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Unified Management of VMs and Containers: Boosting Operational Efficiency and Scalability

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Key Challenge: Operational Complexity

Organizations are aware of the need to modernize their application portfolio to achieve greater agility, scalability, and efficiency but often encounter significant challenges when trying to manage the complex, hybrid infrastructures that support both traditional VMs and modern containerized applications that coexist. These challenges include maintaining operational consistency, ensuring security and compliance, and optimizing resource allocation across diverse environments. Traditional VMs and modern containerized applications often require different management platforms, resulting in silos that complicate operations, increase costs, and therefore slow down the pace of innovation. Organizations struggle to find a unified approach that allows them to deploy, run, and operate both types of applications seamlessly, without disrupting current operations or sacrificing performance and security. The ideal platform should enable them to manage both VMs and containers side-by-side, offering consistent operations management, security, and scalability, while also facilitating the transition to modern application architectures.

Modernization: Challenges and Opportunities

Modern applications are cloud-native, scalable and often leverage microservices, while traditional software is typically monolithic, hosted on-premises, and less adaptable to rapid changes. To achieve optimal business impact—including faster AI and data-driven innovation, improved operational efficiency and reliability across hybrid environments, and reduced IT and cloud costs—it's essential to begin application modernization with those applications that benefit the most from a distributed microservices architecture. However, these expected benefits need to be balanced against the anticipated cost and potential risk of the modernization process. Applications that can benefit the most from modernization typically face one or more of these three challenges:

- **Poor scalability across infrastructure:** Limited extensibility and integration from data centers to cloud and edge environments, poor cloud compatibility, and difficulty scaling applications based on demand or regulatory requirements.
- **Inadequate security and governance:** Applications requiring updated security protocols and governance policies to reduce operational risks and comply with industry regulations.
- **Inflexible development and management requirements:** Rigid development and management practices, which often result in poor operational efficiency and increased costs and timelines for application development, maintenance, and upgrades. Reliance on legacy technologies hindering the addition of new capabilities due to the lack of comprehensive APIs and SDKs, and often preventing the creation of a unified end-user experience across applications.

Addressing these challenges through modernization can significantly enhance an application's performance, security, and adaptability to future requirements.

Examples of Applications With High Expected Modernization ROI

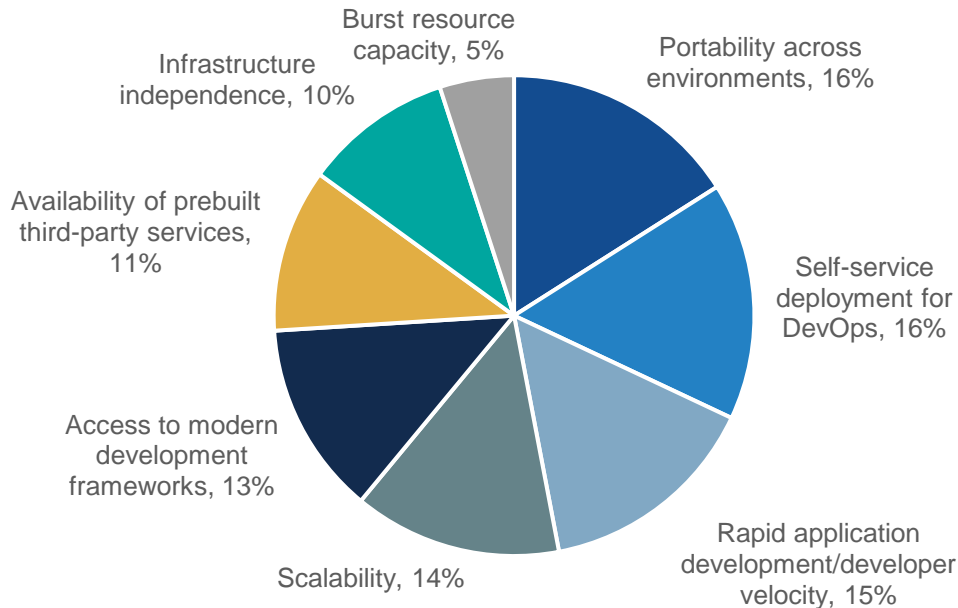
- **E-commerce platforms.** E-commerce platforms can significantly benefit from the integration of AI-driven components, such as a recommendation engine that analyzes data from multiple sources to provide users with personalized product recommendations in real time, achieving a significant boost in customer engagement, customer retention, and sales.
- **Emerging AI applications.** Emerging AI applications, such as generative AI models, automated decision-making systems, and AI-driven process automation, are becoming increasingly critical for organizations. Modernizing these applications to leverage the latest advancements in AI can drive significant ROI by enhancing operational efficiency, enabling new business models, and delivering superior customer experiences.
- **Traditional AI/ML workloads.** Traditional AI and machine learning (ML) workloads, such as voice and image recognition, natural language processing, and anomaly detection, can benefit from enhanced scalability, advanced data processing capabilities, and simplified integration with modern AI tools and frameworks, which enable faster and more efficient model training.
- **Financial services applications.** Modernizing financial services applications is crucial to meeting the demand for real-time transaction processing and advanced analytics. These capabilities can provide immediate insights into transaction trends, prevent fraud, and optimize financial operations.
- **Health management.** Modernizing health management often is a critical requirement for consistently complying with modern standards and data privacy laws such as HIPAA and GDPR. Modernized applications leverage centralized policies, monitoring, and automation tools to support compliance with the latest regulatory standards.

