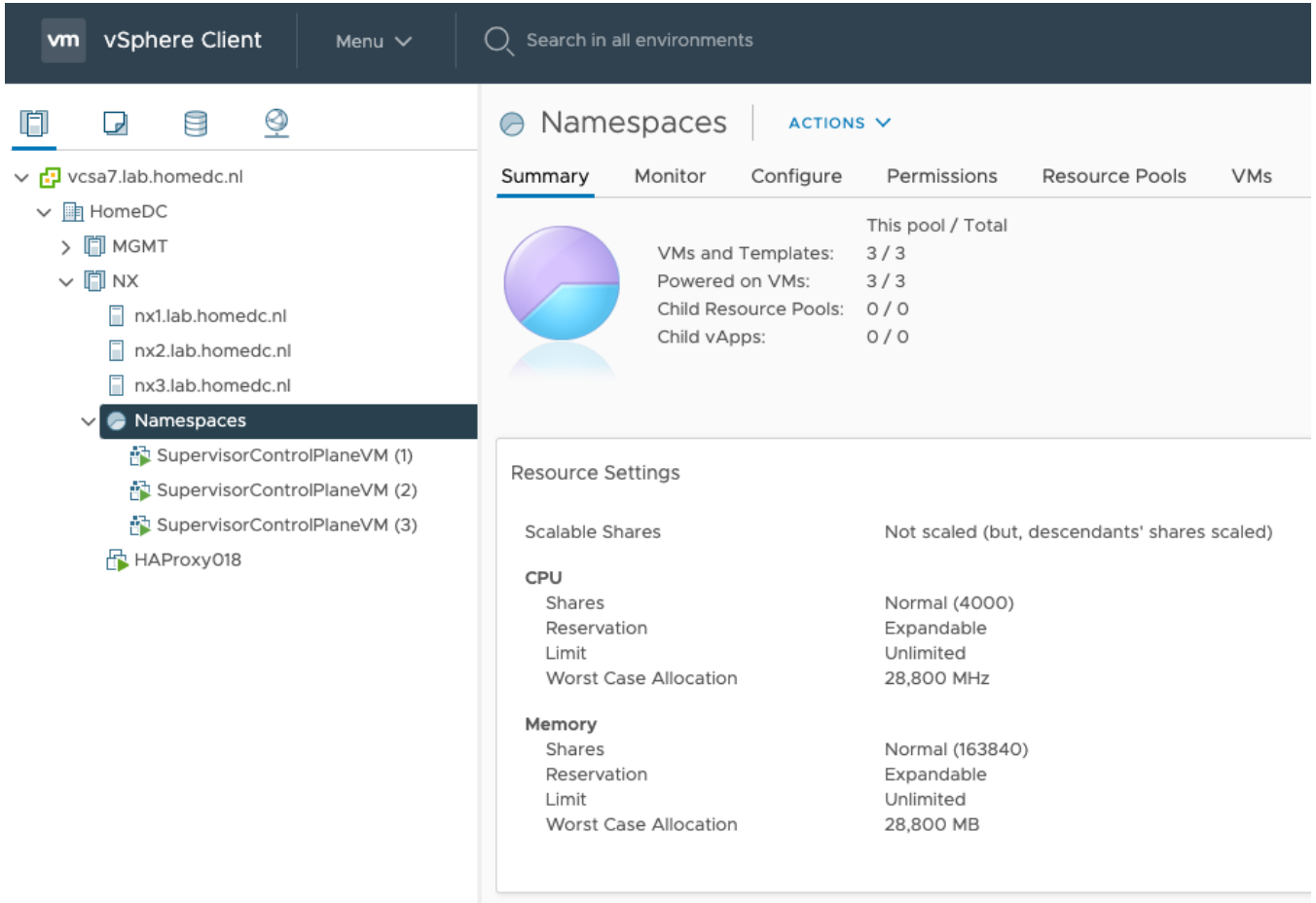
©2021 VMware, Inc.

Creating Self-Service Consumable Pools of Resources

Confidential | ©2019 VMware, Inc.

Enable Workload Management on vSphere Cluster

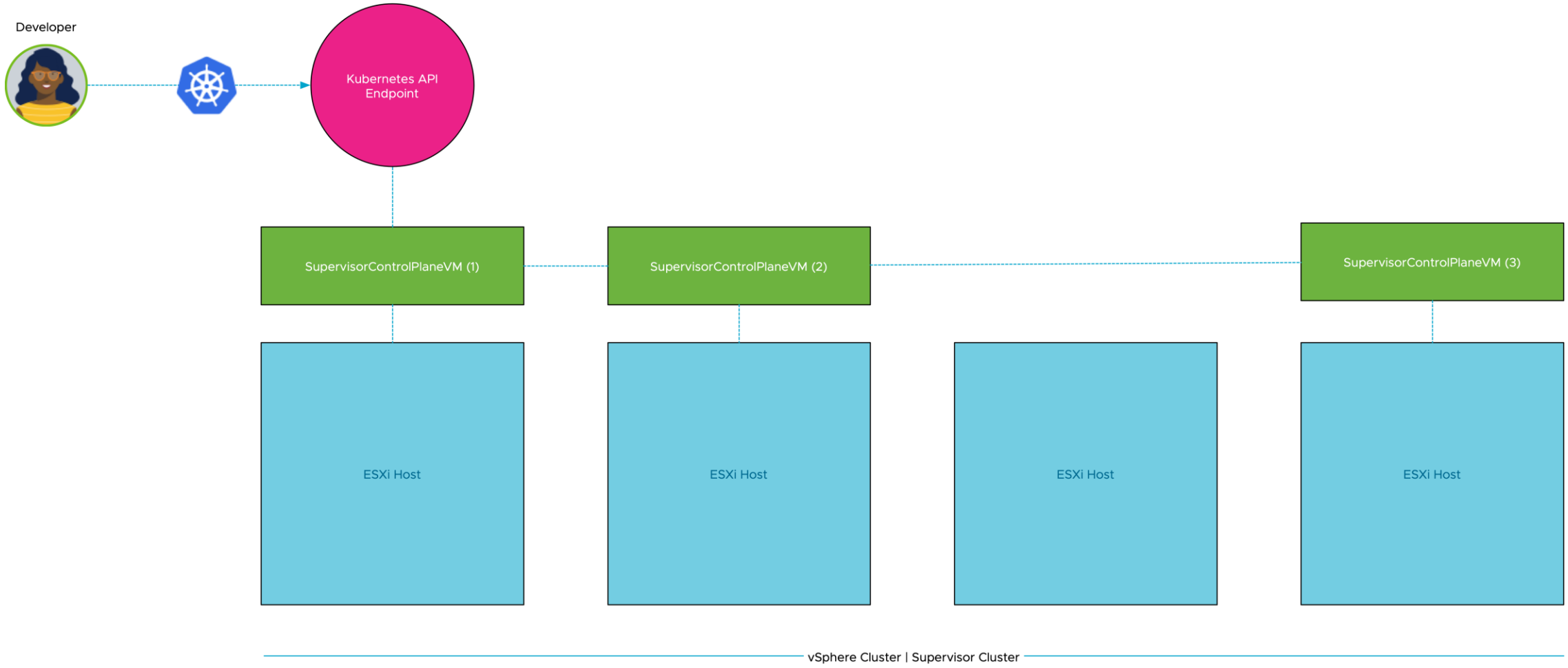




©2021 VMware, Inc.

