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DESIGN STUDY

VMware exit to OpenShift Virtualization, 600 VMs in four waves

Complete design on current platforms

CAPABILITY	INDUSTRY	SETTING
Data Center	Public Sector	City administration
DOCUMENT	**VERSION**	**DATE**
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Document control

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CONVENTIONS

Source tags. [S] figure read from the vendor's own current page on Sep 18, 2026 · [S*] figure from the vendor's page summary where the page itself could not be opened · [A] design assumption, to be confirmed by the signing engineer · [T] design target: the record's outcome figure and anything derived from it. No figure comes from any engagement, file or asset. A row with more than one tag is counted once: as a published figure if any tag is [S] or [S*], otherwise as an assumption if any tag is [A], otherwise as a design target.

Table 1. Revision history

Date	Version	Change
Sep 18, 2026	1.0	First issue.
Sep 20, 2026	1.1	Public implementations added; figures reconciled with published sources.
Sep 27, 2026	1.2	Figures and platform details rechecked against published sources.
Oct 10, 2026	1.3	Approval line now reads: approved by the Founder, issued by Symbeeo. Steve Phillips remains the author.

1 · Scope

Who it is for. The head of IT of a public administration holding a VMware renewal quote it does not want to sign, with 600 VMs spread across departments that each own their own change calendar, and no appetite for weekend cutovers.

Typical buyer [A]. A city administration, 600 VMs, 14 departments. VM mix: 70 % Linux, 30 % Windows; average 4 vCPU and 16 GB RAM; 2,400 vCPU and 9.6 TB RAM in total; 180 TB of VM disk. Two server rooms 6 km apart, one primary. Existing vSphere on hosts 6–7 years old, storage on a NetApp FAS at end of support.

What is in. The target platform (Red Hat OpenShift Virtualization Engine on Dell PowerEdge, NetApp ONTAP storage), the migration tooling, the four-wave plan and its cutover rules, the license position against the renewal quote. **What is out.** Application re-platforming to containers; the network refresh (assumed 25G to every host, [A]); backup redesign (DC-004 covers the pattern); identity.

Assumptions. Red Hat is the virtualization vendor, Dell the server vendor, NetApp the storage vendor [A]. Departments accept a weekday evening window of 18:00–22:00 for the final sync of each VM [A]. No VM larger than 4 TB of disk [A]. VMware licensing is per-core under the current renewal quote [A].

Related documents, read Sep 18, 2026.

- Red Hat OpenShift Virtualization Engine — `https://www.redhat.com/en/technologies/cloud-computing/openshift/virtualization-engine`
- Red Hat, migrate VMware to OpenShift Virtualization — `https://www.redhat.com/en/technologies/cloud-computing/openshift/migrate-vmware-to-openshift-virtualization`
- Red Hat Migration Toolkit for Virtualization 2.9, installing and using — `https://docs.redhat.com/en/documentation/migration_toolkit_for_virtualization/2.9/html-single/installing_and_using_the_migration_toolkit_for_virtualization/index`
- Dell PowerEdge R7725 technical guide — `https://www.delltechnologies.com/asset/en-us/products/servers/technical-support/poweredge-r7725-technical-guide.pdf`
- NetApp AFF A50 key specifications — `https://docs.netapp.com/us-en/ontap-systems/a20-30-50/a50-key-specifications.html`

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- NetApp, migrate a VM from VMware to a Red Hat OpenShift cluster with MTV (read Sep 20, 2026) — `https://docs.netapp.com/us-en/netapp-solutions-virtualization/openshift/osv-workflow-vm-migration-mtv.html`
- NetApp, best practices to deploy VMs in Red Hat OpenShift Virtualization (read Sep 20, 2026) — `https://docs.netapp.com/us-en/netapp-solutions-virtualization/openshift/os-osv-bpg.html`
- Red Hat, virtualization success story snapshots (read Sep 20, 2026) — `https://www.redhat.com/en/blog/success-story-snapshots-whos-building-openshift-virtualization`

1c · Public implementations this design follows

Deployment rows are real public deployments, each dated. Where no public deployment matches, the row is Vendor documentation: the vendor's document that this design, Symbeeo's own, is built on.

Table 2. Public implementations this design follows

Implementation	Who published it · date	What it settles for this design	URL
Vendor documentation. MTV migration of a vSphere VM onto ONTAP-backed OpenShift Virtualization: OpenShift 4.17 or later, Trident 25.02 with node-prep for multipath, `ontap-san` storage class, cold and warm paths both shown	NetApp Solutions · updated Jul 17, 2026	The tool chain in R4–R7 and the CSI name in §3	`https://docs.netapp.com/us-en/netapp-solutions-virtualization/openshift/osv-workflow-vm-migration-mtv.html`
Vendor documentation. ONTAP best practices for OpenShift Virtualization: live migration needs RWX, so VM disks sit on NAS volumes or SAN volumes in raw block mode	NetApp Solutions · updated Jul 16, 2026	R11's NVMe/TCP for VM disks is the SAN raw-block case; NFS for staging is the NAS case	`https://docs.netapp.com/us-en/netapp-solutions-virtualization/openshift/os-osv-bpg.html`
Deployment. A debt-collection company consolidated 400 VMs to 150 and 46 physical servers to 18 on OpenShift Virtualization	Red Hat blog · May 1, 2025	A published estate of the same order as R1, on the same platform	`https://www.redhat.com/en/blog/success-story-snapshots-whos-building-openshift-virtualization`

