Intro: Kubernetes VMware User Group

Best Practices for Running on VMware

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Agenda

Intro to the vSphere cloud provider and related storage plugins

Recent features/changes: What are they?

What are they? How to use them?

Running Kubernetes on "desktop" hypervisors

Kubernetes on Fusion and Workstation

How to get involved in the User Group

The vSphere Cloud Provider

What does it do?

Cloud providers are what makes Kubernetes “cloud native”

- plug-in abstraction layer that links to underlying infrastructure in a public cloud or on-prem

The vSphere Cloud Provider:

- Supports reporting the availability zones of underlying infrastructure tying this in with the CSI storage plugin
- Does not support a specific load balancer, routes, or interface to return a cluster list

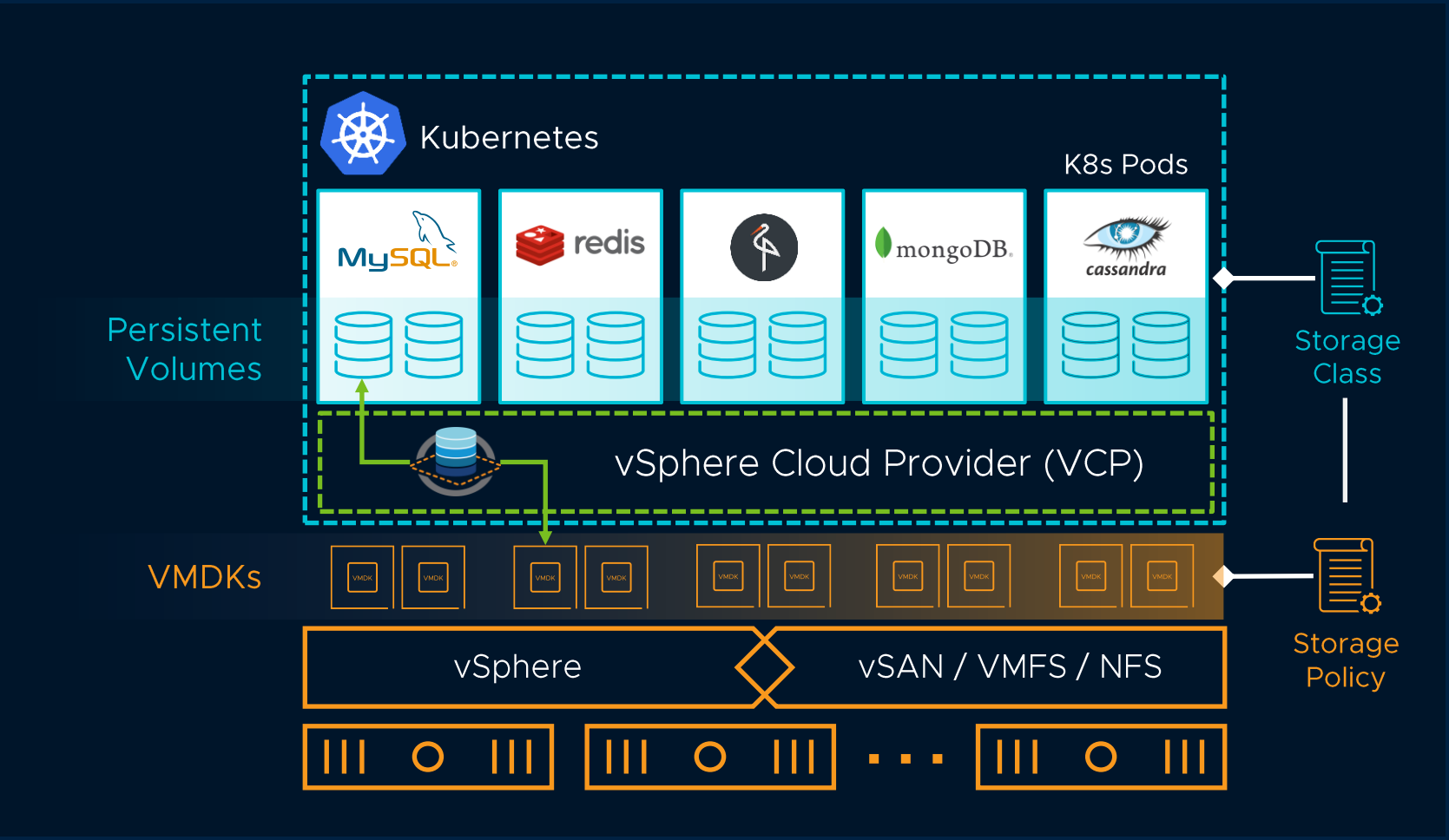
For more details see: cloud-provider-vsphere.sigs.k8s.io/

Intro to storage on vSphere

The VCP, CPI and CSI

vSphere Cloud Provider (VCP) for Kubernetes

The past



Natively built into Kubernetes

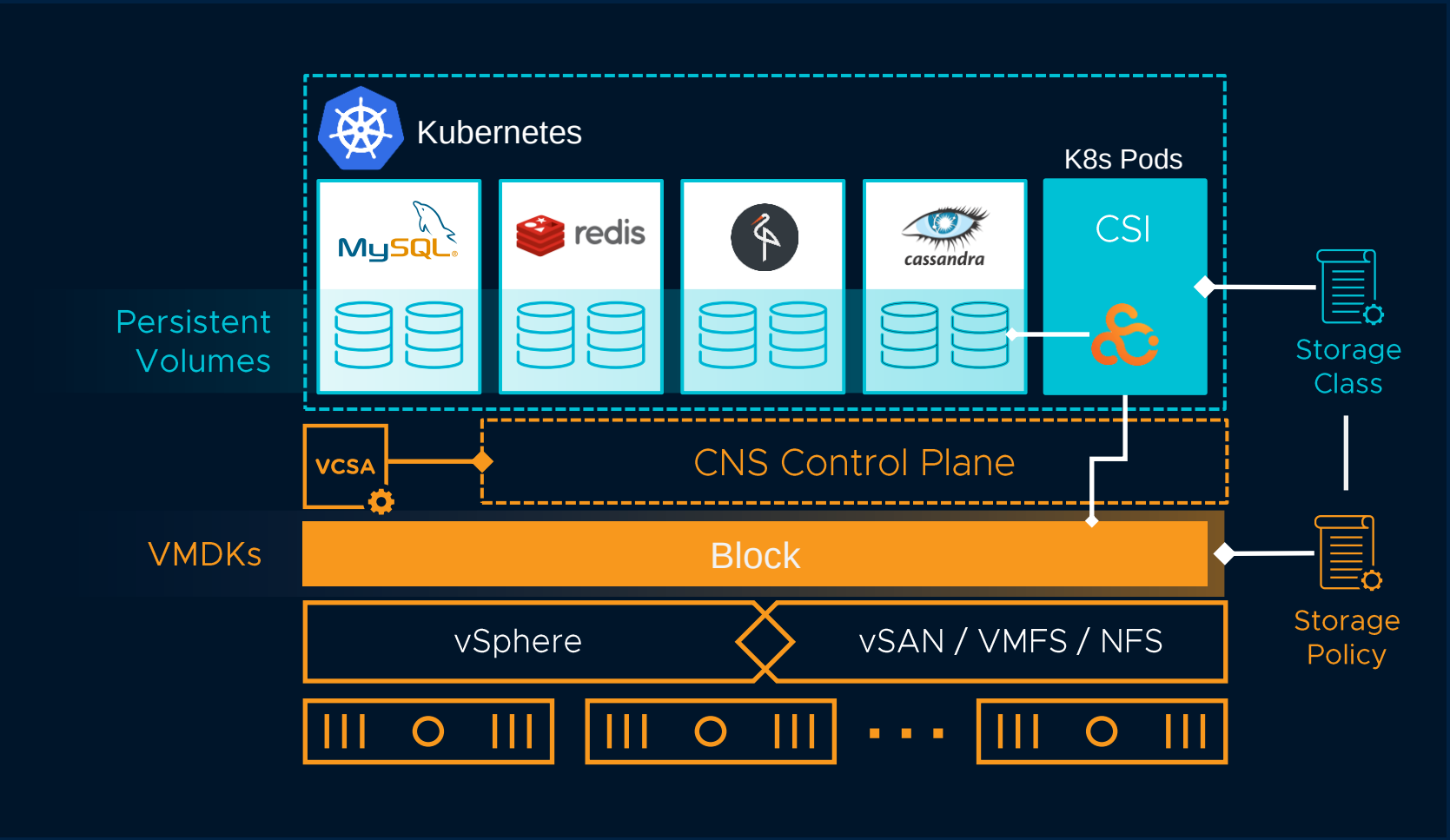
Policy driven dynamic provisioning of Kubernetes persistent volumes

