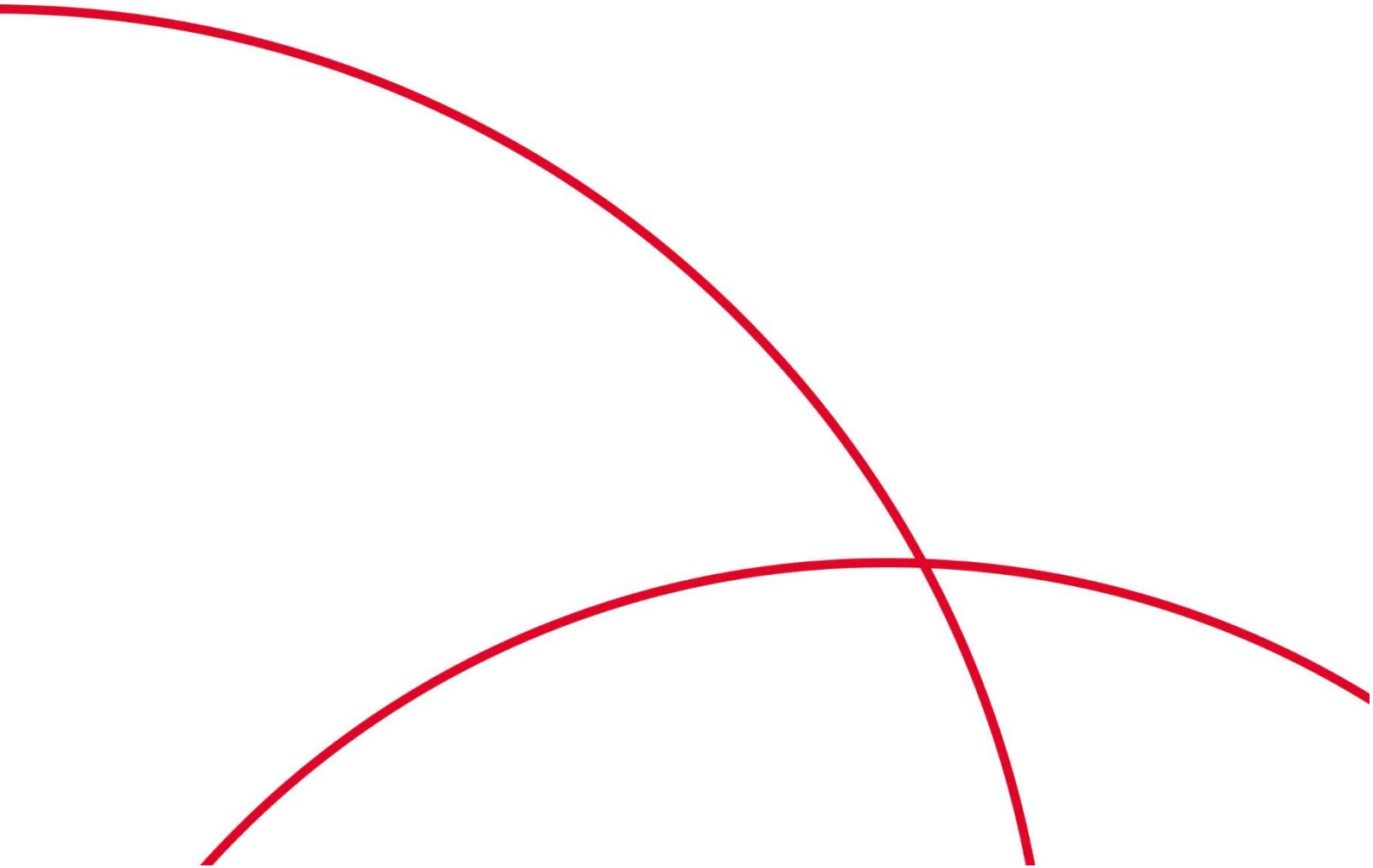
天翼云
eSurfing Cloud

Storage Resource Reutilization System

User Manual - Web Console

China Telecom Cloud Technology Co., Ltd.



Revision History

Version	Release Date	Description
4.0	March 24, 2026	1. Support for the free edition. 2. Support for configuring server memory usage parameters for the HBlock service. 3. Support for suspending cloud LUNs. 4. Support for setting extended attributes of local LUNs via API. 5. Support for configuring authentication methods.
3.10	September 25, 2025	1. Support target access permissions to implement permission management for clients and targets. 2. Support backup, generate data backup files independent of source LUNs based on snapshots. 3. Support for QoS policy to regulate traffic in terms of bandwidth and IOPS.
3.9	April 21, 2025	1. Support for snapshot functionality to achieve rapid data backup and recovery. 2. Support for LUN cloning, for scenarios such as data replication and testing/validation.
3.8	February 14, 2025	1. Update API signature method to enhance security. 2. Cloud LUNs support uploading data to S3-compatible object storage. 3. Support for setting the data storage directory of base services. 4. Add reclaim policy for targets, supporting automatic deletion after disassociation from LUNs. 5. Add performance parameter adjustment for scenarios such as intelligent computing, virtualization, and high-sensitivity scenarios. 6. Support for setting redundancy overlap, allowing data copies/fragments to be placed in the same fault domain.
3.7	August 8, 2024	1. Support for configuring cluster topology. 2. Support for creating and managing multiple storage pools. 3. Support for room and rack level fault domains. 4. Support for setting cache pool for LUNs. 5. Support for base service migration.
3.6	June 3, 2024	1. Support for uploading data from backend storage to OOS for storage LUNs and cache LUNs.

		2. Hardware and HBlock monitoring data now support integration with Prometheus. 3. Optimize read/write performance. 4. Support for Loongson servers.
3.5	March 4, 2024	1. Support for server and disk path level fault domains, and disk-level data services. 2. Support for specifying installation nodes for base services. 3. Support for capacity quota of the disk path, setting the maximum amount of data that HBlock can write. 4. Support for targets to be discovered and connected by multiple clients. 5. Support for setting the minimum number of write replicas for LUNs to improve data write security. 6. Expand erasure coding (EC) N+M support range to satisfy N+M <= 128.
3.4	July 12, 2023	1. LUN connections support one primary with multiple backups, improving business availability. 2. Support for IPv6 environments. 3. Provide a one-page Dashboard overview. 4. Support for querying CHAP passwords via command line.
3.3	December 23, 2022	Support for safely removing servers.
3.2	September 26, 2022	1. Add "Basic Concepts" to the "Product Overview" chapter. 2. Expand monitoring items to broaden coverage. 3. Support for alarm and log management. 4. Support for system events in the Events section. 5. Add to the "Appendix" chapter: HBlock Service, System Event List, Monitoring Metrics, and Alarm List.
3.1	June 14, 2022	1. Support for multiple disk paths in standalone mode. 2. Support for specifying servers when creating targets in cluster mode, and support target migration. 3. Support for recording and querying user events.
3.0	January 18, 2022	1. Change command line to non-interactive mode. 2. Support for WEB and API calling methods. 3. LUN operations: Support for setting LUN high availability types and LUN write policies.
2.1	August 27, 2021	1. Support for ARM servers.

		2. Software license: Display allowed capacity when viewing licenses. 3. LUN operations: Support for LUN active/standby switchover, i.e., switching between ACTIVE target and STANDBY target for LUNs.
2.0	May 28, 2021	1. Support for cluster deployment. 2. Support for multi-replica and erasure coding (EC) data redundancy.

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1 Product Overview

1.1 Product Definition

HBlock is a Storage Resource Reutilization System (SRRS) independently developed by eSurfing Cloud. It is a lightweight storage cluster controller and a fully user-mode software-defined storage controller that converts commodity servers and managed storage resources into HA virtual storage disks. It provides distributed block storage services through the standard Internet Small Computer System Interface (iSCSI) protocol and the disks can be mounted to a local server (or other remote servers) for intensive use of resources. Meanwhile, HBlock is compatible with heterogeneous devices and applies to various scenarios. HBlock helps users tackle the challenges of IT architecture upgrade, reduce costs, and increase efficiency, and assists enterprise users in achieving green transformation.

In non-networked mode, HBlock can be seen as a substitute for local disk arrays for local data storage. In networking mode, HBlock can also serve as a bridge between local and cloud storage, automatically synchronizing all data to S3-compatible object storage, retaining only hot data locally to save local storage space, or retaining all data to ensure local I/O performance, achieving hybrid cloud storage.

HBlock can be installed on Linux operating systems as a common application without root permissions. You can deploy HBlock with other applications in a server in a hybrid manner to form high-performance and HA virtual hard disks for business. This way, HBlock directly re-uses storage resources without affecting user business or purchasing additional equipment!

The traditional hardware storage array provides low latency and high availability for each logical volume, but has poor horizontal scalability, high cost, and may form many "isolated data islands". That leads to high cost and low utilization of storage resource. Traditional distributed storage, while attractive, often suffers from issues such as complex deployment, poor performance, and low stability.

HBlock delivers storage arrays in a quite different approach:

- **Easy Installation**: The HBlock installation package is a zip file that can be installed on mainstream Linux operating systems running on commonly used 64-bit x86 servers, ARM servers or Loongson servers. It also supports physical servers, bare metal servers, and virtual machines. HBlock is completely decoupled with hardware drivers, so users can freely use the latest hardware on the market, with less vendor lock-in.
- **Green**: HBlock runs as a group of user-mode processes, without relying on any specific version of Linux kernel or distributions. It does not rely on or modify the operating system environment, neither does it monopolize the entire hard drive or interfere with the execution of any other processes. Therefore, HBlock can run in the same Linux operating system instance concurrently with other applications. On the one hand, it can help users

improve the utilization of existing hardware resource, on the other hand, it also lowers the barriers for potential users to try HBlock - even a virtual machine is not needed.

- **High Utilization**: HBlock supports heterogeneous hardware. HBlock allows each Linux operating system instance in the cluster to have different hardware configurations, such as different numbers of CPUs, different sizes of memory, and different capacities of local hard drives. Therefore, it can improve the utilization of existing hardware resources.
- **High Performance**: HBlock adopts a distributed multi-controller architecture to provide the low latency and high availability just like traditional hardware storage arrays, as well as high scalability and high throughput just like traditional distributed storage. It can scale up from three servers to thousands of servers or shrink from thousands of servers to three servers one by one without service unavailability.
- **High Quality**: HBlock is designed to guarantee the data durability as long as the number of simultaneous disk faults in the cluster is not greater than the allowed faulty number of logical volumes in redundancy mode (for three-copy mode, the allowed number is two; for Erasure Code N+M mode, the allowed number is M). HBlock can ensure the service availability when any single server, link, or disk in the cluster experiences faults. HBlock is specifically designed for Chaos environment and can be applied to various complicated environments such as unstable networks, unstable computing power, and unstable disks. It has been sufficiently tested in complex and large-scale environments before release. HBlock supports snapshot and clone functions. Users can create time-point snapshots for logical volumes to quickly back up and restore data. The clone function enables quick generation of new volume copies based on snapshots, greatly improving the efficiency of data replication and test environment setup.

Meanwhile, as a bridge between local and cloud storage, HBlock also has the following features:

- **Data Cloud Migration:** HBlock can be integrated with S3-compatible object storage to create local LUNs (local mode) and cloud LUNs (cache mode and storage mode):
  - Local mode LUNs: All data is stored locally, which not only has the low latency and high availability of traditional hardware storage arrays, but also combines the high scalability and throughput of traditional distributed storage. The green feature greatly reduces the cost of user deployment, while the heterogeneous hardware feature improves the utilization of existing hardware resources.
  - Storage mode LUNs: All data is not only stored locally, but also asynchronously replicated to object storage, achieving high local performance and remote data disaster recovery.
  - Cache mode LUNs: Recently read and written data will be cached locally to maximize performance, while the full amount of data will be saved on object storage to reduce costs, allowing a small local capacity to store massive amounts of data. This is particularly suitable for businesses that do not require high real-time performance, such as data backup and archiving, as well as businesses that require more writing and less access, such as document files, medical imaging, video surveillance, etc. HBlock can

seamlessly connect local applications with cloud storage, enabling on-demand use of storage space and elastic expansion.

- **Consistency:** HBlock utilizes the atomic operations of object storage, which can truly ensure the consistency of data on the cloud (i.e., data on the cloud is always a snapshot of local data), and there will be no situation where the entire business cannot be restored due to inconsistency of data on the cloud, thus ensuring data security.

1.2 Application Scenarios

- **Utilization of Existing Resources**
  HBlock features broad compatibility and uniformly manages and integrates idle storage space in various servers into storage pools, and provides high-performance and HA virtual disks to other hosts through the iSCSI protocol. To meet the increasing demand for storage capacity raised by rapid service growth and solve the waste of resources due to idle server resources, HBlock provides rapid deployment and expansion solutions that improve the usage of storage resources without extra cost, and support rolling service updates. This way, HBlock meets the ever-changing requirements for capacity and performance of future business operations.

- **HA Storage for Application Systems**
  HBlock manages the physical disks of application nodes and mounts the HA virtual disks to the application nodes. It makes it easier for applications to achieve HA and re-utilize the storage resources of application nodes. Furthermore, no additional procurement for the storage hardware is required, which reduces the total cost of ownership (TCO) for users.

- **Independent Management and Control of New Resources**
  When using HBlock to manage the storage resource pools that you have created, you will be able to have actual control over storage servers. This means you can use HBlock to manage storage resources and deploy other applications on your hardware to give full play to the hardware. Traditional integrated software and hardware storage products or distributed storage solutions require exclusive access to devices, and users can only perform limited operations on the management console. The storage cluster managed by HBlock enables users to comprehensively manage and control resource pools and enhances operating flexibility. You can select servers with any specifications for resource pool upgrading or expansion without limitations of vendor lock-in. You can also flexibly choose suitable hardware based on your business needs and budgets, improving the cost-effectiveness of investment.

- **Hybrid Cloud Storage**
  HBlock can manage both local storage resources and OOS storage resources simultaneously, achieving unified management of storage space and meeting customers' needs for hybrid cloud storage. For customers who need to store massive amounts of data, HBlock can seamlessly connect local applications with cloud storage, synchronize data to the cloud, and achieve on-demand use of storage space for elastic expansion. For scenarios where high data security is required and sensitive data is not suitable for cloud storage, HBlock can also help users achieve local data storage and improve data access speed. In addition, HBlock simplifies data management in hybrid cloud storage environments. Providing virtual targets and logical volumes for upper layer applications through the

standard SCSI protocol, it can be deployed not only locally but also on private or public clouds.

- **Rapid Construction of a Production-like Environment**
  Based on its distributed block storage-derived multi-LUNs consistent snapshot capability, HBlock can instantly capture the data states of multiple applications in the upper-layer business system. When data is accidentally deleted or logical errors occur, snapshots enable second-level recovery, significantly reducing the risk of data loss. This makes it an ideal choice for data backup, recovery, and version management. Additionally, leveraging the capability to create clone LUNs in seconds, HBlock can rapidly replicate multiple independent test environments that are consistent with the production environment. This greatly improves the efficiency of data replication and environment setup, facilitating the verification of rapid application recovery and disaster recovery capabilities. Meanwhile, it enables efficient business testing, upgrade validation, and data analysis without disrupting the production environment.
- **Geo-Diverse Multi-Active High-Reliability Storage**
  HBlock optimizes the storage protocol stack and innovates in distributed algorithms to ensure cross-AZ strong data consistency (RPO=0) and achieve second-level fault recovery (RTO in seconds). The system can automatically detect faults, triggering cross-AZ data reconstruction. It uses intelligent data redundancy and redundancy overlap to ensure data security while reducing storage costs. In case of an AZ failure, services remain available with seamless business failover, requiring no manual intervention. This guarantees data security and business continuity.
- **Permanent Independent Backup of Critical Data**
  HBlock supports full and incremental backups via snapshot technology, guaranteeing long-term retention and complete isolation from production systems. Backup files can be flexibly exported to various storage media (e.g., object storage, NAS), so data is fully decoupled from the platform. Even if the primary system is totally destroyed or hit by ransomware, these standalone backups remain a trusted source for precise LUN-level recovery, ensuring zero loss of business-critical data. The solution is ideal for finance, healthcare, and other industries with strict long-term archival and compliance-audit requirements, providing rock-solid data protection.
- **Zero-Trust Storage Security Framework**
  HBlock builds an end-to-end zero-trust storage access fabric through a triple lock: iSCSI target allowlist, CHAP authentication, and QoS flow control.
  - At LUN granularity, only clients whose IQN is on the allowlist can discover or connect—unauthorized hosts remain completely invisible.
  - CHAP handshakes block spoofed identities and man-in-the-middle attempts before a single I/O is issued.
  - Coupled with QoS policies that dynamically throttle or block abnormal traffic in real time across both IOPS and bandwidth dimensions.

This delivers a triple guarantee: zero impact on storage performance, airtight isolation of data and traffic, and uninterrupted operation of mission-critical workloads.

- **Cloud Data Differential Restoration**
  HBlock leverages the suspend/resume mechanism of cloud-bound LUNs to achieve cross-cluster disaster recovery switching and data flow management. It supports efficient cross-cluster data synchronization and rapid recovery, building a secure and efficient cloud-edge data collaboration system.
  Based on the exclusive state control mechanism of cloud-bound LUNs, the suspend capability pauses interaction between the LUN and the cloud. Subsequently, the cloud data restoration function supports recovering cloud data on other clusters and continuing data read/write operations until the next suspend. When restoring a suspended LUN, intelligent incremental difference comparison and targeted differential data backhaul technologies are employed—only synchronizing incremental cloud data is required to complete LUN restoration.
  This ensures that the same business LUN belongs to only a single cluster and remains readable/writable at any given time, fundamentally avoiding data conflict risks caused by multi-site writes. HBlock delivers core value in business continuity assurance, cross-cluster data security, and automated disaster recovery switching processes, providing secure, reliable, elastic, flexible, and visually controllable storage-layer disaster recovery capabilities for hybrid cloud and multi-active architectures.

1.3 Basic Concepts

1.3.1 iSCSI

iSCSI (Internet Small Computer System Interface) is a storage technology based on TCP/IP and SCSI-3 protocols, used to establish and manage IP storage devices, interconnections between hosts and clients, create a storage area network (SAN), etc.

1.3.2 LUN

LUN is the abbreviation of the term "Logical Unit Number," In the field of storage, LUN is a global identifier that uniquely identifies a storage volume or partition within a storage device (such as a hard disk or array). Through LUN, the operating system can recognize a specific storage volume and perform data read and write operations. You can create local LUNs (local mode) and cloud LUNs (cache mode and storage mode) according to your needs:

- Local mode: Stores all data locally.
- Cache mode: Stores part of hot data locally and stores all data in cloud asynchronously.
- Storage mode: Stores all data locally and stores them in cloud asynchronously.

Minimum replica number: For a LUN in replica mode, assuming that the number of LUN replicas is X and the minimum replica number is Y (Y <=X), each time the data is written to LUN, at least Y replicas of data must be written successfully before this write request is considered successful. For a LUN in EC N + M mode, assuming that the minimum replica number of the LUN is set to Y (N<=Y<=N + M), the data blocks and parity blocks that sum to at least Y blocks must be written successfully before this write request is considered successful.

1.3.3 Snapshot

A snapshot records an HBlock LUN's state and contents at a specific time point. Like a photo, it captures and saves the complete data status of the LUN at that moment. When needed, users can roll back via snapshots or create clone LUNs based on them to quickly restore to that state, effectively protecting data.
A consistency snapshot involves creating snapshots for all selected LUNs simultaneously at a specific moment, ensuring the snapshots reflect the data status of the same point in time.

1.3.4 Clone LUN

A clone LUN, based on a snapshot, mirrors the data and state at the snapshot's creation. It can be modified independently of the source LUN, tracking only new or changed data post - cloning, while relying on the source for original data. Once remove the reference to the parent snapshot from the clone LUN, it will copy the data stored in the snapshot to the clone. After the operation completes, the clone LUN will become an independent LUN.

Cloning depth refers to the number of layers in a chain of clone LUNs from a single snapshot. It indicates how many layers of clone LUNs can be created consecutively starting from the initial source LUN. For example:

- Create snapshot snap1 from source LUN lun1, then clone lun1-C1 from snap1. Cloning depth is 1.
- Create snapshot snap2 from lun1-C1, then clone lun1-C2 from snap2. Cloning depth becomes 2.

1.3.5 Backup

Captures the data state at a specific point-in-time and produces self-contained backup files that can be stored independently and imported on demand. Supports both full and incremental exports, and allows importing intact backups as well as those interrupted mid-process.

1.3.6 iSCSI Target

iSCSI target is a storage resource located on an iSCSI server. It is a protocol that connects data storage devices through an IP network infrastructure, enabling the mapping of remote storage devices to local hosts. This provides a network-based storage solution.

1.3.7 iSCSI Target Portal

The iSCSI target portal refers to the target portal of the HBlock server, used for communication with initiators that are not on the same LAN of HBlock.
If an Initiator outside the same LAN of HBlock wants to connect with HBlock server, network configuration (such as NAT) is required to ensure the Initiator can access the HBlock server through the IP address. Then, configure this address as the target portal of the HBlock server. Afterward, the Initiator can connect with the HBlock server through the configured target portal.

1.3.8 Storage Pool

Storage pool: A collection of storage resources provided by hardware. Physically, it refers to a collection of hard disks of the same medium across multiple servers. You can also form a storage pool as needed based on disk paths on servers in different server rooms and cabinets.
Base storage pool: The default storage pool created during initialization is the base storage pool. Physical resources upgraded from versions earlier than 3.7 belong to the base storage pool.

1.3.9 QoS Policy

Quality of Service (QoS) policies precisely regulate IOPS and throughput through a token-bucket algorithm, shaping traffic before congestion occurs and thereby preventing network bottlenecks at the source.
The policy can be applied to the following scenarios as required:

- Critical-business protection: By throttling the I/O of adjacent workloads, it indirectly safeguards the service quality of critical applications.
- Storage-tier optimization: Intelligently distributes I/O resources across performance tiers (e.g., SSD and HDD) to optimize performance in hybrid-storage environments.
- Burst-traffic handling: It allows short-term exceedance of baseline limits, smoothing sudden I/O bursts instead of rejecting requests outright.

1.3.10 Cluster Topology

Cluster topology: Displays the deployment of physical resources in a cluster logically and visually.

1.3.11 Fault Domain

You can set a fault domain for a storage pool. A fault domain is a collection of components that may fail simultaneously due to infrastructure sharing, such as rooms, racks, servers and disk paths. A fault of a component in the same fault domain affects only the data in the local fault domain.
HBlock allocates and stores data replicas in replica mode or data blocks in EC mode by fault domains to guarantee data security. Replicas of the same data and EC blocks of the same data are written into different fault domains.

1.3.12 Data Service

One disk path corresponds to one data service, and HBlock manages the user's file data blocks in the disk path through the data service.

1.3.13 Monitoring

Monitoring refers to monitoring and recording the performance indicators of the HBlock system, servers, disk paths, and LUNs. Users can view real-time or historical performance data and pay attention to the performance of storage services. Please see the appendix **Monitoring Metrics**.

1.3.14 Event

Events refer to the user operations on HBlock or HBlock system behaviors recorded by the system, which reflect the comprehensive storage status and facilitate troubleshooting, auditing, and tracking.
Events are divided into user events and system events:

- User events: User operations on HBlock. See the appendix **User Event List** for a detailed list of user events.
- System events: HBlock system behaviors. See the appendix **System Event List** for a detailed list of system events.

1.3.15 Log Collection

Log collection means that users actively collect HBlock log data, generate log files, and download them locally, send to HBlock engineers to view the log details for troubleshooting. You can narrow the scope of log collection and speed up the collection progress by specifying the time period, log type, and server.

1.3.16 Alarm

Alarms refer to information generated when the system detects HBlock business or system abnormality.

Alarms are divided into three levels:

- Warning: Refers to a general situation where the system detects a potential or imminent fault that affects the business. There are currently no alarms that affect the business. Maintenance personnel needs to find the cause of the alarm in time and eliminate potential faults.
- Major: Refers to an alarm within a local scope that affects system performance. Prompt action is required; otherwise, it will impact the operation of critical functions.
- Critical: Refers to a global alarm that has already caused business interruption or paralysis. It needs to be handled immediately, otherwise the system is in danger of collapsing.

For more information, see the appendix **Alarm List**.

1.4 Usage Restrictions

Item	Description
iSCSI target	HBlock supports a maximum of 32766 target IQNs. A target can be associated with up to 256 LUNs, but each LUN can only be associated with one target.
Storage Pool	A maximum of 32768 storage pools can be created in an HBlock cluster.
Snapshot	● Maximum snapshots per LUN: 512. ● Maximum snapshots per system: 100,000. ● Maximum clone LUNs per snapshot: 512. ● Maximum snapshot depth per system: 512.
Consistency Snapshot	Maximum number of LUNs for a consistency snapshot: 512.
Clone	● Maximum number of clone LUNs supported by the system: 100,000. ● Maximum number of clone LUNs per snapshot: 512. ● Maximum clone depth supported by the system: 16.
Server	Each HBlock server can only add up to 100 disk paths.

1.5 Commercial Edition and Free Edition

During initialization, you may select either the Commercial Edition or the Free Edition based on your requirements. The features supported by each edition are as follows:

Features		Commercial Edition	Free Edition
Software License	import software license, list software licenses	Supported	Supported
LUN	create a LUN, expand a LUN, edit a LUN, set LUN primary-secondary priority or automatic failover, trigger Active/Standby switchover of the target corresponding to the LUN, set LUN extended attributes, delete specified extended attributes of LUN, delete all extended attributes of LUN, query LUN extended attributes, delete a LUN, query LUN information	Supported	Supported
	create a clone LUN, flatten the clone LUN, recover a LUN, wipe a LUN, resume LUN recovery	Supported	Not supported
Snapshot	create a snapshot, modify a snapshot, roll back a snapshot, delete a snapshot, query snapshot information	Supported	Not supported
Consistency Snapshot	create a consistency snapshot, modify a consistency snapshot, roll back a consistency snapshot, delete a consistency snapshot, query consistency snapshot information	Supported	Not supported
Backup	export backup file, import backup file	Supported	Not supported
iSCSI target	create an iSCSI target, delete an iSCSI target, set CHAP authentication of the iSCSI target, delete CHAP, migrate an iSCSI target, edit maximum sessions number per IQN under iSCSI target, modify the remain policy of the iSCSI target, set iSCSI target allowlist, delete an iSCSI target allowlist, query iSCSI target information, query iSCSI target	Supported	Supported

	connection, delete iSCSI target connection		
Storage Pool	create a storage pool, add nodes to the storage pool, modify a storage pool, remove nodes from a storage pool, delete a non-base storage pool, query the storage pool information, query the QoS policy associated with the storage pool	Supported	Supported
QoS Policy	create a QoS policy, modify a QoS policy, associate the QoS policy with LUNs, disassociate the QoS policy from LUNs, associate the QoS policy with storage pools, disassociate the QoS policy from storage pools, set the default QoS policy for LUNs in the storage pool, disassociate the default QoS policy for LUNs in the storage pool, delete a QoS policy, query QoS policy information, query information on objects associated or associable with the QoS policy	Supported	Not supported
Cluster Topology	create a topology node, modify topology node information, delete a topology node, query topology information	Supported	Supported
Server	add a server, set server properties (including: modify server port range, set server target portal IP, set the memory available for HBlock on the server, and set server default disk path), delete server properties (server target portal IPs), remove a server, query server information, add disk paths, modify capacity quota of a disk path, remove a disk path	Supported	Supported
	migrate the base services on the server	Supported	Not supported
Monitoring	query real-time performance data, export performance data (command	Supported	Supported

	line), obtain historical performance data (WEB/API)		
Alarm	query HBlock alarm information, export HBlock alarms, manually resolve HBlock alarm, mute HBlock alarm, unmute HBlock alarm	Supported	Supported
Event	query HBlock events, export HBlock events	Supported	Supported
Log	initiate HBlock log collection, query collected logs, download the collected log file, delete collected logs	Supported	Supported
Administrator Password	change the administrator password	Supported	Supported
Email Settings	set the email, send a test email, delete email configuration, query email configuration	Supported	Supported
Remote Assistance Configuration	set remote assistance configuration, delete remote assistance configuration, query remote assistance configuration	Supported	Supported
Pushgateway Monitoring Configuration	add pushgateway monitoring configuration, modify pushgateway monitoring configuration, delete pushgateway monitoring configuration, query pushgateway monitoring configuration information	Supported	Supported
Authentication Mode	set the authentication mode, query the authentication mode	Supported	Supported
Pro Trial	enable the Pro Trial for the free edition	Not supported	Supported
Performance Parameters of HBlock	tune the performance parameters of HBlock, view the performance tuning configuration	Supported	Supported
Service Management	stop HBlock on the server, start HBlock on the server, restart HBlock on the server	Supported	Supported
Uninstall HBlock	uninstall HBlock	Supported	Supported
System Query	query HBlock information, query HBlock service status, query HBlock	Supported	Supported

	version		
Upgrade	query the upgrade status of HBlock	Supported	Supported
	upgrade HBlock	Supported	Supported for 2 years

1.6 Features Available After Software License Expiration (Trial or Subscription Mode)

Module	Feature
Help Command	help command (command line only)
Software License	import software license, list software licenses
LUN	delete a LUN
Server	query server information
Service Management	stop HBlock on the server, start HBlock on the server, restart HBlock on the server
Alarm	query HBlock alarm information
Event	query HBlock events, export HBlock events
Log	initiate HBlock log collection, query collected logs, delete collected logs
Administrator Password	change administrator password
Remote Assistance Configuration	set remote assistance configuration, delete remote assistance configuration, query remote assistance configuration
System Query	query HBlock information, query HBlock service status, query HBlock version
Uninstall HBlock	uninstall HBlock
Other	WEB support overview page (license, data path, fault domain, LUN)

1.7 Terms and Abbreviations

Term/Abbreviation	Description
ALUA	Asymmetric Logical Unit Access
CHAP	Challenge Handshake Authentication Protocol
DSM	Device Specific Module
EC	Erasure Coding
IQN	iSCSI Qualified Name
iSCSI	Internet Small Computer System Interface
I/O	Input/Output
LUN	Logical Unit Number
MPIO	Multipath I/O
NFS	Network File System
NTP	Network Time Protocol
OOS	Object-Oriented Storage (OOS) is a cloud storage service, it provides a massive, flexible, cheap, and highly available storage.
RAID	Redundant Arrays of Independent Disks
SAN	Storage Area Network
SPC	Small Computer System Interface (SCSI) Primary Commands
SSD	Solid State Disk
SSL	Secure Sockets Layer
target	Storage target.
UUID	Universally Unique Identifier
WWID	World Wide Identifier, the unique identifier of the LUN. If there are multiple LUNs on the HBlock side when the Client connects to a LUN, the WWID can be used to identify the LUN to be connected.
Disk Path	Path used to store HBlock data.

2 Server Deployment Requirements

2.1 Environmental Requirements

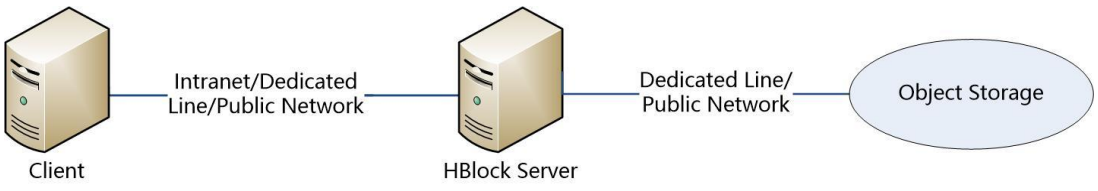
Item	Description
Supporting Linux OS	CentOS 7/8/9 64-bit, CTyunOS 2/4 64-bit.
Hardware	x86 server, ARM server. Minimum configuration: Single-core CPU, 2 GB memory. Configurations can be added based on actual business needs.
Bandwidth	● Bandwidth from client to HBlock: Read and write bandwidth capabilities are greater than business read and write bandwidth. ● The write bandwidth capacity of the disk partition corresponding to the disk path is greater than the bandwidth used by users to write data. ● Cloud bandwidth is greater than business write bandwidth.
Disk of installation directory	Above 10GB, RAID 1 or RAID 10 is recommended.
Disk path	● Minimum configuration: 5GB, configuration can be increased according to actual business needs. ● Configure the capacity of the partition corresponding to the disk path based on the storage capacity and replica mode of LUN. For the directories used by HBlock, it is recommended to set up automatic mounting at boot time or use a directory or subdirectory that has been set up for automatic mounting.
Network settings	Can connect to object storage network (not required for deploying local mode LUNs). The overall network architecture is as follows: 1. The nodes within HBlock are interconnected through the intranet. 2. HBlock is interconnected with upper-layer applications through an intranet, dedicated line, or public network. 3. HBlock is interconnected with object storage through dedicated line or public network, local LUNs are not required. 

Figure 1. Standalone mode network topology diagram

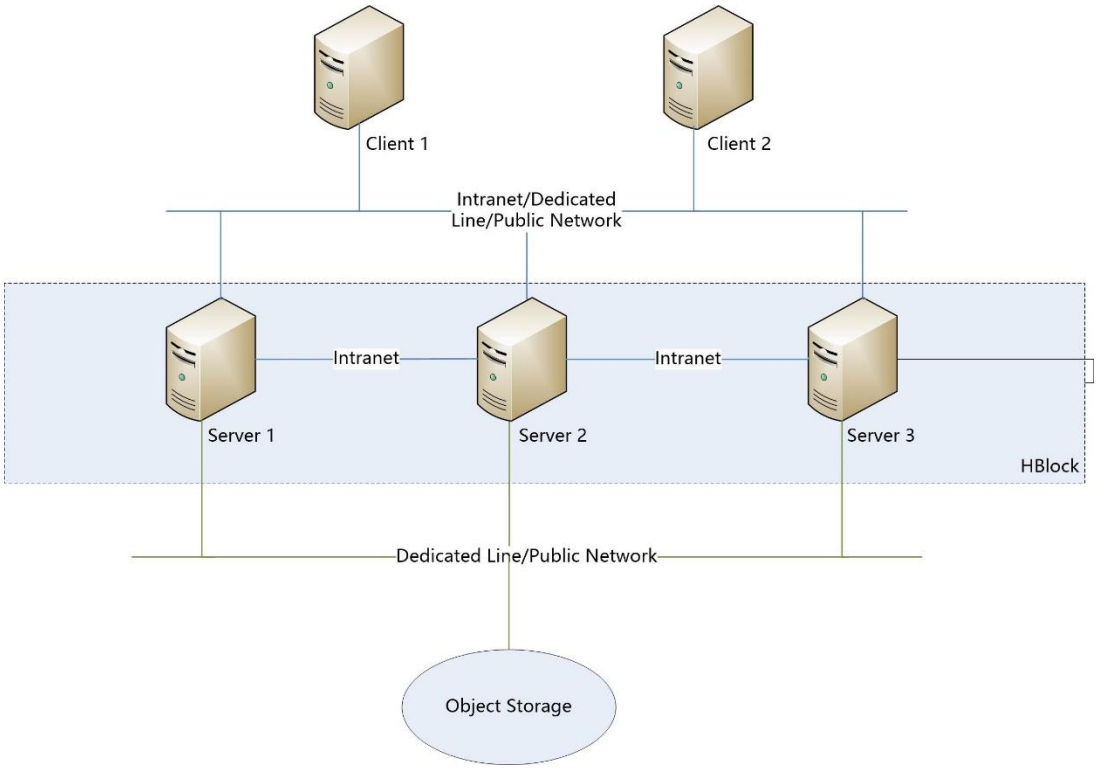


Figure 2. HBlock cluster mode network topology diagram

Note: Confirm whether you are using the standalone mode or cluster mode before deploying HBlock. The mode cannot be changed once deployed.

2.2 HBlock Configuration Environment – Standalone Mode

According to **Environmental Requirements**, prepare one server.

Note: Make sure that the **ping** command and **ps** command are available. For Debian/Ubuntu, you can use the following commands to install the **ping** command and **ps** command.

```
apt-get update     # Get the latest installation package
apt-get install iputils-ping      # Install ping
apt-get install procps     # Install ps
```

The server should be configured according to following the steps. The operations are illustrated using CentOS 7.x as an example:

Note: If the operating system is already installed, please ignore step I. If the disk is already mounted, please ignore step II. You can use the mounting path as the disk path for HBlock, or use the command `mkdir` *`DIRECTORY`* to create a directory under the mounting path and use it as the HBlock disk path.

(I) Install the CentOS 7.x operating system (Optional).

(II) Format the hard disk and mount it (Optional).
Please refer to the following examples to format the hard disk on your server for subsequent deployment.

```
lsblk      # View hard disk
mkfs.ext4 /dev/vdX     #  Format the hard disk to ext4
mkdir DIRECTORY       # Create a mounting path, and DIRECTORY is the directory name.
mount /dev/vdX DIRECTORY     # Mount the hard disk
```

Note: The **mount** command is a temporary mounting command. After the server is restarted, it needs to be mounted again. For the directories used by HBlock, it is recommended to set up automatic mounting at boot time or use a directory or subdirectory that has been set up for automatic mounting.

Note: If the user installing HBlock is a non-root user, the read and write permissions on the directory used by HBlock are required. You can use the following command.

```
chown user:user-group DIRECTORY
#  user is HBlock user, user-group is the user group to which HBlock users belong
```

(III) Close selinux and swap partitions (Recommended).

(IV) Configure the firewall.
If your server's firewall is not enabled, you can skip this step. If your server's firewall is enabled, please open the iSCSI port to allow clients to connect to the server's target.
If the firewall software in use is firewalld, the example is as follows:

(a) Open the iSCSI port, for example, if the iSCSI port is 3260.

```
firewall-cmd --permanent --add-port=3260/tcp
```

(b) Reload the firewall to apply the configuration.

```
firewall-cmd --reload
```

If the firewall is iptables, the example is as follows:

(a) Open the iSCSI port, for example, if the iSCSI port is 3260.

```
iptables -I INPUT -p tcp --dport 3260  -j ACCEPT
```

(b) Save configuration.

```
iptables-save
```

(V) Set resource limits.