2 · Requirements register

Table 3. Requirements register

#	Requirement	Value	Source
R1	VM estate	600 VMs · 2,400 vCPU · 9.6 TB RAM · 180 TB disk	[A]
R2	Waves	4 waves of 150 VMs, one department group per wave	[T]
R3	Cutover window	weekday 18:00–22:00; no Saturday or Sunday cutover	[T]
R4	Migration method	warm migration: bulk copy while the VM runs, final delta at shutdown	[S] MTV 2.9: warm migration supported for VMware vSphere and RHV

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#	Requirement	Value	Source
R5	Concurrency	20 disk transfers in flight per plan by default	[S] MTV `controller_max_vm_inflight` default 20
R6	Source access	VDDK image built for the vSphere provider	[S] MTV: migrations do not work without VDDK when a VM is backed by vSAN; VDDK recommended otherwise
R7	Target platform version	OpenShift 4.19 or 4.18 with matching OpenShift Virtualization	[S] MTV 2.9 requires OpenShift 4.19, 4.18, 4.17
R8	Target license model	per-node subscription for bare-metal virtualization nodes	[S] OpenShift Virtualization Engine: per-node licensing for bare-metal deployments
R9	Host	2U, 2 × AMD EPYC 9005, 24 DIMM slots, 2 × OCP 3.0 NIC	[S] PowerEdge R7725
R10	Host count	8 nodes: 6 carry the estate at 4:1 vCPU:core, 2 spare for N+2 during waves	[T]; [A] ratio
R11	Storage	one ONTAP HA pair, 180 TB used of ≥ 400 TB raw, NVMe over TCP or NFS to hosts	[S] AFF A50: 2U, 24 drive slots, 4.0392 PB max raw per HA pair; [A] fill
R12	Storage ports	100 GbE to the leaf pair	[S] AFF A50: 16 × 100 Gbps Ethernet ports
R13	Rollback	source VM kept powered off on vSphere for 14 days after cutover	[A]
R14	License spend	below the VMware renewal quote over 3 years	[T]

Fourteen rows; eight carry a vendor figure, three are design assumptions, three are design targets.

3 · Architecture overview

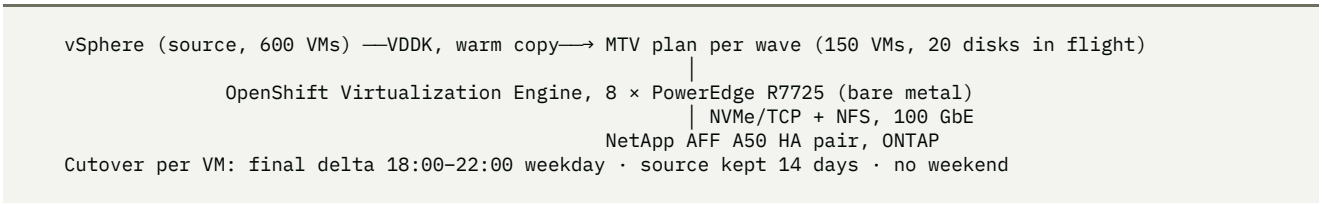


Figure 1. VMware exit to OpenShift Virtualization

One bare-metal OpenShift cluster on eight identical Dell nodes, one ONTAP HA pair as the single storage layer for both VM disks and the migration staging, and the Migration Toolkit for Virtualization driving four plans of 150 VMs each. The renewal quote is answered by a per-node subscription on eight nodes rather than a per-core bill on the same silicon.

Table 4. Architecture overview

Role	Product (exact model)	Qty	Capacity used	Why this unit
Virtualization platform	Red Hat OpenShift Virtualization Engine	1 cluster, 8 nodes	600 VMs [T]	VM-only edition; MTV, GitOps, monitoring and logging included [S]

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Role	Product (exact model)	Qty	Capacity used	Why this unit
Migration tool	Red Hat Migration Toolkit for Virtualization 2.9	4 plans	150 VMs per plan [T]	warm migration from vSphere [S]
Host	Dell PowerEdge R7725	8	2,400 vCPU on 6 nodes at 4:1 = 100 cores per node of 128 [T][A]	2 × EPYC 9005 up to 192 cores each, 24 DIMMs, 8 × PCIe Gen5, 2 × OCP 3.0 [S]
Storage	NetApp AFF A50 (HA pair)	1	180 TB of ≈ 460 TB raw with 24 × 19.2 TB drives [A]	2U, 24 slots, 16 × 100 GbE [S]
Storage integration	NetApp Trident CSI 25.02	1	all PVCs [A]	one storage layer [T]; name and version [S] `https://docs.netapp.com/us-en/netapp-solutions-virtualization/openshift/osv-workflow-vm-migration-mtv.html`

4 · Design by subsystem

4.1 Platform.

OpenShift Virtualization Engine, "a dedicated edition of Red Hat OpenShift designed to deploy, manage, and scale virtual machines" with the admin console, GitOps, user workload monitoring, platform logging and the migration toolkit included [S]. Advanced Cluster Management for Virtualization is a separate offering [S] and is not in this design; one cluster does not need it [A]. Three control-plane nodes are scheduled on three of the eight workers as compact control plane [A]. Rejected: full OpenShift Container Platform — the estate has no container workloads in scope (§1).

