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# A Proven Modern Virtualization Technical Stack

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# Introduction

The enterprise virtualization landscape is at a pivotal strategic inflection point, driven by the convergence of evolving commercial models and rapid technological change. The explosive rise of cloud-native computing anchored by Kubernetes is redefining IT. IDC projects the creation of over 1 billion net new applications by 2028. The push for AI-driven modernization is forcing enterprises to expand their container footprints at an unprecedented scale.

While containerization and cloud-native development are the primary drivers of infrastructure growth, virtual machines (VMs) remain critical for enterprise workloads. However, recent changes in vendor licensing structures have compressed evaluation timelines, turning routine renewals into urgent platform decisions. For many organizations, the immediate priority is a low-risk migration path that protects current operations, but the platform they migrate to will shape their options for years to come. To bridge the gap between legacy stability and future-ready agility, organizations are increasingly adopting hybrid environments that seamlessly orchestrate both VMs and containers.

By leveraging the maturity of the KVM hypervisor alongside KubeVirt's Kubernetes-native orchestration, Red Hat OpenShift Virtualization provides an alternative technical foundation. This approach enables enterprises to modernize while managing VMs alongside containers on a single platform, leveraging a subscription-based model that restores long-term planning stability.

This paper examines how organizations can use Red Hat OpenShift Virtualization, built on KVM and KubeVirt, to modernize and optimize their IT environments. It also includes a real-world customer case study of One New Zealand, which used Red Hat OpenShift Virtualization to eliminate IT silos, reduce costs, and simplify operations by having the same staff manage both VM and container workloads.

# KVM

While proprietary hypervisors such as VMware ESXi and Microsoft Hyper-V dominated the early virtualization era, the landscape shifted fundamentally in 2007 with the integration of the Kernel-based Virtual Machine (KVM) hypervisor into the Linux kernel. Now entering its 19th year of production-grade maturity, KVM inherits the enterprise-grade stability, security, and hardware support of the Linux kernel itself.

## A battle-tested foundation

KVM is anything but a "new" or unproven technology; it serves as the bedrock for the world's largest cloud architectures, including Amazon EC2, Google Compute Engine, and OpenStack. By powering global infrastructures at a scale most enterprises will never need to reach, KVM has been battle-tested for nearly two decades, offering a performance foundation that bridges the gap between traditional reliability and modern, open source agility.

# The two-stack problem: Managing VMs and containers

The industry has undergone a fundamental shift toward immutable infrastructure and microservices, with Kubernetes emerging as the de facto standard for orchestration. Its core strengths, including portability, scalability, declarative management, and self-healing, have set the benchmark for modern application deployment. However, this progress often creates a "dual stack" challenge, in which organizations face significant operational overhead from maintaining separate virtualization and containerization platforms.

## Overcoming operational fragmentation

Managing these parallel environments leads to inconsistent tooling, fragmented skill sets, and friction when integrating traditional VM-based applications with modern containerized services. Organizations are recognizing that this fragmentation creates long-term complexity and unnecessary costs. The focus is now shifting toward a unified operational model that manages VMs and containers through consistent automation, workflows, and governance, reducing overhead and simplifying infrastructure. This approach allows teams to modernize at their own pace, positioning them for the future without requiring immediate, high-risk application rewrites.

# KubeVirt

Born from the Red Hat ecosystem in 2016, KubeVirt has spent the last nine years maturing into a widely accepted Cloud Native Computing Foundation project. With contributions from over 2,000 organizations, it is a bridge that treats VMs as native Kubernetes objects. By pairing the KVM hypervisor with KubeVirt, enterprises gain a unified management plane where the Kubernetes API serves as the single source of truth for both VMs and containers.

This architectural convergence significantly reduces the friction of maintaining parallel stacks. Operations teams can now use familiar tooling, such as kubectl, to manage VM life cycles while enforcing centralized security via Kubernetes RBAC and consistent network policies across all workloads.

## Immediate modernization

However, the true strategic advantage of KubeVirt lies in the immediate adoption of modern operational practices. By bringing VMs into the Kubernetes fold, organizations can apply GitOps workflows, infrastructure as code, and automated CI/CD pipelines to legacy applications. Practices once exclusive to cloud-native microservices, such as observability and declarative self-healing, are now available to traditional VMs from day 1, reducing the overhead of legacy infrastructure.