Edit file **/etc/security/limits.conf** to add the following contents, which set the maximum number of open files and processes in *domain*.

Note: Only non-root users need to manually modify /etc/security/limits.conf.

```
domain soft nofile 65536   # Set a value for the parameter domain as required
domain hard nofile 65536   # Set a value for the parameter domain as required
domain soft nproc 65535    # Set a value for the parameter domain as required
domain hard nproc 65535    # Set a value for the parameter domain as required
```

domain can be a *username*, *groupname*, *uid* or *wildcard*, and you can set it according to actual needs.

Note: If *domain* is set to username, *domain* must include the user who starts the HBlock service.

Example 1: If the value of the parameter *domain* is *, it means all users can open up to 65,536 files and run up to 65,535 concurrent processes.

```
* soft nofile 65536    # * is the value of the parameter domain
* hard nofile 65536    # * is the value of the parameter domain
* soft nproc 65535     # * is the value of the parameter domain
* hard nproc 65535     # * is the value of the parameter domain
```

Example 2: If the value of the parameter *domain* is root, it means the root user can open up to 65,536 files and run up to 65,535 concurrent processes.

```
root soft nofile 65536    # root is the value of the parameter domain
root hard nofile 65536    # root is the value of the parameter domain
root soft nproc 65535     # root is the value of the parameter domain
root hard nproc 65535     # root is the value of the parameter domain
```

(VI) Install the font library on the server that provides web services.

```
yum install fontconfig
```

```
fc-cache --force
```

2.3 HBlock Configuration Environment – Cluster Mode

According to **Environmental Requirements**, prepare three or more servers.
Note: Make sure that the **ping** command and **ps** command are available. For Debian/Ubuntu, you can use the following commands to install the **ping** command and ps command.

```
apt-get update  # Get the latest installation package
apt-get install iputils-ping   # Install ping
apt-get install procps # Install ps
```

Each server should be configured according to following the steps. The following operations take CentOS 7.x version as an example:
Note: If the operating system is already installed, please ignore step I. If the disk is already mounted, please ignore step II. You can use the mounting path as the disk path for HBlock, or use the command `mkdir` *`DIRECTORY`* to create a directory under the mounting path and use it as the HBlock disk path.

(I) Install the CentOS 7.x operating system (Optional).

(II) Format the hard disk and mount it (Optional).

Please refer to the following examples to format the hard disk on the server to facilitate subsequent deployment.

```
lsblk # View hard disk
mkfs.ext4 /dev/vdX  #Format the hard disk to ext4
mkdir DIRECTORY #Create a mounting path, and DIRECTORY is the directory name.
mount /dev/vdX DIRECTORY #Mount the hard disk
```

Note: The **mount** command is a temporary mounting command. After the server is restarted, it needs to be mounted again. For the directories used by HBlock, it is recommended to set up automatic mounting at boot time or use a directory or subdirectory that has been set up for automatic mounting.

Note: If the user installing HBlock is a non-root user, the read and write permissions on the directory used by HBlock are required. You can use the following command.

```
chown user:user-group DIRECTORY
#  user is HBlock user, user-group is the user group to which HBlock users belong
```

(III) Close selinux and swap partitions (Recommended)

(IV) Configure the firewall.

Make sure that the cluster servers can access each other, and are mutually trustlisted. Also, open the iSCSI port to allow clients to connect to server's target. If it is installed on a cloud host, a trustlist also needs to be added to the security group.

If your server's firewall is not enabled, you can skip this step.

If the firewall software in use is firewalld, the example is as follows:

(a) Open the iSCSI port, for example, if the iSCSI port is 3260.

```
firewall-cmd --permanent --add-port=3260/tcp
```

(b) Add the IP of each server in the cluster to the trustlist:

Add IPv4 address.

```
firewall-cmd --permanent --add-rich-rule="rule family=ipv4 source address=your_IP accept"
# your_IP is IP address allowed to access
```

Add IPv6 address.

```
firewall-cmd --permanent --add-rich-rule="rule family=ipv6 source address=your_IP accept"
#your_IP is IP address allowed to access
```

(c) Reload the firewall to apply the configuration.

```
firewall-cmd --reload
```

If the firewall is iptables, the example is as follows:

(a) Open the iSCSI port, for example, if the iSCSI port is 3260.

```
iptables -I INPUT -p tcp  --dport 3260  -j ACCEPT
```

(b) Configure mutual access between servers in the cluster:

Allow the loopback address.

```
iptables -I INPUT -i lo -j ACCEPT
```

Allow access from the internal network segment.

```
iptables -I INPUT -s your_IP -j ACCEPT
```

(c) Save configuration.

```
iptables-save
```

(V) Set resource limits.

Edit file **/etc/security/limits.conf** to add the following contents, which set the maximum number of open files and processes in domain.

Note: Only non-root users need to manually modify /etc/security/limits.conf.

```
domain soft nofile 65536
domain hard nofile 65536
domain soft nproc 65535
domain hard nproc 65535
```

domain can be a *username*, *groupname*, *uid* or *wildcard*, and you can set it according to actual needs.

Note: The *domain* must include the user who starts the HBlock service.

Example 1: If the value of the parameter domain is *, it means all users can open up to 65,536 files and run up to 65,535 concurrent processes.

```
* soft nofile 65536
* hard nofile 65536
* soft nproc 65535
* hard nproc 65535
```

Example 2: If the value of the parameter domain is root, it means the root user can open up to 65,536 files and run up to 65,535 concurrent processes.

```
root soft nofile 65536
root hard nofile 65536
root soft nproc 65535
root hard nproc 65535
```

(VI) Install the font library on the server that provides web services.

```
yum install fontconfig
fc-cache --force
```

3 Management Operations

3.1 Install

1. Please complete the following preparations first: Prepare one or more directories as HBlock disk paths to store HBlock data. For example: **/mnt/storage01**. For the Cluster Mode, the directories as HBlock disk paths for each server can be different. It is recommended that the disk path as HBlock disk path does not share a disk or file system with the operating system.

2. Place the installation package in the directory where HBlock will be installed on the server, then unzip it and enter the unzipped folder.
   Note: It is recommended that the installation directory not share a disk or file system with the HBlock disk path.

```
unzip CTYUN_HBlock_Plus_3.9.0_x64.zip
cd CTYUN_HBlock_Plus_3.9.0_x64
```

- **Example**: Execute the unzipped package on the server and enter the unzipped folder

```
[root@hblockserver opt]# unzip CTYUN_HBlock_Plus_3.9.0_x64.zip
......
[root@hblockserver opt]# cd CTYUN_HBlock_Plus_3.9.0_x64/
```

3. Install HBlock
   Install HBlock on each server.

```
./stor install [ { -a | --api-port } API_PORT ] [ { -w | --web-port } WEB_PORT ]
```

   API_PORT: Specifies the API port number, the default port number is 1443.
   WEB_PORT: Specifies the WEB port number, the default port number is 2443.
   You can set the API port number and WEB port number according to your business needs.
   Note: Please ensure that the Linux user has permission for the required ports. By default, Linux systems do not open ports less than 1024 to ordinary users without root privileges.

Example: Install HBlock on the server.

```
[root@hblocksever1 CTYUN_HBlock_Plus_3.9.0_x64]# ./stor install
Do you agree with HBlock User Agreement? [Yes/No]
Used in Chinese mainland, follow https://www.ctyun.cn/portal/protocol/10073150
Otherwise, follow https://www.esurfingcloud.com/portal/protocol/20692906
y
Installing HBlock...
```

```
Installed successfully.
When all servers are installed, please initialize HBlock in any of the following ways:
1. Use web portal to initialize HBlock. The https port is 2443.
2. Use management API (POST /rest/v1/system/setup) to initialize HBlock. The https port
is 1443.
3. Use command line (stor setup) to initialize HBlock. Type 'stor --help setup' for more
information.
```

4. Installation completed: Once installed, HBlock can be initialized and managed via the web, the command line, or the API. This section will subsequently describe the initialization and management operations of HBlock using the API.

3.2 Initialize HBlock

1. Use a web browser to access: **https://*SERVER_IP*:*PORT***

Parameter	Description
SERVER_IP	IP of the server where HBlock is installed. Make sure that the server can be accessed by you. Only the WEB client and the accessed server are in the same local area network (LAN), the server's intranet IP can be used as *SERVER_IP*.
PORT	The web port is specified during installation, if not specified, the default port is 2443.

2. Select the deployment mode of HBlock: Standalone Mode or Cluster Mode

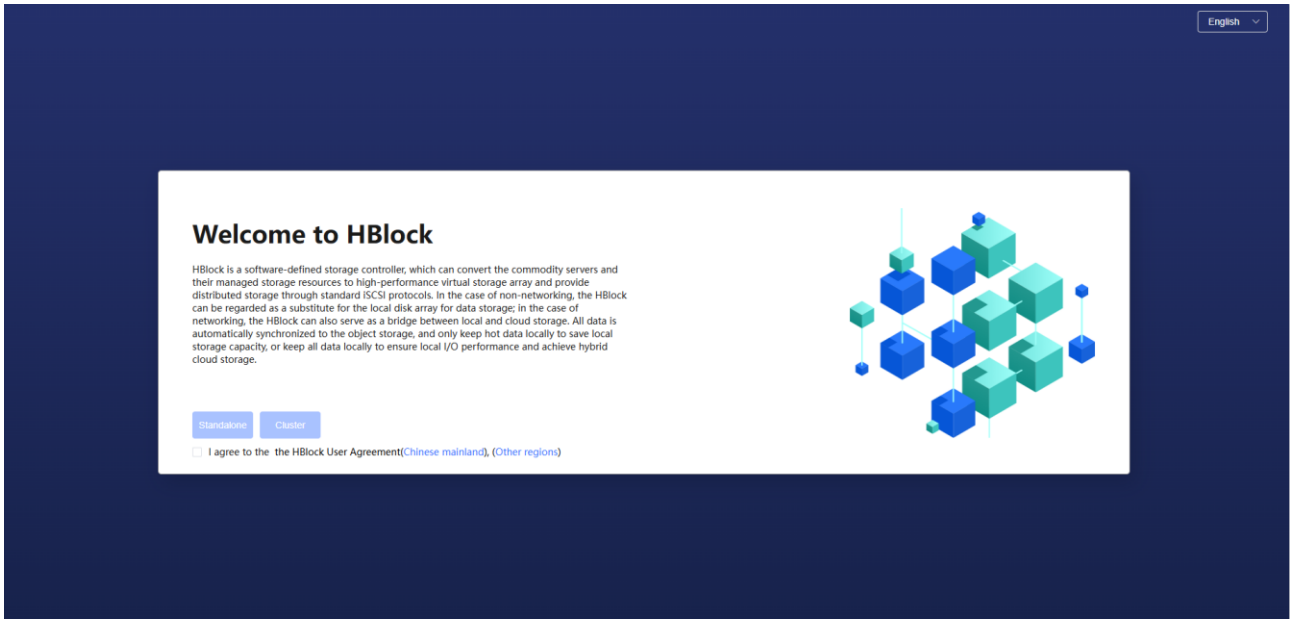


Figure 3. Select the deployment mode of HBlock

- **Standalone Mode**: The standalone mode needs only one server for deploying HBlock.
- **Cluster Mode**: The cluster mode requires at least three servers for deploying HBlock. If you choose the cluster mode, please make sure that the servers in the cluster have completed the HBlock installation and can access each other.

3.2.1 Standalone Mode

(I) Initialize settings: Set Basic Information, Set Disk Paths, Set Network, and Set Ports.

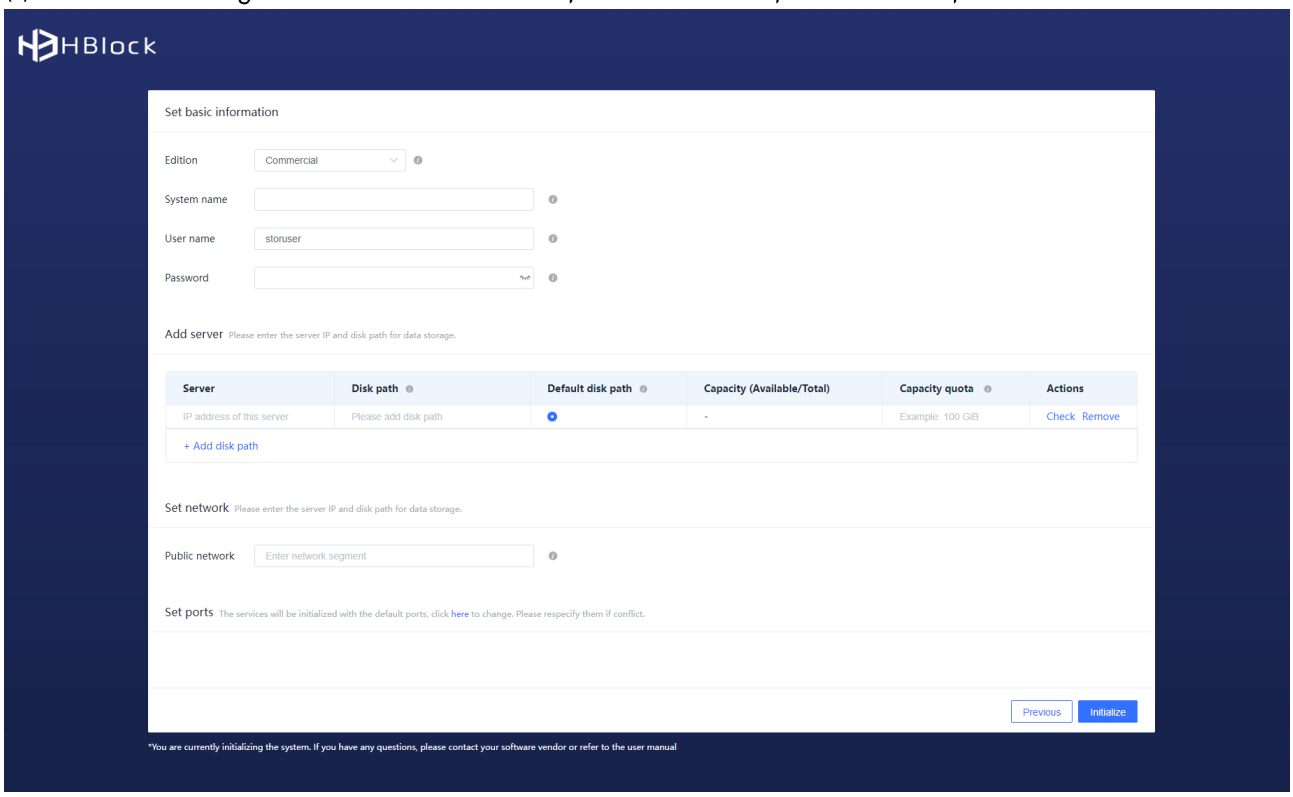


Figure 4. HBlock Initialization (Standalone Mode)

1. Set Basic Information

Parameter	Description
Edition	Edition: ● Free Edition: Basic features are permanently free to use; advanced features are disabled by default, with one 30-day free trial opportunity. Software upgrade functionality for the Free Edition will automatically expire after 2 years. Importing a Commercial Edition software license can activate all features. ● Commercial Edition: Offers a 30-day full-feature trial; after expiration, certain management features will be locked. Importing a Commercial Edition software license can activate all features. For details on the functional differences between the Free Edition and the Commercial Edition, please refer to **Commercial Edition and Free Edition**.
HBlock name	Specifies the HBlock name. The value is a string of 1 to 64 case-sensitive characters. It can contain letters, digits, underscores (_), or hyphens (-). Only supports starting with a letter or a digit.
User name	Specifies HBlock Administrator Username. Type: String

	The value is a string of 5 to 16 case-sensitive characters. It can only contain letters or digits. The default value is `storuser`.
Password	Specifies the password for admin user. The password must be set when initializing HBlock. The value is a string of 8 to 16 case-sensitive characters: ● The password must contain at least three of the following: lowercase letters, uppercase letters, digits, or special characters. The special characters only include ~ ! @ # $ % ^ & * ( ) _ + [ ] { } | ; : , . / < > ?. ● The password cannot contain t 3 consecutive repeating characters, 3 consecutive or in-reverse order of numbers or letters (case-insensitive), 3 consecutive or in-reverse order of keyboard sequences (case-insensitive).

2. Set Disk Paths

Parameter	Description
Server	Specifies the server IP, supporting both IPv4 and IPv6 addresses.
Disk path	Absolute path(s) for storing user data on the server. Value: It can only contain letters, numbers, Chinese characters, or the special characters ~ ! @ $ ( ) _ + - ; . :.
Default disk path	When creating a LUN, you can select a specified disk path for data storage. If not selected, the default disk path will be used to store LUN data.
Capacity (Available/Total)	The available capacity and total capacity of the disk where the disk path resides.
Capacity Quota	Specifies the capacity quota of the disk path, that is, for each disk path added to server, the total amount of data that can be written by HBlock. Once the space used by HBlock reaches the quota, data writing is immediately blocked, and no more space is allowed to be used beyond the quota. It supports inputting numbers (default unit is GiB) or inputting "number + unit". The number should be accurate to two decimal places, and the unit can be KiB, MiB, GiB, TiB, or PiB. The quota cannot be larger than the total capacity of the disk where the disk path resides. 0 indicates prohibiting writing; negative numbers or leaving it blank indicate no restriction.
Actions	● Check: Check whether the disk path is available. ● Remove: Remove the disk path.

3. Set Network

Parameter	Description
Public	Public network for data transmission between client and server. The format is IP

network	The format is IP CIDR format. ● If the public network is specified, please ensure that the server has an IP that matches the specified network segment, and the system will automatically use this IP to communicate with the client. ● If the public network is not specified or the specified network segment does not match any IP of the server, the server IP specified in step 2 is used for data transmission. In this case, server IP cannot be specified as localhost, 127.0.0.1 or 0:0:0:0:0:0:0:1.

4. Set Ports

   The system uses the specified port and port range for initialization. If not specified, it will use the default port.

   Note:

   - Please ensure that the Linux user has permission for the required ports. By default, Linux systems do not open ports less than 1024 to ordinary users without root privileges.
   - When setting the port range, please avoid overlapping with the local temporary port (`ip_local_port_range`) range of the Linux system, otherwise, it may cause the ports used by the HBlock service to be occupied. Use the command `cat /proc/sys/net/ipv4/ip_local_port_range` to view the local temporary port range.

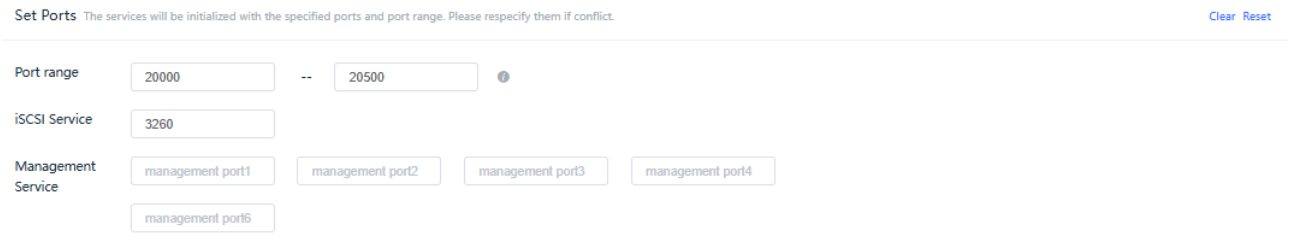


Figure 5. HBlock Initialization Setting Port (Standalone Mode)

Parameter	Description
Port range	Storage services and services without specified ports will automatically be assigned ports from this range. The value is an integer that ranges from 1 to 65535. The default value is 20000-20500. **Note**: It is recommended that the specified port range contains at least 500 ports.
iSCSI service	Specifies the iSCSI port. The value is an integer that ranges from 1 to 65535. The default value is 3260.
Management	Specifies management service port.

services	The value is an integer that ranges from 1 to 65535.

(2) Click the **Initialize** button to initialize HBlock.

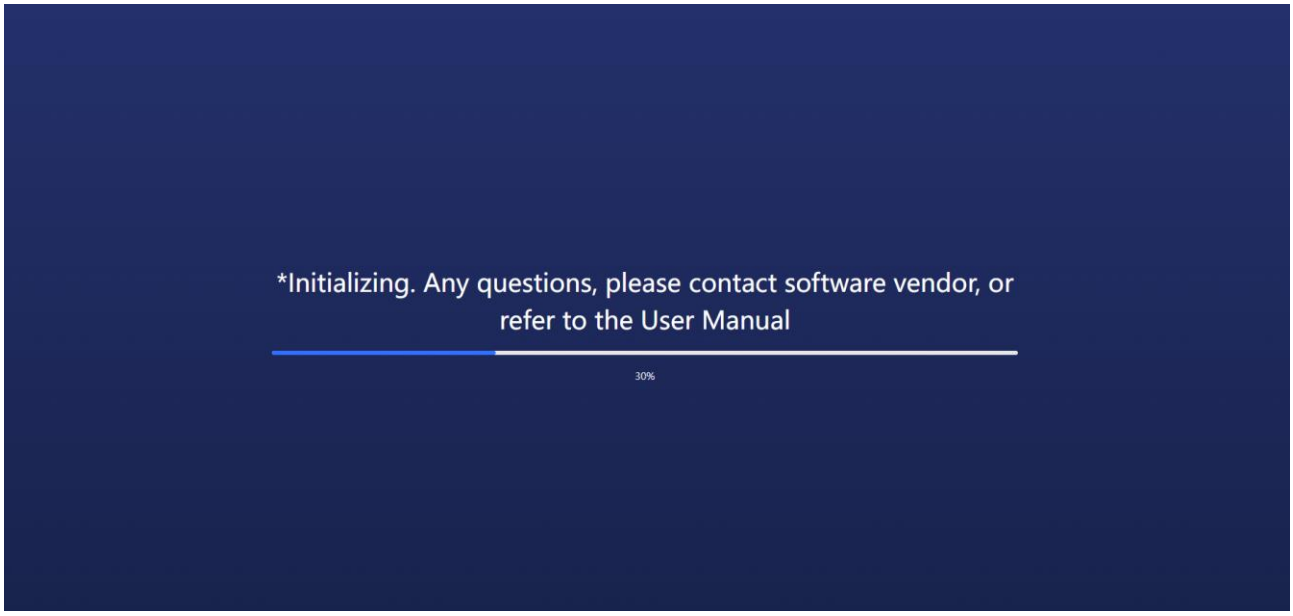


Figure 6. HBlock Initializing. (Standalone Mode)

3.2.2 Cluster Mode

(I) Initialize settings: Set Basic Information, Set Cluster Topology, Set Fault Domian, Set Network, and Set Ports.

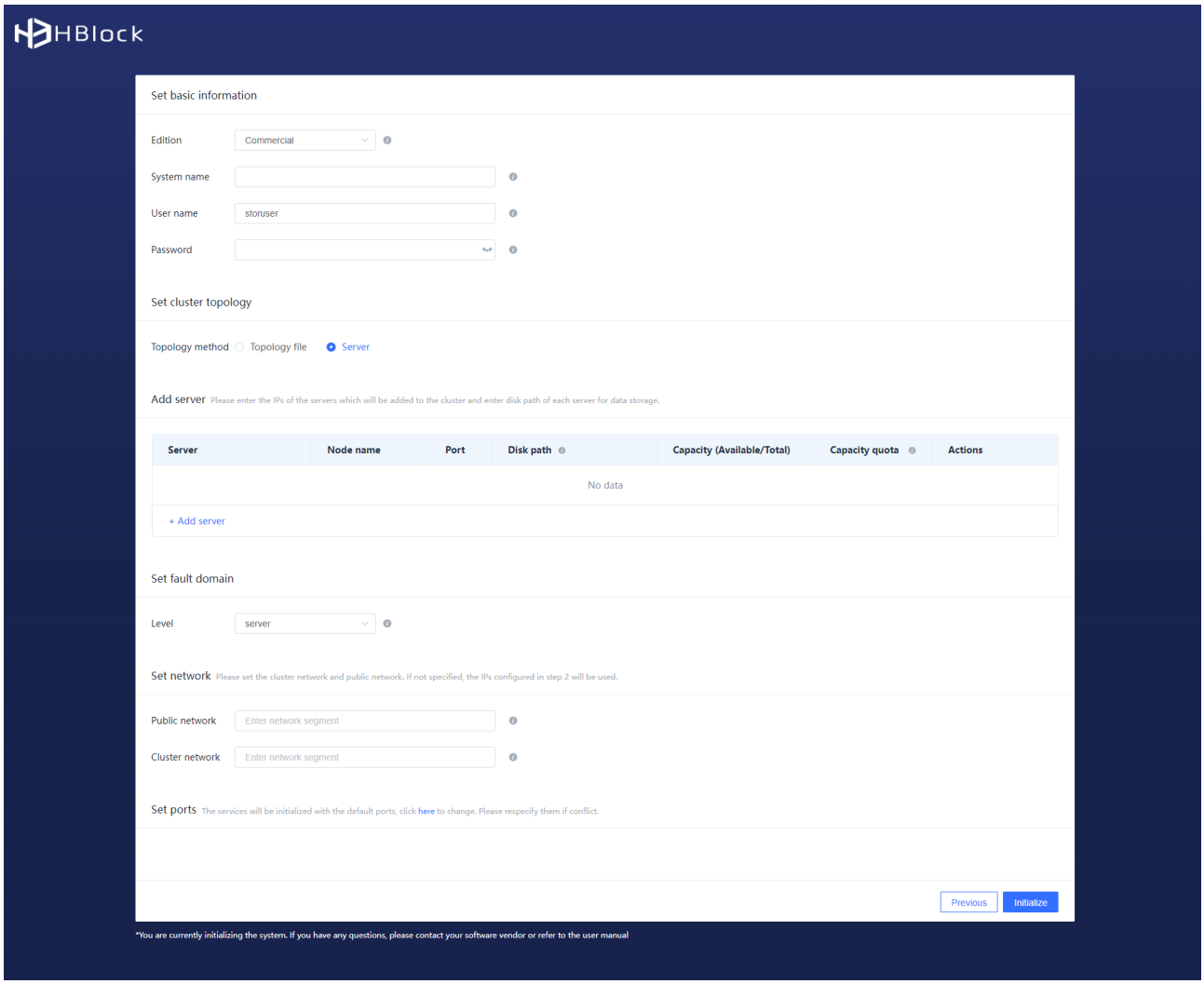


Figure 7. HBlock Initialization (Cluster Mode)

1. Set Basic Information

Parameter	Description
Edition	Edition: ● Free Edition: Basic features are permanently free to use; advanced features are disabled by default, with one 30-day free trial opportunity. Software upgrade functionality for the Free Edition will automatically expire after 2 years. Importing a Commercial Edition software license can activate all features. ● Commercial Edition: Offers a 30-day full-feature trial; after expiration, certain management features will be locked. Importing a Commercial Edition software license can activate all features.

	For details on the functional differences between the Free Edition and the Commercial Edition, please refer to **Commercial Edition and Free Edition**.
HBlock name	Specifies the HBlock name. The value is a string of 1 to 64 case-sensitive characters. It can contain letters, digits, underscores (_), or hyphens (-). Only supports starting with a letter or a digit.
User name	Specifies HBlock Administrator Username. Type: String The value is a string of 5 to 16 case-sensitive characters. It can only contain letters or digits. The default value is `storuser`.
Password	Specifies the password for admin user. The password must be set when initializing HBlock. The value is a string of 8 to 16 case-sensitive characters: ● The password must contain at least three of the following: lowercase letters, uppercase letters, digits, or special characters. The special characters only include ~ ! @ # $ % ^ & * ( ) _ + [ ] { } | ; : , . / < > ?. ● The password cannot contain t 3 consecutive repeating characters, 3 consecutive or in-reverse order of numbers or letters (case-insensitive), 3 consecutive or in-reverse order of keyboard sequences (case-insensitive).

2. Set Cluster Topology
   The topology mode can be selected as either "Topology File" or "Server", one of the two options.
   - Using the “Topology File” method

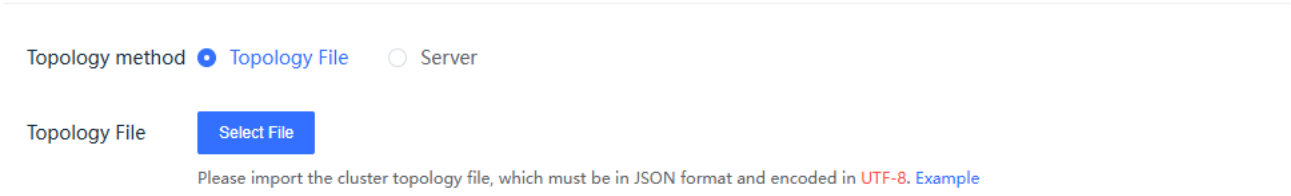


Figure 8. Set Cluster Topology – Topology File (Cluster Mode)

Parameter	Description
Topology File	Import the cluster topology file. The topology file is a JSON file in UTF-8 encoding format. For more information, see **Cluster Topology File**.

   - Using the “Server” method
     Click on “Add server” and fill in the server information.

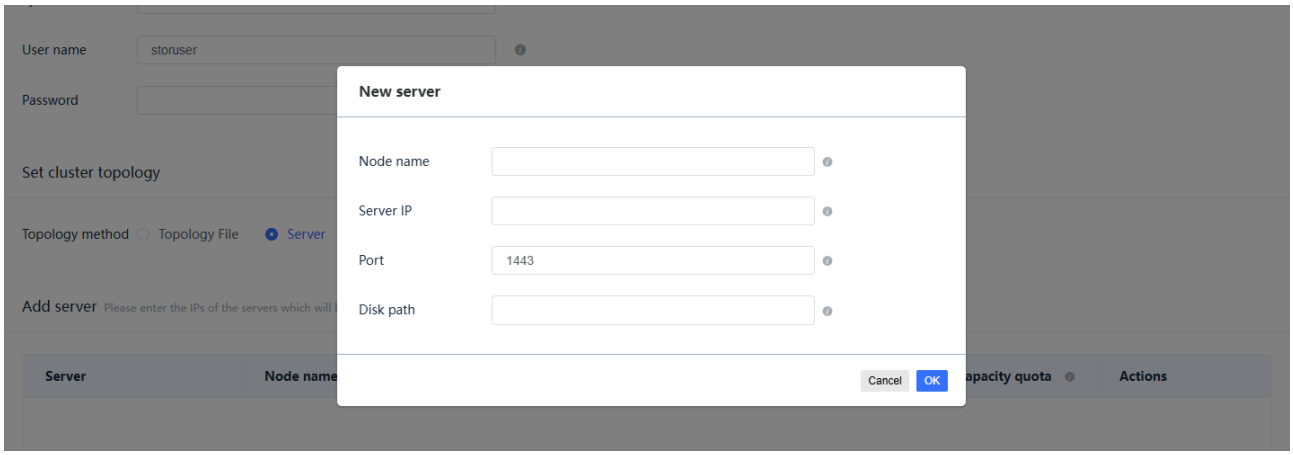


Figure 9. Set Cluster Topology – Server (Cluster Mode)

Parameter	Description
Node name	Specifies the name of a server node. The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit. The server ID is used by default as node name.
Server IP	Specifies the IP address of the server to be added to the cluster, supporting both IPv4 and IPv6 addresses.
Port	Specifies the API Port. **Note**: It needs to be consistent with the API port number set when installing HBlock on the server
Disk path	Absolute path(s) for storing user data on the server. You can input one or more disk paths, separated by commas (,). Value: It can only contain letters, numbers, Chinese characters, or the special characters ~ ! @ $ ( ) _ + - ; . :.
Capacity (Available/Total)	The available capacity and total capacity of the disk where the disk path resides.
Capacity quota	Specifies the capacity quota of the disk path, that is, for each disk path added to server, the total amount of data that can be written by HBlock. Once the space used by HBlock reaches the quota, data writing is immediately blocked, and no more space is allowed to be used beyond the quota. It supports inputting numbers (default unit is GiB) or inputting "number + unit". The number should be accurate to two decimal places, and the unit can be KiB, MiB, GiB, TiB, or PiB. The quota cannot be larger than the total capacity of the disk where the disk path resides. 0 indicates prohibiting writing; negative numbers or leaving it blank indicate no restriction.

Actions	● Check: Check whether the disk path is available. ● Edit: Edit the disk path. ● Remove: Remove the disk path.

3. Set Fault Domain

   Sets the fault domain level of the base storage pool. All disk path nodes in the cluster topology configured during initialization are added to the base storage pool.

   After HBlock initialization, the fault domain cannot be modified.

   You can choose the fault domain level of the base storage pool according to your needs:

   - path: disk path level.
   - server: server level.
   - rack: rack level.
   - room: room level.

   Note: If the fault domain level is "rack" or "room", the "topology file" import method must be used for initialization.

4. Set Network

Parameter	Description
Public network	Public network for data transmission between client and server. The format is IP CIDR format. ● If the public network is specified, please ensure that the server has an IP that matches the specified network segment, and the system will automatically use this IP to communicate with the client. ● If the public network is not specified or the specified network segment does not match any IP of the server, the server IP specified in step 2 is used for data transmission. In this case, server IP cannot be specified as localhost, 127.0.0.1 or 0:0:0:0:0:0:0:1.
Cluster network	Cluster network for data communication between clusters, only supported by cluster mode. The format is IP CIDR format. ● If a cluster network is specified, please ensure that each server has an IP that matches the specified network segment, and the system will automatically use this IP for communication. ● If the cluster network is not specified, the server IP specified in step 2 is used for data communication. In this case, server IP cannot be specified as localhost, 127.0.0.1 or 0:0:0:0:0:0:0:1.

5. Set Ports

   The system uses the specified port and port range for initialization. If not specified, it will use the default port.

   Note:

- Please ensure that the Linux user has permission for the required ports. By default, Linux systems do not open ports less than 1024 to ordinary users without root privileges.
- When setting the port range, please avoid overlapping with the local temporary port (`ip_local_port_range`) range of the Linux system, otherwise, it may cause the ports used by the HBlock service to be occupied. Use the command `cat /proc/sys/net/ipv4/ip_local_port_range` to view the local temporary port range.

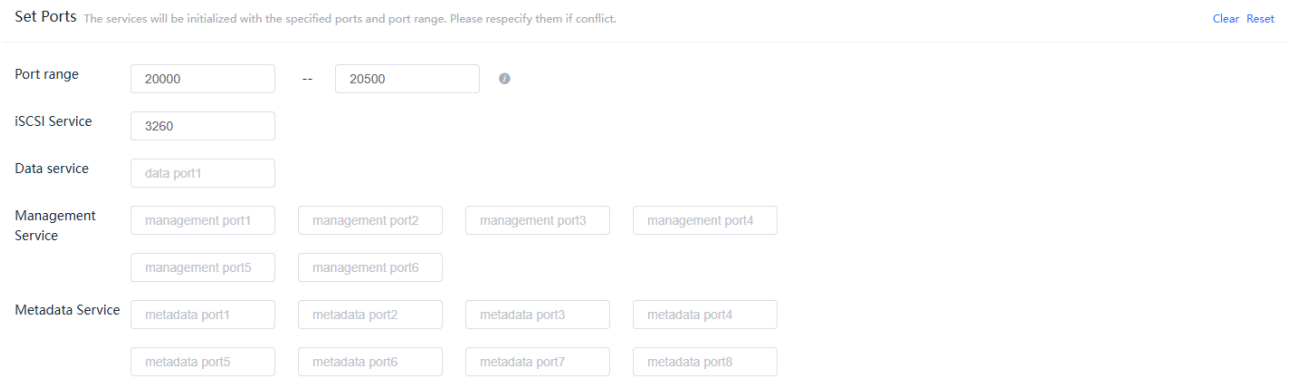


Figure 10.HBlock Initialization Setting Port (Cluster Mode)

Parameter	Description
Port range	Storage services and services without specified ports will automatically be assigned ports from this range. The value is an integer that ranges from 1 to 65535. The default value is 20000-20500. **Note**: It is recommended that the specified port range contains at least 500 ports.
iSCSI service	Specifies the iSCSI port. The default value is 3260.
Data service	Specifies the data service port. The value is an integer that ranges from 1 to 65535.
Management services	Specifies the management service port number. The value is an integer that ranges from 1 to 65535.
Metadata service	Specifies the metadata service port. The value is an integer that ranges from 1 to 65535.

(II) Click the **Initialize** button to initialize HBlock.

