Enterprise Strategy Group™

TECHNICAL VALIDATION

Tintri VMstore Kubernetes Data Services

Native Observability and Management for Kubernetes Persistent Volumes

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Introduction

This Enterprise Strategy Group Technical Validation documents our review of Tintri VMstore Kubernetes Data Services. This analysis focuses on how Tintri has extended the deep observability and granular management it has historically provided to virtual machine (VM) and database workloads to the container platform space.

Application Modernization Challenges

Enterprises today rely on massive estates of production applications to keep operations running smoothly, differentiate themselves in their markets, and more. Nearly a third (31%) of survey respondents reported using 250 to 499 production business applications worldwide, with an additional 21% running 500 to 999 and 8% utilizing 1,000 or more applications worldwide.[1] Managing all these applications in a strategic fashion that maximizes efficiency is a business-critical endeavor for IT teams today.

Supporting on-premises cloud-native applications requires organizations to lean heavily on certain technologies, including containers and container orchestration. Containers provide an excellent environment for running microservices, ensuring consistency, scalability, and portability across different platforms and deployment environments. Interestingly, organizations appear mostly settled on their distribution of these technologies, reporting little expected increases or decreases in their presence in 24 months (see Figure 1). This deployment consistency is vital for IT and development teams to help manage complexity and better target areas for automation and other efficiencies.

Figure 1. Containers Will Persist as Key Cloud-native Support Components

Source: Enterprise Strategy Group, now part of Omdia

Of all the server types (i.e., containers, VMs, bare metal, and serverless functions) used by organizations surveyed by Enterprise Strategy Group, regardless of where they operate, Kubernetes for container orchestration is the most common platform today (28%) and is expected to increase in usage in the next 24 months to 32%.[2]

[1] Source: Enterprise Strategy Group Research Report, Application Modernization and the Role of Platform Engineering, October 2024. All Enterprise Strategy Group research references and charts in this technical validation are from this report unless otherwise noted.
[2] Source: Enterprise Strategy Group Research Report, *State of DevSecOps and Cloud Security Platforms: Scaling Security Practices to Accommodate Cloud-native Application Development*, May 2025.

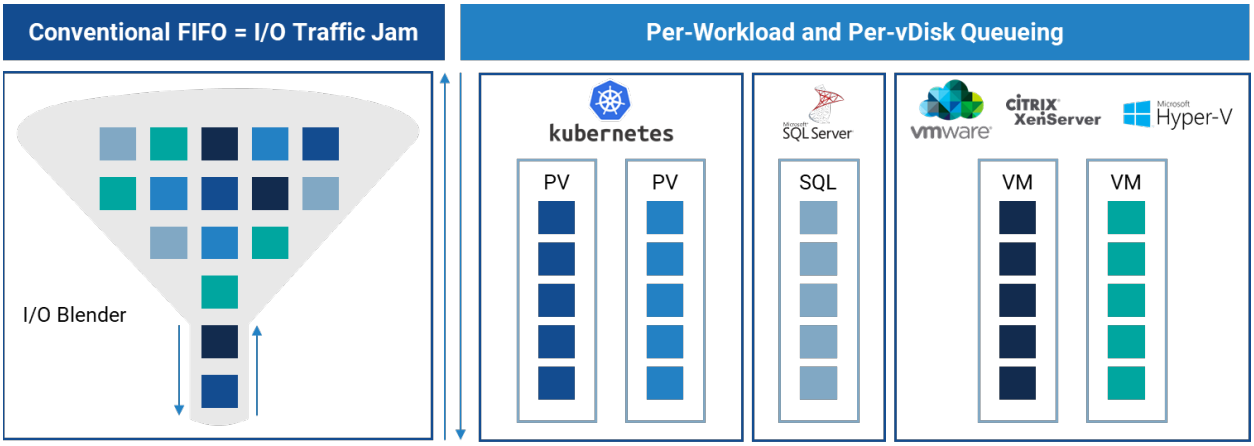
Tintri VMstore Kubernetes Data Services

Enterprise Strategy Group has previously examined Tintri VMstore and validated Tintri's well-established AI-enabled infrastructure, observability, and management, with a focus on high performance and simplicity. Tintri VMstore learns about an organization's environment—quickly and thoroughly—to simplify and automate storage management. Tintri VMstore systems offer a combination of autonomous operations and intelligent real-time and predictive analytics that delivers continuous workload optimization and maximizes performance so organizations can refocus efforts on high-impact projects and business innovation.

