Scalable, software-defined storage

Recommended configurations for Red Hat Ceph Storage on Cisco UCS

> "Contemporary data management and provisioning are dominated by three demands—scalability, simplicity, and security. They are all important but can often compete in terms of resources and "do-ability." With its Ceph storage, Red Hat is delivering a fundamentally simple installation and operational experience that is ideally tuned to help organizations tame the three-headed data monster."
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> ———
> **Mark Peters**
> Principal Analyst and Practice Director
> Enterprise Strategy Group

Overcoming the limitations of unstructured data

Organizations understand and appreciate the insights and opportunities that effective data management can present to their businesses. More than just accommodating the growing need for storage, data now offers an opportunity to disrupt existing business models by facilitating continuous innovation.

Traditional storage systems are limited in their ability to scale easily and cost-effectively to support large amounts of unstructured data. With about 80% of data being unstructured, new approaches using x86 servers are proving to be more cost-effective, providing storage that can be expanded as easily as your data grows.

There are increasing requirements to store unstructured data in smaller quantities as object storage. The advantage of identifying the data by metadata and not taking over management of the location is very attractive even for smaller quantities. As a result, new technologies need to be developed to provide similar levels of availability and reliability as large scale-out object storage solutions.

Software-defined storage—scalable and cost-effective approach

Organizations are starting to understand the insights and opportunities of how effective data management can benefit their business. More than just accommodating the growing need for storage, data now offers an opportunity. Cisco UCS and Red Hat® Ceph® Storage offer a solution that solves the problem of connecting storage and managing data effectively.

Cisco UCS and Red Hat Ceph Storage

Cisco and Red Hat provide a scalable, object storage solution for unstructured data that is integrated with Red Hat Ceph Storage. With the power of the Cisco Intersight management framework, the solution is cost-effective to deploy and manage and will support the next-generation cloud deployments that drive business agility, lower operational costs, and avoid vendor lock-in.

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Figure 1. Cisco and Red Hat Ceph Storage architecture
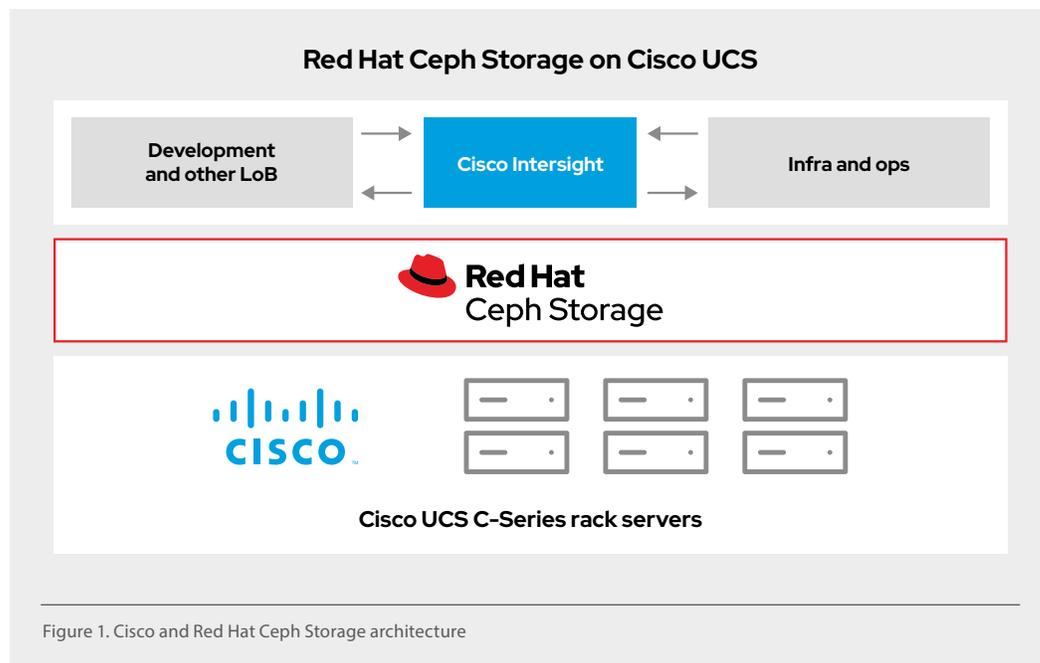
Cisco Unified Computing System

Cisco UCS is a state-of-the-art datacenter platform that unites computing, network, storage access, and virtualization into a single cohesive system. The Cisco UCS is designed to deliver:

▸ Just-in-time provisioning and mobility support to increase IT staff productivity.