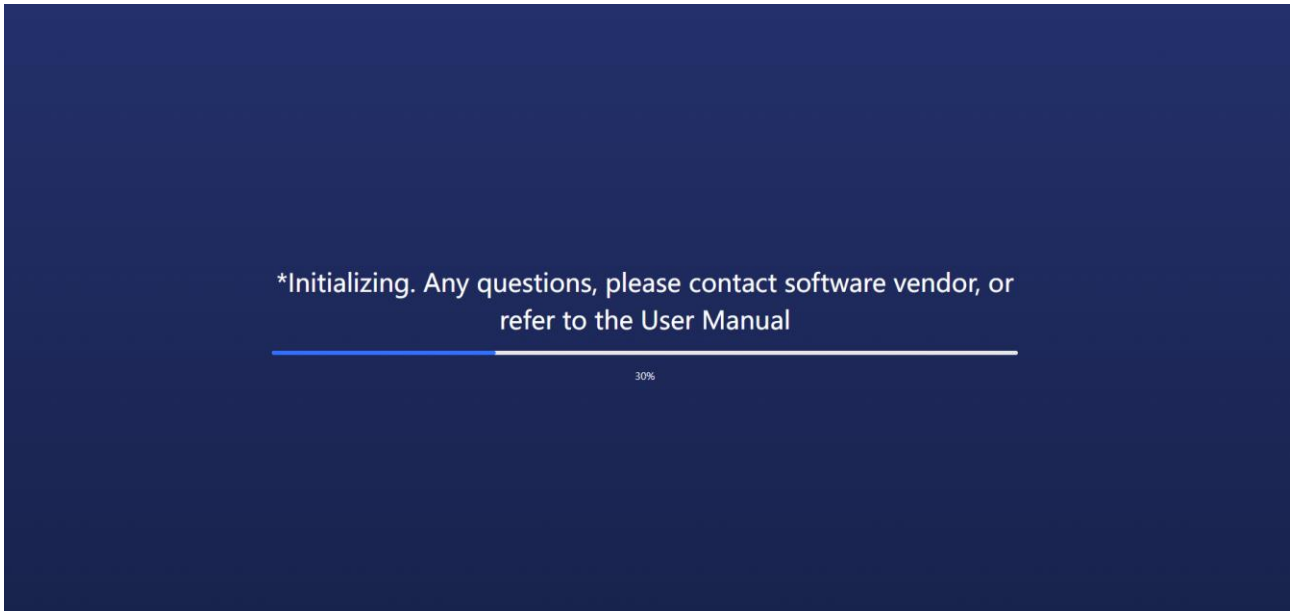


Figure 11. HBlock Initializing (Cluster Mode)

3.3 Login

Use a web browser to access https://*SERVER_IP*:*PORT* to log in.

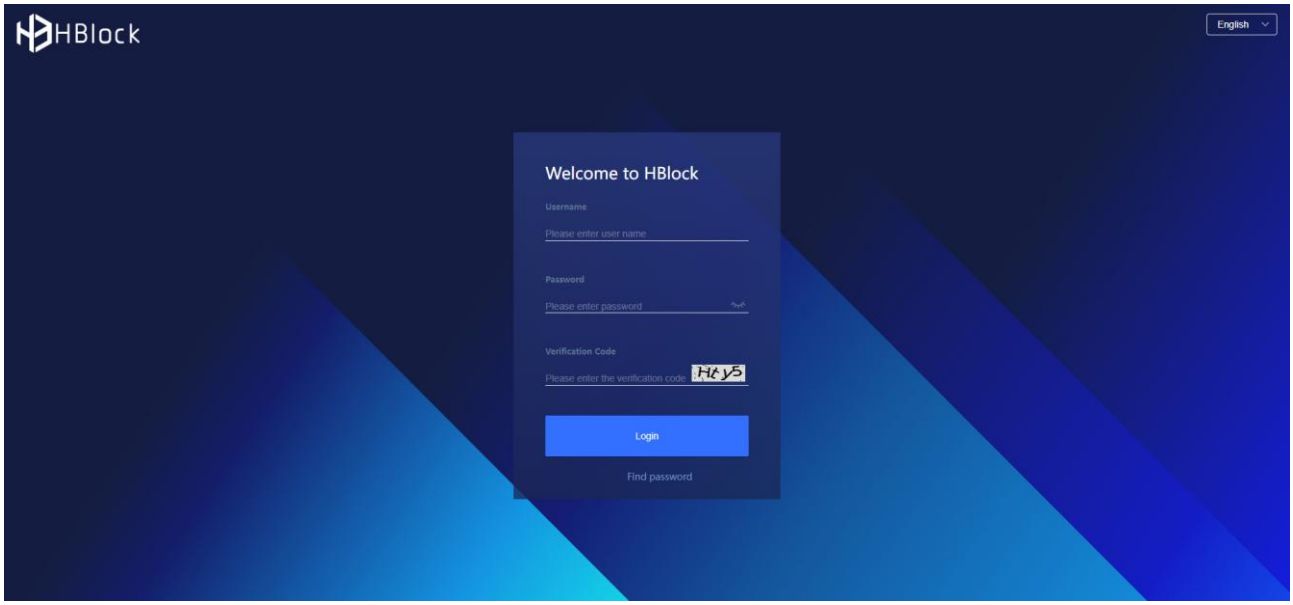


Figure 12. Logging in HBlock (Cluster Mode)

After logging in, management operations can be performed on the HBlock console: LUN, iSCSI target, server management, fault domain (only supported by cluster mode), monitoring, alarm, events and logs, and settings.

Note: If the font library is not installed and the verification code is not displayed, you can do the following:

1. Install the font library on the server that provides web services.

   CentOS:

```
yum install fontconfig
fc-cache --force
```

   Debian/Ubuntu:

```
apt install fontconfig
fc-cache --force
```

2. Execute the following command on the server accessed by WEB to restart the HBlock service.

```
./stor restart
```

3.4 Overview

After logging in to the HBlock system, click the **!** icon in the upper right corner to view system details, user agreement, and contact us.

3.4.1 System Details

Click **System details** to view system information.

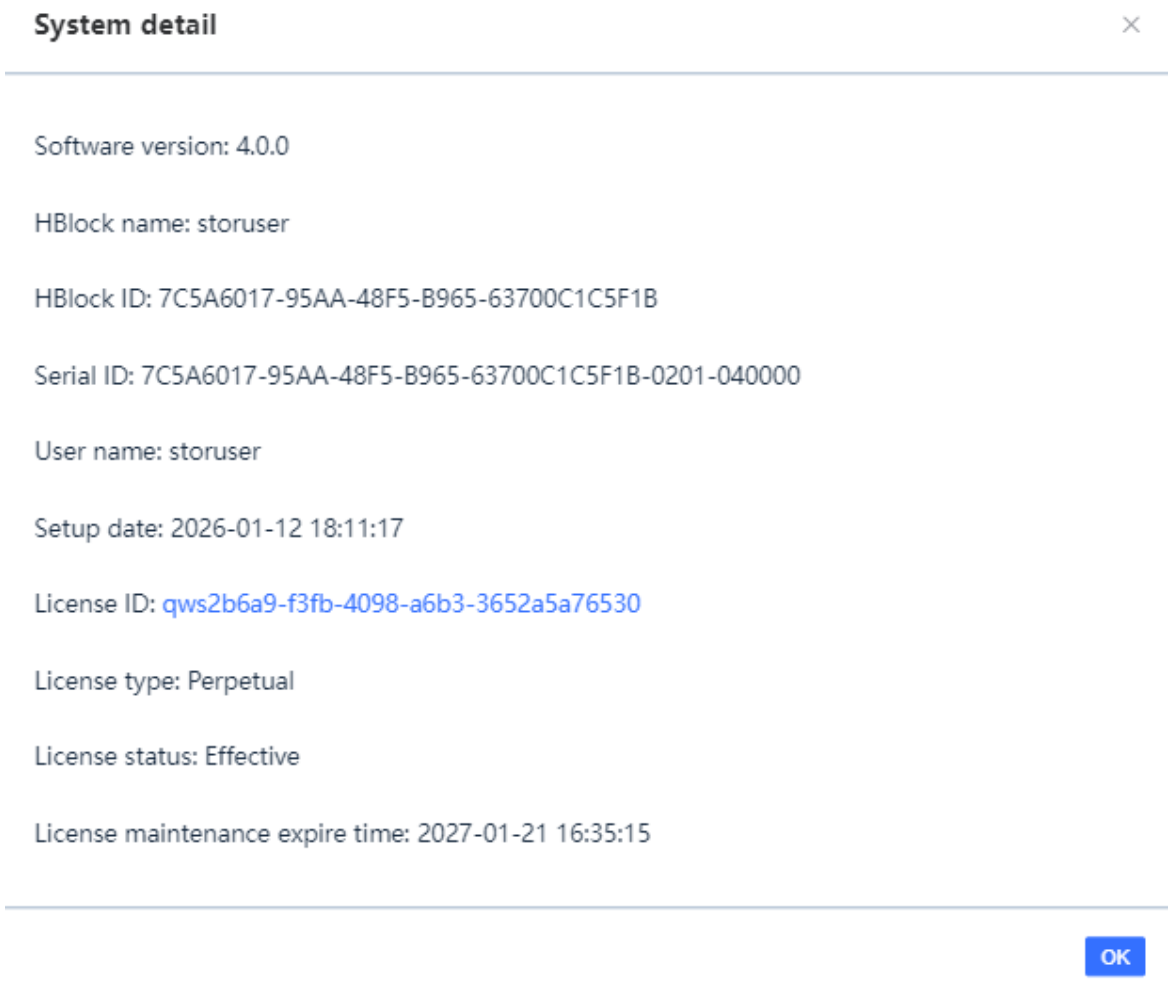


Figure 13. System Details (Standalone Mode – Commercial Edition)

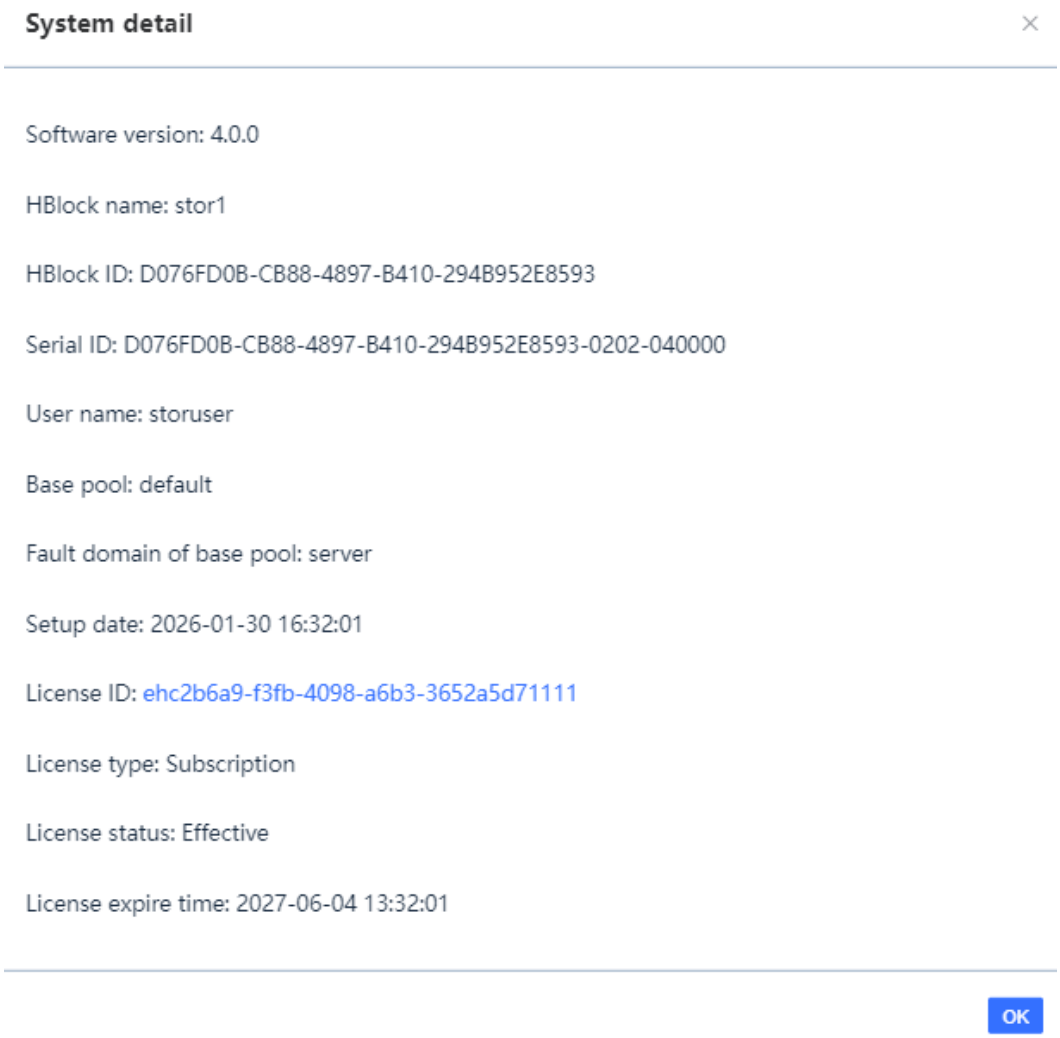


Figure 14. System Details (Cluster Mode - Commercial Edition)

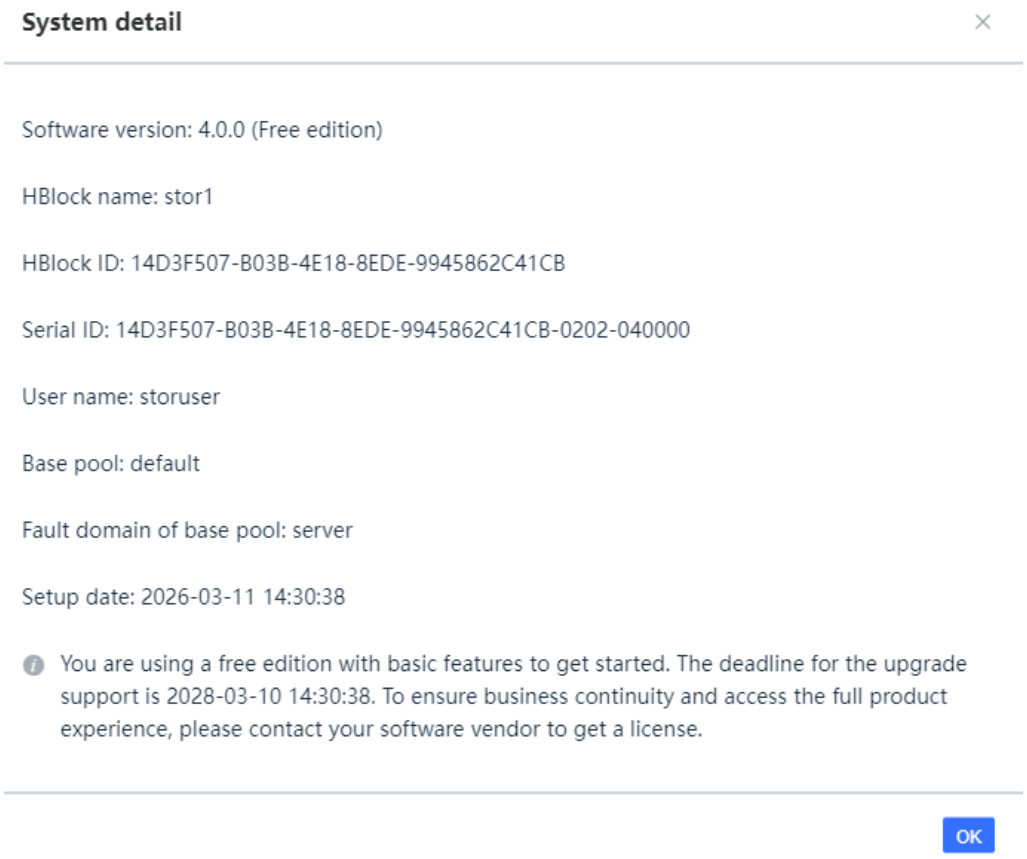


Figure 15. System Details (Cluster Mode -Free Edition)

Name	Description
Software version	The software version. **Note**: ● If it is a trial version, **Trial version** will be indicated after the software version. ● If it is free edition, **Free edition** will be indicated after the software version: ■ If Pro trial is enabled, the text will show: **Free edition, Pro trial active**. ■ If Pro trial was enabled but has expired, the text will show: **Free edition, Pro trial expired**.
HBlock name	HBlock name.
HBlock ID	HBlock ID.
Serial ID	HBlock serial ID. The serial ID is required when obtain a software license.
User Name	HBlock administrator username.
Base pool	The base storage pool name, only supported by

	cluster mode.
Fault domain of base pool	Fault domain type of the base storage pool, only supported by cluster mode: ● path. ● server. ● rack. ● room.
Setup date	Time the HBlock was initialized.
License ID	The ID of the last successfully imported software license (commercial edition).
License type	Types of software license subscriptions (commercial edition): ● Subscription ● Perpetual
License status	Software license status (commercial edition): ● Effective: The software license is effective. ● Expired: The software license has expired. ● Invalid: The software license is invalid.
License expire time or License maintenance expire time	The expiration time of the subscription license, or the maintenance expiration time of the perpetual license.

Note:

- If the HBlock is a trial version, an expiration date will be displayed. After expiration, only partial features remain available. For details, see **Features Available After Software License Expiration (Trial or Subscription Mode)**. If you decide to use it, it is recommended to contact the software vendor as soon as possible to obtain the software license and import it.
- If this is a free edition, the deadline for the upgrade support will be displayed. If the free edition has also enabled Pro trial, the start and end dates of the trial period will be shown as well.

3.4.2 DashBoard

Click **DashBoard** in the navigation bar to enter **DashBoard** page.
On the **DashBoard** page, you can view the Disk Paths (for cluster mode, it is the disk paths for the base storage pool), System Health (License, Storage pool (only supported by cluster mode), LUNs), Performance Indicators (System Bandwidth, System IOPS, System Latency), Performance with cloud, Alarms, ect. Click on the corresponding buttons to view more detailed information.

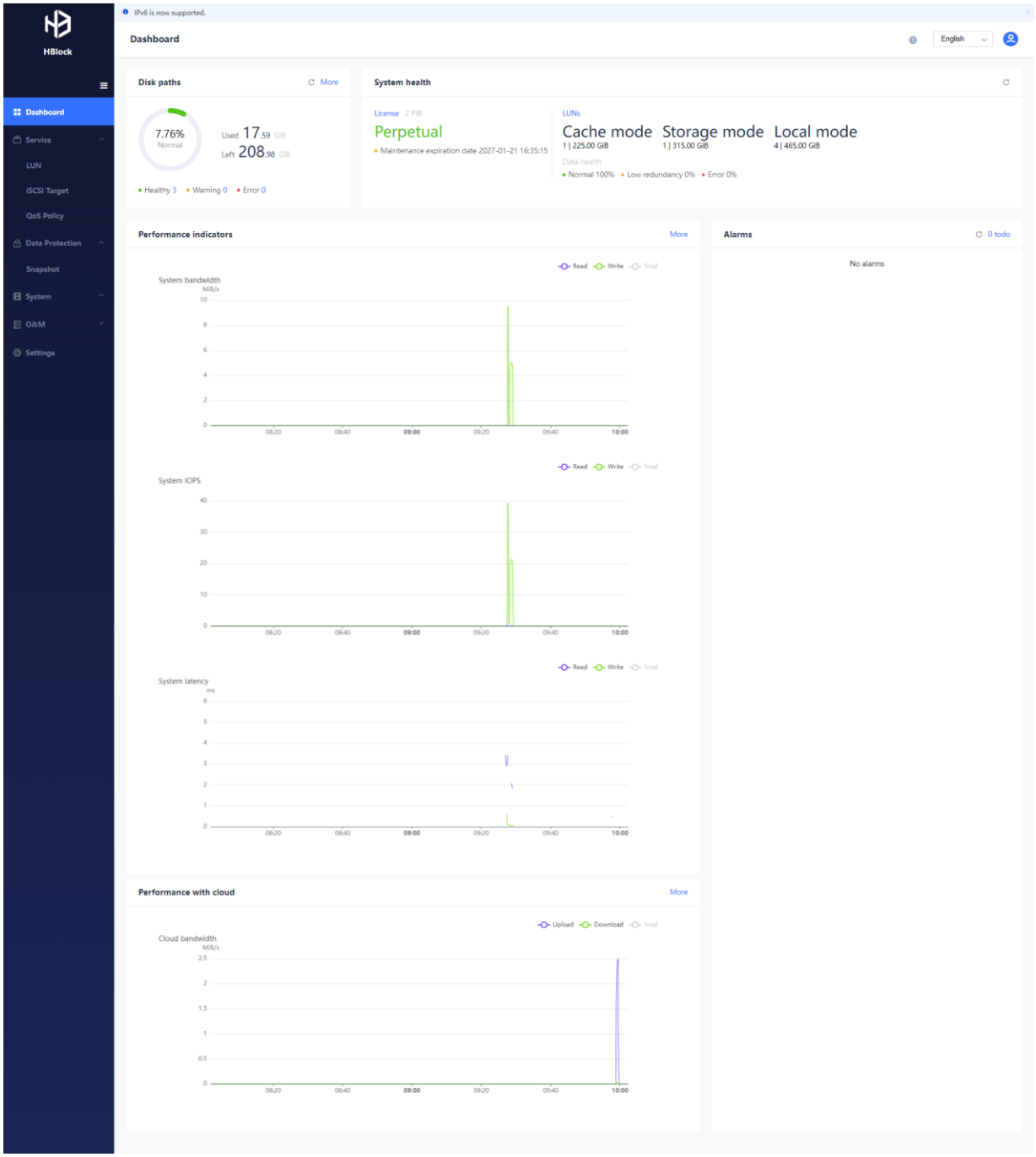


Figure 16. DashBoard (Standalone Mode - Free Edition)

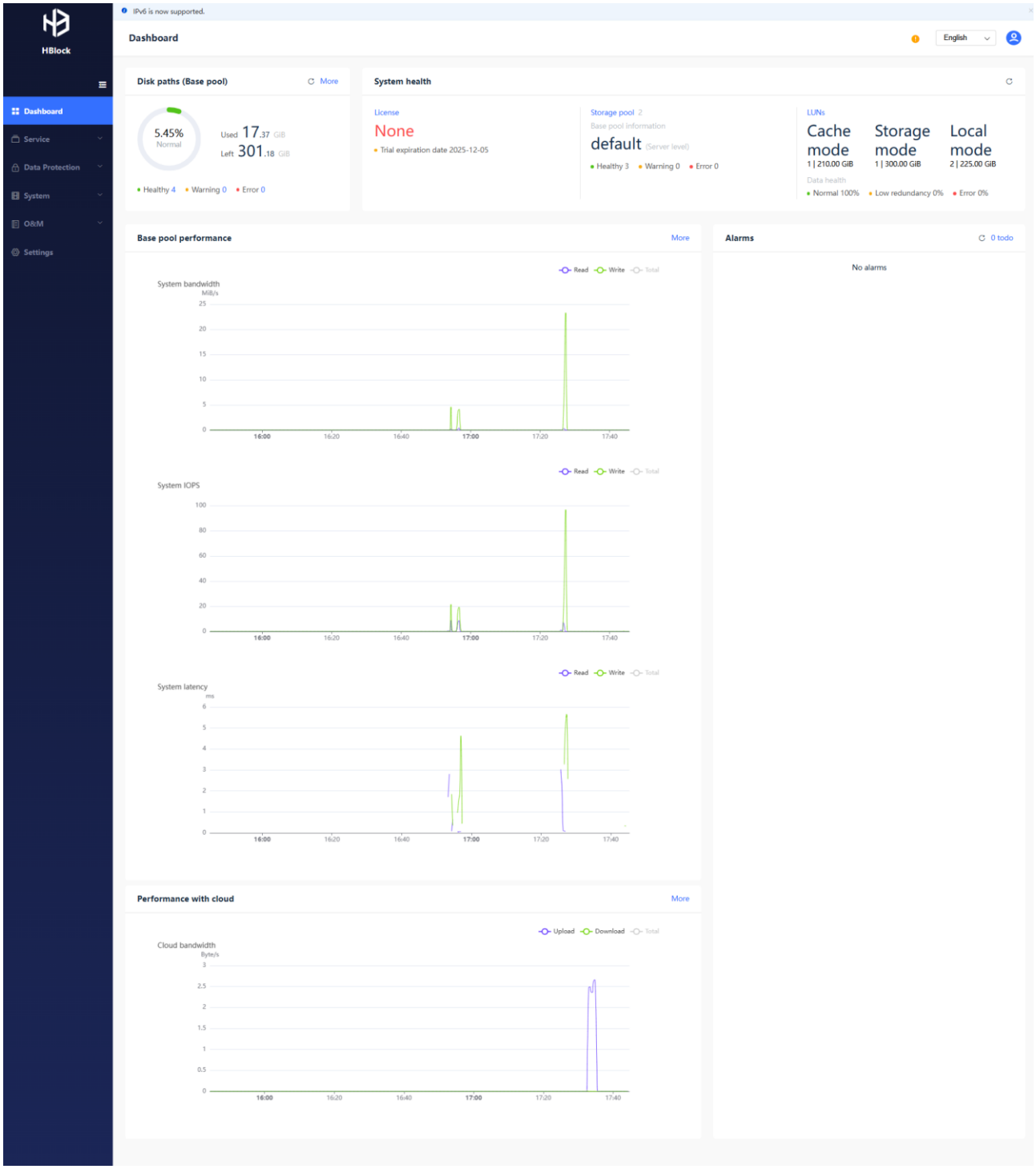


Figure 17. DashBoard (Cluster Mode – Commercial Edition)

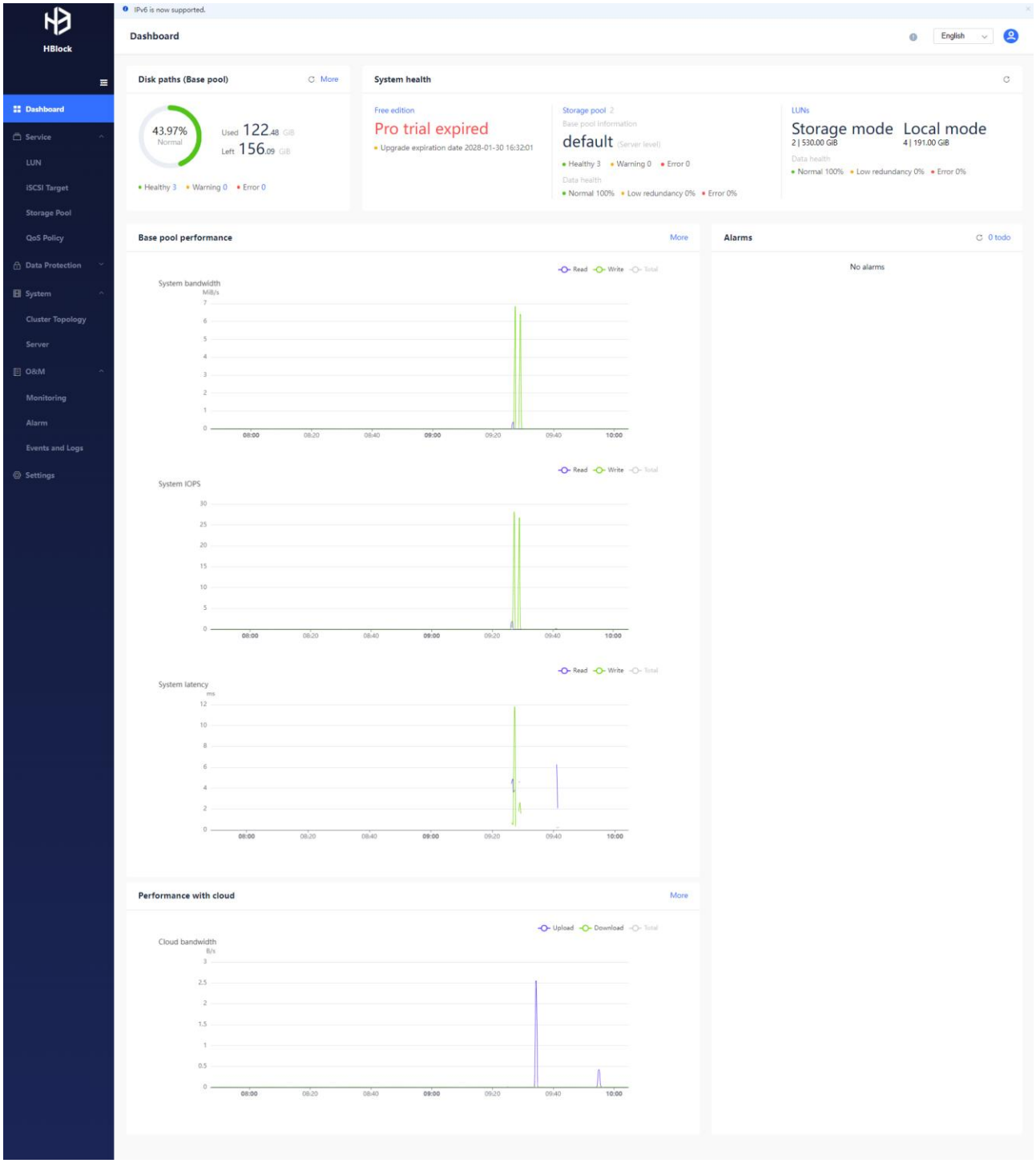


Figure 18. DashBoard (Cluster Mode – Free Edition)

Name	Description
Disk Paths	Standalone mode: The used capacity, remaining capacity, and disk space utilization of disks where all disk paths are located. The number of disk paths with health, warning and error.

		Cluster mode: The used capacity, remaining capacity, and disk space utilization of all disks where all disk paths are located in the base storage pool. The number of disk paths with health, warning and error.
System health	License	Software license status.
	Storage pool, only supported by cluster mode	It includes the number of storage pools and the base storage pool information. The base storage pool information includes: ● The base storage pool name. ● The level of the fault domain. ● The number of fault domains with health, warning, and error status. ● Data health: the proportion of normal data, the proportion of low redundancy data, and the proportion of error data. If low redundancy data exists, low redundancy reconstruction progress will be provided.
	LUN	The number and total capacity of each type of LUN (cache LUN, storage LUN, local LUN). The data status of the LUN, including: the proportion of normal LUN data, the proportion of LUN data with low redundancy, and the proportion of abnormal LUN data. If low redundancy data exists, low redundancy reconstruction progress will be provided.
System bandwidth	Read bandwidth	The bandwidth when the client reads data from HBlock.
	Write bandwidth	The bandwidth when the client write data to HBlock.
	Total bandwidth	The total bandwidth between the client and HBlock.
System IOPS	Read IOPS	The IOPS when the client reads data from HBlock.
	Write IOPS	The IOPS when the client writes data to HBlock.
	Total IOPS	Total IOPS between the client and HBlock.
System latency	Read latency	The latency when the client reads data from HBlock. The average read latency of all LUNs in the system in a collection cycle.
	Write latency	The latency when the client writes data to HBlock. The average write latency of all LUNs in the system in a collection cycle.
	Total latency	The total latency between the client and HBlock. The average write/read latency of all LUNs in the system in a collection cycle.

Cloud bandwidth	Upload bandwidth	Bandwidth when HBlock upload data to cloud.
	Download bandwidth	Bandwidth when HBlock download data from cloud.
	Total bandwidth	Total bandwidth between the HBlock and cloud.
Alarm information		Alarm information list.

3.5 LUN

Click **Service** > **LUN** in the navigation bar to enter the **LUN Management** page, you can manage LUNs, including viewing a LUN, creating LUNs, creating clone LUNs, flattening the clone LUN, expanding LUNs, Edit LUNs, editing cloud configuration for the cloud LUN, deleting LUNs, triggering Active/Standby switchover of the target corresponding the LUN, recovering a LUN, resuming LUN recovery, creating snapshots, or creating consistency snapshots.

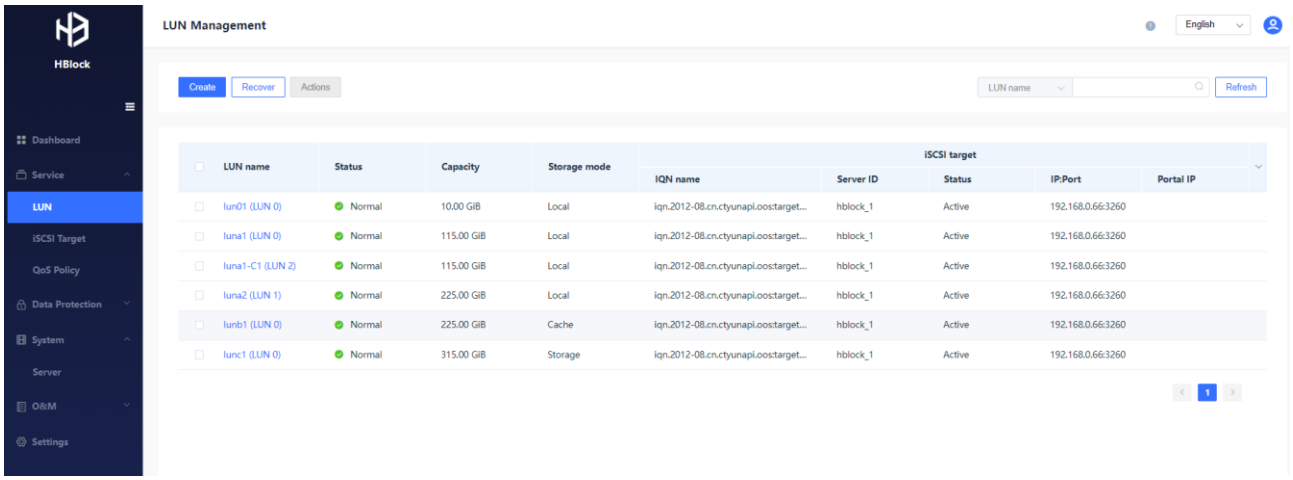


Figure 19. LUN Management (Standalone Mode)

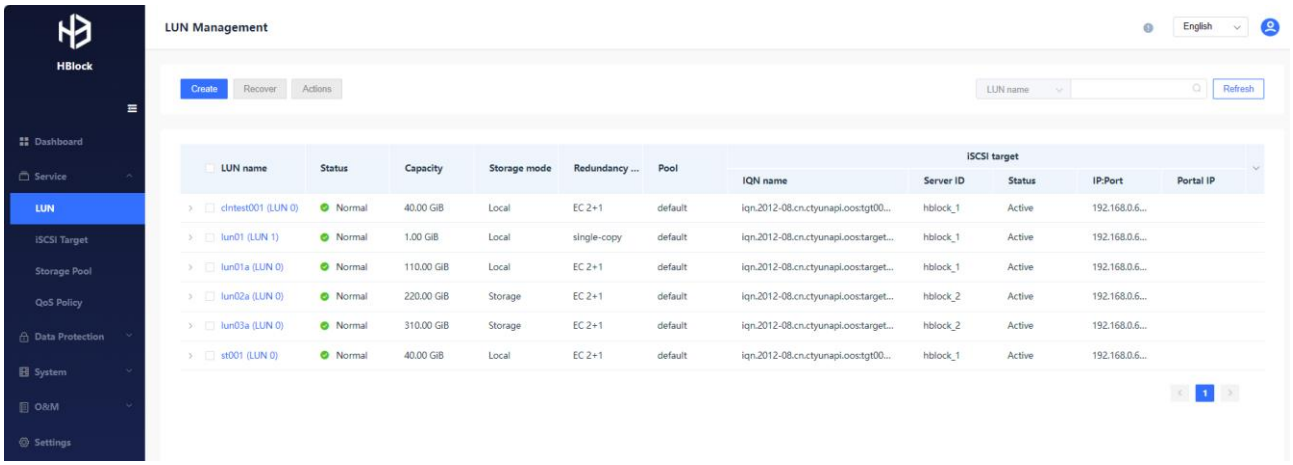


Figure 20. LUN Management (Cluster Edition)

3.5.1 LUN List

On the **LUN Management** page, you can view the LUN information. You can search for the corresponding LUN by LUN name, IQN name or Clone LUN. Click the "∨" in the title bar to expand or collapse LUN information, such as **Storage mode**, **Minimum replicas** (only supported by cluster mode), **Redundancy overlap** (only supported by cluster mode), **Cache pool** (only supported by cluster mode), **Pool** (only supported by cluster mode), **WWID**, **Snapshot count**, **Snapshot size**, **Clone LUN** and **iSCSI target**.

Name	Description
LUN name	Including LUN name and LUN number. The contents in brackets indicate the LUN number. LUN number: The number of the LUN in target, allocated by the storage system, corresponds to the LUN ID in the device address when the client mounts the storage device. If there is only one LUN in the target, the LUN number is generally 0.
Status	LUN status: ● Normal: The LUN is normal. ● Deleting: The LUN is being deleted. ● DeleteFailed: The LUN deletion failed. ● Recovering: The LUN is recovering. ● RecoverFailed: The LUN recovered failed. ● Rollbacking: The LUN is rollbacking. ● Flattening: The chain-breaking process between the clone LUN and the snapshot is underway. The clone LUN is copying data from the source LUN. After the copy is complete, it becomes an independent LUN that no longer depends on the snapshot or source LUN. ● Importing: The LUN is being imported with backup data. ● Wiping: The LUN is being wiped. ● WipeFailed: The LUN data wiping failed. ● Suspended: The LUN is suspended. ● Suspending: The LUN is being suspended. ● SuspendFailed: The LUN failed to be suspended.
Capacity	The storage capacity of LUN.
Storage mode	The storage mode for the LUN: ● Local: Store all data at local only. ● Cache: Store part of hot data at local and store all data in cloud asynchronously. ● Storage: Store all data at local and asynchronously store it in cloud.
Redundancy mode	LUN redundancy mode (only supported by cluster mode):

		● single-copy ● 2-copy ● 3-copy ● EC *N+M*
Minimum replicas		Minimum replica number (only supported by cluster mode). ● For a LUN in replica mode, assuming that the number of LUN replicas is X and the minimum replica number is Y (must satisfy Y <=X), each time the data is written to LUN, at least Y replicas of data are written successfully before this write request is considered successful. ● For a LUN in EC N + M mode, assuming that the minimum replica number of the LUN is set to Y (must satisfy N<=Y<=N + M), the data blocks and parity blocks that sum to at least Y blocks are written successfully before this write request is considered successful.
Redundancy overlap		Redundancy overlap (only supported by cluster mode).
Cache pool		The cache storage pool for LUN (only supported by cluster mode). If a cache storage pool is specified, LUN data is first written to the cache storage pool and then stored to the storage pool.
Pool		The storage pool (only supported by cluster mode). The storage pool is the final storage pool in which LUN data is stored.
Snapshot count		Number of snapshots of the LUN.
Snapshot size		Total size of snapshots associated with the LUN, representing the amount of data recorded in the snapshots. **Note**: Snapshot size may vary due to LUN issues or parent snapshot deletion.
Clone LUN		Whether the LUN is a clone LUN.
WWID		Unique identifier of the LUN. If there are multiple LUNs on the HBlock side when the client connects to a LUN, the WWID identifier can be used to confirm the LUN to be connected.
iSCSI target	IQN name	iSCSI target IQN corresponding to the iSCSI target associated with the LUN.
	Server ID	The server ID where the iSCSI target IQN is located.
	Status	iSCSI target status: ● Active: Active target. ● Standby: Hot standby target. ● ColdStandby: Cold standby target.