Supervisor Cluster Exposing Kubernetes Service

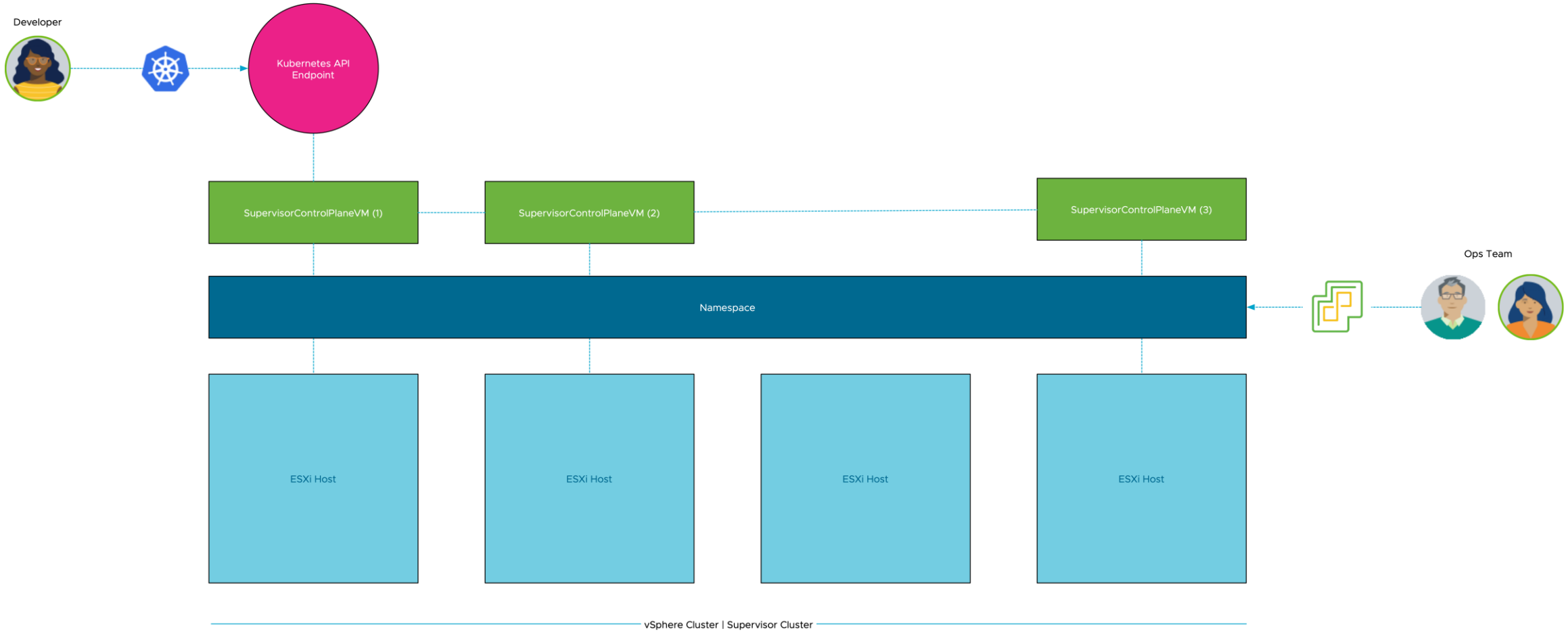
Let the developer communicate in native commands



©2021 VMware, Inc.

Namespaces Allow for Multi-Tenancy of vSphere cluster

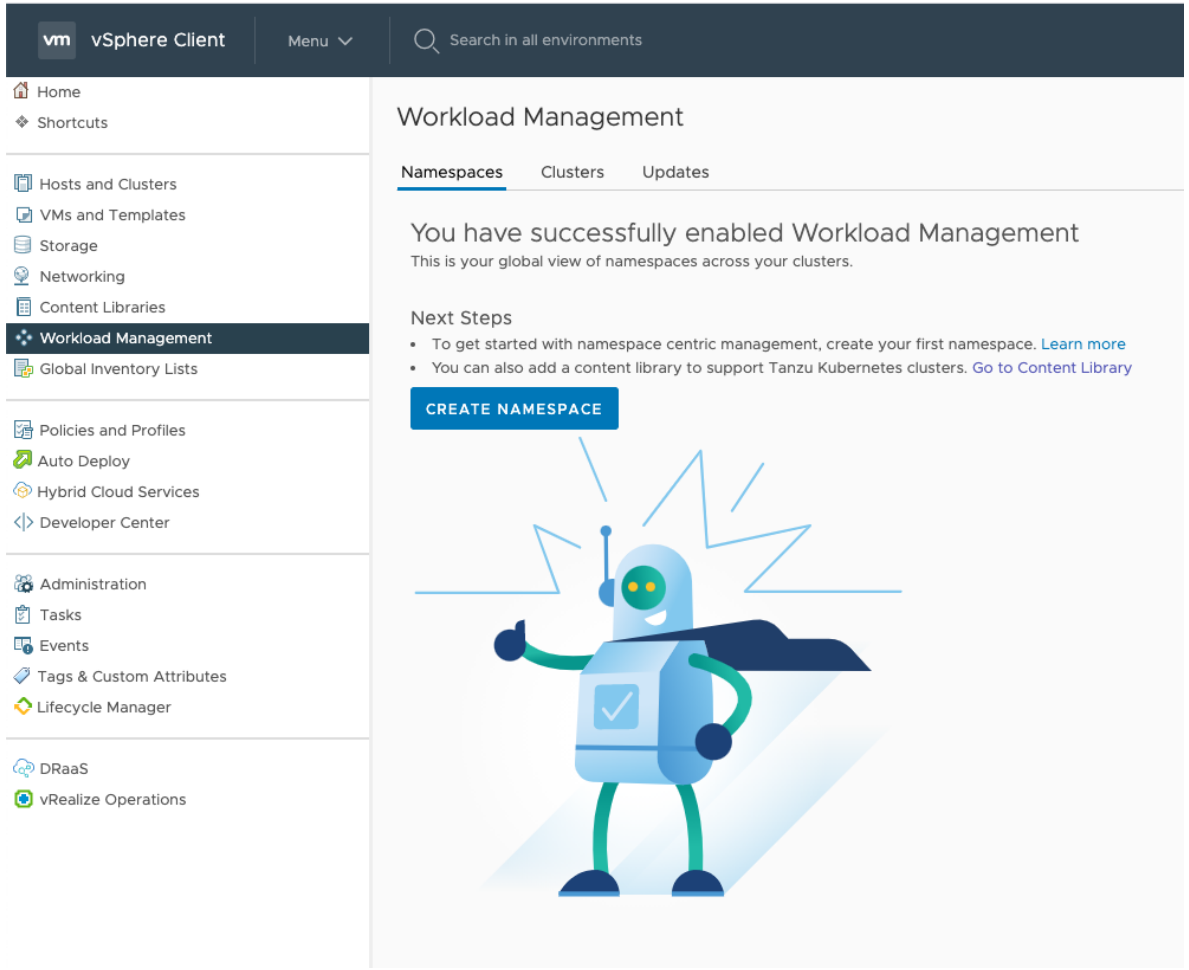
Each application its own space and boundaries

