VMUG
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BULGARIA

THE JOURNEY TO

VMware Tanzu

Part 3: Deploying a basic VMware Tanzu infrastructure

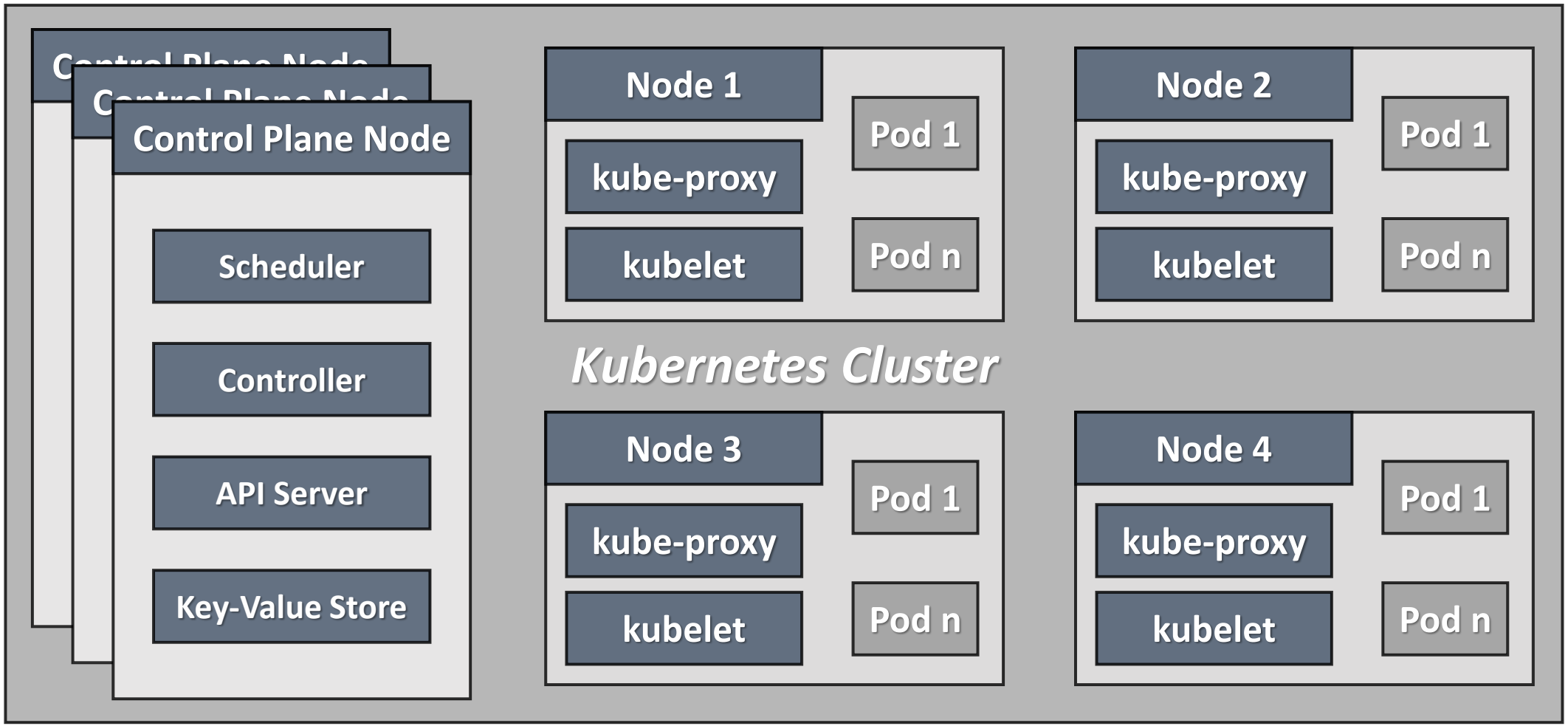
Agenda

- Architecture
- Deployment
- Demo

Architecture

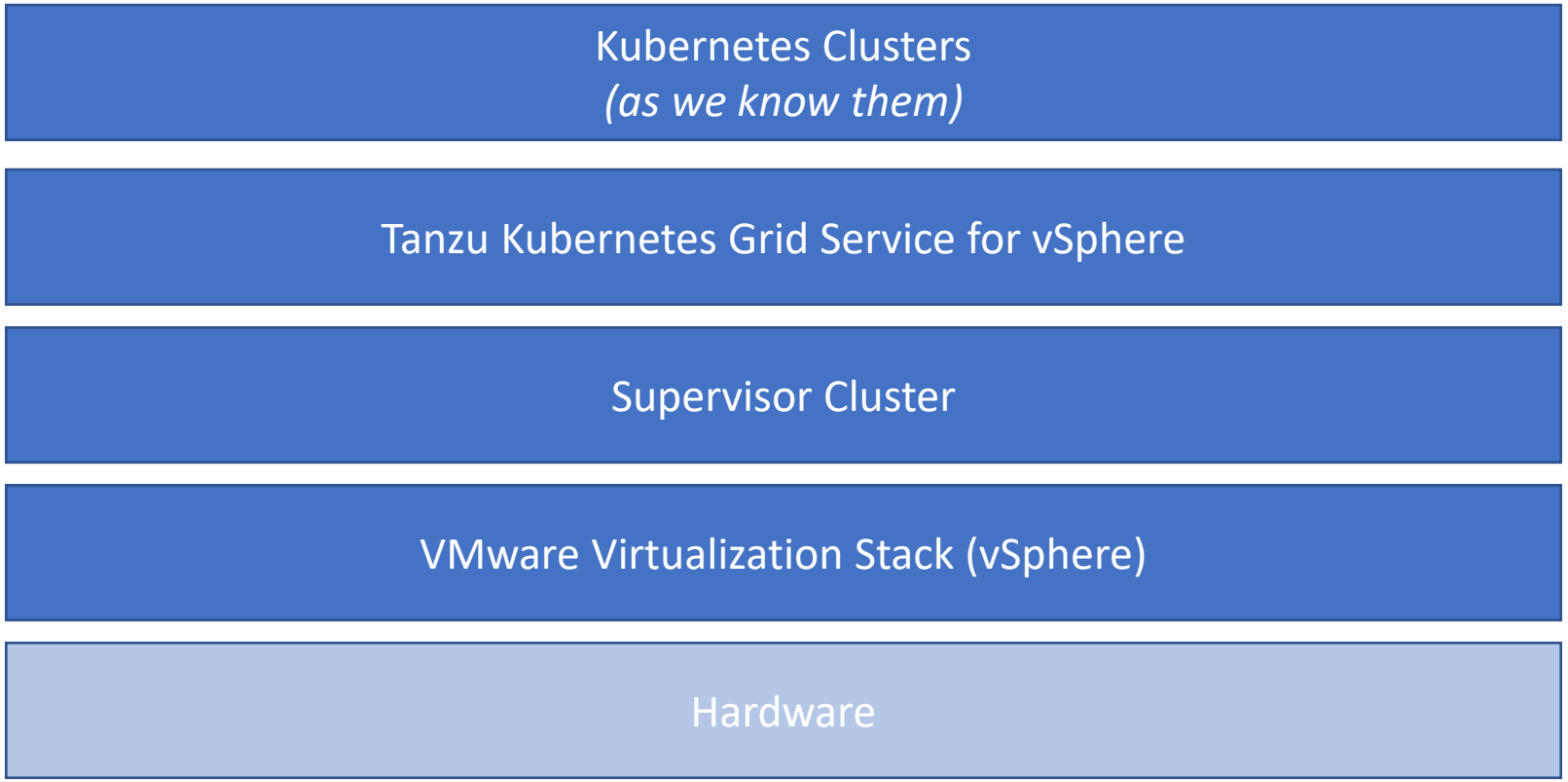
1000 ft view

Kubernetes Architecture*

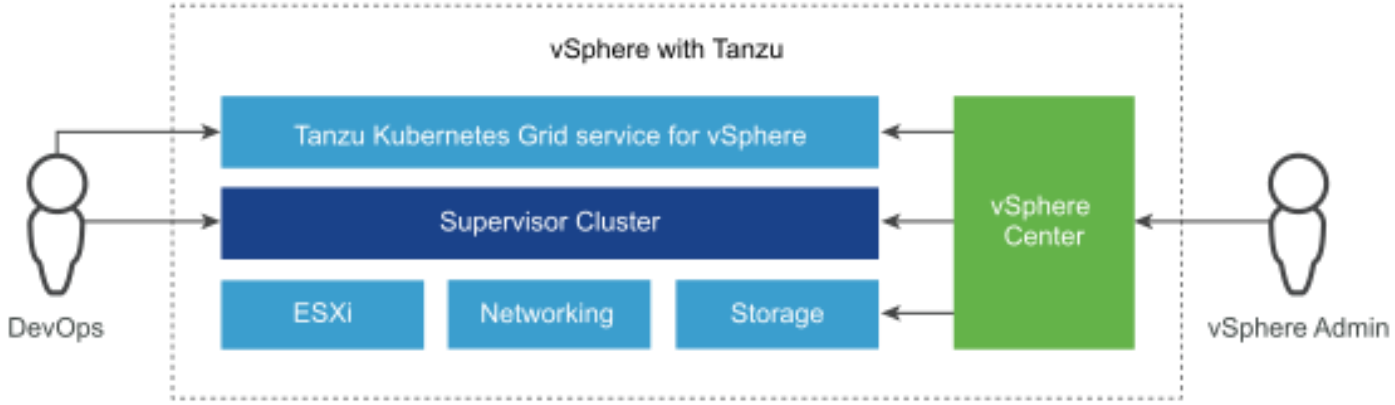