▸ A cohesive, integrated system, which unifies the technology in the datacenter.

▸ Industry standards supported by a partner ecosystem of industry leaders.

In addition, Cisco Intersight uses service profiles, templates, and policy-based management to rapidly deploy and help ensure deployment consistency. It also provides end-to-end server visibility, management, and control in both virtualized and bare-metal environments. This helps reduce the total cost of ownership (TCO) and increase business agility.

Cisco Intersight

Cisco Intersight is an API-driven, cloud-based system management platform. It is designed to help organizations achieve their IT management and operations with a higher level of automation, simplicity, and operational efficiency. It is a management tool for the Cisco UCS and Cisco HyperFlex systems that provides a holistic and unified approach to managing distributed and virtualized environments. Cisco Intersight simplifies the installation, monitoring, troubleshooting, upgrade, and support of your infrastructure.

Red Hat Ceph Storage

Red Hat Ceph Storage provides an open, robust, and compelling software-defined data storage solution that significantly lowers enterprise data storage costs. Red Hat Ceph Storage helps companies manage exponential data growth in an automated fashion as a self-healing and self-managing platform with no single point of failure. Red Hat Ceph Storage is optimized for large installations—efficiently scaling to support hundreds of petabytes of data. Powered by industry-standard x86 servers, the platform delivers solid reliability and data durability and is multisite-aware and supports disaster recovery.

Figure 2. Red Hat Ceph Storage workloads and use case patterns
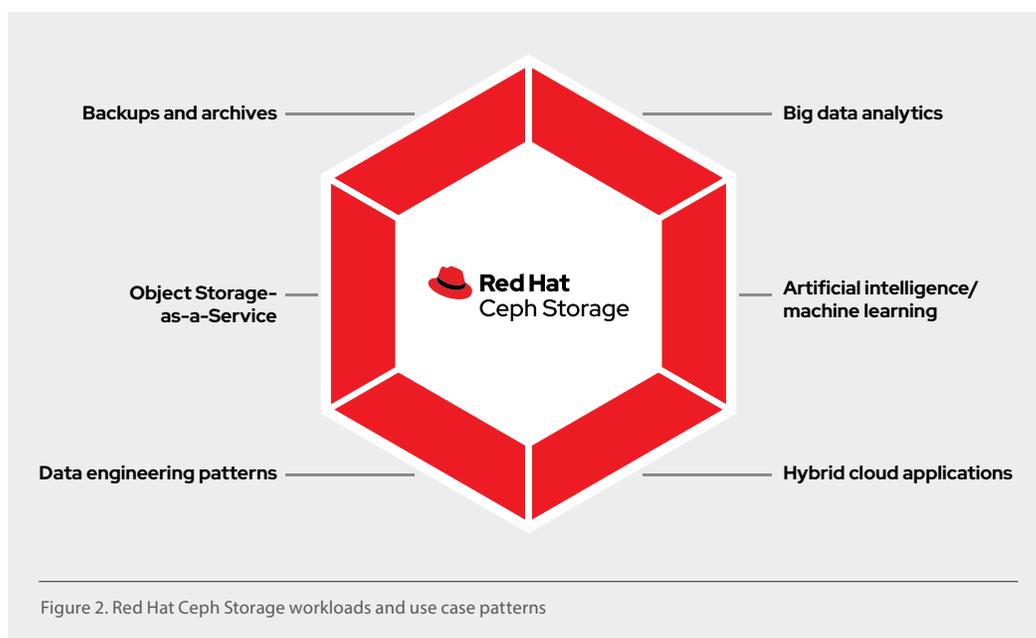
Red Hat Ceph Storage delivers results for a wide range of use cases requiring data-intensive workloads, including:

▶ **Data analytics.** Red Hat Ceph Storage can support massive parallel data from various sources, extending from the edge of your network to the core datacenter and private and public clouds. Ceph facilitates access to datastores and data lakes to drive business insights with data warehousing and analytics tools such as IBM Analytics Engine (Apache Spark), IBM Db2 Warehouse, and Starburst Trino.

▶ **Artificial intelligence and machine learning.** Red Hat Ceph Storage provides a shared data platform allowing data scientists to collaborate and accelerate projects. Platforms such as SAP Data Intelligence, Microsoft SQL Server Big Data Clusters, and Red Hat OpenShift® Data Science rely on Ceph.

▶ **Data engineering patterns.** With Ceph bucket notifications and eventing, organizations can automate data pipelines. Robust data patterns can support use cases from aiding healthcare diagnosis to building a Smart City pipeline from edge to core.

