SUPPORT BUSINESS NEEDS THROUGH VIRTUALIZATION

Five key use cases for modern IT organizations

TECHNOLOGY OVERVIEW

Red Hat Virtualization provides an ideal foundation for modern datacenter use cases, including:

• Server consolidation.

• Performance-sensitive workloads.

• Development and test environments.

• Multi-hypervisor and hybrid environments.

• Technical workstations.

KEY FEATURES

• Centralized platform and workload management

• Enhanced security

• Commercial hardening

• Highly available resources

• Automation and integration capabilities

• Cross-platform support

• Migration tooling

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VIRTUALIZATION: CRITICAL IN MODERN DATACENTERS

Modern IT organizations face change on two fronts. First, they must continuously adopt new technologies to stay current with infrastructure innovation and best practices. Second, they must adapt to a more strategic role within their overall business organization. Combining traditional virtualization with cloud- and container-based architectures can help you meet these changing requirements.

Virtualization is a foundational component in modern datacenters and serves as the underlying infrastructure for traditional, cloud-native, and container-based workloads. In fact, more than 80% of datacenter workloads are virtualized today, according to IDC.[1] Through virtualization, you can improve efficiency, free up resources, boost performance, enhance security, and cut costs.

Red Hat provides agile, fast, and cost-effective virtualization that helps you overcome today's challenges while building a foundation for future technologies.

VIRTUALIZING WITH RED HAT

Red Hat® Virtualization is a complete infrastructure solution for virtualized servers and technical workstations. It is easy to deploy and use, allowing you to get started quickly. High-value, economical subscription pricing saves costs and provides faster return on investment (ROI). Support for up to 480 logical CPUs and 6TB of memory per virtual machine (VM) ensures your applications perform as well in a virtualized environment as they do on bare-metal infrastructure. Built-in Red Hat Secure Virtualization (sVirt) and Security-Enhanced Linux® (SELinux) safeguard your virtualized environment. Open, standards-based features and interoperability protect your existing investments and let you customize your infrastructure. Finally, integration throughout the Red Hat software stack provides increased performance, security, and value when you add other products like Red Hat Enterprise Linux, Red Hat OpenStack® Platform, and Red Hat OpenShift Container Platform.

Virtualization can help IT organizations better support their business in many ways. Here are five common use cases, their benefits, and how Red Hat Virtualization works to provide those benefits more effectively.

USE CASE 1: SERVER CONSOLIDATION

Growing demand, changing business requirements, and new technologies can quickly cause IT infrastructure to become complex. In these complicated environments, server and VM sprawl often leads to inefficiencies. Physical servers are typically overprovisioned to ensure availability during peak demand times. Unused VMs may not be retired due to lack of visibility or ineffective infrastructure management. In both cases, utilization can be low, resulting in higher costs and larger-than-needed infrastructure footprints.

Proprietary operating systems and virtualization platforms can add to these challenges. Using multiple, disparate management tools can impede visibility into your environment, increase the risk of inconsistencies, and take more time and resources to operate. Proprietary licenses can be expensive

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1 *"The Critical Role of Virtualization in Modern Datacenters, Hybrid Clouds, and Containers."* IDC, July 2017.
   redhat.com/en/resources/idc-virtualization-modern-datacenters-hybrid-cloud-containers-analyst-whitepaper

"Before, our server solutions were considered expensive. We can now quickly provision small VMs to test new products without additional costs."[2]

BENJAMIN LAU,
I.T. MANAGER,
CTOS DATA SYSTEMS SDN. BHD.

and often include features and functionality that you may not need, but still must pay for. Closed interfaces limit your flexibility by preventing you from choosing from the full breadth of complementary technologies to adapt to changing business needs.

Consolidating physical servers and proprietary virtualization platforms onto a high-performance, reliable, and open virtualization platform—like Red Hat Virtualization—can unify workload and server management, reduce licensing costs, and deliver technology choice.

When planning for server consolidation, look for a high-performance virtualization platform based on open, standards-based technology that is interoperable with other operating systems and virtualization platforms. Red Hat Virtualization delivers a low total cost of ownership (TCO), faster ROI, and accelerated break-even costs for server consolidation.

CONSOLIDATE MORE WORKLOADS

With Red Hat Virtualization, you can achieve consolidation ratios of 10 to 1 and reduce server rackspace by up to 75%.[2] Exceptional workload density is provided by bare-metal performance and support for up to 288 logical CPUs and 12TB per host and 240 vCPU and 6TB RAM per VM guest. High-availability features, like live migration and prioritized restarts, ensure reliability for critical workloads. Plus, support for third-party tools lets you choose the right backup, restore, and replication products for your organization's disaster recovery needs.