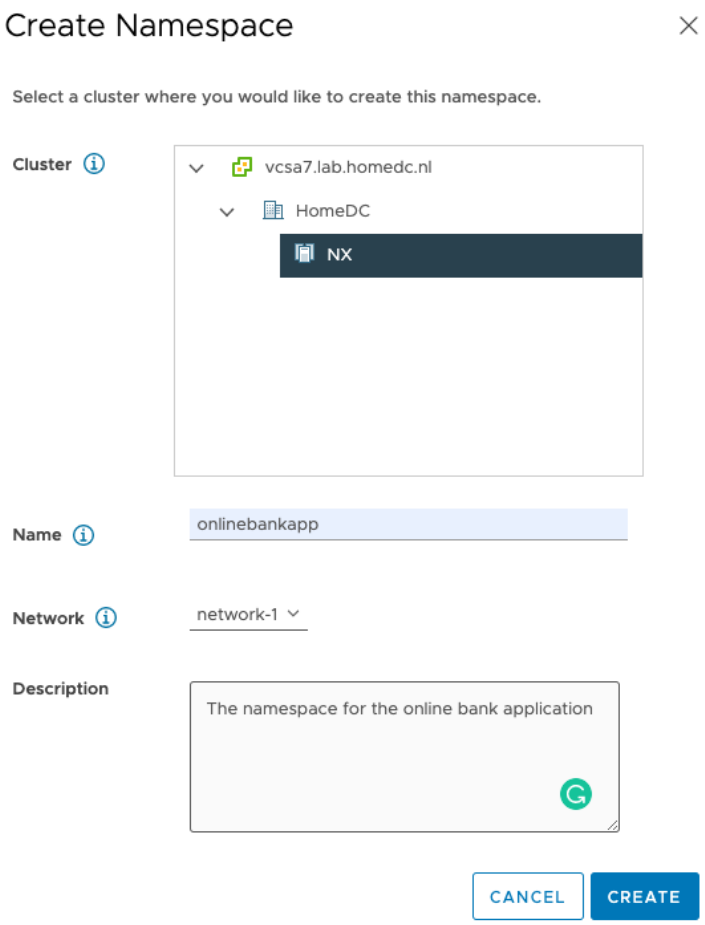


©2021 VMware, Inc.

How to Create a Namespace?

