

Red Hat OpenShift Virtualization

VMA WorkShop Day Two

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Recap Agenda Day 1

09:00 - 10:15

- Welcome and Introductions
- Sales Motion and Getting the Technical Win (GTM Strategy)
- OpenShift Virt Overview
- OpenShift Virt - Storage
- OpenShift Virt - Networking
- Access to the Hands-On Lab

10:30 - 12:00

- LAB - OpenShift Virtualization Basics
- LAB - Network Management
- LAB - Storage Management

12:00 - 13:00 Lunch

13:00 - 14:45

- VMware vSphere Overview Presentation
- VMware to OpenShift Presentation

14:45 - 15:00 BREAK

15:00 - 15:45

- LAB - Migration from VMware to OpenShift

15:45 - 17:00

- Migration Factory
- Deep Dive on the Migration Factory offering



Agenda Day 2

09:00 - 10:15

- Migration discussion based on a real-world scenario
- Discussion on migration risks
- Estimating a project

10:15 - 10:30 Break

10:30 - 12:00

- Showcase the VMA Analysis (Hands-On)

12:00 - 13:00 Lunch

13:00 - 14:45

- Risk Analysis and Project Planning

14:45 - 15:00 BREAK

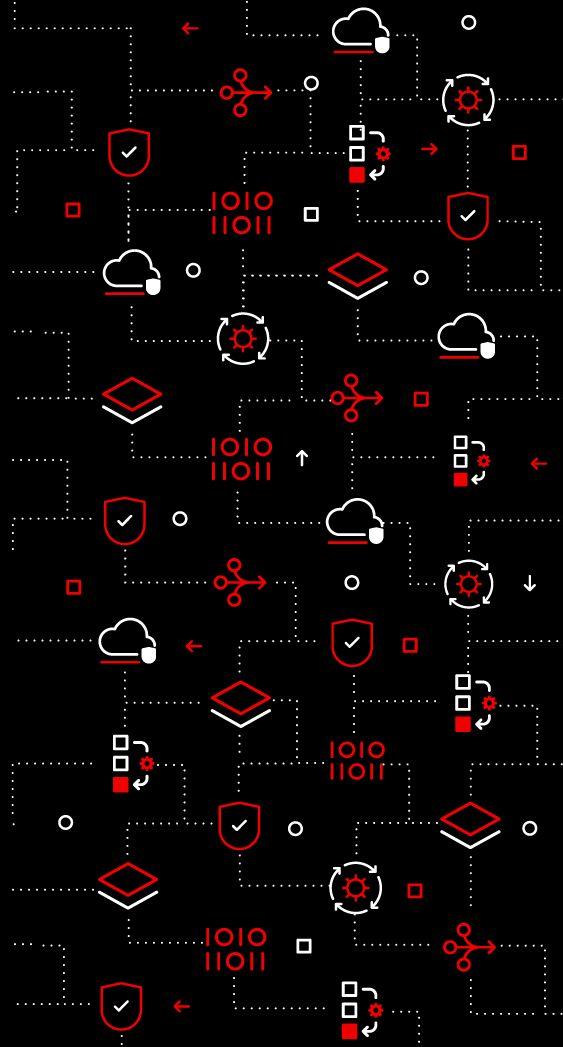
15:00 - 15:45

- Presenting a Customer Showcase (Scenario)

16:00 - 17:00

- GroupWork "Creating a CxO Proposal Presentation" for a Migration Project based on a given real-world Scenario.





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

VMA Customer and Red Hat Roles

Customer Attendee	Role	Red Hat Attendees
Project Sponsor(s)	Responsible for setting goals and determining the measures of success for open-source adoption.	Sr. Architect
Business and IT decision-makers	Key Decision-makers from Business and IT Operations.	Engagement Lead
Enterprise Architect	The architect is responsible for data and systems interactions across the organization.	Strategic Account Executive
Virtualization Product Owner	The product owner for the current virtualization platform.	Sales Specialists
Infrastructure Teams representatives	Representatives for the infrastructure team: computing, storage, and network.	Senior Account Solution Architect
Director and/or Manager of Application Development	Oversees Software Development Technologies and Processes	Customer Success Executive
Director and/or Manager of IT Operations	Oversees Infrastructure Platform and Operations	
Relevant leads and members of Developer teams	Architects, Leaders, and Managers for internal projects and initiatives	
Relevant leads and members of the IT Operations team	Infrastructure, Platform, or Software Owner(s)	
Various	Other interested parties within the organization	



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			

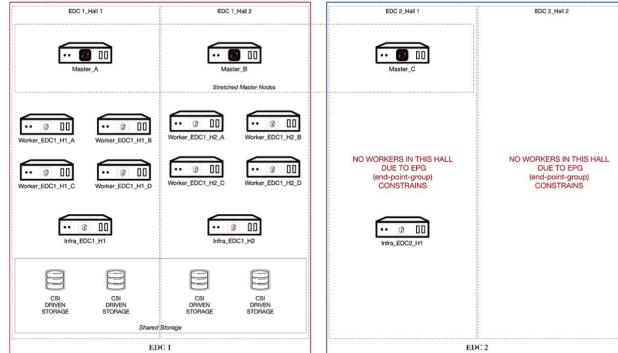
Sample Masked VMA Output



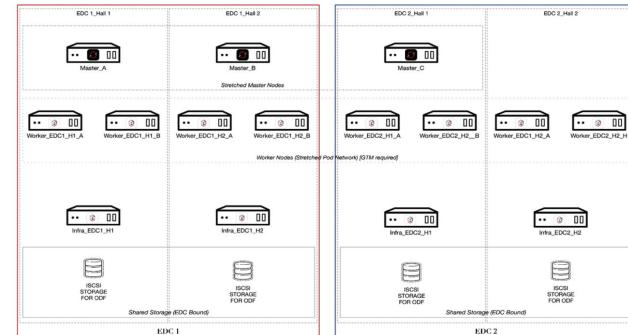
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Target Architecture and Infrastructure Considerations

- Car Manufacturer existing physical server, networking, and storage architecture is an ideal model and landing zone for OpenShift Virtualization, and has been used as the starting point for the infrastructure design. No red flags have been identified with the existing infrastructure
- The architectural layout will consist of four (4) deployment architectures each dedicated to a specific use case:
 - 1) EDC, 2) "Stretched" EDC, 3) Plant/Distributed, and 4) Standalone. The topology will be laid out to take advantage of multiple failure domains where available.
- The "Stretched" EDC is architecture that is designed specifically for VM workloads that currently use the VMWare NSX feature today. This would be an OpenShift Virtualization cluster where storage (using ODF) is stretched across both data centers.



EDC Architecture



"Stretched" EDC Architecture

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.



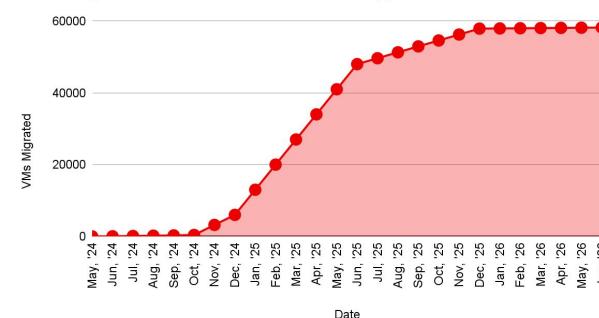
Factor	Easy	Medium	Hard
Storage Size	64087	2167	153
Workload Type	53128	11497	0
Operating System	51336	6736	1237

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.

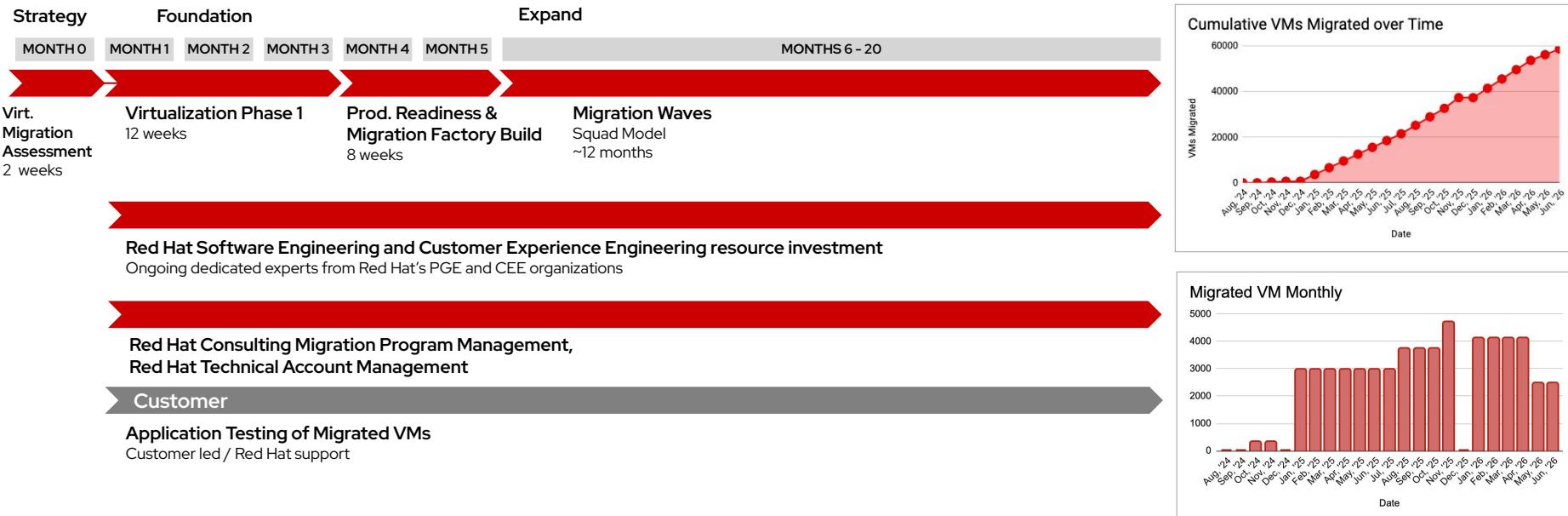
** Assumes production workloads can be migrated on weekdays

*** 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



Mapping the Solution with Ecosystem Partners

VMware Portfolio

VMware Subscription Level	Select	Subscription / Core Count
VMware Cloud Foundation (VCF)		
VMware vSphere Foundation (VVF)	X	
VMware vSphere Standard (VVS)		
VMware vSphere Essentials Plus Kit (VVEP)		

VMware Product	Feature	Used (Y/N)
vSphere		Y
vSAN	Supported Storage Protocol	N
	Dynamic Volume Provisioning	N
	RWX for Live Migration	N
	Snapshot Support	N
	Clone Support	N
NSX (small set of clusters)	Microsegmentation	N
	Multi-Cloud Networking	Y
	Tunnels (IPSec, VPN)	Y
	Dynamic Routing (Distributed / Logical)	Y
	Central Network Management	N
	MPLS	N
	QoS	N
Aria Operations (vROP)	Performance Analytics (vSphere VMs)	Y
	Health Score	Y
	Alerting	Y

VMware Product	Feature	Used (Y/N)
BMC (today)	ITOM/ITSM integration (ServiceNow)	Y
	Recommendation Engine (e.g. rightsizing)	Y
	Automated Optimization	N
	True Visibility Suite	Y
Aria Automation (vRA)/vRo	Infrastructure provisioning (LCM)	Y
	Application Blueprints/workflows	Y
(Chef/Habitat)	Configuration Management	Y
	Service Catalog	Y
	Cloud Assembly	Y
Aria Log Insights		Y
HCX (Hybrid Cloud Extensions)		N
DSM (Data Services Manager)		N
DRS (Distributed Resource Scheduler)		Y
Storage DRS	use when needed	N
VDS (vSphere Distributed Switch)		Y
VMware Site Recovery Manager		Y
VMware Tanzu Kubernetes Service		N
VMware Tanzu Application Service (TAS, PCF)		N