Data services at a granularity of a container volume via SPBM

Not without its drawbacks

vSphere 6.7 Update 3 – CNS Platform Introduction

The present



Built on the **CSI standard** for container storage

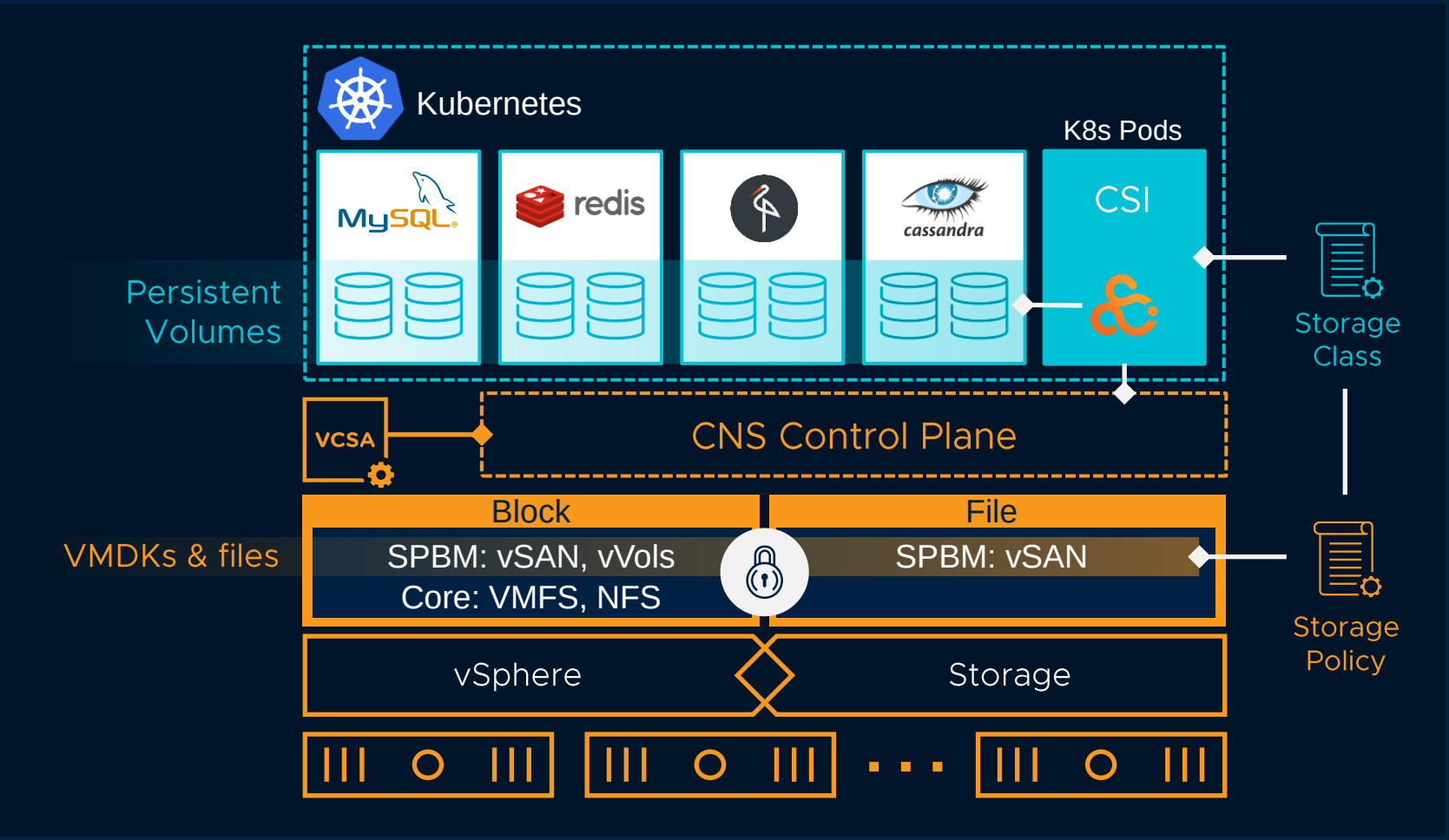
Policy driven dynamic provisioning of Kubernetes persistent volumes

Enabling **operational consistency** between VM and container infrastructure management