Workload Management option

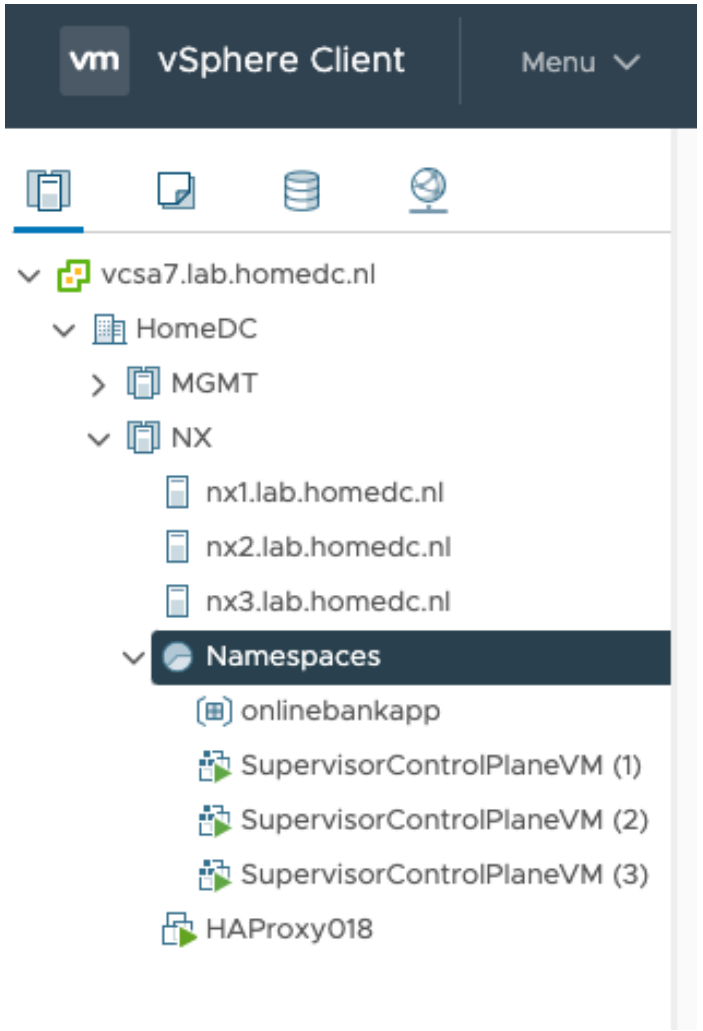


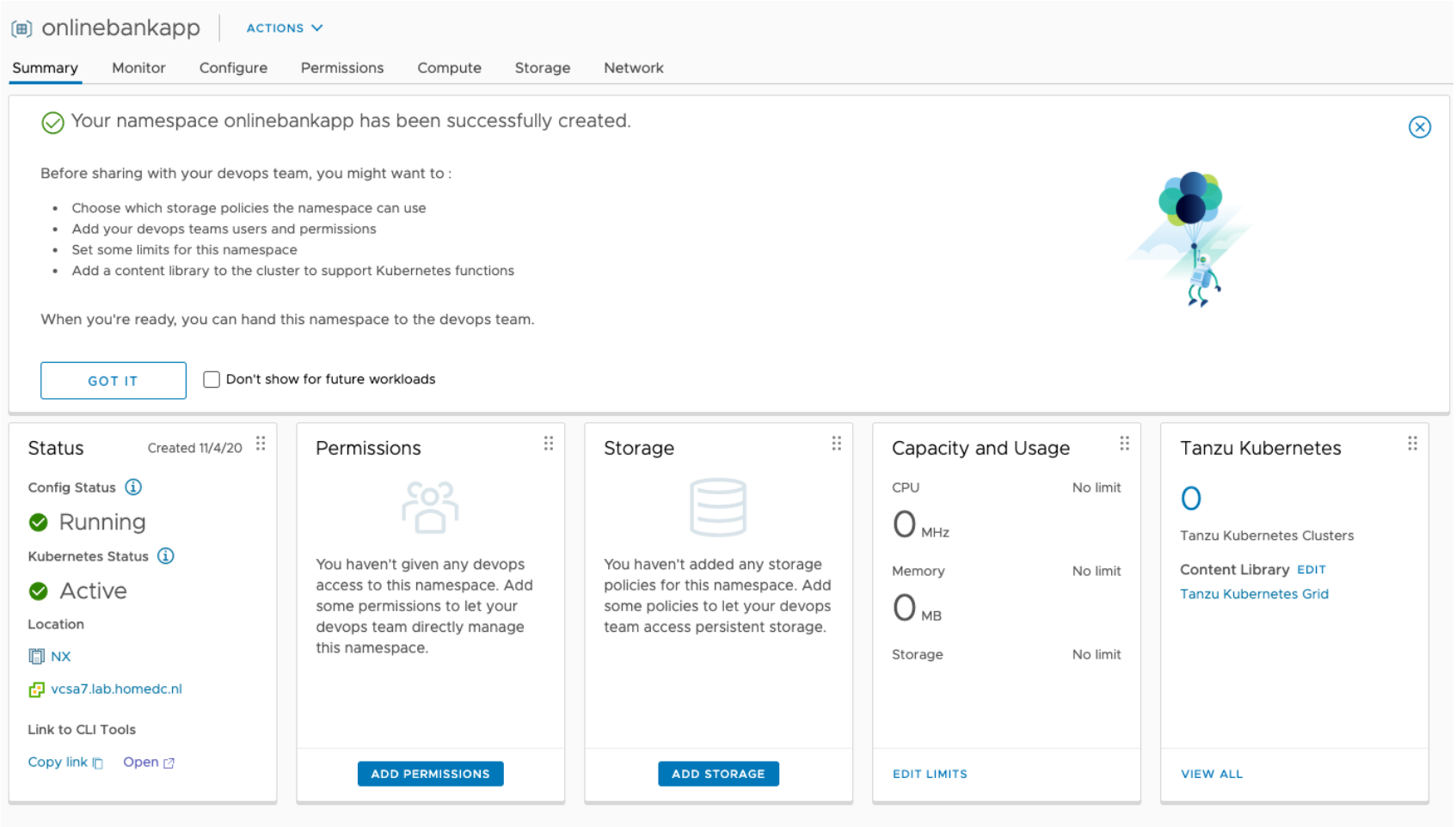


©2021 VMware, Inc.

Namespace

The new control concept for application deployment





©2021 VMware, Inc.

Namespaces Offer Control

RBAC and Default Storage Policies

Add Permissions

Add a user or a group to give access to this namespace

Identity source: vsphere.local

User/Group Search: OnlineBankAppDevs

Role: Can edit

CANCEL OK

Select Storage Policies

Storage Policy	Total Capacity	Available Capacity
VM Encryption Policy	6.48 TB	6.25 TB
vSAN Default Storage P...	5.46 TB	5.24 TB
Management Storage P...	5.46 TB	5.24 TB
Management Storage p...	5.46 TB	5.24 TB
Management Storage P...	5.46 TB	5.24 TB
Management Storage p...	5.46 TB	5.24 TB

1 - 6 of 6 items

CANCEL OK

©2021 VMware, Inc.

Limit Resource Consumption

Guardrails for the self-service model

Resource Limits

Below are various resources that are available to the namespace. You can choose to limit consumption of any or all of these. This is an optional step.

CPU	50	GHz
Memory	64	GB
Storage	No limit	MB
vSAN Default Storage Policy	No limit	MB

CANCEL OK

onlinebankapp ACTIONS

Summary Monitor Configure Permissions Compute Storage

Status Created 11/4/20

Config Status

Running

Kubernetes Status

Active

Location

NX

vcsa7.lab.homedc.nl

Link to CLI Tools

Copy link Open

Capacity and Usage

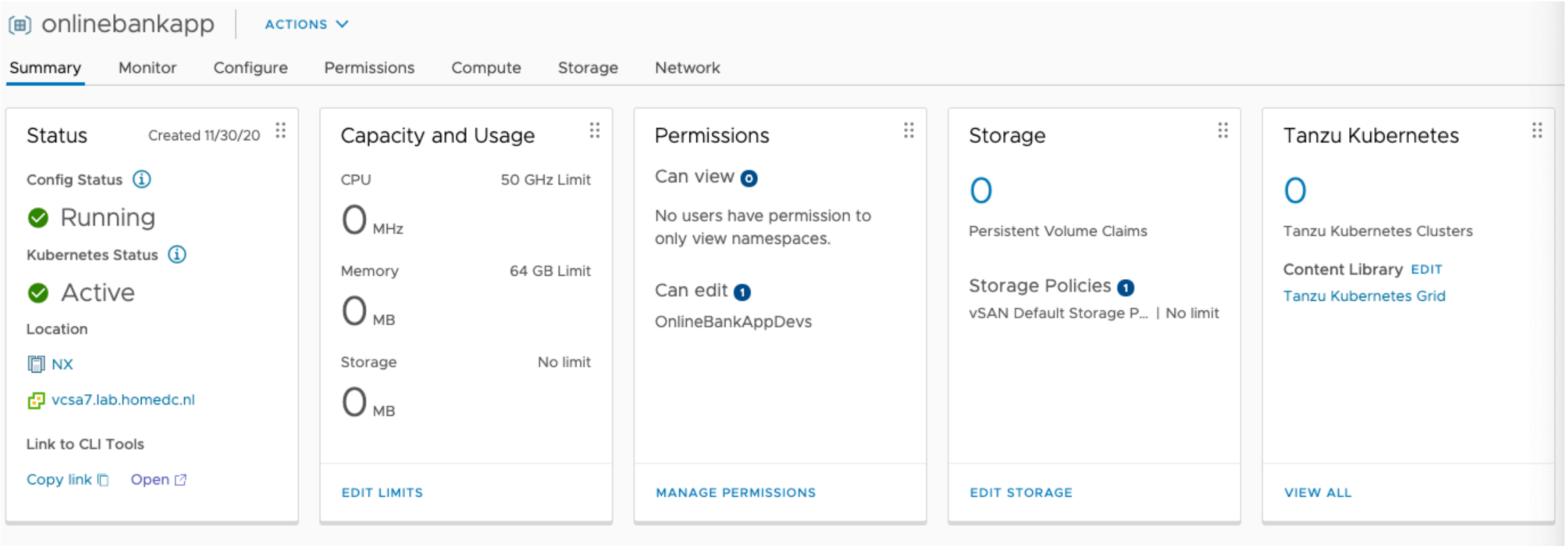
CPU	50 GHz Limit
0 MHz	
Memory	64 GB Limit
0 MB	
Storage	No limit
0 MB	

EDIT LIMITS

©2021 VMware, Inc.