4.2 Hosts.

PowerEdge R7725, 2U, two AMD EPYC 9005 processors of up to 192 cores each, 24 DIMM slots to 6.14 TB, up to eight PCIe Gen5 x16 slots, two OCP 3.0 NIC slots [S]. Specified configuration: 2 × 64-core, 2.3 TB RAM (24 × 96 GB = 2,304 GB), 2 × 25 GbE for VM traffic and 2 × 100 GbE for storage [A]. Six nodes carry 2,400 vCPU at 4:1 (600 cores of 768); two nodes idle for the N+2 needed while a wave doubles memory demand on the target [T]. Rejected: 1-socket R7715 — 24-DIMM memory ceiling on the 2-socket unit fits 9.6 TB across 6 nodes (6 × 2.3 TB = 13.8 TB) with fewer chassis (R1).

4.3 Storage.

AFF A50 HA pair, 2U with 24 drive slots, 256 GB controller memory, 4.0392 PB maximum raw per pair, 16 × 100 GbE host ports [S]. The pair serves NVMe/TCP for VM disks and NFS for the MTV staging volume [A]; both are ONTAP volumes on the same aggregate, which is what "one storage layer" means here [T]. Scale-out to 12 HA pairs for NAS or 6 for SAN is available if the estate grows [S]. Rejected: local NVMe on the hosts — live migration between nodes needs shared storage (R10).

4.4 Migration tooling.

MTV 2.9 with a vSphere provider and a VDDK image [S]. Warm migration: "most data transfers occur while VMs remain operational, with only final deltas copied during shutdown" [S]. `controller_max_vm_inflight` left at the default of 20 concurrent disk transfers [S]; at an assumed 300 MB/s per transfer, 150 VMs × 300 GB average = 45 TB of bulk copy in about 2.1 hours of wall-clock per wave [A], spread over the wave's first week so the final deltas are small [A].

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4.5 Four-wave plan.

Wave 1: the IT department's own 150 VMs (test, tooling, monitoring) [A]. Waves 2–4: 150 VMs each, departments grouped by shared application dependencies so no application straddles a wave [A]. Per VM: bulk copy during the week, final delta and power-on in the 18:00–22:00 weekday window, smoke test by the owning department, source VM powered off but retained for 14 days **[T][A]**. Fifteen VMs per evening gives ten evenings per wave, two weeks per wave, eight weeks for the estate [T]. Rejected: cold migration — needs the VM down for the whole copy, which does not fit a four-hour window at 300 GB (R3, R4).

4.6 License position.

Eight per-node subscriptions on bare metal [S] against a renewal quote priced per core across the same 1,024 physical cores [A]. The number itself is the signing engineer's to fill from the two quotes; the design target is that the OpenShift figure is lower over three years [T].

5 · Failure behavior

Table 5. Failure behavior

Failure	Behavior	Source
One host down	VMs restart on the remaining nodes; two spare nodes hold the capacity	[A] N+2 in R10
MTV disk transfer fails mid-copy	plan retries the VM; source VM untouched and still running	[S] warm migration copies while the source runs; [A] retry
Final delta exceeds the evening window	VM stays on vSphere, cutover re-queued for the next evening; no weekend	[T] R3; [A] rule
Migrated VM fails smoke test	source VM powered back on within 14 days; target VM deleted	[A] R13
ONTAP controller down	partner controller takes over; VM disks stay online	[S] AFF A50 HA pair; [A] takeover
vSphere source unavailable during a wave	wave pauses; migrated VMs unaffected	[A]

6 · Limits

- The 4:1 vCPU:core ratio is a starting assumption; it is set from 30 days of vSphere metrics before wave 1.
- Fifteen VMs per evening assumes small final deltas; a database VM with heavy churn takes its own evening.
- No VM larger than 4 TB is assumed; larger VMs need a separate copy plan and may not fit the window.
- The ONTAP pair is sized at 40 % fill; growth past 12 HA pairs for NAS or 6 for SAN needs a second cluster.
- The license comparison depends on two quotes this document does not hold.

7 · Lessons learned

None yet — this is a design study; populated after the first build against it.

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8 · The author

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SYMBEEO

Each vendor's tool shows you their option. We show you all of them against one requirement.

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Figures are as published by their sources on the dates given in this document; figures marked [A] are assumptions.

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