When planning and prioritizing the modernization of different types of application workloads, it is critical to understand the need for the freshly modernized applications to coexist with traditional unmodernized applications for years to come. Given the expected coexistence of modern and traditional applications for the foreseeable future, it is essential for organizations to facilitate efficient and secure data exchange between modern and traditional applications as well as their underlying infrastructure while providing a consistent and well-automated continuous integration and compliance process for both types of applications, along with consistently efficient operations and troubleshooting.

Real-world Benefits of Application Modernization

Figure 1. Perceived Key Benefits of Microservices Adoption

What has been the most impactful benefit your organization has realized from the use of a microservices architecture? (Percent of respondents, N=241)



Source: Enterprise Strategy Group, a division of TechTarget, Inc.

TechTarget's Enterprise Strategy Group recently asked organizations for the most important benefit they realized through application modernization. The eight most important benefits, shown in Figure 1, all align with the need to achieve consistent application operations, DevOps workflows, and integration between applications.¹

The benefits of gradual application modernization can be realized via consistent application operations and DevOps workflows in the following ways:

- **Workload portability across environments.** Organizations often require interoperability between VMs and containers to maintain a consistent combination of tools, processes, and staff for application development, operation, and enhancement across the overall application portfolio.
- **Self-service deployment for DevOps and platform engineering.** Self-service deployment tools are critical to ensuring efficient and consistent application operations, DevOps pipelines, and developer productivity.
- **Developer velocity.** Enhanced developer productivity is the direct outcome of the other modernization benefits, as developers directly benefit from consistent application lifecycle management, automation, security, and compliance across the overall app portfolio.

¹ Source: Enterprise Strategy Group Complete Survey Results, [Distributed Cloud Series: The Mainstreaming of Cloud-native Apps and Methodologies](#), May 2023.