		• Offline.
	IP:Port	The IP address and port corresponding to the iSCSI target.
	Portal IP	iSCSI target portal IP and port. If the server and client are not in the same network segment (for example, the server is on the intranet and the client is on the extranet) and are connected through a NAT device (such as a router), you need to add the extranet address and port of the NAT device to the server, so that clients on the extranet can normally establish iSCSI connections with the target of the server.

3.5.2 View a LUN

On the **LUN Management** page, click a specific LUN name to view the detailed information of the LUN.

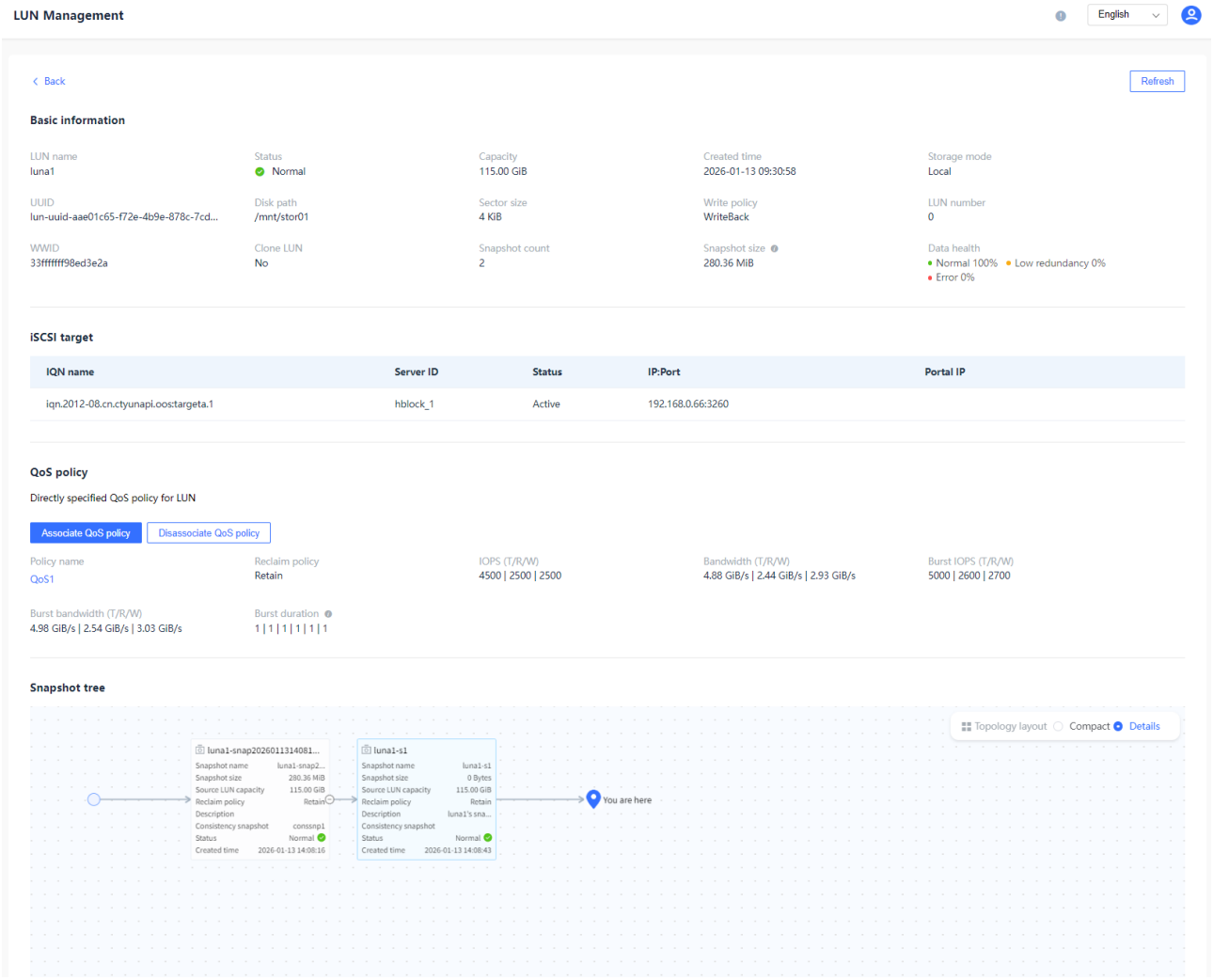


Figure 21. Local LUN Details (Standalone Mode: Non-clone LUN)

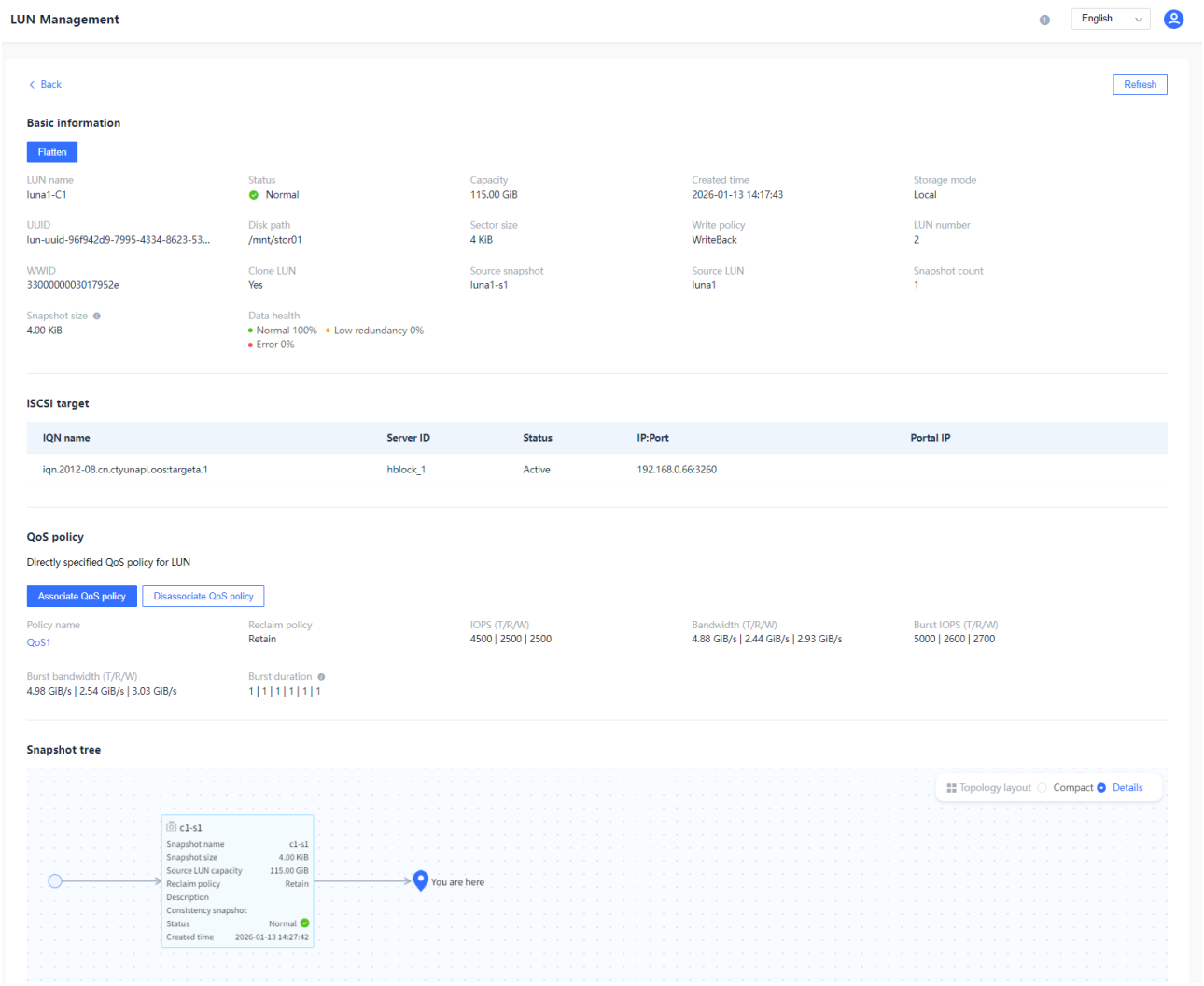


Figure 22.Local LUN Details (Standalone Mode: Clone LUN)

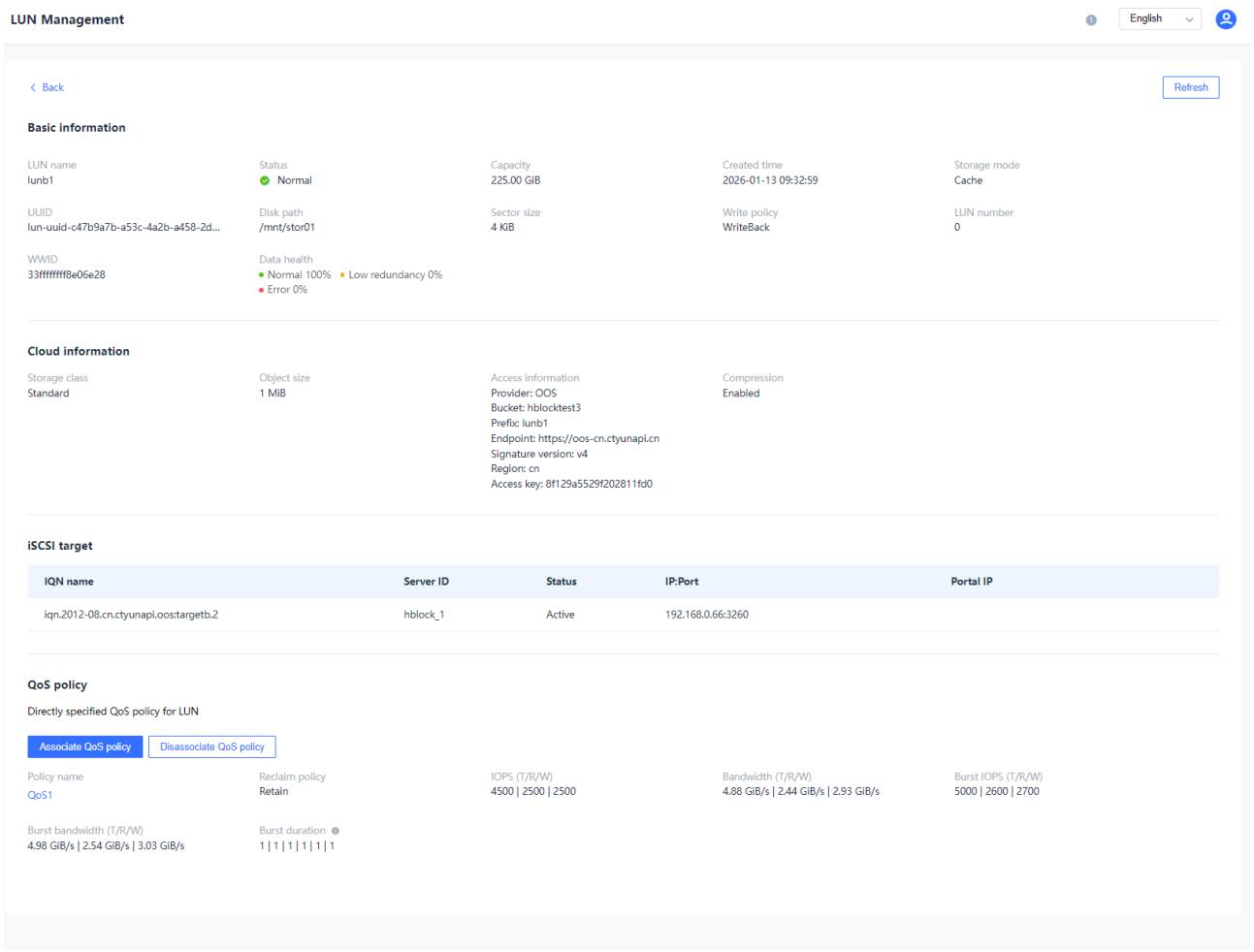


Figure 23. Cloud LUN Details (Standalone Mode)

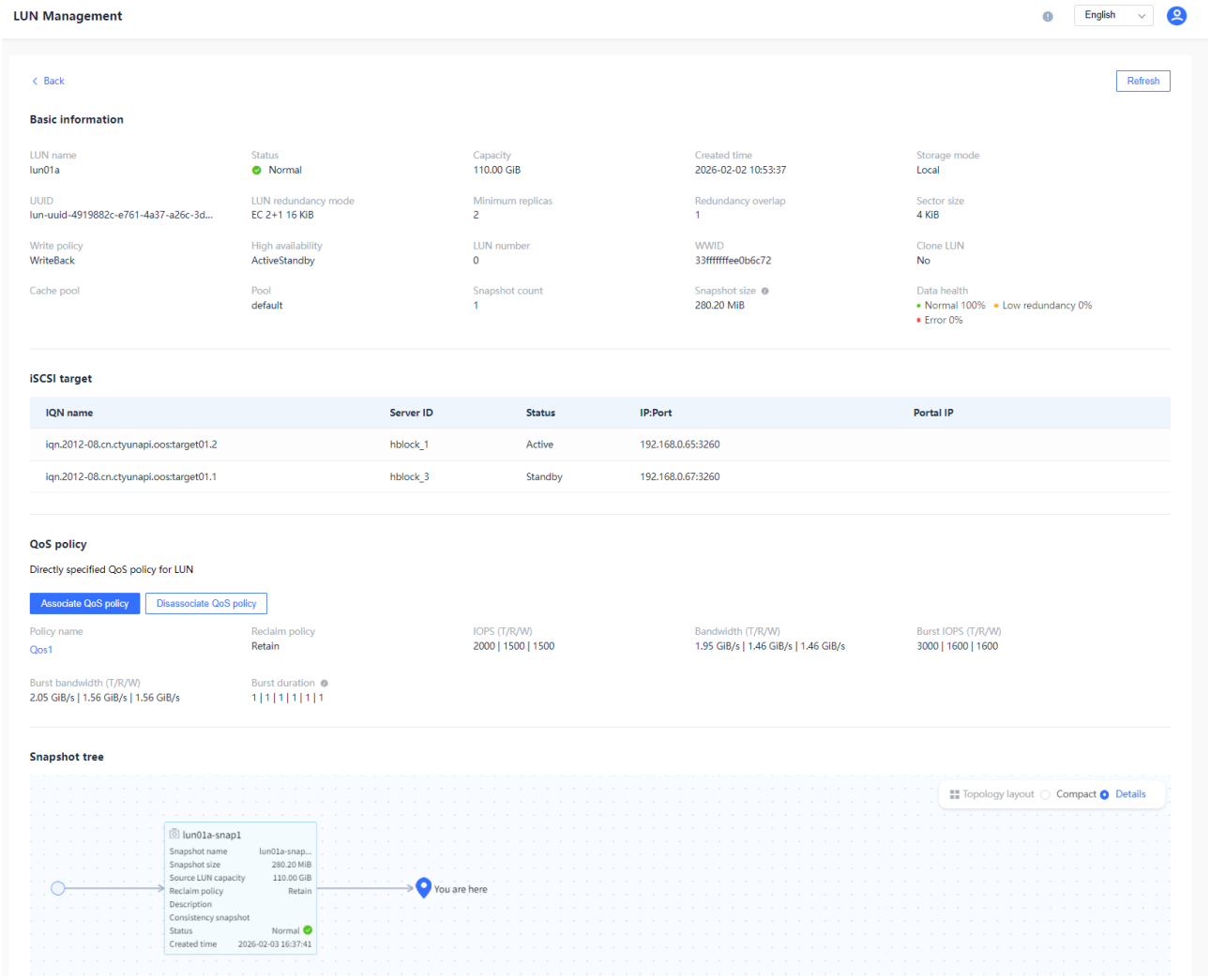


Figure 24. Local LUN Details (Cluster Mode: Non-clone LUN)

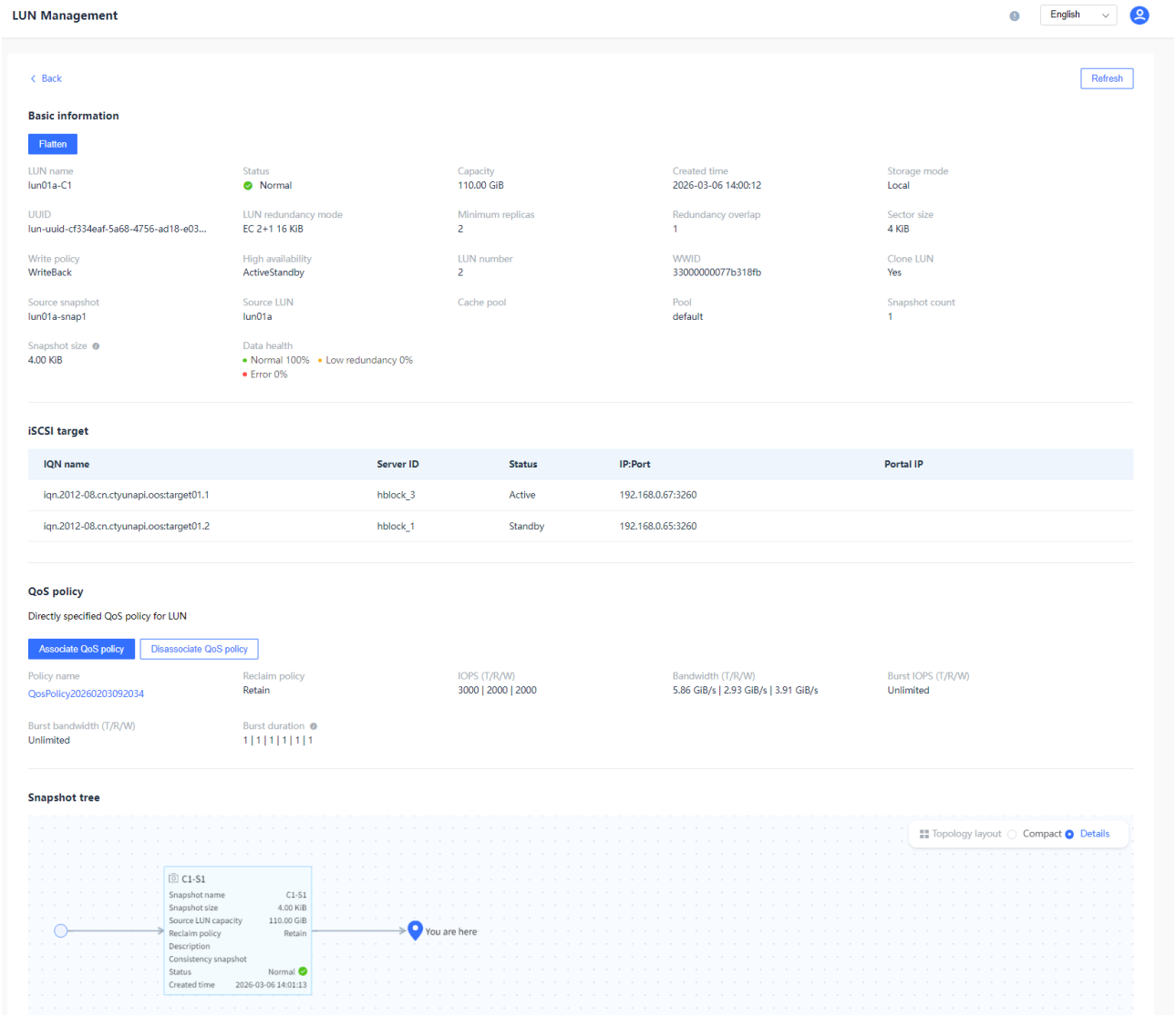


Figure 25. Local LUN Details (Cluster Mode: Clone LUN)

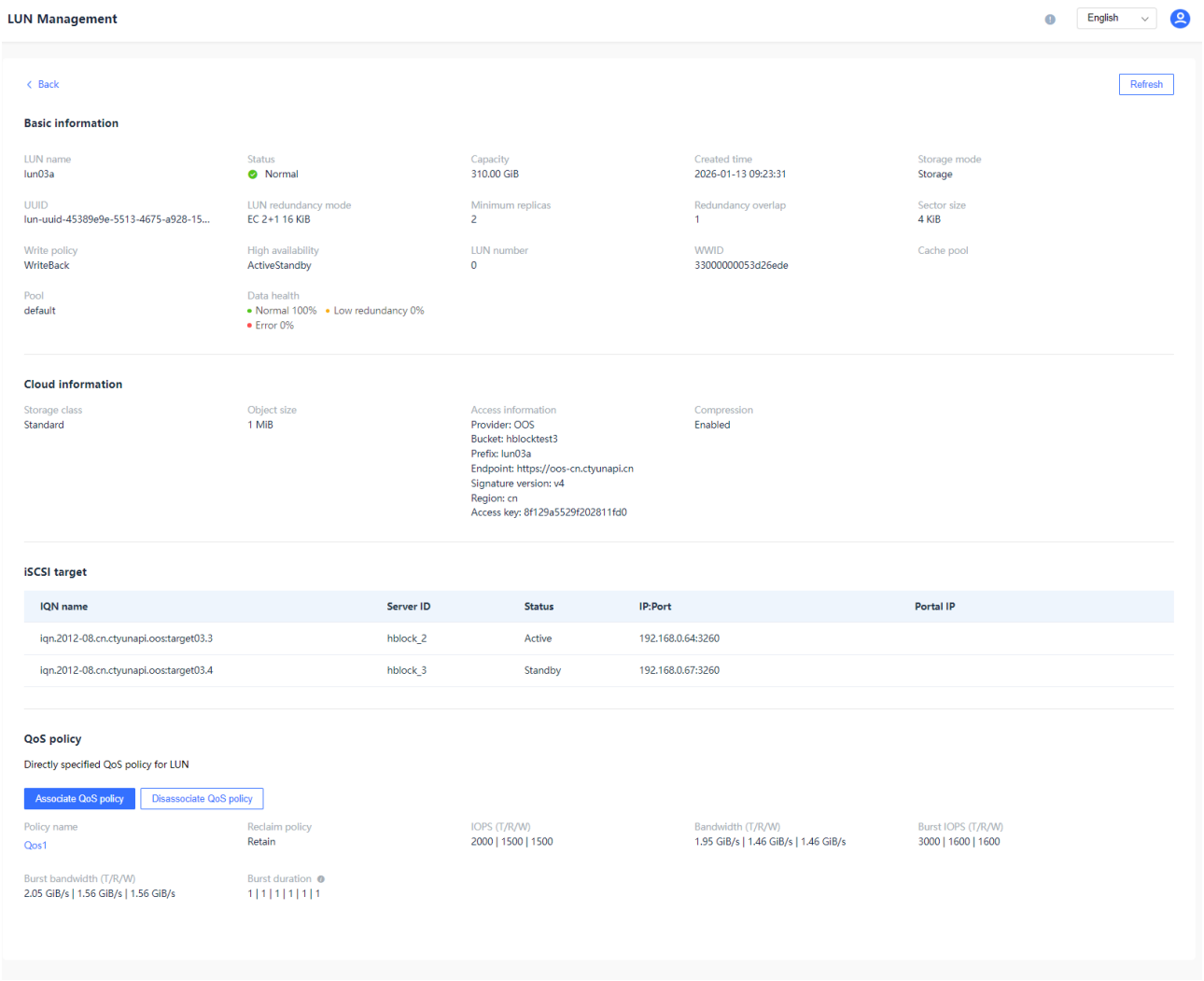


Figure 26. Cloud LUN Details (Cluster Mode)

Basic information

Note: If the LUN is a clone LUN, click "Flatten" to remove the reference to the parent snapshot from the clone LUN. Once remove the reference to the parent snapshot from the clone LUN, it will copy the data stored in the snapshot to the clone, After the operation completes, the clone LUN will become an independent LUN. See **Flatten the Clone LUN** for details.

Name	Description
LUN name	LUN name.
Status	LUN status: ● Normal: The LUN is normal. ● Deleting: The LUN is being deleted. ● DeleteFailed: The LUN deletion failed. ● Recovering: The LUN is recovering.

	● RecoverFailed: The LUN recovered failed. ● Rollbacking: The LUN is rollbacking. ● Flattening: The chain-breaking process between the clone LUN and the snapshot is underway. The clone LUN is copying data from the source LUN. After the copy is complete, it becomes an independent LUN that no longer depends on the snapshot or source LUN. ● Importing: The LUN is being imported with backup data. ● Wiping: The LUN is being wiped. ● WipeFailed: The LUN data wiping failed. ● Suspended: The LUN is suspended. ● Suspending: The LUN is being suspended. ● SuspendFailed: The LUN failed to be suspended.
Capacity	The storage capacity of LUN.
Created time	The creation time of the LUN.
Disk path	The disk path is used to store LUN data (only supported by standalone mode).
Storage mode	The storage mode for the LUN: ● Local: Store all data at local only. ● Cache: Store part of hot data at local and store all data in cloud asynchronously. ● Storage: Store all data at local and asynchronously store it in cloud.
UUID	Universally unique identifier of the LUN.
LUN redundancy mode	LUN redundancy mode (only supported by cluster mode): ● single-copy ● 2-copy ● 3-copy ● EC *N+M*
Minimum replicas	Minimum replica number (only supported by cluster mode). ● For a LUN in replica mode, assuming that the number of LUN replicas is X and the minimum replica number is Y (must satisfy Y <=X), each time the data is written to LUN, at least Y replicas of data are written successfully before this write request is considered successful. ● For a LUN in EC N + M mode, assuming that the minimum replica number of the LUN is set to Y (must satisfy N<=Y<=N + M), the data blocks and parity blocks that sum to at least Y blocks are written successfully before this write request is considered successful.
Redundancy overlap	Redundancy overlap (only supported by cluster mode).
Sector size	LUN sector size: ● 512 Bytes ● 4 KiB

Write policy	Write policy for the LUN: ● WriteBack: After the data is written to the memory, it returns to the client successfully, and then the data is written to the disk asynchronously. It is suitable for scenarios with high performance requirements and low stability requirements. ● WriteThrough: The data is written to both memory and disk at the same time, and then returns to the client after successful writing. It is suitable for scenarios that the stability requirements are high, the write performance requirements are not high, and the recently written data will be read in a short time. ● WriteAround: Write data directly to the disk without writing to memory. It is suitable for scenarios with high stability requirements, low performance requirements, and more writing and less reading.
High Availability	Whether to enable high availability (only supported by cluster mode): ● ActiveStandby: Enable active and standby. The LUN is associated with all IQNs under the corresponding target. ● Disabled: Disable active and standby LUNs. The LUN is associated with 1 target IQN under the corresponding target.
LUN number	The number of the LUN in target, allocated by the storage system, corresponds to the LUN ID in the device address when the client mounts the storage device. If there is only one LUN in the target, the LUN number is generally 0.
WWID	Unique identifier of the LUN. If there are multiple LUNs on the HBlock side when the client connects to a LUN, the WWID identifier can be used to confirm the LUN to be connected.
Clone LUN	Whether the LUN is a clone LUN.
Source snapshot	Snapshot associated with the clone LUN (only supported by clone LUN).
Source LUN	Source LUN name of the clone LUN (only supported by clone LUN).
Cache pool	The cache storage pool for LUN (only supported by cluster mode). If a cache storage pool is specified, LUN data is first written to the cache storage pool and then stored to the storage pool.
Pool	The storage pool (only supported by cluster mode). The storage pool is the final storage pool in which LUN data is stored.
Snapshot count	Number of snapshots of the LUN (only supported by local LUN).
Snapshot size	Total size of snapshots associated with the LUN (only supported by local LUN), representing the amount of data recorded in the snapshots. **Note**: Snapshot size may vary due to LUN issues or parent snapshot deletion.
Data health	The data health status of the LUN, including: the percentage of normal data (Normal), the percentage of low redundancy data (Low redundancy), and the percentage of erroneous data (Error).

	If low redundancy data exists, low redundancy reconstruction progress will be provided.

Cloud information (only supported by cloud LUN)

Name	Description
Storage class	Storage class of object storage (only supported by cloud LUN): ● STANDARD. ● STANDARD_IA.
Object size	The size of data stored in object storage (only supported by cloud LUN).
Access information	Access information for cloud LUN (only supported by cloud LUN): ● Provider: The type of object storage: ● OOS: eSurfing Cloud Object-Oriented Storage. ● S3: Other object storage compatible with S3. ● Bucket: Bucket name of object storage. ● Prefix: The prefix name for the LUN in object storage. ● Endpoint: Endpoint of object storage. ● Signature version: Signature authentication version: ■ v2. ■ v4. ● Region: The region of endpoint. If the signature authentication version is v2, this item will not be displayed. ● Access key： Access key of object storage.
Compression	Whether to compress data and upload it to object storage(only supported by cloud LUN): ● Enabled: Compress data and upload it to object storage. ● Disabled: Do not compress data and upload it to object storage.

iSCSI target

Name	Description
IQN name	iSCSI target IQN corresponding to the iSCSI target associated with the LUN.
Server ID	The server ID where the iSCSI target IQN is located.
Status	iSCSI target status: ● Active: Active target. ● Standby: Hot standby target. ● ColdStandby: Cold standby target. ● Offline.
IP:Port	The IP address and port corresponding to the iSCSI target.
Portal IP	iSCSI target portal IP and port.

QoS policy

Note:

- Click **Associate QoS policy** to associate the QoS policy with the LUN, refer to **Associate QoS Policy with LUNs** for details. Click **Disassociate QoS policy** to disassociate the QoS policy from the LUN, refer to **Disassociate QoS Policy from LUNs** for details.
- For the cluster mode:
  - If a QoS policy is explicitly specified to the LUN, "Directly specified QoS policy for LUN" is displayed.
  - If no policy is specified, "The default QoS policy for LUN in the pool" is shown.

Name	Description
Policy name	QoS policy name.
Reclaim policy	QoS policy reclaim policy: ● `Delete`: When all objects associated with the QoS policy are disassociated or deleted, the system will automatically remove the QoS policy. ● `Retain`: When all objects associated with the QoS policy are disassociated or deleted, the QoS policy itself remains and is not deleted.
IOPS (T/R/W)	The limit of total/read/ write operations per second.
Bandwidth (T/R/W)	The limit of total/read/write throughput per second.
Burst IOPS (T/R/W)	The burst limit of total/read/write operations per second.
Burst bandwidth (T/R/W)	The burst limit of total/read/write throughput per second.
Burst duration	The duration in seconds of I/O operations with burst limit. The corresponding sequence of QoS policy parameters is: burst IOPS (total/read/write), burst bandwidth (total/read/write).
Storage pool name	Storage pool name. If the QoS policy is the default QoS policy for LUN in the pool, this item is displayed.

Snapshot Tree

Note: Right-click a specific snapshot under the snapshot tree, and you can edit a snapshot (**Edit a Snapshot**), roll back a snapshot (**Roll Back a Snapshot**), create a clone LUN based on the snapshot (**Create a Clone LUN**), create backup (**Create Backup (Local LUN)**), or delete a snapshot (**Delete Snapshots**).

Name	Description
Snapshot name	Snapshot name
Snapshot size	Total size of snapshots associated with the LUN (only supported by local LUN), representing the amount of data recorded in the snapshots. **Note**: Snapshot size may vary due to LUN issues or parent snapshot deletion.

Source LUN capacity	Source LUN capacity at snapshot creation.
Reclaim policy	Snapshot reclaim policy: ● Delete: Automatically deleted when the snapshot has no associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). ● Retain: Retained when the snapshot has no associated clone LUNs and has at most one child node.
Description	Snapshot description.
Consistency snapshot	The name of the consistency snapshot it belongs to. Shown only for single-LUN snapshot in a consistency snapshot.
Status	Status: Snapshot status: ● Normal. ● Error. ● Pending: The snapshot is being created. ● Deleting.
Create time	Snapshot creation time.

3.5.3 Create a LUN

On the **LUN Management** page, click **Create** to create a LUN.

Note:

- HBlock supports a maximum of 32766 target IQNs. A target can be associated with up to 256 LUNs, but each LUN can only be associated with one target.
- After a LUN is created, only the following parameters can be modified: LUN capacity, write policy, minimum number of replicas (only supported by cluster mode), redundancy overlap (only supported by cluster mode), Endpoint, cloud signature authentication version, region, AK/SK, and whether to compress data.