Case study

# One New Zealand:

## Breaking down silos, modernizing, and lowering costs with Red Hat OpenShift Virtualization

Umer Younis, a Principal Cloud and Infrastructure Architect at One New Zealand, shared his experience with Red Hat OpenShift, which uses KVM and KubeVirt as foundational virtualization technologies. One New Zealand is a telecommunications company based in Auckland, New Zealand, serving New Zealand with mobile, fixed-line, and broadband services. The company has approximately 2,500 employees.

One New Zealand began operations in 2023 as a divestiture from Vodafone and is a relatively new company, but it inherited IT systems and infrastructure as part of the transfer. The IT team initiated a telco modernization program to future proof its technology investments, aiming to standardize all telco applications on a common platform while averting vendor lock-in.

During an RFP process, Red Hat OpenShift stood out for its maturity, strong ecosystem support, and alignment with One New Zealand's modernization program. Umer shared that it was the cloud-agnostic, automation-first principles and operational excellence that made Red Hat OpenShift a clear choice.

The One New Zealand team is taking a two-pronged approach toward adopting OpenShift Virtualization. It is shifting telecommunications network probes used for monitoring network traffic from physical hardware to OpenShift Virtualization. It is also converting existing VMs to OpenShift Virtualization using automation from the Red Hat Migration Factory, which uses Red Hat Ansible, with assistance from the Red Hat Professional Services team.

### Umer shared the following benefits the company is already getting from using Red Hat OpenShift Virtualization:

- Leveraging OpenShift Virtualization, which is built on the KubeVirt architecture, enables VMs to participate in the cloud-native operating model. So, with OpenShift, the company no longer managed virtualization VMs as separate silos.
- The company was able to remove the overhead and complexity of managing dedicated virtualization infrastructure while delivering strong VM performance, isolation, and security.

- The ability to manage containers and virtualized workloads from a single dashboard enables standardized operations. It automates virtualization life-cycle management using the same GitOps framework, ultimately addressing the two-stack problem.
- Having VM and container workloads on a single platform simplifies operations while also allowing One New Zealand to modernize workloads at its own pace. Plus, it can now manage virtualized workloads and containers with the same staff, improving resource efficiency and enabling faster identification and isolation of issues.
- By shifting its network traffic monitoring probes from physical hardware to OpenShift Virtualization images, the company can use vProbes for both virtual network functions and containerized network functions, delivering greater flexibility and scalability for modern telco environments.
- The company can use the platform's standard security zone model with common security segmentation across all workload types while also using Red Hat Advanced Cluster Security to protect applications across the development life cycle and multicluster environments.
- Developer efficiency has improved because, whether it's a container or VM-based workload, everyone uses the same pipelines, templates, and deployment patterns across all types of workloads, laying the groundwork for the adoption of platform engineering.
- One New Zealand has built a unified blueprint for all workloads on its horizontal cloud platform using OpenShift, covering best practices, design patterns, deployment models, automation standards, and security artifacts. This pattern has enabled the company to build a cohesive, scalable, and future-ready cloud platform, not just another place to run workloads, but a strategic enabler for delivering digital services across New Zealand.

Umer reported that the biggest challenge with adopting OpenShift Virtualization was not the technology itself but changing the mindset within the company. Moving from a traditional hypervisor-based approach to a Kubernetes-native approach for workload management requires a different way of thinking. The Red Hat team helped by delivering an acceleration training program for the One New Zealand engineering, application, and DevOps teams. This groundwork enabled the company to build learning squads across teams and equip them with hands-on knowledge. It ultimately became a positive part of the overall transformation journey.

### He also called out the following business benefits:

- Simplified operations helped reduce the overall operating costs.
- Taking advantage of a Red Hat subscription model tailored to their deployment has reduced software licensing costs.
- Running virtualized workloads with OpenShift Virtualization optimizes them by improving bin packing, squeezing more value from the same hardware resources. Maximizing server utilization also reduces power consumption and the associated carbon footprint.
- Developer efficiency and consistent automated pipelines have enabled faster time to market for new applications, capabilities, and functionalities.
- Open source innovation with the KVM hypervisor and KubeVirt protects against vendor lock-in while enabling benefits from upstream community innovation.

In the world of modern infrastructure, the "great divide" between VMs and modern containers often creates operational friction. One New Zealand has been pivoting to Red Hat OpenShift Virtualization to move away from fragmented silos and toward a unified, cloud-native future.

The transition to a single control plane allows One New Zealand to manage VMs and containers side by side. This isn't a mere technical shift; it's a strategic simplification that provides a clear, low-risk pathway for application modernization.