3rd Party ISV Portfolio

Component	Existing Vendor
Backup & Recovery	NetApp Snap, SQL Veeam, IBM spectrum protect (TSM) / Tape *Plants, Cohesity (future)
DR	SRM, MSSQL Always ON, Oracle-Mirror, IBM spectrum protect (TSM) / Tape *Plants,NetApp Snap, SQL Veeam, ZDLRA
Monitoring	Dynatrace, WhatsUp Gold, vRealize, ACM Observability, Coming NetApp Insights,j
Logging	Splunk, Google Bucket, VM Insights, QRadar,
Metrics Collection & Alerts	Alertmanager, Webex Teams workplace, BMC, vRealize, AI-Ops , Turbonomic
Secrets Management	HashiCorp Vault
Certificate Management	GlobalSign
Security in VM/Container	AV - ACS (Container Scanning),Cisco Traffic Watch and ACLs,vTPM, data encrypted at rest (SAN/NAS), compliance operator
Day 1 Operations	Habitat,chef,custom scripts
Automation and Configuration Management	Habitat,chef,custom scripts

FSICorp Assumptions & Inputs to Model

Additional scoping (e.g. VMA) can be done to get a more accurate target solution proposal

Assumptions:

- 10% of VMs will be consolidated, retired, or moved to another platform (e.g. public cloud).
- Hybrid modernization scenario with 20% of current VM estate will be app modernized/containerized.
- Server hardware will be upgraded to two-socket 128 total cores
- Assuming VMware Cloud Foundation subscription is being used for VMware environment.
- Assuming FSICorp OpenShift cost is covered under current ESA, and Red Hat software costs only include ACM, AAP, and RHEL is needed.
- Existing environment used as baseline; does not account for future increases due to growth.

Environment Inputs provided by FSICorp

Number of ESXi hosts	2,900
Average sockets per server	2
Average cores per socket	32
Total number of cores	185,600
Total number of CPU sockets	5,800
Total VMs in Environment	35,800

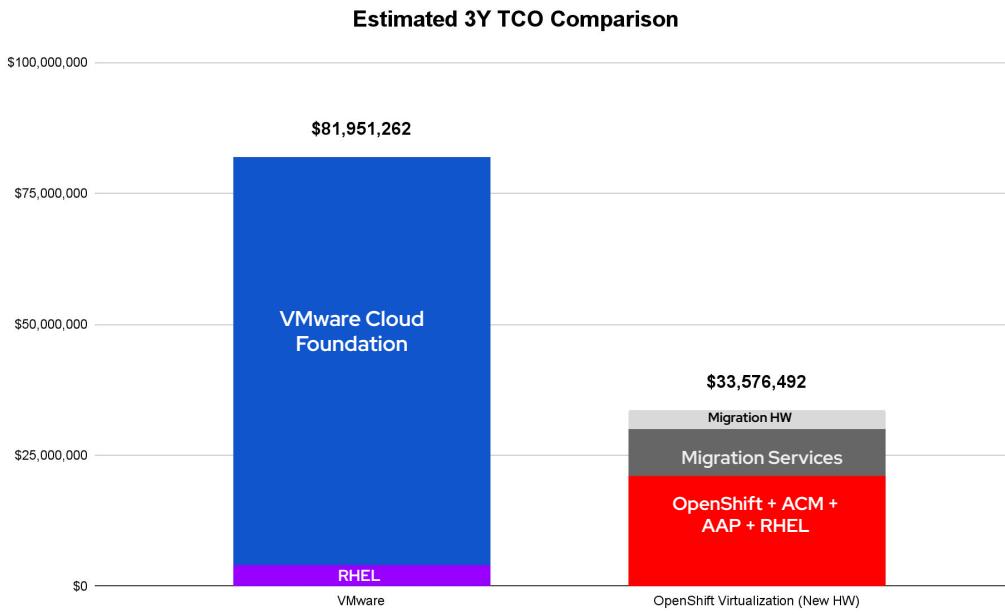
Extrapolated Inputs

Average cores per VM	5.18
Applications running in environment	4,475
VM Density	12

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:

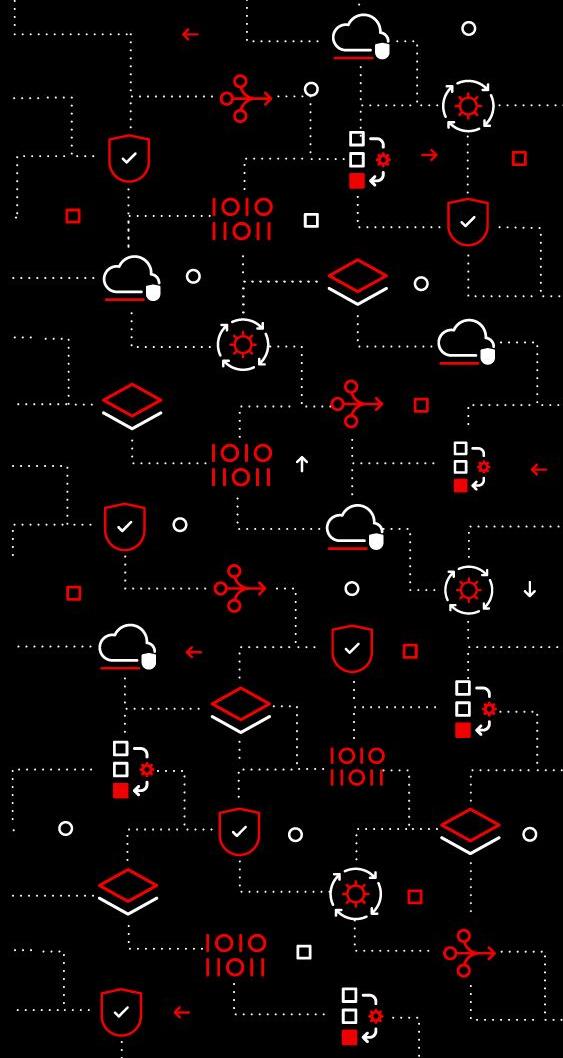
- Less unplanned downtime, **protecting revenue and reputation**
- Faster application development, **accelerating time-to-market**
- Increased IT productivity, **boosting cost efficiency**

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%

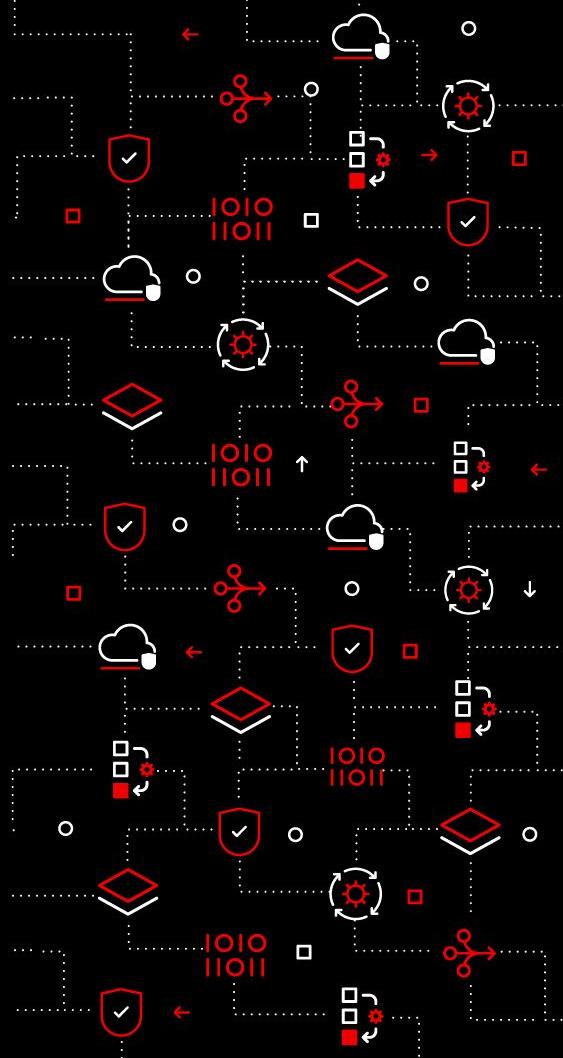
Additional Benefits of App Modernization to FSI Corp

5-yr VMware Migration Benefits Analysis

	Scenario 1 - "Lift and Shift"	Scenario 2 - "Hybrid Modernize"
Approach	1:1 migration of VMs from VMware to Openshift Virtualization	1:1 migration from VMware plus 20% identified for modernization in-flight
Estimated Benefits	\$53.1M cost savings over Initial 3 years (65% reduction)	Overall 5-yr project ROI of 178%
Annual Software Cost Reduction	-79% (\$26m down to \$6m)	-63% (\$26m down to \$16m)
Benefits to Approach	<ul style="list-style-type: none">• Faster migration time• lowest risk profile• lower investment	<ul style="list-style-type: none">• Decreased time to market,• improved operational efficiency• Improved dev efficiency
Key Trade-offs	Limited to software cost reduction	Longer migration and investment cost



BREAK
till 10:30



Hands-On Lab

Installing

RV-TOOLS

Analysis Tool for VMWare Inventories

This tool analyzes VMware inventory reports generated by [RVTools](#) and produces comprehensive reports and visualizations to assess the virtual machine (VM) inventory and the complexity of migration to the Red Hat [OpenShift Virtualization](#) platform.

Overview

- Parses and processes RVTools exports to extract key VM details.
- Generates reports and charts to assess migration feasibility and complexity.
- Uses [Jupyter Notebooks](#) for interactive analysis.
- Leverages [NumPy](#) and [Pandas](#) for data manipulation and calculations.

Supported Operating Systems

This tool has been tested on:

- Fedora 34 and later
- macOS 14 (Sonoma) and later
- Windows 10 and later

Setting Up the Environment

1. Clone the Repository

- If you have your SSH public key uploaded:

```
git clone ssh://git@gitlab.consulting.redhat.com:2222/ansengup/rvtools-virt-analysis.git
```

- If you do not have your SSH key uploaded, use HTTPS instead:

```
git clone https://gitlab.consulting.redhat.com/ansengup/rvtools-virt-analysis.git
```

(You will be prompted to enter your GitLab username and password.)

2. Navigate to the Project Directory

```
cd rvtools-virt-analysis
```

3. Set Up a Python Virtual Environment

You can create a Python 3.x virtual environment using venv or virtualenv (or any other tool of your choice).