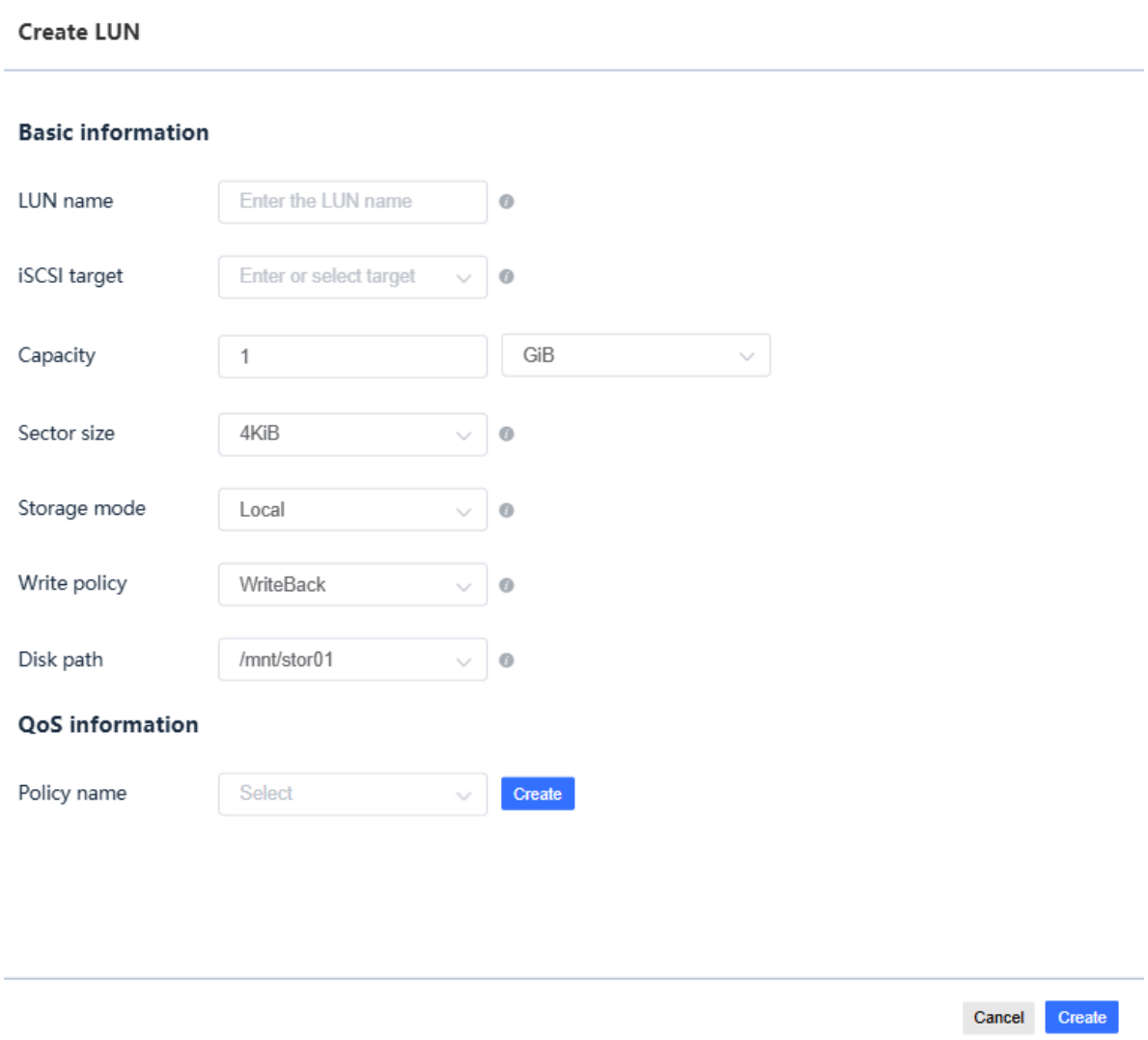


Figure 27.Create a Local LUN (Standalone Mode)

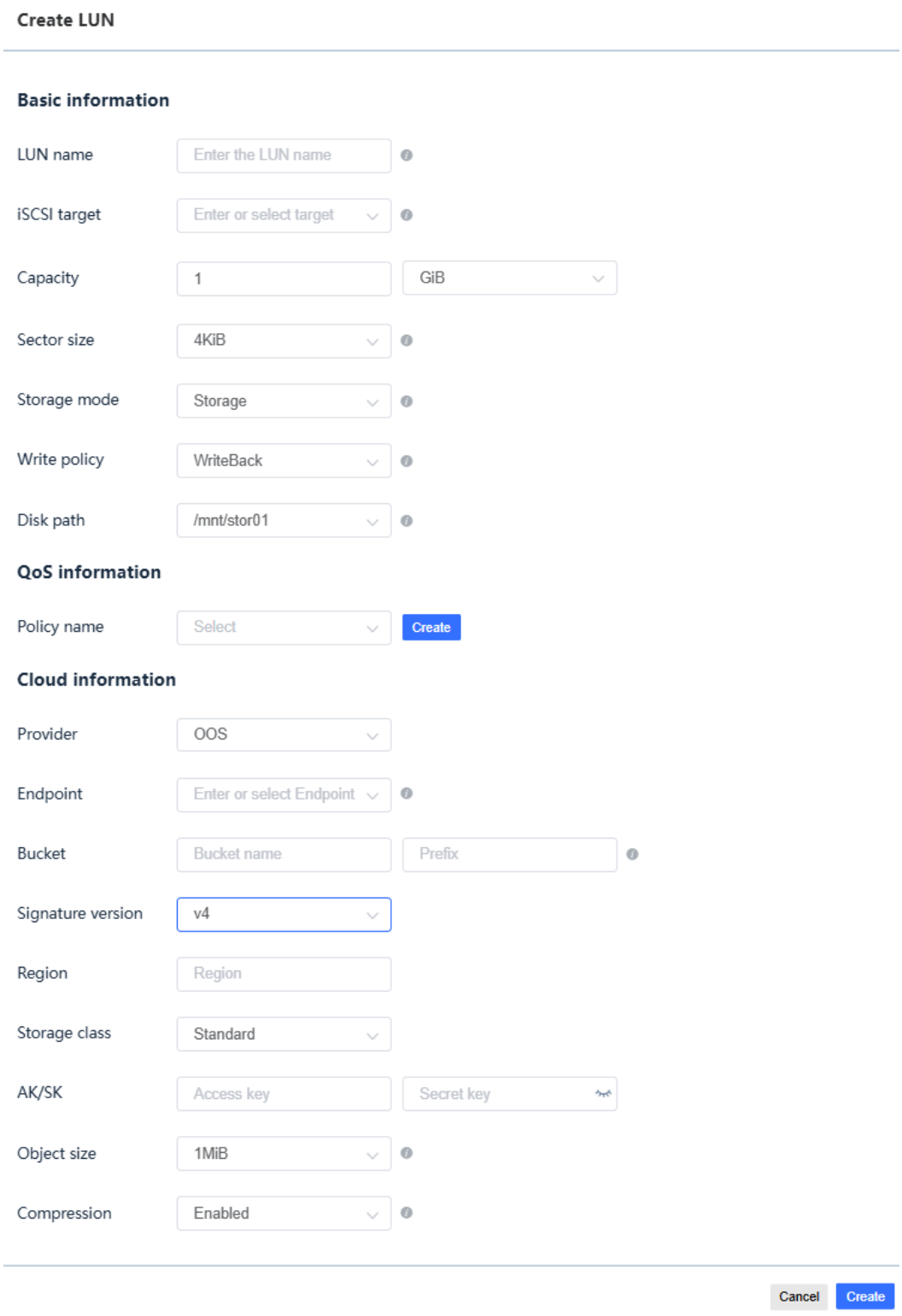


Figure 28. Create a Cloud LUN (Standalone Mode)

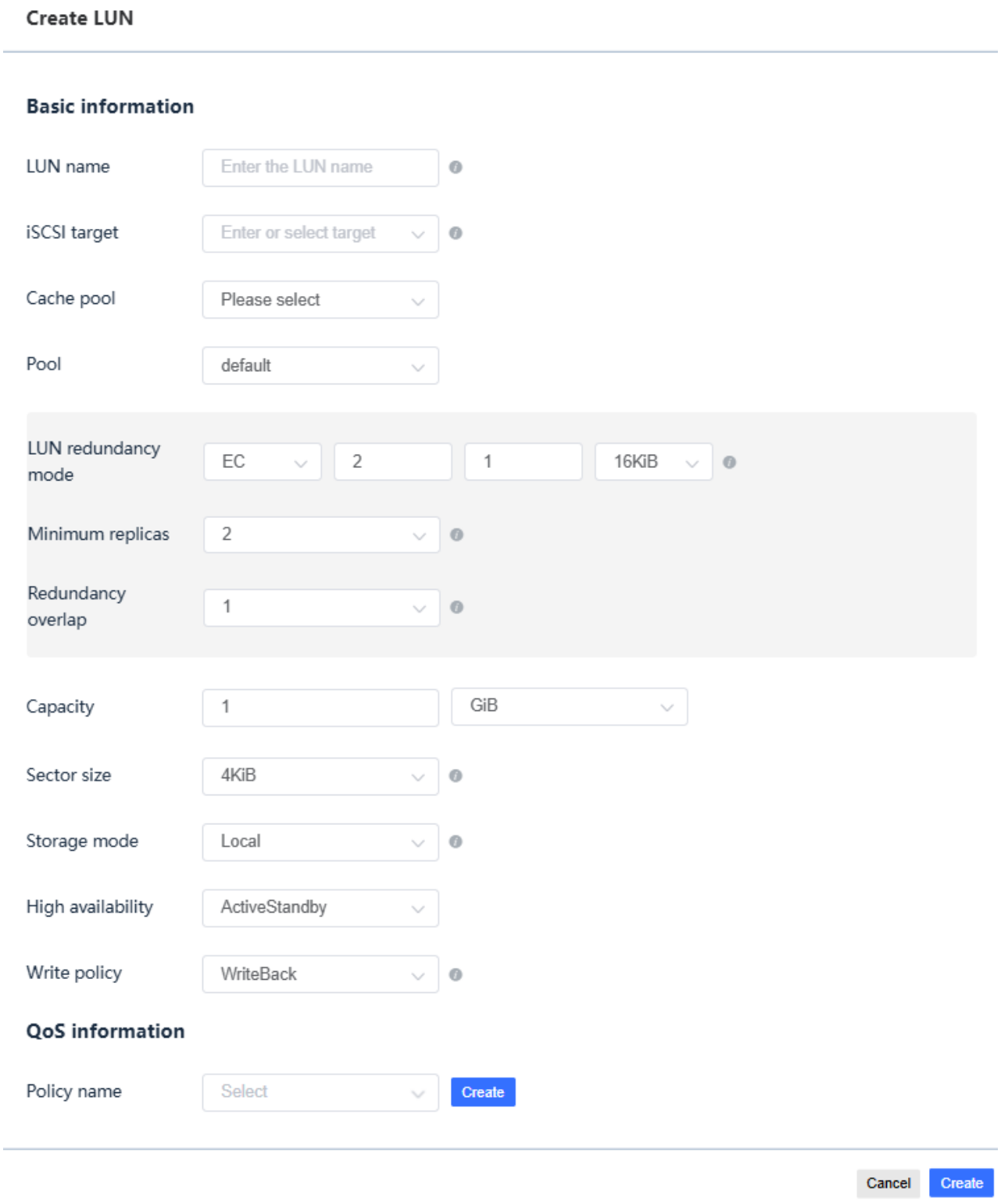


Figure 29. Create a Local LUN (Cluster Mode)

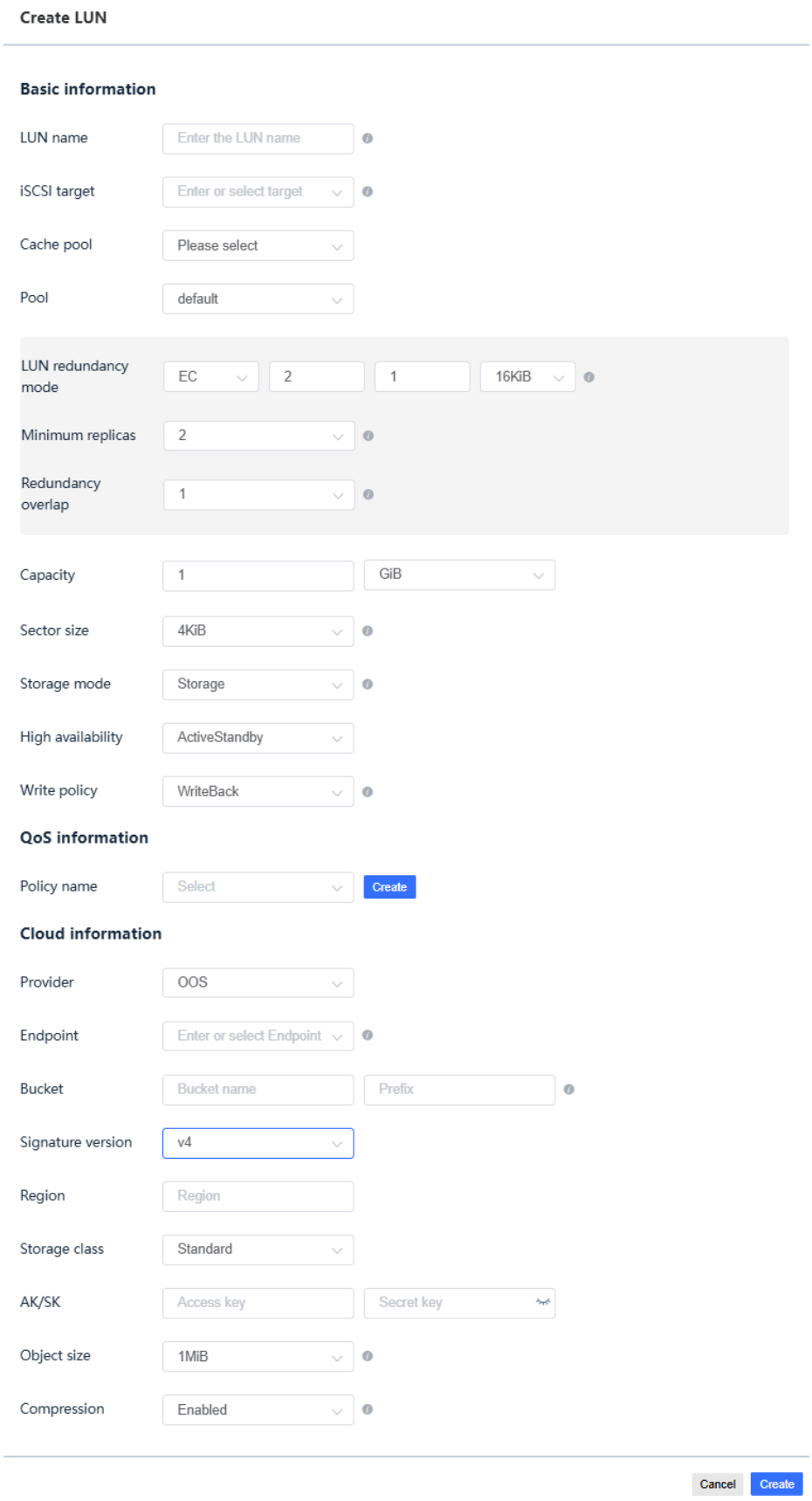


Figure 30. Create a Cloud LUN (Cluster Mode)

Basic information

Name	Description
LUN name	Specifies the LUN name. The value is a string of 1 to 16 case-sensitive characters. It can contain letters, digits, or hyphens (-). Only supports starting with a letter or a digit.
iSCSI target	Specifies the iSCSI target name. The value is a string of 1 to 16 case-sensitive characters. It can contain lowercase letters, dots (.), digits, or hyphens (-). Only supports starting with a letter or a digit. **Note**: If the specified iSCSI target name does not exist when creating a LUN, the iSCSI target will be created at the same time, the reclaim policy of the iSCSI target is Delete.
Cache pool	Specifies a cache storage pool (only supported by cluster mode). If a cache storage pool is specified, LUN data is first written to the cache storage pool and then stored to the storage pool.
Pool	Specifies a storage pool (only supported by cluster mode). The storage pool is the final storage pool in which LUN data is stored. By default, the base storage pool in the cluster is used. **Note**: The storage pool and cache storage pool must not be the same.
Capacity	Specifies the storage capacity of the LUN. Integer format, with optional units (GiB, TiB, PiB) following the number.
Sector size	Specifies the sector size. The value is 512 Bytes or 4 KiB. The default value is 4 KiB. **Note**: Selection of sector size: According to your business scenario, under normal circumstances, if the data size of a single I/O operation is greater than or close to 4 KiB, it is recommended to choose 4 KiB; if the data size of a single I/O operation is close to 512 Bytes, it is recommended to choose 512 Bytes.
Storage mode	Specifies the storage mode for the LUN: ● Local: Store all data at local only. ● Cache: Store part of hot data at local and store all data in cloud asynchronously. ● Storage: Store all data at local and asynchronously store it in cloud. The default value is Local.
LUN redundancy mode	Specifies LUN data storage redundancy mode, only supported by cluster mode. Value: ● single-copy. ● 2-copy. ● 3-copy. ● EC *N+M*: Erasure code mode. N and M are positive integers, N ≥ M, and N + M ≤ 128. This indicates that the data is divided into N fragments and M

	pieces of verification data are generated. The fragment size of erasure code, can be 1 KiB, 2 KiB, 4 KiB, 8 KiB, 16 KiB, 32 KiB, 64 KiB, 128 KiB, 256 KiB, 512 KiB, 1024 KiB, 2048 KiB, 4096 KiB. **Note**: (All scenarios are based on the premise of cluster availability): ● After an EC *N+M* LUN is created: ■ Data can be written to the LUN if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to the minimum number of replicas of the LUN. Data cannot be written to the LUN and an alarm is generated if the number of available fault domains in the storage pool where the LUN resides is smaller than the minimum number of replicas. ■ Data in the LUN is normal and will not degrade if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to N+M. Data in the LUN is being degraded if the number of available fault domains in the storage pool where the LUN resides is between [N, N+M]. We recommend that you add or repair the fault domains as soon as possible. Data written to the storage pool is corrupted if the number of available fault domains in the storage pool where the LUN resides is less than N. ● After a LUN in replica mode is created: ■ Data can be written to the LUN if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to the minimum number of replicas of the LUN. Data cannot be written to the LUN and an alarm is generated if the number of available fault domains in the storage pool where the LUN resides is smaller than the minimum number of replicas. ■ Data in the LUN is normal and will not degrade if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to the number of replicas. For a two-replica or three-replica LUN, data in the LUN data is being degraded if the fault domain in the storage pool where the LUN resides is greater than or equal to 1, but less than the number of replicas. We recommend that you add or repair fault domains as soon as possible. Data written to the storage pool is corrupted if no fault domain is available in the storage pool where the LUN resides.
Minimum replicas	Specifies the minimum replica number, only supported by cluster mode. Click the **More** button after LUN redundancy mode to fill in minimum replica number. ● For a LUN in replica mode, assuming that the number of LUN replicas is X and the minimum replica number is Y (must satisfy Y <=X), each time the data is written to LUN, at least Y replicas of data are written successfully

	before this write request is considered successful. ● For a LUN in EC N + M mode, assuming that the minimum replica number of the LUN is set to Y (must satisfy N<=Y<=N + M), the data blocks and parity blocks that sum to at least Y blocks are written successfully before this write request is considered successful. Value: For a LUN in replica mode, the value is an integer that ranges from 1 to *N*, where *N* is the number of replicas, the default value is 1. For a LUN in EC N + M mode, the value is an integer that ranges from *N* to *N* + *M*, the default value is *N*.
Redundancy overlap	Specifies the number of copies/fragments from the same data which are allowed to be distributed in the same fault domain, only supported by cluster mode. Different copies/fragments of the same data are distributed in different fault domains generally. When the fault domain is damaged, it is allowed to place multiple copies/fragments in the same fault domain but different paths according to the redundancy overlap principle. **Note**: If fault domain level of the storage pool is path, this parameter does not take effect. Value: For a LUN in replica mode, the value is an integer that ranges from 1 to *N*, where *N* is the number of replicas, the default value is 1. For a LUN in EC N + M mode, the value is an integer that ranges from 1 to *N* + *M*, the default value is 1.
High Availability	Set the high availability type of the LUN, only supported by cluster mode: ● ActiveStandby: Enable active and standby. The LUN is associated with all IQNs under the corresponding target. ● Disabled: Disable active and standby LUNs. The LUN is associated with 1 target IQN under the corresponding target. The default value is ActiveStandby.
Write policy	The write policy of the LUN ● WriteBack: After the data is written to the memory, it returns to the client successfully, and then the data is written to the disk asynchronously. It is suitable for scenarios with high performance requirements and low stability requirements. ● WriteThrough: The data is written to both memory and disk at the same time, and then returns to the client after successful writing. It is suitable for scenarios that the stability requirements are high, the write performance requirements are not high, and the recently written data will be read in a short time. ● WriteAround: Write data directly to the disk without writing to memory. It is suitable for scenarios with high stability requirements, low performance requirements, and more writing and less reading. The default value is WriteBack.
Disk path	Specifies the disk path to store LUN data, only supported by standalone mode.

	If not specified, the default disk path of the server will be used for the LUN. Value: It can only contain letters, numbers, Chinese characters, or the special characters ~ ! @ $ ( ) _ + - ; . :.

QoS information

Note: You can either select an existing QoS policy or click "Create" to create a new one; see **Create a QoS Policy** for details.

Name	Description
Policy name	Specifies the name of a QoS policy. For cluster mode, when no QoS policy is explicitly specified: ● If the LUN has both a cache storage pool and a storage pool, its QoS policy is the default QoS policy for LUNs in the cache storage pool. If the cache storage pool has not defined such a default policy, the LUN has no QoS policy. ● If the LUN has only a storage pool, its QoS policy is the default QoS policy for LUNs in that storage pool. If the storage pool has not defined such a default policy, the LUN has no QoS policy.

Cloud information

Name	Description
Provider	Specifies the type of object storage: ● OOS: eSurfing Cloud Object-Oriented Storage. ● S3: Other object storage compatible with S3. The default value is OOS.
Endpoint	Specifies endpoint of object storage. **Note**: ● The Endpoint must match the object storage type you're using. If you use OOS, enter its Endpoint. If you use other object storage compatible with S3, enter its Endpoint. ● Access will be via HTTPS if only the domain name is entered. For details of OOS endpoint, see **OOS Endpoint and Region.**
Bucket	Bucket information. Specifies the bucket name and prefix name for the LUN in object storage. After specifying the prefix name, the LUN data will be stored in the folder named with the prefix in the bucket. The value of prefix name is a string of 1 to 256 characters. **Note**: Do not enable bucket lifecycle settings and compliance retention.
Signature version	Specifies signature authentication version: ● v2 ● v4 The default value is v2.

Region	Specifies the region of endpoint. For the specific OOS region, see **OOS Endpoint and Region.** If the signature authentication version is v4, this item is required.
Storage class	Specifies storage class of object storage: ● STANDARD. ● STANDARD_IA. The default value is STANDARD.
AK/SK	Specifies Access Key and Secret Access Key.
Object size	Specifies the size of data stored in object storage. Values: 128 KiB, 256 KiB, 512 KiB, 1 MiB, 2 MiB, 4 MiB, 8 MiB. The default value is 1 MiB.
Compression	Whether to compress data and upload it to object storage: ● Enabled: Compress data and upload it to object storage. ● Disabled: Do not compress data and upload it to object storage. The default value is Enabled.

3.5.4 Expand LUNs

On the **LUN Management** page, select one or more LUNs and go to **Actions** > **Expand** to expand.
Note: If the LUN is already mounted by the client, the expansion can only take effect after the LUN on the iSCSI initiator is also expanded. For detailed operations, please refer to the "**4.6.5 Expand a LUN**" section in the command line.

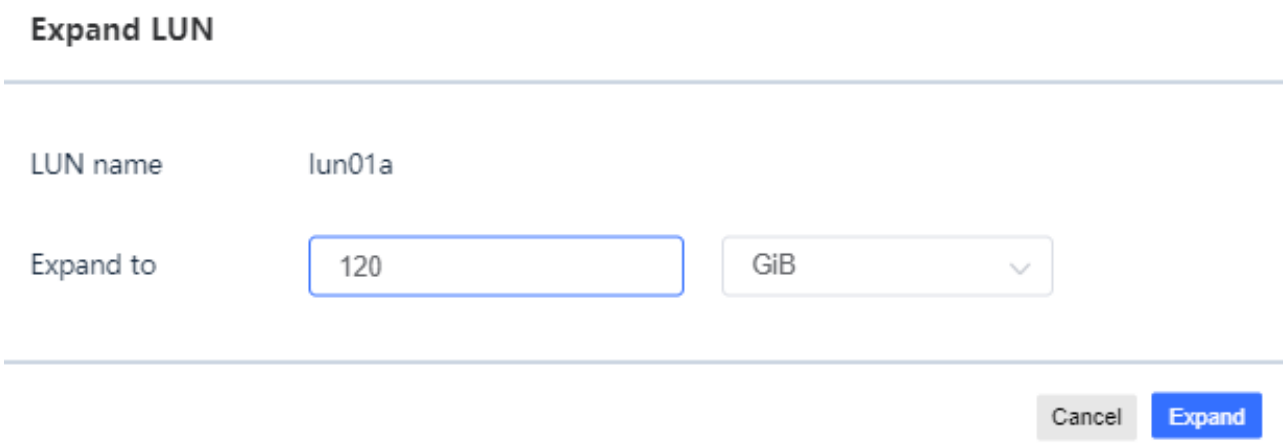


Figure 31. Expand LUNs

3.5.5 Edit LUNs

On the **LUN Management** page, select LUNs and go to **Actions** > **Edit LUN configuration** to edit write policy of LUN, Minimum replicas (only supported by cluster mode), Redundancy overlap (only supported by cluster mode).

Note:

- For the standalone model, you can select multiple LUNs at once and simultaneously modify the "Write policy" of the selected LUNs.
- For the cluster model, you can modify a single LUN's "Write policy", "Minimum replicas", and "Redundancy overlap" all at once; alternatively, you can select multiple LUNs at once to modify the "Write policy" of the selected LUNs.

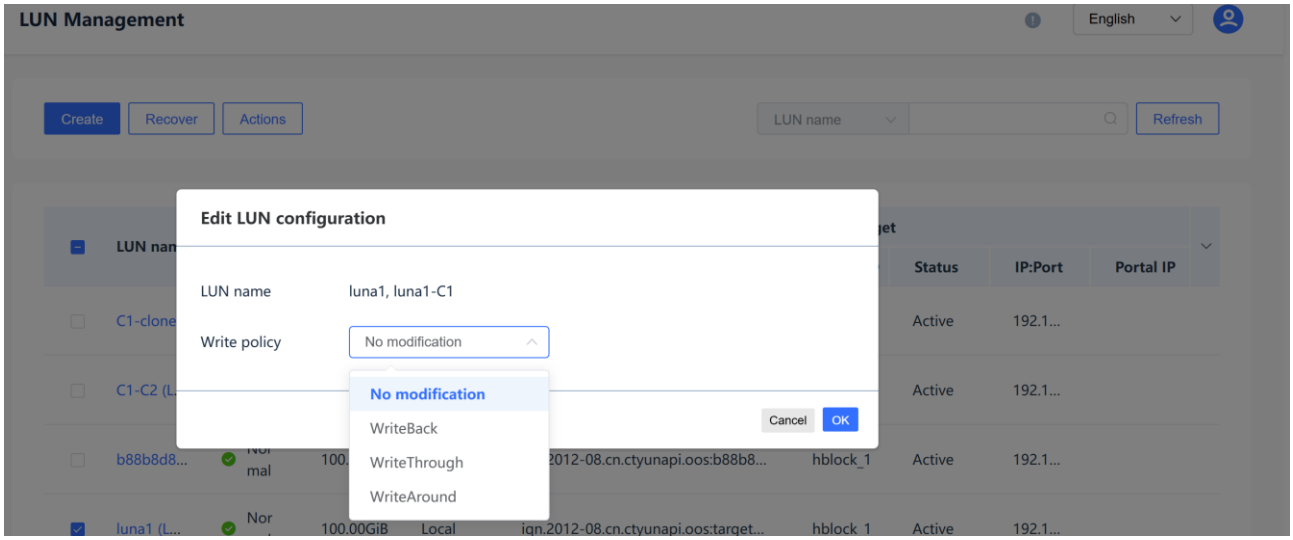


Figure 32. Edit LUNs (Standalone Mode)

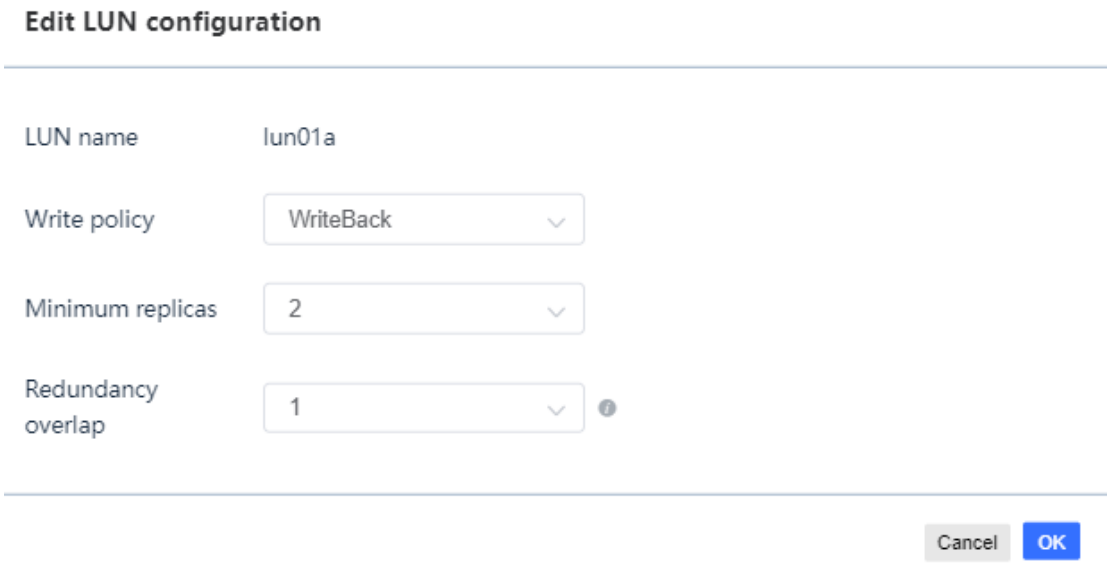


Figure 33. Edit LUNs (Cluster Mode)

Name	Description
LUN name	LUN name.
Write policy	Sets the write policy of the LUN: ● No modification: Keep the existing settings without modification. ● WriteBack: After the data is written to the memory, it returns to the client successfully, and then the data is written to the disk asynchronously. It is suitable for scenarios with high performance requirements and low stability requirements. ● WriteThrough: The data is written to both memory and disk at the same time, and then returns to the client after successful writing. It is suitable for scenarios that the stability requirements are high, the write performance requirements are not high, and the recently written data will be read in a short time. ● WriteAround: Write data directly to the disk without writing to memory. It is suitable for scenarios with high stability requirements, low performance requirements, and more writing and less reading.
Minimum replicas	Specifies the minimum replica number, only supported by cluster mode. ● For a LUN in replica mode, assuming that the number of LUN replicas is X and the minimum replica number is Y (must satisfy Y <=X), each time the data is written to LUN, at least Y replicas of data are written successfully before this write request is considered successful. ● For a LUN in EC N + M mode, assuming that the minimum replica number of the LUN is set to Y (must satisfy N<=Y<=N + M), the data blocks and parity blocks that sum to at least Y blocks are written successfully before this write request is considered successful. Value: For a LUN in replica mode, the value is an integer that ranges from 1 to *N*, where *N* is the number of replicas, the default value is 1. For a LUN in EC N + M mode, the value is an integer that ranges from *N* to *N* + *M*, the default value is *N*.
Redundancy overlap	Specifies the number of copies/fragments from the same data which are allowed to be distributed in the same fault domain, only supported by cluster mode. Different copies/fragments of the same data are distributed in different fault domains generally. When the fault domain is damaged, it is allowed to place multiple copies/fragments in the same fault domain but different paths according to the redundancy overlap principle. **Note**: If fault domain level of the storage pool is path, this parameter does not take effect. Value: For a LUN in replica mode, the value is an integer that ranges from 1 to *N*, where *N* is the number of replicas. For a LUN in EC N + M mode, the value is an integer that ranges from 1 to *N* + *M*.

3.5.6 Edit Cloud Configuration for the Cloud LUN

On the **LUN Management** page, select cloud LUNs and go to **Actions** > **Edit cloud configuration**. You can edit cloud configuration for multiple cloud LUNs at once.

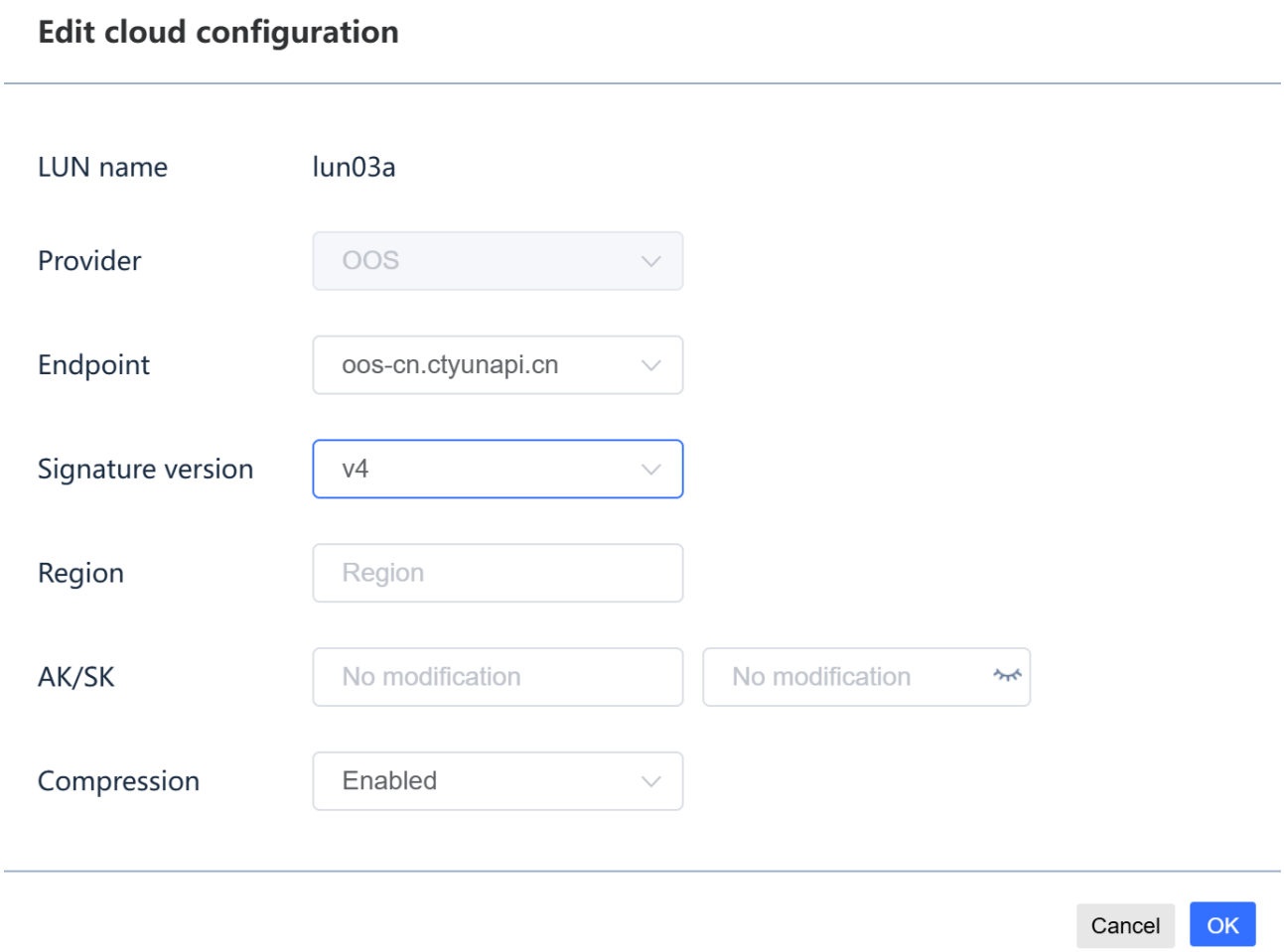


Figure 34. Edit Cloud Configuration for the Cloud LUN

Name	Description
LUN name	LUN name.
Provider	The type of object storage (this item cannot be modified): ● OOS: eSurfing Cloud Object-Oriented Storage. ● S3: Other object storage compatible with S3.
Endpoint	Endpoint of object storage. **Note**: ● The Endpoint must match the object storage type you're using. If you use OOS, enter its Endpoint. If you use other object storage compatible with S3, enter its Endpoint. ● Access will be via HTTPS if only the domain name is entered.
Signature version	Modifies the signature authentication version: ● v2

	• v4
Region	Modifies the region of endpoint. If the signature authentication version is v4, this item is required.
AK/SK	Modifies the Access key and Secret key of object storage.
Compression	Whether to compress data and upload it to object storage: • Enabled: Compress data and upload it to object storage. • Disabled: Do not compress data and upload it to object storage.

3.5.7 Associate QoS Policy with LUNs

Note:

- The status of the LUN to be associated cannot be Deleting or Deletefailed.
- For cluster mode, QoS policy enforcement follows these rules:
  - If a LUN has a QoS policy attached, that policy takes precedence.
  - If a LUN has no QoS policy attached:
    - If the LUN has both a `cachePool` and a `pool`, its QoS policy is the default QoS policy for LUNs in the `cachePool`. If the `cachePool` has not defined such a default policy, the LUN has no QoS policy.
    - If the LUN has only a `pool`, its QoS policy is the default QoS policy for LUNs in that `pool`. If the `pool` has not defined such a default policy, the LUN has no QoS policy.

You can associate QoS policy with LUNs in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated LUN**, click **Associate object**. In the pop-up window, select the LUNs you want to associate with the policy and confirm.

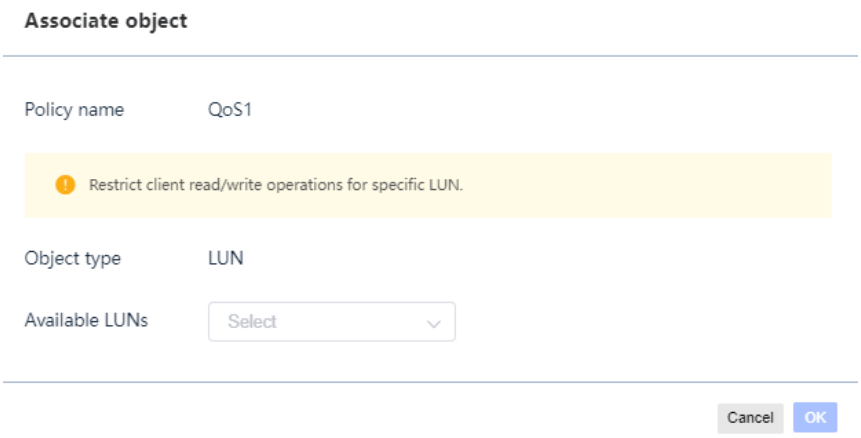


Figure 35. Associate QoS Policy with LUNs (Standalone Mode)

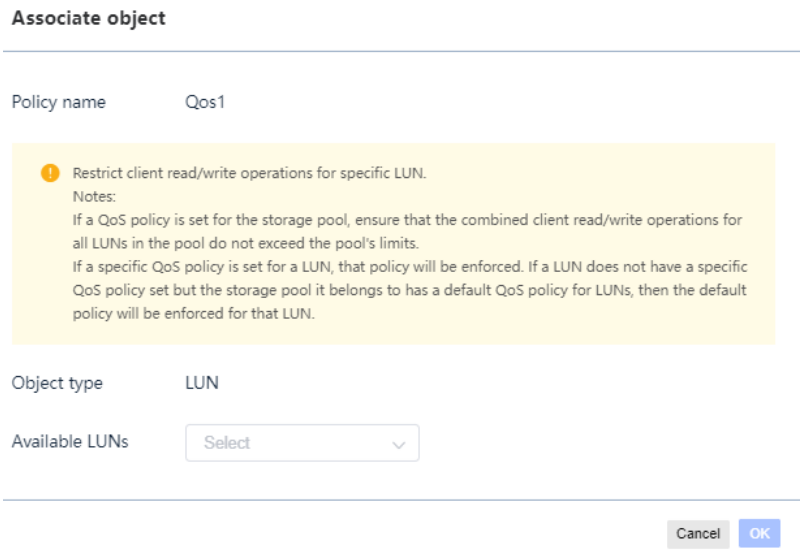


Figure 36. Associate QoS Policy with LUNs (Cluster Mode)

- On the **Service** >**LUN** page, click the target LUN name to enter the LUN details page. Under **QoS policy**, click **Associate QoS policy**. In the pop-up window, select the QoS policy you want to associate with the LUN and confirm.
- On the **Service** >**LUN** page, select one or more LUNs and click **Actions** > **Associate QoS policy**. In the pop-up window, select the QoS policy you want to associate with LUNs and confirm.

