Master the Move: Migrating VMs to Red Hat OpenShift Virtualization

in 60 Minutes!

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BRKCLD-1013

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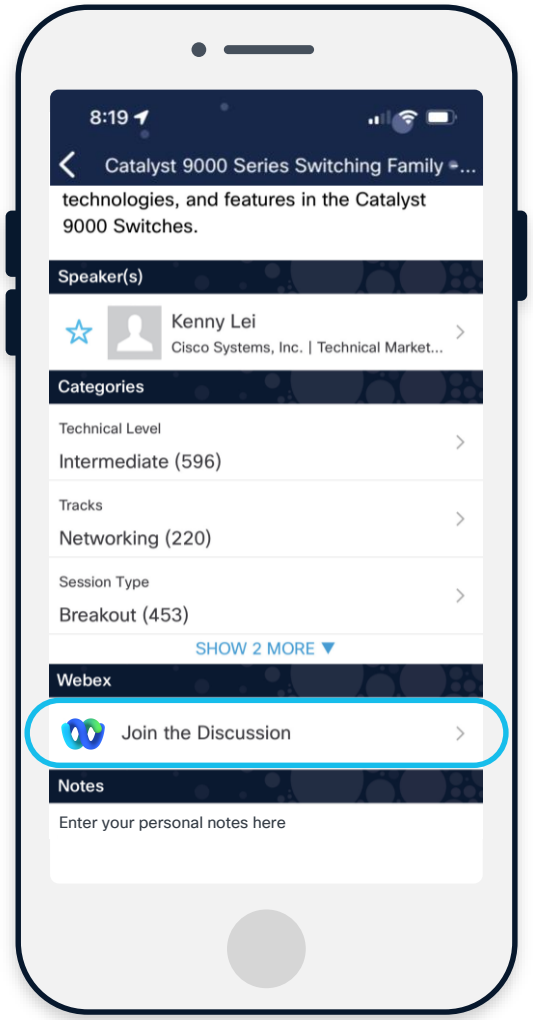


Agenda

01 Introduction

02 OpenShift Virtualization

03 Why OpenShift on Cisco

04 Planning the migration

05 Migration Toolkit (MTV)

06 Migration Demo

07 Post-Migration Operation

08 Closing and Q&A

”Safe Harbor” Statement
This session is not...

Level 200, 300

It is Level 100 so it will be introducing concepts and practices.

Hypervisor Comparisons

Pre-supposes that you are investigating or have chosen Red Hat OpenShift, so we will not cover selecting hypervisors.

Network Focused

Focuses on overall migration and hence is not network centric.

What you will get from this session ...

Consider Red Hat OpenShift Virtualization an alternative solution for your virtual infrastructure.

Become familiar with MTV, the Migration Toolkit for Virtualization.

Discover why Cisco UCS infrastructure is an ideal fit for hosting Red Hat OpenShift.

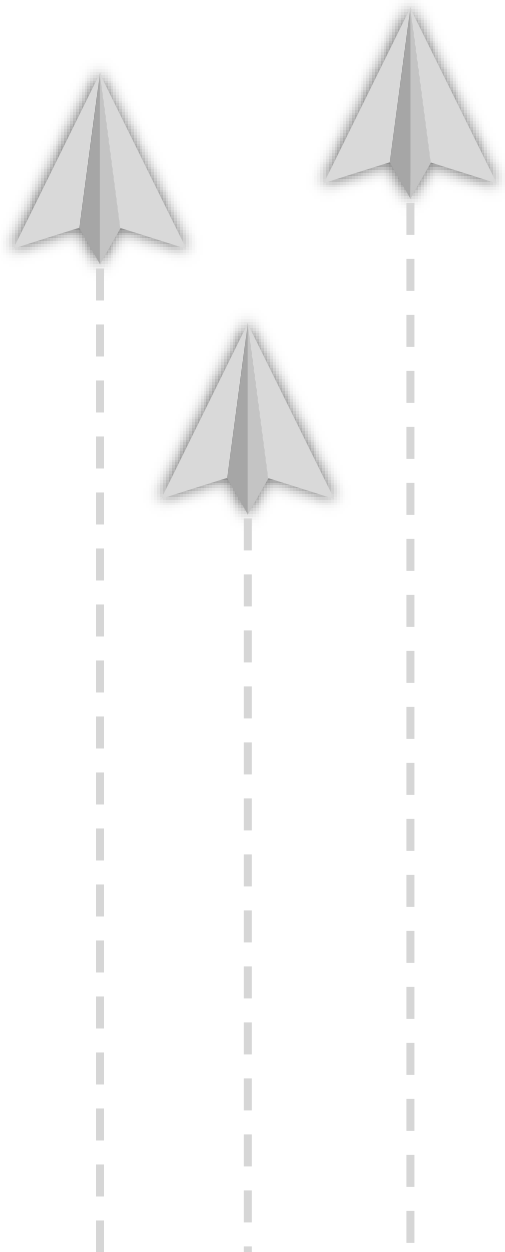
Introduction: addressing the elephant in the room

The server virtualization market is facing its most significant disruption in over a decade. Infrastructure and IT Operations leaders will be forced to question their underlying assumptions for current and future workloads

Gartner

Market Guide for Server Virtualization, Aug 2024
https://gcom.pdo.aws.gartner.com/en/documents/5711151

How have the customers responded?



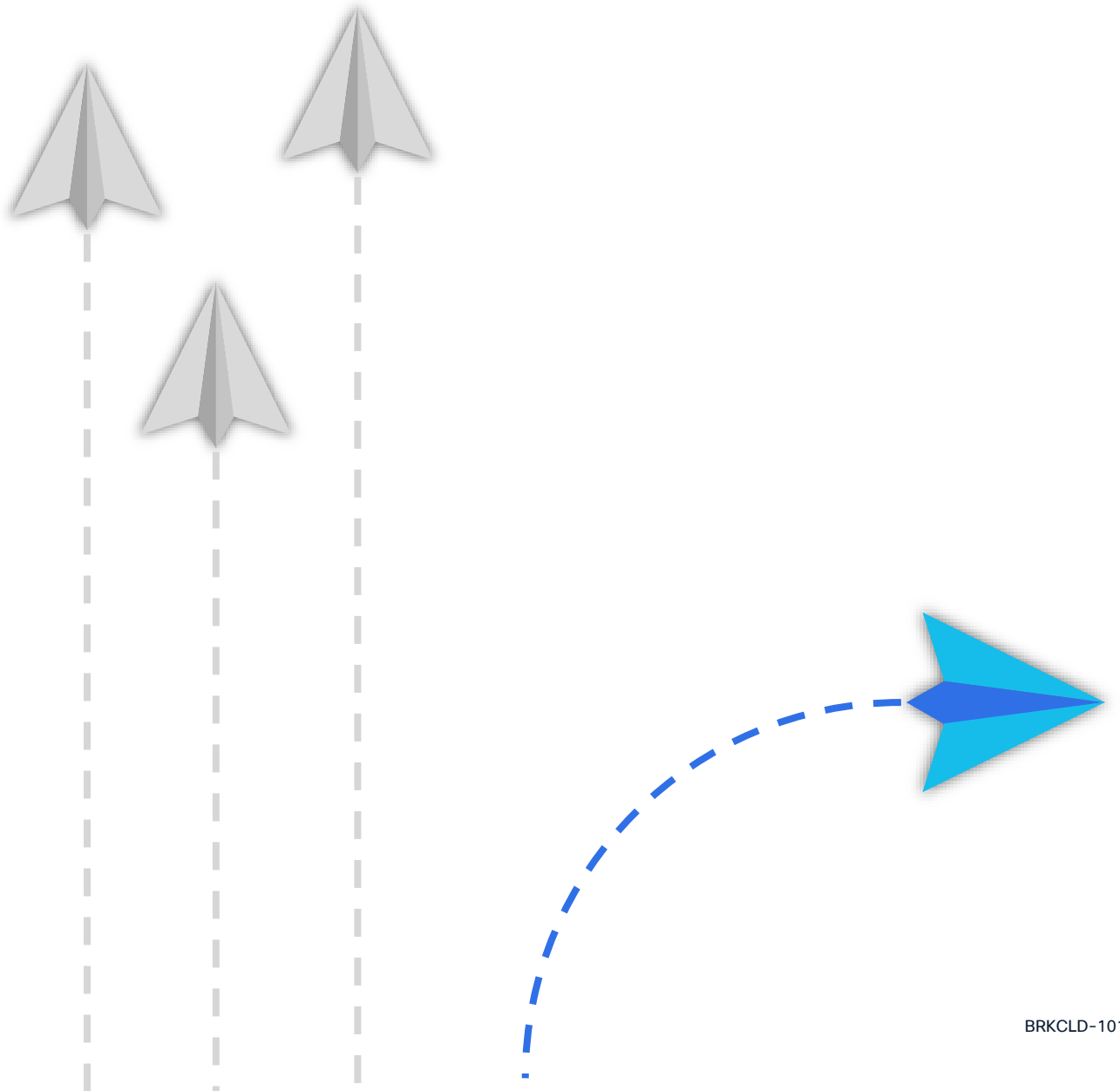
The price increases have many customers exploring how to migrate away from the VMware stack.

Reality Check:

It is implausible that a customer will entirely migrate their workloads:

1. Have little time to renew;
2. Depend heavily on the VMware stack;
3. Realize that migration could be incredibly painful;

How have the customers responded?



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"So, what are the options?"

License/Infrastructure Optimization

Exploring alternatives for new projects:

- Diversify and reduce

Ok, so how Cisco and Red Hat can help me?