Abstracts the storage **infrastructure for developers**

Continued Integration of Cloud Native Storage in vSphere and vSAN

The present



Offer **file-based** persistent **volumes on vSAN**

Supports basic **vVol** primitives

Enable persistent volume **encryption and snapshots**

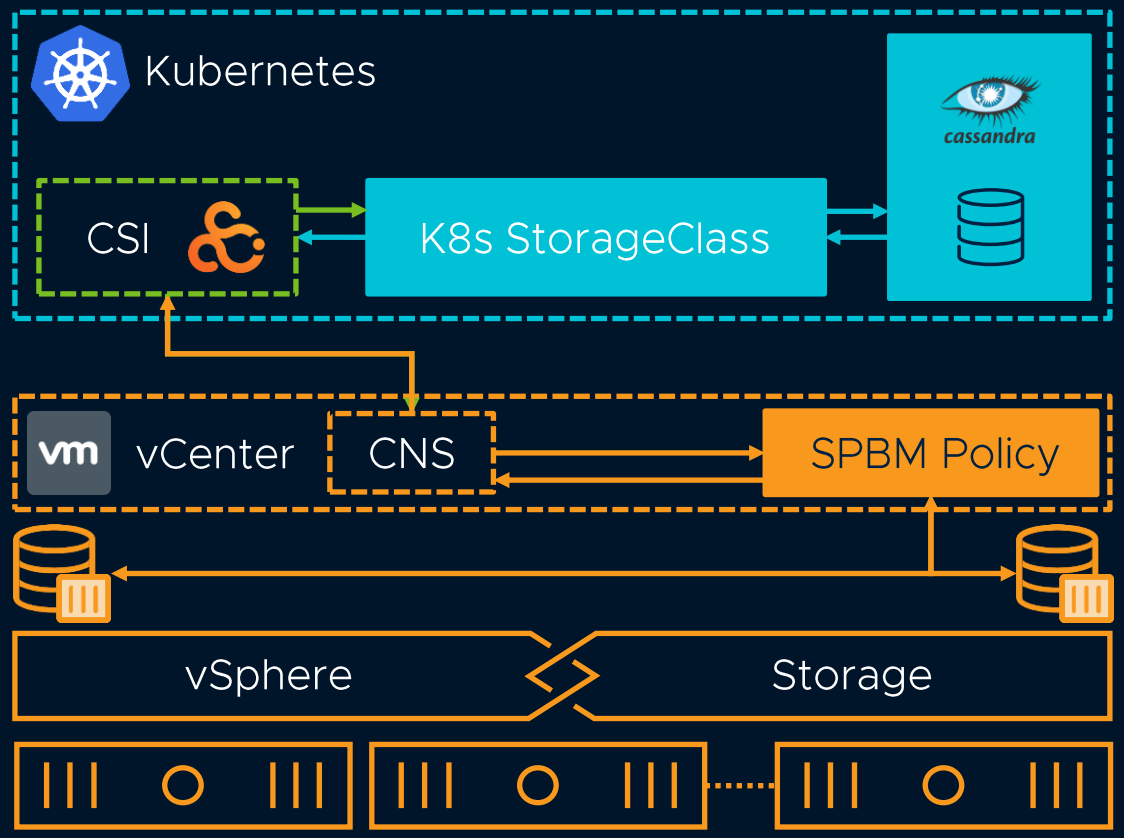
Supports volume resizing

Supports a mix of tooling

- Wavefront
- **Prometheus**
- vR Ops

Policy Based Management for Kubernetes Workloads

Dynamic Provisioning Workflow for Block Container Volumes



Dynamically create volumes on tiers of storage

Preferred method of storage provisioning

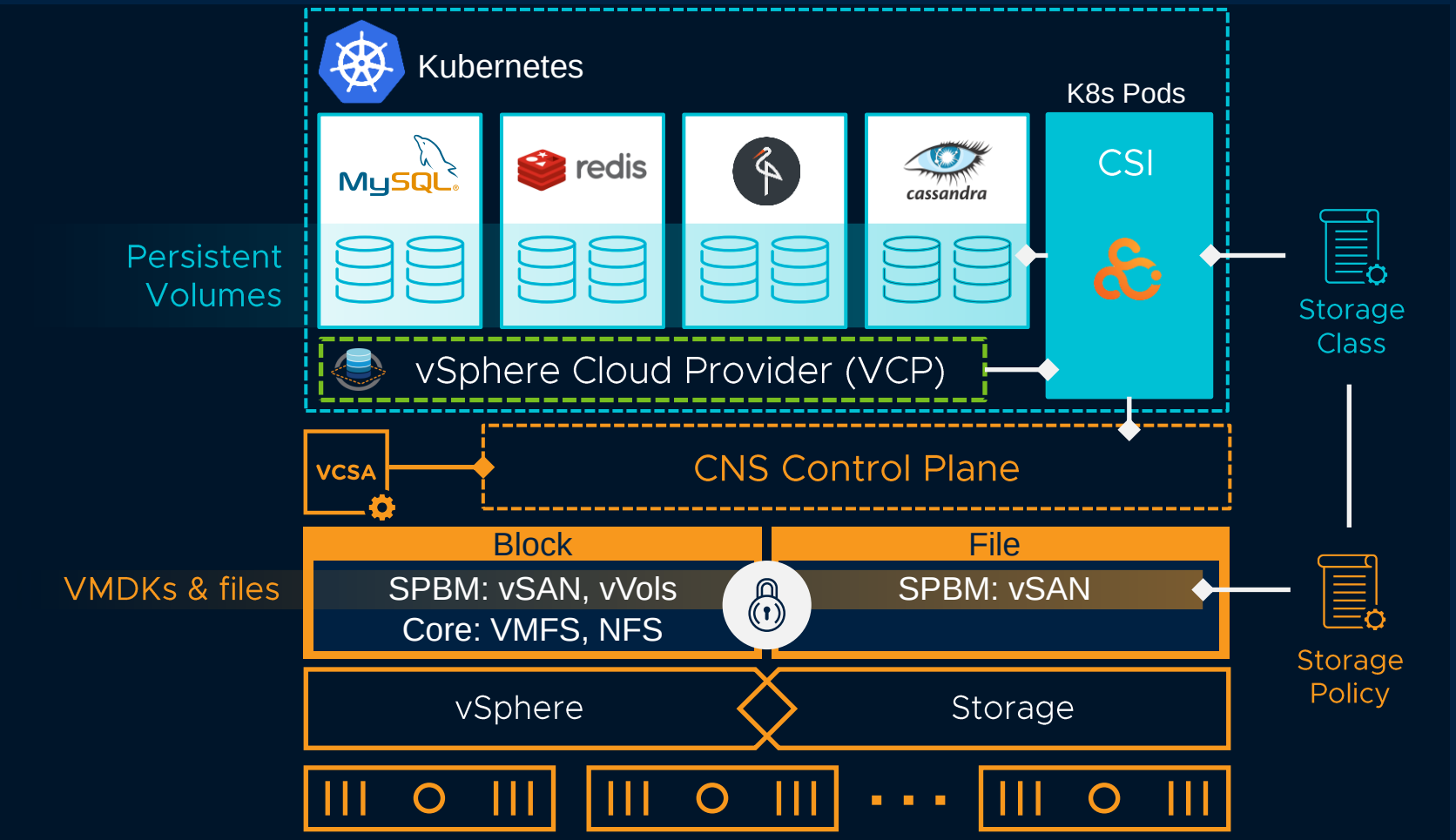
Admin **intervention not required**

Completely **automated volume LCM**

VCP to CSI Migration

Beta in K8s 1.19 and vSphere 7.0 U1

Beta



Offers **migration** from legacy VCP **to supported CSI driver**

Transparent to the application

Volumes converted to FCDs and **included in CNS UI**

Requires new CSI driver and vSphere version

Recently added Features + Changes

What are they? How to Use Them

Recent / Planned Changes

Warning this session was pre-recorded so this is based on plans for a release in the KubeCon Europe timeframe - we will update actual status during Q&A

