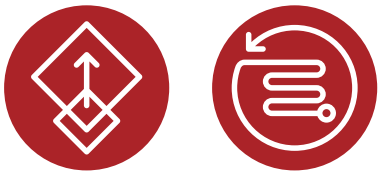
VERITAS

Veritas Enterprise Storage and Data Protection for Containers

Solution Overview.



White Paper | February 2022

Contents

Executive Summary

Containers are rapidly becoming a mainstream solution for building and running IT services that help businesses reduce management overhead and focus on delivering new innovations. Containers provide excellent application portability and also help improve efficiencies by making it easy to standardize the resources your applications require. However, containers and container orchestration engines like Kubernetes do not natively provide all the functionality stateful applications running in containers need.

Veritas provides enterprise data services focused on data management and protection that are designed to provide an enterprise foundation to support your containerized applications. With industry-leading storage management and data protection from Veritas, you can manage your containerized IT services confidently with the functionality container platforms and Kubernetes environments need to be enterprise ready. Some of the key functionality Veritas delivers includes:

- Data protection that ensures the integrity of containerized applications with advanced recoverability that provides distribution and platform mobility.
- Storage and availability management for stateful applications ranging from low-impact to mission-critical.
- A software-defined architecture that can improve application performance, reduce costs and automate key operational processes.

This solution overview will discuss the Veritas data management and protection strategy for containerized applications in Kubernetes environments. Veritas offers a unique integrated solution that ensures your Kubernetes environment is unlocked, fortified and optimized with the flexibility to run your containerized applications and IT services in any Kubernetes environment.

Solution Value

Kubernetes is a complex platform that consists of many abstractions for managing applications and their data to provide advanced container orchestration services. Organizations often provide enterprise storage and data protection for Kubernetes by using multiple independent tools, processes and point products.

As a software-defined solution, Veritas offers a complete foundation for container and Kubernetes data management designed to provide enterprise-grade storage and data protection for containerized applications. This unique integrated approach to data management for containers has several key advantages:

- ✓ **Application portability**—Move containerized applications between platforms with cross-platform recoverability.
- ✓ **Improved availability**—Ensure business continuity and high availability for containerized applications.
- ✓ **Infrastructure optimization**—Use software-defined storage and data protection that provide advanced features and better performance at a lower cost than point products and traditional solutions.

The Veritas software-defined data management solution for containers and Kubernetes offers storage, data protection and application availability management to provide a foundation for running your containerized applications with confidence—using a single, unified strategy.

Solution Overview

With integrated storage, availability and data protection technology, Veritas provides a single source of data management for containers and Kubernetes based on the following solutions:

Veritas InfoScale™—A software-defined optimization solution for mission-critical applications that abstracts applications from their underlying hardware and software resources. That abstraction enables enterprise-grade optimizations around business continuity, performance and infrastructure agility across physical, virtual, cloud and containerized environments. InfoScale provides advanced software-defined storage and availability management for applications running in containers in Docker environments, standard Kubernetes environments and the Red Hat OpenShift Container Platform (OCP). To learn more about InfoScale and containers, visit our website.

Veritas NetBackup™—Provides enterprise-level heterogeneous data protection for any application in nearly any platform, including containers. It provides cross-platform data protection functionality for a large variety of operating systems and applications. NetBackup uses a centralized management architecture that can be easily scaled to manage data protection for vast enterprise environments. For containerized applications running in Docker and Kubernetes environments, NetBackup has been designed to provide data protection for containerized applications by integrating with native constructs. This design enables flexible recoverability that can support any Kubernetes distribution. NetBackup provides comprehensive, quick and intuitive data protection for all application components in a Kubernetes namespace using native tools—on-premises or in the cloud. To learn more about NetBackup, visit our website.

Figure 1 shows an overview of how Veritas provides data management and protection for applications and IT services running in a Kubernetes (K8s) environment.

