Deploy, migrate, and protect virtual machines and containers

Overview

Highlights

Migrate virtual machines (VMs) between clusters, infrastructure providers, and Red Hat OpenShift versions and manage them alongside container-based applications with a unified user experience

Backup and restore VMs and containerized applications anywhere, capturing the entire application stack to restore to a known good state.

Prevent data loss while improving disaster recovery and business continuity to combat escalating ransomware attacks.

Gain agility for DevOps teams managing virtualized applications with a state-of-the-art management interface of a cloud-native API.

Red Hat OpenShift Virtualization and Veeam Kasten

Modern application development and deployment platforms can move productivity and accelerate development lifecycles resulting in higher revenues. At the same time, recent changes in the virtualization market are forcing many organizations with virtualized workloads to reconsider their platform modernization options. Infrastructure modernization with a combination of Veeam Kasten and Red Hat® OpenShift® Virtualization[1] can represent a credible first step to application modernization and a path to a full embrace of cloud-native development frameworks and principles.

Organizations with workloads on traditional virtual machines (VMs) need to honor existing investments and address immediate business needs while setting a modernization strategy for the future, with considerations for:

- **Rehosting**. Application rehosting initiatives can alleviate some cost concerns, and mitigate some challenges associated with retooling and retraining administrative teams. Organizations need to ensure that any new platform will support new workloads and modern development methodologies.
- **Return on investment (ROI)**. Teams need to understand the true cost of their migration strategy. Short-term solutions chosen in the name of expediency may still require costly future infrastructure modernizing exercises, and failed workload migrations can incur additional painful repatriation costs and disruptions.
- **Technology choice**. Many virtualization alternatives offer similar type-2 hypervisor technology, leaving organizations exposed to the same risks and drawbacks as their existing virtualization provider. An ideal solution would deliver virtualized workloads today, while offering a unified platform capable of modern workload development and deployment in the future.
- **Refactoring**. Modernization can certainly extend application life or add new functionality, yet the cost of refactoring into containers and microservices is not always justified. Organizations need the ability to support existing applications indefinitely with options to refactor or retire and replace them at their own pace.
- **Ensuring business continuity**. Ransomware attacks are on the rise, threatening the ability to conduct business. Organizations must be able to recover quickly from attacks and disasters, rapidly restoring complete services and state—potentially on another platform or location—all at a moment's notice.

Veeam Kasten combined with OpenShift Virtualization supports existing virtualized applications in a robust hybrid cloud environment while adding cloud-native workflows, Kubernetes, and a choice of

1 A feature of Red Hat OpenShift, Red Hat Virtualization is based on the upstream KubeVirt project.

platform. Organizations can migrate workloads rapidly and then build highly scalable, flexible, cost-effective, and resilient modern applications when it makes sense for the application, the business, and the opportunity.

Modernize your infrastructure, protect your data and applications

Beyond merely providing a migration target for VMs, this unique technology combination lets organizations unify their virtual machine and container-based workloads under a consistent open interface. With OpenShift Virtualization, organizations can deploy, migrate, and protect their VM workloads on the same platform as their cloud-native applications, managing them through a single unified control plane. Built for Kubernetes, Veeam Kasten delivers reliable backup, restore, disaster recovery, and application mobility for VMs and containers running on Red Hat OpenShift.

Veeam Kasten delivers reliable backup, restore, disaster recovery, and business continuity for applications running in Kubernetes. With OpenShift Virtualization, these protections naturally extend to VMs running in Red Hat OpenShift. VMs represent stateful workloads on Red Hat OpenShift and they run side-by-side with microservices and containers on the same cluster (Figure 1). This unified infrastructure speeds cloud-native application modernization by improving on traditional application infrastructure, operation, and tooling—on-premise, in the cloud, or at the edge.

OpenShift Virtualization allows VM- and container-based workloads to operate consistently on modern cloud-native environments.

