

Red Hat OpenShift Virtualization

VMA WorkShop Day Two

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Principal Learning and Development Instructor

Agenda

Day One

09:00 - 10:35

- Welcome and Introductions
- Sales Motion and Getting the Technical Win (GTM Strategy)
- OpenShift Virt Overview / Storage / Networking

10:35 - 10:45 BREAK

10:45 - 12:00

- VMware vSphere Overview Presentation
- VMware to OpenShift Presentation

12:00 - 13:00 LUNCH BREAK

13:00 - 14:45

12:00 - 13:00 BREAK

13:00 - 14:45

- Citrix VDI
- Migration Factory

15:00 - 17:00

- Access to the Hands-On Lab
- LAB - OpenShift Virtualization Basics / Networking / Storage
- LAB - Migration from VMware to OpenShift

Day Two

09:00 - 10:15

- Discussion on migration risks
- Estimating a project

10:15 - 10:30 BREAK

10:30 - 12:00

- Showcase the VMA Analysis

12:00 - 13:00 Lunch

13:00 - 14:45

- Risk Analysis and Project Planning

14:45 - 15:00 BREAK

15:00 - 15:30

- Choosing the right Subscription
- Advanced Cluster Management-V

RVTools

USA / RVTools - Free VMware Infrastructure Management Tool

RVTools

A free and lightweight utility that empowers VMware administrators to efficiently audit, optimize, and maintain virtual environments with real-time insights and actionable data.

[Download RVTools](#)

[Verify with Checksum File](#)

Name	Status	Connection	Guest State	Heartbeat	Consolidation Needed	PowerOn
action1	poweredOn	False	green	action1.cloud.local	connected	running
Adren01	poweredOn	False	green	adren01.cloud.local	connected	running
ansawix	poweredOn	False	green	ubuntu	connected	running
anitb1	poweredOn	False	green	ubuntu	connected	running
arpwatch	poweredOn	False	green	ubuntu	connected	running
au2mator	poweredOff	False	green	au2mator.cloud.local	connected	notRunning
AzureStackHCI01	poweredOff	False	green		connected	notRunning
AzureStackHCI02	poweredOff	False	green		connected	notRunning
Cameyo	poweredOn	False	green	cameyo.cloud.local	connected	running
CloudUAG01	poweredOff	False	green	uag01	connected	notRunning
CloudUAG02	poweredOn	False	green	uag02	connected	running
Oup1	poweredOff	False	green	CTUP1.cloud.local	connected	notRunning
DC1new	poweredOn	False	green	DC1.cloud.local	connected	running
dc-exlocal	poweredOff	False	green		connected	notRunning
dtest	poweredOff	False	green	datatest.local	connected	notRunning
devops	poweredOn	False	green	devops.cloud.local	connected	running
duo2a	poweredOn	False	green	ubuntu	connected	running
E501	poweredOff	False	green	evententity.cloud.local	connected	notRunning
ESX67	poweredOn	False	green	localhost	connected	running
ESX71st	poweredOff	False	green	localhost	connected	notRunning
ESX7U1	poweredOff	False	green	localhost	connected	notRunning
ex2019	poweredOff	False	green		connected	notRunning
FNIA01	poweredOff	False	green	fnia01.cloud.local	connected	notRunning

TCO Estimator

https://redhatdg.co1.qualtrics.com/jfe/form/SV_82F75bRBCaVyakS



OpenShift Virtualization Total Cost of Ownership Estimator

Solve Near-Term Challenges, Invest in Long-Term Value

For use by Red Hat and Partners only.

Use this tool to create a preliminary total cost of ownership (TCO) estimate for your customer. You will be emailed your documents shortly after completion. A basic understanding of virtualization with OpenShift is needed to use this tool effectively. Work with an OpenShift specialist or your Red Hat account team for a more detailed analysis.

What is the name of the customer?*

What is your email address?*

Get started



VMA Online Tooling

<https://console.redhat.com/openshift/migration-assessment>

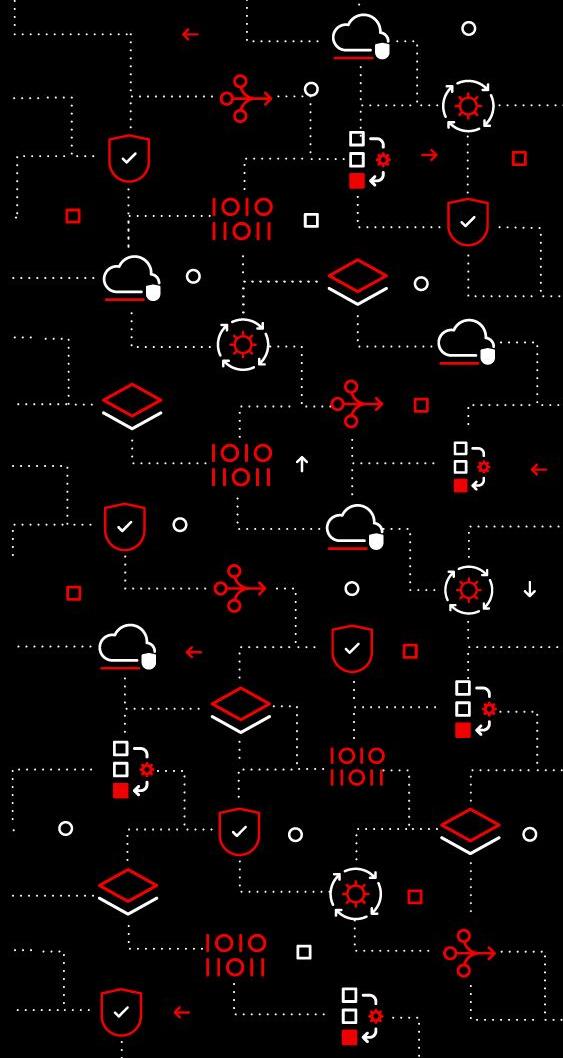
The screenshot shows the Red Hat Hybrid Cloud Console interface for an OpenShift cluster. The main title is "test-prod-new-tag report". Key metrics displayed include:

- Clusters: 2
- Hosts: 10
- CPU Cores: 803
- Total Memory: 2 TB

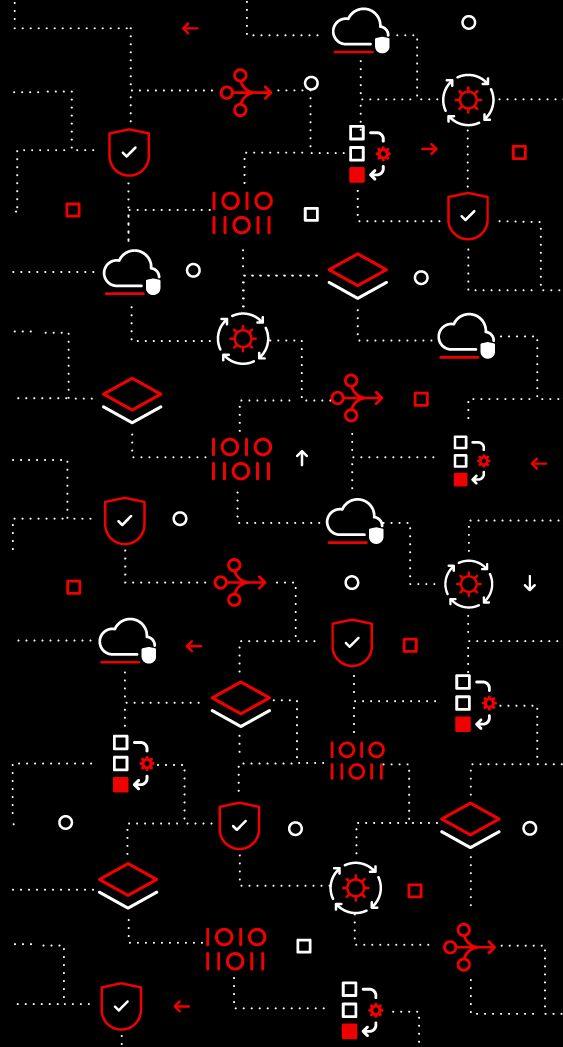
VM Migration Status: 196 VMs

Operating Systems Support:

Operating System	Supported	Not Supported
Red Hat Enterprise Linux 9 (64-Bit)	60	0
Red Hat Enterprise Linux 8 (64-Bit)	40	0
Other 2.6.X Linux (64-Bit)	24	0
Red Hat Fedora (64-Bit)	20	0
Other (32-Bit)	7	0



BREAK
till 10:30



VMA

Virtual Migration

Assessment

Virtualization Migration Assessment

Strategize and plan for migration

Strategy

Foundation

Expand

Evolve



Analyze current VM architecture, existing investments and gather requirements for your future state



Identify VM workloads and define integrations such as storage, networking and clustering requirements



Understand day-2 operations including automation, configuration management, monitoring, backups, etc



Propose a high-level solution design for your custom OpenShift Virtualization based on your business needs



Generate a roadmap for adoption of OpenShift Virtualization and determine next steps

Virtualization Migration Assessment



What We Cover

- OpenShift Virtualization features
- Virtual environment deep dive: networking, storage, security, backup, and disaster recovery
- High level solution design
- Workload migration analysis and recommended migration approach
- Cost and duration estimates for full migration with Red Hat Services