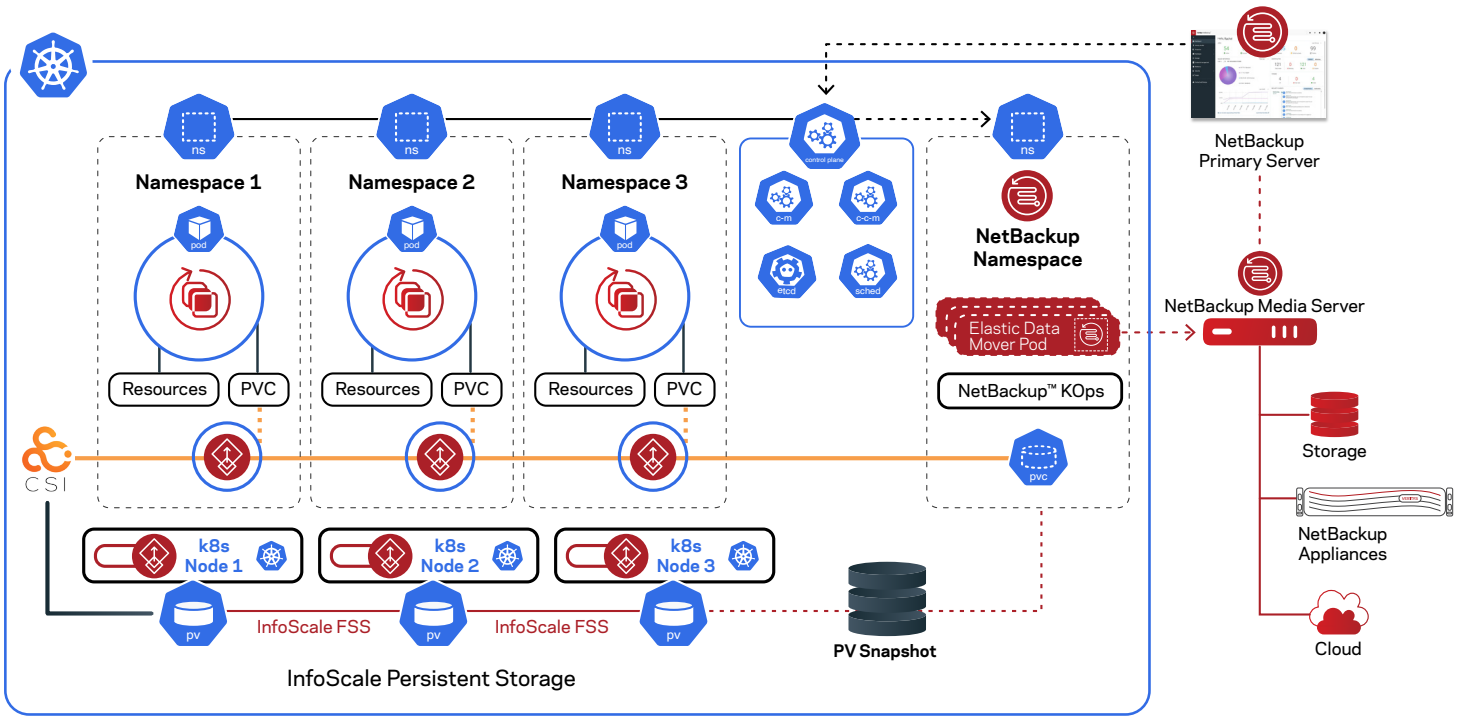


Figure 1. An overview of Veritas enterprise storage and data protection for Kubernetes environments.

Unlock

With several different operating models available within the Kubernetes landscape, it can be difficult to choose the right solution to manage your containerized applications. The flexibility and scalability benefits Kubernetes provides for applications also introduce some storage and data protection challenges. Veritas offers an API-driven solution for managing storage and data protection for Kubernetes, ensuring a streamlined process for delivering application mobility and data protection for containerized applications running in Kubernetes environments.

Veritas understands that you need both flexibility and agility to:

- Deliver the enterprise features and functionality your containerized applications need that is not available natively in Kubernetes.
- Avoid being locked into specific platforms and Kubernetes distributions if your container strategy changes and you need to adapt your containerized applications to run on other platforms.
- Efficiently manage CI/CD pipelines with solutions that are designed to use native Kubernetes processes.

Veritas provides a solution for both persistent storage and data protection that enables choice and flexibility for your containerized applications. With application mobility across physical, virtual and cloud platforms, you can focus on delivering innovation and a smooth user experience with your IT services.

Flexibility

Veritas storage and data protection solutions for Kubernetes are designed to use native APIs to allow for a familiar user experience managing persistent storage, with the ability to back up and recover anywhere—on-premises and in the cloud. NetBackup data protection for Kubernetes is both simple and comprehensive, with a suite of APIs and Helm chart integration that provide the choice and flexibility you need to build custom workflows to fit into your CI/CD pipeline. Veritas provides comprehensive data management for Kubernetes that is not available natively and eliminates lock-in with:

- Data protection that can support any type of storage that uses the Container Storage Interface (CSI), with the ability to back up and recover to different Kubernetes distributions.
- Persistent storage using a CSI plug-in that can work with any direct-attached or SAN-based storage.
- Automated workflows for data protection shared on GitHub that you can fully customize to meet protection requirements for any type of application.

With simple and intuitive self-service management, Kubernetes operations teams can securely access the functionality needed to have complete control over storage and data protection for containerized applications—with the ability to recover Kubernetes namespaces anywhere.