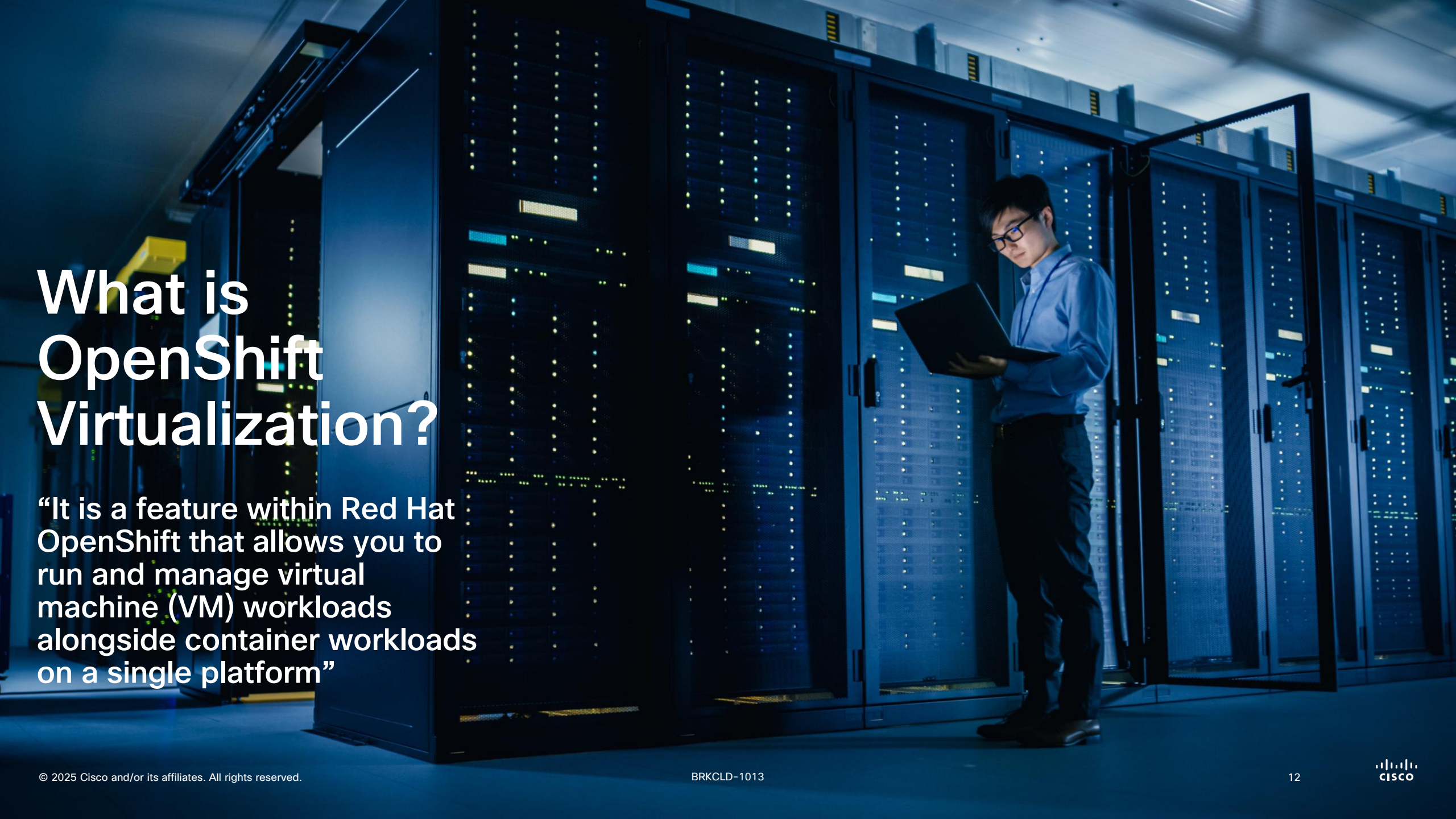
Partnership

Cisco and Red Hat have a shared commitment to open-source innovation, enterprise-class IT solutions, and collaboration that drives innovation in cloud computing, containerization, virtualization, automation, and security.

So, you can:

- Reduce costs
- Deploy apps faster and securely—anywhere
- Reassess your virtualization strategy
- Support AI initiatives

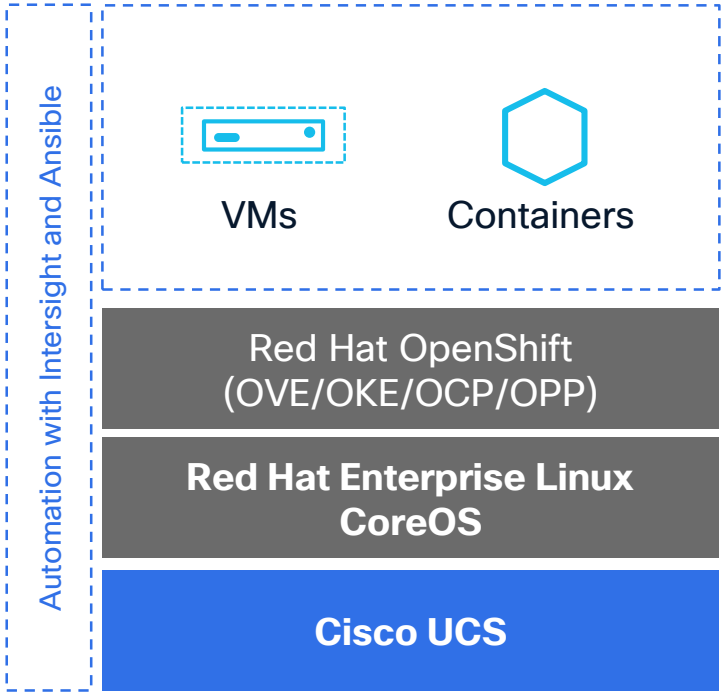
Introducing Red Hat OpenShift Virtualization



What is OpenShift Virtualization?

“It is a feature within Red Hat OpenShift that allows you to run and manage virtual machine (VM) workloads alongside container workloads on a single platform”

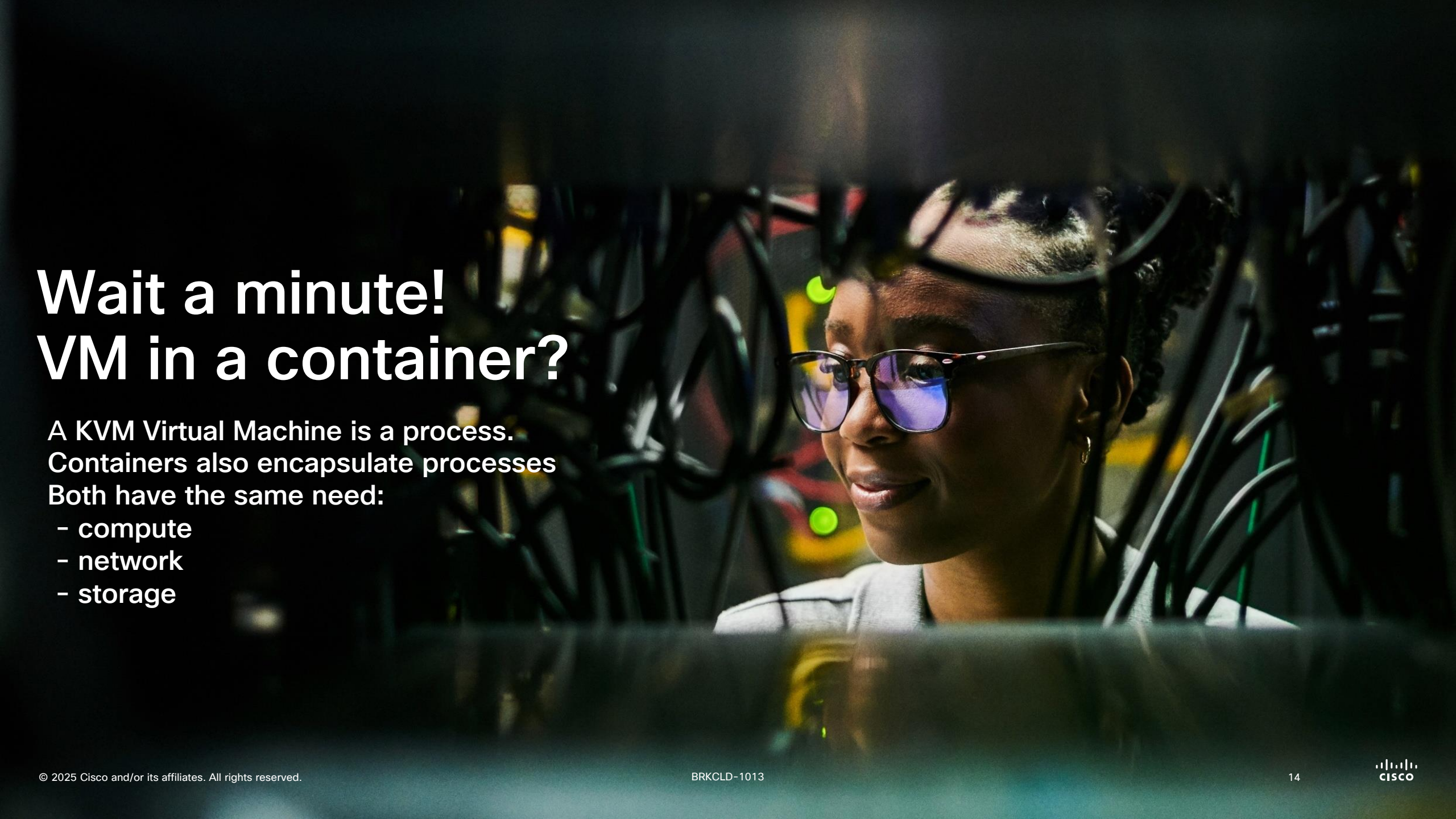
Red Hat OpenShift and OpenShift Virtualization



- **Unified platform** for virtual machines and containers
- **Consistent management** tools, interfaces, and APIs and Ansible Automation Platform (AAP)
- **Performance and stability** of Linux, KVM, and qemu
- **Healthy open-source community** the KubeVirt project is a top 10 CNCF active project, with 200+ contributing companies
- **Included feature** of all OpenShift Subscription
- **Includes Red Hat Enterprise Linux** guest entitlements*
- **Diverse Ecosystem** of Red Hat & partner operators
- **Supports Microsoft Windows** guests

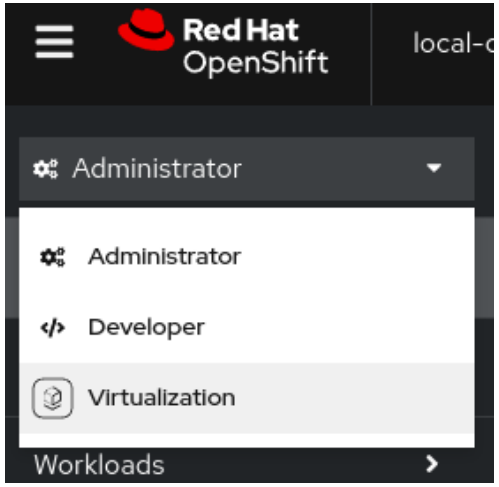
Wait a minute! VM in a container?