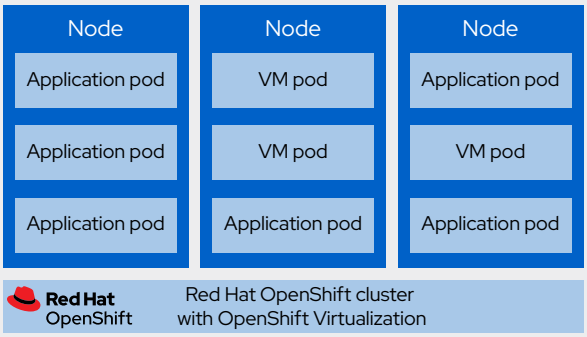

Figure 1. VMs and containers run side-by-side on the same Red Hat OpenShift cluster

Having a common platform for VMs and containers can modernize workflows, incorporating a GitOps framework and enabling continuous integration and continuous delivery/deployment (CI/CD) pipelines. Along with support in Red Hat OpenShift, data operations provided by Kasten can be invoked by an application programming interface (API) or a command-line interface (CLI) in a CI/CD pipeline. GitOps can automate Kasten deployment and Policy-as-Code governance to establish recovery point objectives (RPO) and recovery time objectives (RTO) for VM workloads across multiple clusters. With these tools, development and test environments can be deployed with data from vetted production or other backup sources using Veeam Kasten data operations for full fidelity versus synthesized or mock data.

Red Hat OpenShift Virtualization

OpenShift Virtualization delivers a modern platform for organizations to run and deploy their new and existing VM workloads. The solution allows for efficient migration and management of traditional VM-based applications onto a trusted, consistent, and comprehensive hybrid cloud application platform. This approach offers a path for infrastructure modernization, preserving existing virtualization

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Veeam Kasten delivers reliable backup, restore, and disaster recovery for VMs and containers running on Red Hat OpenShift, including:

- Data protection built for Kubernetes using cloud-native architectural principles, streamlined operations, and modern tooling.
- Comprehensive end-to-end security everywhere with enterprise-ready encryption, customer-managed keys, and ransomware protection.
- Agility and ease of use for DevOps teams identifying and protecting system applications with a state-of-the-art management interface or a cloud-native API.

investments while embracing hybrid cloud infrastructure and modern management principles, allowing organizations to modernize at their own pace. OpenShift Virtualization offers a range of advantages over other approaches, letting you:

- **Ease migration**. OpenShift Virtualization includes a simple way to migrate existing VMs from other hypervisors with the migration toolkit for virtualization. You can even migrate VMs to the cloud or between Red Hat OpenShift clusters in the hybrid cloud. When needed, Red Hat Services offers mentor-based consulting services for hands-on support with your migration. With the global reach of Red Hat's Partner Ecosystem, system integrator (SI) partners can deliver everything from technology services for OpenShift Virtualization to full business consulting services, helping organizations make the most of their modernization strategy.
- **Speed time to production**. OpenShift Virtualization accelerates infrastructure and application delivery with a platform that supports self-service options and integrations of CI/CD pipelines. Developers can build, test, and deploy workloads faster with OpenShift Virtualization.
- **Manage everything from one platform**. OpenShift Virtualization simplifies operations, providing a single platform for VMs, containers, and serverless workloads. Adopters can standardize infrastructure deployment and maintain all workloads using a common and consistent set of established enterprise tools.
- **Modernize your infrastructure**. Migrating VMs from other platforms to OpenShift Virtualization honors existing virtualization investments while letting you capitalize on cloud-native architectures, streamline operations and management, and explore new development approaches.

Business continuity for VM-based workloads with Veeam Kasten

Merely backing up data is necessary but insufficient. Veeam Kasten is a purpose-built data protection solution for Kubernetes that helps organizations to perform backup and restore, disaster recovery, and cross-platform mobility for their applications and VMs. As a native Red Hat OpenShift operator, Kasten protects all workloads within the Red Hat OpenShift cluster, and it can help migrate, protect, and recover VMs running on OpenShift Virtualization. Within the cluster, Kasten communicates with the Kubernetes API server to discover applications and their resources (Figure 2). Kasten orchestrates point-in-time snapshots of complete applications, including both application manifest data and storage volume data. Kasten exports portable copies of the point-in-time snapshot to an external object store or to a Network File System (NFS) share.