STREAMLINE MANAGEMENT

Red Hat Virtualization centralizes management of virtualized compute, network, and storage resources, greatly simplifying operations. A user portal provides standard- and power-user access to the virtualized environment for easier administration and control. Additionally, automated workload management processes and scaling speeds server deployment, configuration, and management.

REDUCE COSTS AND LOCK-IN

With an open source virtualization platform, you can decrease costs and eliminate vendor lock-in. Based on the open source Kernel-based Virtual Machine (KVM), Red Hat Virtualization is intensely tested and commercially hardened for production use. Open and RESTful application programming interfaces (APIs) and certification for Microsoft Windows provides cross-platform interoperability. Furthermore, your subscription includes enterprise-grade support, updates, and patches so you can keep your environment up to date and running at all times.

USE CASE 2: PERFORMANCE-SENSITIVE WORKLOADS

Many core and critical business workloads have elevated performance and availability requirements. To continuously meet these needs, IT organizations frequently deploy sensitive workloads on segregated infrastructure. To ensure performance during peaks in demand, resources are overprovisioned. Redundant infrastructure is deployed to cope with potential failures. Finally, scaling out requires new servers and resources to be purchased, configured, and managed. All of this adds up to higher costs and operational inefficiencies.

Virtualizing these workloads can improve their performance and availability. A shared, high-performance virtualized environment eliminates redundancies, increases utilization, and scales easily. Additionally, you can optimize workload placement at deployment and move them as needs change.

2 *"CTOS improves agility for faster business expansion with Red Hat,"* Red Hat case study, 2017. redhat.com/en/resources/ctos-case-study.

3 *"Lafayette College improves educational experience by virtualizing with Red Hat."* Red Hat. 2017. redhat.com/en/resources/lafayette-college-improves-productivity-flexibility-with-red-hat-enterprise-virtualization.

When migrating performance-sensitive workloads, search for a virtualization platform that delivers leading performance, availability, and scalability. Red Hat Virtualization supplies unmatched scale and performance for enterprise workloads, including SAP® and Oracle, on x86 and Power®.

INCREASE WORKLOAD PERFORMANCE

Workloads virtualized with Red Hat Virtualization experience performance on par with bare-metal systems—Red Hat Virtualization holds leading SPECvirt_sc2013 results.[5] In testing, enterprise work-loads like SAP, Oracle, and Microsoft Exchange showed performance gains of up to 140%.[6] Several features—like high input/output (I/O) throughput, Kernel SamePage Merging (KSM) memory over-commitment, non-uniform memory access (NUMA), single-root I/O virtualization (SR-IOV), and virtual function I/O (VFIO) support—further enhance performance for virtualized workloads.

IMPROVE APPLICATION AVAILABILITY

Red Hat Virtualization includes several features to ensure availability for virtualized workloads. Live migration and prioritized VM restart capabilities let you seamlessly move VMs from one host to another in case of failure—without downtime. Support for third-party backup, restore, and replica-tion tools lets you use the products that work best for your organization now and in the future.

SCALE QUICKLY AND COST-EFFECTIVELY

Designed for large-scale operations, Red Hat Virtualization supports more than 500 virtual hosts and 5,000 VMs in one environment, allowing you to scale out easily and cost-effectively. Support for hundreds of logical and virtual CPUs and terabytes of memory increases workload density and virtualization efficiency. Hot plug capabilities let you expand compute, memory, disk, and network resources for any workload without restarting its VM.

OPTIMIZE WORKLOAD PLACEMENT

Adding Red Hat CloudForms to your Red Hat Virtualization environment lets you strategically place and move VMs to maximize resource utilization and performance. Integration with the oVirt opti-mizer provides better optimization logic for managing clusters and placing workloads. You can also define affinity and anti-affinity workload groups to pin workloads with specialized hardware or licensing requirements to specific hosts.

USE CASE 3: DEVELOPMENT AND TEST (DEV/TEST) ENVIRONMENTS

Development and test (dev/test) environments are critical for creating and improving applications and services. However, unoptimized infrastructure can slow delivery of resources to developers, delaying the entire development cycle. As a result, end users may enlist unsanctioned public cloud resources to accomplish their work. These shadow IT resources are outside of IT's control, increas-ing the risk of costly security and compliance issues.

