

The Economic Benefits of Red Hat Data Services

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Executive Summary

Application modernization and containerization are changing the way IT services are delivered. Competitive considerations and customer expectations require organizations to accelerate application development and leverage the vast amounts of data they generate and store. To do this, they need next-generation storage solutions and data services to increase the agility of data associated with modernized application development.

IT leaders are broadening their perspective from worrying about “inside the data center” to refocusing on how they can seamlessly support applications for the corporate data center, cloud, and edge. The number of people working from home, expanding the edge, makes the modernization effort more urgent. To avoid impact to operations, it is critical that the data that once was locked tightly in the data center be made available to applications at the edge without compromising the integrity, security, or performance of the application.

Red Hat Data Services solutions, integrated with Red Hat OpenShift, provide enterprise-ready data services for applications and for analytics (business intelligence, artificial intelligence, and machine learning). The offering can run on top of or replace hypervisors, providing a flexible alternative for organizations to modernize on their terms and at their pace. Automated and integrated with Red Hat OpenShift in a single console, these data services support cloud-native application development for all types of users. By using data services that satisfy agility and mobility requirements, organizations can expect fast time to value, improved performance, exceptional scalability, and enhanced security.

Introduction: Application Modernization and Containerization

This ESG Economic Validation examines the benefits that organizations can expect by providing data services for modern applications with Red Hat Data Services solutions rather than legacy virtualized storage solutions and methods not designed for containerization.

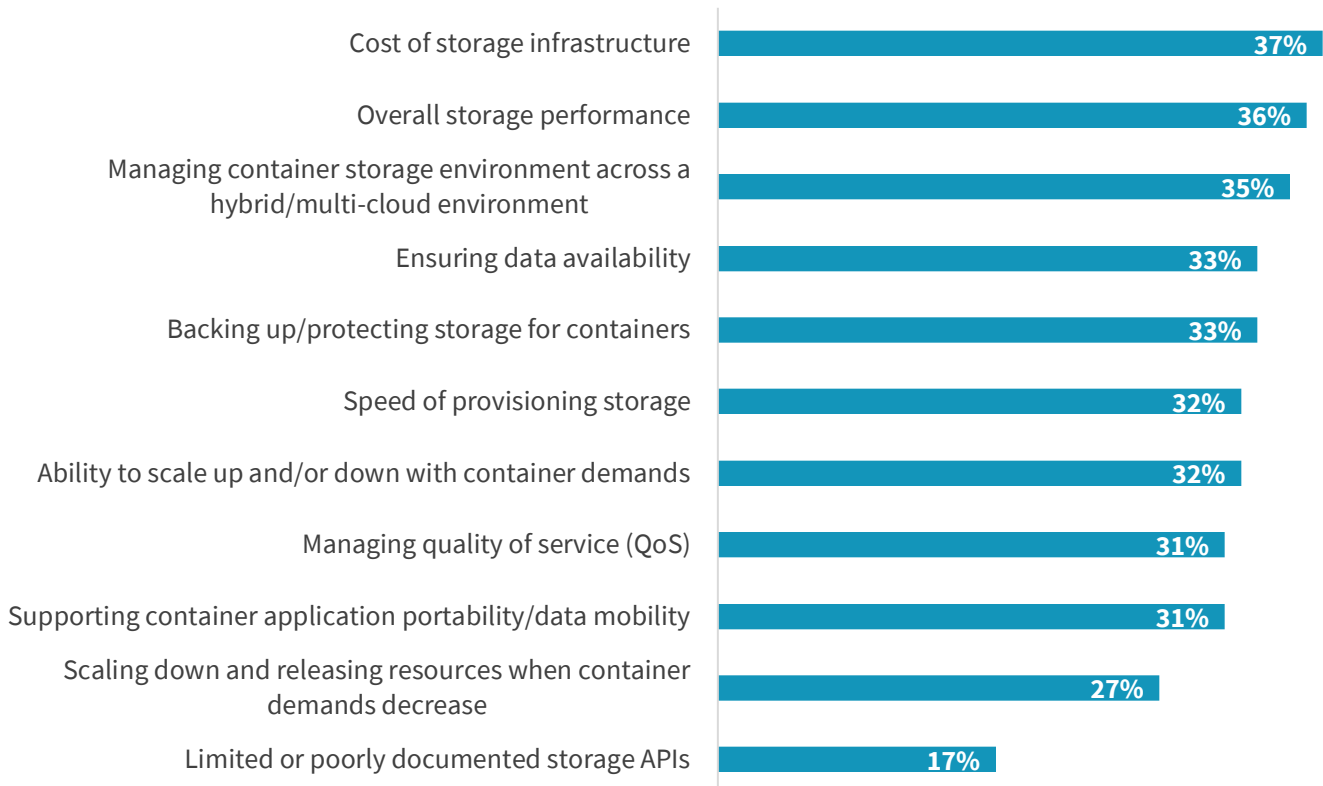
Application Modernization and Containerization