* Not all components are shown

VMware Landscape and Kubernetes



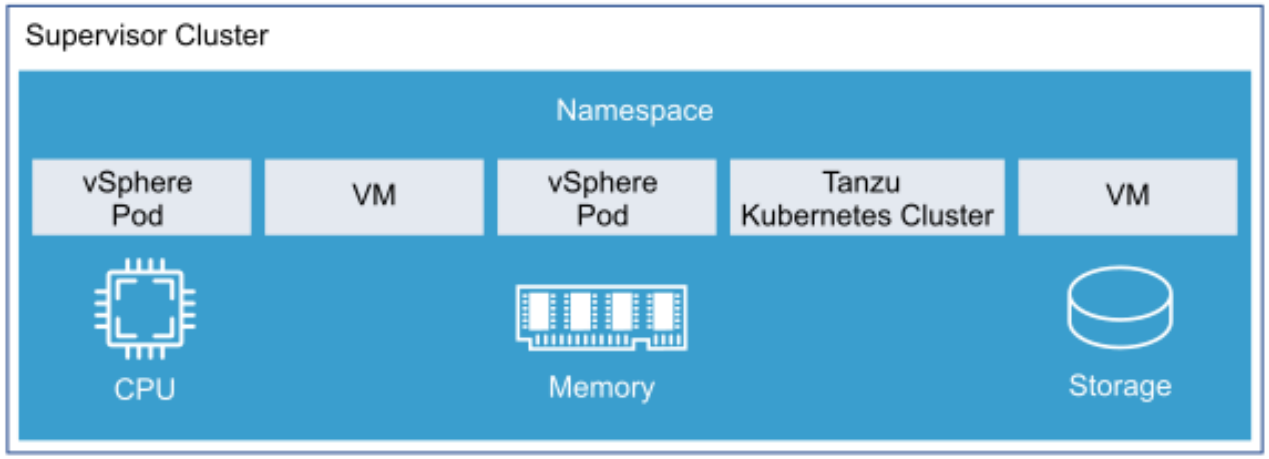
vSphere with Tanzu Architecture



- A cluster that is enabled for **vSphere with Tanzu** is called a **Supervisor Cluster**
- It runs on top of **ESXi** for compute, **NSX-T Data Center** or **vSphere networking**, and **vSAN** or another shared storage solution
- **vSphere administrators** create namespaces within the Supervisor Cluster that are called **vSphere Namespaces**
- **DevOps engineers** run workloads consisting of **containers** running inside **vSphere Pods** and create **Tanzu Kubernetes clusters**

https://docs.vmware.com/en/VMware-vSphere/7.0/vmware-vsphere-with-tanzu/GUID-3E4E6039-BD24-4C40-8575-5AA0EECBBBEC.html