Namespace is ready to be consumed

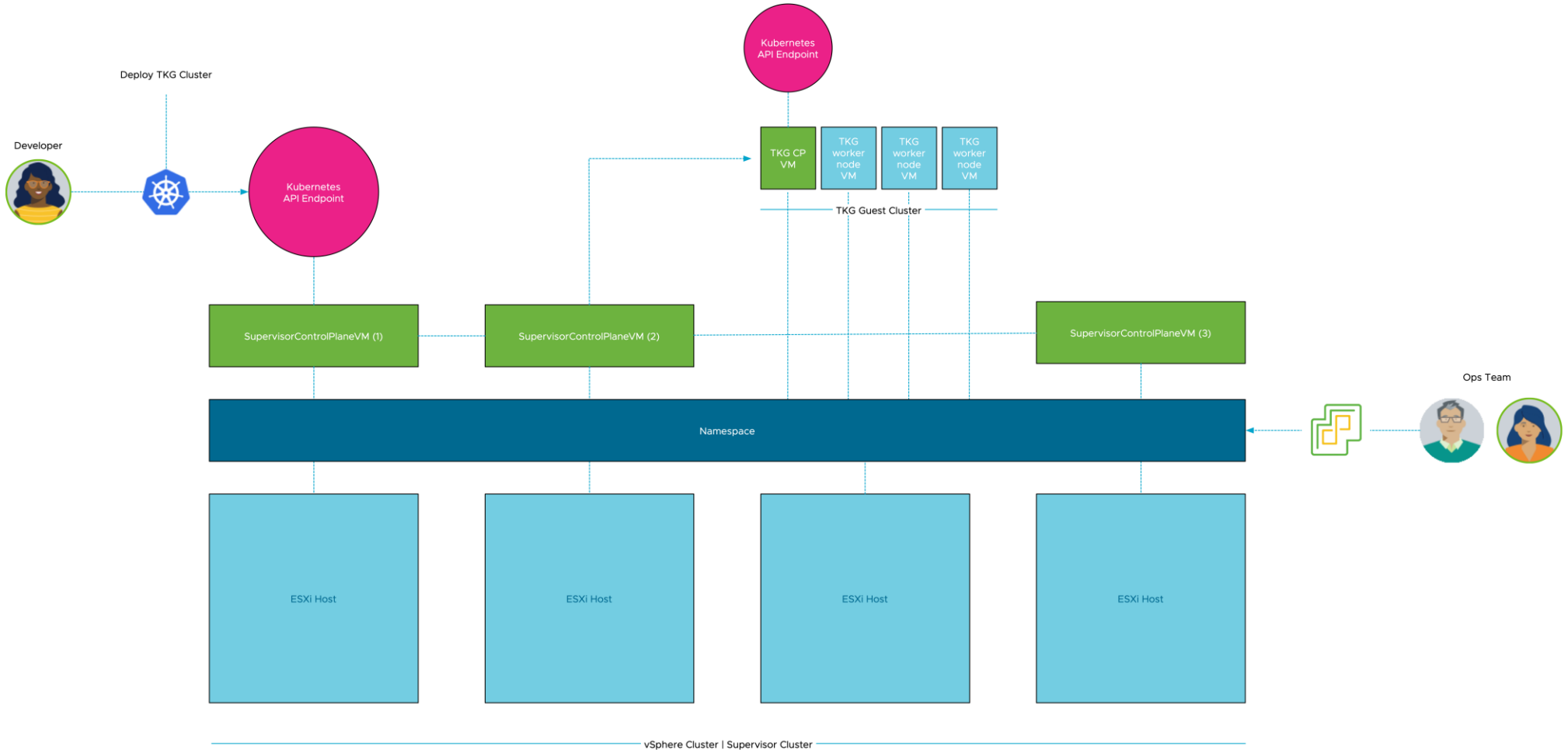
Developers can safely deploy workload



©2021 VMware, Inc.

Developer deploys TKG Cluster

Interacting with the Supervisor API service



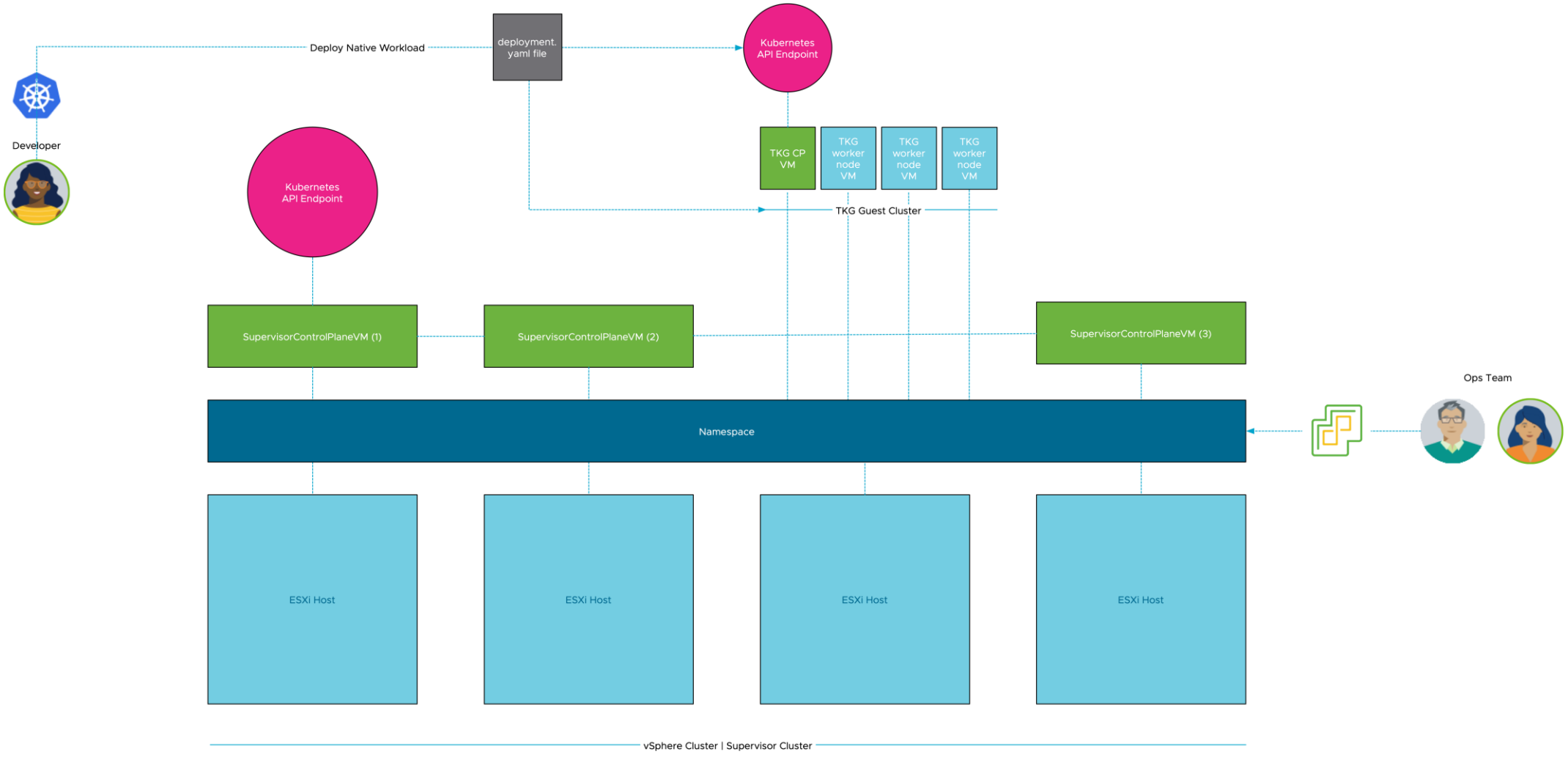
©2021 VMware, Inc.

Consumption strategy

How to guide the self-service customer

Deploying with a deployment YAML file

Infrastructure as Code



©2021 VMware, Inc.