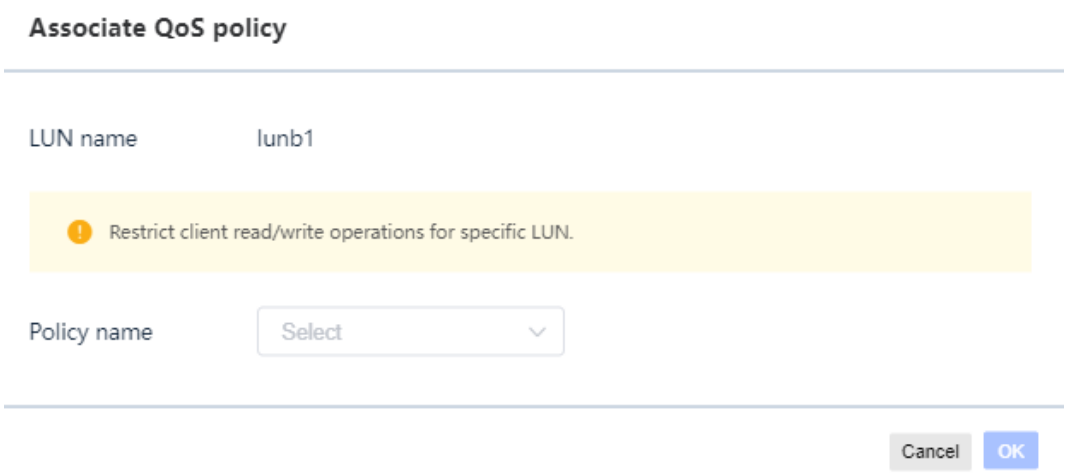


Figure 37.Associate Qos Policy with LUNs (Standalone Mode)

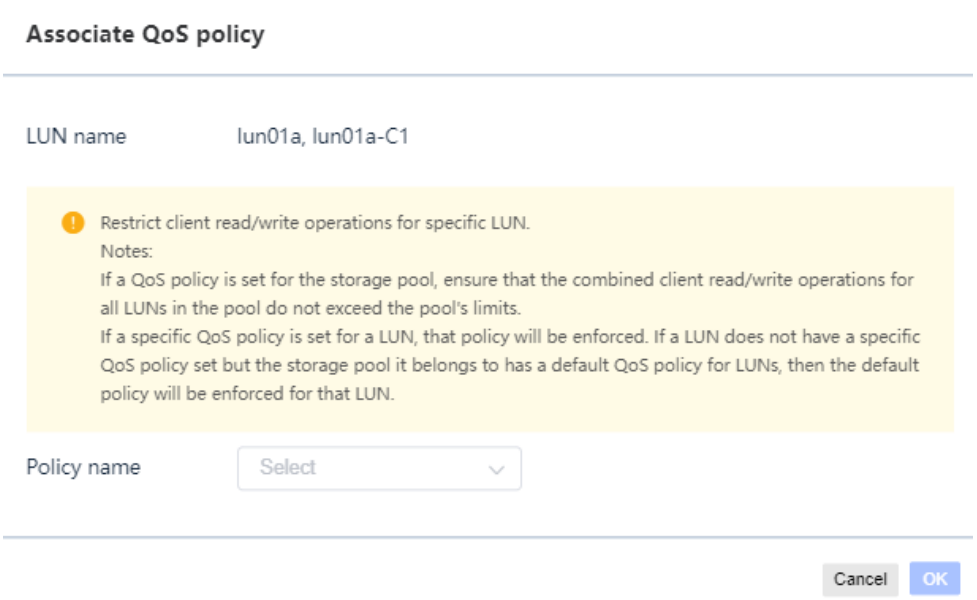


Figure 38. Associate Qos Policy with LUNs (Cluster Mode)

3.5.8 Disassociate QoS Policy from LUNs

You can disassociate QoS policy from LUNs in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated LUN**, click **Dissociate object**. In the pop-up window, select the LUNs you want to disassociate from the policy and confirm.

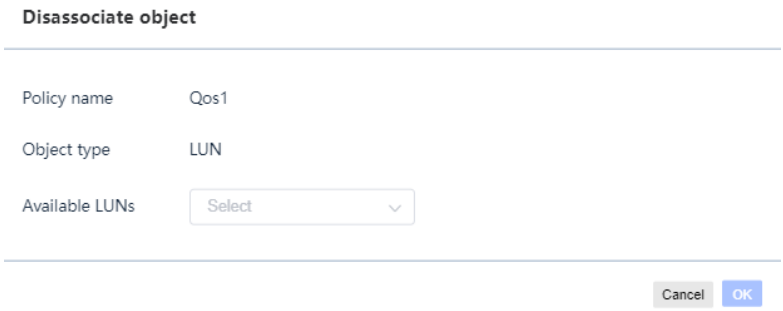


Figure 39. Disassociate QoS Policy from LUNs

- On the **Service** >**LUN** page, click the target LUN name to enter the LUN details page. Under **QoS policy**, click **Disassociate QoS policy**. In the pop-up window, click **confirm**.

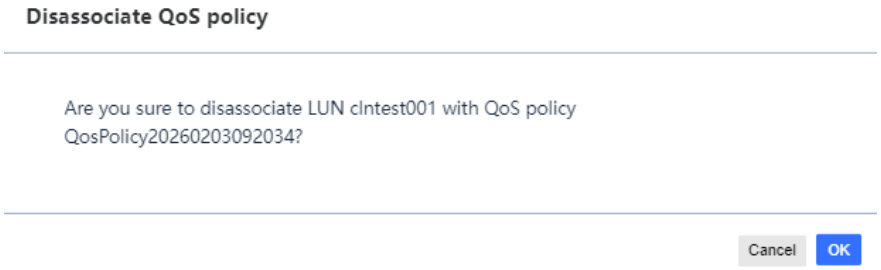


Figure 40. Disassociate Qos Policy from the LUN

3.5.9 Wipe a LUN (Local LUN)

On the **LUN Management** page, select the target LUN and go to **Actions** > **Wipe** to wipe the LUN data.

Note:

- If a clone LUN is wiped of all data and its associated snapshots, it will become an independent LUN.
- When a LUN is in Wiping or WipeFailed status, read and write operations are not supported.
- Before wiping a LUN, you must first log out to disconnect client connections; otherwise, client connections cannot be disconnected until the LUN status returns to Normal.

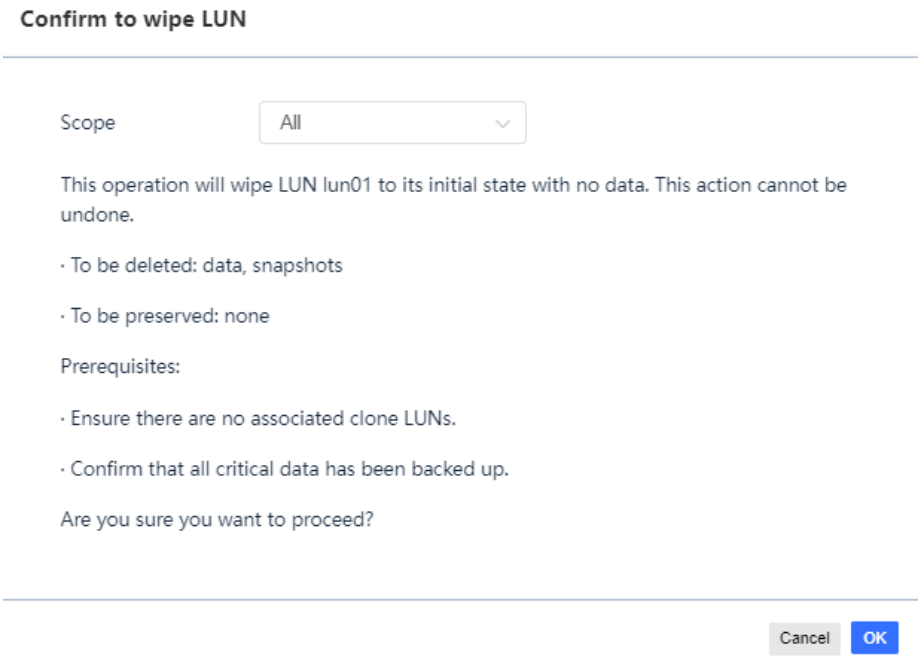


Figure 41.Wipe the LUN

Name	Description
Scope	Specifies the data scope for wiping the LUN. Value: ● All: Wipes all LUN data and its associated snapshots. **Note**: If the LUN has associated clone LUNs, this operation cannot be performed. ● No snapshots: Wipes LUN data while retaining its associated snapshots. The LUN snapshots can subsequently be used for LUN rollback or backup export. **Note**: Clone LUNs cannot perform the operation of wiping data only while retaining associated snapshots.

3.5.10 Trigger Active/Standby Switchover of the Target Corresponding to the LUN (Cluster Mode)

On the **LUN Management** page, select LUNs and go to **Actions** > **Switch** to trigger the active/standby switchover of the target corresponding to the LUN.

Note: After performing this operation, no action is required from the client side.

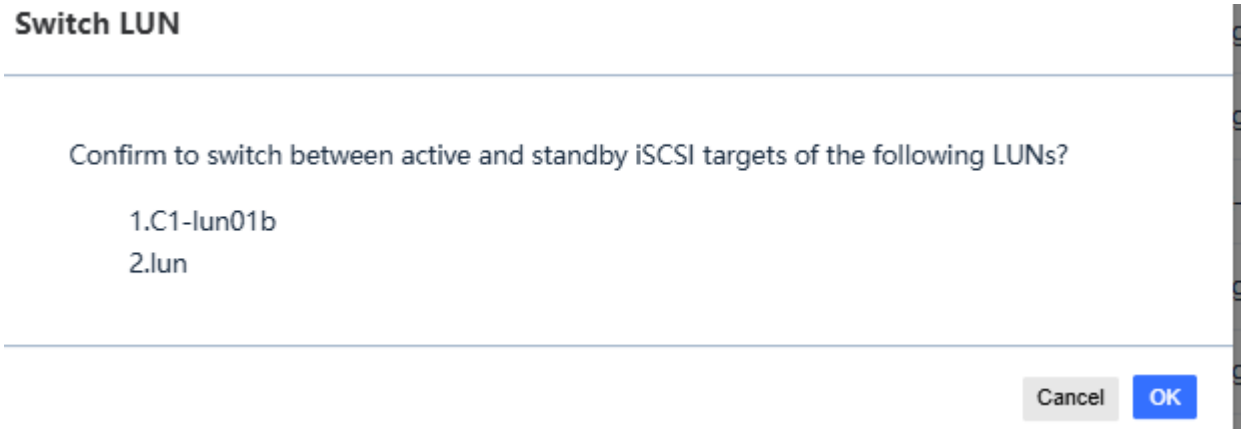


Figure 42. Trigger active/standby switchover of LUNs

3.5.11 Recovering a LUN (Cache/Storage Mode LUN)

On the **LUN Management** page, click **Recover** to recover a cache or a storage mode LUN.
The following scenarios are suitable for using the recover LUN function:

- There is a storage mode LUN or a cache mode LUN in the original HBlock, and the LUN data has been uploaded to the cloud. If the HBlock fails and cannot be started at this time, the LUN can be regenerated in another HBlock through the function of recovering the LUN, and LUN data can be recovered from the cloud.
- The original cache mode LUN or storage mode LUN has been deleted, but the cloud data is retained. The LUN data can be recovered through the recover function.

Note:

- When performing recover operation, please ensure that the connection between the original HBlock and the cloud has been disconnected, and no new data will be written to the LUN.
- The LUN name to be recovered does not exist in the current HBlock.
- The LUN to be recovered must be found in the specified bucket/prefix and the data must be complete.
- The recover LUN operation is executed asynchronously. Please check the recover progress by querying the LUN function.
- Before recovering a LUN in standalone mode, ensure that no residual data of that LUN exists in its corresponding data directory.
- When a LUN is in Recovering or RecoverFailed status, read and write operations are not supported.

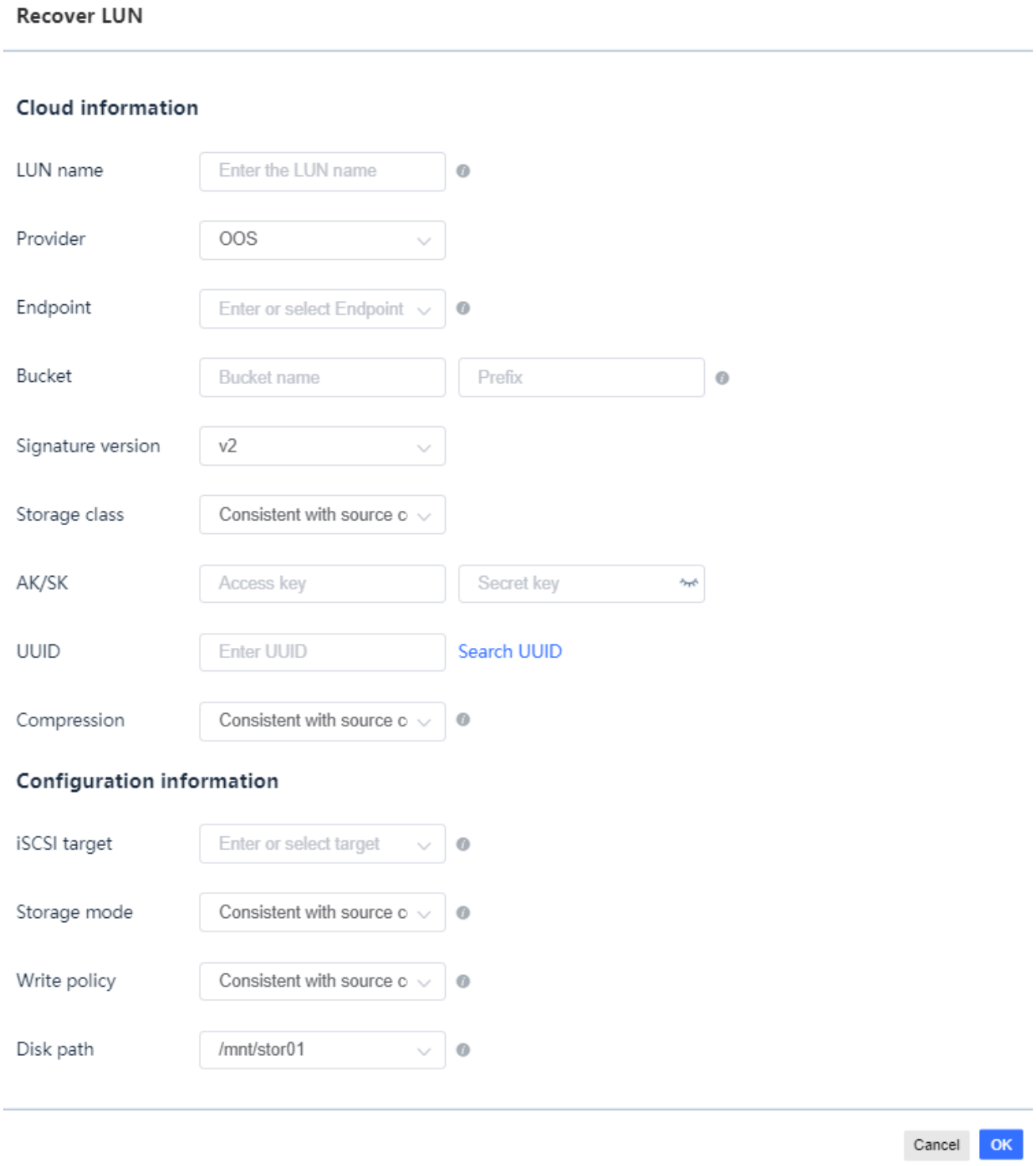


Figure 43. Recover a LUN (Standalone Mode)

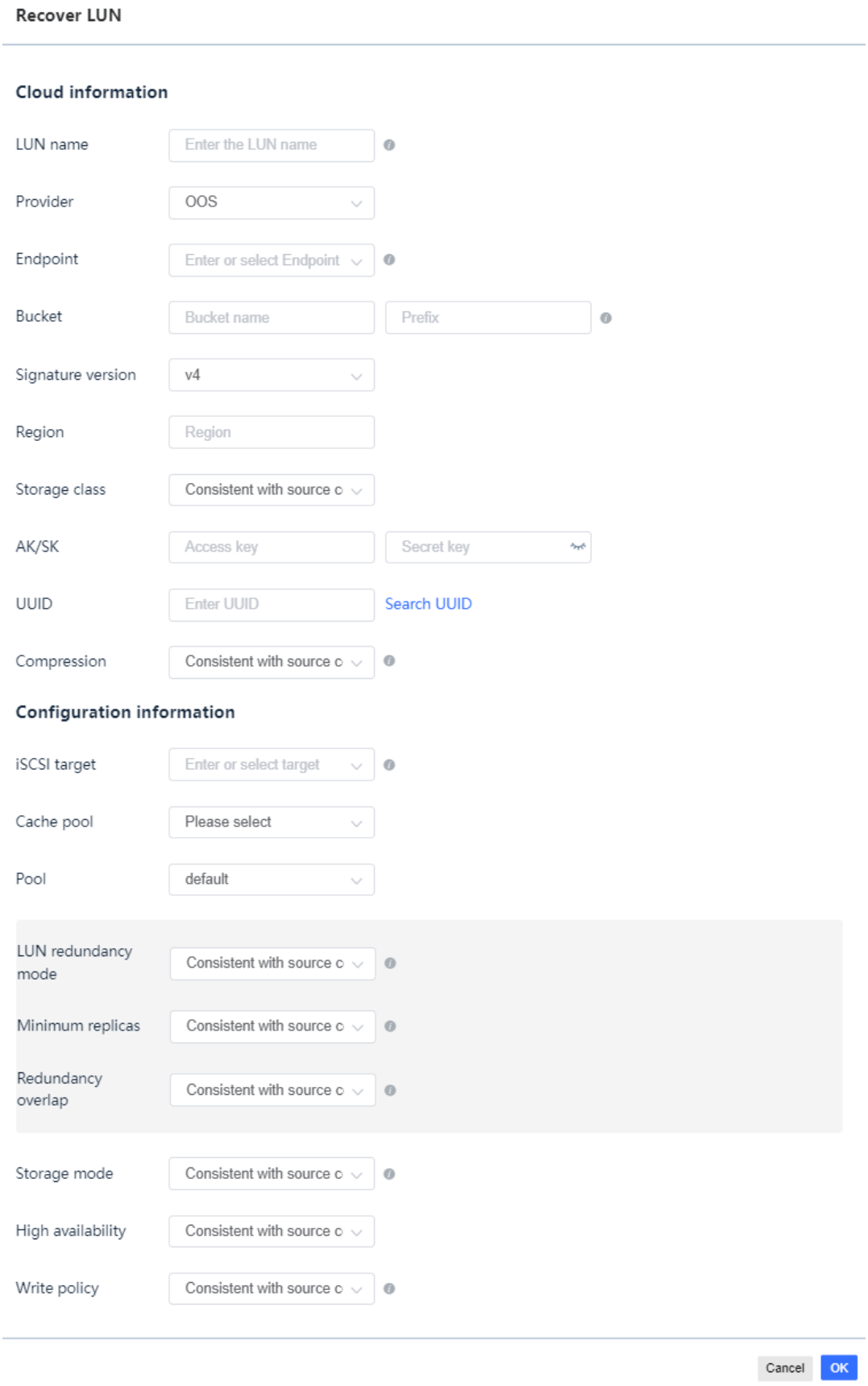


Figure 44. Recover a LUN (Cluster Mode)

After submitting the LUN recovery information, a "Recover LUN" confirmation window will pop up:

- Click "Cancel" to return to the "Recover LUN" information entry page.
- Click "OK" to perform the LUN recovery operation.

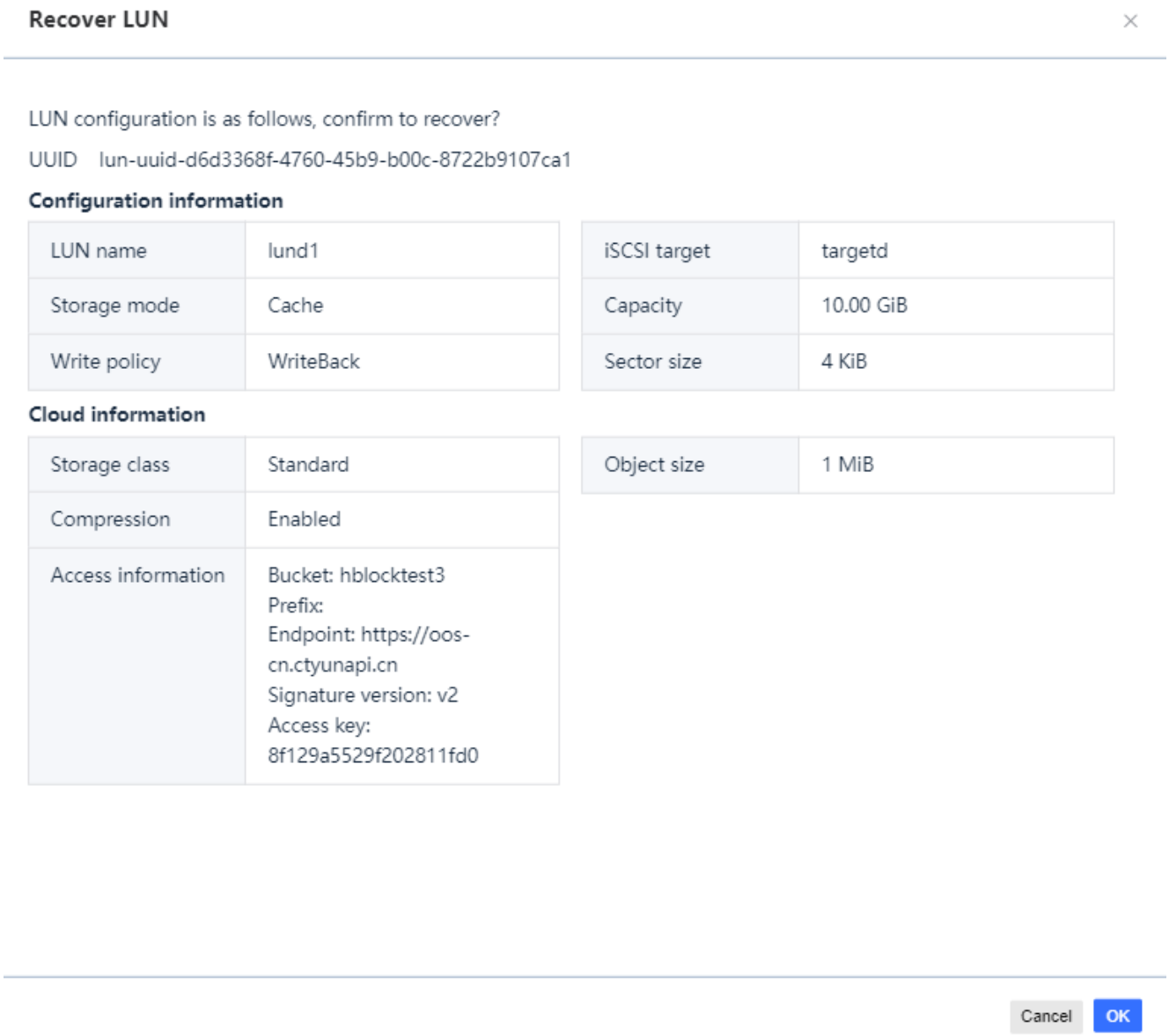


Figure 45. Confirm LUN Recovery Information (Standalone Mode)

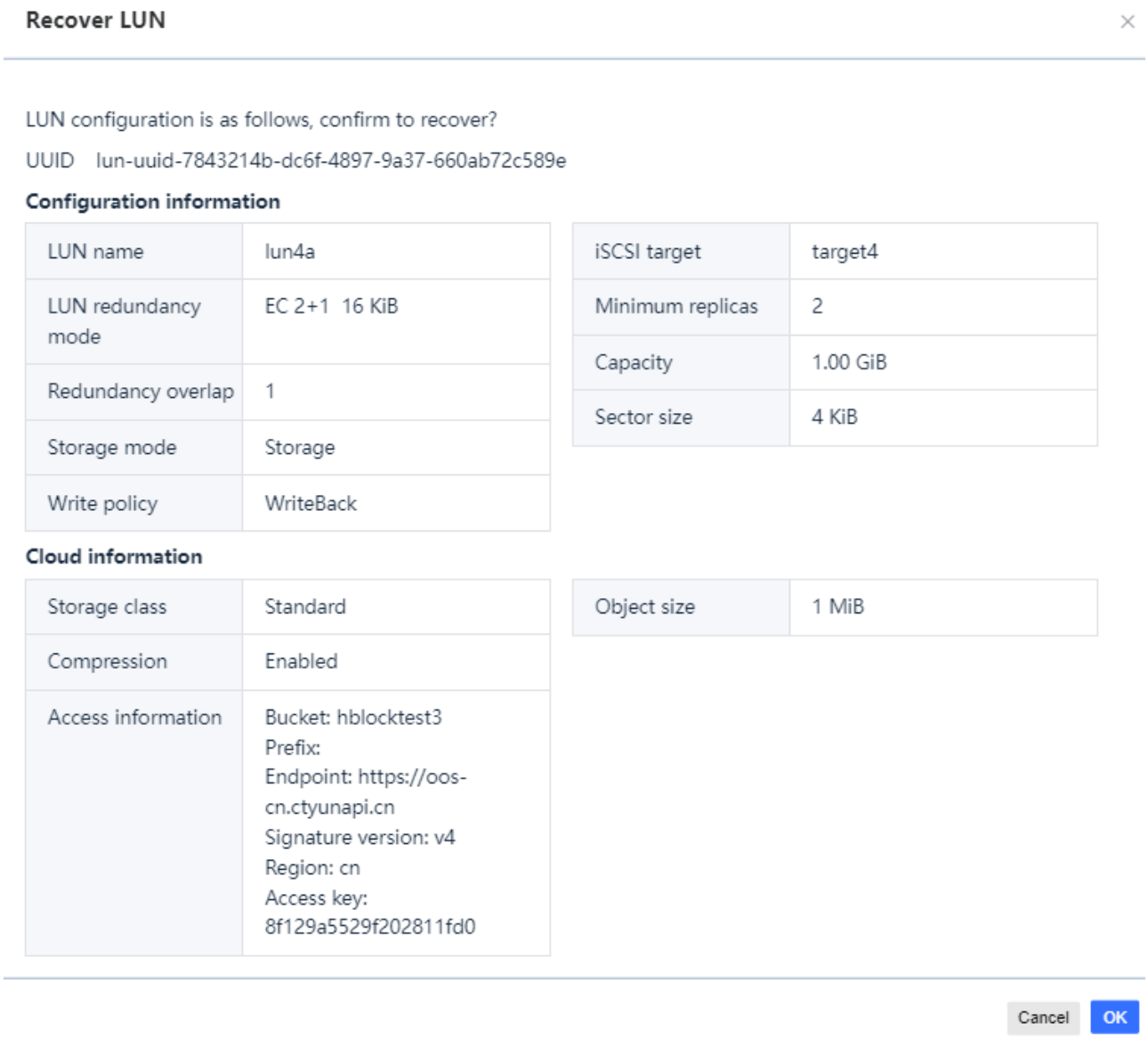


Figure 46. Confirm LUN Recovery Information (Cluster Mode)

Cloud information

Name	Description
LUN name	The source LUN name.
Provider	Specifies the type of object storage: ● OOS: eSurfing Cloud Object-Oriented Storage. ● S3: Other object storage compatible with S3. The default value is OOS. **Note**: The recovered LUN and the source LUN must use the same object storage service.
Endpoint	The source LUN's endpoint. **Note**: Access will be via HTTPS if only the domain name is entered.
Bucket	The bucket information of the source LUN. Specifies the bucket name and

	the prefix name of the source LUN. If the source LUN does not specify a prefix, the prefix does not need to be specified. Prefix name: The value is a string of 1 to 256 characters. **Note**: Do not enable bucket lifecycle settings and compliance retention.
Signature version	Specifies signature authentication version: ● v2 ● v4 The default value is v2.
Region	Specifies the region of endpoint. If the signature authentication version is v4, this item is required.
Storage class	Specifies storage class of object storage: ● STANDARD. ● STANDARD_IA. Consistent with source configuration by default.
AK/SK	The source LUN's access key and secret key.
UUID	Universally unique identifier of the source LUN.
Compression	Whether to compress data and upload it to object storage: ● Enabled: Compress data and upload it to object storage. ● Disabled: Do not compress data and upload it to object storage. Consistent with source configuration by default.

Configuration information

Name	Description
iSCSI target	Specifies the iSCSI target name for the LUN. The value is a string of 1 to 16 case-sensitive characters. It can contain lowercase letters, dots (.), digits, or hyphens (-). Only supports starting with a letter or a digit. **Note**: If the specified iSCSI target name does not exist when recovering the LUN, the iSCSI target will be created at the same time.
Cache pool	Specifies the cache storage pool (only supported by cluster mode). If a cache storage pool is specified, LUN data is first written to the cache storage pool and then stored to the storage pool.
Pool	Specifies the storage pool (only supported by cluster mode). The storage pool is the final storage pool in which LUN data is stored. By default, the base storage pool in the cluster is used. **Note**: The storage pool and cache storage pool must not be the same.
LUN redundancy mode	Sets the redundancy mode for the restored LUN (only supported by cluster mode). Value: ● single-copy.

	● 2-copy. ● 3-copy. ● EC *N+M*: Erasure code mode. Wherein, N and M are positive integers, N ≥ M and N+M ≤ 128. Indicates that the data is divided into N fragments and M pieces of parity data is generated. The default value is the redundancy mode of the source LUN. **Note** (In the following scenarios, the cluster is available): ● After the EC *N+M* LUN is restored: ■ Data can be written to the LUN if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to the minimum number of replicas of the LUN. Data cannot be written to the LUN and an alarm is generated if the number of available fault domains in the storage pool where the LUN resides is smaller than the minimum number of replicas. ■ Data in the LUN is normal and will not degrade if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to N+M. Data in the LUN is being degraded if the number of available fault domains in the storage pool where the LUN resides is between [N, N+M]. We recommend that you add or repair the fault domains as soon as possible. Data written to the storage pool is corrupted if the number of available fault domains in the storage pool where the LUN resides is less than N. ● After a LUN is restored in replica mode: ■ Data can be written to the LUN if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to the minimum number of replicas of the LUN. Data cannot be written to the LUN and an alarm is generated if the number of available fault domains in the storage pool where the LUN resides is smaller than the minimum number of replicas. ■ Data in the LUN is normal and will not degrade if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to the number of replicas. For a two-replica or three-replica LUN, data in the LUN data is being degraded if the fault domain in the storage pool where the LUN resides is greater than or equal to 1, but less than the number of replicas. We recommend that you add or repair fault domains as soon as possible. Data written to the storage pool is corrupted if no fault domain is available in the storage pool where the LUN resides.

Minimum replicas	Specifies the minimum replica number, only supported by cluster mode. ● For a LUN in replica mode, assuming that the number of LUN replicas is X and the minimum replica number is Y (must satisfy Y <=X), each time the data is written to LUN, at least Y replicas of data are written successfully before this write request is considered successful. ● For a LUN in EC N + M mode, assuming that the minimum replica number of the LUN is set to Y (must satisfy N<=Y<=N + M), the data blocks and parity blocks that sum to at least Y blocks are written successfully before this write request is considered successful. For a LUN in replica mode, the value is an integer that ranges from 1 to *N*, where *N* is the number of replicas, consistent with source configuration by default. For a LUN in EC N + M mode, the value is an integer that ranges from *N* to *N* + *M*, consistent with source configuration by default.
Redundancy overlap	Specifies the number of copies/fragments from the same data which are allowed to be distributed in the same fault domain, only supported by cluster mode. Different copies/fragments of the same data are distributed in different fault domains generally. When the fault domain is damaged, it is allowed to place multiple copies/fragments in the same fault domain but different paths according to the redundancy overlap principle. **Note**: If fault domain level of the storage pool is path, this parameter does not take effect. Value: For a LUN in replica mode, the value is an integer that ranges from 1 to *N*, where *N* is the number of replicas. For a LUN in EC N + M mode, the value is an integer that ranges from 1 to *N* + *M*. Consistent with source configuration by default.
Storage mode	Specifies the storage mode for the LUN: ● Cache: Store part of hot data at local and store all data in cloud asynchronously. ● Storage: Store all data at local and asynchronously store it in cloud. Consistent with source configuration by default.
Compression	Whether to compress data and upload it to object storage: ● Enabled: Compress data and upload it to object storage. ● Disabled: Do not compress data and upload it to object storage. Consistent with source configuration by default.
High availability	Sets the high availability type of the LUN, only supported by cluster mode. Value: ● ActiveStandby: Enable active and standby. The LUN is associated with all IQNs under the corresponding target. ● Disabled: Disable active and standby LUNs. The LUN is associated with 1 target IQN under the corresponding target.

	Consistent with source configuration by default.
Write policy	Sets the write policy for the LUN: ● WriteBack: After the data is written to the memory, it returns to the client successfully, and then the data is written to the disk asynchronously. It is suitable for scenarios with high performance requirements and low stability requirements. ● WriteThrough: The data is written to both memory and disk at the same time, and then returns to the client after successful writing. It is suitable for scenarios that the stability requirements are high, the write performance requirements are not high, and the recently written data will be read in a short time. ● WriteAround: Write data directly to the disk without writing to memory. It is suitable for scenarios with high stability requirements, low performance requirements, and more writing and less reading. Consistent with source configuration by default.
Disk path	Specifies the disk path to store LUN data, only supported by standalone mode. If not specified, the default disk path of the server will be used for the LUN. Value: It can only contain letters, numbers, Chinese characters, or the special characters ~ ! @ $ ( ) _ + - ; . :.

3.5.12 Suspend LUNs (Cache/Storage LUN)

On the **LUN Management** page, select target LUNs and go to **Actions** > **Suspend** to suspend them.

Suspending a LUN is applicable to scenarios where "multiple clusters take turns writing to the same cloud LUN." For example: Cluster A suspends the LUN, then performs cloud data restore on Cluster B, after which Cluster B performs read/write operations on the LUN data. When Cluster B suspends the LUN, Cluster A can then resume the LUN. During the resume process, only incremental data needs to be synchronized, allowing direct access to the latest data.

Note:

- Suspending a LUN will immediately freeze all read and write requests to that LUN. Ensure that all data on the LUN has been persisted; that is, if the LUN has been mounted by a client, ensure that all client data has been synchronized to the LUN. Business dependent on this LUN will be unavailable until the LUN returns to Normal status.
- When a LUN is in Suspended status, only suspend, edit the LUN, edit cloud configuration, resume, delete, and query operations are permitted.
- When a LUN is in Suspended, Suspending, or SuspendFailed status, read and write operations are not supported.
- Before suspending a LUN, you must first log out to disconnect client connections; otherwise, client connections cannot be disconnected until the LUN status returns to Normal.
- This operation can only be performed when the LUN is in Normal, Suspended, Suspending, or SuspendFailed status.

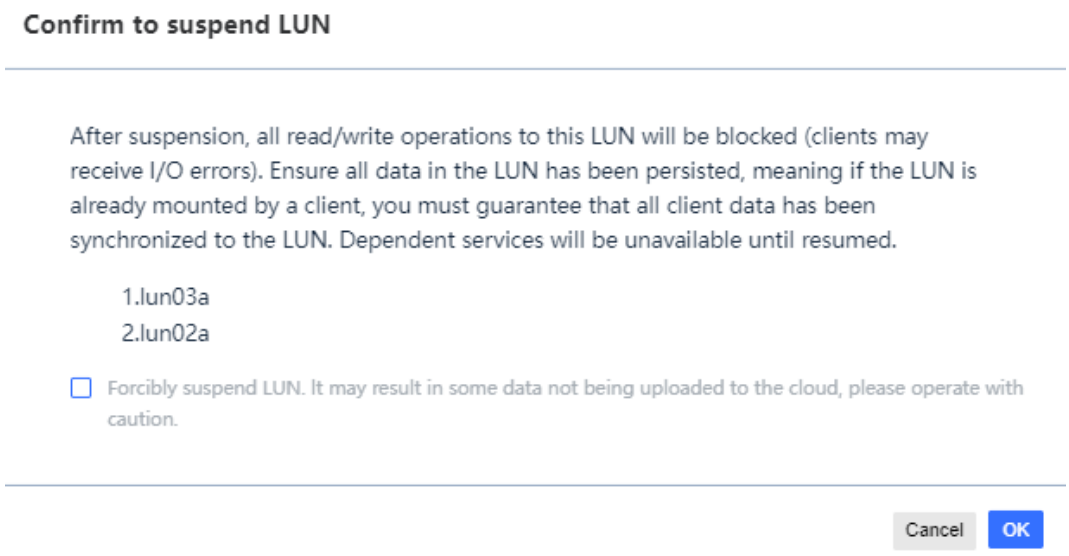


Figure 47.Suspend LUNs.

3.5.13 Resume LUNs from Restore Interruption or Suspension (Cache/Storage Mode LUN)

On the **LUN Management** page, select LUNs with status RecoverFailed or Suspended, click **Actions** > **Resume** to resume LUNs from restore interruption or suspension.
Note: Ensure that the LUN data files in the local disk paths have not been modified in any way, otherwise it may lead to incomplete data of the recovered LUN or the LUN cannot be used normally.

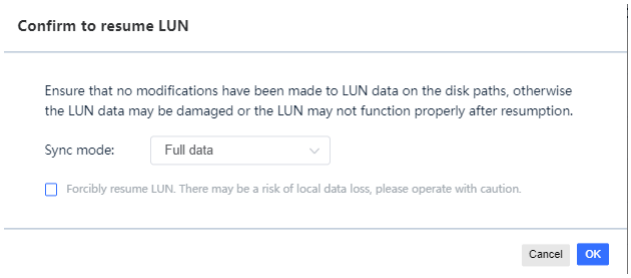


Figure 48. Resume LUNs from Restore Interruption or Suspension

Name	Description
Sync mode	Specifies the data scope for resuming a cache-mode LUN. Value: ● Metadata only: Updates only the differences in the LUN index compared to the cloud data index. ● Full data: Updates both the differences in the LUN index compared to the cloud, and the differences between locally stored hot data and the cloud. **Note**: This parameter applies only to cache mode LUNs. If no local data exists, no local data will be updated.

3.5.14 Create a Snapshot

You can create a snapshot in the following ways:

- On the **Data protection** > **Snapshot Management** > **Snapshot** page, click **Create** to create a snapshot.
- On the **Service** > **LUN Management** page, select a LUN and click **Actions** > **Create snapshot** to create a snapshot.

Note:

- Before performing this operation, ensure all data on the source LUN is persistent. If the source LUN is mounted by a client, make sure the client's data has been synchronized to the LUN. Before creating a snapshot:
  - For Linux clients: If the client supports `sync -f` (check with `sync --help`), run `sync -f`; otherwise, run `sync`.
  - For Windows clients: Take the disk corresponding to the source LUN offline on the client before the snapshot, and bring it back online afterward.
- The source LUN needs to be in Normal status.

Usage restrictions:

- Maximum snapshots per LUN: 512.
- Maximum snapshots per system: 100,000.
- Maximum clones per snapshot: 512.
- Maximum snapshot depth per system: 512.