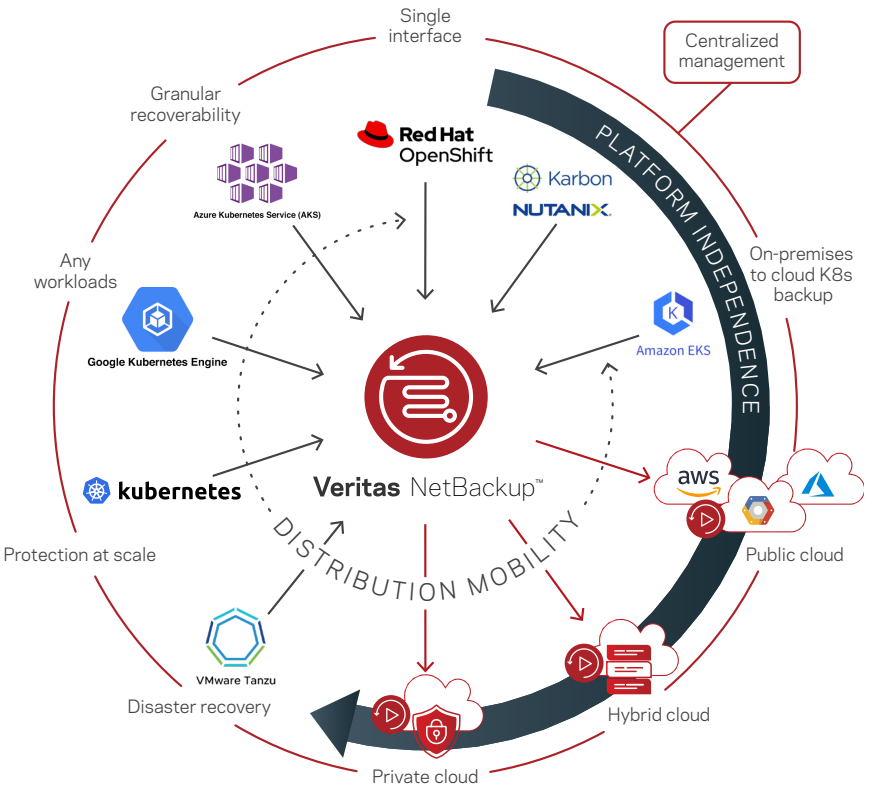


Figure 2. Distribution mobility with NetBackup for Kubernetes.

Software-Defined Storage

InfoScale's CSI plug-in works with Kubernetes to provide advanced storage management and high availability for containerized applications. Because storage is not available natively in a Kubernetes environment, InfoScale provides software-defined storage that is hardware and platform-agnostic, with the functionality needed by stateful applications running in production containers. InfoScale's enterprise functionality integrates with Kubernetes to provide a container management platform suitable for running stateful and mission-critical applications that require:

- **Advanced storage management**—InfoScale's CSI plug-in allows Kubernetes to provide InfoScale persistent storage volumes to containerized applications being managed within a Kubernetes namespace. You can use InfoScale's Flexible Storage Sharing to provide high-performance storage within a Kubernetes cluster using either traditional SAN storage or disks directly attached to Kubernetes cluster nodes. This approach can result in better performance than traditional SAN-based storage solutions at a significantly reduced cost.
- **Data integrity and availability**—With advanced I/O fencing that prevents data from being written to volumes on nodes within a Kubernetes cluster that have failed due to hardware or network communication issues, InfoScale provides higher data availability and prevents data corruption by allowing only the working nodes to continue normal operations. In the event of a disruption within the cluster, InfoScale's fencing driver helps manage a fast recovery by ensuring application pods are moved to another node and brought online to continue normal operations.
- **Automated operations**—InfoScale is a Red Hat certified solution for the OpenShift Container Platform that can provide full-stack automated operations with integrated monitoring, security and lifecycle management for containerized applications both on-premises and in the cloud.

InfoScale is deployed within a Kubernetes cluster as container images, and the InfoScale CSI plug-in provides the interface between Kubernetes and InfoScale. Figure 3 shows an overview of how InfoScale integrates with Kubernetes to provide persistent storage for containerized applications.

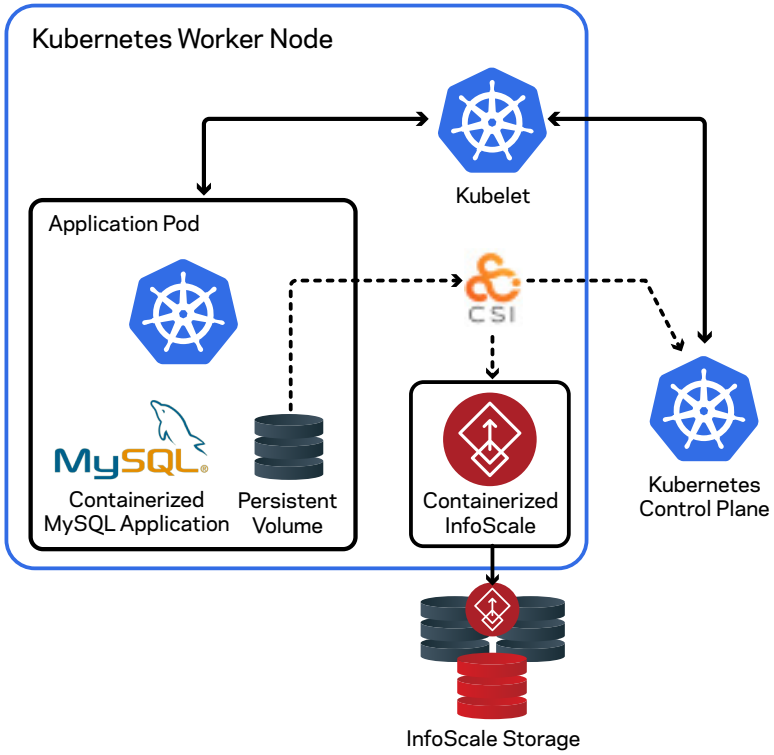


Figure 3. An overview of InfoScale persistent storage for a containerized application running in Kubernetes.

Fortify

Modern, fast-changing container environments require a new approach to data protection to ensure all your applications are protected without limiting your recovery options. With NetBackup, you can fortify and protect your entire environment from a single interface and eliminate the need for point products that only provide limited protection. This capability helps reduce the costs, complexity and risks associated with a fragmented data protection and resiliency strategy. NetBackup is designed with an application-centric architecture that ensures Kubernetes workloads are easily protected and recoverable by automating discovery, protection and recovery of all components of containerized applications.