VirtualMachineClass used for TKG Cluster Deployment

The directly visible consumers of the vSphere platform

```
c:\bin>type onlinebankappdevcluster.yaml
apiVersion: run.tanzu.vmware.com/v1alpha1
kind: TanzuKubernetesCluster
metadata:
  name: onlinebankappdevcluster
spec:
  topology:
    controlPlane:
      count: 1
      class: guaranteed-medium
      storageClass: vsan-default-storage-policy
    workers:
      count: 2
      class: guaranteed-large
      storageClass: vsan-default-storage-policy
  distribution:
    version: v1.17.7
c:\bin>_
```

```
c:\bin>kubectl get virtualmachineclass
NAME                    AGE
best-effort-2xlarge     32d
best-effort-4xlarge     32d
best-effort-8xlarge     32d
best-effort-large       32d
best-effort-medium      32d
best-effort-small       32d
best-effort-xlarge      32d
best-effort-xsmall      32d
guaranteed-2xlarge      32d
guaranteed-4xlarge      32d
guaranteed-8xlarge      32d
guaranteed-large        32d
guaranteed-medium       32d
guaranteed-small        32d
guaranteed-xlarge       32d
guaranteed-xsmall       32d

c:\bin>_
```

©2021 VMware, Inc.

Tanzu VirtualMachineClass

VMClass	CPU Reservation	Memory Reservation
best-effort-*size*	0	0
Guaranteed-*size*	Equal to CPU config	Equal to memory config

VMClass Size	CPU	Memory
8 XLarge	32	128Gi
4 XLarge	16	128Gi
2 XLarge	8	64Gi
XLarge	4	32Gi
Large	4	16Gi
Medium	2	8Gi
Small	2	4Gi
XSmall	2	2Gi

©2021 VMware, Inc.

Kubernetes Cluster Config Footprint

Kubernetes cluster sizing can impact overall vSphere platform performance

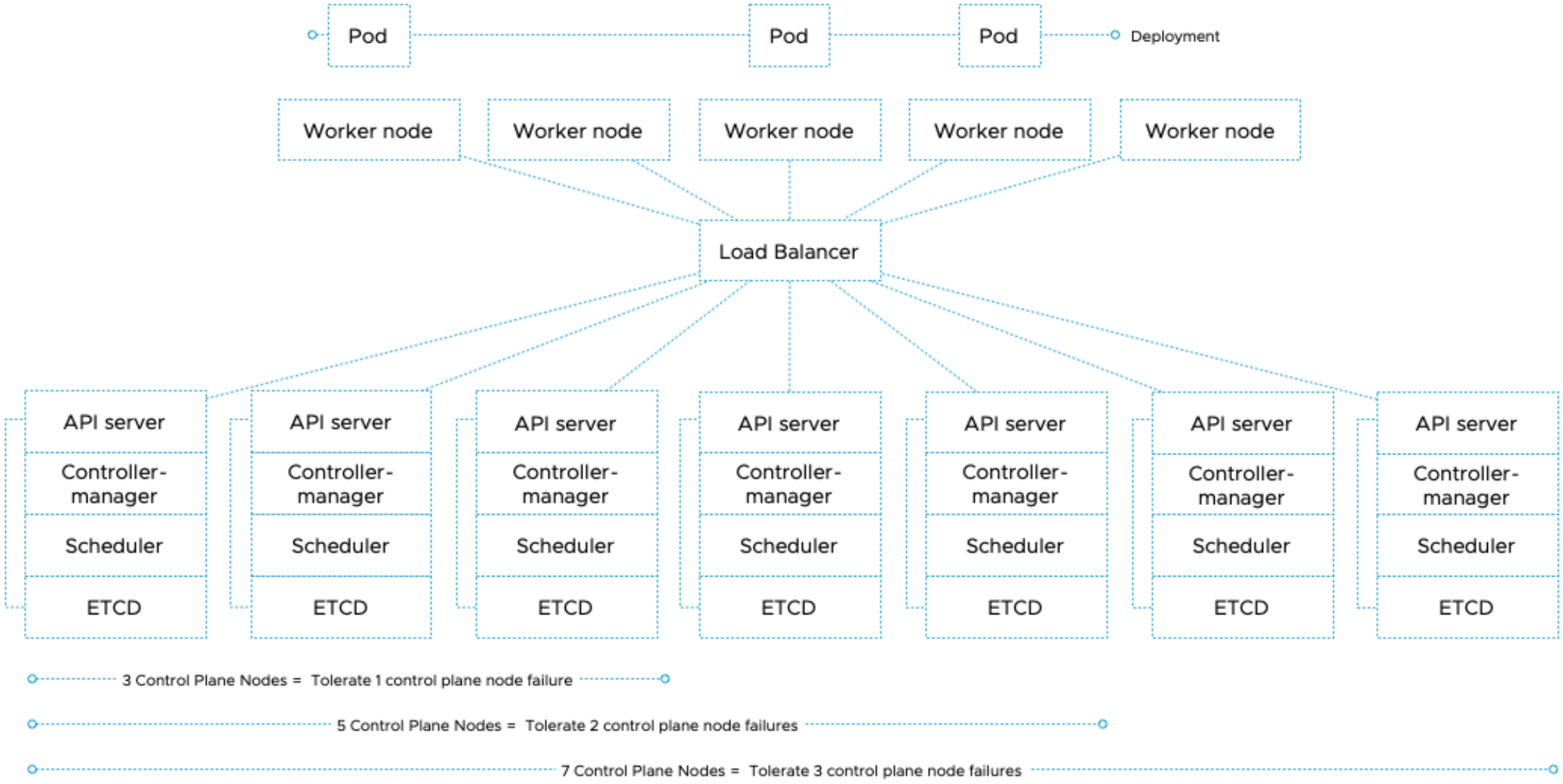
Control Plane Node Sizing Considerations

- How many operations are expected? (Container Churn) (CP node sizing)
- Production or Interactive tests cluster? (VM class type)
- For consistent performance use guaranteed resources for production environment
- Reserved resources impact consolidation ratio of Supervisor Cluster
- Solving High Availability of Kubernetes control plane nodes with vSphere HA
- vSphere HA might be quicker to respond to node failure before Kubernetes can

©2021 VMware, Inc.

