



Lenovo Ceph Storage Solutions powered by ThinkSystem Ready Nodes: Massively Scalable Software-defined Storage Platform for Block, File, and Object Data

Solution Brief

Lenovo Ceph Storage Solutions

Lenovo Ceph Storage Solutions are a comprehensive answer to those critical storage challenges. Seamlessly integrating IBM Storage Ceph with Lenovo ThinkSystem Ready Nodes, these pre-configured, validated, and fully supported solutions allow organizations to prioritize core business operations and avoiding risk and complexity. With consolidated support for block, file, and object storage, Ceph storage eliminates data silos while preserving cost efficiencies at scale and data sovereignty.

A validated design provides 24x7 support, enhancing security and reliability. In partnership with IBM, Lenovo delivers the benefits of open-source storage with enterprise-grade confidence and support.

Key Features

- **Enterprise Support:** Available 24x7x365 with Lenovo Premier support
- **Scalability:** Non-disruptively grow from one to hundreds of petabytes
- **Cost-effective:** At scale, implementing software-defined storage reduces TCO
- **Validated Design:** Easy to configure and order with proven performance and manageability
- **Security:** Enterprise grade data protection and data governance

Lenovo Ceph Storage Solutions are designed to tackle the most pressing storage obstacles faced by organizations. Seamlessly integrating IBM Storage Ceph with Lenovo ThinkSystem Ready Nodes, these validated, and fully supported solutions empower organizations to prioritize core business operations efficiently knowing they have a secure enterprise solution with 24x7 support.

Central to its capabilities is a resilient scale-out architecture, operating as a self-repairing, self-administering distributed object repository. This framework guarantees exceptional adaptability and dependability with ease of management. By integrating block, file, and object storage protocols, Ceph Storage eliminates data segregation while preserving cost-effectiveness at scale and data control.

Together, Lenovo and IBM, deliver a world-class open-source solution supporting large data sets with unparalleled support.

Lenovo Ceph Storage Solutions Use Cases

Data Lakehouse for AI Workloads

As AI becomes integrated into more routine business processes, organizations increasingly require access to massive and continually expanding repositories of diverse datasets. And they need data management tools for control over the content of the datasets, where the data is stored, who has access, the regulatory and compliance requirements, and more. A data lakehouse is a modern data architecture that combines the key benefits of data lakes (large repositories of raw data in its original form) and data warehouses (organized sets of structured data). Now organizations can deploy quickly yet still scale massively combining an open, hybrid, fit-for-purpose data store. Lenovo Ceph Storage Solutions are capable of handling large, diverse datasets while providing flexibility, scalability, and compliance with regulatory requirements, thereby supporting business growth and operational efficiency.

Object Storage-as-a-Service

Lenovo Ceph Storage Solutions delivers object storage as-a-service for applications such as analytics and data pipelines, online archives, backup targets, disaster recovery, and enterprise file sharing. Many such applications now use object storage because of their cost-efficient and secure design, concurrent multi-user access, and the ability to scale to large capacity and performance requirements. Lenovo Ceph Storage Solutions are a great fit in these environments as Ceph supports concurrent data access from multiple applications, multiple systems, and multiple locations in secure repositories or buckets. Lenovo Ceph Storage Solutions are a versatile, cost-efficient, secure, and scalable solution that can support concurrent multi-user access, accommodate large-scale data requirements, and provide data governance meeting the diverse storage demands of modern enterprises effectively.

Cloud-native Applications Using S3 API

As a data lake, Lenovo Ceph Storage Solutions deliver massive scalability and high availability to support demanding multitenant analytics and AI/ML workloads. With high fidelity compatibility to the Amazon AWS S3 interface, applications can access their storage with the same application API, in public, private, or hybrid clouds. Lenovo Ceph flexibility in cloud deployment and operational efficiency through seamless integration with S3, caters to the diverse storage needs and deployment preferences of modern organizations and cloud service providers.

Virtual Private Clouds and Container Management Platforms

Ceph is a proven cloud storage solution that has evolved into the leading storage platform for OpenStack-based virtual private Clouds (VPCs) and for OpenShift Container Platform. A reliable, leading-edge solution that integrates seamlessly with cloud and container platforms, offering organizations scalability, compatibility, and a cost-effective storage management solution.