Veritas provides advanced data protection and resiliency for containerized applications with a focus on:

- **Disaster recovery**—NetBackup provides protection for all components within a namespace and can protect any number of namespaces, protecting your entire environment in the event of a site failure. InfoScale provides resiliency and disaster recovery for Kubernetes clusters with real-time replication that can provide a very low recovery point objective/recovery time objective (RPO/RTO) for your containerized applications.
- **Recovery flexibility**—NetBackup enables cross-distribution mobility, with the ability to back up and restore containerized applications across Kubernetes clusters and distributions on-premises or in the cloud.
- **Platform independence**—InfoScale persistent storage and NetBackup data protection are platform agnostic and can work with nearly any infrastructure, with integrated lifecycle management supported in both Kubernetes and Docker environments.

Figure 4. An overview of the NetBackup solution for Kubernetes data protection.

High Availability and Disaster Recovery

The increased demand for running production applications and IT services in containers has resulted in a need to ensure business continuity in the event of a failure or service disruption. InfoScale provides advanced cluster availability management with an integrated I/O fencing solution that protects against data corruption and downtime. InfoScale can also provide disaster recovery for Kubernetes clusters with integrated cluster-level data replication that can manage data transfer between different Kubernetes clusters with a near-zero RPO.

InfoScale has high availability and disaster recovery features designed specifically to augment Kubernetes native functionality and provide additional availability features for Kubernetes environments. Some of the key functionality in InfoScale includes:

- **I/O fencing**—Ensure your applications are online in the event of a disruption within the cluster by identifying the failure and directing Kubernetes to quickly redeploy application pods on functional nodes.
- **Disaster recovery**—Geographically dispersed disaster recovery for Kubernetes clusters lets you recover an entire cluster to a second cluster in the event of a failure, helping eliminate the impact of localized outages.

- **Data consistency**—With several integrated replication options available, InfoScale can manage data replication between Kubernetes clusters using native replication functionality with Veritas Volume Replicator that maintains data consistency and write order fidelity. InfoScale can also support replication at the storage array level with out-of-the-box support for multiple storage vendors.

Flexible Recoverability

NetBackup reduces complexity, scales with growth and provides a foundation for container data protection that delivers broad platform support for container platforms and architectures. NetBackup protects all components of containerized applications at the namespace and individual volume level. NetBackup provides comprehensive protection and recovery options that give you:

- **Flexibility**—Easily roll back persistent volume backups.
- **Advanced recoverability**—Restore an entire namespace or multiple namespaces within the same or to alternate Kubernetes clusters.
- **Granular recovery**—Recover individual resource types in a Kubernetes namespace to the same or alternate Kubernetes clusters.

NetBackup is fully Kubernetes aware and protects your applications seamlessly by discovering and managing the snapshot and recovery of all components that make up a containerized application, including all persistent storage volumes, configuration files and custom resources. Figure 5 shows an example of a recovery operation in the NetBackup web console.

Recovery At Scale

NetBackup offers a single-click recovery model to reduce management overhead and complexity in large, complex environments. NetBackup supports the rapid recovery of Kubernetes workloads with the ability to recover individual resources, persistent volumes, a single namespace or thousands of namespaces—to the same or alternate Kubernetes clusters—as a simple, automated process.

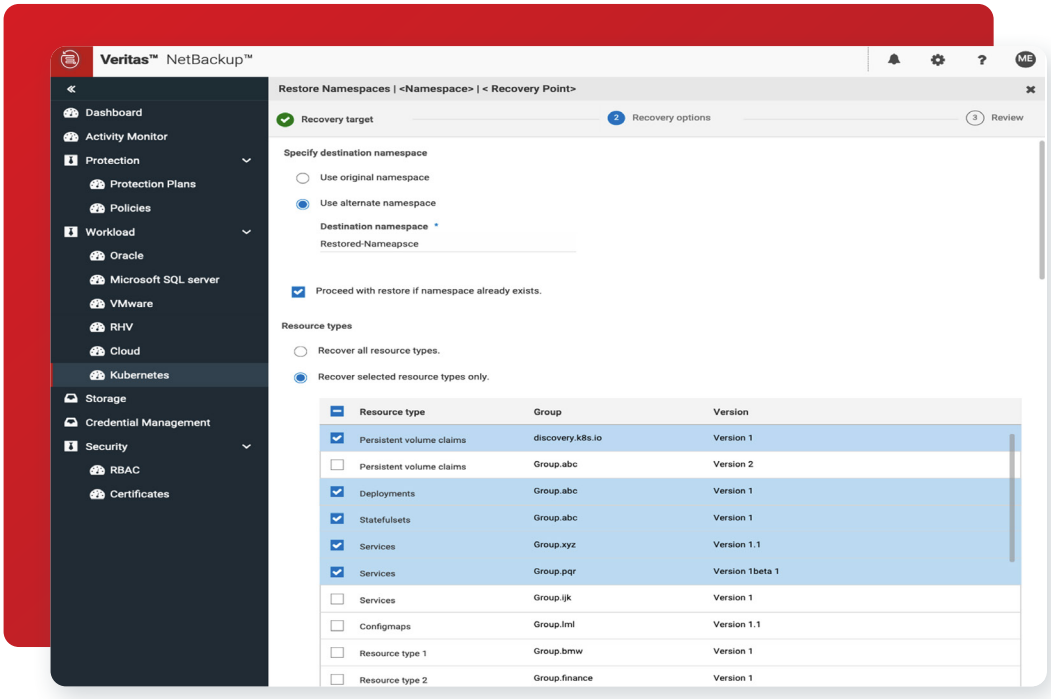


Figure 5. NetBackup for Kubernetes recovery options available from the management console.