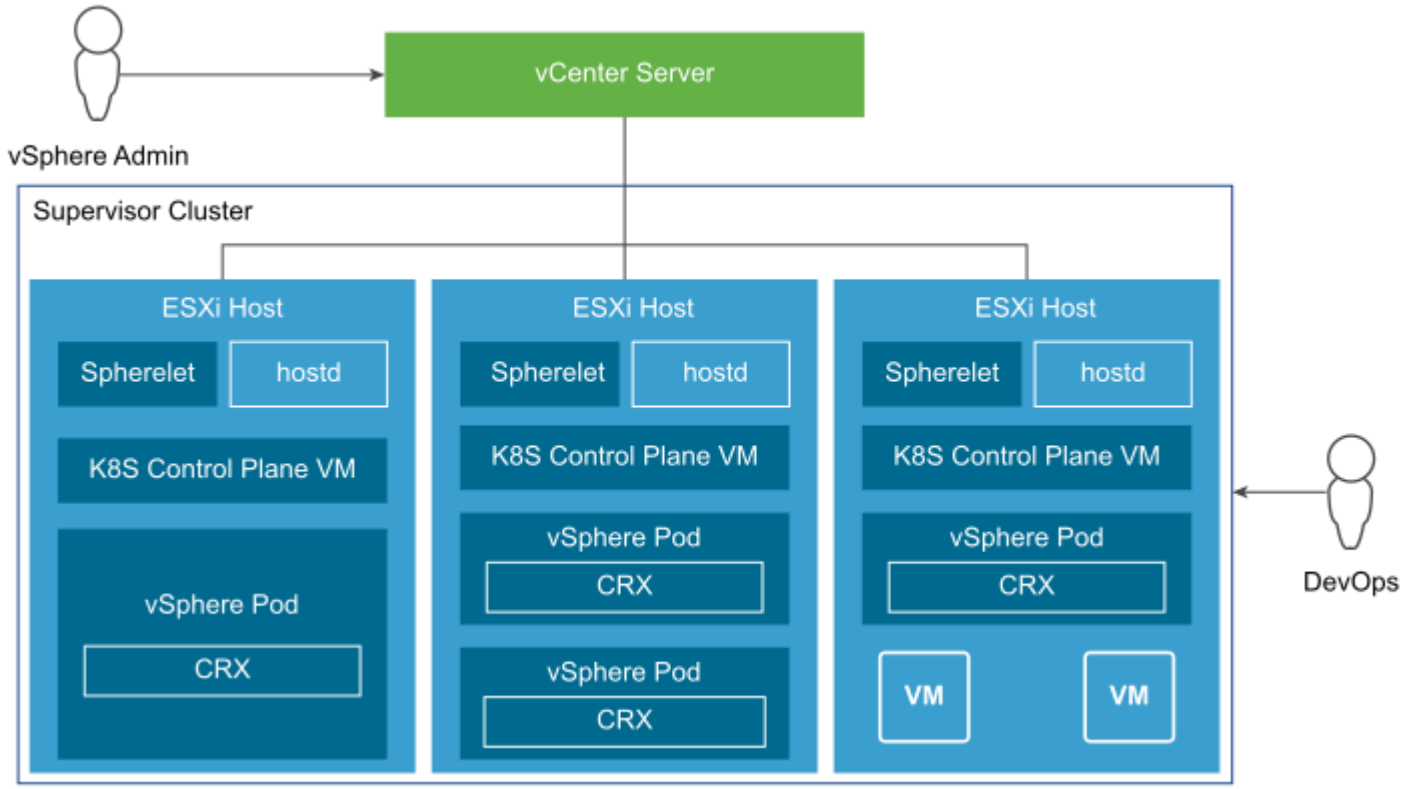
vSphere with Tanzu Architecture



- vSphere Namespace sets the **resource boundaries** where vSphere Pods and Tanzu Kubernetes clusters run
- Initially, the namespace has **unlimited resources** within the Supervisor Cluster
- vSphere administrator can **set limits** for **CPU**, **memory**, **storage**, and the **number of Kubernetes objects** that can run within the namespace
- A **resource pool** is created per each namespace in vSphere

https://docs.vmware.com/en/VMware-vSphere/7.0/vmware-vsphere-with-tanzu/GUID-3E4E6039-BD24-4C40-8575-5AA0EECBBBEC.html

vSphere with Tanzu Architecture



- **Three Kubernetes control plane VMs** in total are created
- They are **load balanced** as each one of them has its own IP address
- Additionally, a **floating IP address** is assigned to one of the VMs