Automated Setup

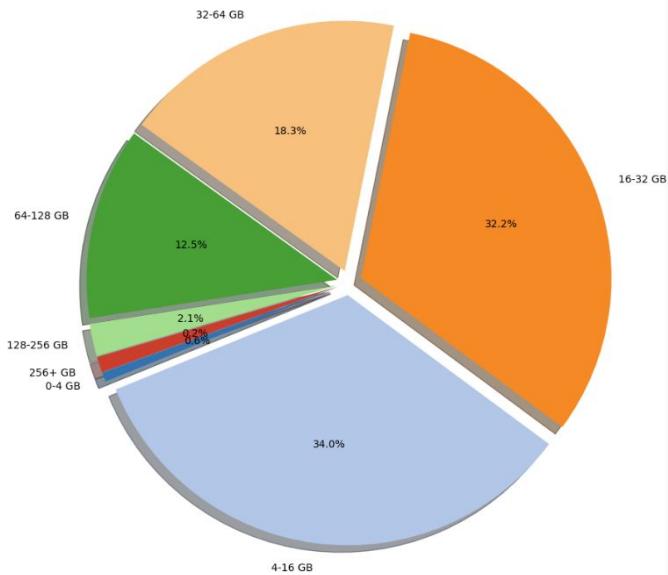
A shell script (setup.sh) for Linux/macOS and a batch file (startanalyzer.bat) for Windows are included to automate the setup and launch Jupyter Lab:

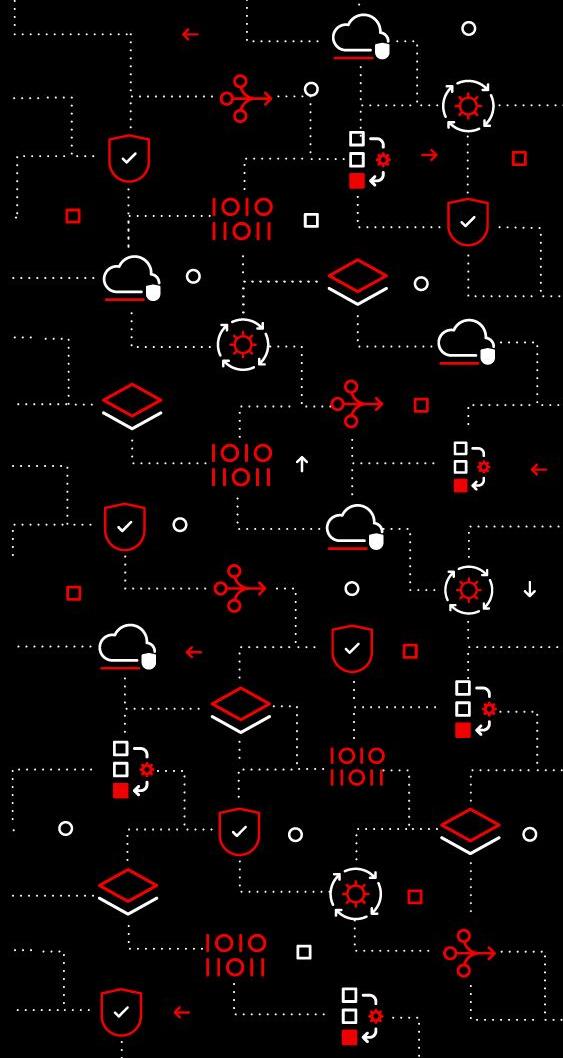
- Linux/macOS: ./setup.sh
- Windows: startanalyzer.bat

Memory Tier Summary (In-Scope OS's Only)
VM Count

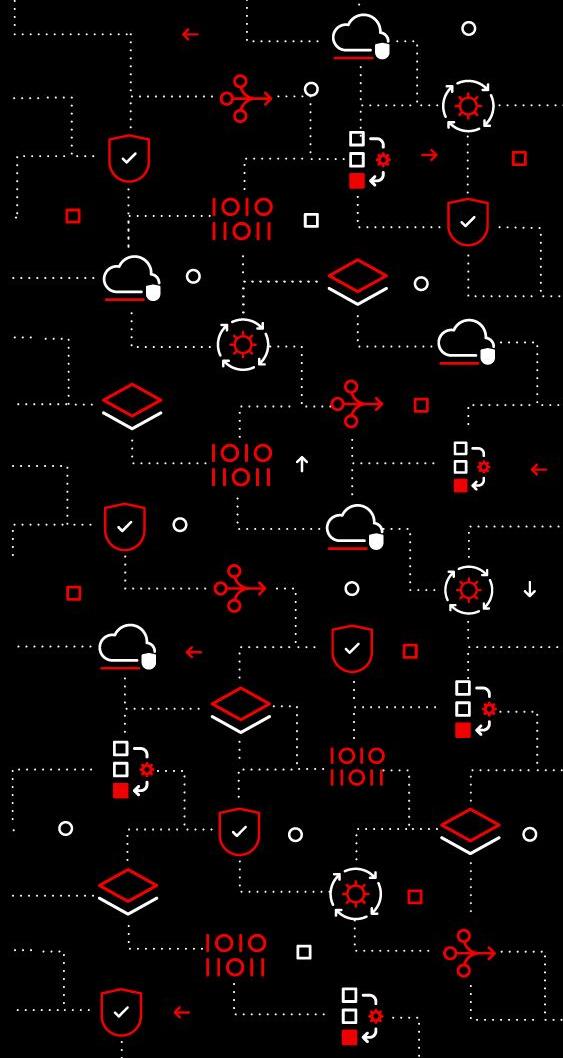
Memory Tier	VM Count
0-4 GB	35
4-16 GB	2085
16-32 GB	1978
32-64 GB	1124
64-128 GB	767
128-256 GB	130
256+ GB	15

VM Distribution % by Memory Size Tier





Lunch Break



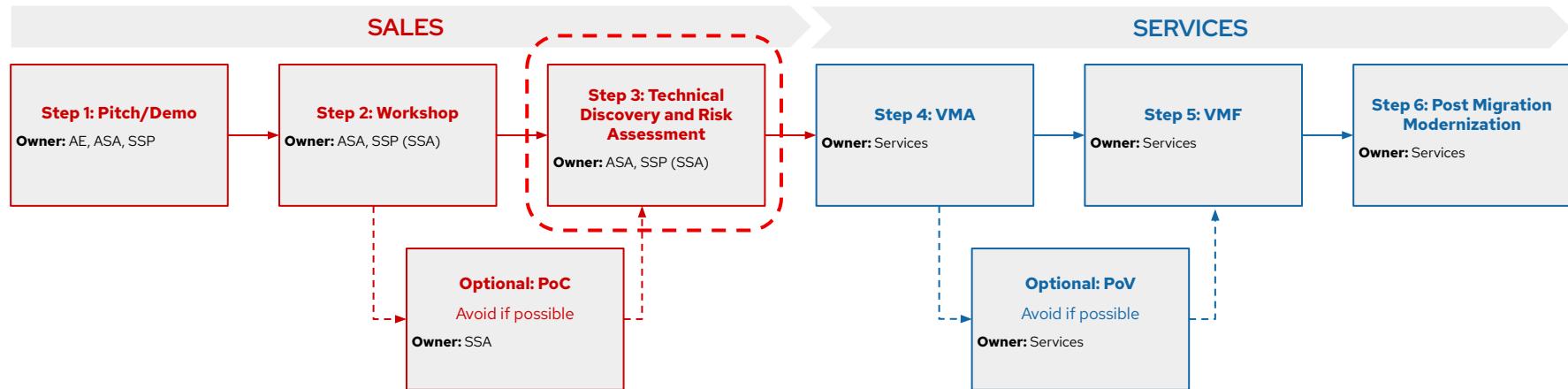
Risk Analysis and Project Planning

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

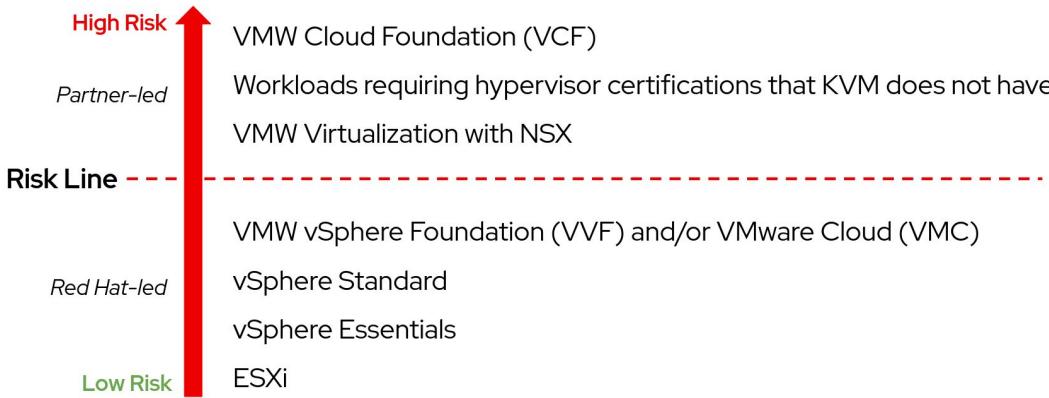


⚠ All created assets should be stored in RHSC, see guidance [here](#)



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



Information Request

Participants: AE, SSP and/or ASA

If possible, get a customer commitment to provide **the RVTools report (in Excel format)**. [Example](#)

It is known that some customers need relatively long time to internally request such information (virtualization is usually managed by an outsourcing company or a different organizational unit), so this is suggested to introduce this information need during the very first interaction (Step 1: Pitch/Demo) in the context of the overall process overview, in order to manage customer expectations.

[RVTools](#) is a free management tool for VMware present on most of VMware environments. Generates a MS-Excel report of VMware infrastructure.

- ❖ If the customer is willing to provide the full report, use the provided [binaries*](#) to compose the processed report.
- ❖ If the customer is providing just part of the report, or can't provide it for whatever reason (i.e. sensitive information), it is better to send them the [binaries*](#) so they can use them themselves on the full reports. Partial reports can't be analyzed.
- ❖ This report gives us a condensed view of the original one, easier to read and analyze.

* Source code contributed by [Mario Mendoza](#), available [here](#)



Initial Review and Prepare Questionnaire

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

Gather all possible information from previous steps, including any output from the Proof of Concept if any.

- ❖ In the case the customer has shared the RVTools output, remember to use the provided [binaries*](#) to compose the processed report. It will provide information for some sections (*Sizing* and *Operating Systems*) of the [Questionnaire](#) so the customer doesn't have to fill those out.
- ❖ In the case the customer prefers not to share any information, the sections corresponding to *Sizing* and *Operating Systems* from the [Questionnaire](#) will have to be filled out manually by the customer.

 Important! Review the [Questionnaire](#) as well as the [Guidance](#) to prepare the meeting with the customer. Remember that the Guidance is an **internal only** document

* Source code contributed by [Mario Mendoza](#), available [here](#)



Gather Information from Customer

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

Use the [Questionnaire](#) as well as the [Guidance](#) to gather all the information from the customer.

The Guidance is meant to help you find possible issues for the migration project, so it is focused on those possible issues. During your conversation with the customer, focus mainly on use cases instead of specific functionalities. Avoid to engage in a feature-by-feature comparison.