Ceph Protocol Support

Object Storage

- AWS S3 Supports all common AWS S3 bucket and object API calls
- Advanced S3 features such as object versioning, object lock, S3-select with table format support (Apache Parquet, CSV and JSON)
- OpenStack Swift Compatible with the OpenStack Swift object storage API

Block Storage

- Supports NVMe/TCP block protocol, VMware ESXi 7.0U3 and 8.0+
- Supports latency-sensitive applications running on operating systems that support NVMe/TCP
- Ceph RBD, Block storage access through the native Ceph RBD client part of RHEL or OpenStack. Used for KVM/QEMU virtual machine workloads and native Linux applications requiring TCP/IP-accessible block storage

File Storage

- NFSv3 and NFSv4, Export of CephFS volumes and sub-volumes via NFSv3 and NFS v4.1
- NFSv4 gateway to object storage, support for data ingest and export of object storage data via NFS shares
- CephFS, export of CephFS volumes and sub-volumes via native Linux kernel or FUSE client running on RHEL or other Linux distribution

Container Storage

- Kubernetes CSI-drivers, supports CephFS and Ceph RBD CSI-drivers to provide persistent storage for containers

Minimum Hardware Configurations

HS350X V3, for Capacity, Backup, Archive, Media

- Intel Xeon Gold 32C 2.1GHz Processor
- 24 x 3.5" HDD (8TB, 12TB, 16TB, 22TB SATA)
- 2x NVMe (for metadata)
- 10/25GbE

SR650 V3, for Performance / Data & AI / Lakehouse

- Intel Xeon Gold 32C 2.1GHz Processor
- 28 x NVMe (TLC- 3.8TB, 7.7TB, & 15.4TB or QLC- 15.4TB & 30.7TB)
- 10/25GbE, 100GbE

IBM Storage Ceph Software

IBM Storage Ceph Premium Edition is available as a subscription license for object only or as unified (block, file, and object) solution.

Both offerings include:

- Red Hat Enterprise Linux operating system software license to support Ceph.
- IBM Storage Insights provides a view of storage resources from the server, application, network, and file system perspective.
- 24x7x365 software support

Minimum Recommended Configuration

The following table lists the minimum recommended configuration for a Lenovo Ceph Storage solution.

Table 1. Lenovo Ceph Storage Solutions

Specification	Recommended minimum
Server models	<ul style="list-style-type: none"> • HS350X V3 (Capacity, Backup, Archive, Media): Model 7DE3CTO2WW • SR650 V3 (Performance / Data & AI / Lakehouse): Model 7D76CTOMWW
Number of Servers	<ul style="list-style-type: none"> • 4 node cluster
SSD Capacity/Drive	<ul style="list-style-type: none"> • HS350X V3 (24 HDD): 8TB, 12TB, 16TB, or 22TB SATA + 2 NVMe (metadata) • SR650 V3 (28 NVMe): 3.8TB, 7.7TB, & 15.4TB TCL or 15.4TB & 30.7TB QLC
Usable Capacity	<ul style="list-style-type: none"> • 85% of total TBs (after factoring data protection)
CPU	<ul style="list-style-type: none"> • HS350X V3: 1x Intel Xeon Gold 32C 2.1GHz • SR650 V3: 2x Intel Xeon Gold 32C 2.1GHz
Networking	<ul style="list-style-type: none"> • HS350X V3: <ul style="list-style-type: none"> ◦ 1x 10/25GbE SFP28 2-Port OCP3.0 Ethernet Adapter • SR650 V3 (select one): <ul style="list-style-type: none"> ◦ 1x 10/25GbE SFP28 4-Port OCP Ethernet Adapter ◦ 1x 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter
Software	<ul style="list-style-type: none"> • IBM Storage Ceph, Subscription license for 1 to 5 years. 1 license = 1TB of raw storage (license is sum of the raw capacity of the cluster) – Two options: <ul style="list-style-type: none"> ◦ IBM Storage Ceph Premium Edition, Object only ◦ IBM Storage Ceph Premium Edition, Block, File & Object • RHEL is included for storage cluster & Storage Insights for monitoring.
Data Protection	<ul style="list-style-type: none"> • Encryption at Rest, SSE-KMS, SSE-S3, SSE-C • S3 Object Lock compliant with WORM • Multi Factor Authentication Delete (MFA Delete) • S3 Enterprise Authentication & Authorization with Secure Token Service (STS) + IAM
Storage Monitoring	<ul style="list-style-type: none"> • Cloud-based Monitoring and Analytics for Application Tuning and Remote Support
System Management	<ul style="list-style-type: none"> • HS350X V3: BMC, UEFI, operator panel with status LEDs. AMI based. No support for XClarity. • SR650 V3: Lenovo XClarity Controller (XCC2)
Support	<ul style="list-style-type: none"> • Add Premier support for all hardware • Software: 24x7x365, 4-hour response

For more information

For more information, see these resources:

- Lenovo product publications
<https://pubs.lenovo.com/>
- ThinkSystem servers drivers and support
<https://datacentersupport.lenovo.com/us/en>
- ServerProven hardware compatibility
<http://serverproven.lenovo.com>
- User Guides for options:
<https://serveroption.lenovo.com>

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Related product families

Product families related to this document are the following:

- [ThinkSystem HS350X V3 Storage Server](#)
- [ThinkSystem SR650 V3 Server](#)

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