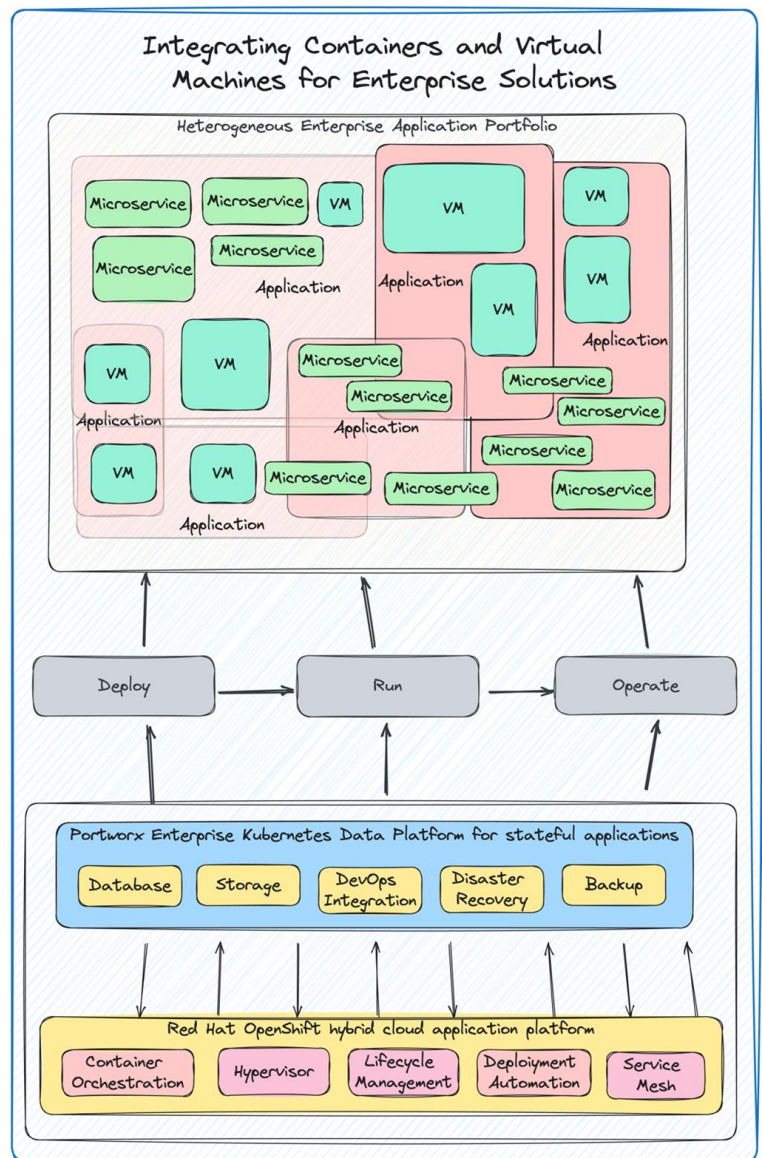
- **Scalability.** Consistent management between traditional and modern applications is critical to ensuring scalability in response to fluctuating demand, as it allows dynamic resource allocation across the entire application portfolio. This ensures that traditional and modernized microservices can seamlessly scale up or down, maintaining performance and cost-effectiveness without disruption.
- **Platform engineering.** Consistent operations management is key to enabling DevOps teams to effectively use third-party services such as database as a service, messaging, and authentication to simplify and accelerate development processes for modern and traditional applications.
- **Infrastructure independence.** Achieving infrastructure independence empower organizations with strategic flexibility, allowing them to autonomously shift and combine applications—both modern and traditional—across different infrastructure platforms. This capability is crucial for enhancing operational agility, ensuring scalable, reliable, and adaptable operations management.

Unifying the Management and Operation of VMs and Containers

Red Hat® OpenShift® Virtualization offers a path for infrastructure modernization by leveraging the simplicity and speed of a cloud-native application platform while preserving existing virtualization investments. This modernization approach includes the capability to migrate a targeted set of applications to OpenShift Virtualization without the need for significant refactoring, thus minimizing disruptions and resource expenditure.

Red Hat and Portworx by Pure Storage deliver an integrated platform that enables organizations to develop, deploy, run, and operate containers and VMs side by side in a consistent manner. By extending the capabilities of the Red Hat OpenShift application platform to support VMs, OpenShift Virtualization allows organizations to operate VMs alongside containers within a cohesive, Kubernetes-native environment. This setup not only simplifies the transition to modern application architectures but also supports modernization of legacy systems gradually and with minimal risk.

Portworx complements this by providing container data-management capabilities that work seamlessly across both VMs and containers. With features such as persistent storage, automated backups, disaster recovery, and enhanced data security, Portworx delivers data consistency, security, and availability across on-premises, cloud, and hybrid environments, further enhancing the unified management and operation of diverse application infrastructures.