Customer Outcomes

- Understand the **solution, the path to adoption, the timeline, and the cost**
- Understand **workload and migration complexity**
- Leverage **OpenShift, Ansible, and ACM product capabilities** to meet requirements
- Achieve faster time-to-value with **Red Hat Consulting, Training, and TAM**



VMA Report with proposed solution design and approach



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Migration Services Journey

Virtualization Migration Assessment (VMA)

Plan to quickly and safely migrate from legacy virtualization platform

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

Virtualization Migration Factory (VMF)

Deploy virtualization migration technology. Prepare to operate at scale

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

Achieve steady state migration – Reduce legacy footprint

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



Explaining what the VMA is (and isn't)

The VMA is:

- A paid in depth assessment of the customer's current VM estate
- Answers 1) where the customer is going 2) how they're going to get there 3) how long it will take and 4) how much it will cost
- Requires about a week of customer pre-work followed by a week of onsite time with the customer

The VMA is not:

- A discovery session and must never be positioned as so; discovery takes place prior to the VMA



Virtualization Migration Assessment

Our Approach



Planning Activities

- Identify stakeholders
- Send pre-work including RVTools export needed

Onsite Activities

- Whiteboarding
- Requirements gathering
- Decision making
- Removing blockers

Post Work Activities

- Crunch the RVTools data to build migration estimate
- Complete HLD
- Present Exec Summary and Next Steps

Walkthrough of Sample VMA

Virtualization Migration Assessment Report for CUSTOMER

Proposed Migration Approach and High Level Design

Version 1.0 - [Jun 26, 2024]

Assessment Sessions Delivered

Session Name	Description Summary
Stakeholder Mapping and Goals	Understand motivation, migration requirements
CUSTOMER Infrastructure Deep Dive	Review of current VM environment
Virtualization Solution Overview	Review OpenShift Virtualization cases and understand Virtualization.
Architecture Review	Review the initial solution design and objectives, stakeholders involved.
Security Requirements	Define security requirements and inclusion in RHEL.
Recommended Approach	Present migration and additional recommendations.
Pilot Proposal and Document Delivery	Review the documentation and establish a code Red Hat Account.

Current Environment

Overview

CUSTOMER's global infrastructure consists of [REDACTED] VMs. These VMs can be categorized into four main types:

- Production
- Non-Production
- Management
- Virtual Desktop Infrastructure (VDI)

Workload Migration Complexity Analysis

Approach

Categorizing workload complexity will help us prioritize the migration plans and give us an estimate of the effort. We base our evaluation on the following:

- Workload Environment
- Operating System and Version
- Workload Type
- Resource Capacity and Requirement
- Disk Size

Workload Environment

Provisioning lab and nonproduction workloads for migration will help ensure that we perform production migration as efficiently and smoothly as possible.

RHEL and other Linux Distributions

Out of the [REDACTED] eligible workloads from VMware, we first categorize the VMs into supported operating systems and version or not. <https://www.redhat.com/rhel/rhel723x3>

RHEL and RHEL-derivatives such as CentOS, Rocky and Oracle Linux that are newer than RHEL 5 will be placed into the easy bucket. These versions are heavily tested and officially supported by Red Hat. The older versions will require upgrades before migration so they will be placed in the medium bucket.

SUSE is also a supported distribution starting with version 12+. SUSE 12 is also supported. Ubuntu is not supported distributions, but are considered Technology Preview. Various Linux VMs with unlabelled distribution will need to be determined by other means. The effort level will be determined on a case-by-case basis.

Operating Systems	Easy	Medium	Hard
RHEL 5	[REDACTED]	[REDACTED]	[REDACTED]
RHEL 6, 7, 8, 9			
CentOS 4, 5			
CentOS 6, 7, 8			

Sample Masked VMA Output



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VM Workload Breakdown and Planning

Complexity Analysis

- ▶ The workload analysis shows a 85/10/5 easy/medium/hard distribution of workloads
 - 97% of VMs are sized as easy to migrate
 - A small number of VMs (1%) are very large and may need to be V2P migrations
 - 2% of VMs are running Ubuntu and non-RHEL distros and will need to be further evaluated during Phase 1
 - During Phase 1, we will build patterns for the appliances and COTS migrations, determining what can be moved to a native container.



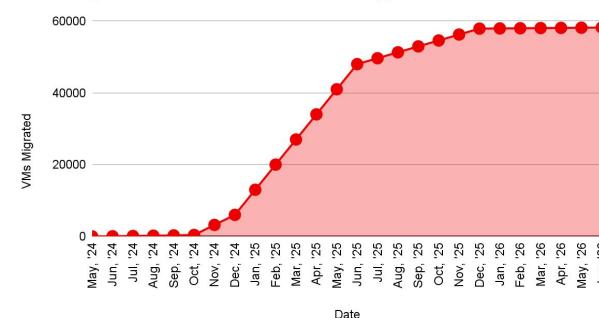
Factor	Easy	Medium	Hard
Storage Size	64087	2167	153
Workload Type	53128	11497	0
Operating System	51336	6736	1237

Financial Services VM Migration Velocity Projection Example

1. Visa's global infrastructure consists of more than 71,000 virtual machines (VMs) distributed across data centers in six countries.
2. These VMs can be categorized into four main types:
 - Production: 26,000 VMs
 - Non-production: 33,000 VMs
 - Management: 7,000 VMs
 - Virtual Desktop Infrastructure (VDI): 5,000 VMs
3. The VDI VMs are based on Citrix/Hyper-V technology, while the other three categories (production, non-production, and management) are VMware-based. This means that out of 71,000 VMs, 66,000 are potentially migratable to a new platform.
4. Approximately 17,000 VMs are under the responsibility of the Operations and Infrastructure (O&I) team while the remaining VMs are owned by various product teams within the Visa organization.

Date	VMs Migrated (V2V)	VMs Retired (V2C, V2P, Decomm)	vSphere VMs Remaining
PHASE 1 BEGINS			
June 2024	0	0	66,000
October 2024	400	100	65,500
PHASE 1 ENDS / MIGRATION FACTORY BEGINS			
December 2024	6,000	500	59,500
June 2025	48,000	2,500	18,500
December 2025	57,900	6,600	1,500
MIGRATION FACTORY ENDS / ONGOING SUPPORT BEGINS			
June 2026	58,200	7,800	0

VMs Migrated vs. Date - Lift and Shift Approach



* Velocity is based on optimal rate, without resource or process constraints.

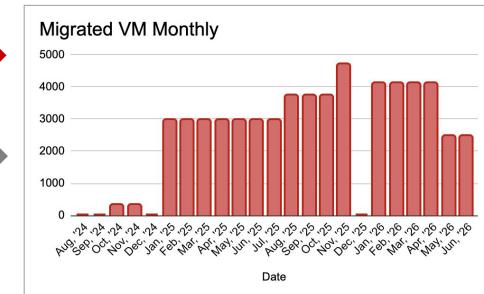
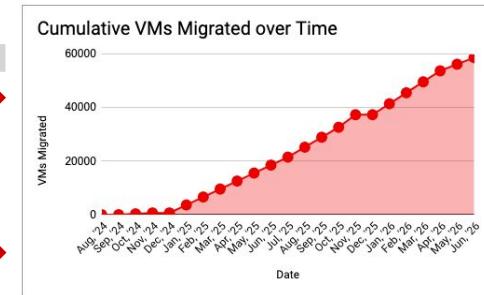
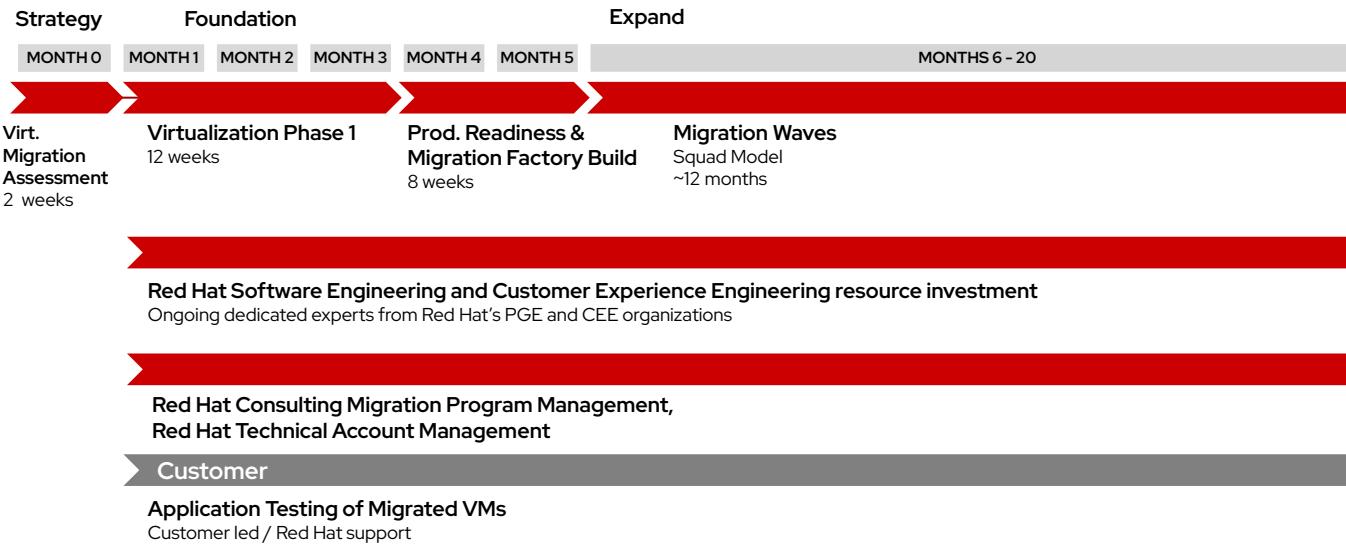
** Assumes production workloads can be migrated on weekdays