Tintri Analytics are key to VMstore's value, enabling organizations to simplify and accelerate operations and driving precise data-driven business insights for timely decision-making. Tintri states that its customers save thousands of management hours and millions of dollars annually using intelligent infrastructure. Key differentiators include:

- **Observability and control.** VMstore combines broad and deep visibility across the infrastructure stack with granular performance and capacity metrics and visualization. Because there are no LUNs, volumes, or other traditional storage constructs to manage, the system provides immediate insight into latency, IOPs, throughput, and space usage at the managed object—VM, database, or container—level.
- **Self-optimization.** This includes autonomous quality of service (Auto-QoS), which, among other things, ensures that each application incurs less than 1ms of latency and will not experience any performance degradation regardless of system capacity utilization. Auto-QoS and other autonomous operations help VMstore customers avoid time-consuming performance management and costly resource overprovisioning.

Figure 2. Tintri VMstore Autonomous QoS

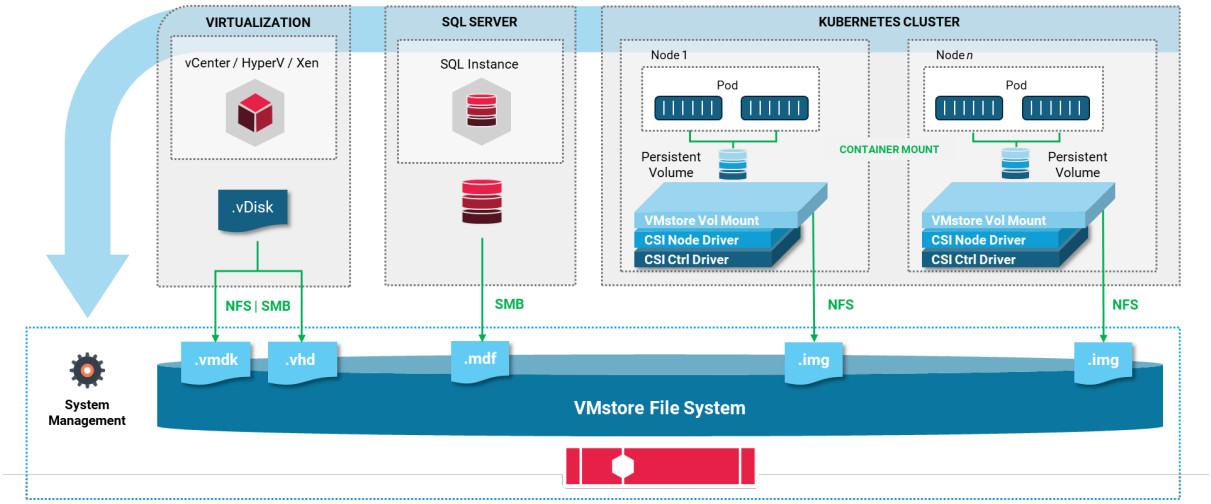


Source: Tintri and Enterprise Strategy Group, now part of Omdia

- **Predictive analytics.** VMstore leverages machine learning and three years of the customer's historical data as a means of reducing capital expenses and the inordinate amount of time spent on cumbersome resource planning.
- **Empowerment of end users and IT generalists.** VMstore is simple to deploy and use, which means that organizations don't require a team of storage experts and the associated overhead. Users are empowered by architectural simplicity, which results in far fewer resources needed to monitor and manage compared to using legacy storage such as LUNs and volumes.
- **Automation.** Tintri is sharply focused on automating IT operations. Tintri's strategy is based on the goal of having artificial intelligence software that eliminates 95% of storage administration tasks, which Tintri claims is now widely achieved by its customers. This empowers Tintri customers who administer Kubernetes with more development abilities and simplifies automation of common tasks and processes.