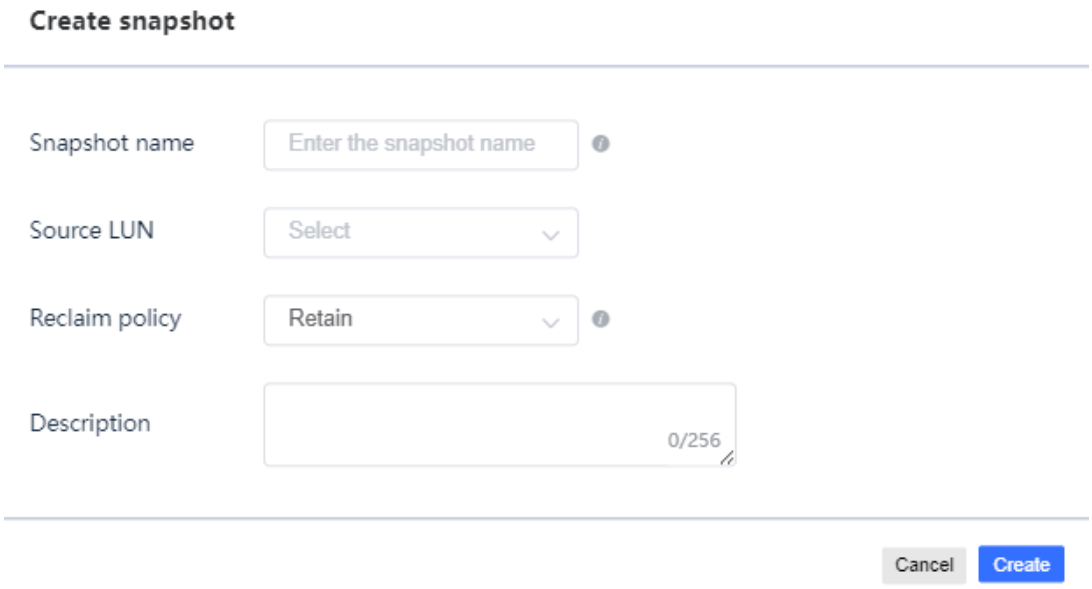


Figure 49. Create a Snapshot

Name	Description
Snapshot name	Specifies the snapshot name

	The value is a string of 1 to 256 case-sensitive characters. It can contain letters, digits, hyphens (-), or underscores (_). Only supports starting with a letter or a digit. **Note**: Snapshot names, consistency snapshot names, and names of single-LUN snapshots in a consistency snapshot must be unique and not duplicated across each other.
Source LUN	Specifies the source LUN for the snapshot. **Note**: Snapshots can only be created for local LUNs.
Reclaim policy	Specifies snapshot reclaim policy: ● Delete: Automatically deleted when the snapshot has no associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). **Note**: If the snapshot reclaim policy is set to Delete, the following operations will trigger snapshot deletion: rolling back a consistency snapshot, rolling back a snapshot, flattening a clone LUN, deleting a clone LUN, wiping a LUN, and deleting a snapshot. ● Retain: Retained when the snapshot has no associated clone LUNs and has at most one child node. The default value is Retain.
Description	Specifies the snapshot description. The value is a string of 1 to 256 characters.

3.5.15 Create a Consistency Snapshot

You can create a consistency snapshot in the following ways:

- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, click **Create** to create a consistency snapshot.
- On the **Service** > **LUN Management** page, select LUNs and click **Actions** > **Create consistency snapshot** to create a consistency snapshot.

Usage restrictions: Maximum number of LUNs for a consistency snapshot: 512.

Note:

- Before performing this operation, ensure all data on the source LUN is persistent. If the source LUN is mounted by a client, make sure the client's data has been synchronized to the LUN. Before creating a consistency snapshot:
  - For Linux clients: If the client supports `sync -f` (check with `sync --help`), run `sync -f`; otherwise, run `sync`.
  - For Windows clients: Take the disk corresponding to the source LUN offline on the client before the snapshot, and bring it back online afterward.
- The source LUNs need to be in Normal status.

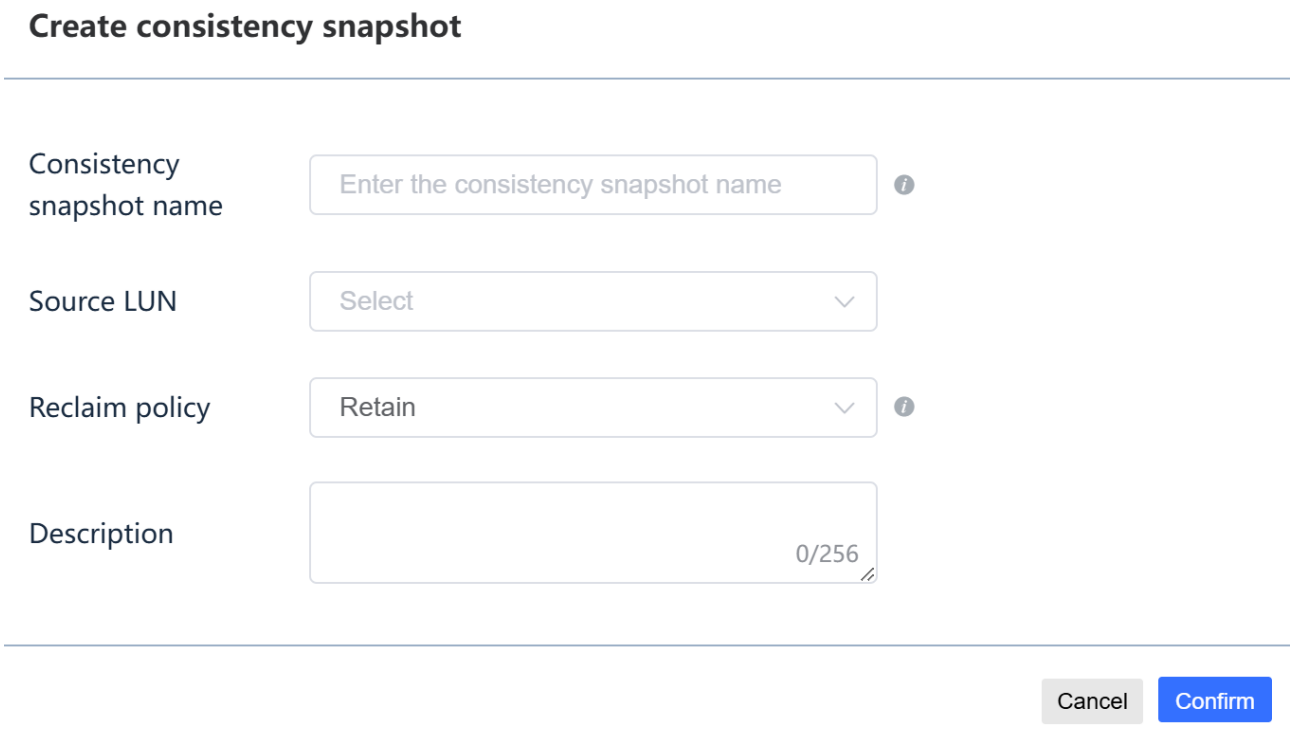


Figure 50. Create a Consistency Snapshot

Name	Description
Consistency snapshot name	Specifies the consistency snapshot name. The value is a string of 1 to 256 case-sensitive characters. It can contain letters, digits, hyphens (-), or underscores (_). Only

	supports starting with a letter or a digit. **Note**: Snapshot names, consistency snapshot names, and names of single-LUN snapshots in a consistency snapshot must be unique and not duplicated across each other.
Source LUN	Specifies source LUNs for the consistency snapshot. You can specify multiple source LUNs at once. **Note**: ● Consistency snapshot can only be created for local LUNs. ● Maximum number of LUNs for a consistency snapshot: 512.
Reclaim policy	Specifies reclaim policy for single-LUN snapshots in the consistency snapshot: ● Delete: Automatically deleted when the snapshot has no associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). ● Retain: Retained when the snapshot has no associated clone LUNs and has at most one child node. The default value is Retain.
Description	Specifies the consistency snapshot description. The value is a string of 1 to 256 characters.

3.5.16 Create Backup (Local LUN)

Backups are divided into full backups and incremental backups:

- Full backup: Exports all data from the LUN's creation up to the selected snapshot into a backup file.
- Incremental backup: Exports only the changed data between two snapshots into a backup file. For example, creating an incremental backup from snap1 to snap2 exports the LUN's data between the time of snap1 and the time of snap2.

Note:

- Backups can only be created when all snapshots are in Normal status.
- Backups can only be created when the LUN is in Normal, Flattening, or Rollbacking status.
- When exporting a backup, the associated snapshots and LUN must not be deleted.
- Each server can export a maximum of 4 backups simultaneously. The server here refers to the server where the snapshot source LUN's Active IQN resides.

You can create backup in the following ways:

- On the **Service** > **LUN Management** page, select the target LUN and click **Actions** > **Create backup** to create either a full backup or an incremental backup.
  Note: Only LUNs that already have at least one snapshot can be used to create a backup.
- On the **Service** > **LUN Management** page, click the source LUN of the target snapshot. On the LUN details page, right-click the specific snapshot in the **Snapshot Tree** and select **Backup** to create either a full backup or an incremental backup.
- On the **Data protection** > **Snapshot Management** > **Snapshot** page, select the target snapshot and click **Actions** > **Create backup** to create either a full backup or an incremental backup of the snapshot.
- On the **Data protection** > **Snapshot Management** > **Snapshot** page, click the target snapshot name to enter the snapshot details page. Under **Basic information**, click **Backup** to create either a full backup or an incremental backup of the snapshot.
- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, click the target snapshot's consistency snapshot to the consistency snapshot details page. Select the target snapshot and click **Backup** in the **LUN Snapshots** section to create either a full backup or an incremental backup of the snapshot.

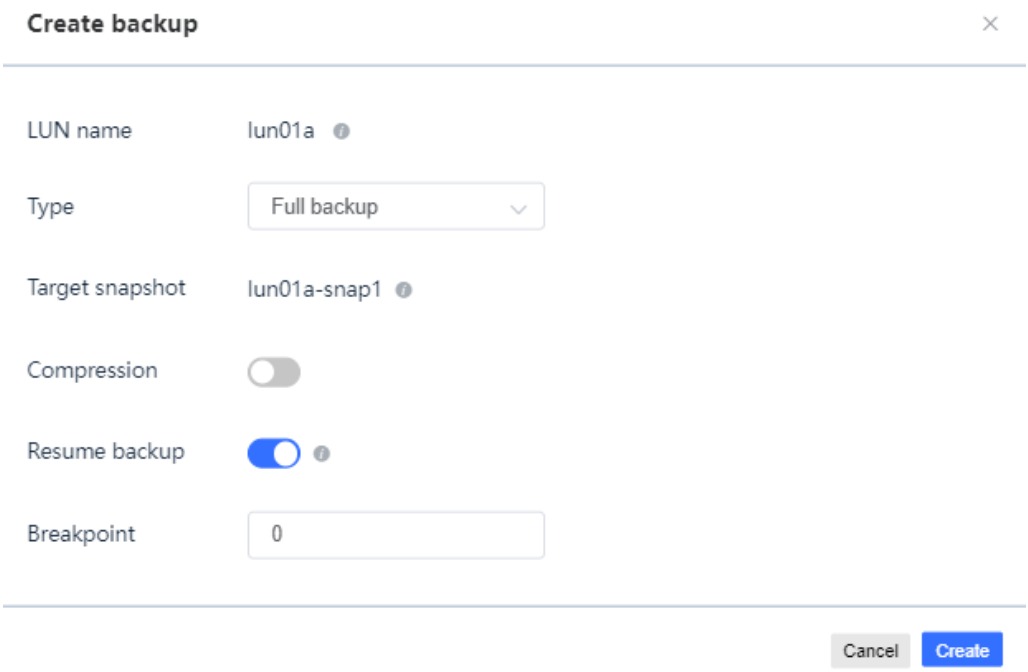


Figure 51. Create a Full Backup

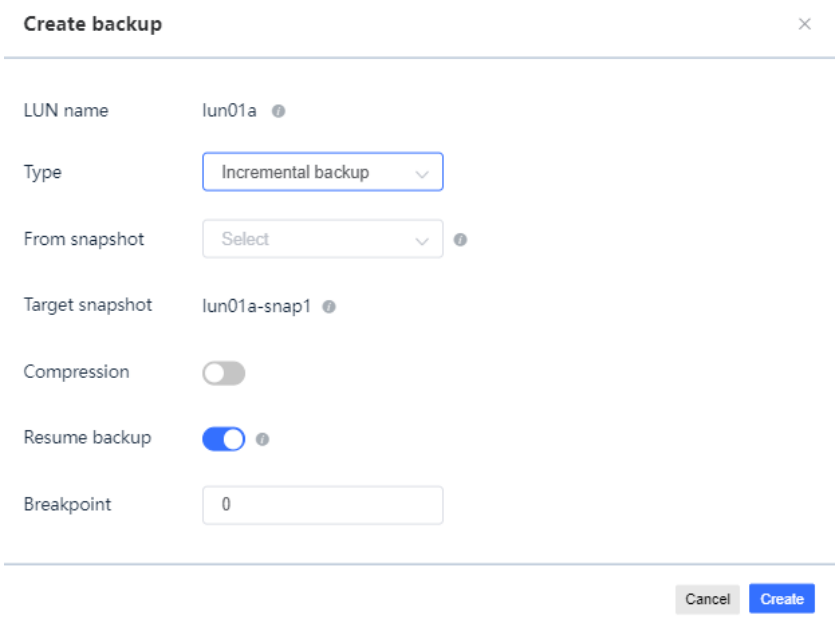


Figure 52. Create an Incremental Backup

Name	Description
LUN name	The LUN name.
Type	The backup type: ● Full backup. ● Increment backup.

From snapshot	Snapshot name, indicating that data created after this snapshot point will be exported. **Note**: This parameter must be provided for an incremental backup, where it serves as the starting snapshot.
Target snapshot	Snapshot name, indicating that the data captured at the snapshot point will be exported.
Compression	Whether to compress the backup file.
Resume backup	If the backup file export is interrupted unexpectedly, you can resume the task from the break point by supplying the size of the last valid slice that was successfully exported.
Breakpoint	Breakpoint position: the starting offset for this export task. If the previous export was interrupted, the task must resume from this offset. Value: The value must be a multiple of 268,435,456, the unit is bytes. Omitting the parameter or supplying 0 means exporting the entire data set. If the supplied value exceeds the backup-file size, an empty backup file is produced. **Note**: For non-compressed backups the file is made up of fixed-size chunks (256 MiB). When calculating the breakpoint of an export task, use the size of the already-exported backup file and the fixed chunk size to determine the size of the successfully exported chunks—this size is the breakpoint. **For example**: 1. After the first interruption, 257 MiB have been written, rounded down to 256 MiB. Breakpoint = 268,435,456 bytes (one complete 256 MiB chunk). 2. After the second interruption, the cumulative amount written is 256 MiB + 530 MiB = 786 MiB, rounded down to 768 MiB (three complete 256 MiB chunks). Breakpoint = 805,306,368 bytes. The same rule applies to any subsequent breakpoints.

3.5.17 Import Backup (Local LUN)

On the **Service** > **LUN Management** page, select the target LUN and click **Actions** > **Import backup** to import a backup file.

When importing a full backup, it is recommended to use a new LUN, or ensure that the existing data on the LUN has been wiped. The LUN data can be wiped using the wipe LUN function; decide whether to retain the LUN's snapshot data based on actual requirements.

Note:

- Only one backup file can be imported at a time. If multiple backup files are involved, import them in the exact order of their snapshot creation.
- The target LUN must be free of any read or write operations while the backup is being imported.
- While importing backup files—especially when dealing with multiple full and incremental backups—do not mount the target LUN to any client until all required backups have been fully imported. Premature mounting may cause file-system corruption.
  Only mount the LUN after every planned backup has been imported, and do not import any additional backups once the LUN is mounted.
  If the LUN is already mounted, unmount it first, wipe the LUN, and then proceed with the backup import.
- If the user splits the full backup file into multiple segments on their own before performing the import, they must ensure that there is data overlap between the previous segment and the next one, and that the starting position of each segment is a multiple of 256 MiB. For example, the first segment is 0–515 MiB, and the second segment is 512 MiB–1024 MiB.

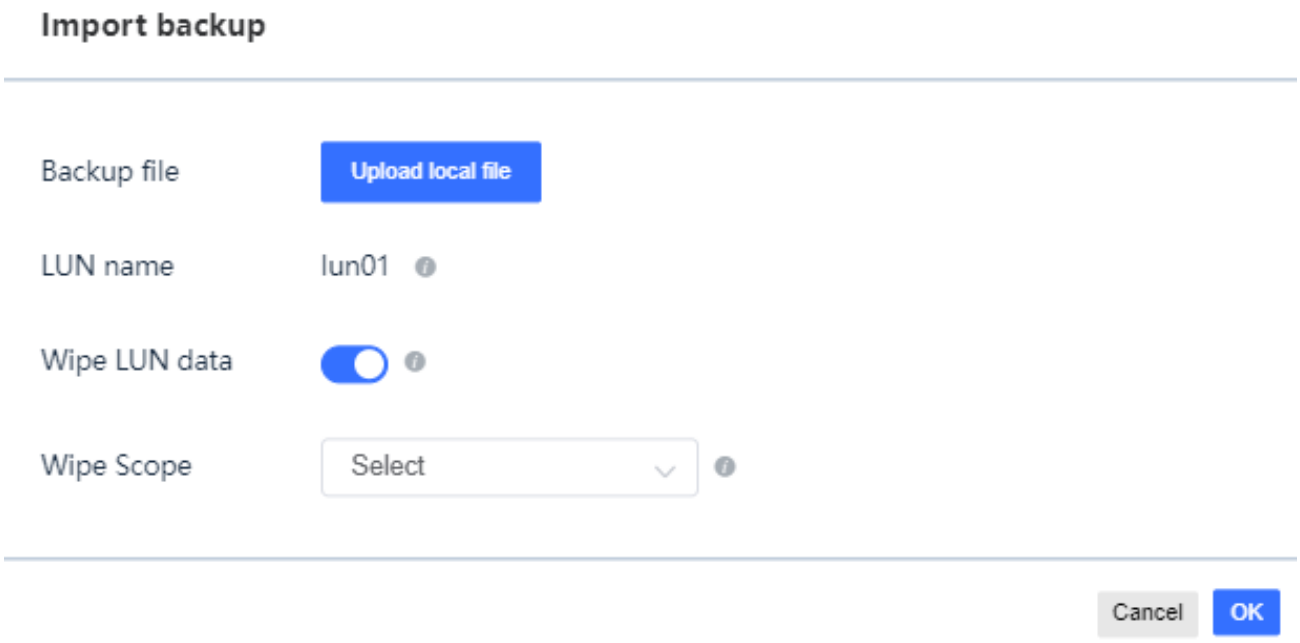


Figure 53. Import the Backup File

Name	Description
Backup file	The backup file to be imported.
LUN name	Name of the LUN into which the backup will be imported. **Note**: The LUN must be larger than the source LUN's size at the moment the snapshot was taken.
Wipe LUN data	Whether to wipe the LUN and retain only the imported backup data. **Note**: ● For LUNs that have already been written with data, it is recommended to wipe them, retaining only the data imported from the backup files. ● For scenarios involving multiple imports using full backup files and incremental backup files: select to wipe existing LUN data during the first import. For subsequent imports, existing LUN data must be retained. ● Newly created LUNs are not affected by this parameter.
Wipe Scope	Specifies the data scope for wiping the LUN. Value: ● All: Wipes all LUN data and its associated snapshots. **Note**: If the LUN has associated clone LUNs, this operation cannot be performed. ● No snapshots: Wipes LUN data while retaining its associated snapshots. The LUN snapshots can subsequently be used for LUN rollback or backup export. **Note**: Clone LUNs cannot perform the operation of wiping data.

3.5.18 Create a Clone LUN

You can create a clone LUN in the following ways:

- For local LUNs with snapshots, go to the **LUN Management** page, click the LUN name to enter its details page, right-click a specific snapshot under the **Snapshot Tree**, select **Clone**, and you can create a clone LUN.
- On the **Data protection** > **Snapshot Management** > **Snapshot** page, select the target snapshot, click to enter its details page, click **Clone** in **Basic information**, and you can create a clone LUN.
- On the **Data protection** > **Snapshot Management** > **Snapshot** page, select the target snapshot and click **Clone** in **Actions** to create a clone LUN.
- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, select the target consistency snapshot, click to enter its details page, check a target LUN snapshot, and click **Clone** to create a clone LUN.

Prerequisite: The snapshot used for creating a clone LUN must be in "Normal" status.

Notes:

- Maximum clone LUNs supported by the system: 100,000.
- Maximum clone LUNs creatable from a single snapshot: 512.
- Maximum cloning depth supported by the system: 16.

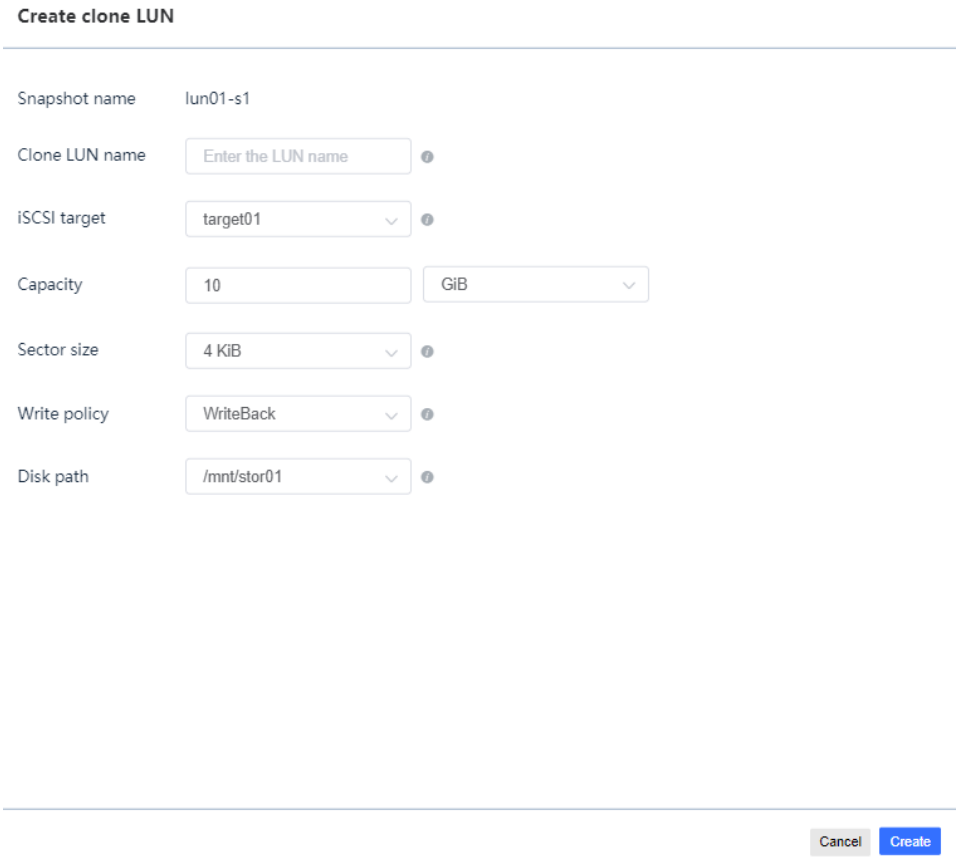


Figure 54. Create a Clone (Standalone Mode)

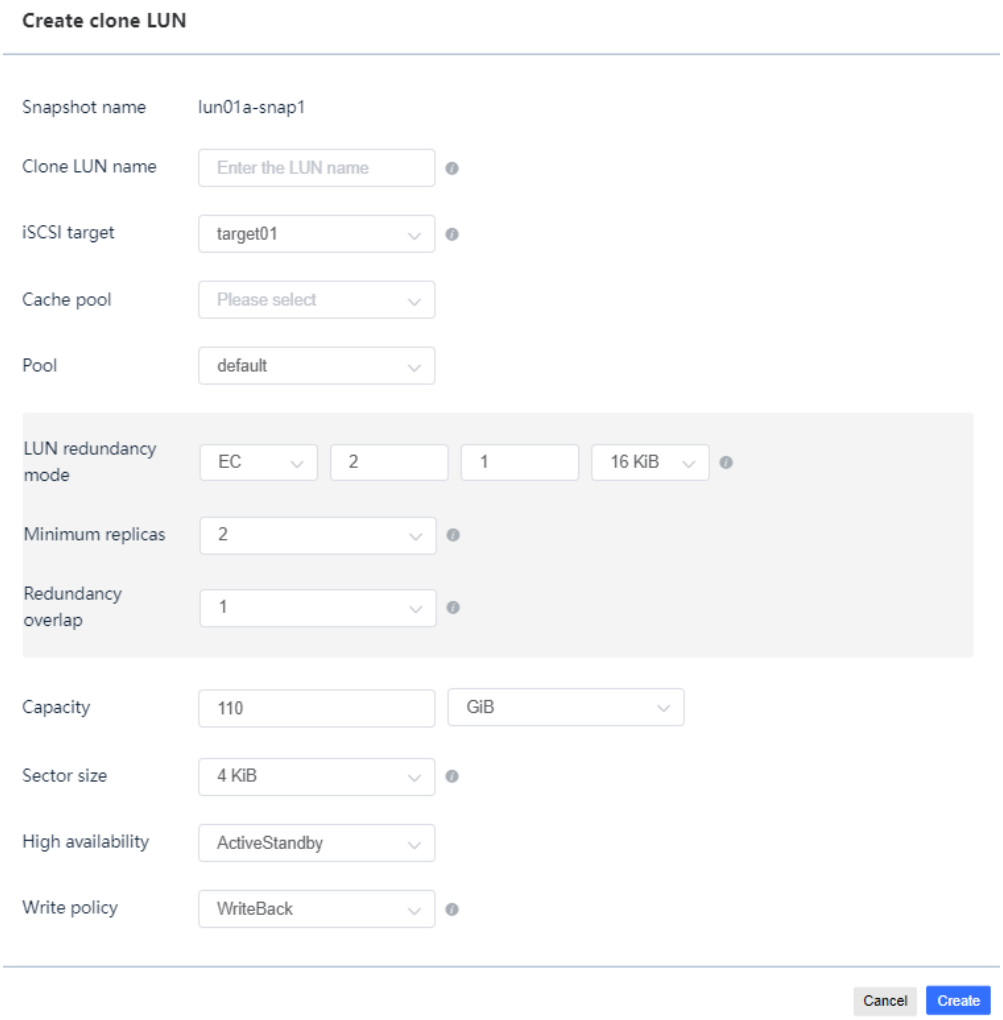


Figure 55. Create a Clone LUN (Cluster Mode)

Name	Description
Snapshot name	The name of the snapshot associated with the clone LUN.
Clone LUN name	Specifies the clone LUN name. The value is a string of 1 to 16 case-sensitive characters. It can contain letters, digits, or hyphens (-). Only supports starting with a letter or a digit.
iSCSI target	Specifies the name of the iSCSI target associated with the clone LUN, which can differ the from source LUN's iSCSI target. The value is a string of 1 to 16 case-sensitive characters. It can contain lowercase letters, dots (.), digits, or hyphens (-). Only supports starting with a letter or a digit. **Note**: If the specified iSCSI target name does not exist when creating a clone LUN, the iSCSI target will be created at the same time, the reclaim policy of the iSCSI target is Delete.

Cache pool	Specifies a cache storage pool, only supported by cluster mode. The default value matches the source LUN's configuration. **Note**: ● The Pool and Cache pool must not be the same. ● If the clone LUN's Pool and Cache pool settings match the source LUN's, no extra configuration is needed. If either the Pool or Cache pool for the clone LUN is set separately, the corresponding settings of the source LUN are overridden, and the configured parameter values are used. For example, if the source LUN has both Cache pool and Pool and the clone LUN only sets Pool without setting Cache pool, then the clone LUN will only use the newly set Pool and have no Cache pool. Conversely, if the clone LUN sets Cache pool, you must also set Pool or use the base storage pool.
Pool	Specifies the storage pool, only supported by cluster mode. The default value matches the source LUN's configuration. **Note**: ● The Pool and Cache pool must not be the same. ● If the clone LUN's Pool and Cache pool settings match the source LUN's, no extra configuration is needed. If either the Pool or Cache pool for the clone LUN is set separately, the corresponding settings of the source LUN are overridden, and the configured parameter values are used. For example, if the source LUN has both Cache pool and Pool and the clone LUN only sets Pool without setting Cache pool, then the clone LUN will only use the newly set Pool and have no Cache pool. Conversely, if the clone LUN sets Cache pool, you must also set Pool or use the base storage pool.
LUN redundancy mode	Specifies the clone LUN data storage redundancy mode, only supported by cluster mode. Value: ● single-copy. ● 2-copy. ● 3-copy. ● EC *N+M*: Erasure code mode. N and M are positive integers, N ≥ M, and N + M ≤ 128. This indicates that the data is divided into N fragments and M pieces of verification data are generated. The default value matches the source LUN's configuration. **Note**: (All scenarios are based on the premise of cluster availability): ● After an EC *N+M* LUN is created: ■ Data can be written to the LUN if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to

	the minimum number of replicas of the LUN. Data cannot be written to the LUN and an alarm is generated if the number of available fault domains in the storage pool where the LUN resides is smaller than the minimum number of replicas. ■ Data in the LUN is normal and will not degrade if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to N+M. Data in the LUN is being degraded if the number of available fault domains in the storage pool where the LUN resides is between [N, N+M]. We recommend that you add or repair the fault domains as soon as possible. Data written to the storage pool is corrupted if the number of available fault domains in the storage pool where the LUN resides is less than N. ● After a LUN in replica mode is created: ■ Data can be written to the LUN if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to the minimum number of replicas of the LUN. Data cannot be written to the LUN and an alarm is generated if the number of available fault domains in the storage pool where the LUN resides is smaller than the minimum number of replicas. ■ Data in the LUN is normal and will not degrade if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to the number of replicas. For a two-replica or three-replica LUN, data in the LUN data is being degraded if the fault domain in the storage pool where the LUN resides is greater than or equal to 1, but less than the number of replicas. We recommend that you add or repair fault domains as soon as possible. Data written to the storage pool is corrupted if no fault domain is available in the storage pool where the LUN resides.
Minimum replicas	Specifies the minimum replica number, only supported by cluster mode. Click the **More** button after LUN redundancy mode to fill in minimum replica number. ● For a LUN in replica mode, assuming that the number of LUN replicas is X and the minimum replica number is Y (must satisfy Y <=X), each time the data is written to LUN, at least Y replicas of data are written successfully before this write request is considered successful. ● For a LUN in EC N + M mode, assuming that the minimum replica number of the LUN is set to Y (must satisfy N<=Y<=N + M), the data blocks and parity blocks that sum to at least Y blocks are written successfully before this write request is considered successful. Value: For a LUN in replica mode, the value is an integer that ranges from 1 to *N*, where *N* is the number of replicas. For a LUN in EC N + M mode, the value is an

	integer that ranges from *N* to *N* + *M*. The default value matches the source LUN's configuration.
Redundancy overlap	Specifies the number of copies/fragments from the same data which are allowed to be distributed in the same fault domain, only supported by cluster mode. Different copies/fragments of the same data are distributed in different fault domains generally. When the fault domain is damaged, it is allowed to place multiple copies/fragments in the same fault domain but different paths according to the redundancy overlap principle. **Note**: If fault domain level of the storage pool is path, this parameter does not take effect. Value: For a LUN in replica mode, the value is an integer that ranges from 1 to *N*, where *N* is the number of replicas. For a LUN in EC N + M mode, the value is an integer that ranges from 1 to *N* + *M*. The default value matches the source LUN's configuration.
Capacity	Specifies the storage capacity of the clone LUN. Integer format, with optional units (GiB, TiB, PiB) following the number. The default is the source LUN's capacity at the snapshot time. If reconfigured, it must be no less than the source LUN's capacity at the snapshot time.
Sector size	Specifies the sector size. The value is 512 Bytes or 4 KiB. The default value matches the source LUN's configuration. **Note**: Selection of sector size: According to your business scenario, under normal circumstances, if the data size of a single I/O operation is greater than or close to 4KiB, it is recommended to choose 4 KiB; if the data size of a single I/O operation is close to 512bytes, it is recommended to choose 512 Bytes.
High availability	Set the high availability type of the clone LUN, only supported by cluster mode: ● ActiveStandby: Enable active and standby. The LUN is associated with all IQNs under the corresponding target. ● Disabled: Disable active and standby LUNs. The LUN is associated with 1 target IQN under the corresponding target. The default value matches the source LUN's configuration.
Write policy	The write policy of the clone LUN ● WriteBack: After the data is written to the memory, it returns to the client successfully, and then the data is written to the disk asynchronously. It is suitable for scenarios with high performance requirements and low stability requirements. ● WriteThrough: The data is written to both memory and disk at the same time, and then returns to the client after successful writing. It is suitable for scenarios that the stability requirements are high, the write performance requirements are not high, and the recently written data will be read in a

	short time. ● WriteAround: Write data directly to the disk without writing to memory. It is suitable for scenarios with high stability requirements, low performance requirements, and more writing and less reading. The default value matches the source LUN's configuration.
Disk path	Specifies the disk path to store clone LUN data, only supported by standalone mode. The default disk path matches the source LUN's configuration. Value: It can only contain letters, numbers, Chinese characters, or the special characters ~ ! @ $ ( ) _ + - ; . :.

3.5.19 Flatten the Clone LUN

You can break the relationship chain between a clone LUN and a snapshot in the following ways:

- On the **LUN Management** page, click the name of a specific clone LUN to enter its details page. Then, click **Flatten** to break the relationship.
- On the **Data Protection** > **Snapshot Management** > **Snapshot** page, click the target snapshot to enter its details page. Then, click **Flatten** in the target clone LUN to break the relationship.

After the operation completes, the clone LUN will become an independent LUN.

Note:

- If the source LUN's data is damaged or unreadable due to other reasons, the system will keep retrying until it can read and copy the data to the clone LUN.
- This operation cannot be performed if the clone LUN is being rolled back.

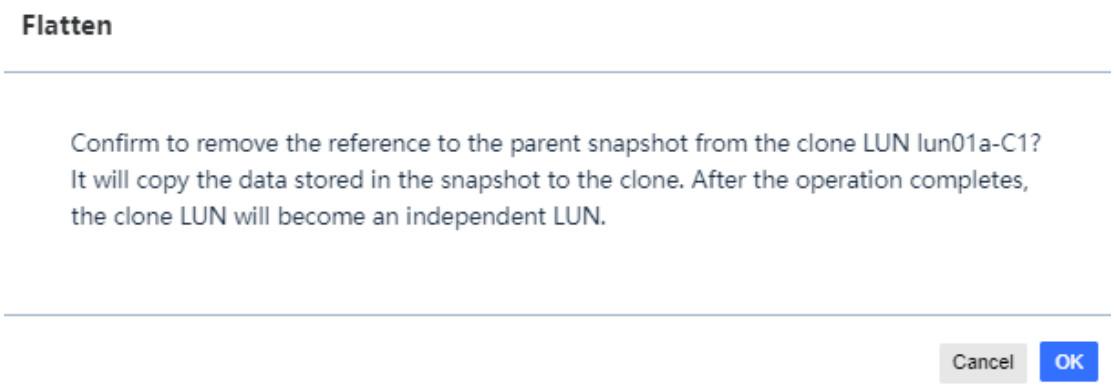


Figure 56. Flatten the Clone LUN

3.5.20 Delete LUNs

On the **LUN Management** page, select LUNs and go to **Actions** > **Delete** to delete them.
For clone LUNs, you can also delete them via the **Data protection** > **Snapshot Management** > **Snapshot** page. Click the snapshot linked to the clone LUN to access its details. In the **Clone LUN Info** section, locate the clone LUN and click the **Delete** button in its **Actions** column.
For the cache or storage mode LUN, if the data on the cloud is not deleted when deleting the LUN, the LUN restore function can be used later for LUN data restoration. When deleting a LUN, ensure it has no snapshots or consistency snapshots.
Note:

- If the LUN status is Suspended, Suspending, or SuspendFailed, the cloud data cannot be deleted even if the LUN is forcibly deleted.
- For the cache or storage mode LUN, if forcibly deleting the LUN while also deleting cloud data may result in residual cloud data, which needs to be manually deleted.
- If a LUN has associated clone LUNs that are not in "Deleting" or "Flattening" status, deleting the source LUN is prohibited.
- If a LUN has associated snapshots or consistency snapshots, you can only force-delete the LUN. Forcing deletion will also delete the snapshots and LUN snapshots in the consistency snapshots. This may cause data residue, please proceed with caution.

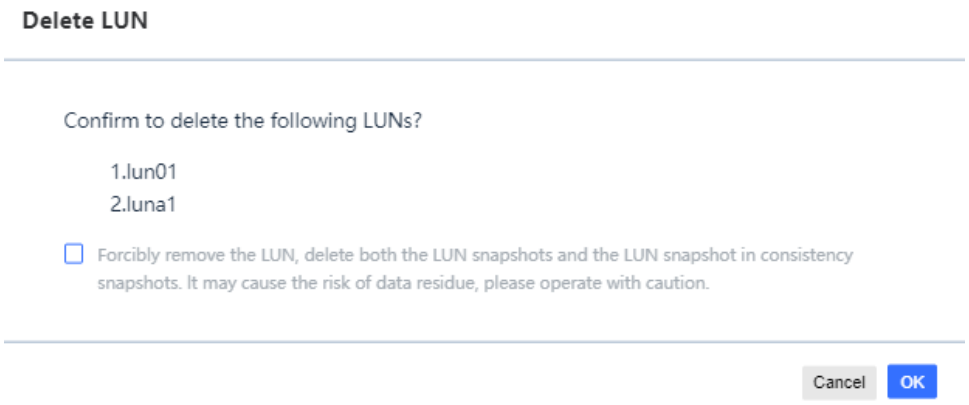


Figure 57.Delete LUNs.