*** Assumes migration windows of 4 hours per day, 5 days per week

**** Full assumptions in [Appendix](#)

Virtualization Migration Assessment

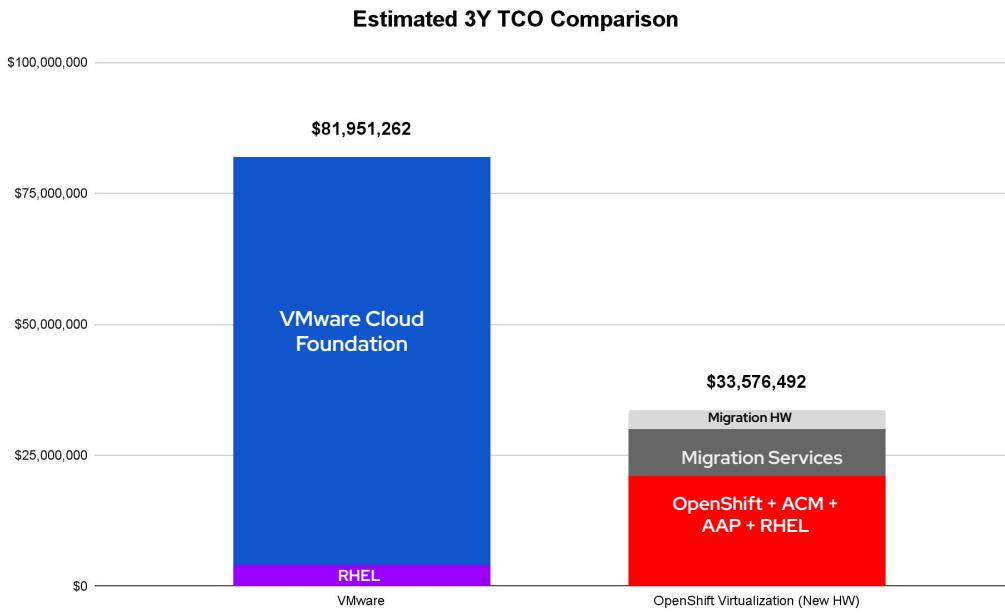
Example Migration Schedule: 50,000 VMs



OpenShift Virtualization Will Yield Substantial Cost Savings

FSICorp will avoid new higher Broadcom subscriptions and benefit from a modern application platform

Three-Year Cost Comparison for In-Scope VMs

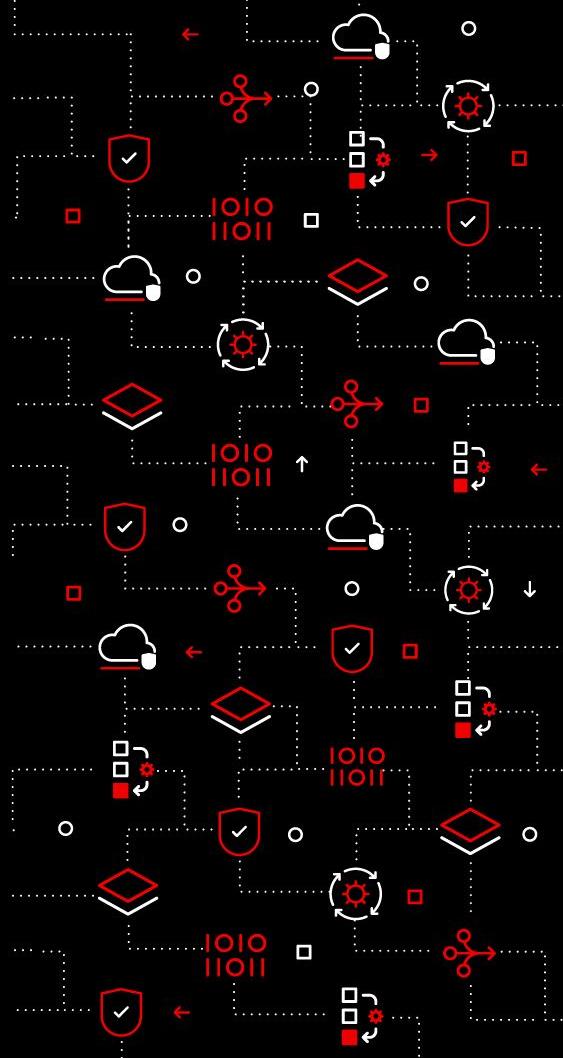


3-Year Savings: \$48.3M
Virtualization Cost Reduction: 59%

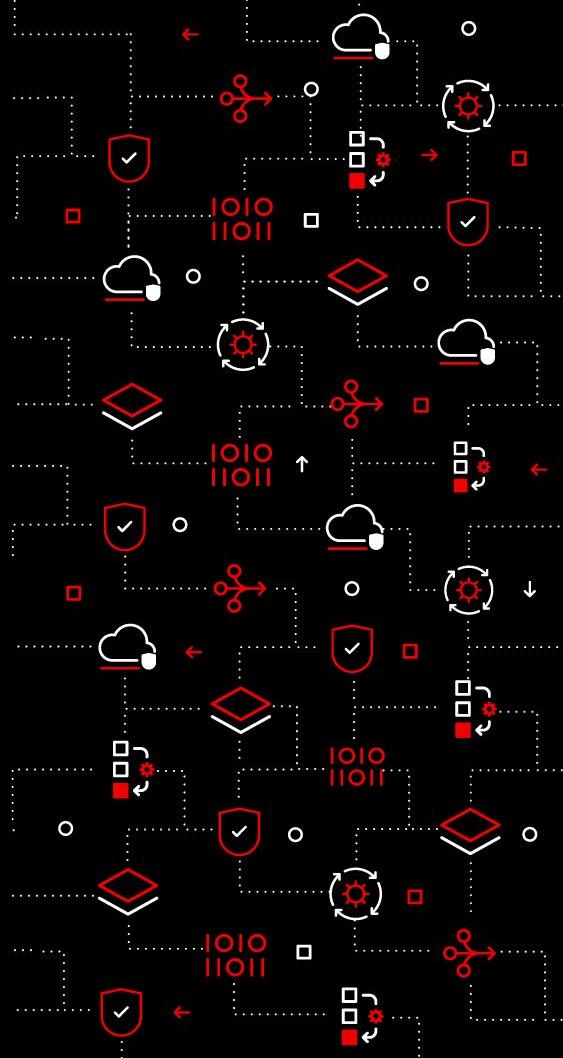
In addition to virtualization cost savings, **customers who use OpenShift as an application platform** realize powerful operational benefits, which deliver financial returns to the business:

- Less unplanned downtime, **protecting revenue and reputation**
- Faster application development, **accelerating time-to-market**
- Increased IT productivity, **boosting cost efficiency**

3-yr Cost Components	VMware	Red Hat
VMware Subscriptions	\$77,952,000	
RHEL Subscriptions	\$3,999,262	\$3,999,262
OpenShift Subscriptions		\$9,670,050
AAP Subscriptions		\$7,684,669
Migration Services		\$8,968,438
Migration Hardware		\$3,654,000
3Y Total Cost	\$81,951,262	\$33,576,492
Total Cost Savings with OCP		\$48,374,770
% Cost Savings with OCP		59%



Lunch Break



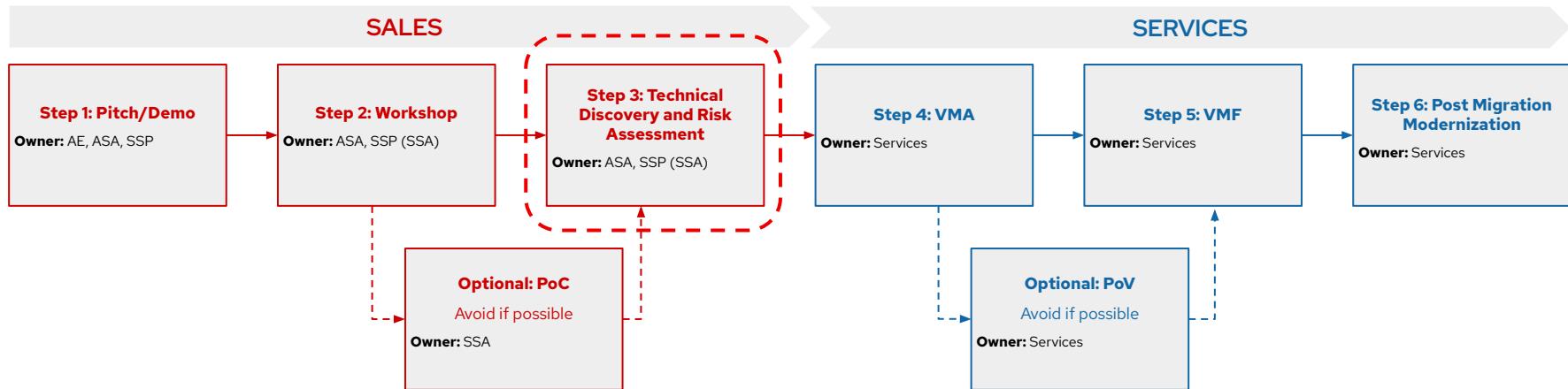
Risk Analysis and Project Planning

Objectives and Outcomes:

1. Know how to assess a customer's current environment
2. Understand the tools available to you
3. Understand what Red Hat and 3rd party software options are available to address the customer's needs



Virtualization Sales and Delivery Path

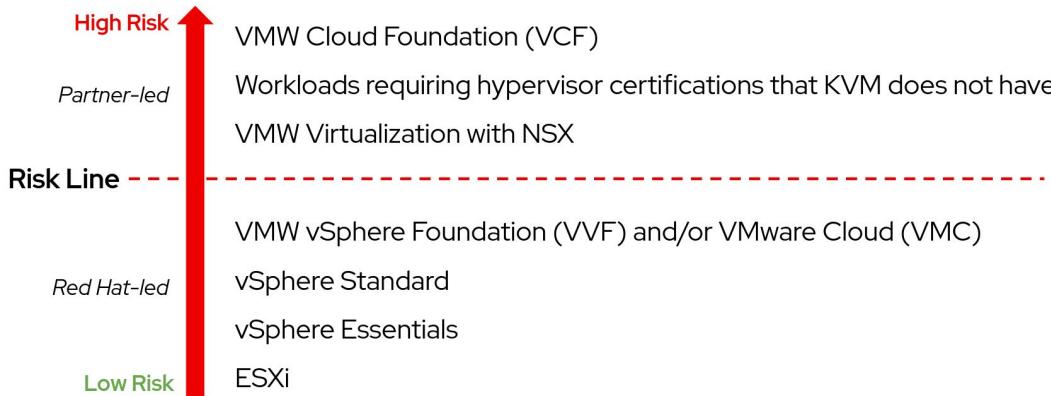


⚠ All created assets should be stored in RHSC, see guidance [here](#)

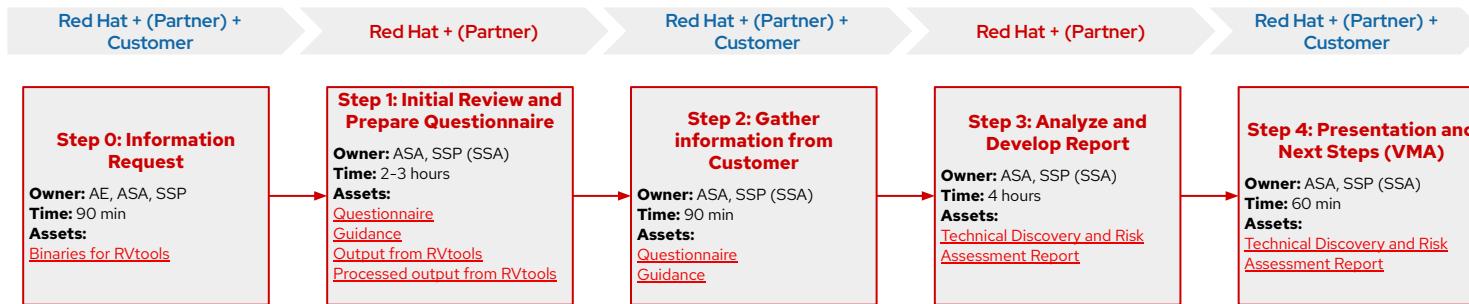


Presales Tech Discovery and Risk Assessment

- ❖ Presales activity to be performed **before** the VMA
- ❖ Process to follow together with the customer to perform a **high level** assessment of the current situation and their commitment to migrate
- ❖ Needed to set the **Risk Line** and decide if it is a Red Hat or partner-led opportunity



Presales Tech Discovery and Risk Assessment



Analyze Information and Develop Report

Participants: SSP and/or ASA with Assistance from OpenShift SSA / Architect

Use all the information provided by the customer and the condensed report to build a high level [document](#) to assess the migration risk. This document will be reviewed together with the customer.

 Important: This exercise in no way replaces the rigor of the VMA but is very valuable for Services in the case we progress to a VMA



Presentation and Next Steps

Participants: SSP and/or ASA with Assistance from OpenShift SSA / Architect

Review the high level [document](#) with the customer to explain the migration risk if any.

Get a commitment from the customer to progress to the VMA.



Resources

GitRepo Link

- ❖ RVTools report [Example](#)
- ❖ [Binaries](#) to process the RVTools report
- ❖ Processed RVTools report [Example](#)
- ❖ [Guidance](#) to complete the Questionnaire
- ❖ [Questionnaire](#)
- ❖ Report [Template](#)



Customer Example

Certification Environment for Phase 1

Phase 1 Outcome:

Prove the functionality, performance and reliability of the proposed cluster architecture as it would be implemented inside of Ford Motor Company's network and data center constraints.

Objectives:

Evaluate the functionality, performance, and reliability of the proposed cluster architecture within Ford Motor Company's network and data center constraints.

Lays the foundation for migration by preparing OpenShift infrastructure and related automation, defining and validating a strategy for migration, and developing procedures and providing training.

Work Streams	Purpose
EDC Virtualization	Focus on the use-cases identified for the EDC deployment and VMs
Plant / Distributed Virtualization	Focus on the use cases and unique scenarios specific to the plant/distributed scenarios
Platform Automation	Enable the OpenShift Virtualization infrastructure deployment and the related automation (including reuse of existing assets at Ford)

Non-production environment. Initial VM migrations and initial use-cases tested with Phase 1 workloads

Platform Automation

 **GOAL:** Enable the OpenShift Virtualization infrastructure deployment and the related automation

 **OVERVIEW:**

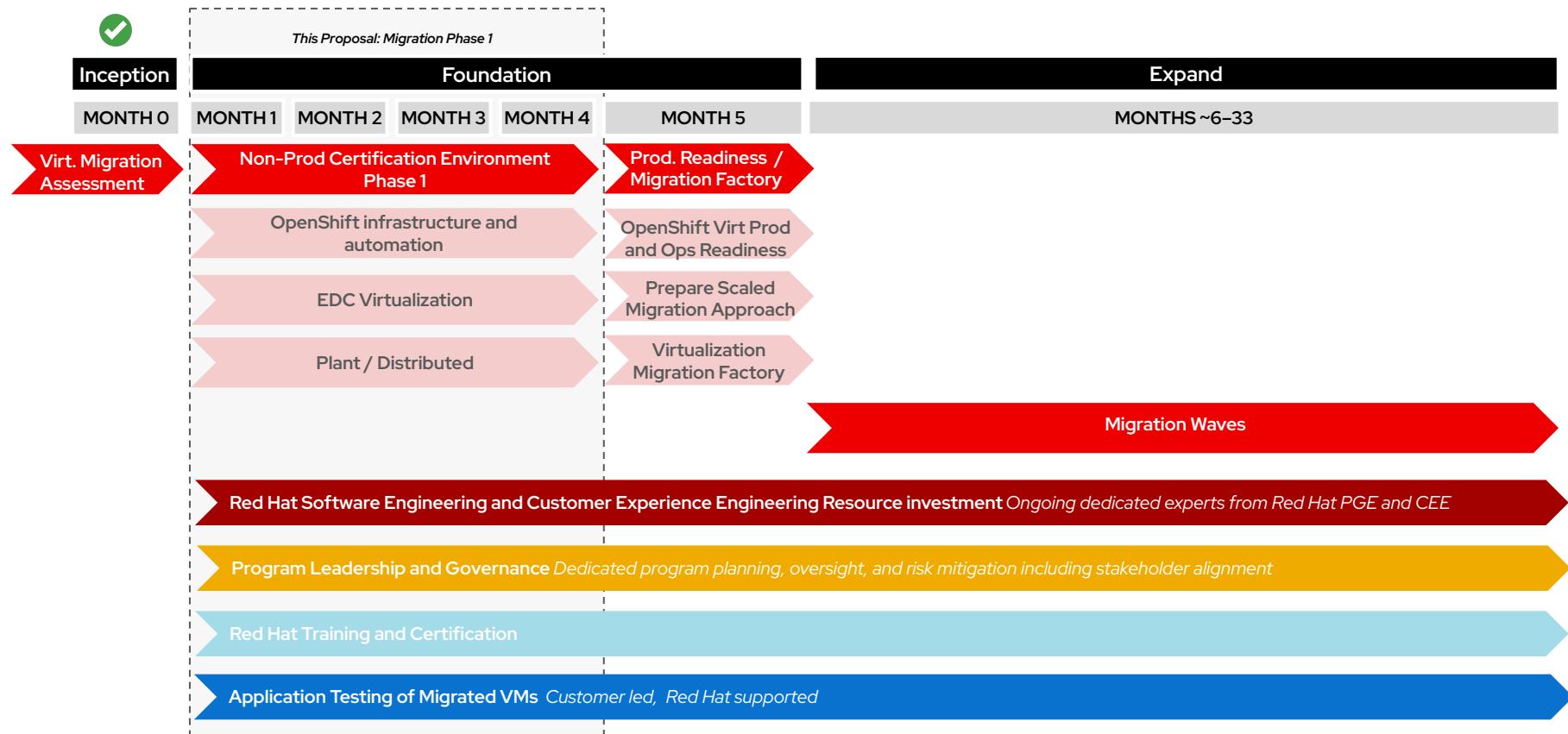
- Identify capabilities to assist with Ford's goal of establishing consistent Deployment and Day-2 operational automation practices for EDCs and plants
- Reuse existing automation and other platform artifacts (e.g., the GitOps based IaC) developed for the current OpenShift CaaS implementation
- Infrastructure low-level design
- IaC / GitOps and AAP automation for infrastructure
- OpenShift deployments
- Process and automation for host recommissioning