VMstore offers native Kubernetes support through a Container Storage Interface (CSI) driver. This makes it easier for VMstore customers to adopt and manage Kubernetes environments alongside their existing virtualized infrastructure. This enables customers to leverage new and existing Tintri Storage for VMs, SQL Server databases, and persistent volumes for containerized applications. Users can manage persistent volumes using familiar Tintri interfaces and tools, reducing complexity when running hybrid environments.

Figure 3. Tintri VMstore: Consistent Management for All Workloads



Source: Tintri and Enterprise Strategy Group, now part of Omdia

Enterprise Strategy Group Technical Validation

Enterprise Strategy Group analyzed Tintri VMstore's capabilities and how they apply to containerized applications in three distinct use cases: data protection and disaster recovery, unified management and observability, and DevOps workflows.

Data Protection and Disaster Recovery

Databases, analytics platforms, monolithic applications—older apps that maintain state on disk, such as logs, configuration, or user data—and web servers with persistent content are all examples of stateful applications. Stateful applications on Kubernetes require persistent storage and robust data protection and disaster recovery. VMstore's Kubernetes Data Services and CSI integration bring enterprise-grade capabilities such as automated snapshots, replication, and rapid recovery to Kubernetes workloads.

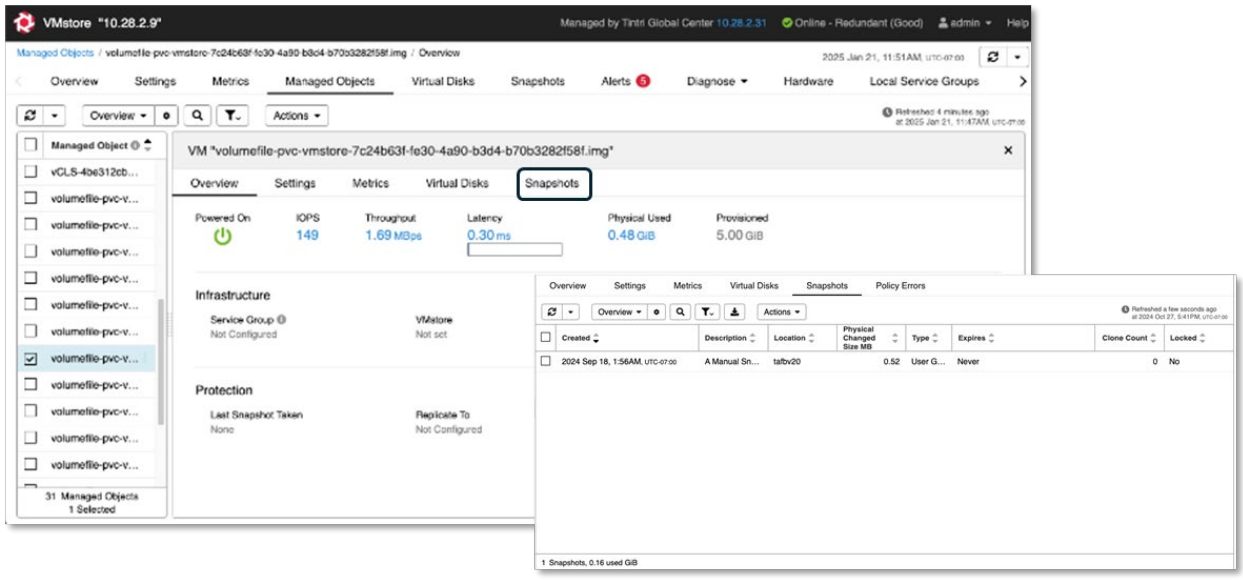
Enterprise Strategy Group Analysis

Enterprise Strategy Group considered the needs of a financial services company that runs customer-facing databases on Kubernetes and must meet strict recovery point objective (RPO) and recovery time objective (RTO) requirements for compliance and business continuity.

Kubernetes Data Services and the CSI driver enable automated, policy-driven snapshots and replication of persistent volumes used by stateful Kubernetes applications.