Kubernetes Highly Available Topology

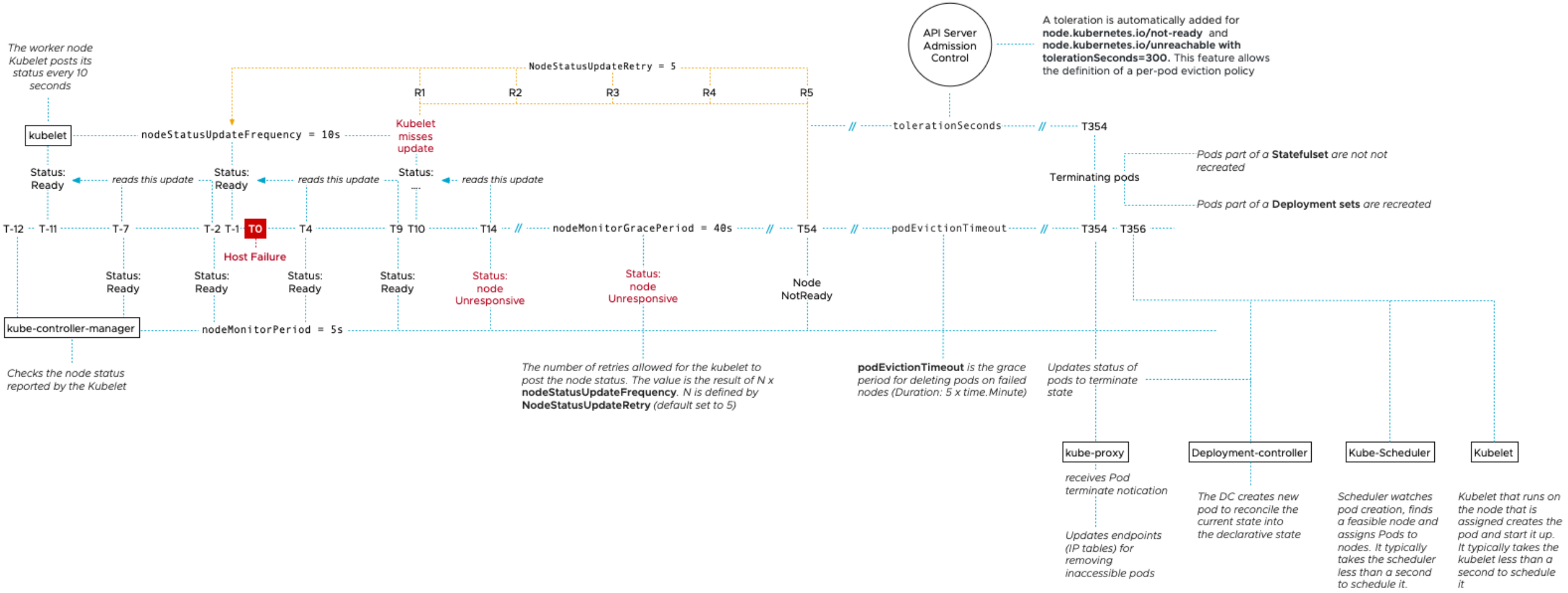
Stacked ETCD topology (ETCD member within the control plane node)



©2021 VMware, Inc.

Kubernetes Failure Response Timeline

Worst-case scenario: 356 seconds



©2021 VMware, Inc.

Kubernetes Cluster Config Footprint

Kubernetes cluster sizing can impact overall vSphere platform performance

Worker Node Considerations

- How many resources do the containerized workloads require? (Node size)
- Availability of containerized workloads (Number of Nodes)
- Kubernetes node is a ”soft” fault domain
- Test or Production (Guaranteed or Best effort virtual machine class)

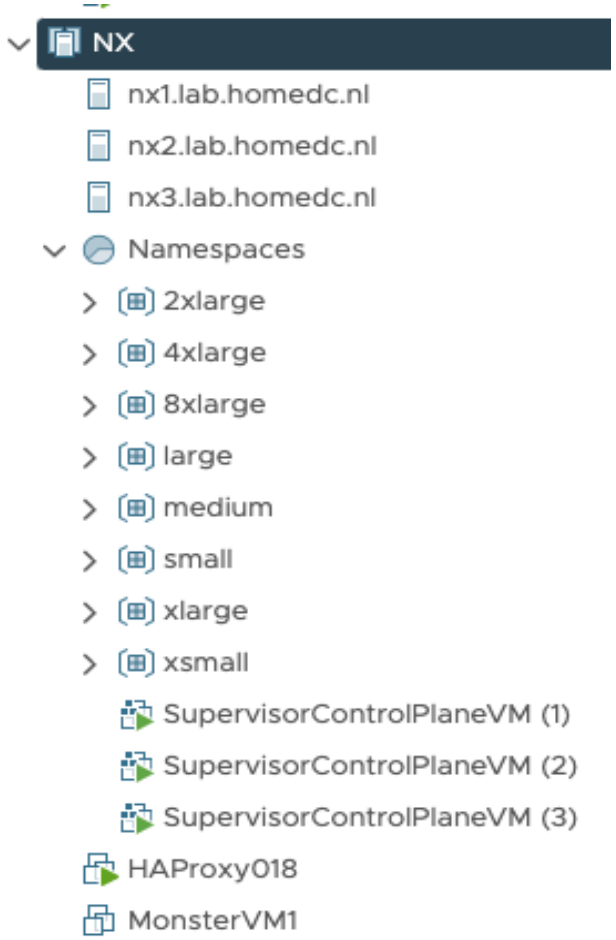
©2021 VMware, Inc.

Namespaces are Backed by Resource Pools

Commit to RP structures for all workload objects

VMs placed outside namespaces can create sibling rivalry

Placing a VM “next” to the namespaces can create contention for best-effort TKG clusters



NX ACTIONS

Summary | Monitor | Configure | Permissions | Hosts | VMs | Namespaces | Datastores

Hosts | Resource Pools

Name	CPU Shares	CPU Shar...	Memory Shares	Memory Shares Value
Namespaces	Normal	4000	Normal	163840
xsmall	Normal	4000	Normal	163840
tkg-best-effort-xsmall	Normal	4000	Normal	163840
small	Normal	4000	Normal	163840
tkg-best-effort-small	Normal	4000	Normal	163840
medium	Normal	4000	Normal	163840
tkg-best-effort-medium	Normal	4000	Normal	163840
large	Normal	4000	Normal	163840
tkg-best-effort-large	Normal	4000	Normal	163840
xlarge	Normal	4000	Normal	163840
2xlarge	Normal	4000	Normal	163840
4xlarge	Normal	4000	Normal	163840
8xlarge	Normal	4000	Normal	163840
tkg-best-effort-xlarge	Normal	4000	Normal	163840
tkg-best-effort-2xlarge	Normal	4000	Normal	163840
tkg-best-effort-4xlarge	Normal	4000	Normal	163840

©2021 VMware, Inc.

Namespace (Resource Pool) Limits

Limit the physical resource allocation

Namespace Limit impacts overall consumption of vSphere reserved resources

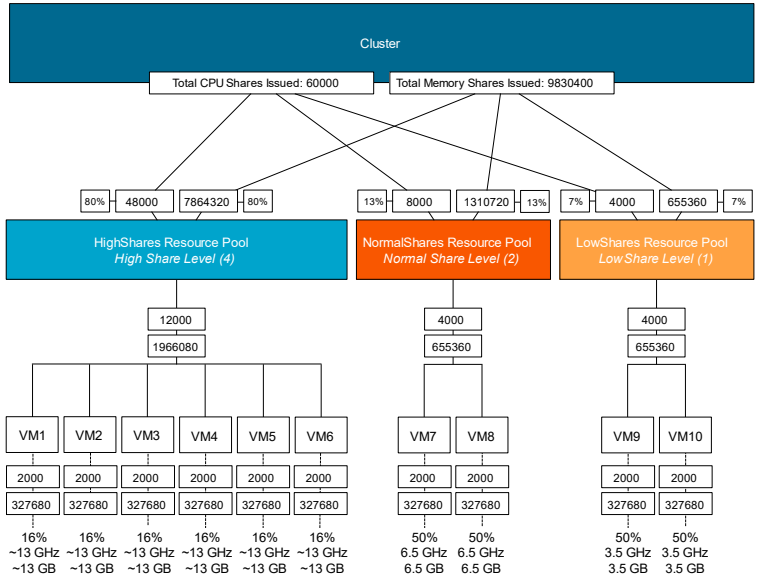
50 G Limit will not allow a deployment of 6 guaranteed-large node Kubernetes cluster (96G > 50 G)

But, to workaround developer can deploy 6 best-effort large node Kubernetes cluster

How much oversubscription will you allow?