Storage and Data Protection for Docker

Although Kubernetes is an excellent solution for managing and orchestrating operations for containerized environments, it may not be ideally suited for scenarios with less-demanding infrastructure and orchestration requirements. InfoScale offers a plug-in for Docker that provides enterprise functionality for containers running on Docker, including:

- **Storage management**—Get software-defined storage for Docker with integrated and snapshot functionality that enables copy data management for additional usage and testing requirements without affecting production data.
- **Scale-out architecture**—Add compute and storage capacity independently to meet the changing needs of your containerized applications, with integrated I/O acceleration that caches frequently accessed data for increased application performance.
- **Availability and resiliency**—Monitor processes and resources used by applications running in containers and replicate application data to other sites to manage availability and disaster recovery for containerized applications.

The software-defined approach to data management in Docker environments allows containers to run on any Docker machine, which provides flexibility and resiliency for your containerized applications. If a system fails, containers can run on another host using the same datasets. The advanced features and functionality InfoScale provides for Docker ensure your stateful applications have the foundation they need to run in Docker containers with maximum performance, availability and resiliency.

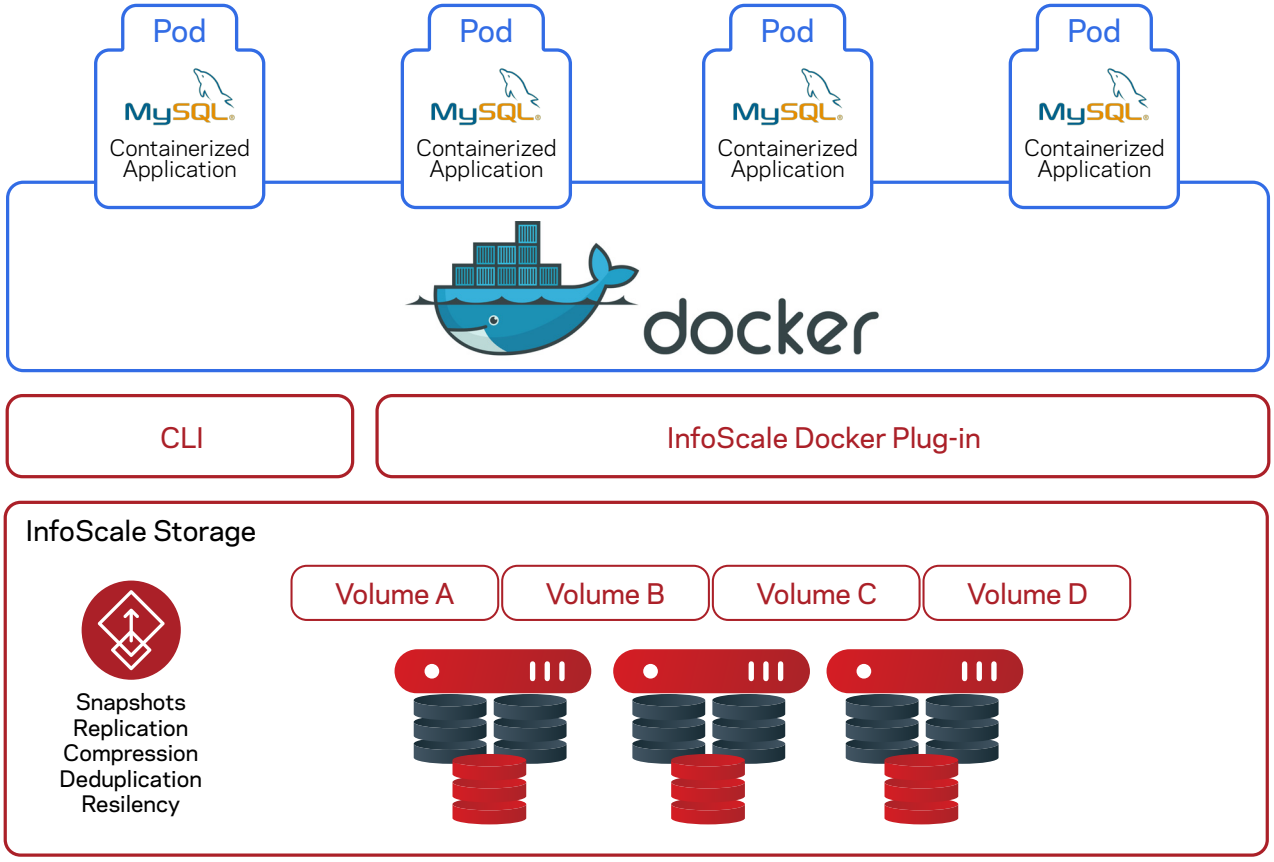


Figure 6. An overview of InfoScale storage management for Docker containers.