Optimizing your IT infrastructure can help you deliver resources faster. You can increase the effi-ciency and utilization of resources, provide self-service portals for developers, track and control dev/test environment costs, and bring resources back into IT control.

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4 *"Posco ICT builds intelligent factory with open source IT from Red Hat," Red Hat case study, 2017.* redhat.com/en/resources/posco-ict-case-study.

5 *Results as of February 26, 2018 from spec.org. SPEC®, SPECvirt_sc®, and the benchmark name SPECvirt™ are trademarks or registered trademarks of the Standard Performance Evaluation Corporation. For more information about SPECvirt_sc2013, see* spec.org/virt_sc2013/.

6 *"Advanced operations with Red Hat Virtualization 3.6." Red Hat. May 2016.* redhat.com/en/resources/red-hat-enterprise-virtualization-36-operations.

When optimizing dev/test environments, find a virtualization platform that provides self-service portals for developers, streamlined resource provisioning and management, and visibility into resource use. Red Hat Virtualization provides a simple, inexpensive self-service infrastructure for enterprise development environments.

DELIVER RESOURCES FASTER

Combined with Red Hat CloudForms and Red Hat Ansible® Automation, Red Hat Virtualization speeds resource delivery through centralized and automated resource management. Developers can use a single self-service catalog to request compute, network, and storage resources, simplifying the request process and reducing the number of portals they need to use. Automated provisioning accelerates delivery and ensures that resources are configured in compliance with policies.

TRIM COSTS

Red Hat Virtualization gives you tools to reduce the cost of nonproduction environments. Quota definition and enforcement limits the number of virtual guests, quantity of storage used, CPU utilizations, and amount of memory on host servers that users can allocate. Detailed reporting and chargeback functionality give you visibility into use and let you allocate costs to user groups. Automated management streamlines resource administration and operations costs.

REDUCE SHADOW I.T. RISKS

With increased speed and visibility, Red Hat Virtualization lets you build a security-focused, nondisruptive, ring-fenced environment to reduce the risks associated with unsanctioned resource use. A system dashboard provides detailed information and a global-use overview of CPUs, memory, and storage host resources. Simple Network Management Protocol (SNMP) support allows you to integrate third-party monitoring systems for increased visibility into your environment.

USE CASE 4: MULTI-HYPERVISOR AND HYBRID ENVIRONMENTS

MULTI-HYPERVISOR ENVIRONMENT CUSTOMER SUCCESS: UNIVERSITY OF SALZBURG

University of Salzburg set up virtual landscapes parallel to existing VMware landscapes to achieve rapid, scalable, and automated deployment of IT services.[7]

Hybrid and bimodal IT approaches are becoming more common as organizations seek to gain the speed, flexibility, and cost benefits of cloud and container technologies. However, putting these concepts into practice can be challenging. Virtualization can play a key role in moving to bimodal operations and building a hybrid environment. This approach allows you to optimize traditional applications and workloads and create a path to private cloud.

Additionally, many organizations are adopting a multi-hypervisor approach to lower costs and reduce dependence on a single vendor. Adding a second, open source virtualization hypervisor can help you achieve both. Today, 26% of organizations have already deployed more than one hypervisor platform and another 23% have plans to deploy a second hypervisor in the future.[8] Most organizations deploy new workloads on the new hypervisor, but migrating workloads from an existing hypervisor to a new one can be challenging. VMs must first be converted to the new hypervisor format. Then, the contents of the VM—drivers and agents, for example—must be modified. Finally, VMs must be retested and retooled for the new hypervisor and its underlying systems.

When adopting a multi-hypervisor or hybrid environment, select a virtualization platform that integrates with cloud and container platforms and is interoperable with other hypervisors. Open APIs and workload migration tooling are also essential for smooth transitions. Red Hat Virtualization can help you build a foundation for seamless private and open hybrid cloud implementations.

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7 "*University of Salzburg builds self-service IT portal with Red Hat,*" *Red Hat case study, 2017.* redhat.com/en/resources/university-of-salzburg-case-study.

8 "*The Critical Role of Virtualization in Modern Datacenters, Hybrid Clouds, and Containers.*" *IDC. July 2017.*

Learn more about Red Hat Virtualization and Red Hat OpenStack Platform integration in the technology brief, Bridging the gap between traditional virtualization and OpenStack.