Namespaces Scalable Shares help

Please review the [Scalable Shares deep dive](#) on frankdenneman.nl



©2021 VMware, Inc.

Questions to ask yourself and your customer, the developer

Understanding their needs helps you to provide a stable platform

What type of Kubernetes landscape do you expect?

- Highly dynamic test Kubernetes deployments
  - How many developers will interact with vSphere platform?
  - High number of developers deploying? Consider *Max concurrent vCenter provisioning operations* setting
  - What is the expected lifetime of a Kubernetes cluster? (Churn)
  - Separate vCenter for vSphere Platform designated to run Kubernetes?

High Available Kubernetes deployments consist of 3 control plane nodes with guaranteed resources.

- Cannot limit VM classes in a namespace (yet)
- Educate your developers on the power of vSphere HA
- Scalable shares are enabled by default for developer-managed namespaces

©2021 VMware, Inc.

Agenda

Providing a platform for modern IT services

Part 1 – Creating a developer self-service platform with vSphere 7.x presented by Frank Denneman

Part 2 - vSphere 7.x and the Kubernetes Admin presented by Cormac Hogan

Part 3 - vSAN 7.x and the vSphere Admin presented by Duncan Epping

©2021 VMware, Inc.

Learn more:

at frankdenneman.nl

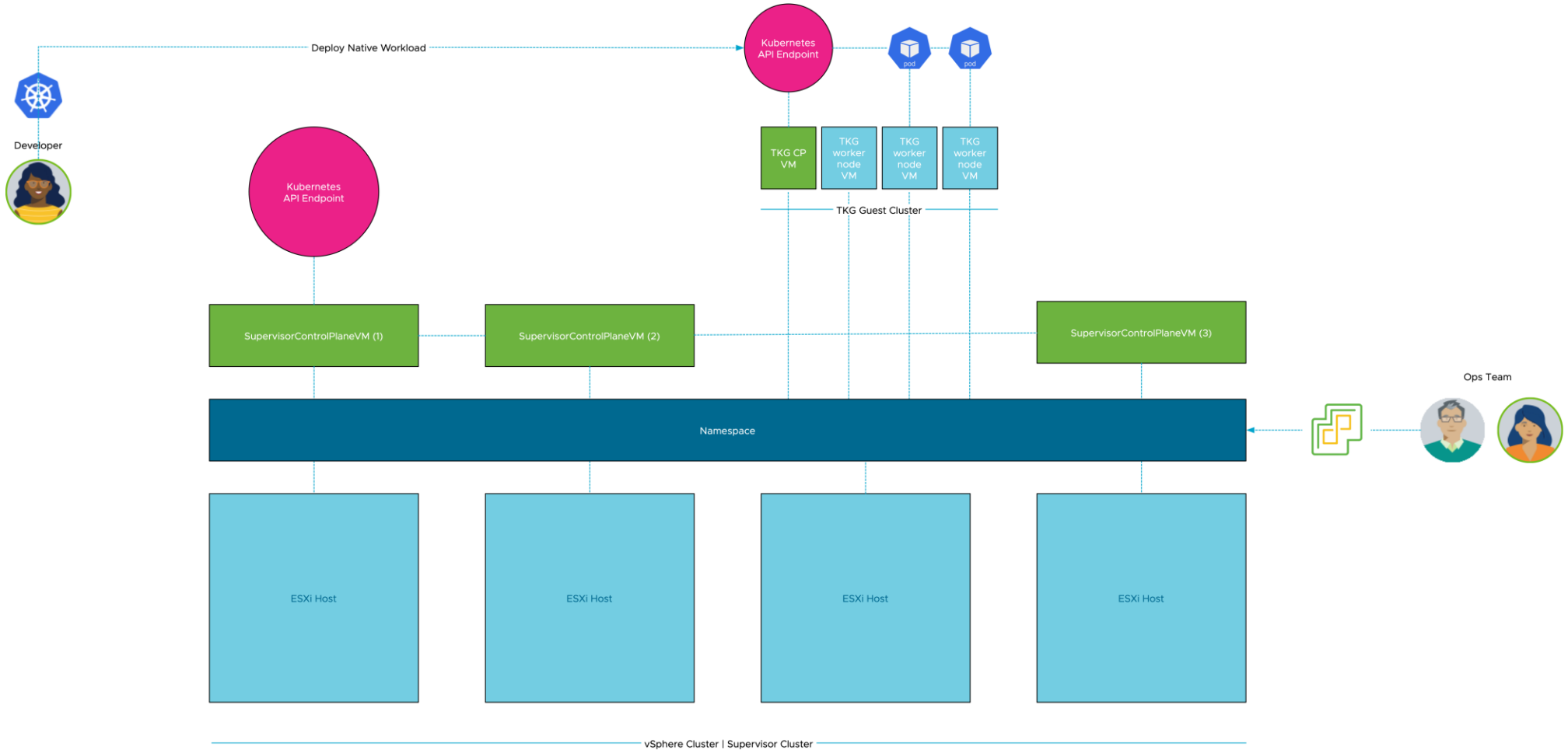
Thank You

Confidential | ©2019 VMware, Inc.

"Build or Pull your containerized workload onto vSphere 7. As vSphere 7 is the foundational building block for an infrastructure that is home for new workloads.

Developer Deploys New Workload

Interacting with TKG Kubernetes API service



©2021 VMware, Inc.

How to deploy a TKG cluster on vSphere with Tanzu

Infrastructure as Code plays a key role

```
c:\bin>kubectl-vsphere.exe login --insecure-skip-tls-verify --vsphere-username administrator@vsphere.local --server=https://192.168.115.32

Password:
Logged in successfully.

You have access to the following contexts:
   192.168.115.32
   2xlarge
   4xlarge
   8xlarge
   large
   medium
   onlinebankapp
   small
   xlarge
   xsmall

If the context you wish to use is not in this list, you may need to try
logging in again later, or contact your cluster administrator.

To change context, use `kubectl config use-context <workload name>`

c:\bin>kubectl config use-context onlinebankapp
Switched to context "onlinebankapp".

c:\bin>type onlinebankappdevcluster.yaml
apiVersion: run.tanzu.vmware.com/v1alpha1
kind: TanzuKubernetesCluster
metadata:
  name: onlinebankappdevcluster
spec:
  topology:
    controlPlane:
      count: 1
      class: guaranteed-large
      storageClass: vsan-default-storage-policy
    workers:
      count: 2
      class: guaranteed-large
      storageClass: vsan-default-storage-policy
  distribution:
    version: v1.17.7
c:\bin>kubectl apply -f onlinebankappdevcluster.yaml
tanzukubernetescluster.run.tanzu.vmware.com/onlinebankappdevcluster created

c:\bin>_
```

©2021 VMware, Inc.