NetBackup can manage Docker data protection with a client that can be deployed as a container. The NetBackup Client Container offers different levels of protection to suit a wide variety of containerized applications. With the NetBackup Client Container for Docker environments, you can protect containerized applications with:

- **Sidecar deployment**—Protect application data in persistent volumes using the NetBackup Client Container as a sidecar within the application pod.
- **Dump and sweep**—Use a staging area where application data can be copied and then backed up by NetBackup using standard policies.
- **Application-consistent backups**—Mount persistent volumes used by applications directly in the NetBackup Client Container to provide NetBackup with visibility and awareness of application processes and dependencies.

The NetBackup Client Container for Docker is fully interoperable with existing NetBackup infrastructure and is available as a container image in the Docker hub.

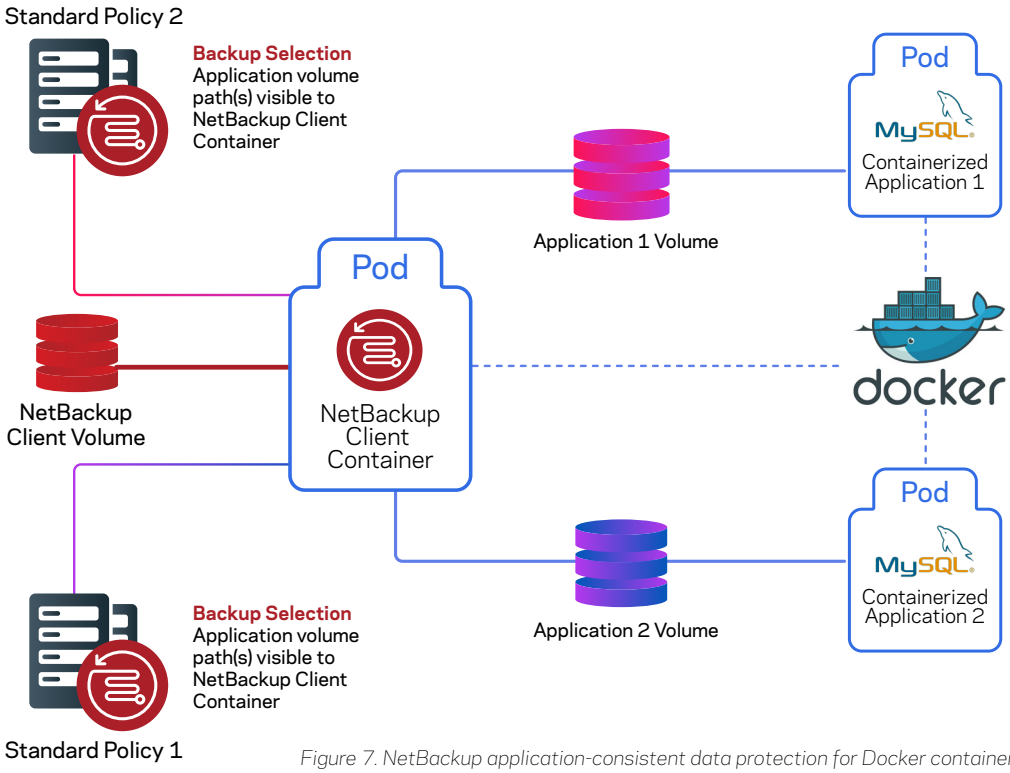


Figure 7. NetBackup application-consistent data protection for Docker containers.

Optimize

Ensuring that all storage and data protection for Kubernetes can be delivered dynamically is a key priority for Veritas. Both the Veritas storage and data protection solutions operate natively within a Kubernetes environment and can be scaled to support environments of nearly any size. This approach ensures the costs to keep environments flexible and fortified remains low while delivering performance and scalability as needed. Veritas storage management and data protection solutions for Kubernetes help optimize your resource utilization and operational efficiency with several key benefits:

- ✓ Optimize your storage infrastructure footprint by using your existing hardware without adding single-purpose hardware resources or appliances.
- ✓ Reduce the cost of managing development and testing environments with a software-defined solution that lets you use only the infrastructure you need without affecting production readiness.
- ✓ Use a single solution for data protection that can provide protection for applications with any protection requirement within any Kubernetes environment.

Operational Simplicity

Although Kubernetes can be complex to deploy and manage, it provides a significant amount of functionality for applications running in containers. Veritas integrates seamlessly into Kubernetes environments to ensure a smooth operating experience that doesn't require you to be a Kubernetes expert. NetBackup provides a web-based user interface to manage data protection operations for Kubernetes. InfoScale is supported within the Red Hat OpenShift Container Platform and as a stand-alone solution for Kubernetes storage management using the native Kubernetes command line interface.

Deployment Overview

Both InfoScale and NetBackup offer an optimized deployment experience that is consistent with how you will deploy and manage other Kubernetes resources.

- NetBackup—Uses Helm charts for a streamlined deployment experience familiar to Kubernetes users. Helm charts help define, install and upgrade Kubernetes applications, making ongoing maintenance for the NetBackup components within Kubernetes easier to manage.
- InfoScale—Available as a containerized deployment, InfoScale can be easily deployed within a Kubernetes environment in a native container form factor. This option makes it easy to install and operate and reduces resource overhead on the physical Kubernetes infrastructure while delivering the same advanced storage management functionality for applications in containers.