Application modernization and data agility are important to organizations trying to modernize by becoming data-driven businesses and adopting hybrid cloud and containers. ESG research found that 74% of organizations surveyed use or plan to use containers for production applications.¹ With containerization, the underlying infrastructure doesn't matter, so organizations can develop applications for one platform and have them run anywhere, on-premises or in the cloud, on any operating system or hypervisor. In this modern landscape, lines are blurring between physical storage and data services, which are inclusive of ingesting, moving, storing, governing, accessing, and transforming data as well as responding to and extracting value from data through artificial intelligence (AI) and machine learning (ML). Data needs to be easily accessible across the open hybrid cloud in a safe manner to support next-generation applications.

ESG research shows the top storage challenges around containerization are related to the cost of infrastructure, maintaining good performance for microservices, and managing container storage across a hybrid/multi-cloud environment while ensuring data availability and protection (see Figure 1).²

Figure 1. ESG Research: Storage Challenges for Container-based Environments

In general, what would you say are your organization's biggest persistent storage-related challenges in terms of its container-based environment? (Percent of respondents, N=274, multiple responses accepted)



Source: Enterprise Strategy Group

¹ Source: ESG Research Report, [Data Storage Trends in an Increasingly Hybrid Cloud World](#), March 2020.

² Ibid.

Additionally, more data than ever before is being generated and stored because business leaders recognize its value. What's behind the growth of unstructured data? The internet of things (IoT), big data/data lakes, and artificial intelligence/machine learning are all big contributors. In an ESG survey, 37% of respondents said that higher data volumes are a driver of greater IT complexity, making it the most often cited response.³

As the industry moves to infrastructure-as-code, current virtualization solutions may not meet future modernization needs. Architectural limitations that can impede agility, innovation, and speed to market include multiple layers of data abstraction; a hypervisor's rigid, hierarchical method of talking to storage; lack of native object storage; restricted scalability; lack of automation; and management complexity. Given the ongoing shortage of IT resources, the lack of automation poses a significant obstacle to modernization. It is important that IT organizations become more efficient as 74% of IT executives report that they have already frozen or have plans to freeze IT hiring.⁴

The alternative approach offered by Red Hat allows for agility, scale, and automation across physical, virtual, cloud, and containers. Data storage and services must support, not limit, these outcomes. Red Hat Data Services offers a flexible way forward for organizations to modernize on their terms and at their pace.

Modernized Applications Require Modernized Storage Solutions and Services

Managing storage is not the storyline of modernization. A storage-centric approach doesn't enable the type of agility that comes from speed (get it quickly) and flexibility (immediate access to an array of services). Instead, modernization is about tying storage together with automation for workloads, simplifying the complexity around modern data pipelines, and providing access and control to different consumers of storage. IT administrators, DevOps teams, data scientists, OpenShift administrators, and others need to provision their own storage and automate processes. Ideally, an application administrator kicks off an app, which initiates storage provisioning, network setup, and everything else from end to end, through a single interface, without interrupting the workflow. Modern storage solutions must support this model.