⚠️ Important: The [Guidance](#) document is **internal only!**



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

EDC and Plant /Distributed Virtualization

 **GOAL:** Focus on the use-cases identified for the EDC deployment and VMs

 OVERVIEW:	 OUTCOMES:
<ul style="list-style-type: none">• Deploy and validate Openshift virtualization environments• Migrate representative test VM workloads to the Openshift virtualization certification environments• Complete a suite of functional, performance and resilience tests to certify the environments• Initial VM Migrations (with MTV)• Platform Operationalization (observability)• Testing and Validation• Develop a process for migrations of upper environments	<ul style="list-style-type: none">• Validation of the proposed OpenShift Virtualization architectures' functionality, performance, and reliability within Ford's network and data center constraints• Successful testing of initial VM migrations and use-cases with initial workloads• Have a tested process for migrations for upper environments
DEFINITION OF SUCCESS:	Validated the agreed upon use cases for the four architectural migration models

Platform Automation

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

 **OVERVIEW:**

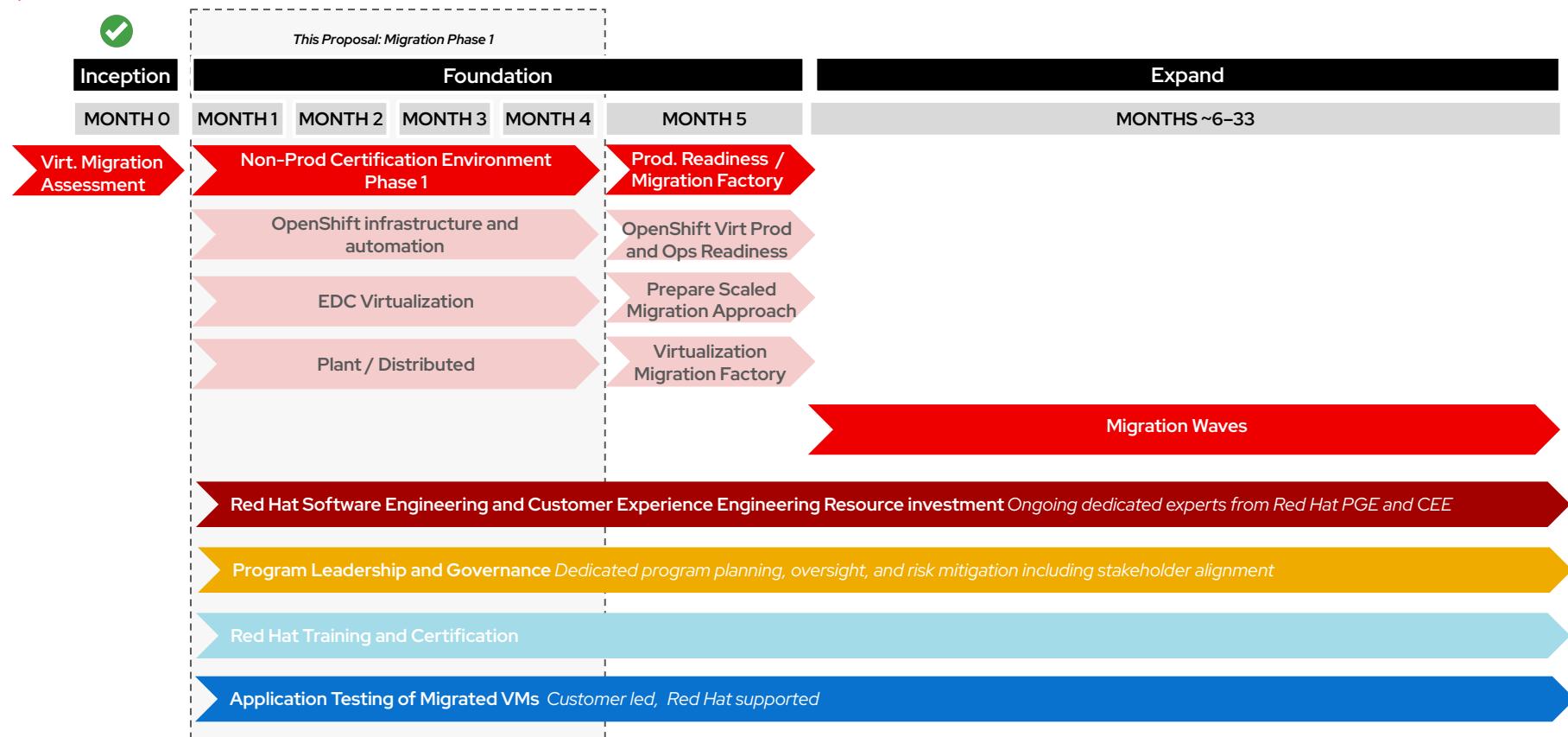
- Identify capabilities to assist with Ford's goal of establishing consistent Deployment and Day-2 operational automation practices for EDCs and plants
- Reuse existing automation and other platform artifacts (e.g., the GitOps based IaC) developed for the current OpenShift CaaS implementation
- Infrastructure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

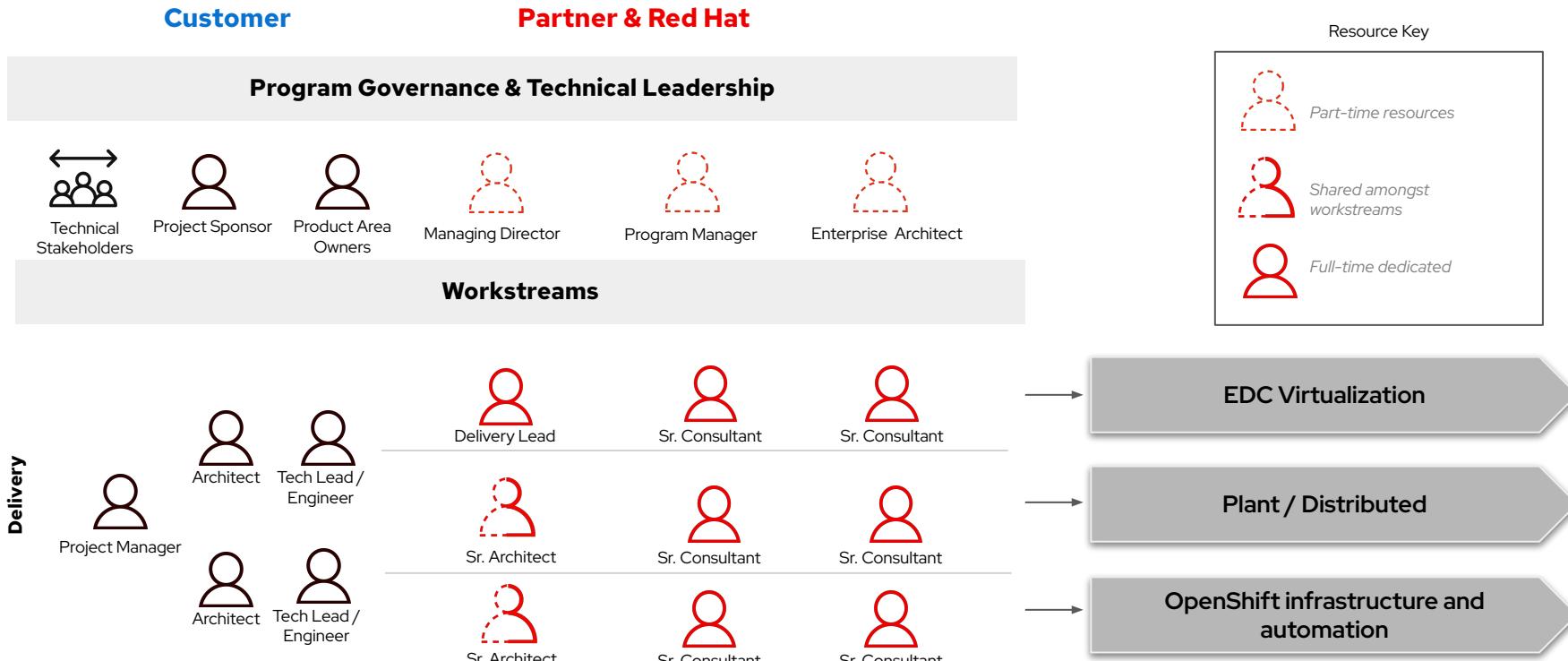
Ford Migration Program Timeline



*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:

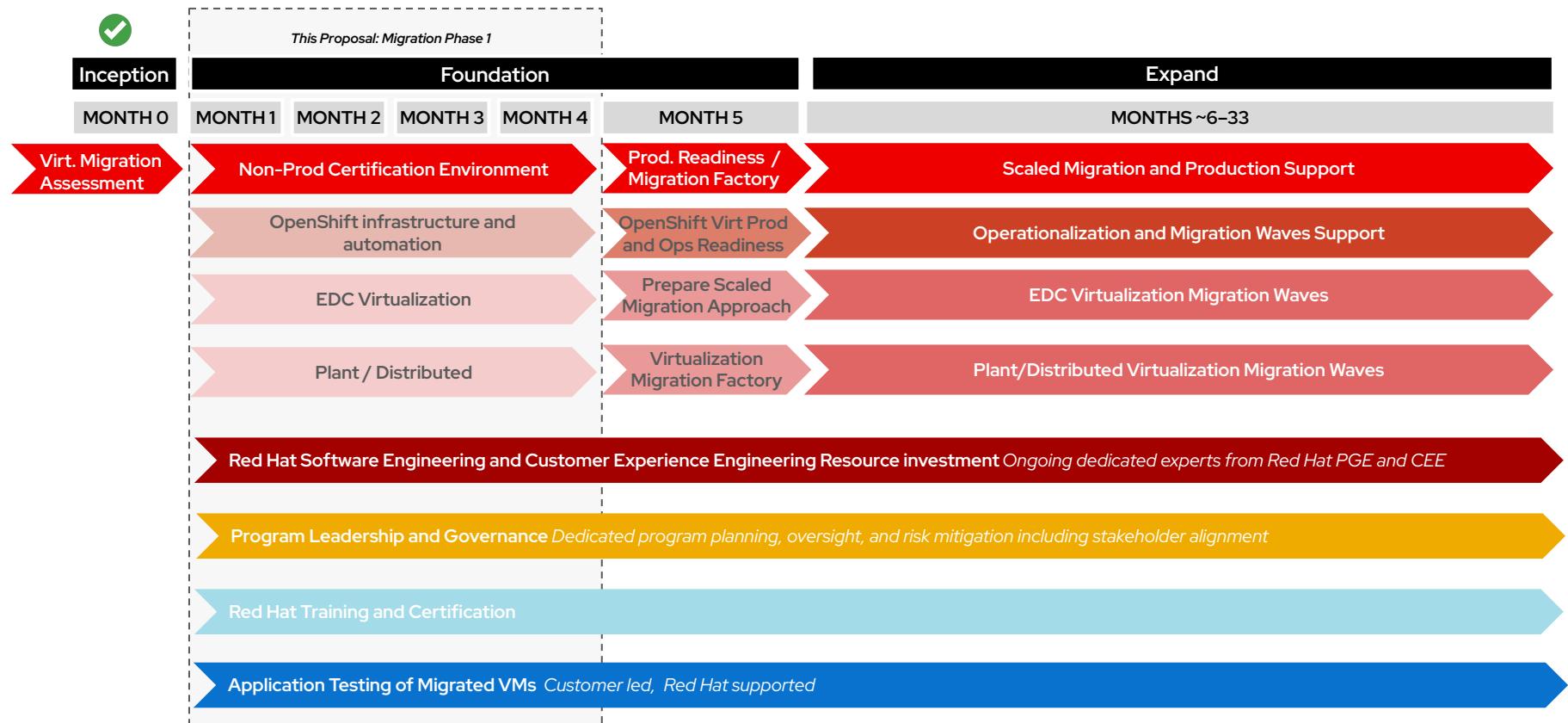
Successfully transitioning thousands of virtual machines to OpenShift Virtualization clusters while ensuring the new platform meets Ford's production system requirements. The goal is to achieve an efficient, automated, and scalable virtualization platform that integrates seamlessly with the company's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

Objectives:

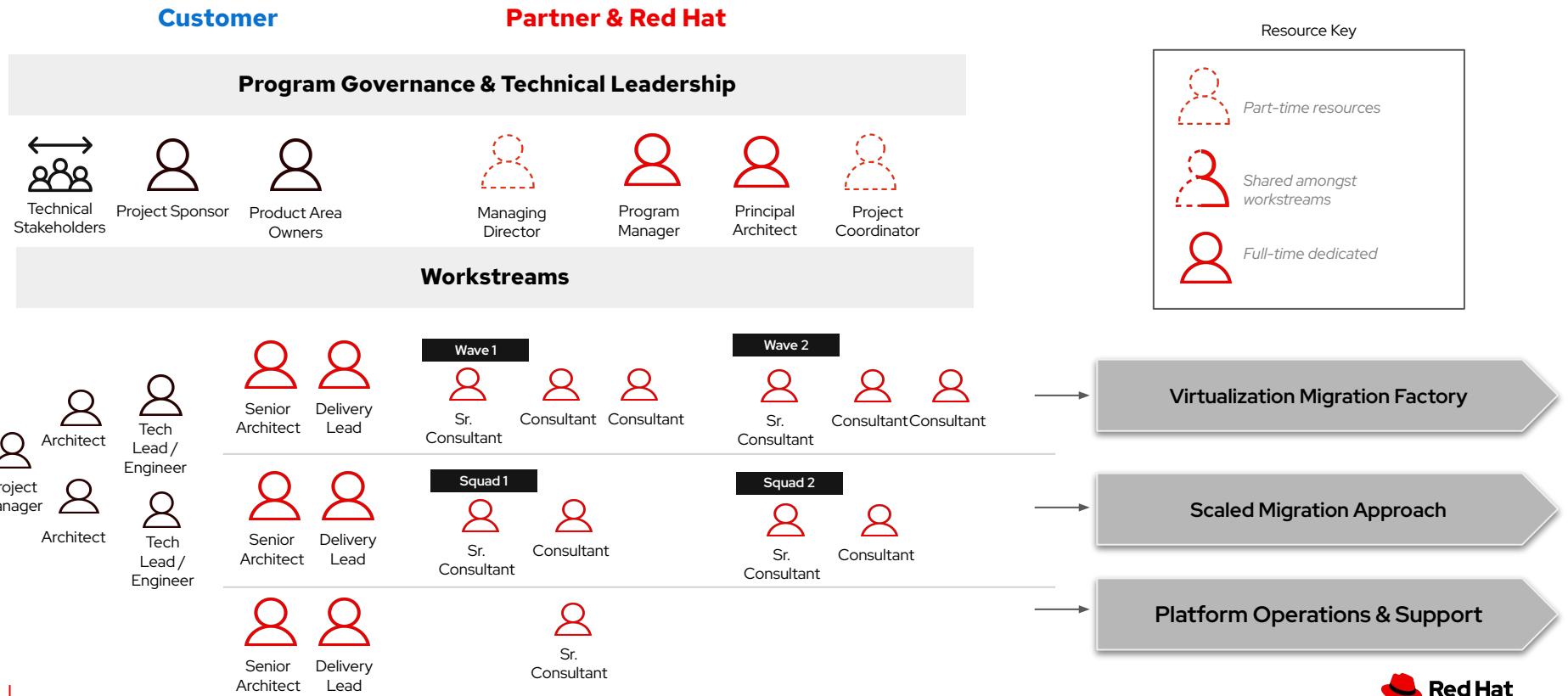
- Deploy, manage, and monitor OpenShift Virtualization clusters
- Develop automation solutions for VM migration
- Leverage existing automation and GitOps practices
- Prepare a scaled migration approach
- Ensure operational readiness

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



Proposal for the Complete Migration

Bill of Materials

Recommended Red Hat Environment

Red Hat Portfolio

Product	Quantity
OpenShift Kubernetes Engine (Bare Metal Node) (1-2 sockets) For VM Migration	1,700 Nodes
Advanced Cluster Management (1-2 sockets)	TBD
Ansible Automation Platform (100 Managed Nodes)	5,000 Nodes
OpenShift Platform Plus (Bare Metal Node) (1-2 sockets) For App Platform	TBD

Host Count per Category

Product	Quantity
# of hosts for Virtualization use case	
# of hosts for Container Management use case	
# of hosts for Application Platform use case	

3rd Party ISV Portfolio

Component	Red Hat Recommended Vendor	Recommended Subscription
Backup & Recovery	Cohesity	TBD
DR	Cohesity	TBD
Monitoring	Current Solution: WhatsUP Gold,Cisco Workload monitoring, Dynatrace Add: ACM Observability, Alertmanager for Virt clusters	As-is + TBD
Logging	Current Solution: Splunk/Google Bucket/shell script/vRealize Log Insight Future: Logging 6.0 for OTEL	As-is + TBD
Metrics Collection & Alerts	Current Solution: WhatsUP Gold,Cisco Workload monitoring, Add: ACM Observability, Alertmanager for Virt clusters	As-is + TBD
Secrets Management	Current Solution: HashiCorp Vault	As-is
Certificate Management	Current Solution: Globalsign	As-is
Security in VM/Container	Current Solution: AV - ACS (Container Scanning),Cisco Traffic Watch and ACLs, vTPM, data encrypted at rest (SAN/NAS), compliance operator	As-is
Day 1 Operations	Habitat,chef,custom scripts	Ansible Automation Platform (AAP)
Automation and Configuration Management	Habitat,chef,custom scripts	Ansible Automation Platform (AAP)

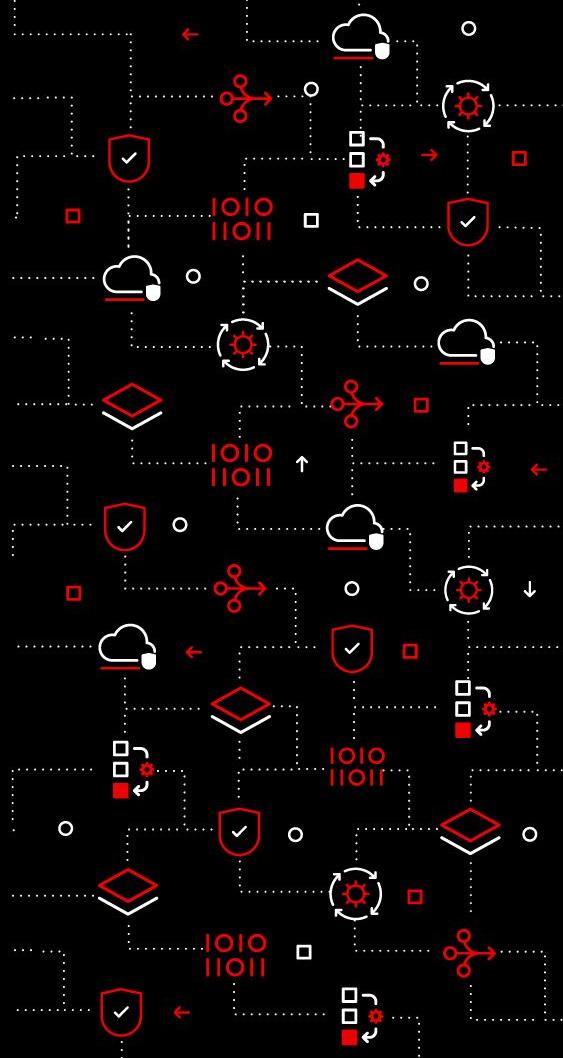
Discussion

- ▶ What did you?
- ▶ What do you plan to do differently with your customer

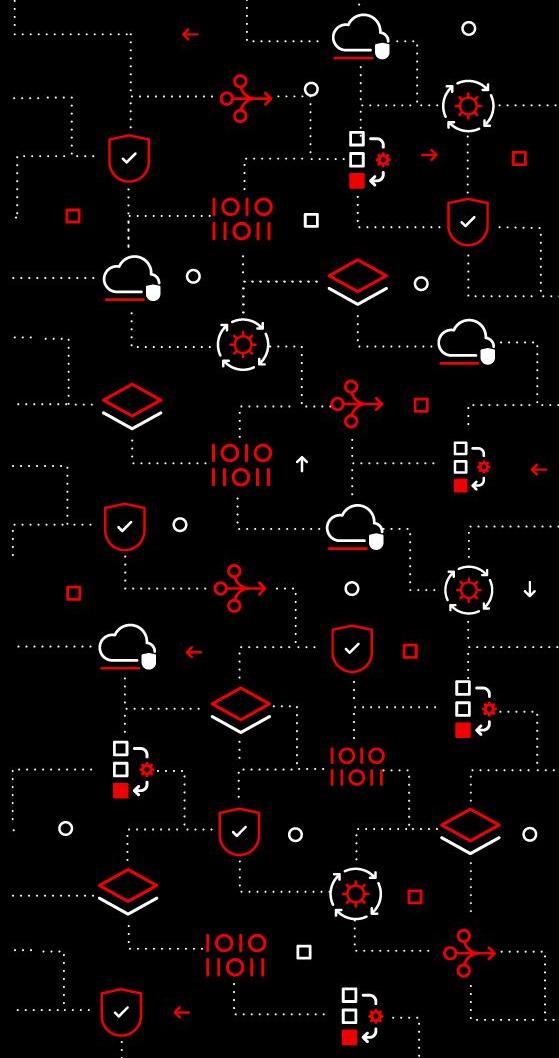
10 Minutes



Red Hat
Learning



BREAK
till 15:00



GroupWork ShowCase

Scenario 3: Government Agency

Ask	The customer wants to migrate their current virtualized environment to a new platform due to financial pressures from the current vendor.			
Current Environment Specifications	Software & Data Center Config	<ul style="list-style-type: none"> VMware Cloud Foundation 4 Physical data centers 3 main DCs <ul style="list-style-type: none"> Westeros Pentos Dorne 1 Disaster Recovery DC <ul style="list-style-type: none"> Winterfell 	Workloads	<ul style="list-style-type: none"> ~25K workloads Mix of Operating Systems <ul style="list-style-type: none"> 50% windows <ul style="list-style-type: none"> Windows Server 2K - a few... Windows Vista - 2% Windows XP - 3% Windows Server 2003 - 10 % Windows 2016 - 45 % Windows Server 2019 - 20 % Windows Server 2022 - 20 % 45% Linux <ul style="list-style-type: none"> RHEL 7 - 35 % Ubuntu Server - 15 % RHEL 8 - 30 % RHEL 9 - 10% SLES - 5% Other Linux - 5% 5% Other <ul style="list-style-type: none"> Solaris various (30%) Other Unix (80%)
	Hardware	<ul style="list-style-type: none"> Total of 820 hypervisors Mix of Cisco Servers and HPE 		
	Connectivity	<ul style="list-style-type: none"> Mix: Cisco Nexus / Dell PowerSwitch CLOS leaf-spine topology Servers: <ul style="list-style-type: none"> 2x 10gbps NIC <ul style="list-style-type: none"> management 4x 25 gbps NIC <ul style="list-style-type: none"> data 		
	Storage	<ul style="list-style-type: none"> Multiple NetApp NAS Multiple IBM SAN (iscsi) 		
Other Considerations	<ul style="list-style-type: none"> Other things to consider: <ul style="list-style-type: none"> NSX is in use No hardware to be procured The customer wants OpenShift for virtualization and container workloads. Wants proposal for container workload virtualized and in bare metal. Microsegmentation is a must as part of the proposal High Availability is a must for all components of the design (no SPOF) Some specific workloads: <ul style="list-style-type: none"> SAP Datagrid MongoDB workloads NodeJS 			

Executive Summary

Red Hat has successfully completed the assessment of Department ETX's VMware environment and has built a proposal to migrate approximately 20,750 of Department ETX's 25,000 VMs running on VMware using a scaled migration factory over a period of three years. This deck highlights the key findings, recommendations, and migration approach.