Snapshots can be executed on demand, scheduled in the UI, or automated using a REST API, ensuring consistent point-in-time versions that administrators can use to rapidly restore applications to a previous good state using the VMstore interface or Kubernetes-native workflows.

Figure 4. Persistent Volume Snapshots



Source: Tintri and Enterprise Strategy Group, now part of Omdia

Replicated data can also be used for disaster recovery, quickly bringing workloads online in a secondary location if the primary site fails.

Why This Matters

Organizations' top three data protection spending priorities are risk reduction (44%), business continuity (43%), and disaster recovery (42%).[3] All of these priorities share a common requirement: access to a clean copy of data that can be restored quickly when needed.

VMstore addresses these challenges with flexible snapshot capabilities that are simple to use and help organizations meet enterprise RPO/RTO requirements for Kubernetes workloads.

Tintri's automated, consistent snapshots provide multiple tangible business benefits. They can be utilized for quick recovery, reducing the risk of data loss; they can simplify disaster recovery processes for containerized data sets and applications; and they integrate with existing VMstore data protection and compliance policies.

Unified Management and Observability

VMstore supports production workloads on multiple types of infrastructure, including traditional VM-based applications, SQL Server on bare metal or in VMs, and in modern containerized environments. VMstore enables unified management, monitoring, and performance tuning for all, through a single interface and with granular observability.

Enterprise Strategy Group Analysis

In this example, we consider how an enterprise IT team would manage a hybrid environment with critical applications split between VMs and Kubernetes clusters. In this environment, some VM-based applications would

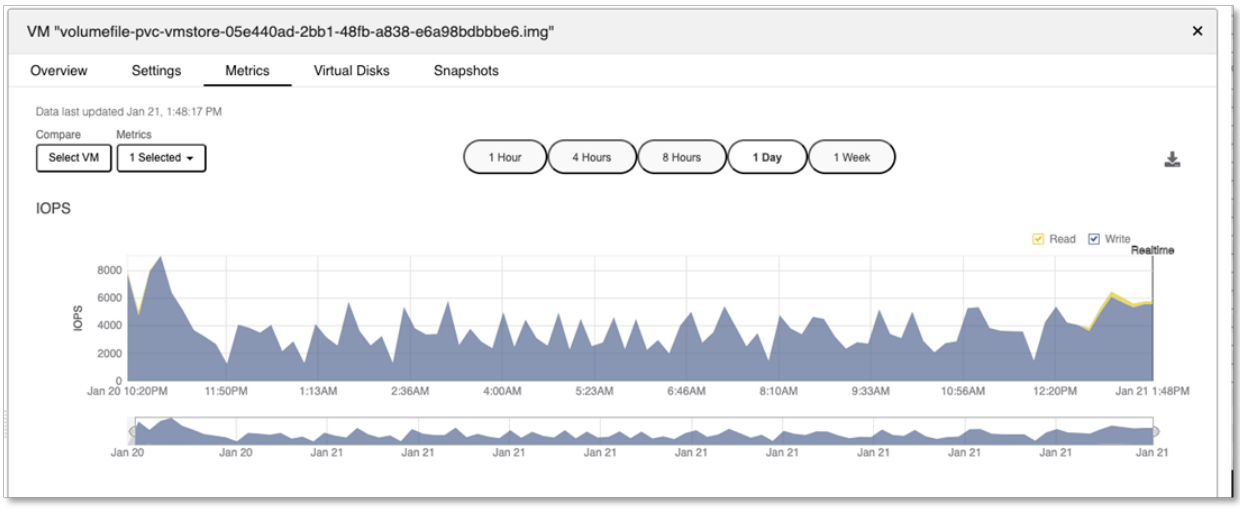
[3] Source: Enterprise Strategy Group Research Report, *2025 Technology Spending Intentions Survey*, December 2024.

be targets for conversion to microservices. Challenges include guaranteeing consistent performance, data protection, and insight across platforms.

VMstore Kubernetes Data Services and the CSI driver bring performance, data protection, and observability features VMs have long enjoyed to Kubernetes environments. Administrators use familiar VMstore tools and techniques to monitor, manage, and allocate resources for both VMs and persistent volumes.