Organizations that prize agility, scalability, automation, and the ability to extract value from data are shifting away from traditional storage and virtualization solutions, which are expensive and inflexible, to a new storage model. Satisfying databases, data warehouses, data lakes, and other data repositories with traditional systems results in storage sprawl and storage silos, especially considering cloud storage and the differing characteristics of file, block, and object storage. Additionally, companies are handling data simultaneously for potentially tens of thousands of scattered microservices—and this situation cannot be managed by a single, monolithic system through legacy storage management techniques. A traditional approach limits business agility and complicates storage management. A modern, automated approach simplifies storage management and delivers a self-service experience familiar to cloud users.

Modern storage offers a choice of block, file, and object storage, which increases flexibility. Containerization works best with object storage, which requires a simple RESTful API and scales easily. Most virtualization storage platforms focus on block storage, which can be inflexible and often is dealt with in the application or database level, adding complexity.

The Solution: Red Hat Data Services

Red Hat Data Services solutions include persistent storage and data services for applications and data analytics running in Red Hat OpenShift. Both align with Red Hat OpenShift Container Storage, which is based on Red Hat Ceph Storage—software-defined storage designed to enable innovation by providing at-scale agility and high availability for demanding analytics and AI/ML workloads.

- **Data services for applications:** These OpenShift-based services enable application developers and DevOps teams to “design once, run anywhere.” Users manage Kubernetes persistent volume services through an

³ Source: ESG Research Report, [2020 Technology Spending Intentions Survey](#), February 2020.

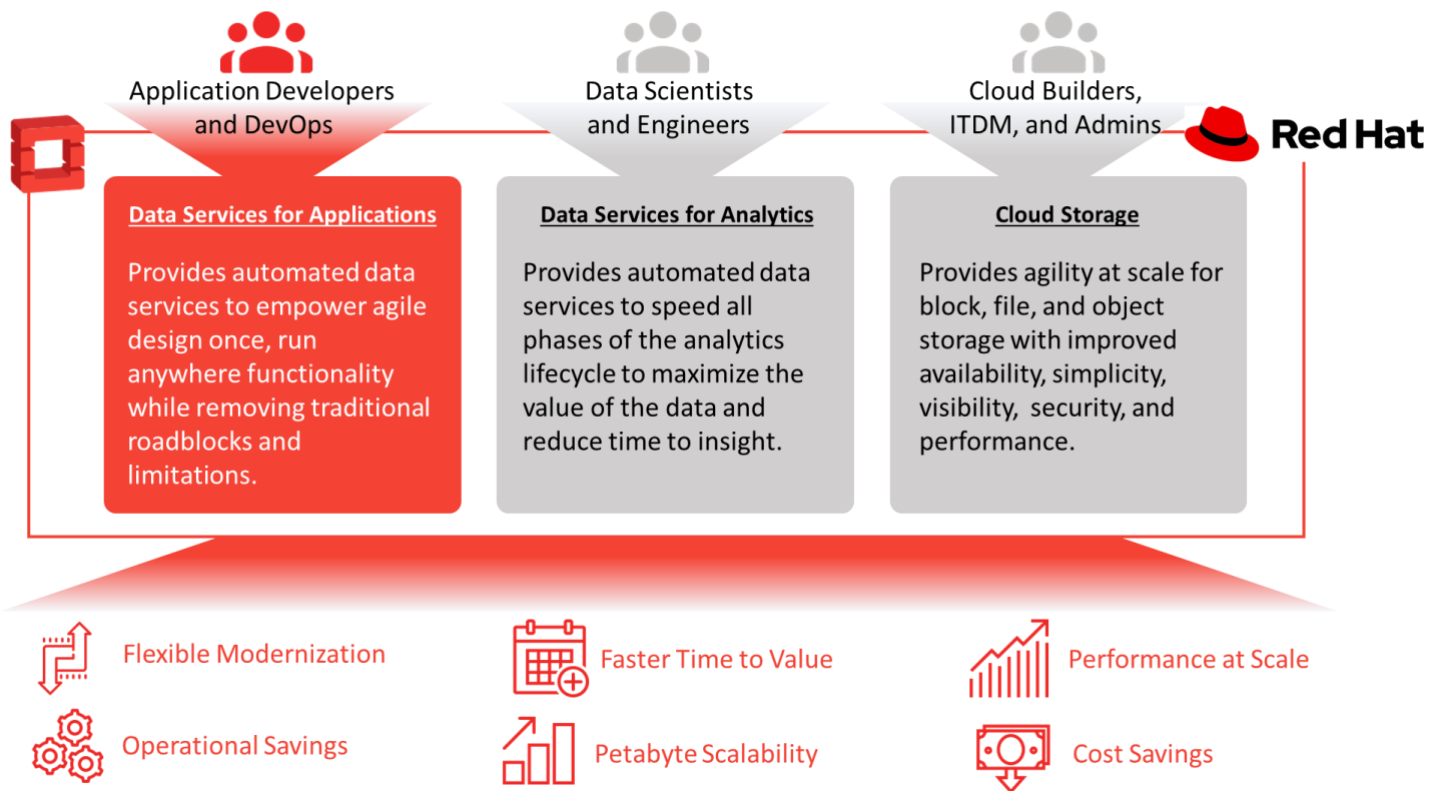
⁴ Source: ESG Master Survey Results, [Technology Impact of COVID-19: IT Decision Maker \(ITDM\) View](#), May 2020.