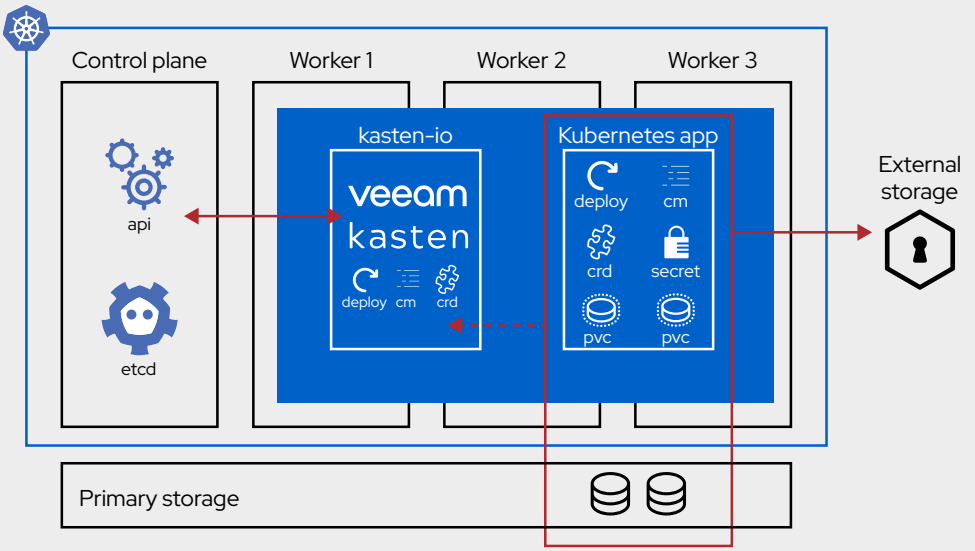

Figure 2. Veeam Kasten communicates directly with the Kubernetes API server

Kasten enables disaster recovery and data restoration with intelligence and automation, minimizing downtime and ensuring operations resilience, enabling:

- **Protection against ransomware and data loss**. Kasten administrators can configure policies to automate disaster recovery workflows, use Kubernetes-native role-based access control (RBAC), and benefit from backup immutability to protect recovery paths and application data from ransomware attacks. Kasten integration with Red Hat Advanced Cluster Security for Kubernetes also provides enhanced visibility, proactive threat detection, and reliable data protection to help ensure a resilient and safe environment, no matter where cloud-native workloads run.

- **Backup and restore of applications and VMs, anywhere**. Kasten can automatically capture and protect an entire application stack, including resource definitions, configuration, and underlying data, enabling restoration to a known good state. Through Kasten integration with persistent storage solutions, you can use policy-driven automation to manage where and how your backups are safely replicated to off-site storage while allowing near-zero recovery time objectives (RTO) for Kubernetes workloads.

- **Application and VM mobility and freedom of choice**. Kasten helps organizations to migrate VMs and containers between clusters, infrastructure providers, and Red Hat OpenShift versions. With Kasten's powerful Transform capabilities, data protection operations between different infrastructure providers can migrate workloads between heterogeneous Red Hat OpenShift clusters. For example, a VM might migrate from a data center to a branch office, to Red Hat OpenShift on Amazon Web Services, or to an edge location. Kasten Transforms enable VM cloning data operations for forensics, troubleshooting, and ransomware recovery.

Creating a virtual machine in Red Hat OpenShift Virtualization

Red Hat OpenShift operators automate the creation, configuration, and management of instances of Kubernetes-native applications. They provide automation at every level of the stack, from managing the parts that make up the platform to applications that are provided as a managed service. Red Hat OpenShift includes an embedded OperatorHub, a registry of certified operators from software vendors and open source projects. Admins can browse and install a library of operators verified to work with Red Hat OpenShift, packaged for user-friendly lifecycle management. For this solution, operators migrate and manage VMs under OpenShift, including:

- The OpenShift Virtualization operator.
- The migration toolkit for virtualization operator.
- The Veeam Kasten operator.

The OpenShift Virtualization operator includes several precreated VM templates, including CentOS, Fedora®, Red Hat Enterprise Linux®, and Microsoft Windows. Organizations can also create their own templates with their own images. Once a template is selected, it can be "Quick Created" or customized to fit individual needs. Customization might include the VM name, a cloud user password, a data source name, and a namespace. Once it is defined, OpenShift Virtualization then provisions the new VM on the OpenShift cluster.

Migrating a VM using the migration toolkit for virtualization

Kasten's support for exporting and importing raw block volumes enables new use cases including enhanced support for OpenShift Virtualization and high performance data services that use block volumes.