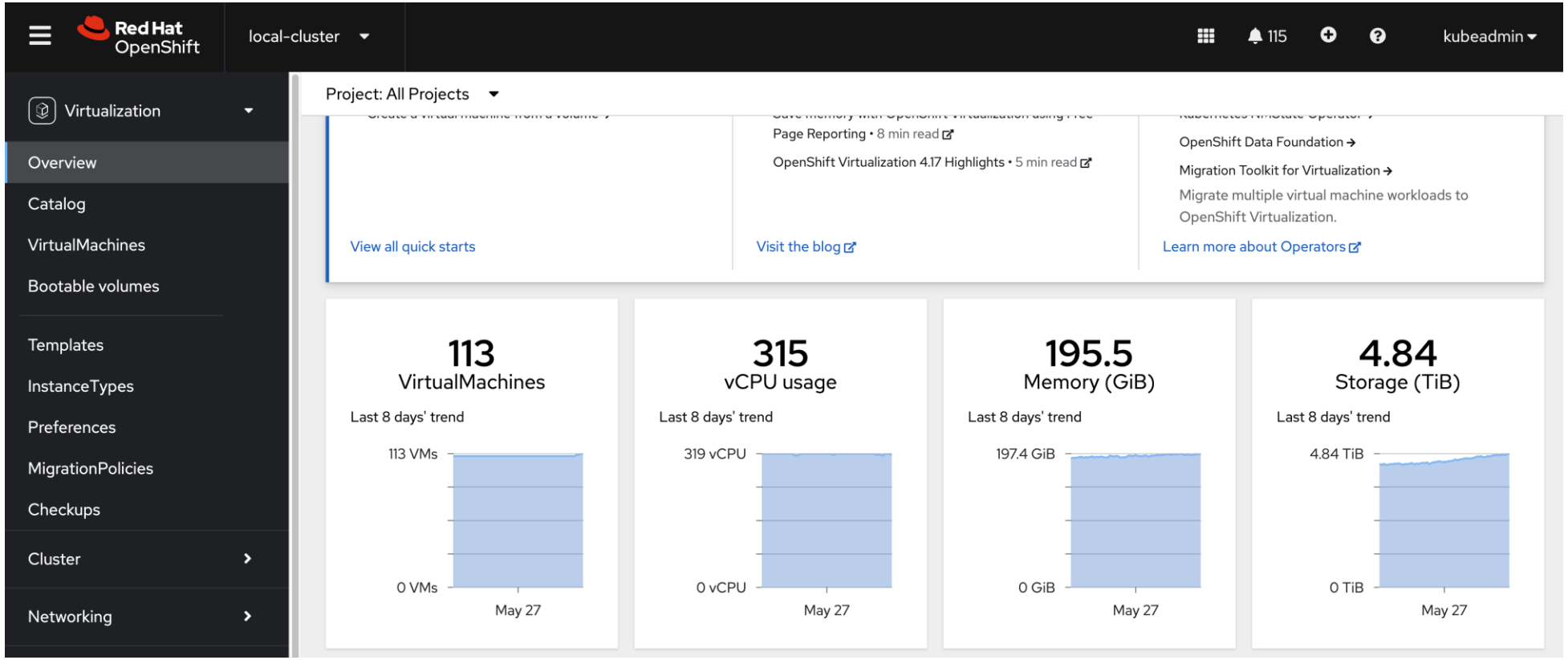
A KVM Virtual Machine is a process.
Containers also encapsulate processes
Both have the same need:
- compute
- network
- storage



Oh no, I must use a CLI

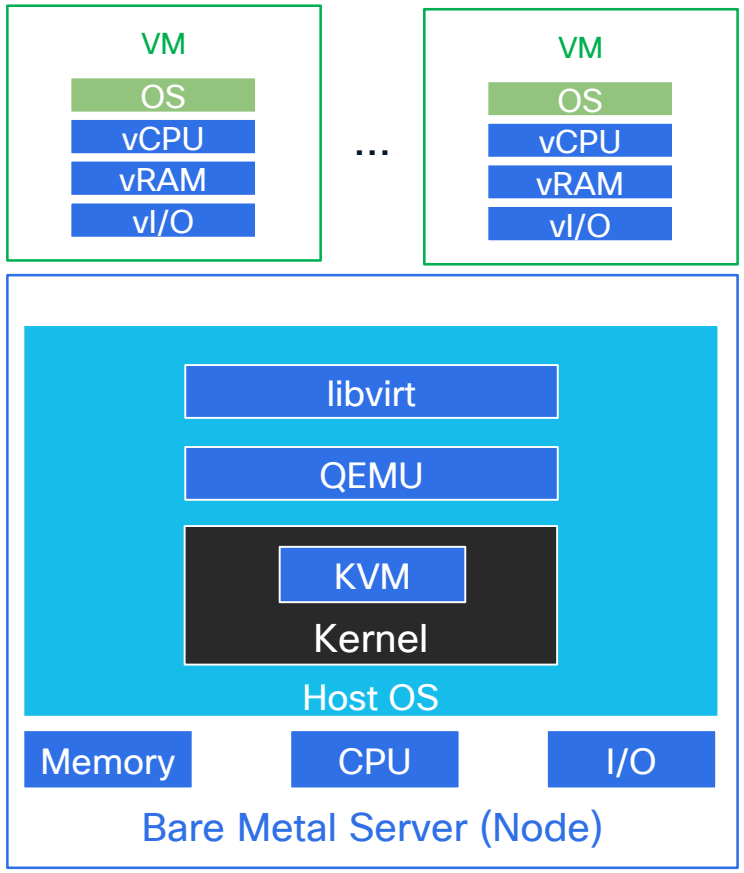
Dedicated View for Virtualization, Virtual Machine Management





For your reference: Comparing Virtualization Models

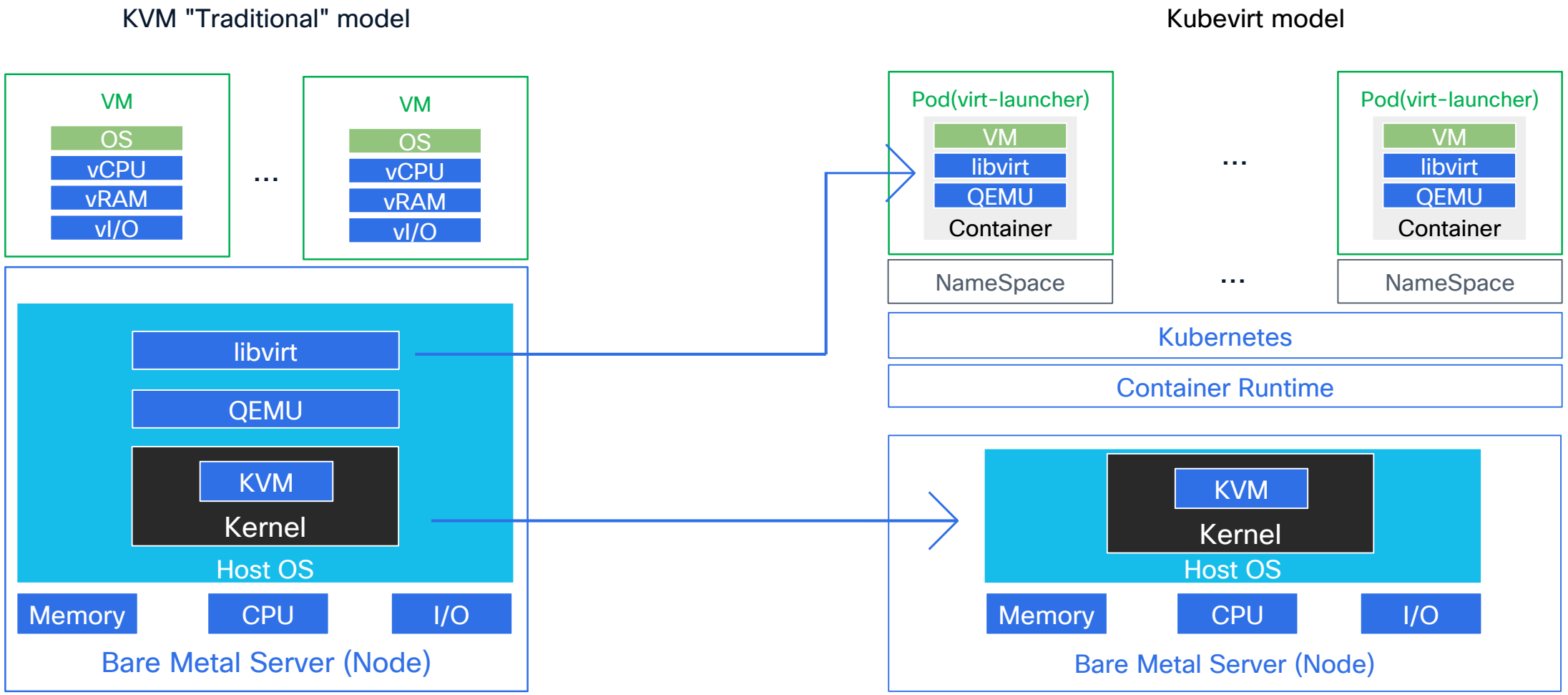
Leveraging process isolation and KVM



- libvirt
  - open source toolkit to manage virtualized platform.
- QEMU (Quick EMUlator)
  - open-source emulator and virtualizer widely used in virtualization and containerization environments
- KVM (Kernel-based Virtual Machine)
  - linux kernel module that provides hardware virtualization

For your reference: Comparing Virtualization Models

Leveraging process isolation and KVM



Okay, what's happening when I spin up a VM?