OpenShift console, where they control services through APIs. Red Hat OpenShift Container Platform delivers container storage interface (CSI) drivers, operators, snapshots/clones, and hybrid cloud data placement services.

- **Data services for analytics:** Data pipeline developers such as data scientists, engineers, and architects need to innovate quickly and shorten time to value when working with databases, data lakes, data warehouses, and AI/ML workloads. Data pipeline automation and data services for ML pipelines help speed business process automation for customer relationship management, supply chains, enterprise resource planning, transaction processing, operations support, and other systems.
- **Cloud storage:** Unlike traditional storage, Red Hat software-defined storage solutions provide continuously available and scalable file, block, and object storage services on commodity hardware. Ceph-based storage reflects more than 10 years of Red Hat hardening and broad community involvement.

Red Hat Data Services are enterprise-ready services designed to support cloud-native application development and continuous integration/continuous development (CI/CD). The data services are integrated with Red Hat OpenShift Container Storage, which works with the Red Hat OpenShift Container Platform via a single interface. Traditional storage management often is complicated by multiple interfaces and dashboards. Users of all types are empowered by integration and automation, which reduces their dependence on IT administrators, simplifies operations, lowers risk, and increases agility.

Figure 2. Red Hat Cloud Storage and Data Services



Source: Enterprise Strategy Group

Containerized Applications Should Run on an Infrastructure Designed for Containers

Organizations pursuing modernization may have experience with Kubernetes, and may have invested in other virtualization platforms, virtual machines (VMs), and storage devices. As a result, they are comfortable with virtualization, and a natural next step is to leverage the existing infrastructure by trying out containers layered on top of virtualization. As they move forward, business leaders will want to evaluate the technical and economic reasons for running containerized applications on VM-centric hypervisors and storage or for taking a modern approach.