The migration toolkit for virtualization simplifies VM creation and migrates virtual machines at scale to OpenShift Virtualization. This process involves creating a choreographed plan to migrate VMs from their existing infrastructure to OpenShift Virtualization, with details that include:

- **Providers**. Configuring providers involves detailing the platform integrations and provisioning source and destination credentials. Supported providers include VMware, Red Hat Virtualization, OpenStack®, and other OpenShift platforms.
- **Network map**. Network mapping involves addressing the translation between the source and destination networks. For example, network mapping might map between VMware networks and Red Hat OpenShift network layers.
- **Storage map**. Analogous to network mapping, storage mapping creates a mapping between data stores on the existing storage infrastructure and target storage classes accessible through Red Hat OpenShift. For example, a storage map might map VMware ESXi data stores to Ceph® block volumes in Red Hat OpenShift Data Foundation.
- **Migration plan**. Migration planning involves mapping the source and destination infrastructure and options. This step typically involves specifying credentials to access the VM on its existing infrastructure and the target Red Hat OpenShift namespace for the VM.

Once these maps and plans are in place, adminstrators can select VMs and storage mapping from the user interface. The migration toolkit will warn of any issues that will prevent VMs from being migrated. Migrations can either be warm (online) or cold (offline). Under cold migration, source VMs are shut down while VM data migration is underway. Under warm migration, VM data is copied incrementally, leaving source VMs running until a final cutover. Adminstrators can also add hooks for playbooks for Red Hat Ansible® Automation Platform to run after the migration automation.

The Red Hat Openshift user interface indicates an updated migration status as soon as the migration begins. Detailed logs within the namespace show the migration stepping through the mapping process as defined above. When the migration plan is complete, the VMs start and are visible within the Red Hat OpenShift interface.

Protecting and recovering a VM with Veeam Kasten

Within Red Hat OpenShift, the Kasten operator web user interface allows administrators to create, run, monitor, and manage backup, restore, and disaster recovery policies across the cluster. Because Kasten is native to Kubernetes and deployed within the Red Hat OpenShift cluster, it can automatically discover adjacent applications and workloads. The user interface provides Yet Another Markup Language (YAML) for every action performed, enabling automation opportunities.

Kasten detects and lists all the namespaces available on the cluster, including those hosting containers and VMs. When namespaces are added or removed, Kasten updates the list in real time—essential since development teams or DevOps engineers may create and destroy namespaces frequently in a cloud-native world. Backup policies protect VMs and any associated objects deployed in Red Hat OpenShift.[2] For example, if VMs and cloud-native applications are deployed within the same namespace, all the application and VM descriptors, configmaps, secrets, and persistent data are protected. Kasten provides myriad options for protecting VMs and containers, including:

- Backup frequency
- Setting a designated backup window
- Snapshot retention settings
- Specifying which resources to protect

Veeam Kasten supports exporting backups to various targets, including Amazon Simple Storage Service (S3) or S3-compatible storage, Azure Blob, volume boot record (VBR) repository (when using vSphere CSI), or an NFS share. By incorporating solutions that support immutability, such as object lock or write-once-read-many (WORM) technologies, Veeam Kasten protects backups and data against ransomware attacks. Kasten restores projected objects to their previous state through the same consistent user interface. Importantly, fine-granularity restoration options allow administrators to respond to a wide range of circumstances.

- Kasten can restore entire VMs, containers, their associated data, and any associated objects.
- Individual components can be restored if only they are affected.
- On-cluster snapshots can protect against accidental deletions or configuration errors.
- Snapshots exported to off-cluster storage with immutability can defend against ransomware attacks.

2 Built-in automation can automatically apply backup policies to any new objects or VMs created in the cluster by using label-based policies, or policy-as-code.

Learn more

For more information on how Veeam Kasten can protect your VMs and containers, visit the following resources:

- Visit the Red Hat Partner Ecosystem website.
- Review the Veeam Kasten and Red Hat OpenShift Virtualization reference architecture.
- Run through an interactive demo of Veeam Kasten that shows protecting a VM on Red Hat OpenShift Virtualization.
- Take the OpenShift Virtualization Roadshow, an add-on lab exercise for Kubernetes-ready data protection.
- Fork and use our Validated Pattern for OpenShift Virtualization to accelerate your deployment.
- Protect up to five nodes for free with Kasten in your own sandbox on any Red Hat OpenShift platform.

About Red Hat

Red Hat is the world's leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers develop cloud-native applications, integrate existing and new IT applications, and automate and manage complex environments. A trusted adviser to the Fortune 500, Red Hat provides award-winning support, training, and consulting services that bring the benefits of open innovation to any industry. Red Hat is a connective hub in a global network of enterprises, partners, and communities, helping organizations grow, transform, and prepare for the digital future.

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