 **OUTCOMES:**

- Automation-first approach with consistency of implementation
- Successful implementation of platform best practices and automation ensuring adherence to best practices and "doing it right the first time"

 **DEFINITION OF SUCCESS:** Validate scaled migration and the critical Day-2 operations (3-5 use cases) using AAP automation; Review existing automation at Ford for reuse assessment and integration

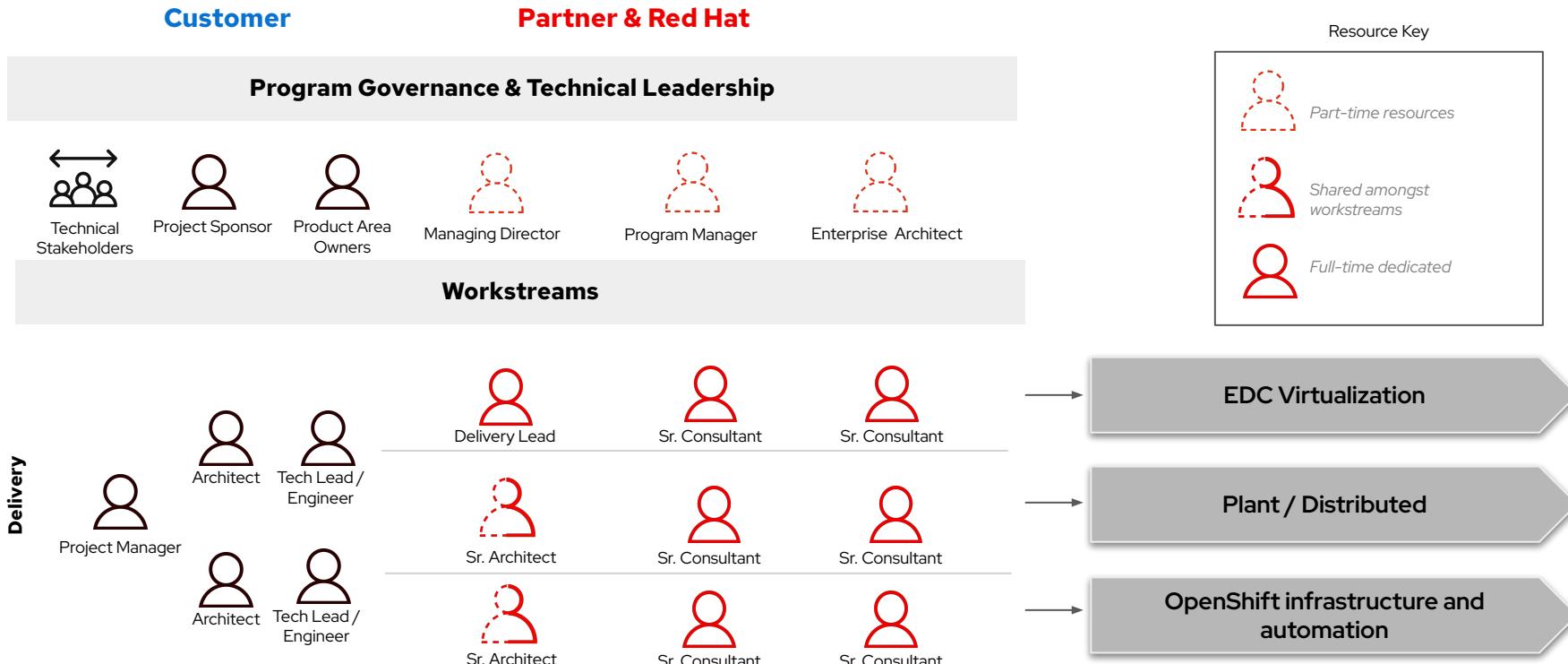
Migration Program Timeline



*Fords outage and release schedules have not been provided to Red Hat for this estimate. This timeline is based on standard industry holiday and quarter schedules.

For a more accurate timeline, Ford will need to provide actual release and outage planning details.

Phase 1 Teaming Model



Phase 2: Migration

Deploy production infrastructure and migrate at scale

Migration Outcome:

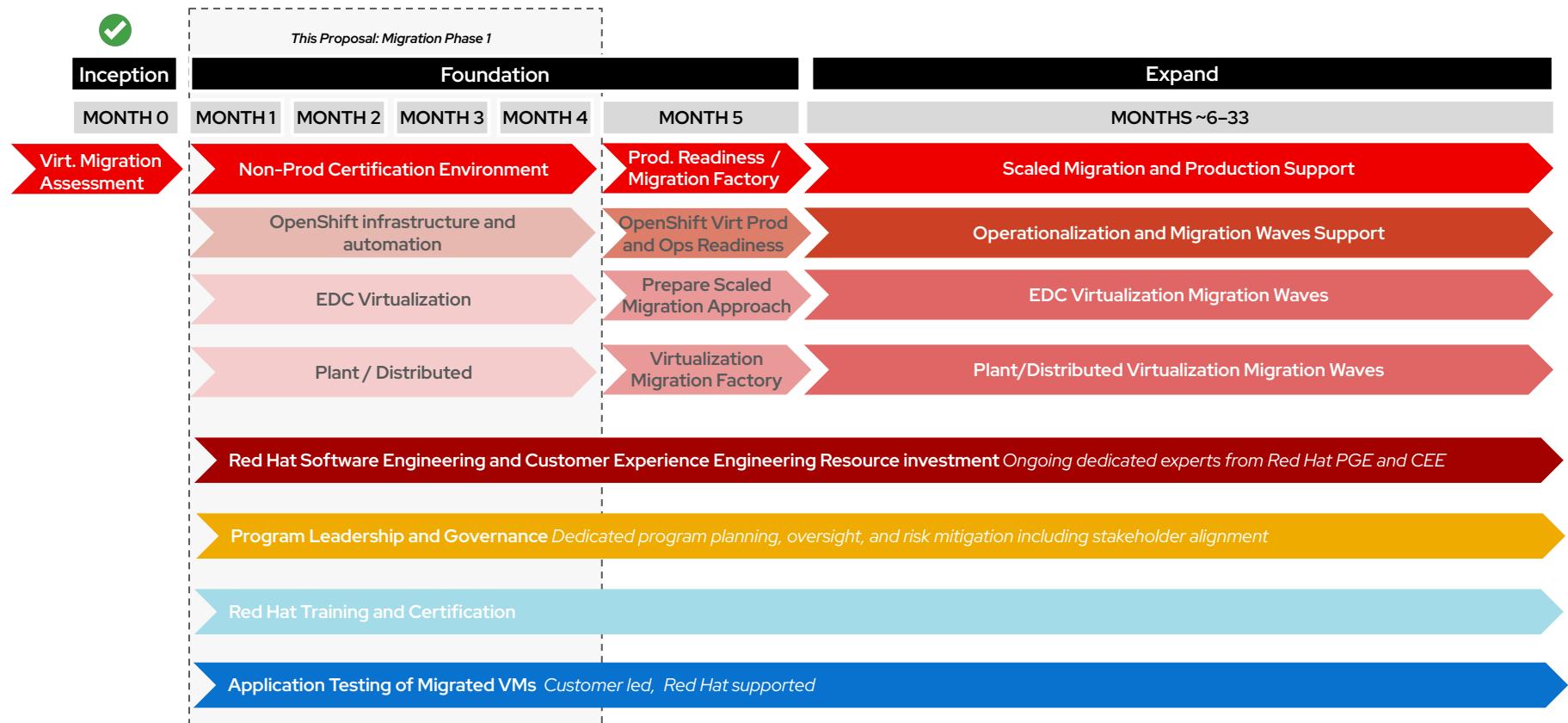
Successfully transitioning thousands of virtual machines to OpenShift Virtualization clusters while ensuring the new platform meets Ford's production system requirements. The goal is to achieve an efficient, automated, and scalable virtualization platform that integrates seamlessly with the company's existing infrastructure and operational practices.