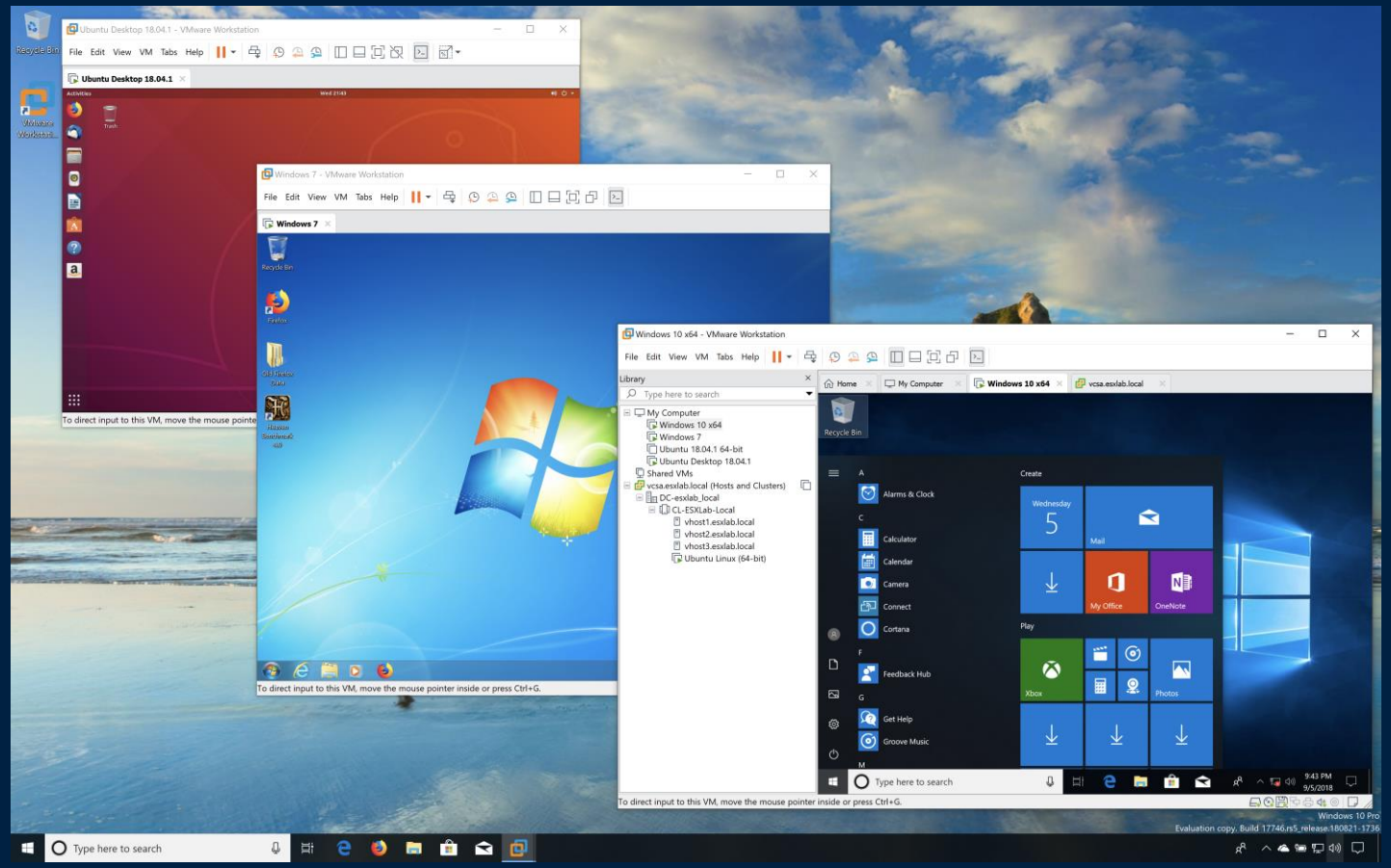
[NEW] Support for NSX-T based Load Balancers PR: #292
[NEW] Initial implementation for YAML based config. PR: #305
[NEW] Update CPI image to use non-root account. PR: #297
[NEW] Add support for Resource Pool and Folder traversal for Zones/Regions. PR: #362
[ENHANCE] InstanceExistsByProviderID Signal Deletion to K8s. PR: #359
[ENAHNCE] Update docs for VMTools exclude-nics filtering. PR: #349
[ENHANCE] Added guide on how to install CSI on an already-existing K8s cluster. PR: #293
[ENAHNCE] Documentation updates. PR: #310,
[BUG] Don't cache instances if addresses are not found. PR: #336
[BUG] vSphere cloud-controller-manager should tolerate not-ready taint. PR: #339
[BUG] Prevent guest from getting cached when unable to get properties. PR: #343
[BUG] Remove ToLower when using FQDN. PR: #352
[BUG] Log does not print node initialization success when zone labels are not configured. PR: #361

Kubernetes on Desktop hypervisors

Unique aspects of running on Fusion and Workstation

VMware Desktop Hypervisors: Fusion + Workstation

Industry changing local virtualization tools



VMware Workstation

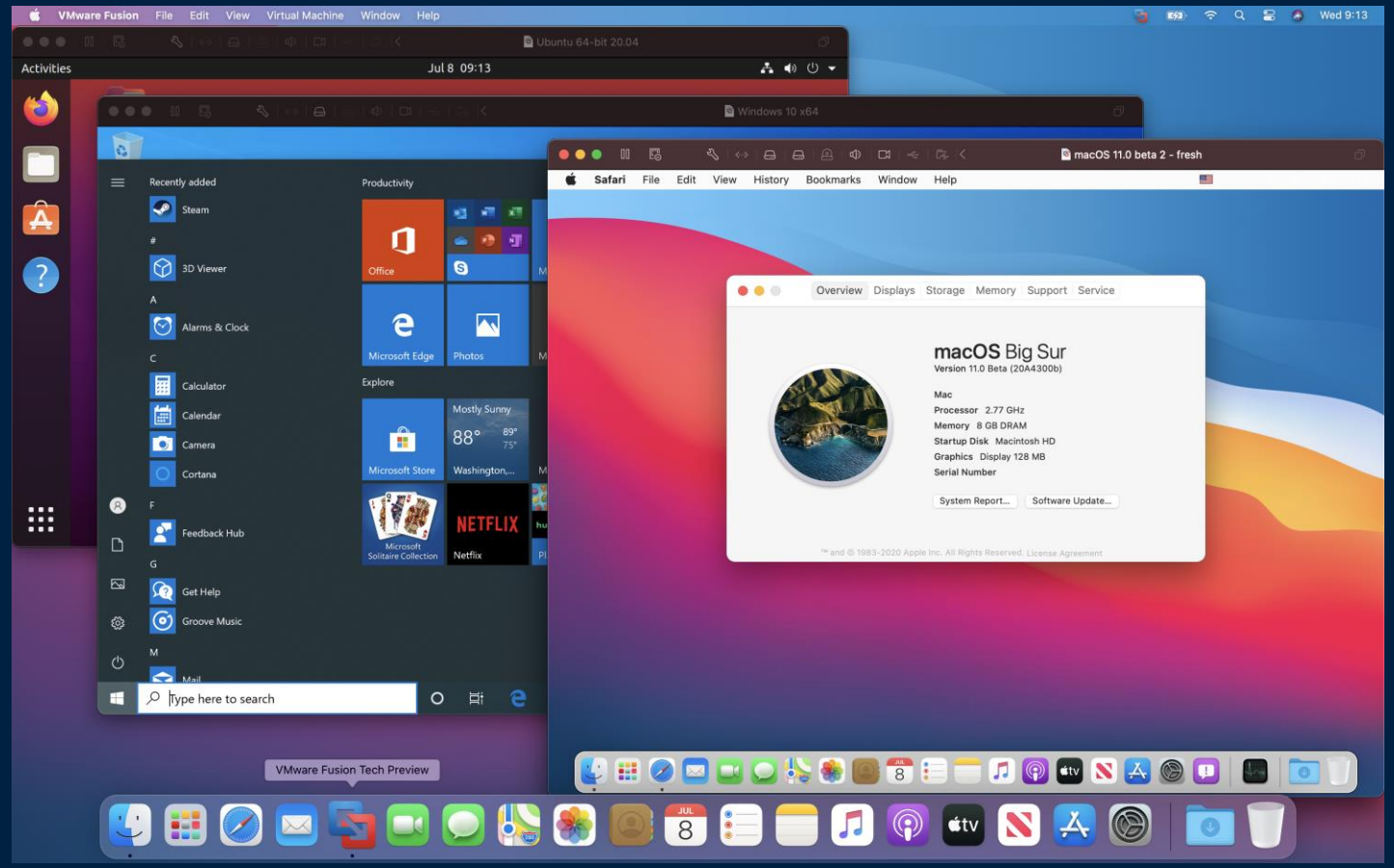
- Type-2 Hypervisor
- Originally “VMware 1.0 for Linux”
  - Introduced in 1999
  - ESX was based on this
- Windows + Linux
  - Host and Guest
- Virtual Networking
- Used by *millions* of Developers and IT professionals worldwide