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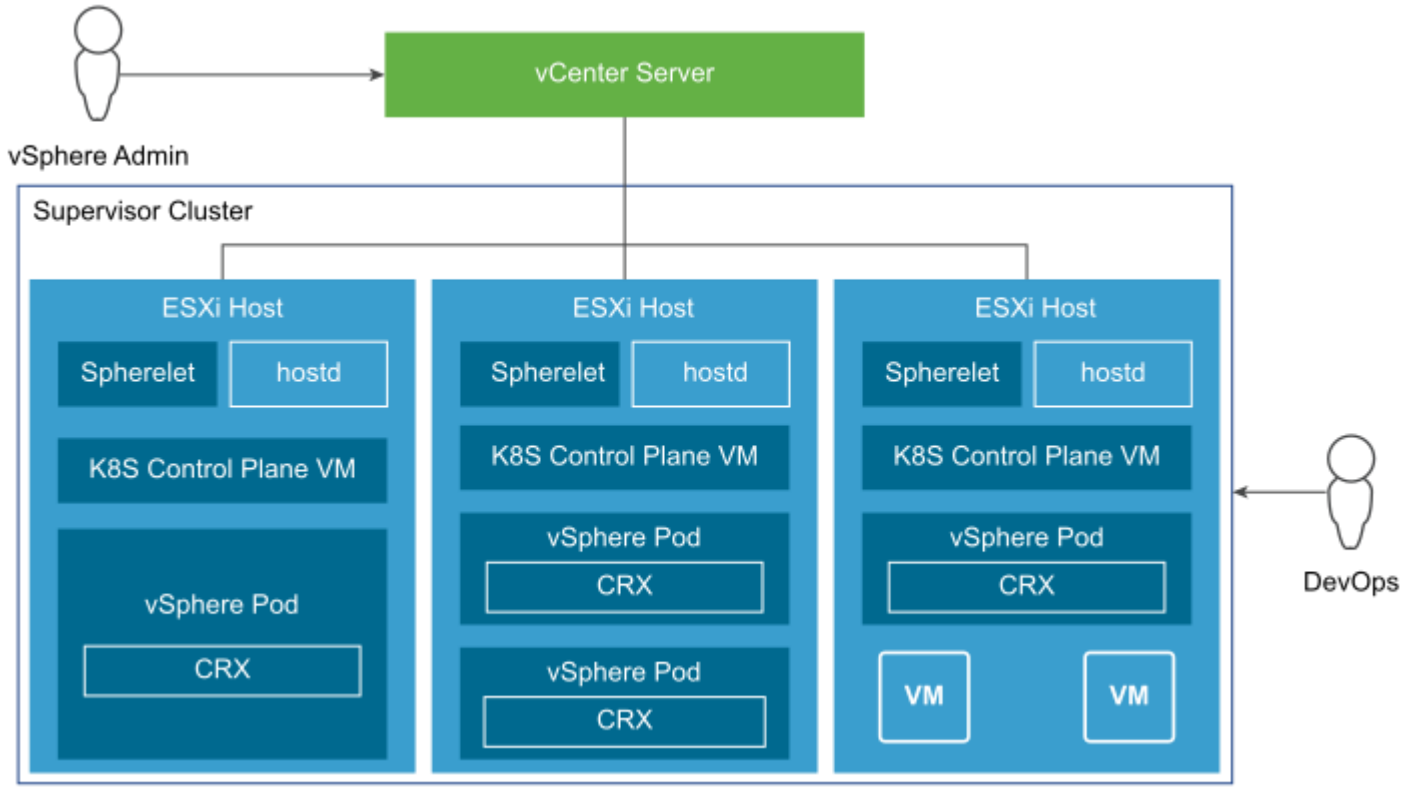
vSphere with Tanzu Architecture



- An additional process called **Spherelet** is created on each host
