



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 (RHEL) server 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	Minimum Recommendation
Server	Lenovo ThinkSystem HS350X V3 (Capacity, Backup, Archive, Media) 7DE3CTO2WW Lenovo ThinkSystem SR650 V3 (Performance / Data & AI / Lakehouse) 7D76CTOMWW
Number of Servers	4 node cluster
SSD Capacity/Drive	Lenovo ThinkSystem HS350X V3 (24 HDD): 8TB, 12TB, 16TB, or 22TB SATA + 2 NVMe (metadata) Lenovo ThinkSystem SR650 V3 (28 NVMe): 3.8TB, 7.7TB, & 15.4TB TCL or 15.4TB & 30.7TB QLC
Usable Capacity	85% of total TBs (after factoring data protection)
CPU	Lenovo ThinkSystem HS350X V3: 1x Intel Xeon Gold 32C 2.1GHz Lenovo ThinkSystem SR650 V3: 2x Intel Xeon Gold 32C 2.1GHz
Networking	Lenovo ThinkSystem HS350X V3: 1x 10/25GbE SFP28 2-Port OCP3.0 Ethernet Adapter Lenovo ThinkSystem SR650 V3: 1x 10/25GbE SFP28 4-Port OCP Ethernet Adapter & 1x 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter
Software	IBM Storage Ceph, Subscription license for 1 to 5 years. 1 license = 1TB of raw managed storage – Two options IBM Storage Ceph Premium Edition, Object only IBM Storage Ceph Premium Edition, Block, File & Object (RHEL included for storage cluster & Storage Insights for monitoring)
Data Protection	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	Cloud-based Monitoring and Analytics for Application Tuning and Remote Support
System Management	Lenovo ThinkSystem HS350X V3: BMC, UEFI, operator panel with statusLEDs. AMI based. No support for XClarity. Lenovo ThinkSystem SR650 V3: Lenovo XClarity Controller (XCC2)
Support	Add Premier support for all HW Software: 4hr 24x7x365

Notes: please engage a Lenovo storage specialist for sizing

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>
 - System Configuration Guide
 - Hardware Maintenance Guide
 - Messages and Codes Reference
 - UEFI Manual for ThinkSystem Servers

Author

Ben Blomberg is an experienced Product Marketing professional with over 20 years of experience in the IT industry. He has Bachelor's of Business Administration (BBA) in Marketing from the University of Wisconsin-Eau Claire.

Related product families

Product families related to this document are the following:

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

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

© Copyright Lenovo 2024. All rights reserved.

This document, LP1996, was created or updated on August 30, 2024.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
<https://lenovopress.lenovo.com/LP1996>
- Send your comments in an e-mail to:
comments@lenovopress.com

This document is available online at <https://lenovopress.lenovo.com/LP1996>.

Trademarks

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at <https://www.lenovo.com/us/en/legal/copytrade/>.

The following terms are trademarks of Lenovo in the United States, other countries, or both:

Lenovo®

ServerProven®

ThinkSystem®

XClarity®

The following terms are trademarks of other companies:

Intel® and Xeon® are trademarks of Intel Corporation or its subsidiaries.

Linux® is the trademark of Linus Torvalds in the U.S. and other countries.

Other company, product, or service names may be trademarks or service marks of others.