TECHNICAL WORKSTATION CUSTOMER SUCCESS: INTERNATIONAL AIRLINES GROUP (IAG)

IAG built a graphical interface for passenger check-in and luggage logging operations that takes only 20 minutes to learn and greatly speeds up customer-facing activities.[9]

ADOPT A MULTI-HYPERVISOR STRATEGY

With high performance and low TCO, Red Hat Virtualization is an ideal choice for organizations that want to reduce dependence on a single hypervisor vendor. Virtual-to-virtual (V2V) conversion tooling lets you migrate workloads from VMware vSphere and vCenter with one click, drastically simplifying transfers. Open, RESTful APIs provide interoperability with both Red Hat and custom-developed tools so you can align your environment with your organization's needs.

BUILD A PATH TO PRIVATE CLOUD

Red Hat provides common underlying services and management technologies for both traditional and cloud-enabled workloads running on Red Hat Virtualization, Red Hat OpenStack Platform, and Red Hat OpenShift Container Platform, so you can add cloud and container technologies as your requirements change.

- **Red Hat OpenStack Platform for private Infrastructure-as-a-Service (IaaS) deployments.** Based on the KVM hypervisor—the highest-performing and most popular hypervisor for cloud deployments—Red Hat Virtualization is integrated with and provides support for OpenStack Neutron networking and Glance storage services. This allows applications to be used simultaneously in both traditional virtualization and OpenStack environments.

- **Red Hat OpenShift Container Platform for container deployments.** Red Hat Virtualization supports Red Hat Enterprise Linux Atomic Host—a lightweight operating system for Linux containers—via a container guest agent. Users can inventory containers running on KVM and gain insight into containers running on the hypervisor.

- **Red Hat CloudForms for unified management and self-service capabilities.** The combination of Red Hat CloudForms and Red Hat Virtualization lets you deliver cloud-like services, including self-service portals, on a traditional infrastructure.

USE CASE 5: TECHNICAL WORKSTATIONS

In many industries, IT organizations deploy technical and graphics-intensive workstations to support visualization applications that require high-performance graphics processing and computational power. However, disparately located desktop PCs can introduce management and security concerns.

Virtualizing these workstation environments can help you simplify administration, regain control over access and data, and reduce technical workstation hardware costs. A high-performance, virtualized environment centralizes data and core systems in the datacenter—only endpoint devices are located outside of direct IT control.

When virtualizing technical workstations, choose a virtualization platform that delivers exceptional performance and includes resource isolation capabilities. Red Hat Virtualization helps you deliver a seamless user experience while mitigating management and security risks.

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9 *"International Airlines Group Picks Red Hat as Technology Partner to Power its Hybrid Cloud Platform,"* Red Hat press release, 2017. redhat.com/en/about/press-releases/international-airlines-group-picks-red-hat-technology-partner-power-its-hybrid-cloud-platform.

DELIVER A HIGH-QUALITY USER EXPERIENCE

Using the SPICE protocol for remote rendering, Red Hat Virtualization delivers a seamless end-user experience that is indistinguishable from that of a physical desktop PC. Optimized compression algorithms enhance network performance over higher-latency, lower-bandwidth wide-area network (WAN) environments. Native USB redirection provides support for specialized devices within the virtualized workstation environment. KSM memory overcommitment, NUMA, SR-IOV, and VFIO capabilities enhance application and environment performance. Resource isolation functionality ensures graphics-intensive applications have access to the resources they need to perform optimally.

IMPROVE SECURITY AND CONTROL

With a unified platform for server and workstation virtualization, you can improve security by centrally locating, controlling, and accessing data. Built-in SELinux and sVirt capabilities, including mandatory access control (MAC), enhance VM and hypervisor protection. SmartCard and Common Access Card (CAC) support with two-factor authentication safeguards your environment from intrusion. Finally, workstation pooling allows you to quickly deploy multiple workstation VMs from predefined templates.

LEARN MORE

Virtualization will continue to play a key role in modern cloud- and container-based datacenters. With lower costs, higher performance, enhanced security, simplified management, and more flexibility, Red Hat Virtualization can help you better support your business' evolving needs and prepare for future change.

- Learn more about Red Hat Virtualization at redhat.com/rhev.

- Download a 90-day trial at access.redhat.com/products/red-hat-virtualization/get-started.
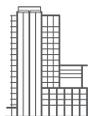
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Red Hat is the world's leading provider of open source software solutions, using a community-powered approach to provide reliable and high-performing cloud, Linux, middleware, storage, and virtualization technologies. Red Hat also offers award-winning support, training, and consulting services. As a connective hub in a global network of enterprises, partners, and open source communities, Red Hat helps create relevant, innovative technologies that liberate resources for growth and prepare customers for the future of IT.