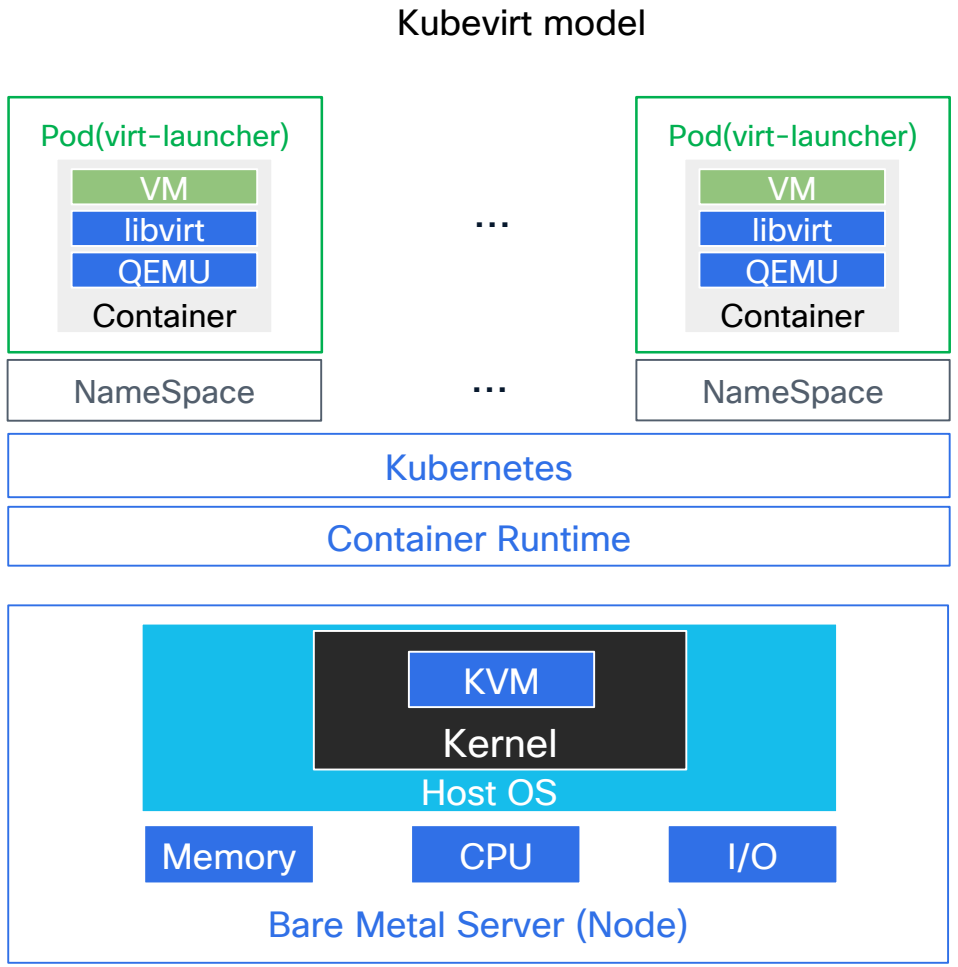
Quick reference

01 You create a VM in OpenShift via the web console or YAML file.

02 OpenShift Virtualization spins up a pod with a container, named virt-launcher.

03 Inside virt-launcher

- libvirt is used to define and manage the VM.
- QEMU is launched by libvirt to emulate VM's hardware.
- KVM is used by QEMU to actually run the guest code with hardware acceleration.



Why OpenShift on Cisco UCS?

Red Hat OpenShift on Cisco UCS

Cisco Unified Computing System (UCS) is the ideal platform for running OpenShift due to its unified, flexible, and high-performance architecture.

Why running OpenShift on Cisco UCS?

A brief overview of the benefits

Simplified Management

Simplified management through automation, orchestration and analytics capabilities.

Unified Fabric & Connectivity

Cisco UCS offers a unified fabric that integrates LAN and SAN connectivity, providing low-latency, lossless Ethernet capabilities.

Validated Designs and Support

Ensuring predictable performance and simplified management. Also, we provides a single point of contact for resolving issues across the infrastructure stack.

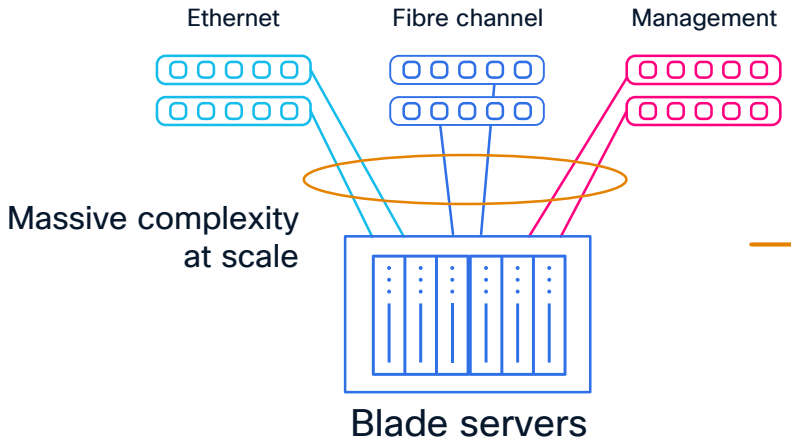
Modular and Scalable Architecture

Reduce operational costs by optimizing resource utilization and providing a unified system for managing both virtualized and bare-metal environments.

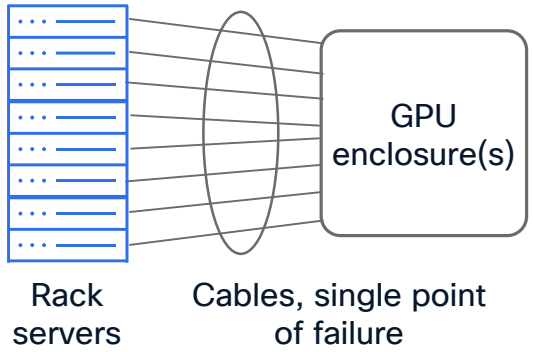
Why running OpenShift on Cisco UCS?

A simple example of a real scenario

Silos of multiple Ethernet and SAN fabrics and adapters



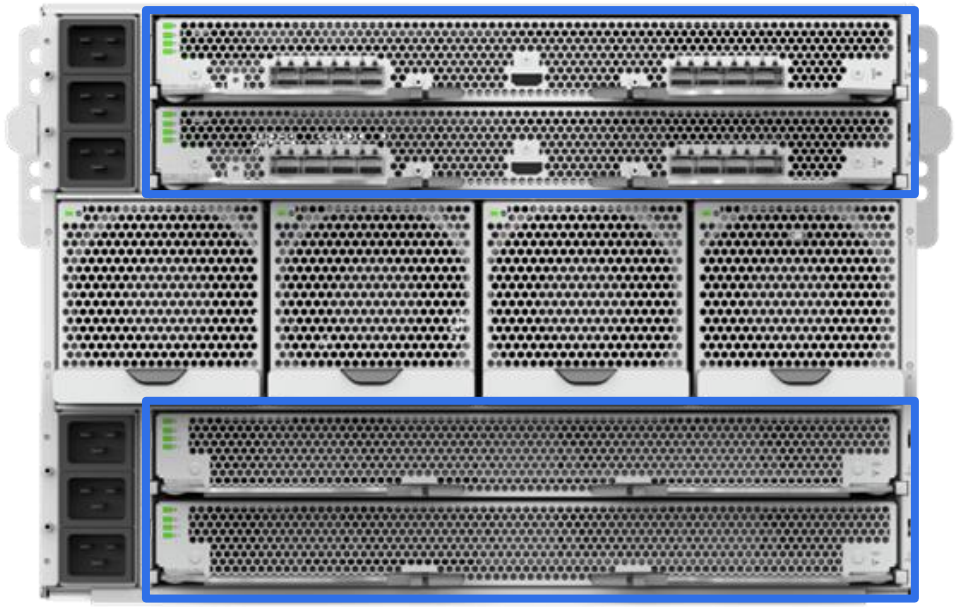
Complex PCIe connectivity to external accelerators



Cisco solution

UCS® X-Series

Cisco Intersight®



Unified fabric

X-Fabric + PCIe nodes

Cisco Validated Designs

For performant and predictable Red Hat deployments

- **Bare-Metal:** FlexPod Datacenter with red Hat OCP Bare Metal Manual Configuration with Cisco UCS X-Series
- **Bare-Metal:** FlashStack with Red Hat OpenShift Container and Virtualization Platform using Cisco UCS X-Series
- **Bare-Metal:** FlexPod for Accelerated RAG Pipeline with NVIDIA NIM and Cisco Webex
- **Bare-Metal:** Flexpod with OpenShift and NetApp Astra

- **Virtualized:** Red Hat OpenShift Container Platform with OpenShift Data Foundation on Cisco UCS X-Series
- **Virtualized:** FlashStack for Cloud Native with Cisco Intersight, Red Hat OpenShift, and Portworx Enterprise Design
- **Virtualized:** FlashStack for AI: MLOps using Red Hat OpenShift AI
- **Virtualized:** Cisco and Hitachi Adaptive Solutions with Red Hat OCP AI Ready Infrastructure (as-a-Service)

Cisco Validated Design are co-authored with Red Hat

Planning the migration

What does a virtualization journey look like?

A typical VM migration project

01 → 02 → 03 → 04

Virtualization Migration Assessment

Capture current VM architecture, analyze workload complexity, propose a high-level design and roadmap.

Virtualization Migration PoV

Deploy OpenShift cluster, enable virtualization features, validate integrations, migrate first workloads and prepare for production.