VMware Desktop Hypervisors: Fusion + Workstation

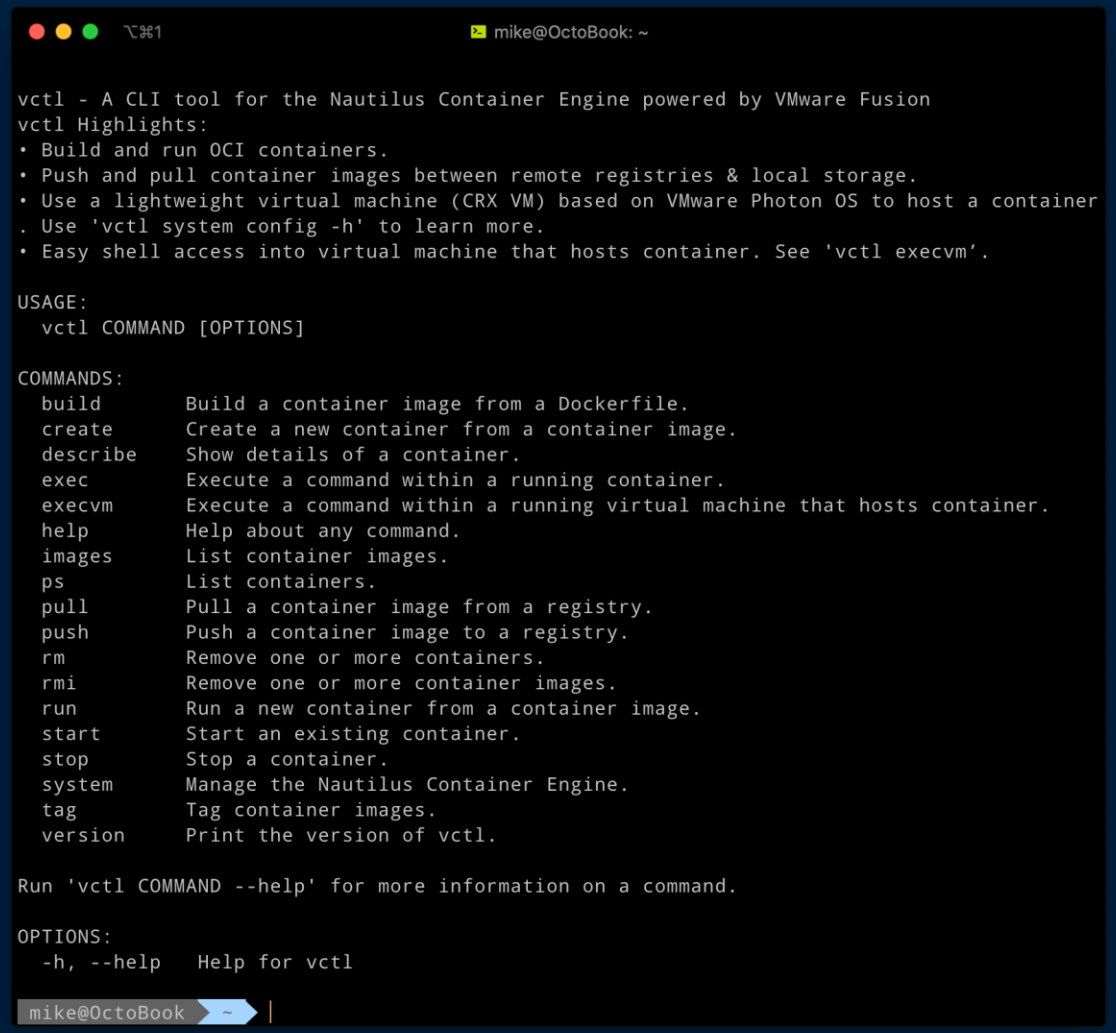
Industry changing local virtualization tools

VMware Fusion

- Type-2 Hypervisor
- Originally introduced in 2007
  - Possible because Apple transitioned to Intel x86
  - Based on Workstation code
- Mac only
- Windows, Linux + macOS Guests
- Virtual Networking
- Used by *millions* of Developers and IT professionals worldwide



Project Nautilus: OCI Containers in Fusion and Workstation



Containers without Docker

- vctl: New but familiar CLI
- Based on containerd
- Facilitated by ‘CRX’ runtime from vSphere (Project Pacific)
- Simple ‘build’, ‘run’, ‘pull’, ‘push’ workflows
  - **‘kind’ support coming soon!**
- containerd socket exposed: hack away!
  - ~/.vctl/storage/containerd/run/containerd/containerd.sock

See https://github.com/VMwareFusion/nautilus for latest (20H2 as of now)

Desktop Hypervisor resources

15.5.6 Download Links: Linux Windows MAC: Fusion 11.5.5

Workstation Tech Preview 20H2

- Download Links Linux Windows MAC
- TP getting Started Guide link

Kubernetes on a Desktop Hypervisor

demo

Minikube on Workstation for Windows

Linux and MAC (Fusion) are similar

Step 1 – download the parts you will need

1. Windows Installer for Workstation hypervisor
   https://bit.ly/get-workstation-tp
2. Go language – we are going to install driver by building it from source
   https://golang.org/dl/go1.14.6.windows-amd64.msi
3. Git for command line – needed by go
   github.com/git-for-windows/git/releases/download/v2.28.0.windows.1/Git-2.28.0-64-bit.exe
4. Kubectl Kubenetes CLI
   https://storage.googleapis.com/kubernetes-release/release/v1.18.6/bin/windows/amd64/kubectl.exe
5. Minikube for Windows
   github.com/kubernetes/minikube/releases/download/v1.12.1/minikube-installer.exe