- ▶ **Object Storage-as-a-Service.** Red Hat Ceph Storage is ideal for implementing an object storage service, with proven scalability and performance for storing small and large objects. Red Hat Ceph Storage supplies a shared data context for all your projects, whether provided by a trusted service provider, shared across a consortium, or delivered to an extended enterprise.

- ▶ **Backups and archives.** Ceph object protocol is an ideal platform to support backup targets and data archives for various workloads, from Kubernetes-based application resiliency to long-term immutable archives required for data governance. Red Hat Ceph Storage includes node-based subscription options for object storage targets with backup and archive solutions delivered with our data protection ecosystem partners.

- ▶ **Hybrid cloud applications.** Red Hat Ceph Storage extends your data platform from the core datacenter to public and private cloud deployments, all with a common user experience (regardless of deployment model). Red Hat Ceph Storage offers scalability for private cloud deployments on Red Hat OpenStack® Platform[1] supporting application programming interfaces (APIs) such as Cinder, Glance, Nova, Manila, and Swift. And Red Hat OpenShift Data Foundation brings persistent file, block, and object data services with Ceph to stateful applications running on Red Hat OpenShift.[2]

Security

Red Hat Ceph Storage has features to help protect data from malicious and accidental threats, including hardware failures, employee errors, and cyberattacks. It provides a continuum of resiliency and data durability options from erasure coding to replications and supports at-rest and end-to-end encryption.

The modular, physically, and logically distributed architecture of Cisco UCS offers advantages in creating a highly available, secured computing platform and network. Discrete software components (subsystems) are implemented as separate software processes that run in their own protected memory address spaces. This implementation provides true fault isolation and compartmentalization in the event of a security incident by preventing faults in one subsystem from negatively affecting others.

- ▶ **Management plane:** The management plane contains the logical group of all traffic that supports provisioning, maintenance, and monitoring functions for the Cisco UCS.

- ▶ **Control plane:** The control plane contains the logical group of all switching, signaling, link-state, and other control protocols that are used to create and maintain the state of the network.

- ▶ **Data plane:** The data plane contains the logical group of customer application traffic generated by hosts, clients, servers, and applications that are sourced from and destined to other similar devices supported by the network.

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1 *Ceph storage is reliably the most popular storage for OpenStack applications. For the latest information see the OpenStack Foundation Annual Survey.*

2 *Red Hat OpenShift Data Foundation automates Ceph technology with the Rook Kubernetes operator and NooBaa multicloud object gateway.*

Cisco UCS and Red Hat Ceph Storage—better together

Object storage is an increasingly popular form of distributing data in a scale-out system. Cisco UCS with Red Hat Ceph Storage is one of the most valuable and performant scale-out storage solutions on the market. The solution provides customers and partners with everything necessary to store object data easily and more securely. Cisco's leading technology of centralized management and advanced networking technology helps to easily deploy, manage, and operate Red Hat Ceph Storage solution.

With the continuous evolution of software-defined storage (SDS), there has been increased demand to have Red Hat Ceph Storage solutions on Cisco UCS servers. Cisco UCS, originally designed for the data-center, together with Red Hat Ceph Storage is optimized for such object storage solutions, making it an excellent fit for unstructured data workloads such as active archive, backup, and cloud data. The Cisco UCS C240 Rack Server delivers a complete infrastructure with exceptional scalability for computing and storage resources together with enterprise networking.

About Cisco

Cisco (NASDAQ: CSCO) is the worldwide technology leader that has been making the Internet work since 1984. Its people, products, and partners help society securely connect and seize tomorrow's digital opportunity today. Discover more at thenetwork.cisco.com and follow them on Twitter at @Cisco.

Conclusion

Cisco is a global leader in compute, network, and cloud solutions for enterprises, customers, service providers, and telcos. As business expands and needs evolve to support today's demands, companies are searching for new approaches to meet increased end-user demand while continuing to deliver value to the business—all with limited resources.

As the global, trusted leader in open source solutions for today's enterprises, Red Hat helps organizations of all types and sizes adapt to continually changing IT requirements. With Red Hat Ceph Storage, you can transform your organization's IT infrastructure and your ability to manage vast amounts of data, especially for cloud computing platforms. Red Hat Ceph Storage delivers extraordinary scalability, providing thousands of clients access to petabytes or exabytes of data and beyond.

Learn more:

Red Hat Ceph Storage

Cisco UCS

Cisco UCS design and deployment guide

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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