Phase	Deliverables / Outcomes	Duration	Estimated Pricing
Foundation	OpenShift Virtualization and Migration Factory Build and Operationalization	6 Months	\$632,00
Accelerated Migration	Successful Migration of the existing 25k VMware Virtual Machines	40 Months	\$1,856,000
Containerization and Testing Squads	Teams focused on containerizing, testing and skills transfer to product teams <small>*Best effort, replatform viable applications</small>	12 Months	-
Red Hat Subscriptions after migration	Subscription growth for: OpenShift Platform Plus	3 year projection	\$304,876

Objective and Executive Summary

Department ETX Objectives

1. Profile Workloads for Migration and Analyze for Migration Complexity
2. Design the Target Virtualization Environment
3. Build a Scaled Migration Approach and Timeline

Red Hat Response

1. The workload assessment has shown an 32%/42%/11% breakdown of easy/medium/hard migrations, and red flags for the migration have been identified. Detailed recommendations for specific workload types are included in the report.
2. Red Hat has completed an in-depth review of Department ETX's existing environment and designed the target landing zone, including the supporting hardware, storage systems, and networking, based on the smoothest and fastest migration path.
3. Red Hat has successfully mapped out the migration journey and timeline of Department ETX's 20,750 Virtual Machines from VMware to OpenShift Virtualization, Containers or to retiring. With our automated migration factory and teamed migration squad approach, we estimate the optimal journey duration at **40 months**, assuming no resource or process constraints.



Target Architecture and Infrastructure Considerations

- ▶ Department ETX's existing physical server, networking, and storage architecture is an acceptable landing zone for OpenShift Virtualization. This has been used as the starting point for the infrastructure design, but with some things to consider.
- ▶ Red flags have been identified with the existing infrastructure, and our partners will assist in reviewing and providing guidances on the migration of their components, for example: network microsegmentation and SAP workloads.
- ▶ No new hardware will be procured as part of this effort. We will do a rolling migration on existing infrastructure. With a mixture of hosts with different generations of CPU architecture, we are recommending host isolation to reduce possible interoperability issues and to maximize VM performance.
- ▶ The topology will be laid out so there are multiple failure domains across the racks and multiple OpenShift clusters to ensure hardware segmentation
- ▶ This design also allows for Department ETX to support their current "no SPOF" for workloads. In the future, the data center can be easily converted to a three failure domain model for workloads through scaling operations rather than redeployment of clusters.
- ▶ Ecosystem management will be achieved through RHACM, providing automation and visibility into the entire environment

Network Infrastructure Considerations

- ▶ **Current Situation:** The Department ETX currently leverages NSX for microsegmentation across their Virtual Machines (VMs).
- ▶ **Important Consideration:** Granular microsegmentation for VMs is not available out of the box with OpenShift Virt.
- ▶ **Opportunity for Improvement:** To further strengthen the security posture and match the current capabilities, we recommend partnering with Tigera for an advanced microsegmentation solution.
- ▶ **Key Benefits of Partnering with Tigera**
 - Leverages Tigera's proven track record in complex microsegmentation deployments.
 - Applies zero-trust workload security for a strong security posture.
 - Provides auditing and visualization of real-time workload communication and security violations.
 - Can be used in conjunction with OpenShift Service Mesh.

Modernization Considerations

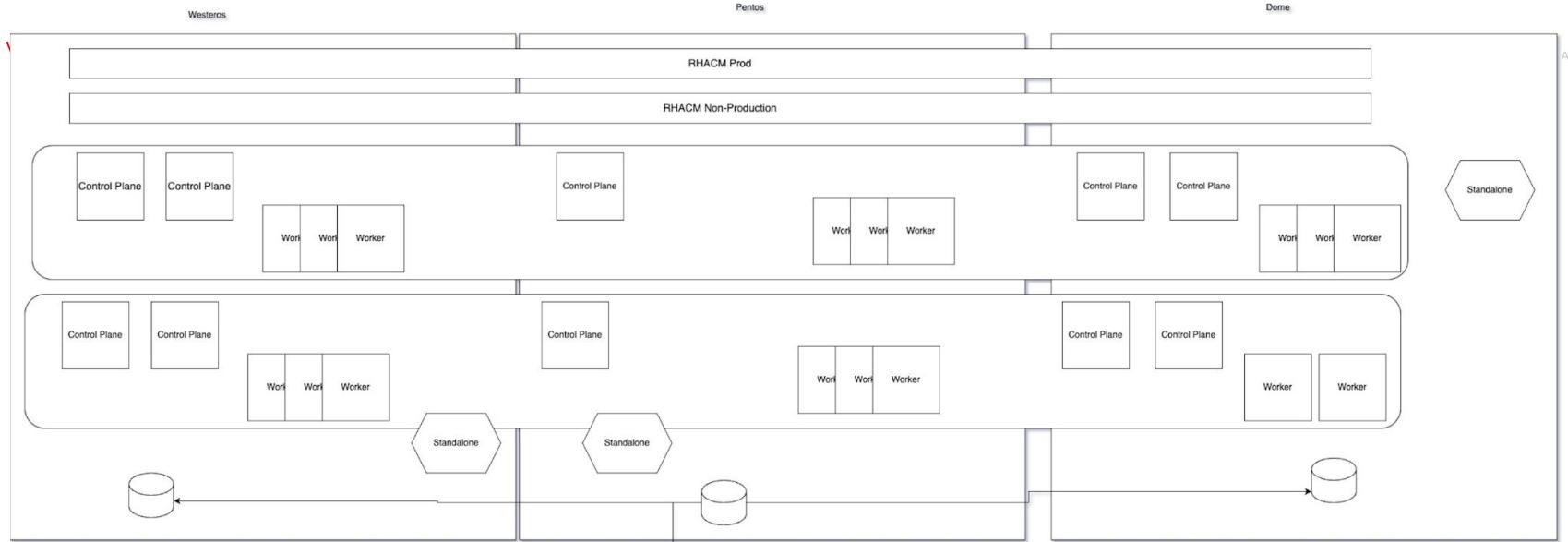
Looking Ahead: Modernization through Native Containerization: We identified VMs running Datagrid, MongoDB, and NodeJS as prime candidates for future modernization. By containerizing these workloads directly within OpenShift, we can unlock significant benefits.

Advantages of a Unified OpenShift Environment: Consolidating both your VMs and containers on OpenShift offers a streamlined and efficient operational model, providing:

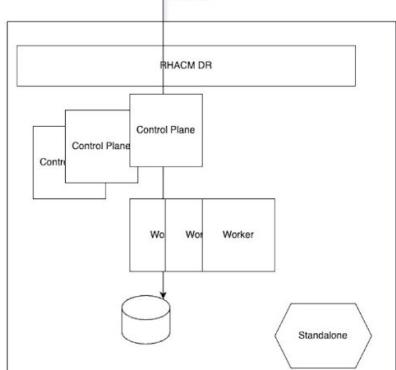
- **Reduce cost and optimized resource utilization and allocation.**
- **A consistent management experience across all your workloads.**
- **Simplified scaling and high availability configurations.**
- **Centralized governance and security policies.**

Other Considerations: Currently, SAP HANA is not certified to run on VMs running on OpenShift Virtualization. Further investigation to Department ETX's use case will be needed; however, our immediate recommendation is to deploy a dedicated RHEL cluster to run these workloads.

Key Takeaway: Our migration strategy ensures a smooth transition of your existing VMs and Kubernetes containers to OpenShift. We also highlight the future potential to further optimize specific VM workloads through native OpenShift containerization.



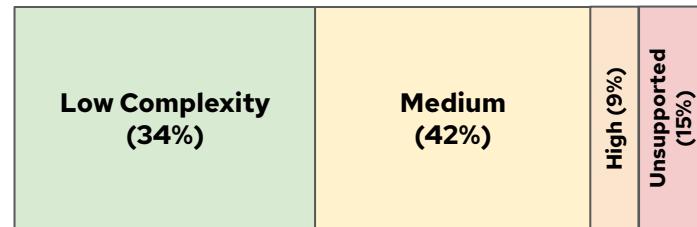
High Level Design



VM Workload Breakdown and Planning

Complexity Analysis

- ▶ The workload analysis shows easy/medium/hard distribution of workloads
 - 34% of VMs are sized as easy to migrate
 - 42% of VMs are medium complexity migration concern, e.g. large size
 - 9% of Linux VMs are running non-RHEL distros, and will need to be further evaluated during the Production Build
 - 15% of VMs are not supported on OpenShift Virtualization, due to operating system EOL or have not been certified by their respective vendor
 - During the Production Build, we will design patterns for the applications and COTS migrations and determine what can be containerized



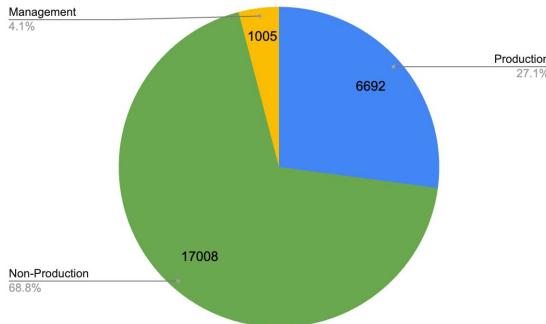
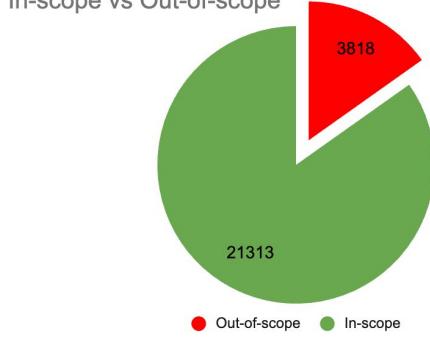
Factor	Easy	Medium	Hard	Not Supported
Storage Size	8,438	10,622	1,691	
Workload Type	11500	8000	2780	200
Operating System	8,438	10,625	5,943	3,693

*Assumed average workload size ~ 2000 Gb

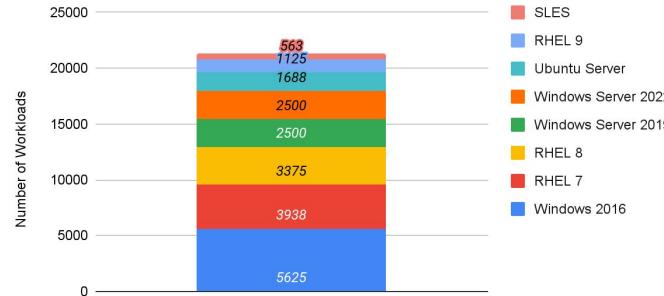
VM Workload Analysis

Complexity Analysis

In-scope vs Out-of-scope



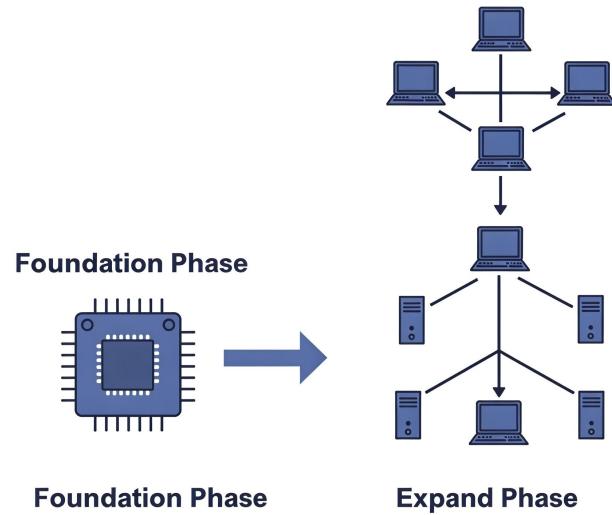
In Scope Workloads by OS



Out of Scope Workloads by OS



Phased Approach



Foundation Phase

- ▶ This initial phase will identify a representative subset of non-production VMs to develop migration plans applicable to most of Department ETX's VMs during the Expand Phase.
- ▶ Deploy initial set of ACM and ACS Clusters and create automation.
- ▶ Given the initial hardware limitations, the Foundation Phase will focus on establishing a rapid migration pathway to available infrastructure and developing a testing plan to build confidence in our deployment.
- ▶ We will also create a plan to decommission existing infrastructure post-migration to free up resources for future migrations.
- ▶ Red Hat would assist in the creation of the Migration Plans while upskilling our teammates at EXT.