Source: Red Hat

Key Advantages of a Combined Platform

The integration of OpenShift Virtualization and Portworx can help organizations achieve a number of advantages.

Faster Time to Value at a Lower Cost

Combining Red Hat OpenShift with Portworx can deliver significant business advantages, including faster time to market and enhanced operational efficiency. Enabling DevOps and platform engineering teams to consistently deploy and manage containerized and virtualized applications through the same pipeline helps organizations to accelerate time to value and reduce costs related to infrastructure, licenses, and subscriptions. A combined platform streamlines resource management across VMs and containers, reducing silos and optimizing compute, storage, and networking resources, enhancing operational efficiency, and reducing the need for specialized skills and separate teams.

Simplified Development and Unified Management

A unified platform for managing VMs and containers simplifies development and management by establishing a consistent set of storage, data, and app management tools. This can foster efficient collaboration among platform teams and virtualization admins and lead to a unified development process with consistent monitoring and logging. The platform's scalability and flexibility can enable organizations to apply cloud-native operational and development practices to VMs, enhancing app performance and reliability across on-premises, cloud, hybrid, or multi-cloud infrastructures.

Flexible Deployment and Enhanced Data Management

The integration of modern storage, data, and app management principles can enable the consistent deployment of VM and containerized applications on different types of infrastructure while, at the same time, maintaining consistent storage and data services. This flexibility can significantly lower the risks of inconsistent application performance and complex disaster recovery. Strengthening data management capabilities, the platform supports data availability, security, and compliance across diverse environments through automated backups, disaster recovery services, and enhanced data security, integrating with Kubernetes' storage orchestration features to simplify the management of stateful applications.

Interoperability and Robust Security

Addressing interoperability challenges, the platform allows VMs to run alongside containers within the same Kubernetes infrastructure. This can drastically simplify development, testing, and deployment processes. Unifying the management of security protocols for VMs and containers reduces vulnerabilities with consistent encryption, backups, and access controls, providing robust protection for both. Consolidating infrastructure for VMs and containers lowers resource overheads through higher utilization of hardware and admin team support, resulting in better cost-effectiveness and manageability of the entire application portfolio.

Consistent Performance and Simplified Disaster Recovery

Delivering consistent application performance, the platform enables both containers and VMs to receive the necessary resources from a universal Kubernetes scheduler, creating a consistent end-user experience. Simplifying disaster recovery, the platform provides automated backup and restore capabilities for hybrid applications through a universal set of disaster recovery workflows, enabling quick and efficient recovery for both VM and containerized applications.

Conclusion: OpenShift Virtualization and Portworx, a Unified Approach

Consolidating the management of traditional stateful enterprise applications and cloud-native apps can bring strategic advantages that go far beyond cost savings. Running, managing, and operating VMs and containers side by side on the same platform can boost developer productivity and accelerate time to market for new product capabilities. Additionally, organizations can modernize applications at their own pace, without the immediate need to containerize every legacy application, as VM-based applications can also benefit from some of the advantages traditionally reserved for containerized apps. This enables developers to focus on writing business code instead of dealing with infrastructure compatibility issues, managing disparate deployment pipelines, and resolving integration challenges between legacy and modern systems. Platform engineers and operators can streamline their workflows, reduce operational complexity, and maintain consistent security and compliance across the corporate infrastructure, while optimizing resource allocation and minimizing downtime. This unified approach increases efficiency and accelerates innovation, enabling businesses to respond more quickly to market demands and technological advancements.

For organizations lacking the skills and expertise to consolidate their applications onto one platform, solutions such as Red Hat OpenShift Virtualization integrated with Portworx cloud-native data services can be a great option for capturing the business benefits of a unified platform. While careful planning, testing, and validation remain essential to ensure the reliability, security, and functionality of the migrated applications, this joint platform significantly simplifies these tasks and enables organizations to strategically modernize their applications while maintaining operational stability and optimizing their hybrid environments. In a nutshell, a unified application platform can streamline operations and boost agility at the same time, enabling organizations to successfully compete in an increasingly complex digital landscape.

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