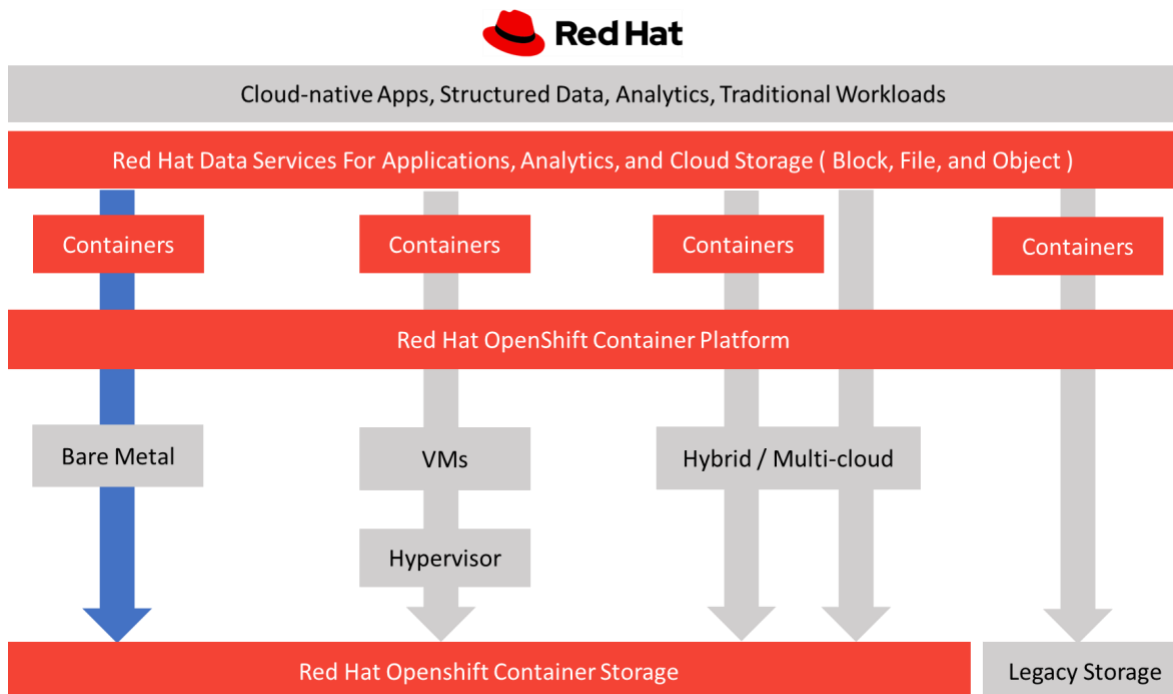
Red Hat OpenShift Container Platform, which is designed for containerized applications, allows users to access storage without having to manage complex storage systems. It can run on top of, or replace hypervisors, running with third-party storage or replacing virtualized storage area networks (vSANs). For example, Red Hat OpenShift running on top of a hypervisor with third-party storage offers advantages including:

- Rich container storage management and monitoring versus limited capabilities.
- Robust operator-based automation versus no automation.
- Block, file, and object storage versus block storage only.

When Red Hat OpenShift Container Platform and Red Hat OpenShift Container Storage replace both the hypervisor and vSAN (or third-party storage arrays), it overcomes many hypervisor-imposed VM storage limitations including:

- Lack of native object storage and data services such as snapshots, clones, and native replication.
- Limited scalability.
- Performance issues resulting from tiered architecture, bottlenecks, and inefficient deduplication.

Figure 3. Red Hat Containerized Deployment Options Powered by Red Hat Data Services