## The bottom line

### OpenShift Virtualization is delivering measurable impact across three key pillars:

1. **Future proofing:**
   Legacy apps are brought into the Kubernetes ecosystem today, ensuring they don't become tomorrow's technical debt.
2. **Cost efficiency:**
   Consolidating platforms significantly reduces both operational overhead and the licensing costs of parallel stacks.
3. **Sustainability:**
   High-density hardware utilization reduces the physical footprint, directly supporting corporate carbon-reduction goals.

# The Red Hat OpenShift Virtualization platform

## Red Hat OpenShift Virtualization enables enterprises to run traditional VMs on a modern platform, offering a cloud-native foundation with full enterprise support and life-cycle management.

Unifying VMs and containers under a single operational model enables flexibility across on-premises, edge, and public cloud environments. For organizations moving off incumbent virtualization platforms, this is critical. The platform empowers existing IT teams rather than overwhelming them, preserving familiar VM management workflows and intuitive interfaces, allowing administrators to maintain established operational patterns while gradually adopting Kubernetes-native practices at their own pace.

Organizations can also consume OpenShift Virtualization as a fully managed cloud service through offerings available from AWS and Microsoft Azure. This gives teams the option to run virtualized workloads in the public cloud with the same operational model they use on premises without taking on the overhead of managing the underlying platform infrastructure.

# A platform for seamless evolution

Beyond serving as a migration target, Red Hat OpenShift Virtualization can serve as a foundation for future growth.

## It mitigates the "all or nothing" pressure of modernization by allowing organizations to:

**Protect existing investments:**
Leveraging an ecosystem of validated integrations for storage, networking, backup, and disaster recovery helps ensure that current vendor relationships and infrastructure remain intact.

**Modernize on their terms:**
Organizations can run legacy VMs unchanged while simultaneously integrating modern services, such as AI workloads and containerized microservices, only when business priorities dictate.

**Reduce migration risk:**
Transitioning critical workloads into a modern environment with a predictable, subscription-based model avoids the uncertainty of shifting legacy licensing structures.

# OpenShift Virtualization: Common challenges addressed

### Challenge:

The learning curve for Kubernetes-native VM management upskilling existing virtualization teams in Kubernetes concepts

### Mitigation:

The Red Hat Team has created a virtualization administrative view that consolidates all VM-related tasks into a single, intuitive dashboard. This interface mirrors well-known logical flows, enabling administrators to manage virtualization compute, storage, and networking.

### Challenge:

A strategic migration plan and the importance of a well-defined strategy for migrating existing VM workloads to Red Hat OpenShift Virtualization

### Mitigation:

Red Hat provides the migration toolkit for virtualization (MTV), which ships with OpenShift. and covers the majority of the migration needs, enabling organizations to migrate VMs independently and at their own pace. It provides a suite of tools to migrate and manage your VMs at scale alongside containers in OpenShift Virtualization. If you require more assistance, the Red Hat Professional Services team is available. They can perform a Virtualization Migration Assessment (VMA) to help you plan the migration of workloads from existing hypervisors to Red Hat OpenShift Virtualization.

# Conclusion

## Red Hat OpenShift Virtualization reflects a broader shift toward platforms that balance operational continuity with long-term agility.

By unifying VMs and containers under a single control plane, organizations can reduce complexity, regain cost predictability, and modernize incrementally without abandoning existing investments. As enterprises reassess their virtualization strategies amid market disruption, platforms that support current realities and future innovation will be in the best position to serve as a durable foundation for the next era of enterprise IT.

Enterprise virtualization decisions today are increasingly platform choices rather than technology replacements. For organizations navigating uncertainty around costs and licensing models, the question is not simply "Where do I move my VMs to?" but "What foundation positions me for the next decade and beyond?"

# About the IDC analyst

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Jim Mercer is a program vice president managing multiple programs spanning application life-cycle management (ALM), modern application development and trends, emerging generative AI software development, DevOps, DevSecOps, open source, PaaS for developers, and cloud application platforms. His focus areas are DevOps and DevSecOps Solutions research practices. In this role, he is responsible for researching, writing, and advising clients on the fast-evolving DevOps and DevSecOps markets. Mercer's core research includes topics such as rapid enterprise application development, modern microservice-based packaging, platform engineering, GitOps, application security, software supply chain security, and automated deployment and life-cycle/management strategies as applied to a DevOps practice.

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