NetBackup Deployment

NetBackup has been designed to protect your Kubernetes environment without impacting or disrupting your applications. With the ability to easily protect and recover workloads in the web-based interface, NetBackup lets you manage data protection operations without the need for deep operational knowledge of Kubernetes.

The Netbackup Kubernetes operator (NetBackup KOps) is the interface that manages scheduling, updates and communications between NetBackup and Kubernetes. NetBackup integrates with an open-source component called Velero, which is installed and configured in the same namespace as NetBackup KOps. NetBackup uses Velero to facilitate volume shapshots using CSI.

Figure 8 provides an overview of how the NetBackup components are deployed and interact within a Kubernetes cluster.

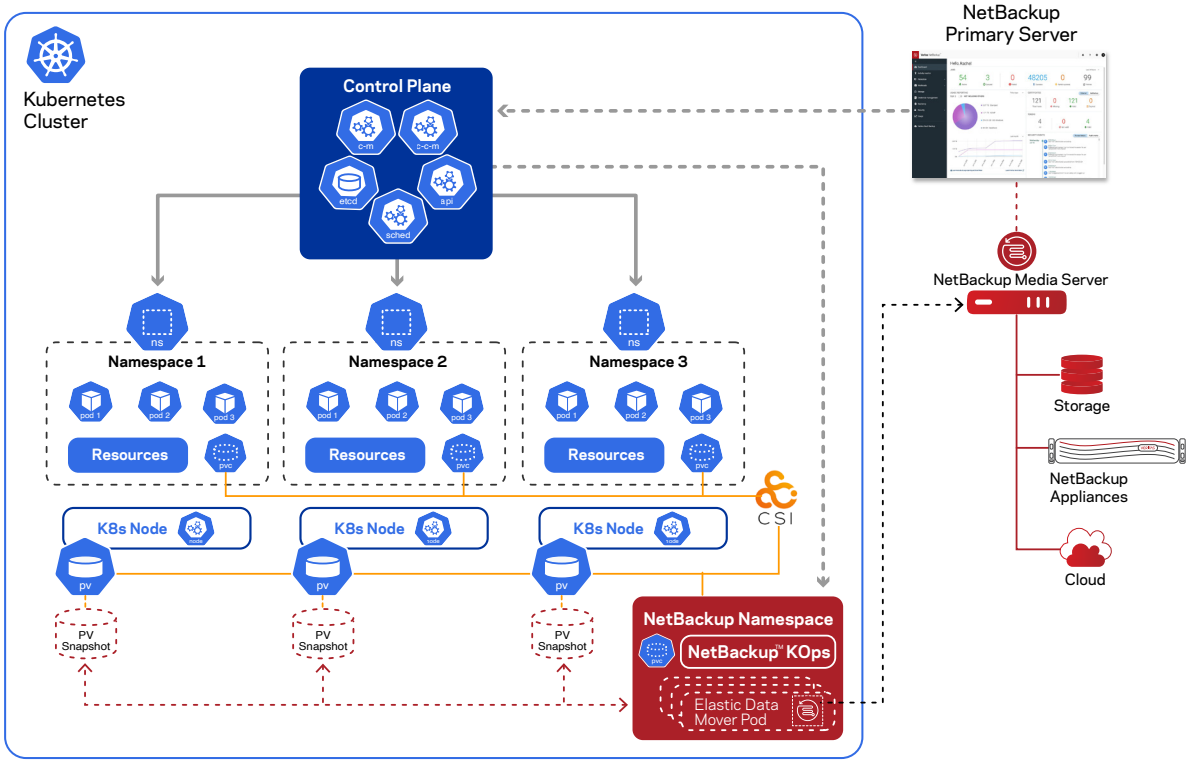


Figure 8. An overview of NetBackup data protection for Kubernetes clusters.

InfoScale Deployment

InfoScale is available as a containerized application that can be deployed within both standard Kubernetes environments as well as the Red Hat OpenShift Container Platform. All the required InfoScale components have been containerized and can be deployed as containers within a Kubernetes environment.

You handle lifecycle management for InfoScale using a Kubernetes special resource operator that manages cluster configuration and an InfoScale operator that manages operational processes such as upgrades, configuration changes and licensing.

Figure 9 shows an example of how InfoScale is deployed within a Kubernetes cluster and provides persistent storage for containerized applications.