Source: Enterprise Strategy Group

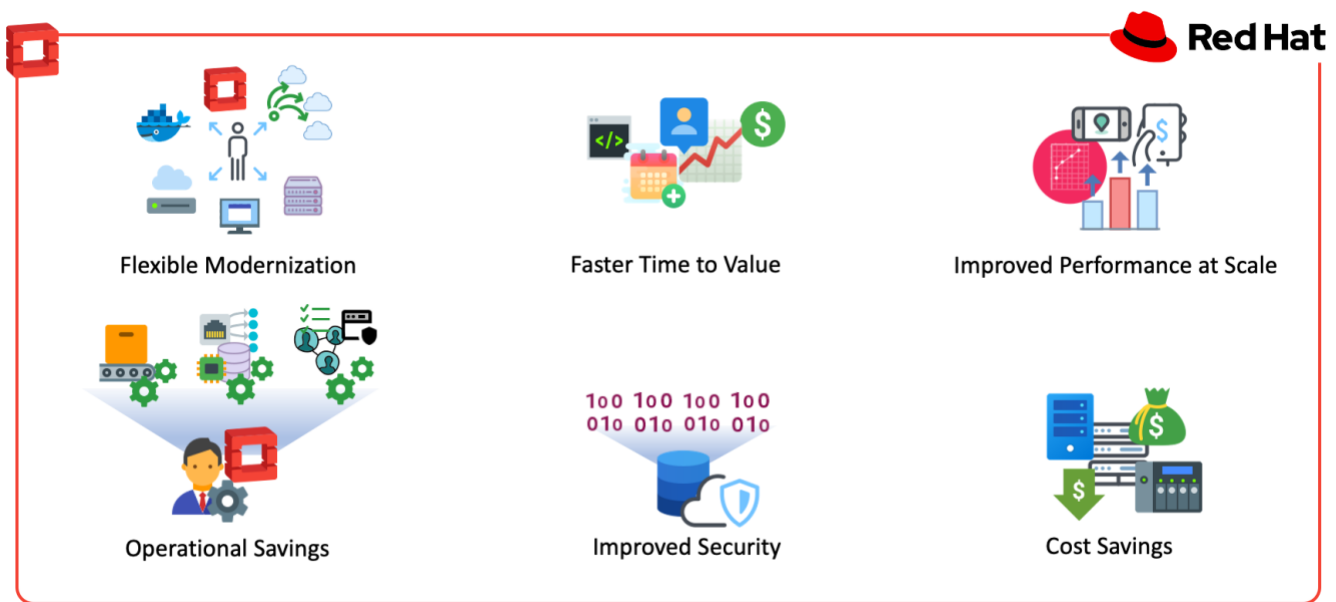
ESG Economic Validation

ESG’s Economic Validation process is a proven method for understanding, validating, quantifying, and modeling the economic value propositions of a product or solution. The process leverages ESG’s core competencies in market and industry analysis, forward-looking research, and technical/economic validation.

The Economic Advantages of Red Hat Data Services

ESG reviewed the technologies behind Red Hat Data Services and recently completed a technical validation of the technology. Based on observations to date, we expect the following outcomes in six categories that are summarized in Figure 4 and explored in this section of the report.

Figure 4. Expected Savings and Benefits Provided by Red Hat Data Services



Source: Enterprise Strategy Group

Flexible modernization. Flexibility is essential to allow businesses to modernize and innovate their way. A “one path for all” scenario doesn’t optimize creativity or each business’ modernization cadence. A customer stated that OpenShift Container Platform is innovative and lets them deploy quickly and easily control containers. Red Hat Data enables data portability across public, private, and hybrid clouds in a single interface—no need to pivot among multiple interfaces. Resources can be on bare metal, VMs, containers, serverless apps, and any type of storage—file, block, or object. Data can go anywhere for any application, reducing the risk of human error. Further, organizations can adjust easily to take advantage of cost- and time-savings opportunities.

Faster time to value. Businesses are more agile with automated installation/deployment, automated workflows that allow developers to control storage, automated scaling of apps, and automated data pipelines from edge to core. When apps are deployed faster, revenue can be recognized sooner. Data can be extracted, transformed, and loaded more quickly for AI/ML purposes to reduce time to market and increase competitive advantage. Data stays in place, eliminating expensive data migrations. Removing roadblocks associated with traditional and virtualization approaches enables ongoing business improvements. The ease and speed of installing Red Hat OpenShift Container Storage was quantified in a recently published ESG Validation report, which stated, “In less than 10 minutes, from a single pane of glass, we installed OpenShift Container Storage and created an AWS cloud cluster with data

Installed and configured in less than 10 minutes.

resiliency across multiple AWS availability zones that would be updated automatically and could be used for file, block, or object storage.”⁵ According to a customer with no prior experience with OpenShift Container Storage, “Our team was able to set up two distinct OpenShift clusters and conduct full data warehouse performance validation in less than two weeks. This experience far exceeded our expectations, as tests involving other Kubernetes storage services proved to be much more difficult to configure and validate.” Another customer with a similar experience said, “Using Red Hat OpenShift Dedicated helped us speed the project. It was set up and ready to use in only 10 working days. Red Hat helped us migrate our services into OpenShift Dedicated and maintains the day-to-day operations of OpenShift Container Platform.”

Improved performance at scale. Container-centric storage removes the limitations of multiple layers of abstraction, and it supports objects and direct-to-disk functionality. Improved performance results in faster time to insight, improved application consistency, and enhanced customer experience. ESG validated the results of Red Hat testing that shows a significant performance improvement can be achieved by eliminating the virtualization layer. ESG observed that benchmark testing with OpenShift Container Storage resulted in up to 44% better performance than a competitive storage solution. The director responsible for the performance testing with a big data insights (BDI) application workload said, “We

*“98% faster
build times.”*

have been delighted with the ease of use and outstanding performance of OpenShift Container Storage, prompting us to consider it our preferred data platform for running IBM Db2 Warehouse on OpenShift.” A customer quantified the performance benefits for his organization when he said, “Using Red Hat OpenShift Container Storage to provide persistent storage for Jenkins pods delivers up to 98% faster build times.”