Expand Phase

- ▶ Expand and accelerate VM migrations.
- ▶ Leverage Openshift Virtualization Platform
- ▶ Utilize automated migration solutions developed in foundation.
- ▶ Red Hat remains engaged for immediate issue support.
- ▶ Bulk migrations begin after initial beta sites success.



Migration Estimate Assumptions

- ▶ All security approvals to operate the platform will have been obtained during the Proof of Value implementation or early in the production build.
- ▶ First wave of workloads will consist of a cross-section of easy and medium instances. Working closely with the third party vendors to review the Hard instances.
- ▶ Change management will be integrated with the migration process through a “standard change” or similar process that will allow migration of virtual machines during at least four hours of every day.
- ▶ The supported migration back-out procedure consisting of powering the source VM back on and deleting the migrated VM (losing any changed disk state) is acceptable for at least 60% of VM workloads.
- ▶ Recommissioning of ESXi hosts to OpenShift will happen in-place, be automated through Ansible, and can happen through a standard change at any time.
- ▶ Windows Machines don't have windows disk encryption and don't use windows shared disk feature.
- ▶ VMs are spread equally across all ESXi hosts.
- ▶ A dedicated service account per vCenter will be available.
- ▶ NSX is only used for a subset of the VMs.

Department ETX VM Migration Velocity Projection

1. Department ETX's global infrastructure consists of more than 25,000 virtual machines (VMs) distributed across 3 data centers.
2. These VMs can be categorized into three main types:
 - Production: 6992 VMs
 - Non-production: 17008 VMs
 - Management: 1005 VMs
3. Approximately 2000 VMs are under the responsibility of the IT operations team while the remaining VMs are owned by various product teams within the Department ETX organization.

Date	VMs Migrated (V2V)	VMs Retired (V2C, V2P, Decomm)	vSphere VMs Remaining
PILOT PHASE BEGINS			
06/01/25	0	0	20600
12/01/25	100	20	20500
PILOT PHASE ENDS / MIGRATION FACTORY BEGINS			
12/01/25	100	20	20500
11/01/26	4000	300	15,500
10/01/27	10000	500	5,500
10/01/28	20700	1000	0
MIGRATION FACTORY ENDS / ONGOING SUPPORT BEGINS			
10/01/28	~20700	~1000	0

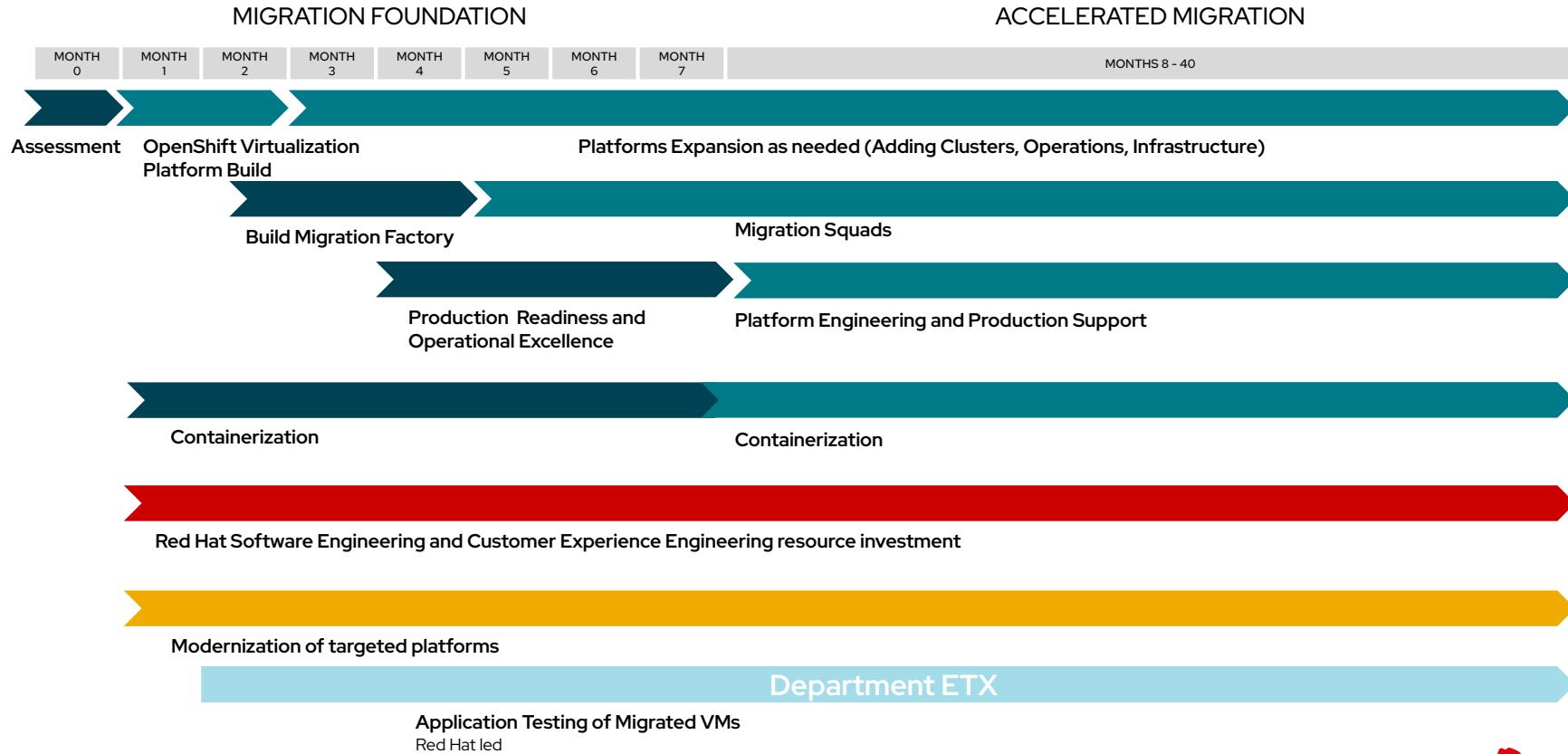
* Velocity is based on optimal rate, without resource or process constraints.

** Assumes production workloads can be migrated on weekdays

*** Assumes migration windows of 8 hours per day, 5 days per week

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

Department ETX Migration Timeline with Containerization



Next Steps: Proof of Value (PoV)

Virtualization Migration PoV

Prove the value of the OpenShift Virtualization as a landing zone for VMware Migrations

Objectives

- Prepare infrastructure and evaluate workloads for replatforming
- Develop procedures for basic platform operations
- Test manual VM migration with real workloads

Approach

- Red Hat works with Department ETX to implement the PoV infrastructure designed during the assessment workshops
- Red Hat builds out a lab, non-prod environment (PoV)
- Red Hat and Department ETX migrate an application to PoV
- PoV persists into the production build

Next Steps: Production and Migration Factory

OpenShift Virtualization Migration Factory

Deploy production infrastructure and
migrate at scale

Objectives

- Prepare infrastructure, evaluate workloads, test migration
- Achieve production readiness
- Build automated platform provisioning process
- Build Migration Factory and complete first migration wave

Approach

- Red Hat builds production platform and processes for automated, repeatable, and scalable provisioning
- Red Hat deploys and configures OpenShift Virtualization in preparation for Migration Factory
- A Red Hat delivery team directs multiple squads to support VM owners through the migration
- Red Hat deploys Advanced Cluster Management (ACM) for cluster fleet management

Scaling Examples

NVIDIA

Running VMs on KubeVirt
~40 datacenters
28M Users
100s of nodes per cluster
1000s of VMs and pods per cluster
source: [NVIDIA OpenShift Commons preso](#)

Large FSI

Globally distributed datacenters
1,000+ OpenShift Clusters
200+ nodes per cluster

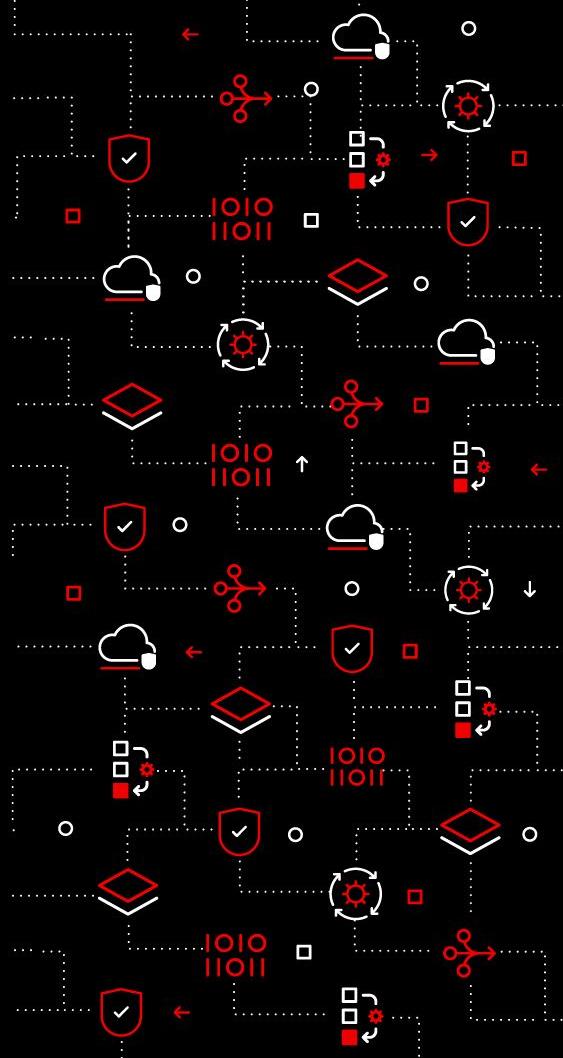
Goldman Sachs

Running VMs on KubeVirt
Sources:

- [Goldman Sachs discusses virtues of Kubernetes for virtual machine management](#)
- [Virtualization meets Kubernetes](#)

Large Energy Provider

2500 clusters
15 VMs per VM Hypervisor
80% Windows Servers



Group Work
Till tomorrow
10:30

Split into 4 Groups

- BANK - Finance
- TELCO
- Automotive
- Healthcare

Scenario 1: Financial Services (Large European Bank)

Ask	The customer wants to migrate their current virtualized environment to a new platform due to financial pressures from the current vendor.			
Current Environment Specifications	Software & Data Center Config	<ul style="list-style-type: none"> VMware vSphere Foundation (from versions 6.5 to 8.0) 2 physical data centers <ul style="list-style-type: none"> Main production data center (Naboo) DR / Dev data center (Coruscant) 1 main vSphere vCenter 	Workloads	<ul style="list-style-type: none"> 18k workloads Mix of Operating Systems <ul style="list-style-type: none"> 70% windows <ul style="list-style-type: none"> Windows Server 2003 - 10 % Windows 2016 - 50 % Windows Server 2019 - 30 % Windows Server 2022 - 10 % 25% Linux <ul style="list-style-type: none"> RHEL 7 - 45% Ubuntu Server - 25 % RHEL 8 - 30% 5% Other <ul style="list-style-type: none"> Solaris various (80%) OpenServer (20%)
	Hardware	<ul style="list-style-type: none"> Total of 254 hypervisors <ul style="list-style-type: none"> 55% of hypervisors in Naboo 45% of hypervisors in Coruscant Dell Technologies is the preferred server vendor 		
	Connectivity	<ul style="list-style-type: none"> Cisco is the preferred network vendor <ul style="list-style-type: none"> Cisco Nexus are in use CLOS Leaf-Spine topology deployed Server Network Interface Controllers: 4x 10 gbps <ul style="list-style-type: none"> 2x management/oob network 2x data plane network 1x FC HBA connected to MDS Switches 		
	Storage	<ul style="list-style-type: none"> Dell Technologies is the preferred Storage vendor Storage in use: <ul style="list-style-type: none"> Dell PowerMax (tier 1) - 400TB Dell PowerFlex (tier 2) - 800TB Local Storage [raid 5 sas] (tier 3) - 900TB 		
Other Considerations	<ul style="list-style-type: none"> Other things to consider: <ul style="list-style-type: none"> No NSX in use There is no new hardware for migrating virtual machines; re-use is necessary! The customer wants OpenShift Virtualization exclusively on bare metal, with no container workloads. Security compliance needs to be taken into account for the design. Some apps in scope: <ul style="list-style-type: none"> Oracle RAC Red Hat OpenShift AI ActiveDirectory Server 			