- It is a **kubelet** that is ported natively to ESXi
- Allows the ESXi host to become part of the Kubernetes cluster

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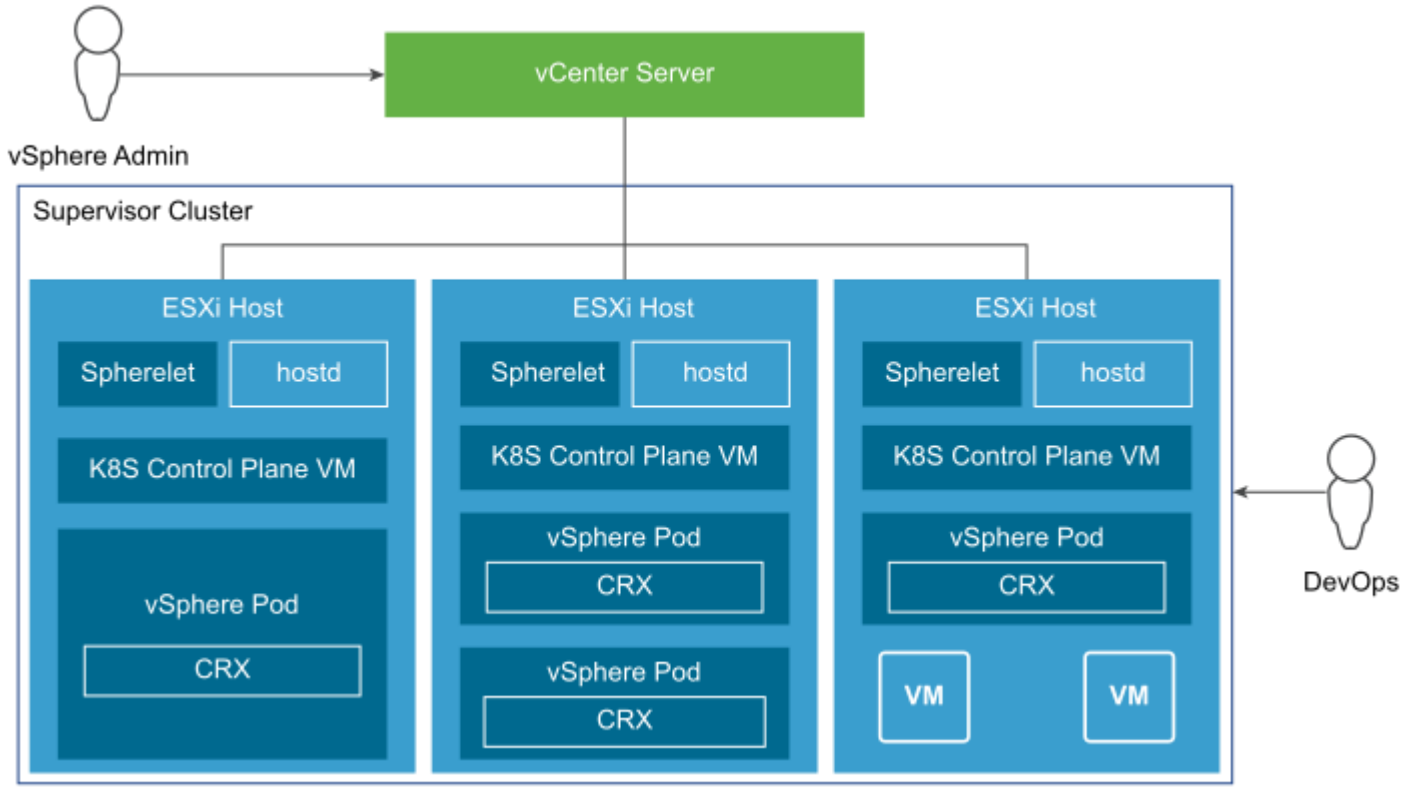
vSphere with Tanzu Architecture