Objectives:

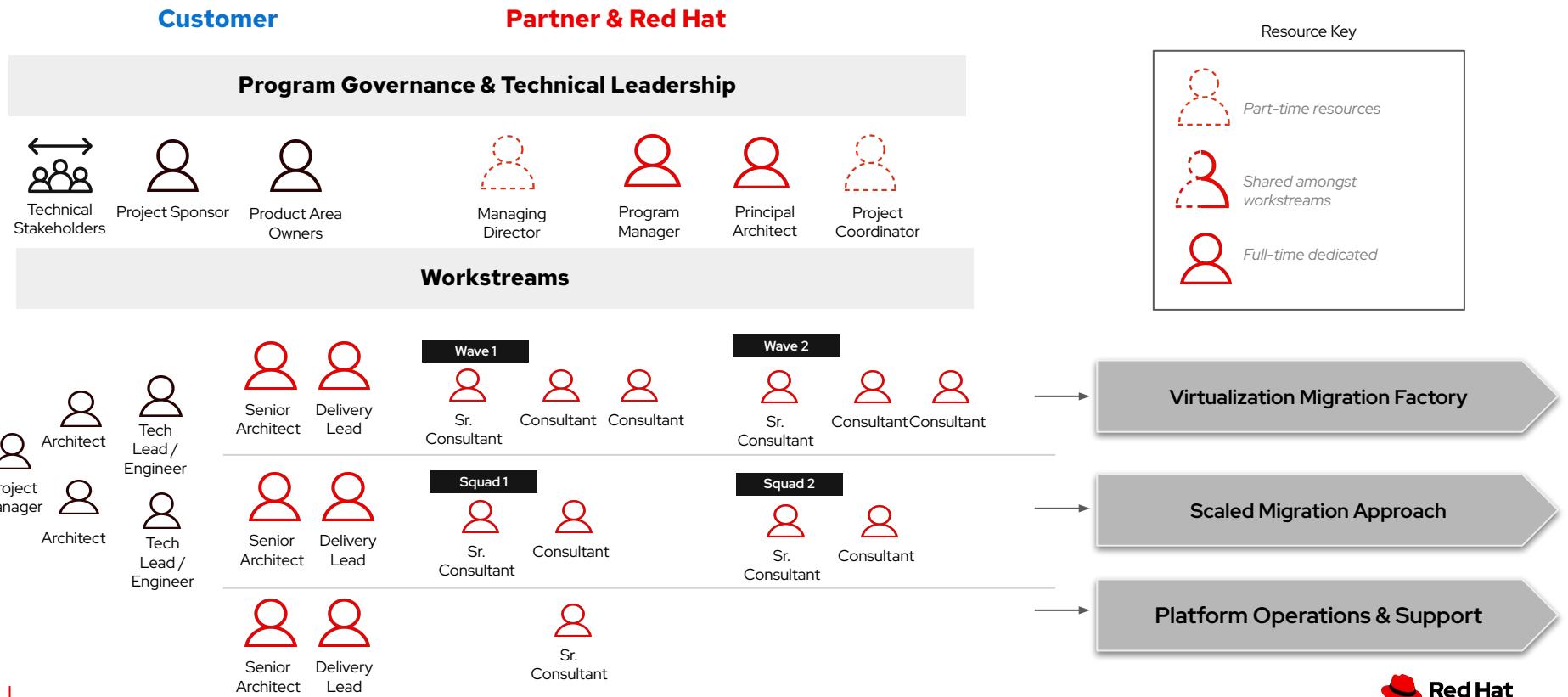
- Deploy, manage, and monitor OpenShift Virtualization clusters
- Develop automation solutions for VM migration
- Leverage existing automation and GitOps practices
- Prepare a scaled migration approach
- Ensure operational readiness

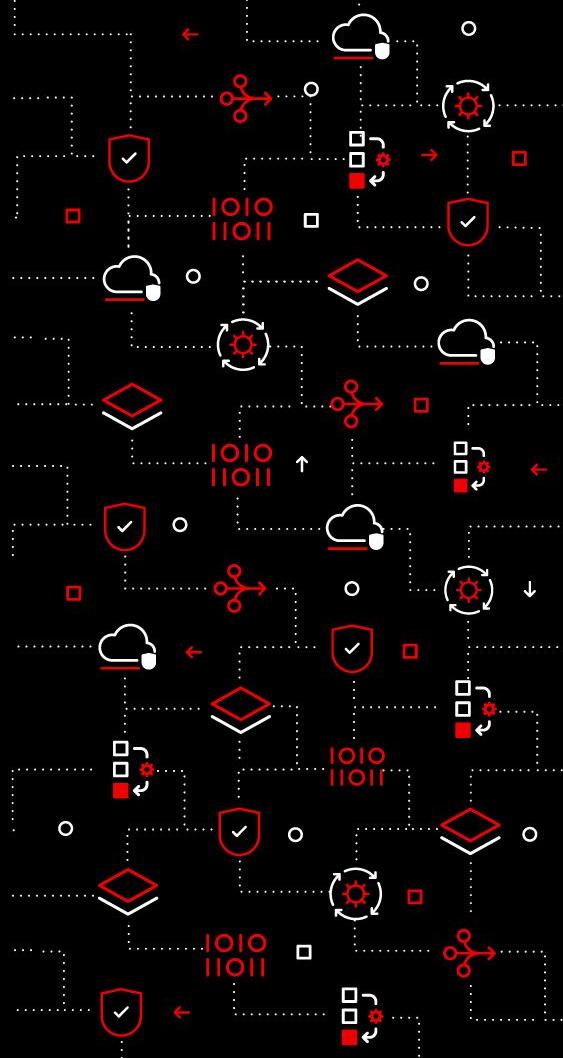
Work Streams	Purpose
Virtualization Migration Factory	Design and deploy Ansible Automation Platform and validate Ansible playbooks for batch VM migration, configurations, rollback and recovery, and VM validation
Scaled Migration Approach	Develop a seamless VM migration process with infrastructure-led and self-service options, workload planning, outage windows, preflight checks and exception handling
Platform Operations & Support	Ensure seamless deployment, management, and integration of OpenShift Virtualization clusters with company systems and support day-2 operations through ACM

Migration Program Timeline

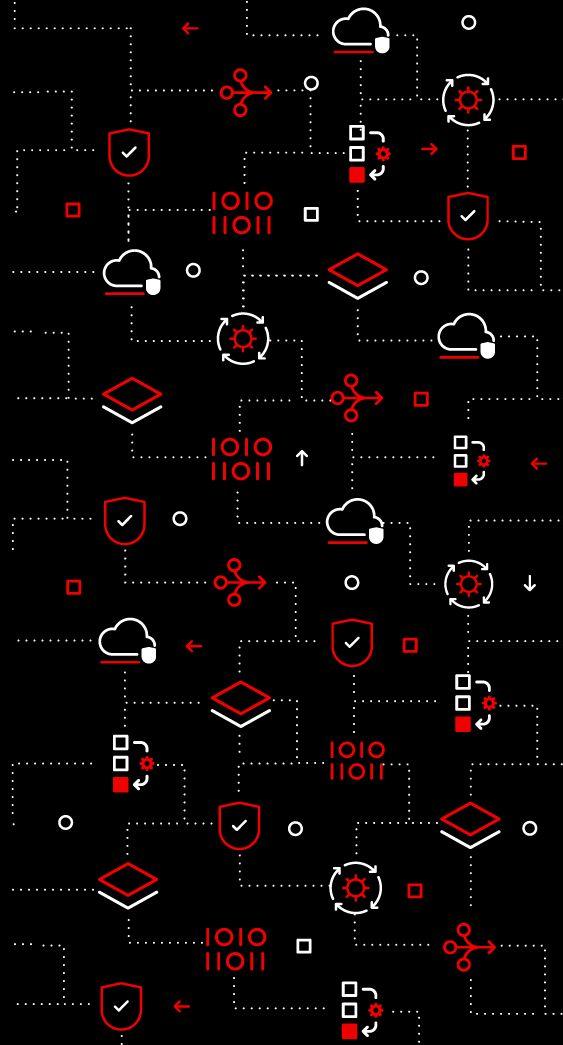


Migration Factory Teaming Model





BREAK
till 15:00



Choose the right Subscription

Hybrid cloud application platform



Red Hat
OpenShift

Advanced Management & Security

Multicluster Management | Cluster Security | Global Registry | Cluster Data Management | Compliance & Policy Automation

Integrated DevOps Services

Service Mesh | Serverless | Builds | Pipelines | GitOps | Tracing | Log Management | Cost Management

Containers

Image Registry | Container Runtime | Pod Autoscaling | Resource Quotas & Limits | Namespace Isolation | Container Networking