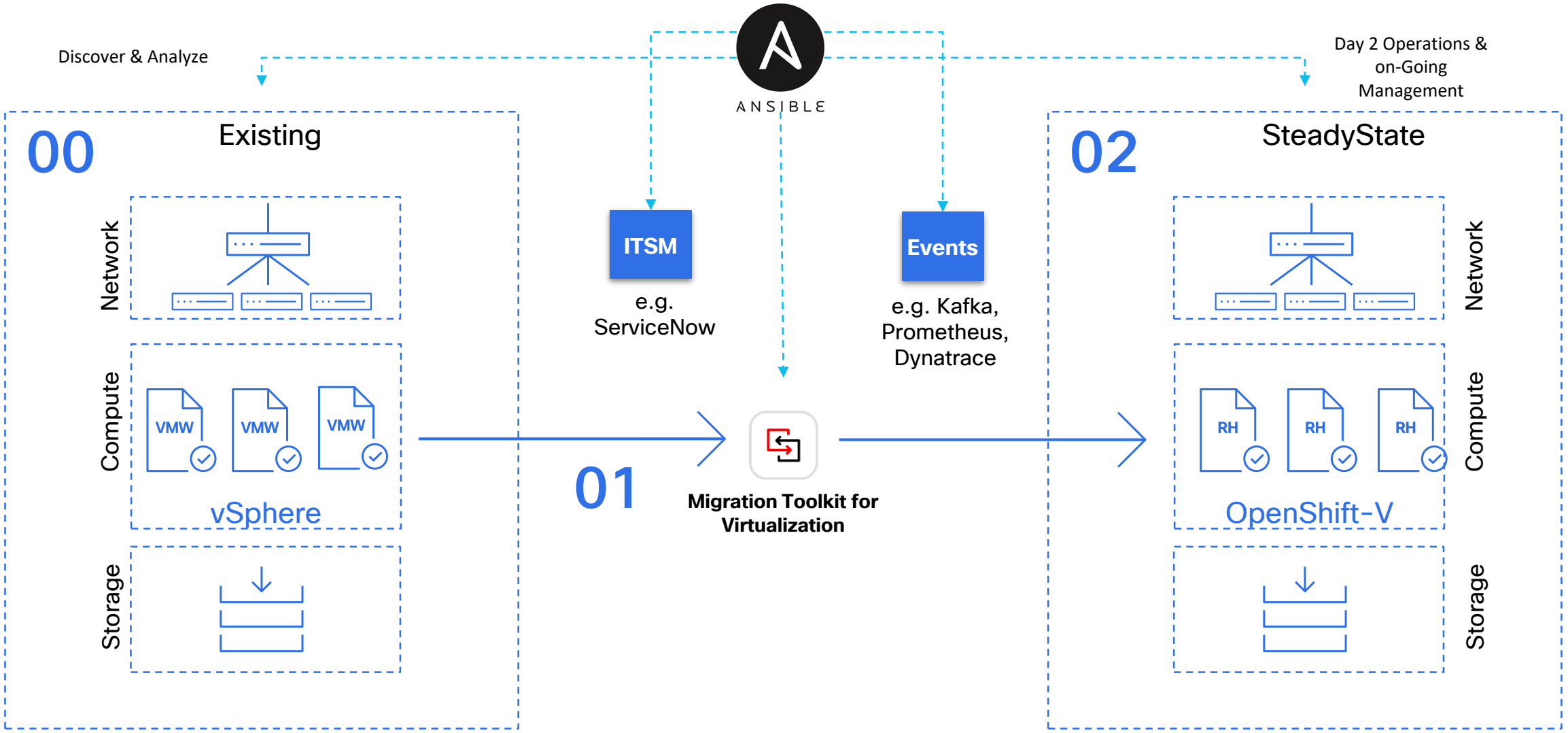
Virtualization Migration Factory

Migrate workloads, validate and automate migration pattern, scale and complete migration.

Application Modernization (optional)

Modernize VM workloads, containerize applications.

Operations as Code for the DC



4 Key Considerations for a Successful Migration

Essential Insights for a Seamless Transition

01

Network Consideration

OpenShift Virtualization uses different network layers compared to vSphere.

You need to plan how VM networking will map into the OpenShift network model (e.g., pod networking, multus, or other secondary networks).

IP Management & Connectivity:ensure compatibility for services relying on static IPs or specific network topologies [we will revisit this point later].

4 Key Considerations for a Successful Migration

Essential Insights for a Seamless Transition

02

Storage Consideration

VM Disk Format is different: VMDK (VMware disk format) to QCOW2 or RAW image

OpenShift uses Persistent Volume Claims (PVCs) instead of VMware datastores.

Make sure to have Shared storage (RWX), as is required for VM live migration (host to host)

4 Key Considerations for a Successful Migration

Essential Insights for a Seamless Transition

03

Workload Consideration

Ideal workloads:

- Generally, all legacy applications are fine
- VMs that will be split up into microservices/containers
- VMs that have no special requirements

Check VM operating system support and compatibility (e.g., kernel versions, drivers).

Validate CPU, memory, and disk allocation in OpenShift to match the VM's requirements.

Some features (like VM snapshots or certain device passthroughs) may differ between vSphere and OpenShift Virtualization.

4 Key Considerations for a Successful Migration

Essential Insights for a Seamless Transition

04

Integration with Infrastructure Services

Backup and Recovery: implement solution compatible with OpenShift

Monitoring and Logging: Integrate VMs with OpenShift’s monitoring and logging solution

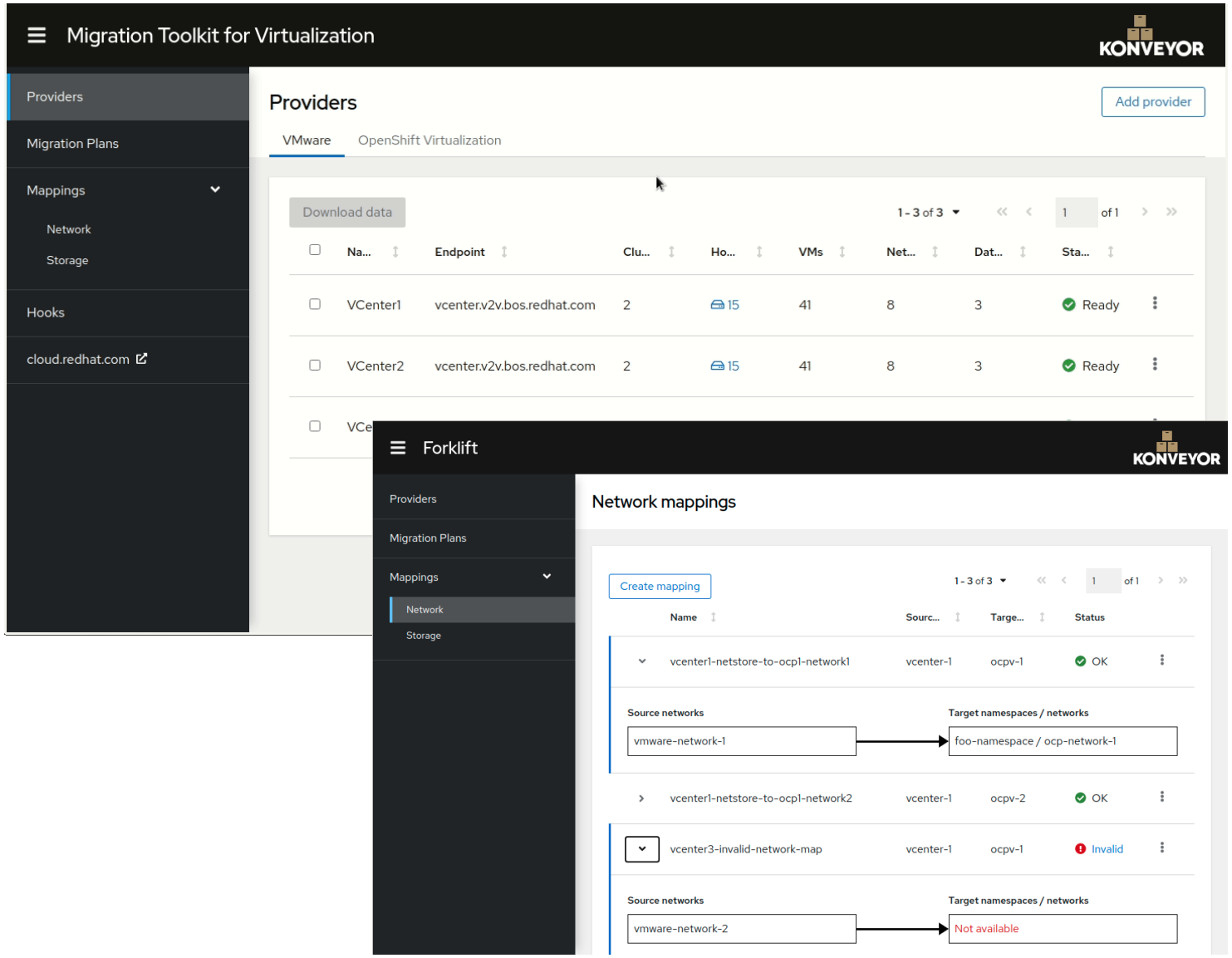
Red Hat OpenShift Migration Toolkit

Migration Toolkit for Virtualization

Migrate virtual machines at scale to OpenShift Virtualization in a few simple steps

Provide source and destination credentials, map infrastructure, and create migration plan

Warm and Cold Migration with automated validation



Administrator
Home
Operators
OperatorHub
Installed Operators
Workloads
Virtualization
Networking
Storage
Builds
Observe
Compute
User Management
Administration

You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Project: All Projects

OperatorHub

Discover Operators from the Kubernetes community and Red Hat partners, curated by Red Hat. You can purchase commercial software through Red Hat Marketplace. You can install Operators on your clusters to provide optional add-ons and shared services to your developers. After installation, the Operator capabilities will appear in the Developer Catalog providing a self-service experience.

All Items
AI/Machine Learning
Application Runtime
Big Data
Cloud Provider
Database
Developer Tools
Development Tools
Drivers and plugins
Integration & Delivery
Logging & Tracing
Modernization & Migration
Monitoring
Networking
OpenShift Optional
Openshift Optional
Other
Security
Storage
Streaming & Messaging
Other

Source

Red Hat (4)

Modernization & Migration

Filter by keyword...

9 items

Community
Devops-in-a-box
provided by Perficient Inc
Perficient's DevSecOps Manager For Kubernetes Applications

Community
Konveyor Move2Kube
provided by Konveyor
Konveyor Move2Kube is an open source tool that helps migrate your app to run on...

Community
Konveyor Operator
provided by Konveyor
Konveyor is an open-source application modernization platform that helps organization...

Red Hat
Migration Toolkit for Applications Operator
provided by Red Hat
MTA is an application modernization platform that helps organizations safely and...

Red Hat
Migration Toolkit for Containers Operator
provided by Red Hat
Facilitates migration of container workloads from OpenShift 3.x to OpenShift 4.x

Red Hat
Migration Toolkit for Runtimes Operator
provided by Red Hat
Migration Toolkit for Runtimes is an analysis tool that supports the modernization and migration of...

Red Hat
OADP Operator
provided by Red Hat
OADP (OpenShift API for Data Protection) operator sets up and installs Data Protection...

Community
Pelorus Operator
provided by Red Hat
Tool that helps IT organizations measure their impact on the overall performance of their...