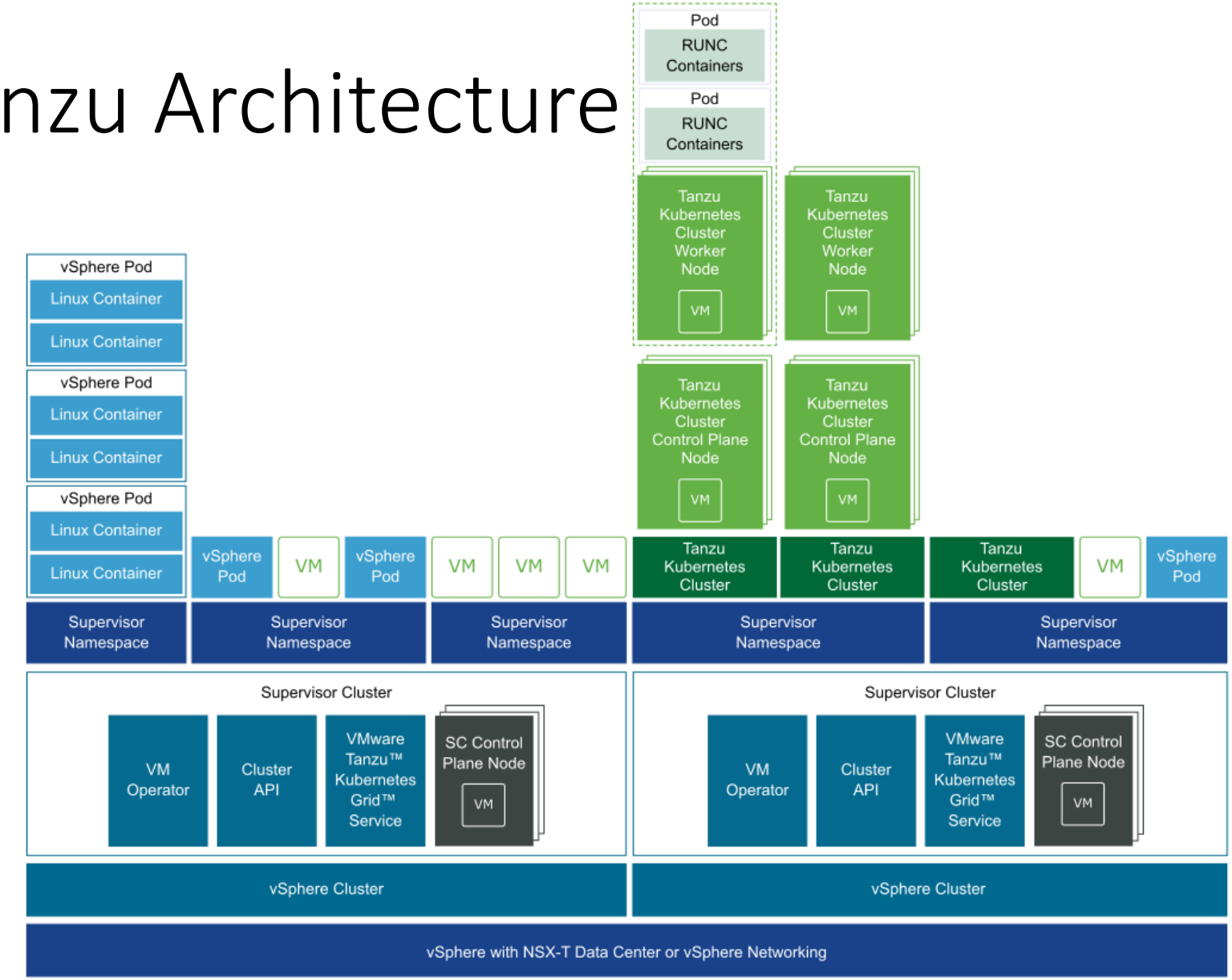


- **Container Runtime Executive** (**CRX**) is similar to a VM from the perspective of **Hostd** and **vCenter Server**
- Includes a **paravirtualized Linux kernel** that works together with the hypervisor and uses the same hardware virtualization techniques as VMs
- In addition, **direct boot** technique allows the Linux guest of CRX to initiate the main init process without passing through kernel initialization

https://docs.vmware.com/en/VMware-vSphere/7.0/vmware-vsphere-with-tanzu/GUID-3E4E6039-BD24-4C40-8575-5AA0EECBBBEC.html

vSphere with Tanzu Architecture

- A **Tanzu Kubernetes cluster** is a **full distribution** of the open-source **Kubernetes** software that is **packaged**, **signed**, and **supported** by **VMware**
- **Tanzu Kubernetes Grid Service** is used to provision Tanzu Kubernetes clusters on the Supervisor Cluster
- Its **API** can be invoked **declaratively** by using **kubectl** and a **YAML** definition



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Deployment

Infrastructure and deployment steps

Installation Options

- vSphere 6.7u3 (with an Enterprise Plus license)
  - First deploy a management cluster via **VMware Tanzu Kubernetes Grid** either using UI or CLI
  - Then create guest clusters with the **tanzu** command line tool
- vSphere 7.0 (without vSphere with Kubernetes feature)
  - Same as with vSphere 6.7u3
- vSphere 7.0 (with vSphere with Kubernetes feature)
  - We can utilize the **Workload Management** feature

https://docs.vmware.com/en/VMware-vSphere/7.0/vmware-vsphere-with-tanzu/GUID-EE236215-DA4D-4579-8BEB-A693D1882C77.html

Requirements

- To run container-based workloads natively on vSphere, we must enable **Workload Management** on a **vSphere cluster**
- The result is a **Kubernetes management cluster** known as a **Supervisor Cluster** where we run **vSphere Pods**, provision **Tanzu Kubernetes clusters**, and **VMs**
- A vSphere cluster is a **collection of ESXi hosts managed by a vCenter Server**
- The Supervisor Cluster runs on a vSphere cluster
- We need a vSphere cluster with at least **3 ESXi hosts** or if using vSAN with **4 ESXi hosts**
- There are two options for the networking to be used for the Supervisor Cluster – **NSX-T Data Center** or **vSphere Distributed Switch** (**vDS**) networking **with a load balancer**
- vDS Networking **doesn't support** vSphere Pods and Embedded Harbor Registry