Scenario 2: Tier 1 Telco

Ask	The customer wants to migrate 1440 hypervisors to a new platform due to financial pressures from the current vendor and to have an opportunity to modernize.			
Current Environment Specifications	Software & Data Center Config	<ul style="list-style-type: none"> VMware vSphere Foundation 12 physical data centers (3 per network zones) 4 vSphere vCenter Divided into network zones: <ul style="list-style-type: none"> Hogwarts Mahoutokoro Castelobruxo Ilvermorny 	Workloads	<ul style="list-style-type: none"> ~40K workloads Mix of Operating Systems <ul style="list-style-type: none"> 70% windows <ul style="list-style-type: none"> Windows Vista - 2% Windows XP - 3% Windows Server 2003 - 10 % Windows 2016 - 45 % Windows Server 2019 - 20 % Windows Server 2022 - 20 % 25% Linux <ul style="list-style-type: none"> RHEL 7 - 35% Ubuntu Server - 25 % RHEL 8 - 30 % RHEL 9 - 10% 5% Other <ul style="list-style-type: none"> Solaris various (30%) Other Unix (80%)
	Hardware	<ul style="list-style-type: none"> Total of 1440 hypervisors <ul style="list-style-type: none"> Equally distributed between all data centers Various hardware technologies being used 		
	Connectivity	<ul style="list-style-type: none"> Juniper Fabric <ul style="list-style-type: none"> CLOS Leaf-Spine topology deployed Servers: <ul style="list-style-type: none"> 2x 1gbps NIC <ul style="list-style-type: none"> management/oob network 2x 10 gbps NIC <ul style="list-style-type: none"> 1 - data 1 FC HBA to Brocade Switch 		
	Storage	<ul style="list-style-type: none"> Various types of storage, including: <ul style="list-style-type: none"> EMC Symmetric Oracle FS1 Dell EqualLogic Pure FlashArrayX VMware VSAN 		
Other Considerations	<ul style="list-style-type: none"> Other things to consider: <ul style="list-style-type: none"> No NSX in use New hardware can be procured with a refresh cycle; reusing will be good The customer wants OpenShift for virtualization and container workloads The customer wants to use new container & application management technologies to manage virtual machines (gitops, etc.) 20% of the workloads are telco network workloads: <ul style="list-style-type: none"> vEPC vRAN 80% of the workloads are IT workloads, including: <ul style="list-style-type: none"> JBOSS servers , Databases (Microsoft SQL Server) , .NET 8.x applications 			



Scenario 3: Government Agency

Ask	The customer wants to migrate their current virtualized environment to a new platform due to financial pressures from the current vendor.			
Current Environment Specifications	Software & Data Center Config	<ul style="list-style-type: none"> VMware Cloud Foundation 4 Physical data centers 3 main DCs <ul style="list-style-type: none"> Westeros Pentos Dorne 1 Disaster Recovery DC <ul style="list-style-type: none"> Winterfell 	Workloads	<ul style="list-style-type: none"> ~25K workloads Mix of Operating Systems <ul style="list-style-type: none"> 50% windows <ul style="list-style-type: none"> Windows Server 2K - a few... Windows Vista - 2% Windows XP - 3% Windows Server 2003 - 10 % Windows 2016 - 45 % Windows Server 2019 - 20 % Windows Server 2022 - 20 % 45% Linux <ul style="list-style-type: none"> RHEL 7 - 35 % Ubuntu Server - 15 % RHEL 8 - 30 % RHEL 9 - 10% SLES - 5% Other Linux - 5% 5% Other <ul style="list-style-type: none"> Solaris various (30%) Other Unix (80%)
	Hardware	<ul style="list-style-type: none"> Total of 820 hypervisors Mix of Cisco Servers and HPE 		
	Connectivity	<ul style="list-style-type: none"> Mix: Cisco Nexus / Dell PowerSwitch CLOS leaf-spine topology Servers: <ul style="list-style-type: none"> 2x 10gbps NIC 4x 25 gbps NIC 		
	Storage	<ul style="list-style-type: none"> Multiple Multiple 		
Other Considerations	<ul style="list-style-type: none"> Other things to consider: <ul style="list-style-type: none"> NSX is in use No hardware to be procured The customer wants OpenShift for virtualization and container workloads. Wants proposal for container workload virtualized and in bare metal. Microsegmentation is a must as part of the proposal High Availability is a must for all components of the design (no SPOF) Some specific workloads: <ul style="list-style-type: none"> SAP Datagrid MongoDB workloads NodeJS 			

SOLD OUT

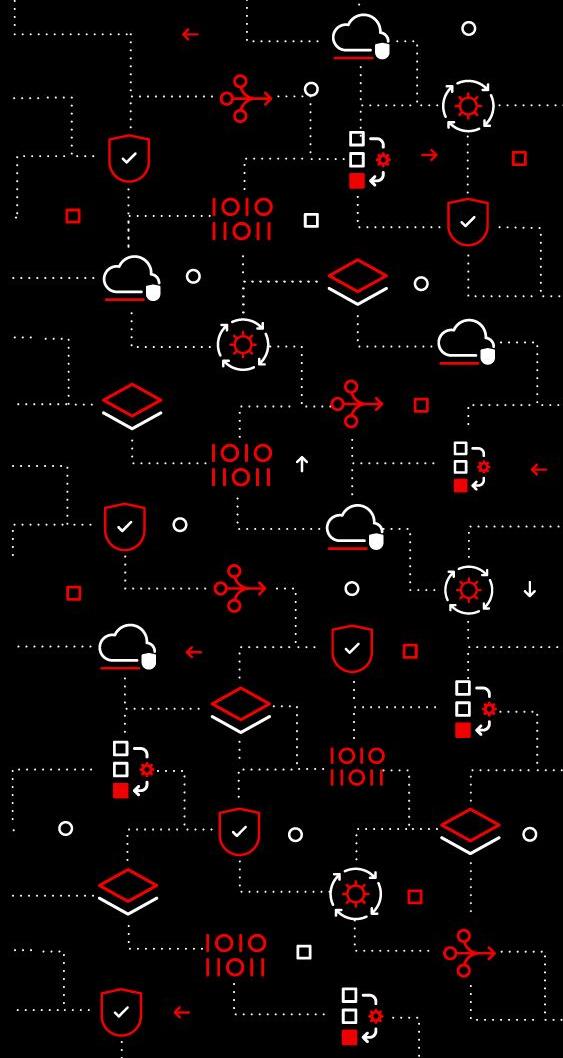
Scenario 4: Large Automotive Manufacturer

Ask	The customer wants to migrate their current virtualized environment to a new platform due to financial pressures from the current vendor.			
Current Environment Specifications	Software & Data Center Config	<ul style="list-style-type: none"> VMware Cloud Foundation 2 main DCs <ul style="list-style-type: none"> motor-city wind-city 16 in-factory Data Centers <ul style="list-style-type: none"> Running all production workloads for the factory (including the assembly line) 	Workloads	<ul style="list-style-type: none"> ~75K workloads Mix of Operating Systems <ul style="list-style-type: none"> 40% windows <ul style="list-style-type: none"> Windows Server 2K - a few... Windows Vista - 2% Windows XP - 3% Windows Server 2003 - 10 % Windows 2016 - 45 % Windows Server 2019 - 20 % Windows Server 2022 - 20 % 55% Linux <ul style="list-style-type: none"> RHEL 7 - 35 % Ubuntu Server - 15 % RHEL 8 - 30 % RHEL 9 - 10% SLES - 5% Other Linux - 5% 5% Other <ul style="list-style-type: none"> Solaris various (30%) Other Unix (80%)
	Hardware	<ul style="list-style-type: none"> Total of 1500 hypervisors Mix of Cisco Servers and HPE 		
	Connectivity	<ul style="list-style-type: none"> Mix: Cisco Nexus / Dell PowerSwitch CLOS leaf-spine topology Servers: <ul style="list-style-type: none"> 2x 10gbps NIC <ul style="list-style-type: none"> ■ management 4x 25 gbps NIC <ul style="list-style-type: none"> ■ data 		
	Storage	<ul style="list-style-type: none"> Multiple NetApp NAS Multiple Pure Storage SAN 		
Other Considerations	<ul style="list-style-type: none"> Other things to consider: <ul style="list-style-type: none"> NSX is in use No hardware to be procured The customer wants OpenShift for virtualization and container workloads. Wants proposal for container workload virtualized and in bare metal. Microsegmentation is a must as part of the proposal High Availability is a must for all components of the design (no SPOF) Some specific workloads: <ul style="list-style-type: none"> SAP Datagrid 			

Scenario 5: Healthcare Provider Company

Ask	The customer wants to migrate 4400 hypervisors to a new platform due to financial pressures from the current vendor and to have an opportunity to modernize.			
Current Environment Specifications	Software & Data Center Config	<ul style="list-style-type: none"> VMware vSphere Foundation 8 physical data centers (2 per network zones) 4 vSphere vCenter Divided into network zones: <ul style="list-style-type: none"> Malaga Madrid Barcelona Vigo 	Workloads	<ul style="list-style-type: none"> ~80K workloads Mix of Operating Systems <ul style="list-style-type: none"> 60% windows <ul style="list-style-type: none"> Windows Vista - 2% Windows XP - 3% Windows Server 2003 - 10 % Windows 2016 - 45 % Windows Server 2019 - 20 % Windows Server 2022 - 20 % 35% Linux <ul style="list-style-type: none"> RHEL 7 - 35% Ubuntu Server - 25 % RHEL 8 - 30 % RHEL 9 - 10% 5% Other <ul style="list-style-type: none"> Solaris various (30%) Other Unix (80%)
	Hardware	<ul style="list-style-type: none"> Total of 4400 hypervisors <ul style="list-style-type: none"> Equally distributed between all data centers Various hardware technologies being used 		
	Connectivity	<ul style="list-style-type: none"> Juniper Fabric CLOS Leaf-Spine topology deployed Servers: <ul style="list-style-type: none"> 2x 1gbps NIC <ul style="list-style-type: none"> management/oob network 2x 10 gbps NIC <ul style="list-style-type: none"> 1 - data 		
	Storage	<ul style="list-style-type: none"> Various types of storage, including: <ul style="list-style-type: none"> Pure FlashArrayX VMware VSAN 		
Other Considerations	<ul style="list-style-type: none"> Other things to consider: <ul style="list-style-type: none"> New hardware can be procured with a refresh cycle; reusing will be good The customer wants OpenShift for virtualization and container workloads The customer wants to use new container & application management technologies to manage virtual machines (gitops, etc.) 			





End of Day 2

Thank you

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