Scalability. Optimized for large deployments, Data Services for OpenShift scales to 10 billion objects while maintaining consistent performance. Organizations can improve their storage agility by starting small and scaling up or down in a single system as requirements change—all without forklift upgrades or data migration projects. Storage flexibility increases because users can match storage media to their needs, use open source/commodity hardware, modify characteristics quickly, and rebalance automatically. Storage is simpler and easier with block, file, and object storage in a single platform.

Operational efficiency. As a result of simplifying, centralizing, and automating provisioning and daily management, there are fewer parts to manage. This lowers the cost of administration and gives time back to administrators who can focus on higher level tasks. A single console integrates Red Hat OpenShift containers and includes built-in capacity management and monitoring tools that provide visibility and control of the entire storage footprint. Self-service capabilities are aligned with modern workloads and increase the efficiency of app administrators, DevOps teams, data scientists, and other users who do not have to request resources from network and storage administrators. A customer summarized the benefits for his organization when he said, “Developer productivity has improved by more than 50%. We can iterate faster through our software development lifecycles. We can provision end-to-end environments for each developer and maximize server use by increasing container density.”

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Improved security. Integrated data protection, self-healing properties, and no single points of failure improve availability. Rolling software upgrades require little or no downtime. Client-side and object-level encryption; erasure coding, striping, or replication; and authentication features enable end-to-end data protection. Users can choose the backup and recovery capabilities that best match their needs.

Cost savings. Storage can be deployed on the commodity hardware of choice—flash or a mix of flash and more cost-effective storage. By buying only what is needed at a given time, users avoid the need to over-provision or make uninformed decisions years in advance. By eliminating hypervisors, virtualization license costs are reduced.

⁵ ESG Technical Validation: [Simplifying Persistent Container Storage for the Open Hybrid Cloud](#), September 2020

The Bigger Truth

Organizations need to modernize so they can be competitive in areas such as speed to market, flexibility, and customer satisfaction. Containerization is modernizing DevOps and providing hybrid/multi-cloud agility. But storage, a key component of modernization, has not kept pace with IT and DevOps advancements. Traditional storage infrastructures cannot scale fast enough, and management silos slow down operations, impeding the work of DevOps and data analytics teams. The scarcity of IT skills will continue to disadvantage companies that rely too heavily on labor instead of automation.

Red Hat is looking to the future, designing an enterprise-ready storage and data services strategy to empower modernization journeys. The strategy delivers enough flexibility to accommodate applications simultaneously as they are deployed today and enable a simple transition to where they are going. With options for data services to coexist with virtualization solutions or to fully replace them, organizations can evaluate various scenarios to determine and compare the functional, performance, and economic benefits

Red Hat Data Services provides the integrated, automated functionality to support cloud-native application development for all types of users and CI/CD. Data services for applications provide “design once, run anywhere” functionality. Data services for analytics automate data pipelines to help developers extract valuable information faster. Red Hat cloud storage offers continuous availability and superior scalability for file, block, and object storage. These capabilities translate into improvements in business agility, operational efficiency, spending, and security—all of which affect the bottom line. The director responsible for an evaluation of Red Hat Data Services for a big data insights (BDI) application workload summarized the bottom line benefits well when he said, “We have been delighted with the ease of use and outstanding performance of OpenShift Container Storage.”

Red Hat Data Services solutions are worth serious consideration if you are evaluating data services to support modern applications as an alternative to legacy virtualized storage solutions and other methods not designed for containerization. As storage volumes continue to increase, the limitations of traditional storage approaches will be more evident and difficult to work around. Just as important, this solution is a great choice for the analytics workloads that are so central to innovation.

To learn more about Red Hat Data Services, Red Hat OpenShift Container Storage, and Red Hat Ceph Storage and how they power application development, analytics, AI, and ML, visit openshift.com/storage.

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