Minikube on Workstation for Windows

Step 2 Install what you downloaded

1. Install the Workstation hypervisor
2. Install Go language tools
3. Install Git
4. Put Workstation and Go directories in your search path

   ```
   Example C:\Program Files (x86)\VMware, C:\Go\bin
   ```

5. Install Docker machine driver used by minikube, at a command line

   ```
   go get -u github.com/machine-drivers/docker-machine-driver-vmware
   ```

6. Put kubectl in a location within your search path
7. Install minikube

Minikube on Workstation for Windows

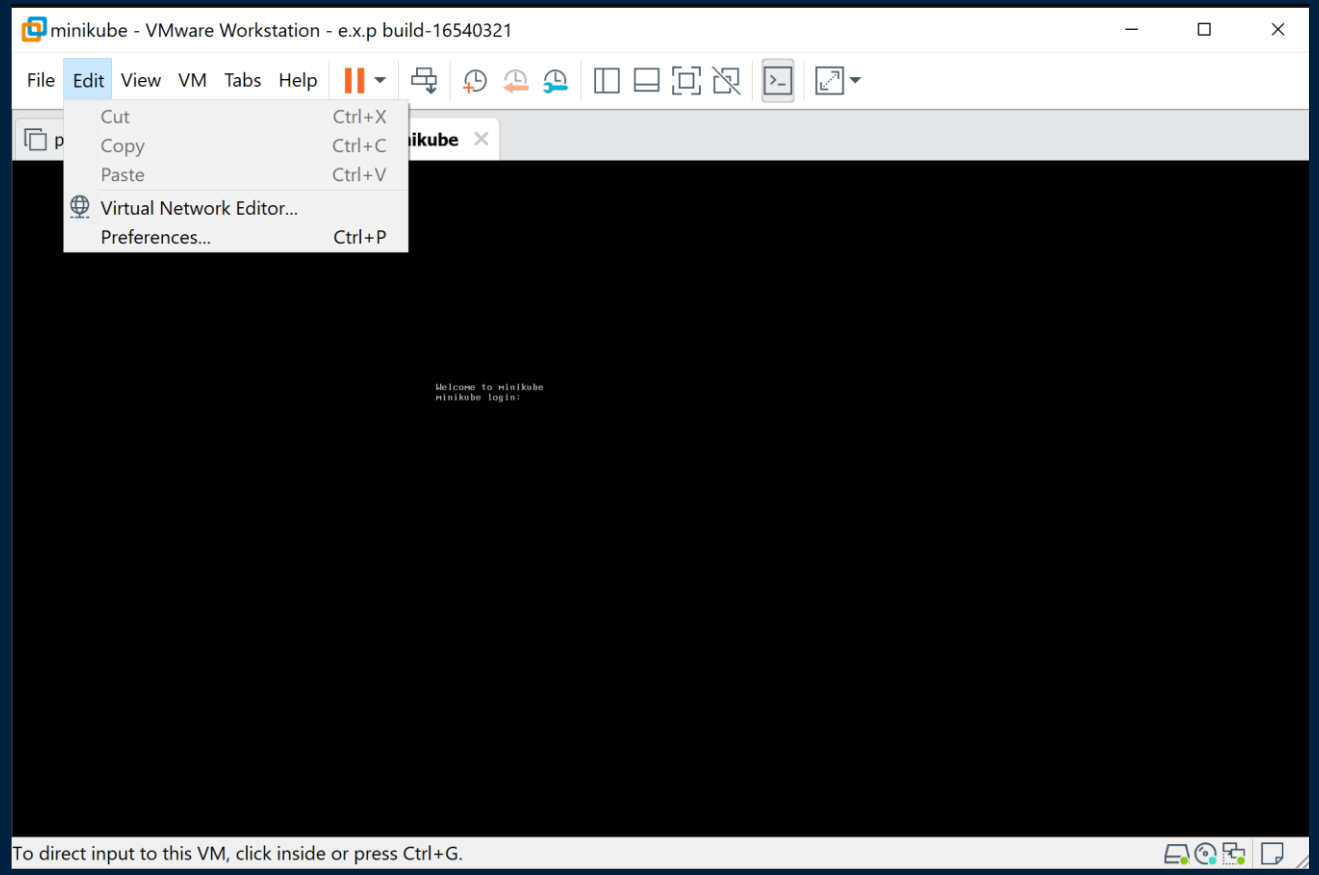
Step 3 - Configure minikube : do these at a command line

minikube config set vm-driver vmware
minikube config set cpus **4**
minikube config set memory **16384**
minikube config set disk-size **50g**
minikube config set host-only-cidr **192.168.99.1/24**
minikube config set kubernetes-version **v1.18.6**

minikube config view

Invoke network editor

Optional Step 4: Set network CIDR using Network editor from VMware Workstation Menu