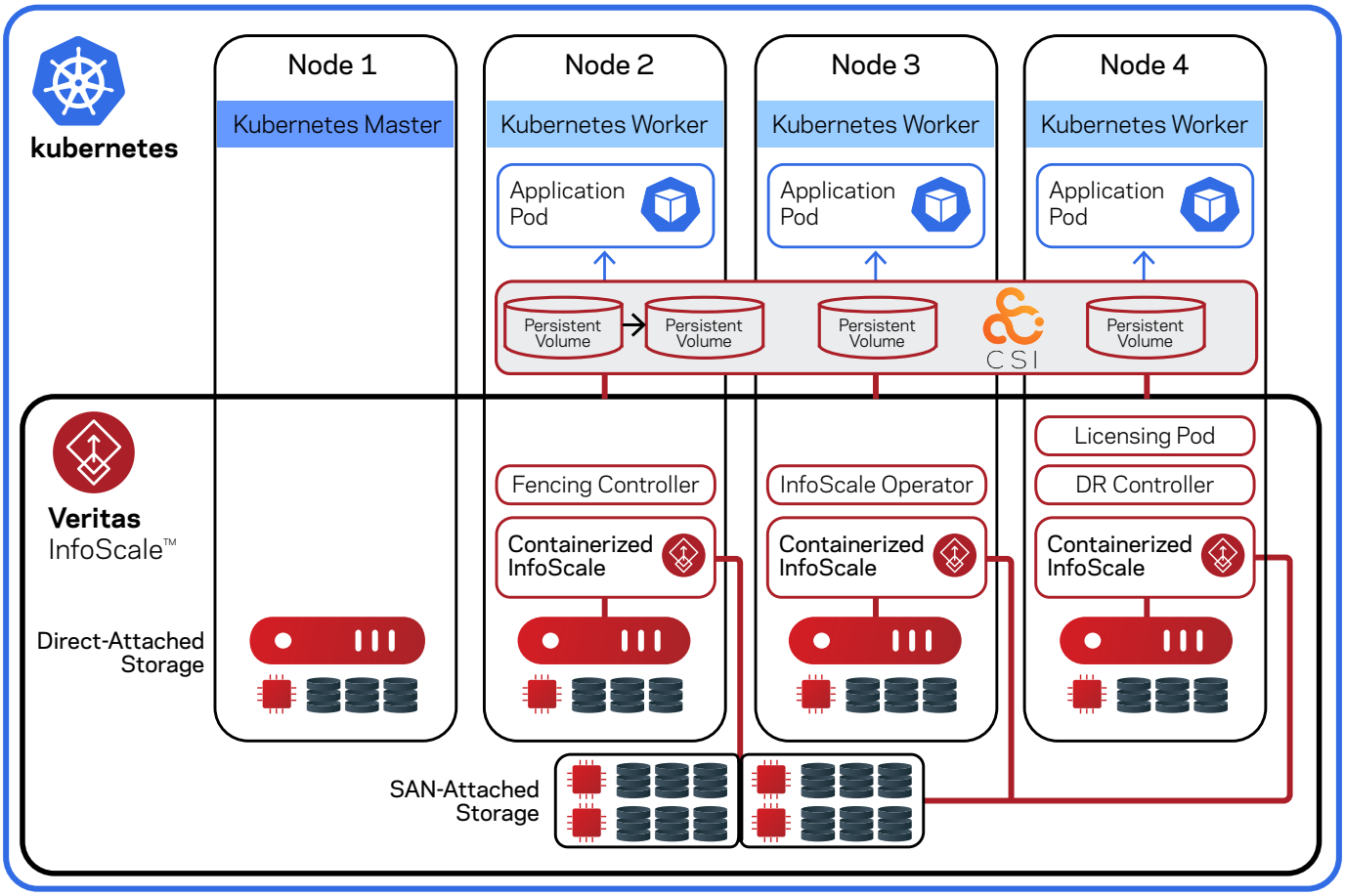


Figure 9. A Kubernetes cluster with InfoScale software-defined persistent storage.

Summary

Digital transformation has driven enterprises toward IT solutions that provide better efficiency and scalability for their IT services. Containerizing applications and managing operations with orchestration engines like Kubernetes can help businesses deliver more efficient innovation, but this operating model has several gaps in the enterprise functionality needed by most applications. Veritas solves this problem by providing an enterprise-focused foundation for storage management and data protection for containers and Kubernetes that can operate at scale. This unique solution has several key benefits:

- ✓ **Unlock** your container environment with advanced platform-agnostic storage and protection that lets you run your containerized applications on any infrastructure, with distribution mobility to move applications between platforms.
- ✓ **Fortify** your container operations with enterprise-grade persistent storage and data protection for any application that can operate at scale.
- ✓ **Optimize** operations by eliminating point products and reducing overhead with a storage and data protection solution designed to integrate seamlessly with native processes and infrastructure.

With a focus on usability and functionality, Veritas enables businesses to take advantage of the benefits of containerization with advanced protection and storage management that integrates seamlessly with containerized environments. Designed for flexibility and scalability to support the largest container environments, Veritas delivers an enterprise software-defined storage and data protection solution that provides the confidence you need to run your applications in containers with maximum availability and protection.

Table of Figures

About Veritas

Veritas Technologies is a global leader in data protection and availability. Over 80,000 customers—including 87 percent of the Fortune Global 500—rely on us to abstract IT complexity and simplify data management. The Veritas Enterprise Data Services Platform automates the protection and orchestrates the recovery of data everywhere it lives, ensures 24/7 availability of business-critical applications, and provides enterprises with the insights they need to comply with evolving data regulations. With a reputation for reliability at scale and a deployment model to fit any need, Veritas Enterprise Data Services Platform supports more than 800 different data sources, over 100 different operating systems, more than 1,400 storage targets, and more than 60 different cloud platforms. Learn more at www.veritas.com. Follow us on Twitter at @veritastechllc.

VERITAS

2625 Augustine Drive
Santa Clara, CA 95054
+1 (866) 837 4827
veritas.com

For global contact information visit:
veritas.com/company/contact

V1456 11/21