Community
Windup Operator
provided by Windup
Windup is an analysis tool that supports the modernization and migration of Java applications.

Okay, how can I utilize the Migration Toolkit?

A typical VM migration-plan scenario with Migration Toolkit

01 → 02 → 03 → 04

Install Migration Toolkit for Virtualization

Install using a “wizard” via the OpenShift Operator Hub

Creating the Provider for Migration

Configure source providers (credentials, address of vCenter etc.)

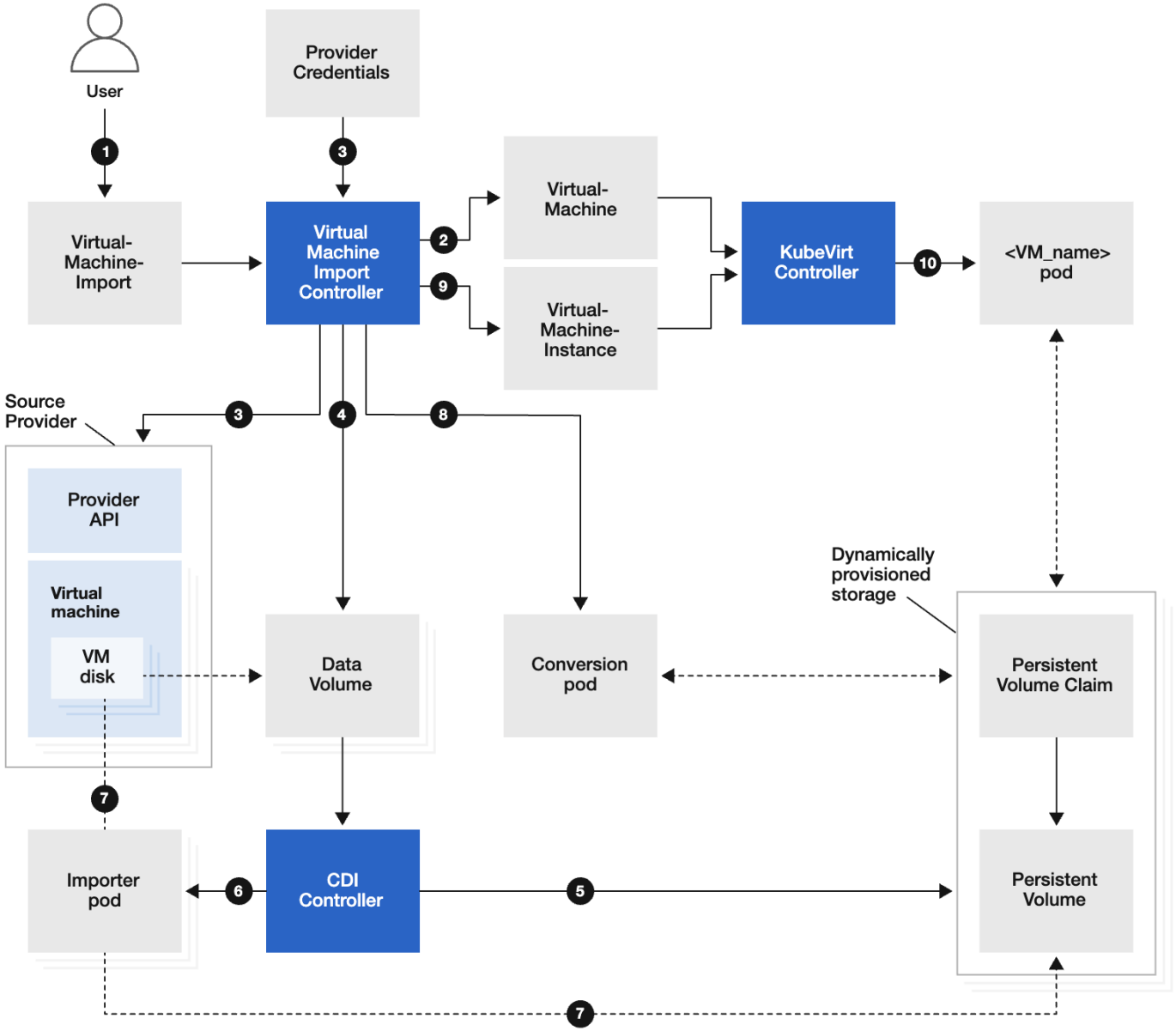
Creating and Starting a Migration Plan

Define what VMs you want to migrate and resource mapping (like storage, network)

Verify and cleanup

Verify the execution plan then archive or delete the plan

A typical VM migration-plan scenario with Migration Toolkit



Demo:
Creating a Provider

Overview · Red Hat OpenShif | vSphere - vc2.cam.ciscolabs

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Red Hat OpenShift | local-cluster | kubeadmin

- Administrator
- Home
- Operators
- Workloads
- Virtualization
- Migration
  - Overview
  - Providers for virtualization
  - Plans for virtualization
  - StorageMaps for virtualization
  - NetworkMaps for virtualization
- Networking
- Storage
- Builds

Migration Toolkit for Virtualization

Successful

Overview | YAML | Metrics

Welcome

Migration Toolkit for Virtualization (MTV) migrates virtual machines at scale to Red Hat OpenShift Virtualization. You can migrate virtual machines from VMware vSphere, Red Hat Virtualization, OpenStack, OVA and OpenShift Virtualization source providers to OpenShift Virtualization with the Migration Toolkit for Virtualization (MTV).

This gives organizations the ability to more easily access workloads running on virtual machines, while developing new cloud-native applications.

Migrations are performed in a few simple steps, first by providing source and destination credentials, then mapping the source and destination infrastructure and creating a choreographed plan, and finally, executing the migration effort.

Operator

Namespace	Created at	Status
NS openshift-mtv	May 30, 2025, 8:00 AM	Successful

Pods

Pod	Status	Pod logs	Created at
P forklift-validation-68967c7f9d-vpw7b	Running	Logs	Jun 4, 2025, 8:51 AM

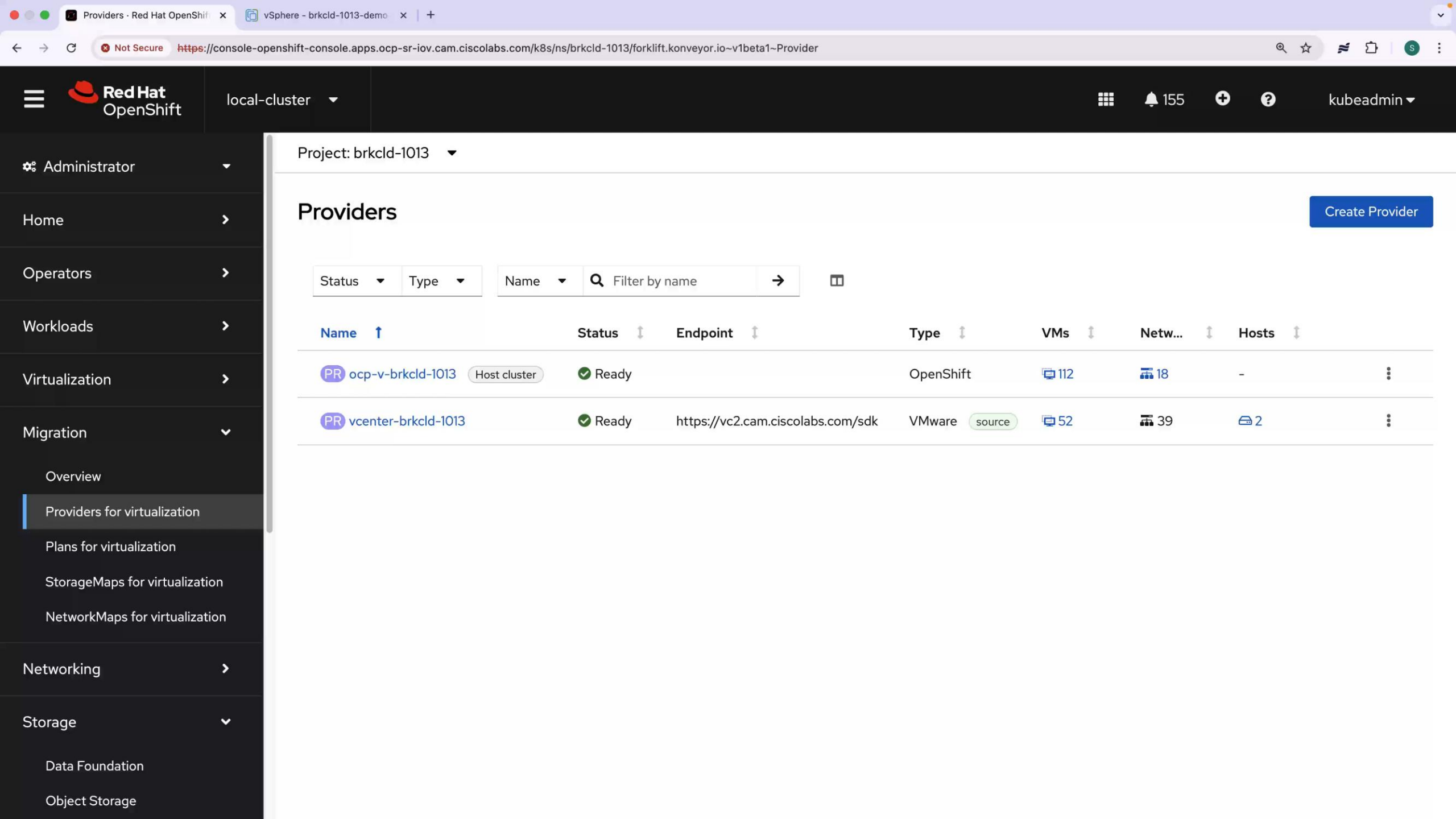
Settings

Max concurrent virtual machine migrations

20

Controller main container CPU limit

Demo:
Executing a Cold Migration


Providers · Red Hat OpenShif
vSphere - brkcld-1013-demo
Not Secure
https://console-openshift-console.apps.ocp-sr-iov.cam.ciscolabs.com/k8s/ns/brkcld-1013/forklift.konveyor.io~v1beta1~Provider
Red Hat OpenShift
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NetworkMaps for virtualization
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Data Foundation
Object Storage
Project: brkcld-1013
Providers
Create Provider
Status
Type
Name
Filter by name
Name
Status
Endpoint
Type
VMs
Netw...
Hosts
PR ocp-v-brkcld-1013
Host cluster
Ready
OpenShift
112
18
-
PR vcenter-brkcld-1013
Ready
https://vc2.cam.ciscolabs.com/sdk
VMware
source
52
39
2

Demo
Executing a Warm Migration

Okay, what's happening exactly when I migrate?