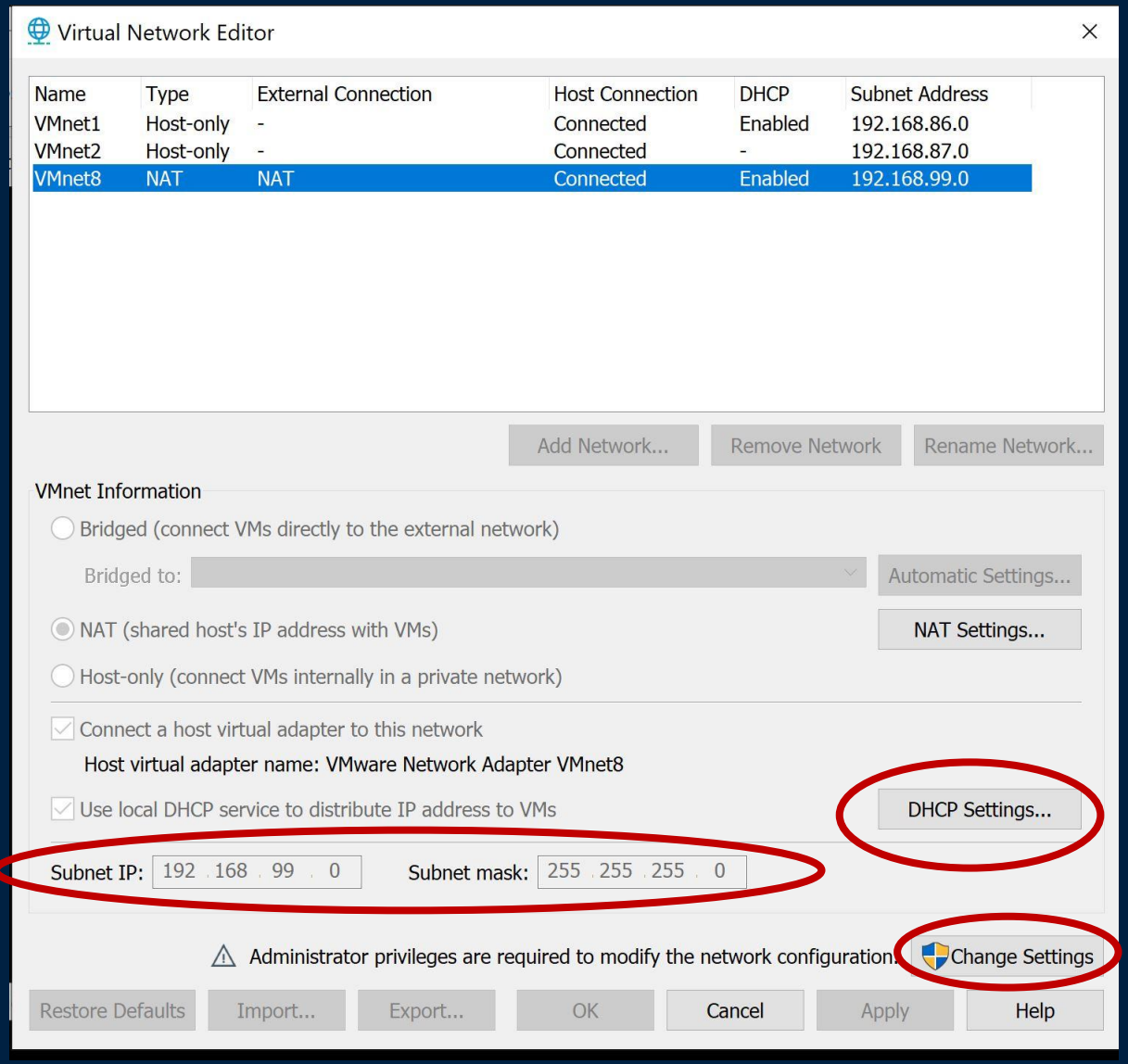


Invoke network editor

We are going to edit VMnet8

We are changing the CIDR of this network to 192.168.99.0/24

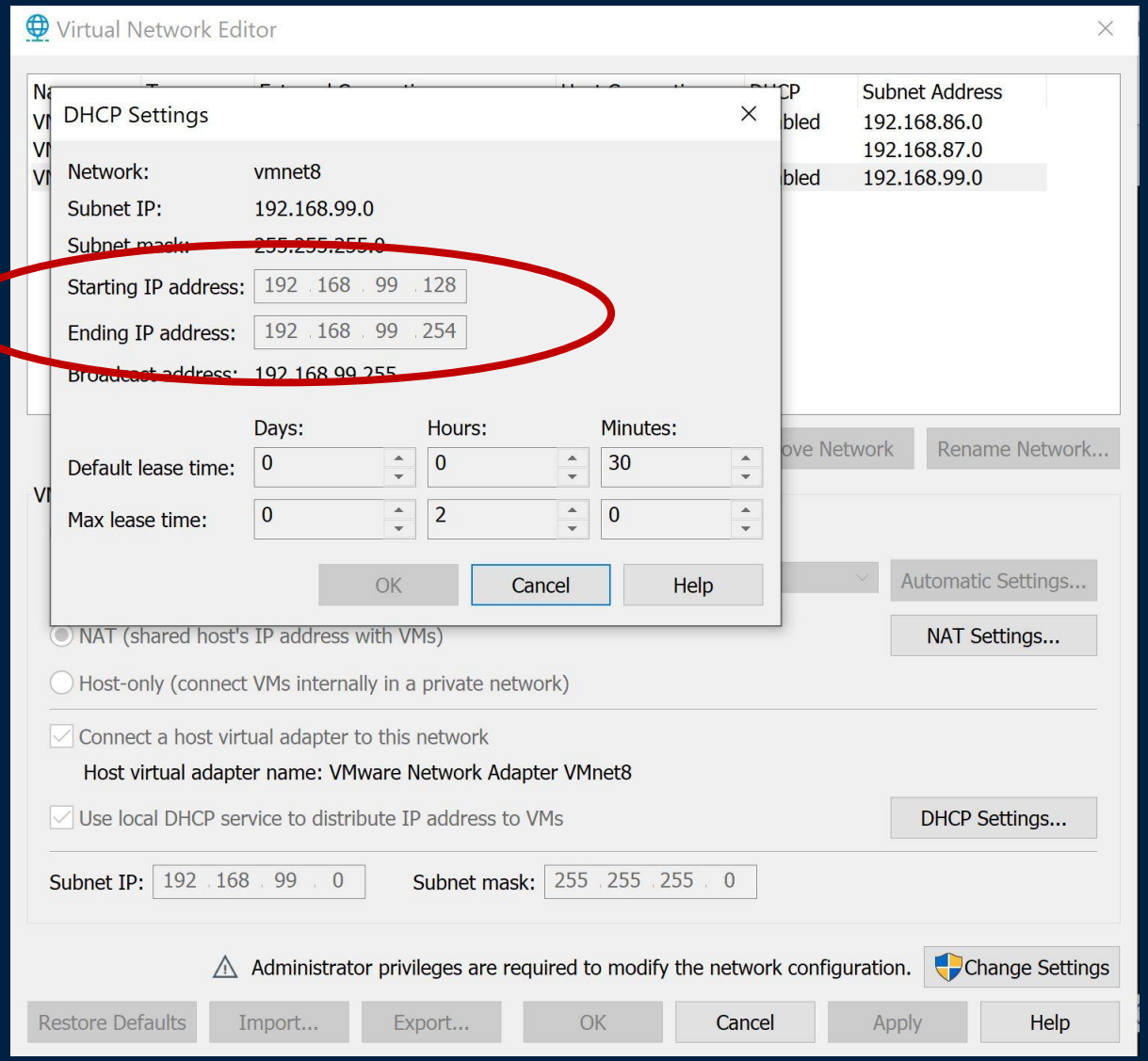
1. Hit Change Settings button
2. Change the Subnet IP
3. Hit the DHCP Settings button



Invoke network editor

We are going to edit VMnet8

Change prefix of DHCP range to 192.168.99.x



Minikube on Workstation for Windows

Step 5 – Start minikube – build and run a VM with Kubernetes installed

```
C:\>minikube start --alsologtostderr -v=8
...
*Done!  Kubectl is now configured to use minikube ...
```

```
C:\>minikube status
minikube status
minikube
type: Control Plane
host: Running
kubelet: Running
apiserver: Running
kubeconfig: Configured
```

```
C:\>kubectl version
Client Version: version.Info{Major:"1", Minor:"18", GitVersion:"v1.18.6", GitCommit:"dff82dc0de47299ab66c83c626e08b245ab19037", GitTreeState:"clean",
BuildDate:"2020-07-15T16:58:53Z", GoVersion:"go1.13.9", Compiler:"gc", Platform:"windows/amd64"}
Server Version: version.Info{Major:"1", Minor:"18", GitVersion:"v1.18.6", GitCommit:"dff82dc0de47299ab66c83c626e08b245ab19037", GitTreeState:"clean",
BuildDate:"2020-07-15T16:51:04Z", GoVersion:"go1.13.9", Compiler:"gc", Platform:"linux/amd64"}
```