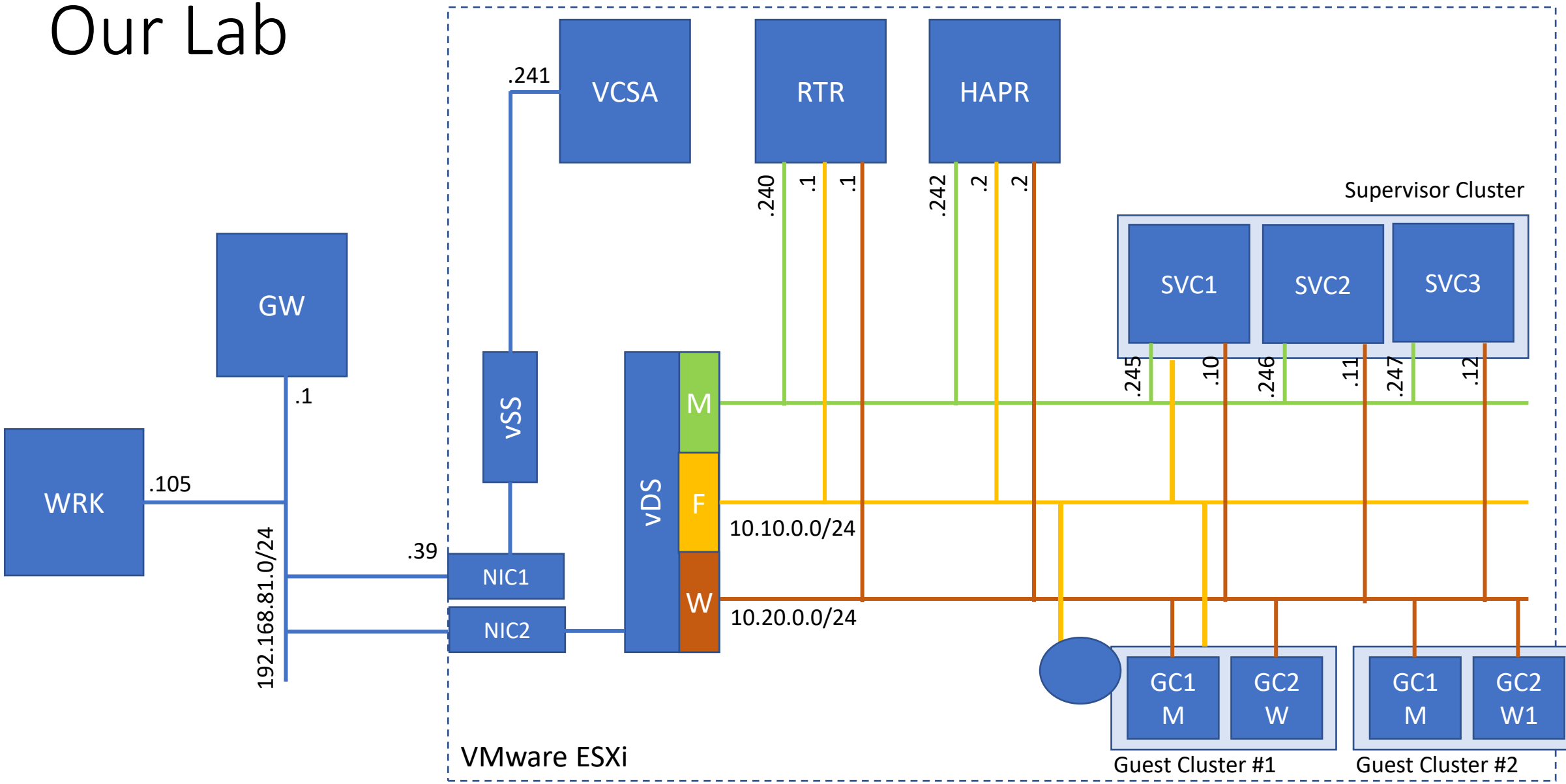
https://docs.vmware.com/en/VMware-vSphere/7.0/vmware-vsphere-with-tanzu/GUID-EE236215-DA4D-4579-8BEB-A693D1882C77.html

Our Setup

- Single ESXi node with vCenter installed (7.0u2)
- Use vDS with HAProxy instead of NSX-T
- No vSAN

https://docs.vmware.com/en/VMware-vSphere/7.0/vmware-vsphere-with-tanzu/GUID-EE236215-DA4D-4579-8BEB-A693D1882C77.html

Our Lab


VCSA
.241
RTR
HAPR
.240
.1
.1
.242
.2
.2
Supervisor Cluster
SVC1
SVC2
SVC3
.245
.10
.246
.11
.247
.12
GW
.1
WRK
.105
192.168.81.0/24
vSS
.39
NIC1
NIC2
vDS
M
F
W
10.10.0.0/24
10.20.0.0/24
GC1
M
GC2
W
GC1
M
GC2
W1
Guest Cluster #1
Guest Cluster #2
VMware ESXi

Steps

- Start with a clean vSphere 7.x installation (with vSphere cluster)
- Create content library
- Prepare the network infrastructure (layer)
- Enable workload management and create a (supervisor) cluster
- Create a namespace and adjust some settings
- Download and connect CLI tools
- Prepare and create first (guest) k8s cluster
- Start playing with k8s under VMware Tanzu ☺

VMware Tanzu in Action

A short demonstration of how to deploy VMware Tanzu

Most recent version can be downloaded from **https://github.com/shekeriev/journey-vmware-tanzu**

2021.07.20