A typical VM migration-plan scenario with Migration Toolkit

Phase 1

Create a snapshot of running VM disks.

Phase 2

Copy the first snapshot to OpenShift.

Phase 3

Copy deltas: copying only data that has changed since the last snapshot was taken. It takes less time to complete.

Cutover Stage

Cutover Stage (manual or automatic) it’s up to you.

Red Hat OpenShift | vSphere - brkcld-1013-demo

Not Secure https://console-openshift-console.apps.ocp-sr-iov.cam.ciscolabs.com/k8s/ns/brkcld-1013/kubevirt.io~v1~VirtualMachine/brkcld-1013-demo-cold

Red Hat OpenShift | local-cluster | 156 | kubeadmin

Administrator

- Home
- Operators
- Workloads
- Virtualization
- Migration
- Networking
- Storage
- Builds
- Observe
- Compute
- User Management
- Administration

Project: brkcld-1013

VirtualMachines > VirtualMachine details

VM brkcld-1013-demo-cold Running

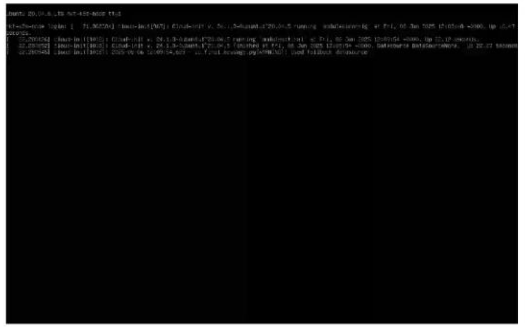
Actions

Overview | Metrics | YAML | Configuration | Events | Console | Snapshots | Diagnostics

Details

Name	brkcld-1013-demo-cold
Status	Running
Created	Jun 6, 2025, 2:09 PM (37 minutes ago)
Operating system	Guest agent is required
CPU | Memory	2 CPU | 8 GiB Memory
Time zone	-
Template	None
Hostname	Guest agent is required
Machine type	pc-q35-rhel9.4.0

VNC console



Open web console

Alerts (0)

General

Namespace	NS brkcld-1013
Node	N ocp-sr-iov-bm03
VirtualMachineInstance	VMI brkcld-1013-demo...
Pod	P virt-launcher-brkcld-...
Owner	No owner

Snapshots (0)

Take snapshot

No snapshots found

Migration Recommendations & Common Questions

Warm or Cold Migration?

Any network optimization?

Concurrent or sequential migration of my VMs?

How much time should I budget for the migration?

Is there a rollback option?

How can I validate that the migration was successful?

Post-migration Operations

Day 2 Operation Use Cases

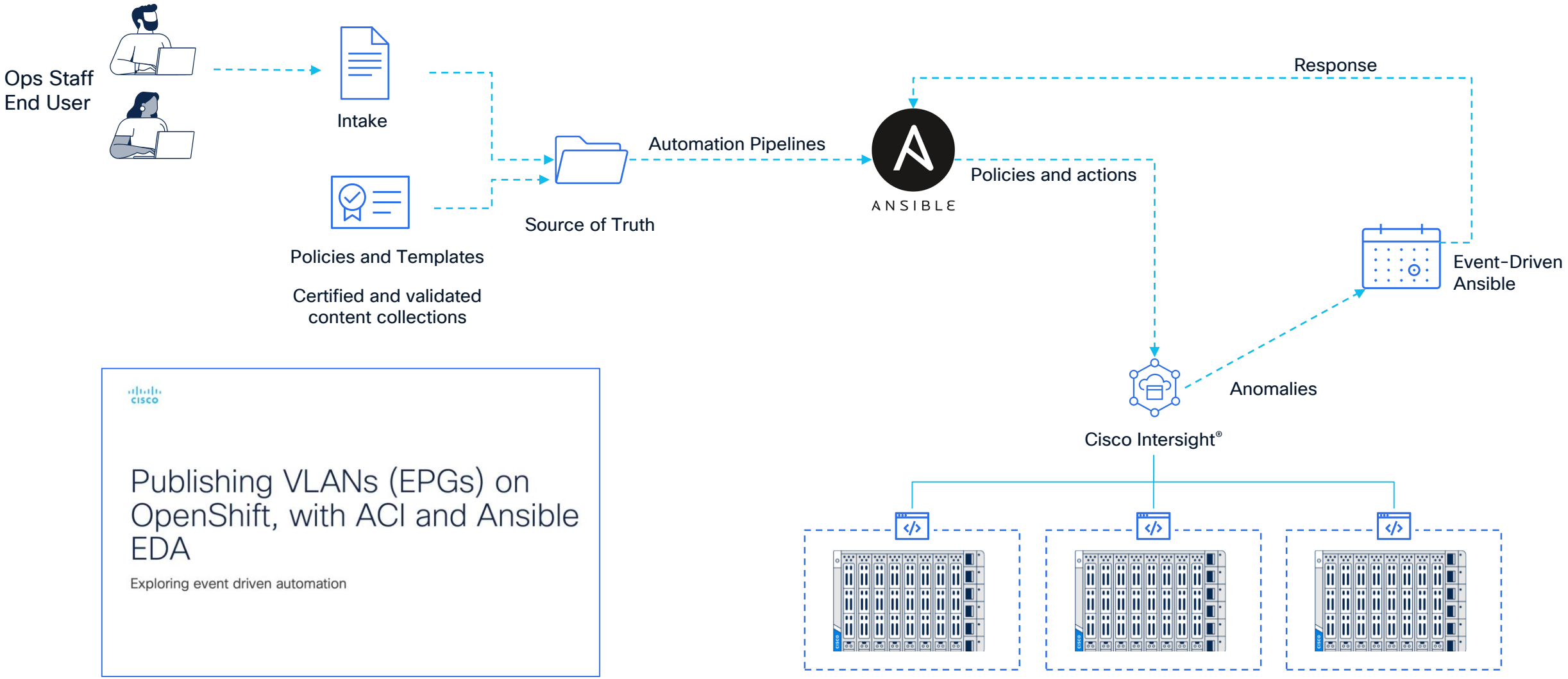
OpenShift and OpenShift Virtualization (OCP-V) Use Cases

- Add an S3-compatible object store to an OpenShift cluster
- Add a worker node to an OpenShift cluster
- Add networking for bare-metal nodes.
- Add vNICs for OpenShift Virtualization
- Create, delete, and restore VM snapshots.

Cisco UCS Use Cases

- Deploy a new chassis in an existing UCS domain
- Deploy a new server to an existing UCS-X chassis using server profile templates
- Upgrade server firmware
- Add vNICs for storage
- Add VLANs

Operations as Code for the DC Compute

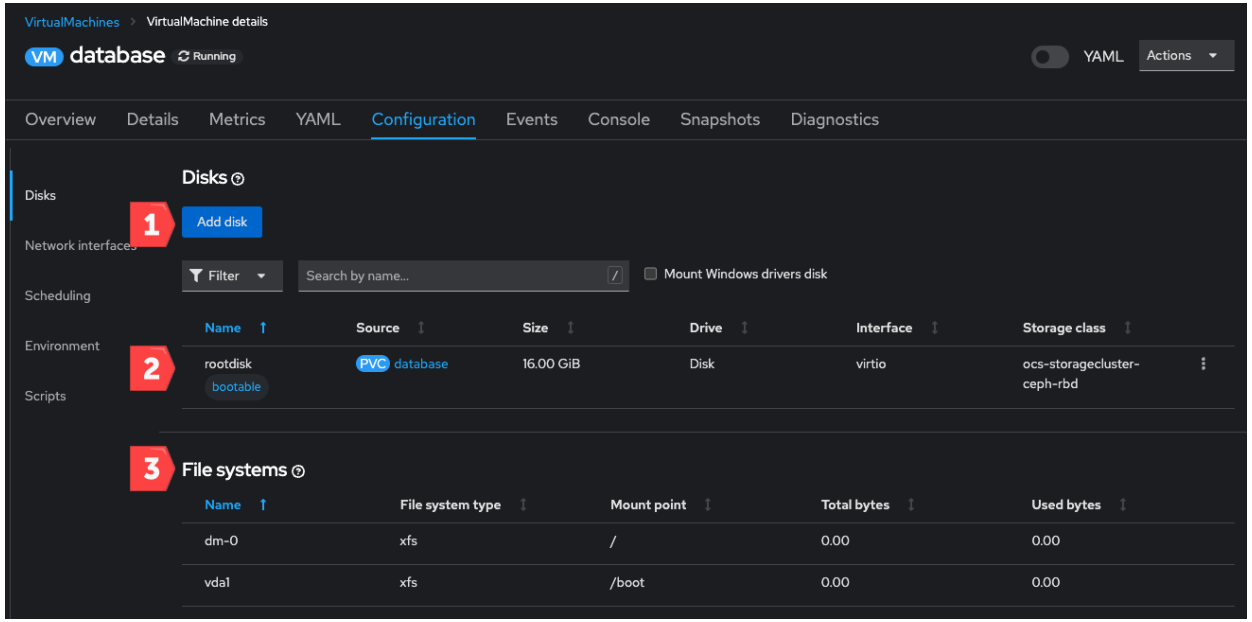


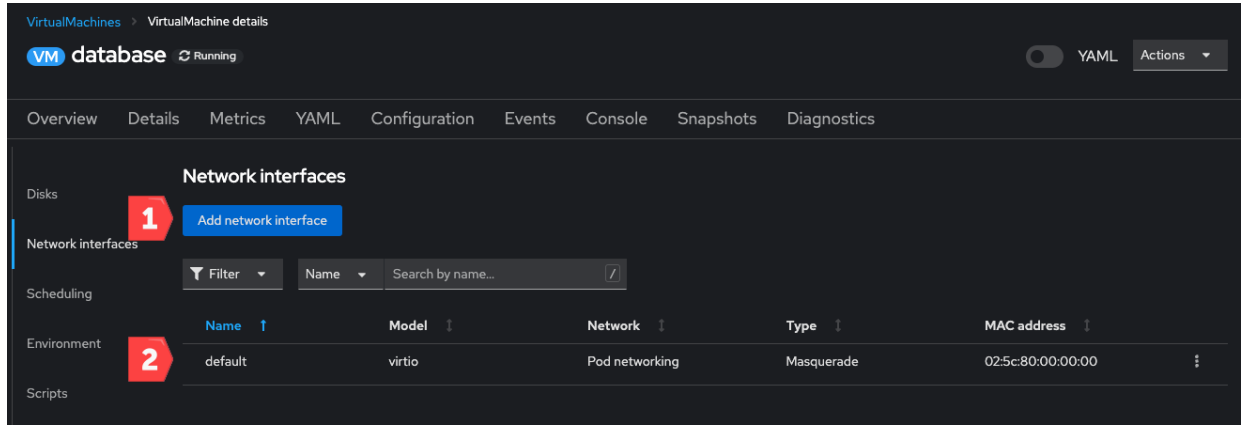
Day-2 Operation

VM configuration – Disks and NICs

- Add, edit, and remove NICs and disks for virtual machines using the Configuration tab.