VMs

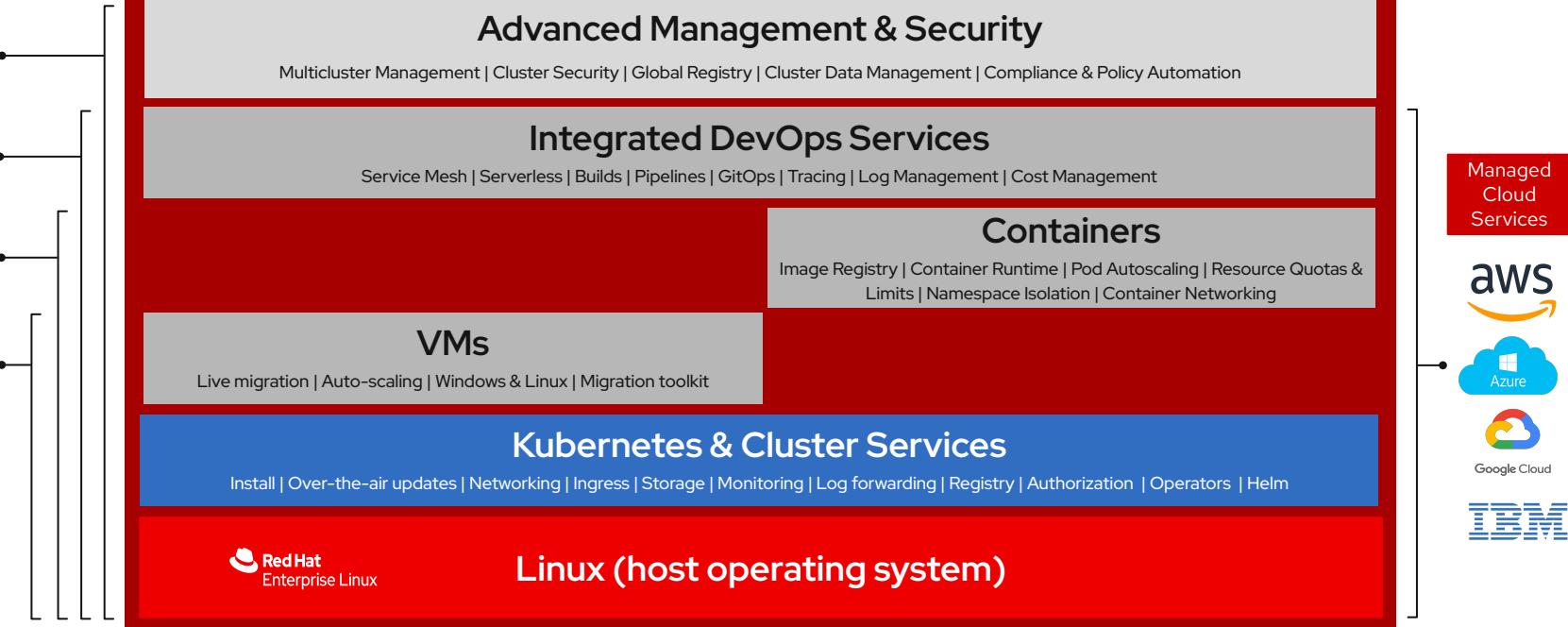
Live migration | Auto-scaling | Windows & Linux | Migration toolkit

Kubernetes & Cluster Services

Install | Over-the-air updates | Networking | Ingress | Storage | Monitoring | Log forwarding | Registry | Authorization | Operators | Helm



Linux (host operating system)



Physical



Virtual



Private cloud



Public cloud



Edge



Self-managed OpenShift editions

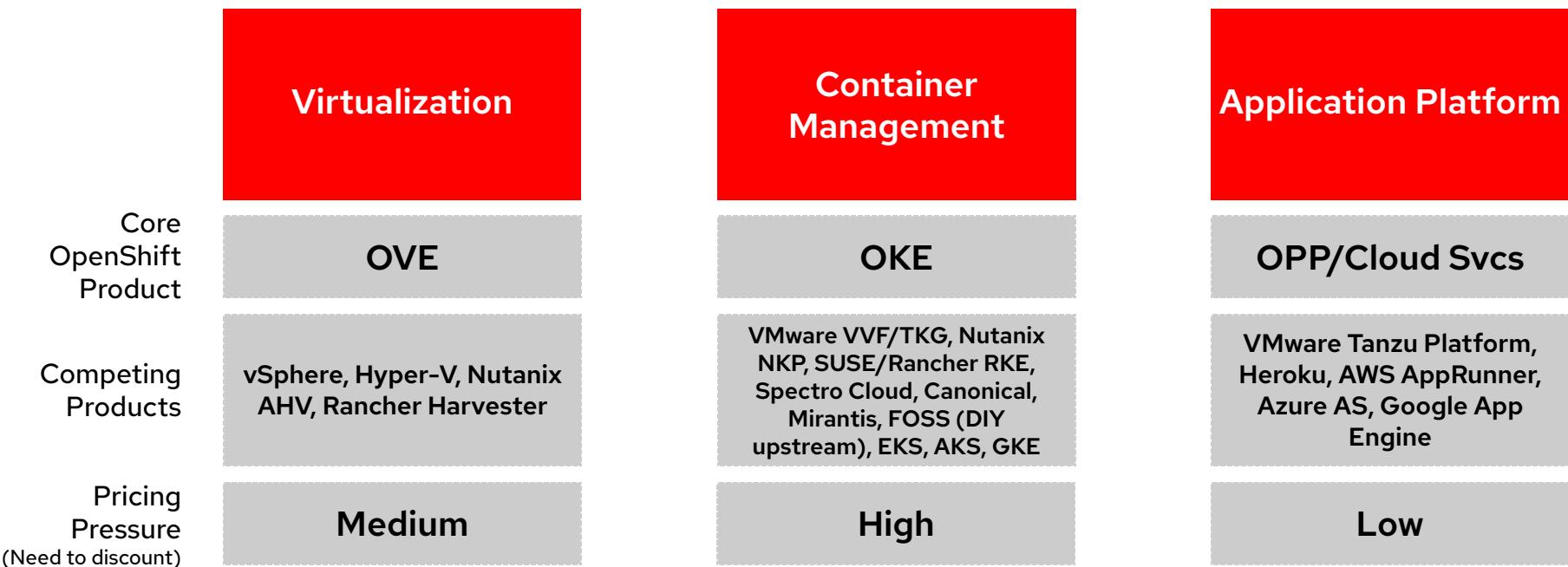
	 Red Hat OpenShift Virtualization Engine	 Red Hat OpenShift Kubernetes Engine	 Red Hat OpenShift Container Platform	 Red Hat OpenShift Platform Plus
Virtual machine workloads Migrate, manage, and deploy virtual machines	✓	✓	✓	✓
Enterprise Kubernetes for container applications Build, deploy, and run containerized applications		✓	✓	✓
Comprehensive application platform Full set of operations and developer services and tools			✓	✓
Management and security at scale Complete platform for accelerating app development and app modernization				✓

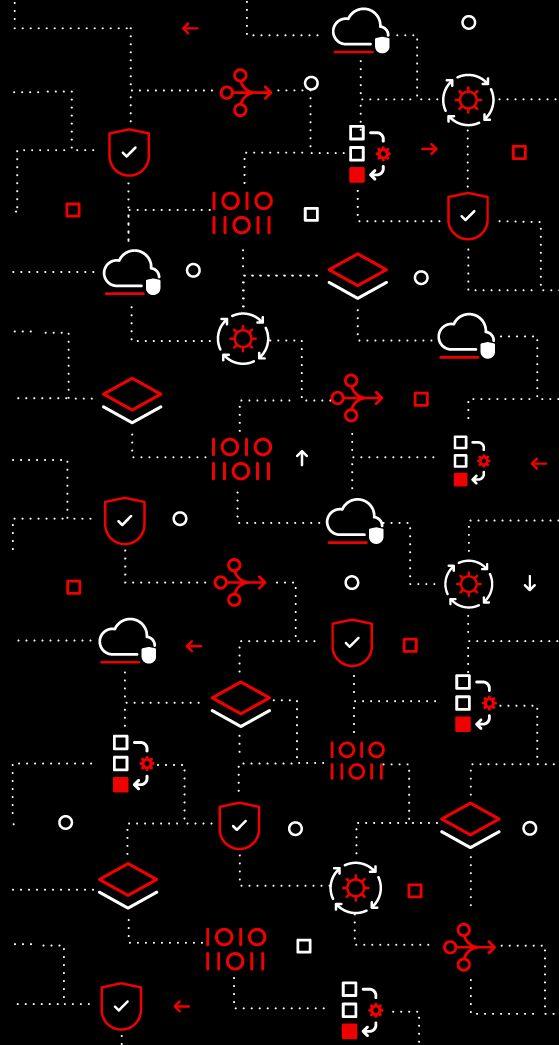
Find a feature breakdown across all OpenShift editions in our [subscription guide](#).