The system provides real-time observability into I/O patterns, resource usage, and performance bottlenecks at the workload, application, or persistent volume level.

Figure 5. Persistent Volume Observability



Source: Tintri and Enterprise Strategy Group, now part of Omdia

Auto-QoS ensures fair resource allocation and performance guarantees for both VMs and container persistent volumes, preventing noisy neighbor issues.

Why This Matters

Observability is critical for operating hybrid, complex, and dynamic application stacks. To ensure and optimize the long-term health and value of applications, organizations need robust observability and management capabilities. The majority of respondents to an Enterprise Strategy Group survey (60%) reported using from six to 20 separate observability tools and platforms,[4] adding to the management burden these teams are already facing.

Tintri VMstore simplifies operations with a single management framework for all managed workload applications, increases operational efficiency, and reduces training requirements for both Kubernetes and VMstore administrators.

In addition, VMstore ensures predictable performance for all workloads and enhances troubleshooting with granular, real-time observability.

[4] Source: Enterprise Strategy Group Research Report, Transforming Observability and Monitoring Through AI, April 2025.

Accelerated DevOps Workflows With Instant Cloning and Snapshots

Organizations spend a significant amount of their development resources on application migration and modernization, in addition to maintaining and troubleshooting existing applications. Development teams often need to quickly spin up, refresh, or roll back test and staging environments. The VMstore Data Services for Kubernetes, via its CSI driver, enables instant, space-efficient snapshots and cloning of persistent volumes, enabling DevOps teams to rapidly create or refresh environments from production data.

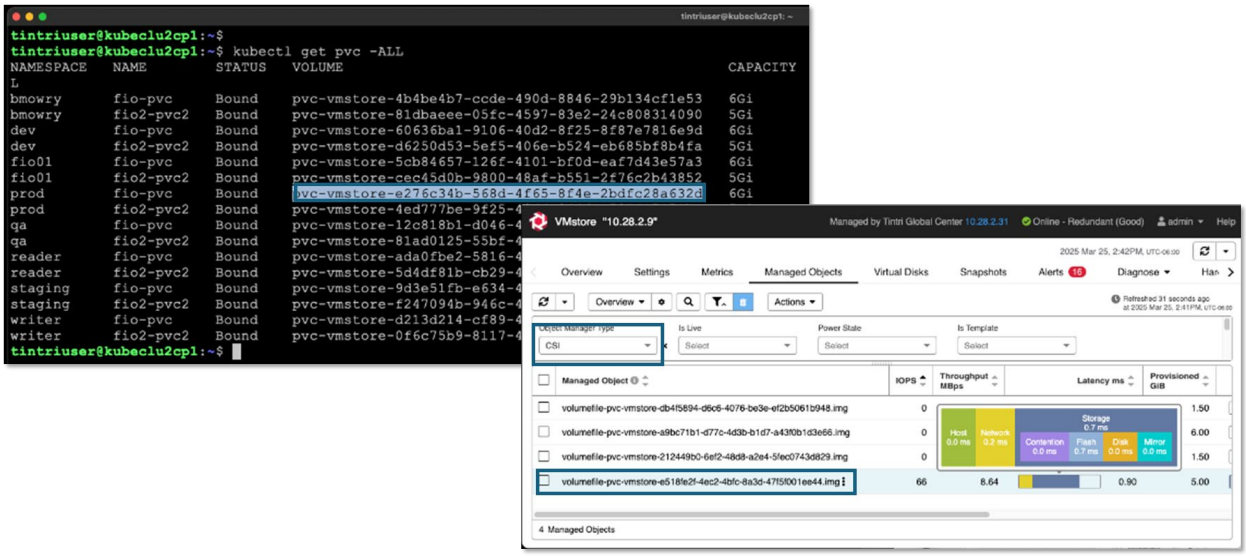
Enterprise Strategy Group Analysis

According to Enterprise Strategy Group research, a majority of organizations that have adopted continuous integration and continuous delivery (CI/CD) pipelines have implemented continuous automated testing of the delivery pipeline (61%) and continuous automated code deployment (61%). This reveals that automation is the foundation for scalability in successful DevOps practices. Particularly noteworthy here is that half of organizations implementing a CI/CD pipeline use continuous delivery via manual practices.