Minikube on Workstation for Windows

Step 6 – use Kubernetes

```
C:\>kubectl version
Client Version: version.Info{Major:"1", Minor:"18", GitVersion:"v1.18.6", GitCommit:"dff82dc0de47299ab66c83c626e08b245ab19037", GitTreeState:"clean", BuildDate:"2020-07-15T16:58:53Z",
GoVersion:"go1.13.9", Compiler:"gc", Platform:"windows/amd64"}
Server Version: version.Info{Major:"1", Minor:"18", GitVersion:"v1.18.6", GitCommit:"dff82dc0de47299ab66c83c626e08b245ab19037", GitTreeState:"clean", BuildDate:"2020-07-15T16:51:04Z",
GoVersion:"go1.13.9", Compiler:"gc", Platform:"linux/amd64"}
```

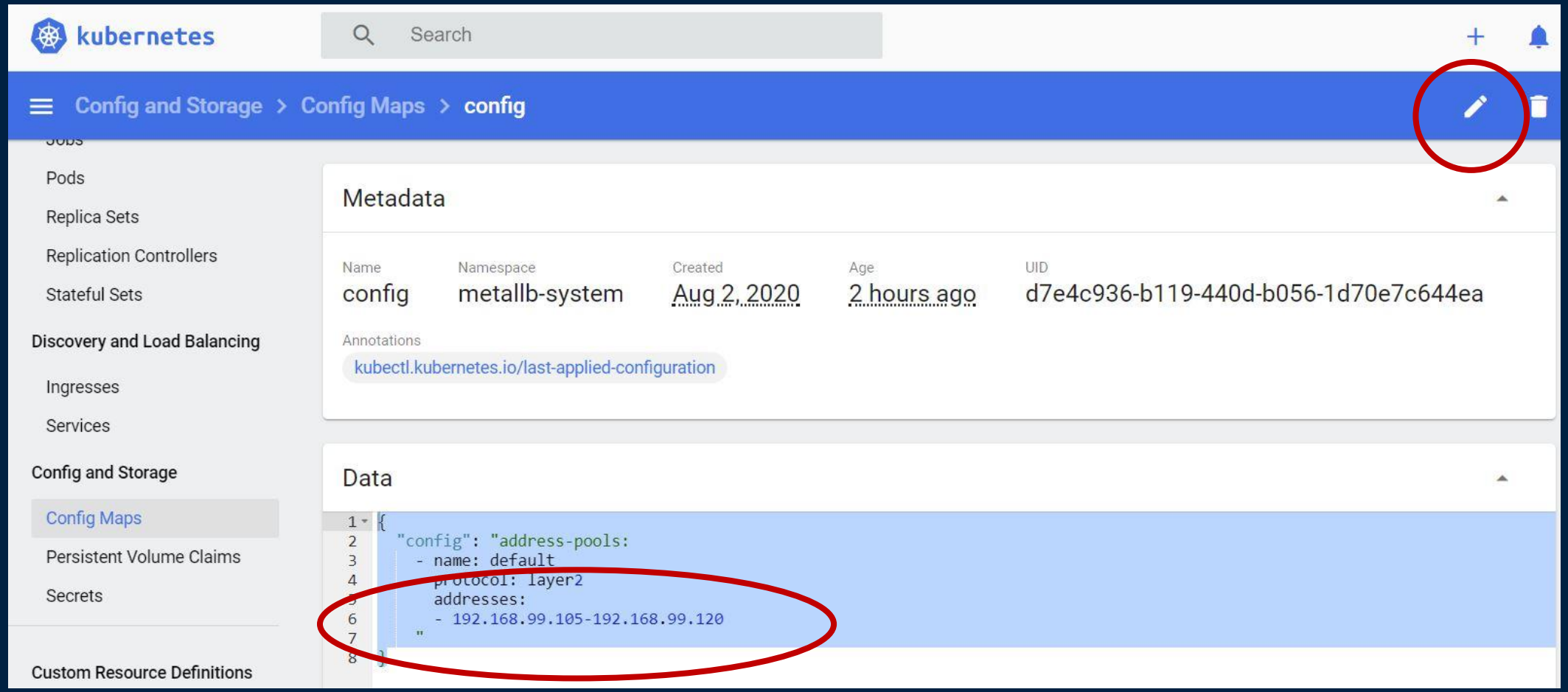
```
C:\>minikube addons enable metallb
C:\>minikube addons enable dashboard
C:\>minikube addons list
```

ADDON NAME	PROFILE	STATUS
ambassador	minikube	disabled
dashboard	minikube	enabled ✓
default-storageclass	minikube	enabled ✓
efk	minikube	disabled
freshpod	minikube	disabled
gvisor	minikube	disabled
helm-tiller	minikube	disabled
ingress	minikube	disabled
ingress-dns	minikube	disabled
istio	minikube	disabled
istio-provisioner	minikube	disabled
kubevirt	minikube	disabled
logviewer	minikube	disabled
metallb	minikube	enabled ✓

Minikube on Workstation for Windows

Configure load balancer using dashboard

```
C:\>minikube dashboard
```



Minikube on Workstation for Windows

Deploy a service

Open a new command prompt session since the dashboard has the first one tied up

```
C:\>kubectl create deployment hello-minikube --image=k8s.gcr.io/echoserver:1.10
```

```
C:\>kubectl expose deployment hello-minikube --type=LoadBalancer --port=80 --target-port=8080
```

Find the service in the dashboard with an exposed URL link or get the load balancer hosted URL from the command line

Kubernetes VMware User Group

What is it?

Similar to SIGs and Working Groups - intended to serve the needs of users running Kubernetes on particular platforms.

The VMware User group is the first (and currently only) K8s UG for a platform - covers running K8s on all VMware hypervisors.

Why is this important?

Create community culture among our users

- Users can help each other
- Users can help us make Kubernetes better – and strengthen user experience on our platforms:
  - Feature requests
  - Feedback + issue resolution

Who is involved?

Co-chairs

- Steven Wong, MAPBU CET
- Myles Gray, VMware Storage Tech Marketing, UK

User Co-leads

- Bryson Shepherd, Walmart
- Joe Searcy, T-Mobile

125+ Slack channel participants as of July 2020

Kubernetes VMware User Group

User Group Meeting:

First Thursday each month 11am PT
calendar link

Link to join the group

- groups.google.com/forum/#!forum/kubernetes-ug-vmware

Link to join Slack channel

- https://kubernetes.slack.com/messages/ug-vmware

Speaker contact info

Deck link: https://sched.co/ZewL

Some other related sessions:

Cloud Provider out of tree (next): sched.co/ZeuY

K8s User experience (Thursday): sched.co/Zeue

vSphere Cloud Provider (Thursday): sched.co/ZevZ

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Thank You