	 Red Hat OpenShift Virtualization Engine	 Red Hat OpenShift Kubernetes Engine	 Red Hat OpenShift Container Platform	 Red Hat OpenShift Platform Plus
Enterprise Secured Kubernetes	✓	✓	✓	✓
Hosted control planes	✓	✓	✓	✓
Operator Lifecycle Manager	✓	✓	✓	✓
Compliance & File Integrity Operators	✓	✓	✓	✓
Virtual machine-based workload hosting	✓	✓	✓	✓
Container-based infra workload hosting	✓	✓	✓	✓
User Workload Monitoring	✓*	✓*	✓	✓
Platform Logging	✓*	✓*	✓	✓
OpenShift GitOps	✓*	✓*	✓	✓
Metering and Cost Management SaaS Service	✓	✓	✓	✓
Container-based user application hosting		✓	✓	✓
RHEL guest and hosted virtual OpenShift subscriptions included		✓	✓	✓
Runtimes, Build Tools, and IDE			✓	✓
CI/CD Pipelines			✓	✓
Serverless			✓	✓
Service Mesh			✓	✓
Tracing			✓	✓
Multi-cluster complete management with Red Hat Advanced Cluster Management				✓
Kubernetes-native security with Red Hat Advanced Cluster Security				✓
Scalable, central registry with Red Hat Quay				✓
Persistent software-defined storage & essential data services with OpenShift Data Foundation Essentials				✓

*VMs only. [Learn more.](#)

Know How to Position OpenShift





Advanced Cluster Management for Virtualization (ACM-V)

Red Hat Advanced Cluster Management

A guide to the subscriptions



- ▶ Red Hat Advanced Cluster Management for **Virtualization** manages Red Hat OpenShift Virtualization Engine
- ▶ Red Hat Advanced Cluster Management for **Kubernetes** manages Red Hat OpenShift platforms

Advanced Cluster Management for Virtualization

Reduce fragmented visibility and manual context switching across VM estates



Business continuity from Day 0 to Day 2

Increase business resiliency to enhance SRE experience, minimize operational risk, enable backup and disaster recovery



Manage applications and virtual machines with ApplicationSets

Deploy VM applications from code source to ease deployment and streamline management at scale



Dynamic search & observability

See all virtual machines in your fleet. Understand health and capacity holistically using ready-to-use dashboards



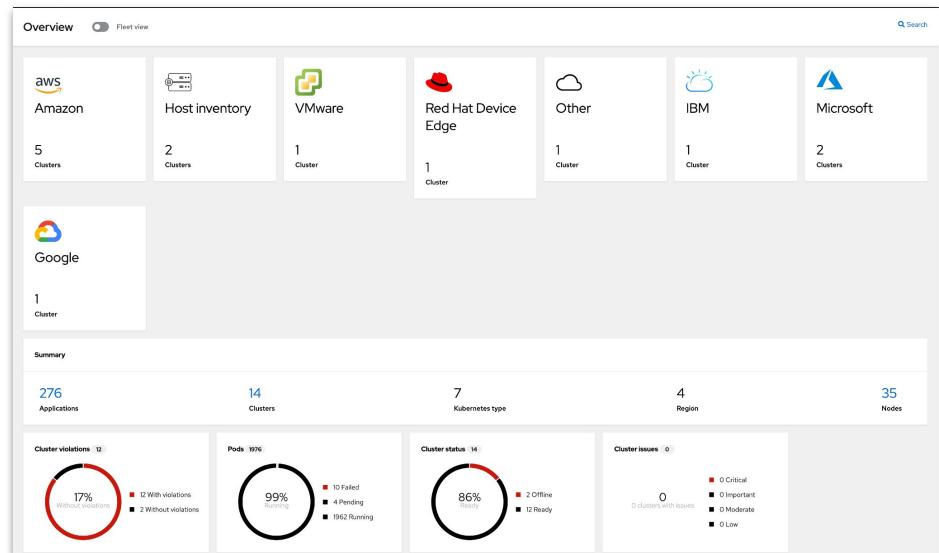
Manage VMs directly from ACM

Stop, start, restart, pause and unpause VMs directly from ACM

Business continuity from Day 0 to Day 2

Increase business resiliency

- ▶ Multicluster observability for VM health & optimization for an **enhanced SRE experience**
- ▶ Unified multicloud lifecycle management across the full-stack to **reduce VM complexity**
- ▶ Policy-driven governance, risk & compliance that **minimizes operational risks**
- ▶ Rapid service backup & disaster recovery to ensure **consistent user experiences**



Dynamic search & observability

A hybrid cloud view for all virtual machines & containers

Search

Saved searches ▾ Open new search tab ↗

kind:VirtualMachine X

Name ↑	Namespace	Cluster	Status
centos-stream8-wise-gibbon	default	aro-central	Stopped
centos-stream9-scarlet-crabfish-19	default	aro-central	Running
centos-stream9-time-test	default	aro-central	Running
database	default	aro-central	Running

- ▶ Quickly see all VMs in your fleet
- ▶ Gain deeper insights & visibility into your OpenShift Virtualization inventory with ready-to-use dashboards

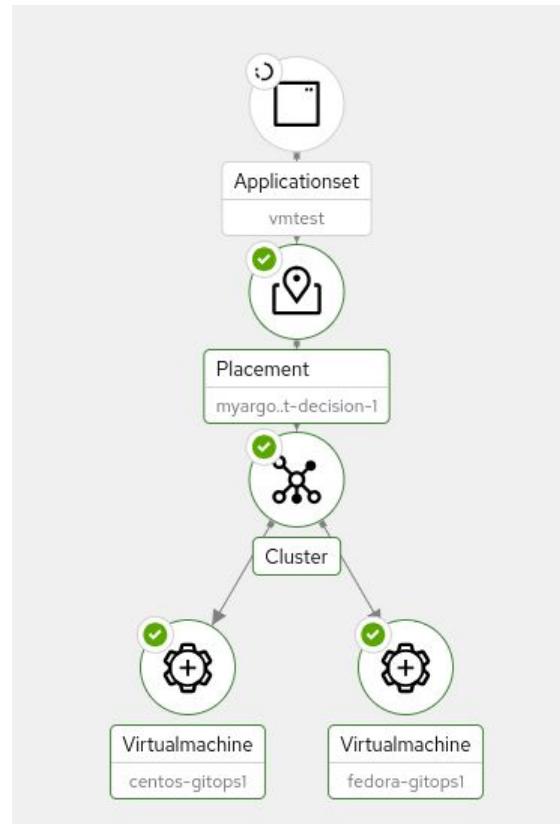


Manage OpenShift Virtualization with ApplicationSets

Ease deployment and streamline management at scale

Scenarios:

- ▶ Manage applications from Git-Repositories
- ▶ Supports multiple deployment patterns
 - Ex: Push/Pull Model
- ▶ Mass deployments to different namespaces
- ▶ Use placement for unplanned cluster failures
- ▶ See all Virtual Machines across multiple hubs at a Global Hub using Global Hub Search
- ▶ Prepare for Metro-DR and Regional-DR scenarios using Red Hat Open Data Foundation



Manage virtual machines from Advanced Cluster Management

Control without the context switching

Manage VM's directly from ACM 2.12:

- ▶ Start ▶ Unpause
- ▶ Stop ▶ Edit
- ▶ Restart ▶ View
- ▶ Pause ▶ Delete

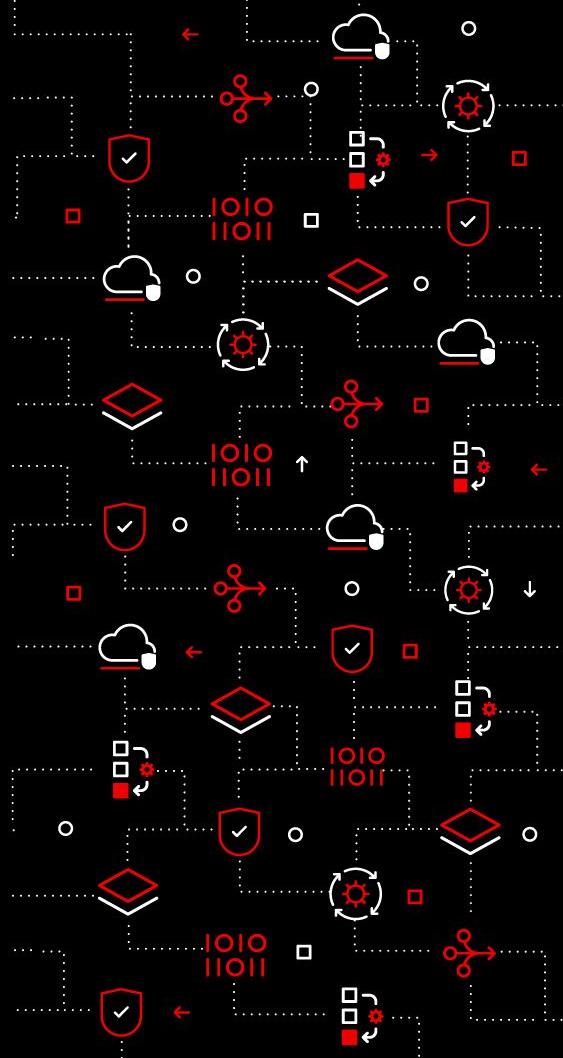
The screenshot shows the ACM 2.12 interface for managing virtual machines. At the top, there are two entries under the 'Labels' section:

- go app=centos7-gray-owl-35 vm.kubevirt.io/template=centos7-server-small
- go app=rhel9-amaranth-pelican-44 kubevirt.io/dynamic-creden... vm.kubevirt.io/template=rhel9-server-small 3 more

Below each entry, there is a set of management actions:

- Start VirtualMachine
- Stop VirtualMachine
- Restart VirtualMachine
- Pause VirtualMachine
- Unpause VirtualMachine
- Edit VirtualMachine
- View related resources
- Delete VirtualMachine

A blue box highlights the 'Delete VirtualMachine' option for the second entry.



End of Day 2

Thank you

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