In this example, we modeled a software development company that wants to accelerate its CI/CD pipeline to enable it to develop and release code more rapidly. Rapid code development gives organizations the ability to more quickly identify and resolve bugs in code, streamline deployment operations, and, ultimately, achieve faster time to market. Daily code releases also enable organizations to more adeptly react to market conditions and market feedback.

Using a live system in a test environment, we observed how Tintri VMstore snapshots and clones provide developers with up-to-date test environments that mirror production data, while VMstore Kubernetes Data Services and the CSI driver bring the same performance, data protection, and observability features used for virtualized applications to Kubernetes environments.

Figure 6. Simple, Flexible Management



Source: Tintri and Enterprise Strategy Group, now part of Omdia

We walked through how administrators use familiar VMstore tools to monitor, manage, and allocate resources for both VMs and persistent volumes. and verified the system integration with CI/CD and DevOps tools via the CSI driver and full REST APIs.

Why This Matters

Enterprise Strategy Group research revealed that application developers spend only 35% of their time, a little more than two and a half out of eight work hours every day, on productive coding. This means that the remaining five and a half hours go to overhead tasks such building, testing, deploying, and troubleshooting code for different infrastructure; defining, provisioning, monitoring, and optimizing infrastructure and platform resources; and making everything work in heterogeneous application environments.

Tintri VMstore provides significant benefits to organizations' development environments, including automation of rapid environment provisioning and refresh; reduced storage footprint due to space-efficient snapshots and clones; consistent, production-like test data for higher quality releases and security testing; minimal manual intervention; and streamlined and automated application deployment processes. In addition, VMstore reduces manual optimization and ensures consistent performance for all environments with Auto-QoS.

Each of these capabilities can individually increase developer productivity. In combination, they provide a significant uplift to an organization's ability to deliver more robust products to market faster.

Conclusion

Modern data centers are increasingly diverse and distributed, resulting in infrastructure complexity and a growing, unsustainable gap between IT resources and available IT expertise to manage them. When IT leadership attempts to overcome these challenges by adding personnel or new technologies, complexity only increases, and new problems emerge.

The scalability, flexibility, and speed that the adoption of microservices architectures fosters is a prerequisite for sustainable business success. Microservices adoption is quickly turning mainstream, with 68% of organizations expecting to have modernized over half of their application portfolio in the next 24 months and 29% planning to have modernized 75% or more of their application modernization efforts by that time.

Tintri's VMstore infrastructure, observability, and management platform focuses on reliability, high performance, and simplicity. Tintri VMstore learns about an organization's environment—quickly and thoroughly—to simplify and automate storage management. Tintri VMstore Kubernetes Data Services bring this combination of autonomous operations and intelligent real-time and predictive analytics to containerized applications, delivering continuous workload optimization and maximizing performance so organizations can focus efforts on their core business and innovation.

Enterprise Strategy Group validated that Tintri VMstore Kubernetes Data Services provides quick recovery for containerized data sets and applications, reducing the risk of data loss and simplifying disaster recovery processes while integrating with existing VMstore data protection and compliance policies. VMstore simplifies operations with a single management framework for all managed workload applications, increases operational efficiency, and reduces training requirements for both Kubernetes and VMstore administrators, while ensuring predictable performance for all workloads and enhancing troubleshooting with granular, real-time observability. We found that VMstore can significantly increase developer productivity, providing numerous enhancements to an organization's time to market.

If your organization is looking at modernizing its application estate using microservices and Kubernetes container orchestration and needs to minimize complexity while maximizing observability and optimizing performance, Enterprise Strategy Group recommends you take a close look at Tintri VMstore.

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Enterprise Strategy Group, now part of Omdia, provides focused and actionable market intelligence, demand-side research, analyst advisory services, GTM strategy guidance, solution validations, and custom content supporting enterprise technology buying and selling.

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