- For guests with the qemu guest agent installed, configuration and status reporting is displayed for the relevant objects.

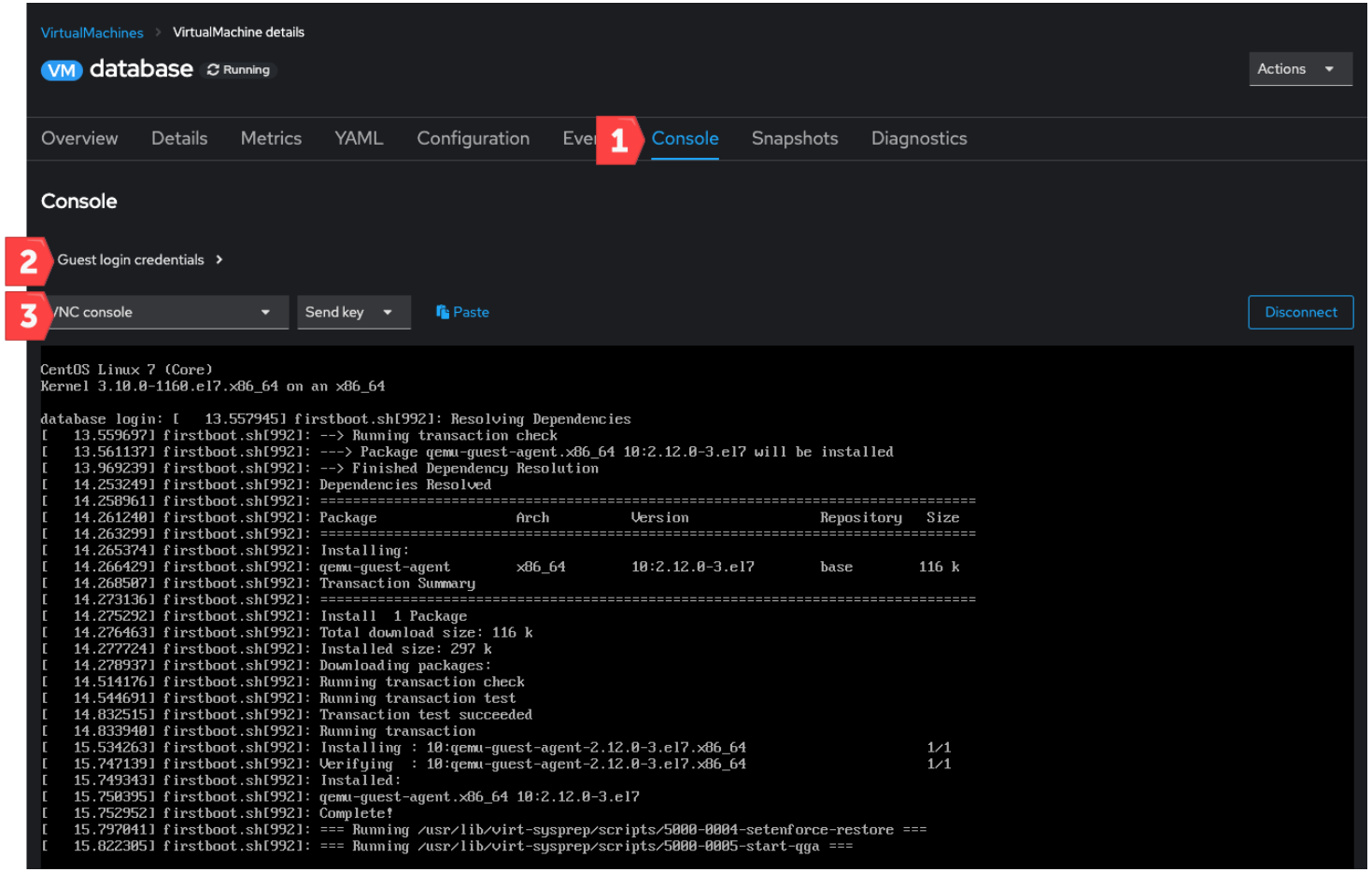




Day-2 Operation

Console

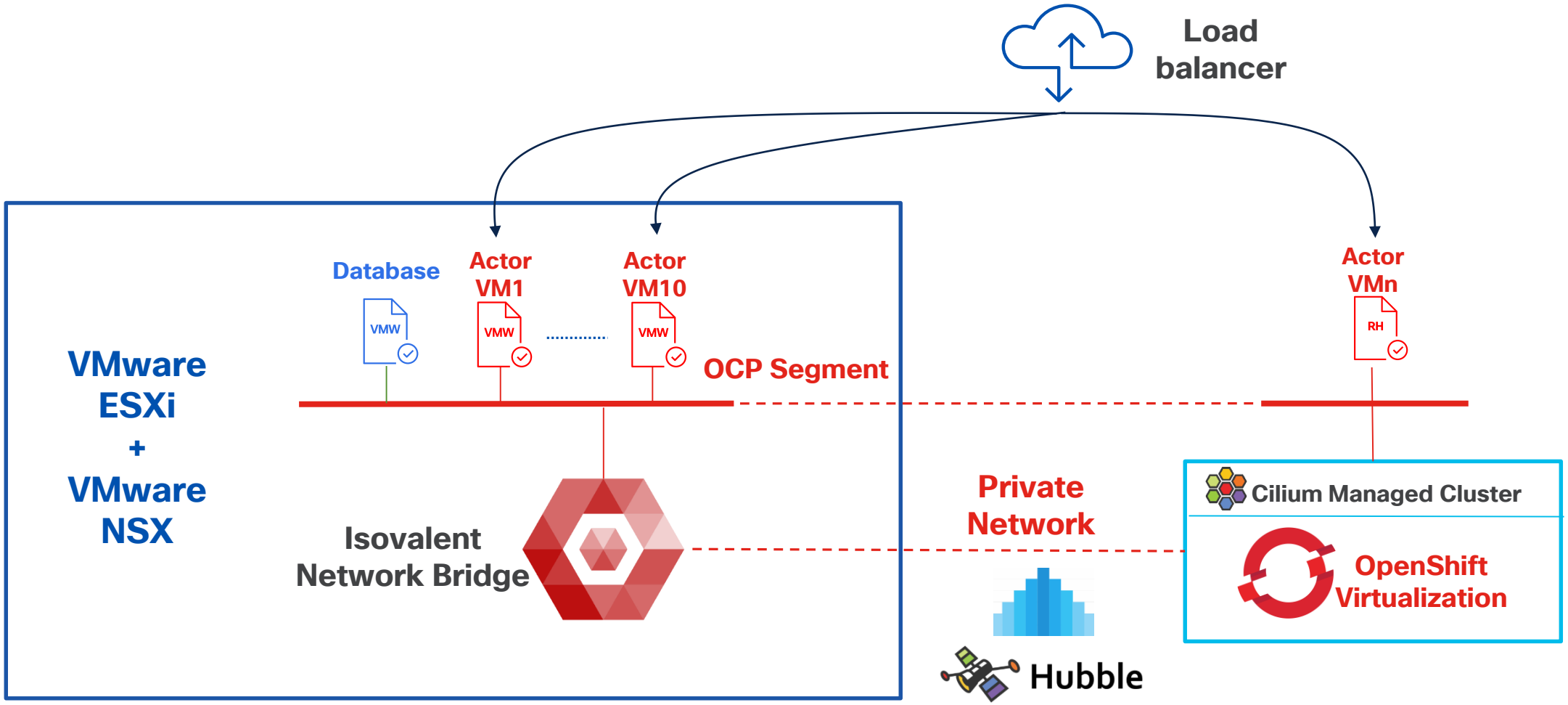
- Browser-based access to the serial and graphical console of the virtual machine.
- Access the console using native OS tools, e.g. virt-viewer, using the virtctl CLI command
  - virtctl console vmname
  - virtctl vnc vmname



One more thing...
Not everything moves at once

Isovalent Network Bridge

Migration & Observability between [VMware & Kubernetes]



Isovalent Network Bridge

Cisco Live Demonstrations

Isovalent@Cisco

Everything has an end: Conclusion and key remarks

OpenShift Virtualization is mature and works like a breeze on UCS

Migration from VMware can be done, via Migration Toolkit and Ansible Automation Platform

Cisco has several Cisco Validated Design to support OpenShift and the entire stack

Complete your session evaluations

Complete a minimum of 4 session surveys and the Overall Event Survey to be entered in a drawing to win 1 of 5 full conference passes to Cisco Live 2026.

Earn 100 points per survey completed and compete on the Cisco Live Challenge leaderboard.

Level up and earn exclusive prizes!

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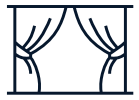

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Contact me at: sgioia@cisco.com

Thank you

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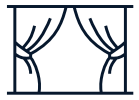
Appendix

Link to Demo



Demo 1:
Migration Toolkit Installation

https://youtu.be/2GQU-Htr1mo

Demo 2:
Provider Setup

https://youtu.be/akyy1GXyr_E

Demo 3:
Cold Migration

https://youtu.be/O36NFEiPpmY

Demo 4:
Warm Migration

https://youtu.be/ltCSJTdyxcU

Contact me at: sgioia@cisco.com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