3.6 iSCSI Target

Click **Service** > **iSCSI Target** in the navigation bar to enter the **iSCSI Target Management** page.

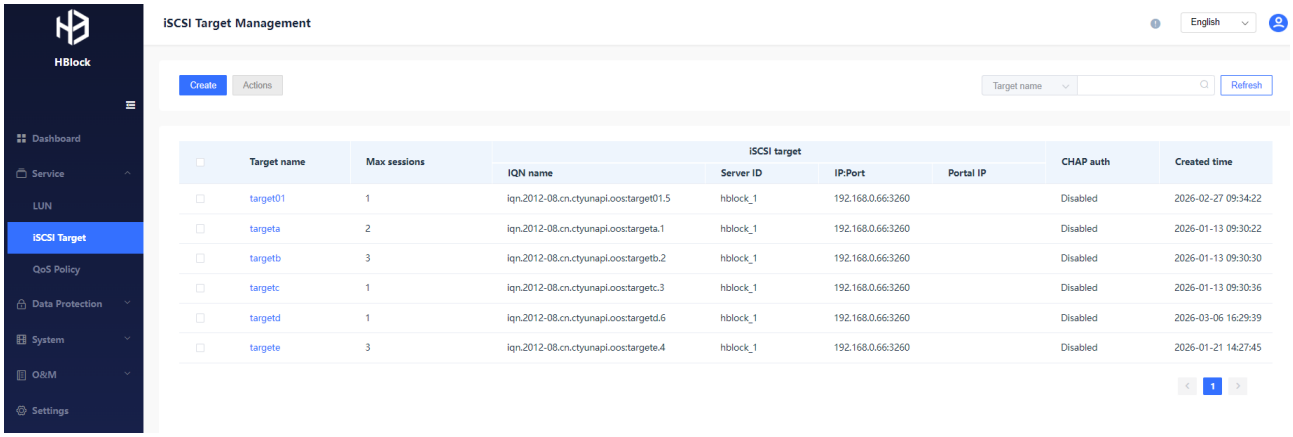


Figure 58. iSCSI Target Management (Standalone Mode)

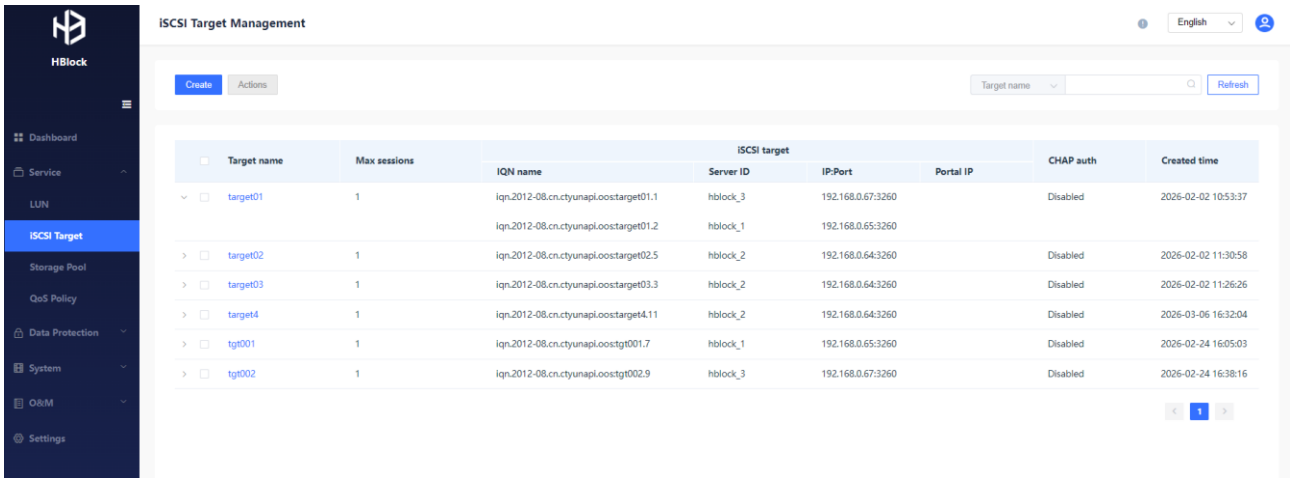


Figure 59. iSCSI Target Management (Cluster Mode)

3.6.1 iSCSI Target List

On the **iSCSI Target Management** page, you can view iSCSI targets information. You can find the corresponding iSCSI target through target name, IQN name, or Associated LUN.

Name		Description
Target name		iSCSI target name. **Note**: If the iSCSI target is in "deleting" status, there will be a yellow mark in front of the iSCSI target name.
Maximum sessions		The maximum number of sessions allowed to be established per IQN under the iSCSI target.
iSCSI target	IQN name	iSCSI target IQN name of the iSCSI target.
	Server ID	The server ID where the iSCSI target IQN is located.
	IP:Port	The IP address and port corresponding to the iSCSI target.
	Portal IP	iSCSI target portal IP and port.

CHAP auth	CHAP authentication status: ● Enabled: Enable login credentials while accessing the target. ● Disabled: Disable login credentials while accessing the target.
Created time	The creation time of the iSCSI target.

3.6.2 Create an iSCSI Target

On the **iSCSI Target Management** page, click **Create** to create an iSCSI target.
Note: HBlock supports a maximum of 32766 target IQNs. A target can be associated with up to 256 LUNs, but each LUN can only be associated with one target.

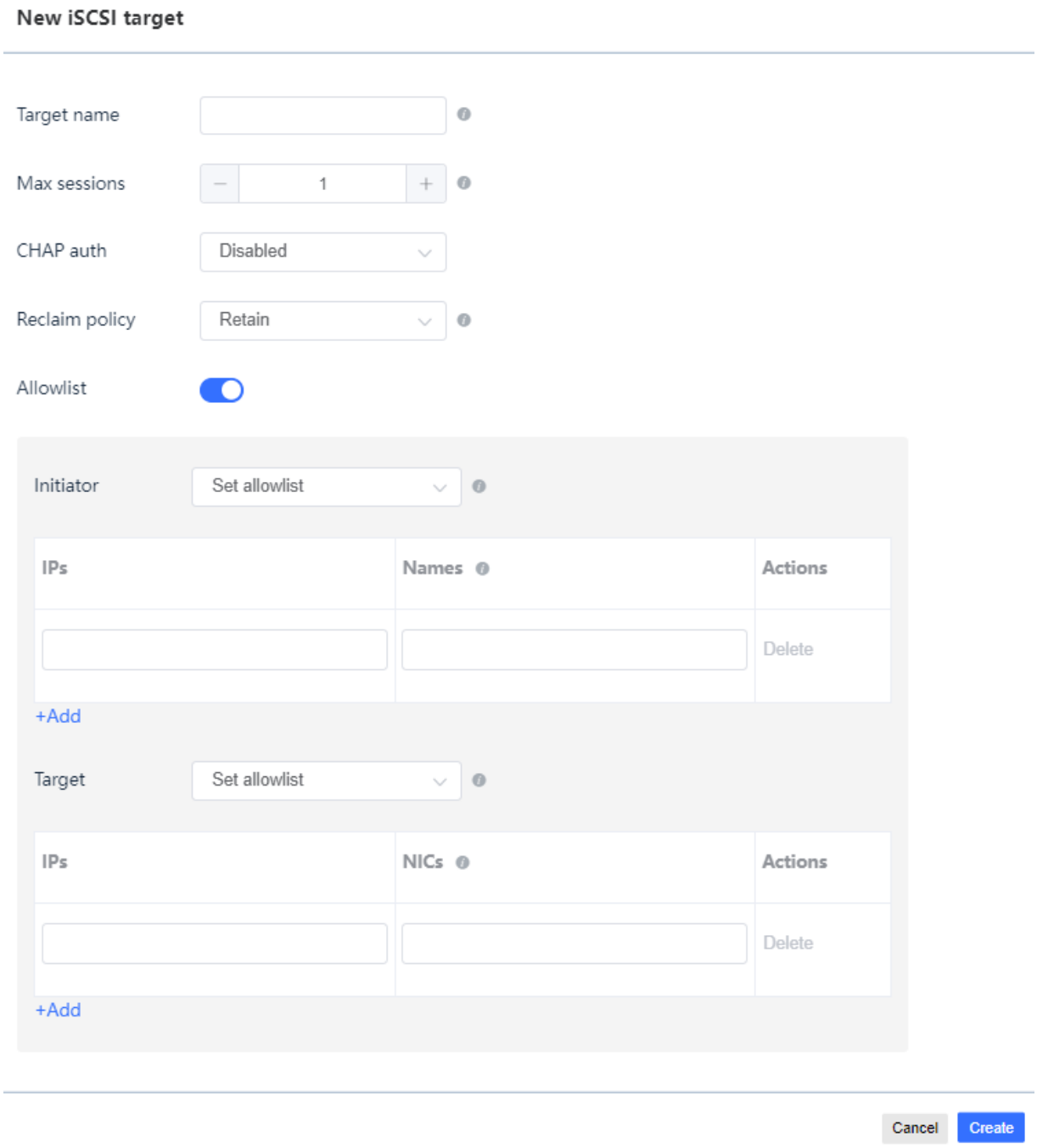


Figure 60. Create an iSCSI Target (Standalone Mode)

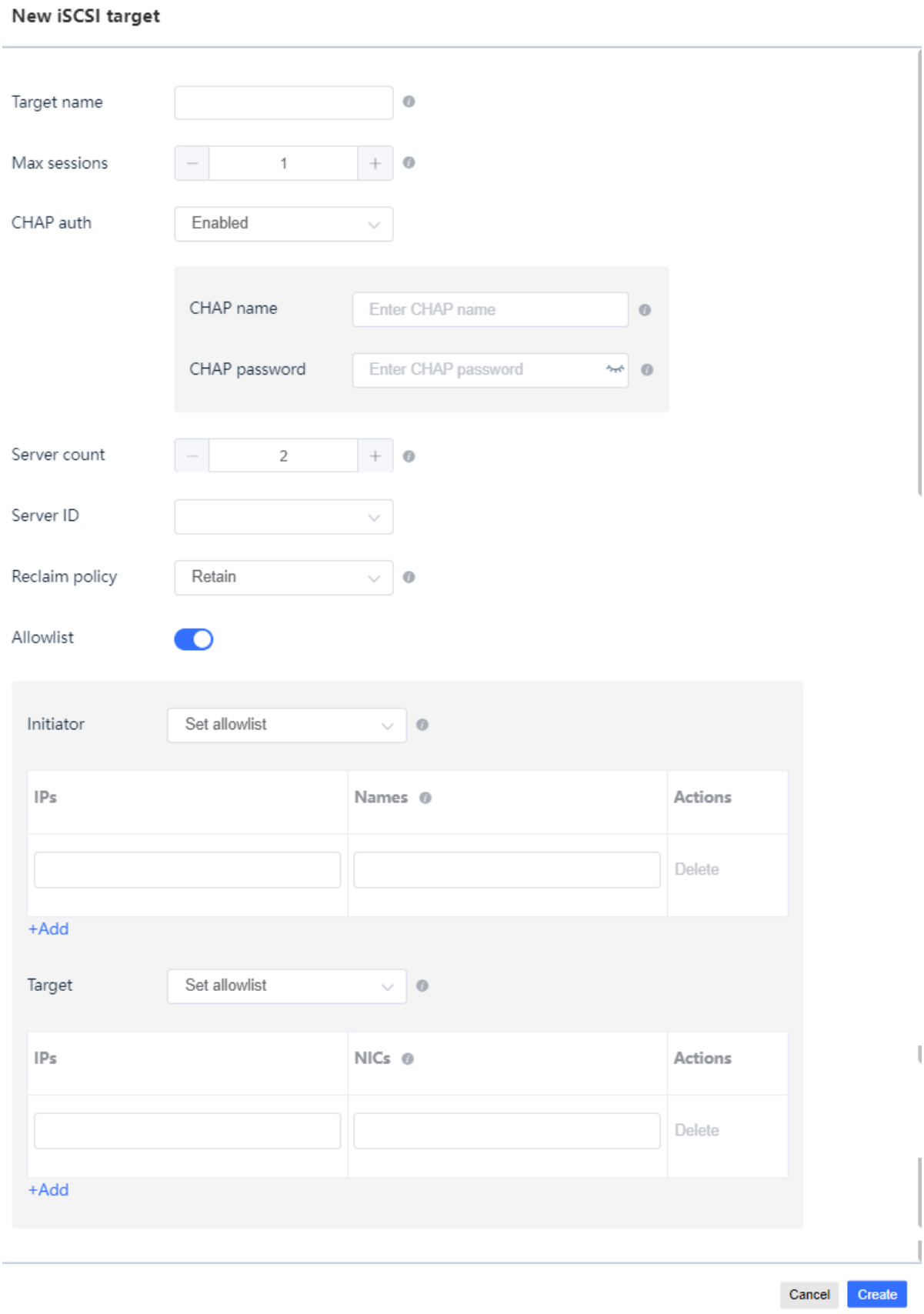


Figure 61. Create an iSCSI Target (Cluster Mode)

Name	Description
Target name	Specifies the iSCSI target name. The value is a string of 1 to 16 case-sensitive characters. It can only contain lowercase letters, dots (.), digits, or hyphens (-). Only supports starting with a letter or a digit. **Note**: A target can be associated with up to 256 LUNs, but a LUN can only be associated with one target.
Max sessions	The maximum number of sessions allowed to be established per IQN under the iSCSI target. The value is an integer that ranges from 0 to 1024, the default value is 1. 0 means the client cannot discover the target. **Note**: If multiple clients are connected to the same target IQN, they can read at the same time, but cannot write at the same time.
CHAP auth	Whether to enable CHAP authentication. If CHAP authentication is enabled, you need to fill in the CHAP name and CHAP password and use the same credentials in the CHAP authentication for the iSCSI initiator. Default does not enable CHAP authentication.
CHAP name	Specifies the CHAP authentication name. The value is a string of 3 to 64 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), underscores (_), or colons (:). Only supports starting with a letter or a digit.
CHAP password	Specifies the client CHAP authentication password. The value is a string of 12 to 16 case-sensitive characters. It must contain at least two of the following: lowercase letters, uppercase letters, digits, or underscores (_).
Server count	Specifies the number of servers where target is located, only supported by the cluster mode.
Server ID	Specifies the server ID where target is located, only supported by cluster mode.
Reclaim policy	Specifies the reclaim policy of the iSCSI target. Value： ● Delete: The iSCSI target is automatically deleted when all associated LUNs are deleted. ● Retain: The iSCSI target remains retained when all associated LUNs are deleted. The default value is Retain. **Note**: If you specify a non-existent iSCSI target when creating a LUN, the reclaim policy for creating a new iSCSI target will default to Delete.
Allowlist	Set iSCSI target allowlist. **Note**: When the switch is off, all access is allowed. ● Initiator: Set the iSCSI initiator allowlist for every IQN under the target.

	■ Allow all access. ■ Deny all access. ■ Set allowlist: You can define several allowlists, the relationship among them is logical **OR**. Within one allowlist you may simultaneously specify both IP address and initiator name; these two conditions are combined with logical **AND**. ◆ IPs: Set the allowlist for iSCSI initiators based on their IP addresses. Value: IPv4, IPv6, or CIDR subnets. Multiple entries can be configured and must be separated by commas. **Note**: 'localhost' addresses are not permitted. ◆ Names: Set the allowlist for iSCSI initiators based on their names. Value: The value is a string of 1 to 223 case-sensitive characters. It can only contain letters, digits, dots (.), colons (:), or hyphens (-). Wildcards * and ? are supported. Multiple entries can be configured and must be separated by commas. ● Target: Set the target allowlist for every IQN under the target. ■ Allow all access. ■ Deny all access. ■ Set allowlist: You can define several allowlists, the relationship among them is logical **OR**. Within one allowlist you may simultaneously specify both IP address and NIC name; these two conditions are combined with logical **AND**. ◆ IPs: Set the allowlist for targets based on their IP addresses. Value: IPv4, IPv6, or CIDR subnets. Multiple entries can be configured and must be separated by commas. **Note**: 'localhost' addresses are not permitted. ◆ NICs: Set the allowlist for targets based on their NICs. Value: The value is a string of 1 to 100 characters. It can contain letters, digits, dots (.), hyphens (-), or underscores (_). Wildcards * and ? are supported. Multiple entries can be configured and must be separated by commas.

3.6.3 View/Edit an iSCSI Target

On the **iSCSI Target Management** page, click the specific iSCSI target to view/edit the iSCSI target.

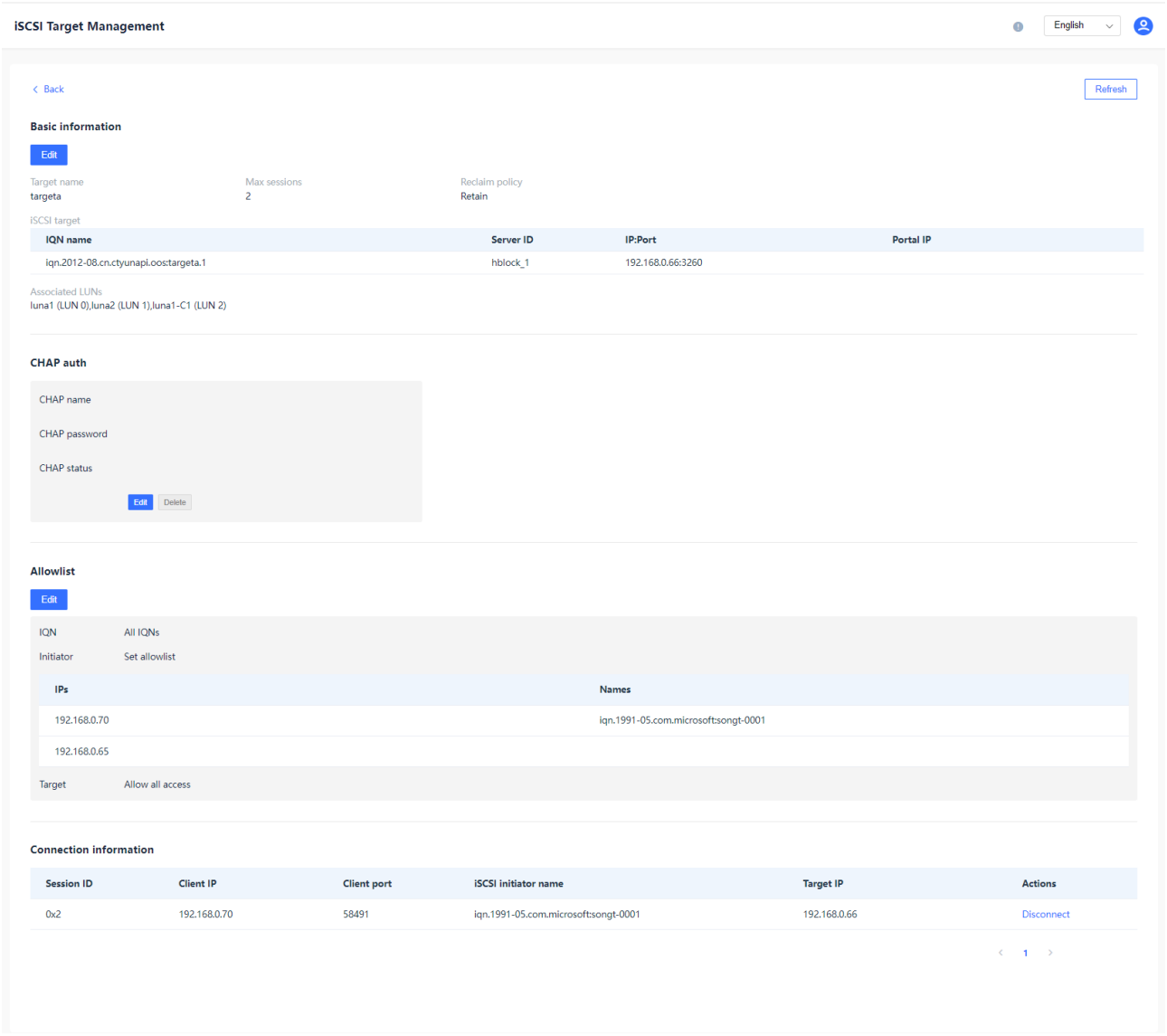


Figure 62. iSCSI Target Details (Standalone Mode)

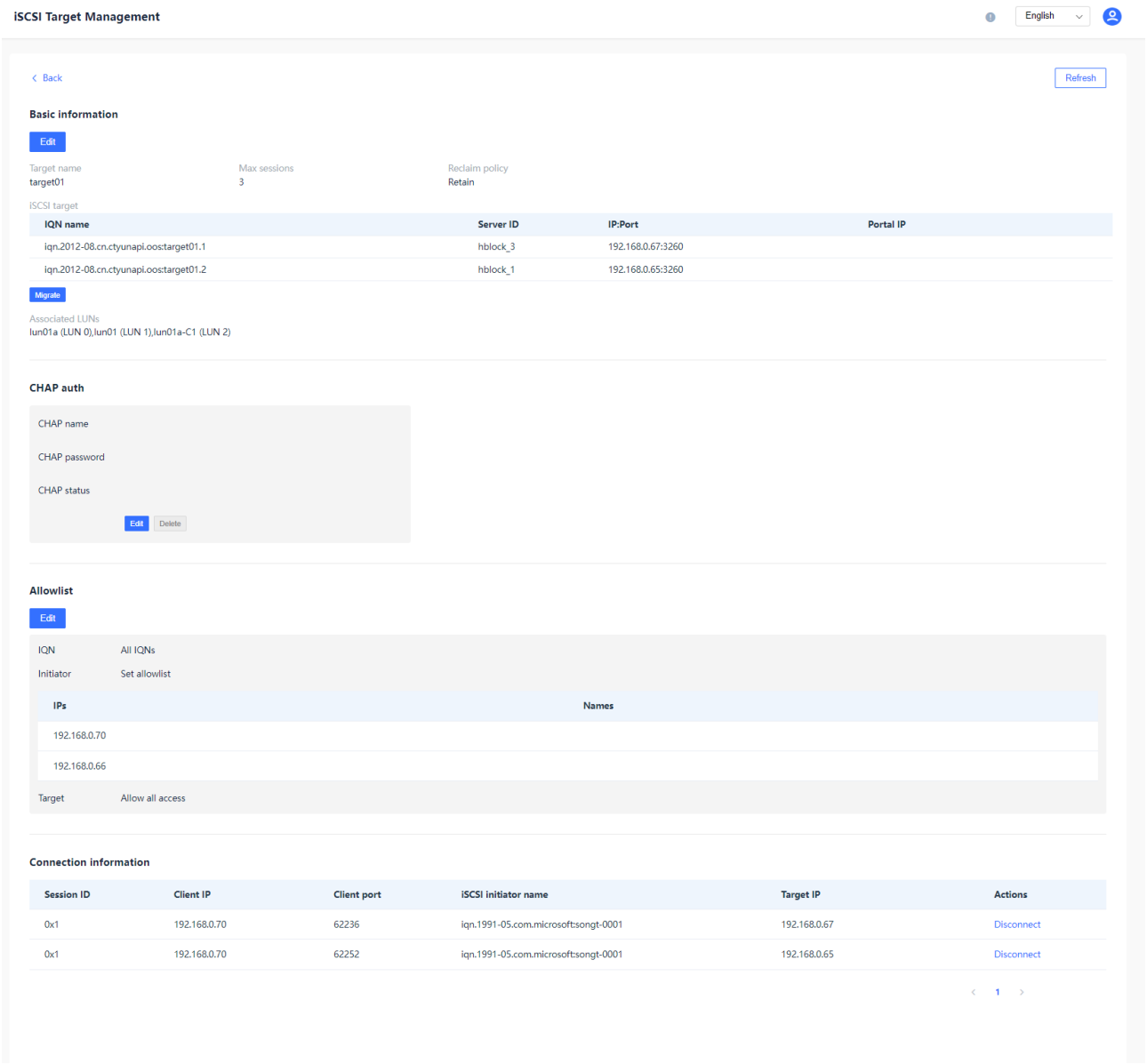


Figure 63. iSCSI Target Details (Cluster Mode)

Basic information

Name	Description
Edit	Click the **Edit** button to modify the **Max sessions** and **Reclaim policy** of the iSCSI target.
	Max sessions: The value is an integer that ranges from 0 to 1024, the default value is 1. 0 means the client cannot discover the target.
	Reclaim policy: ● Delete: The iSCSI target is automatically deleted when all associated LUNs are deleted. ● Retain: The iSCSI target remains retained when all associated LUNs are

	deleted.
Target name	iSCSI target name. **Note**: If the iSCSI target is in the process of being deleted, the status "Deleting" will be marked after the iSCSI target name.
Max sessions	The maximum number of sessions allowed to be established per IQN under the iSCSI target. **Note**: If multiple clients connect to the same target IQN, clients can read simultaneously, but not write at the same time.
iSCSI target	IQN name: iSCSI target IQN name.
	Server ID: The server ID where the iSCSI target IQN is located.
	IP:Port: The IP address and port corresponding to the iSCSI target.
	iSCSI target portal IP: iSCSI target portal IP and port.
Migrate	Click **Migrate** to edit the server ID corresponding to the iSCSI target (only supported by cluster mode). **Note**: ● Currently, you can only forcibly migrate iSCSI target, which may cause data loss. ● Before migrating the iSCSI target, make sure that the cluster is in the working, and the source and destination servers are in the connected status. ● If iSCSI target to migrate has been connected to a LUN and the LUN has been mounted to a client, disconnect the client from the original iSCSI target IQN before migrating iSCSI target. After the migration, ensure that the original iSCSI target IQN cannot be discovered, and reconnect the client to the migrated iSCSI target IQN.
Associated LUNs	The name of the associated LUNs. Content within parentheses indicates the LUN number.
Reclaim policy	The reclaim policy of the iSCSI target: ● Delete: The iSCSI target is automatically deleted when all associated LUNs are deleted. ● Retain: The iSCSI target remains retained when all associated LUNs are deleted.

CHAP auth

Note: You can modify the current CHAP authentication.

- If CHAP authentication needs to be modified, click the **Edit** button.
- If CHAP authentication needs to be deleted, click the **Delete** button.

Name	Description
CHAP name	CHAP authentication name. The value is a string of 3 to 64 case-sensitive characters. It can contain

	letters, digits, dots (.), hyphens (-), underscores (_), or colons (:). Only supports starting with a letter or a digit.
CHAP password	CHAP authentication password. The value is a string of 12 to 16 case-sensitive characters. It must contain at least two of the following: lowercase letters, uppercase letters, digits, or underscores (_).
CHAP status	Status of CHAP authentication: ● Enabled. ● Disabled.

Allowlist

Click **Edit** to edit allowlist, refer to **Edit iSCSI Target Allowlist** for details.

Name	Description
IQN	iSCSI target IQN.
Initiator	The iSCSI initiator allowlist: ● IPs: The allowlist for iSCSI initiators based on their IP addresses. ● Names: The allowlist for iSCSI initiators based on their names.
Target	The target allowlist: ● IPs: The allowlist for targets based on their IP addresses. ● NICs: The allowlist for targets based on their NICs.

Connection information

Name	Description
Session ID	The session ID of the connection with the client.
Client IP	Client IP connecting to the iSCSI target.
Client Port	Client port number connecting to the iSCSI target.
iSCSI initiator name	The name of the initiator to which the connection belongs.
Portal IP	iSCSI target IP connecting to the client.
Actions	Click **Disconnect** to disconnect the specified initiator. Same operation on the initiator should be done in case that the initiator reconnects automatically.

3.6.4 Edit an iSCSI Target

On the **iSCSI Target Management** page, click **Actions** > **Edit** to modify the configuration of the selected iSCSI targets.

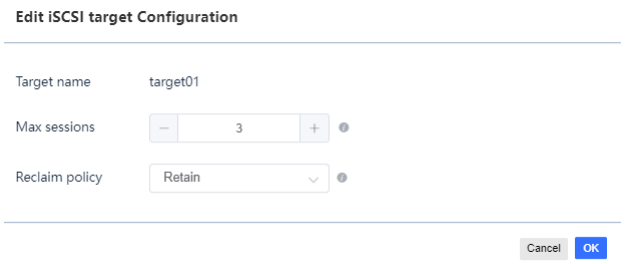


Figure 64. Edit iSCSI Target Configuration

Name	Description
Target Name	iSCSI target name.
Max sessions	The maximum number of sessions allowed to be established per IQN under the iSCSI target. The value is an integer that ranges from 0 to 1024, the default value is 1. 0 means the client cannot discover the target. **Note**: ● If multiple iSCSI targets are selected and "No modification" is chosen, it means to keep the current maximum number of sessions for iSCSI targets. ● If multiple clients are connected to the same target IQN, they can read at the same time, but cannot write at the same time.
Reclaim policy	Specifies the reclaim policy of the iSCSI target. Value： ● Delete: The iSCSI target is automatically deleted when all associated LUNs are deleted. ● Retain: The iSCSI target remains retained when all associated LUNs are deleted. ● No modification: If multiple iSCSI targets are selected and "No modification" is chosen, it means to keep the current reclaim policy for iSCSI targets.

3.6.5 Edit iSCSI Target Allowlist

You can edit iSCSI target allowlist in the following ways:

- On the **Service** > **iSCSI Target Management** page, click the target iSCSI target name. On the iSCSI target details page, under **Allowlist**, click **Edit** to edit iSCSI target allowlist.
- On the **iSCSI Target Management** page, select the target iSCSI target, click **Actions** > **Edit** allowlist to edit iSCSI target allowlist.

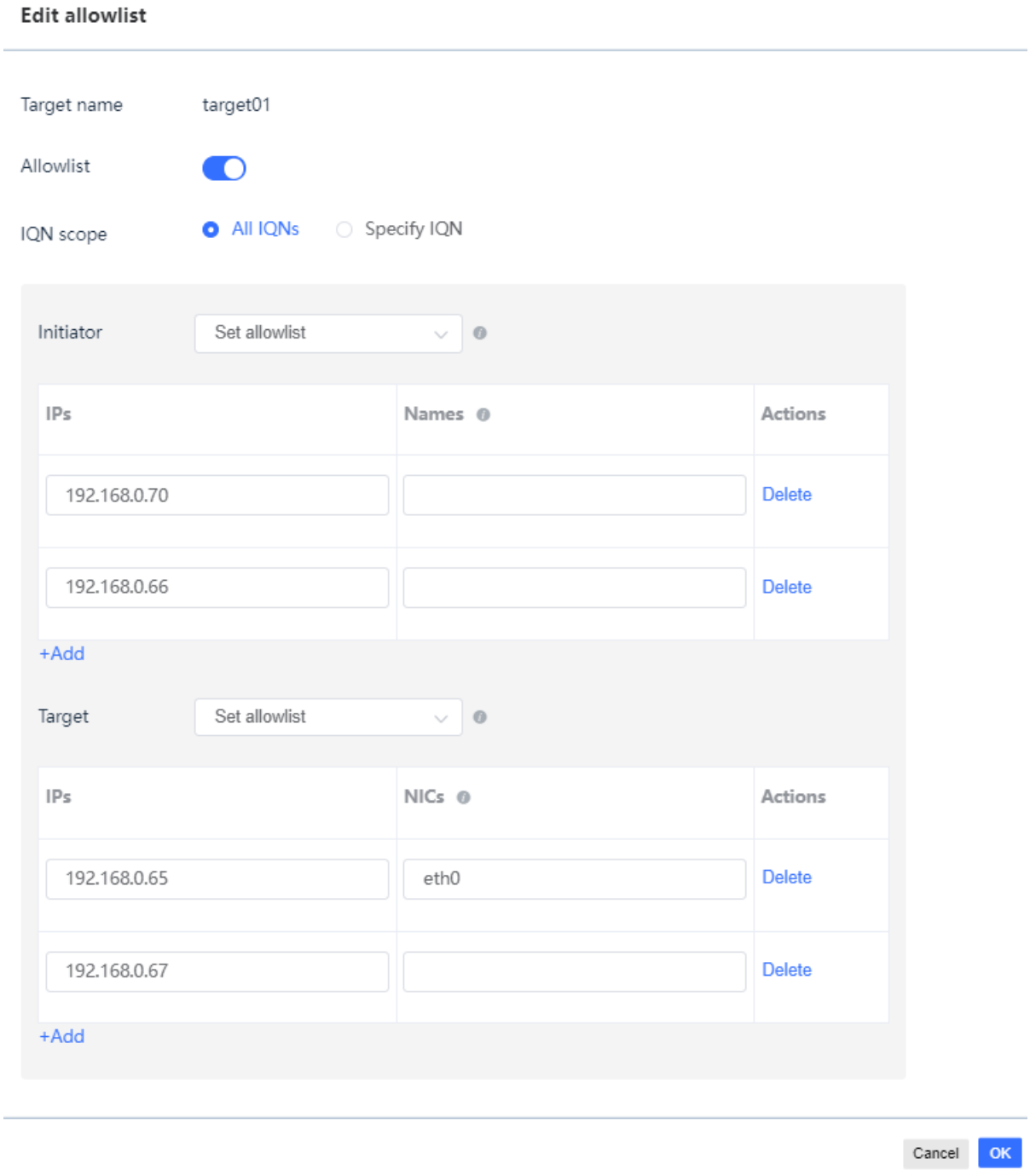


Figure 65. Edit iSCSI Target Allowlist

Name	Description
Target name	iSCSI target name.
Allowlist	Toggle the switch to turn the allowlist on or off. **Note**: When the switch is off, all access is allowed. Click **Delete** next to a target IQN's allowlist box to remove that target's allowlist.
IQN scope	Specifies the IQN ranges in the access list: ● All IQNs. ● Specify IQN: Specify the target IQN names. Multiple target IQNs can be selected at a time.
Initiator	Set the iSCSI initiator allowlist for the IQN under the target. ● Allow all access. ● Deny all access. ● Set allowlist: You can define several allowlists, the relationship among them is logical **OR**. Within one allowlist you may simultaneously specify both IP address and initiator name; these two conditions are combined with logical **AND**. ■ IPs: Set the allowlist for iSCSI initiators based on their IP addresses. Value: IPv4, IPv6, or CIDR subnets. Multiple entries can be configured and must be separated by commas. **Note**: 'localhost' addresses are not permitted. ■ Names: Set the allowlist for iSCSI initiators based on their names. Value: The value is a string of 1 to 223 case-sensitive characters. It can only contain letters, digits, dots (.), colons (:), or hyphens (-). Wildcards * and ? are supported. Multiple entries can be configured and must be separated by commas. ■ Actions: Click **Delete** to remove the corresponding IPs and initiator names.
Target	Set the target allowlist for the IQN. ● Allow all access. ● Deny all access. ● Set allowlist: You can define several allowlists, the relationship among them is logical **OR**. Within one allowlist you may simultaneously specify both IP address and NIC name; these two conditions are combined with logical **AND**. ■ IPs: Set the allowlist for targets based on their IP addresses.

	Value: IPv4, IPv6, or CIDR subnets. Multiple entries can be configured and must be separated by commas. **Note**: 'localhost' addresses are not permitted. ■ NICs: Set the allowlist for targets based on their NICs. Value: The value is a string of 1 to 100 characters. It can contain letters, digits, dots (.), hyphens (-), or underscores (_). Wildcards * and ? are supported. Multiple entries can be configured and must be separated by commas. ■ Actions: Click **Delete** to remove the corresponding IPs and NICs.

3.6.6 Delete the Allowlist for iSCSI Targets

On the **iSCSI Target Management** page, select iSCSI targets and go to **Actions** > **Delete allowlist** to delete the allowlist for iSCSI targets.

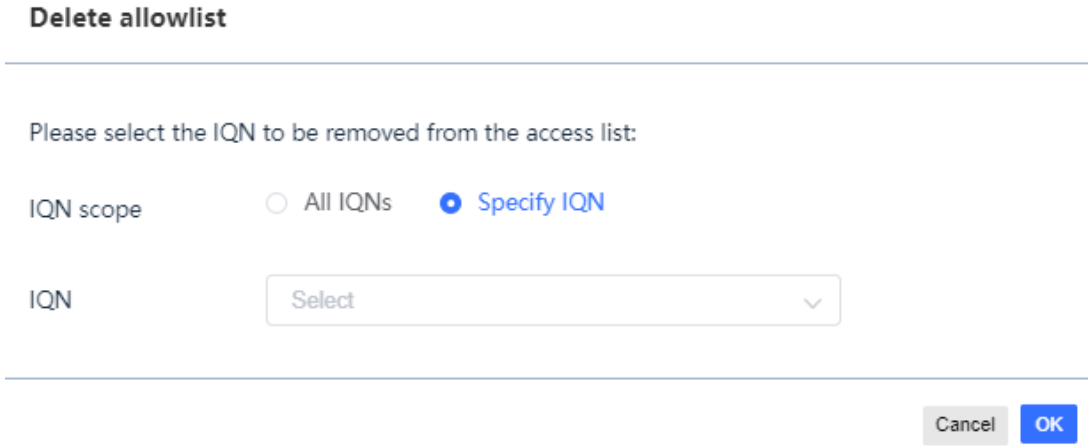


Figure 66. Delete the Allowlist for iSCSI Target

Name	Description
IQN scope	Specifies the IQN scope to delete from the access list: ● All IQNs: Delete all access lists under this target. ● Specify IQNs: Specify the target IQN names for which the access lists will be deleted.
IQN	Select the IQNs for which you want to delete the access list. Multiple target IQNs can be selected at a time.

3.6.7 Delete an iSCSI Target

On the **iSCSI Target Management** page, select iSCSI targets and go to **Actions** > **Delete** to delete iSCSI targets.

Note: Only iSCSI targets that are not associated with any LUNs can be deleted.

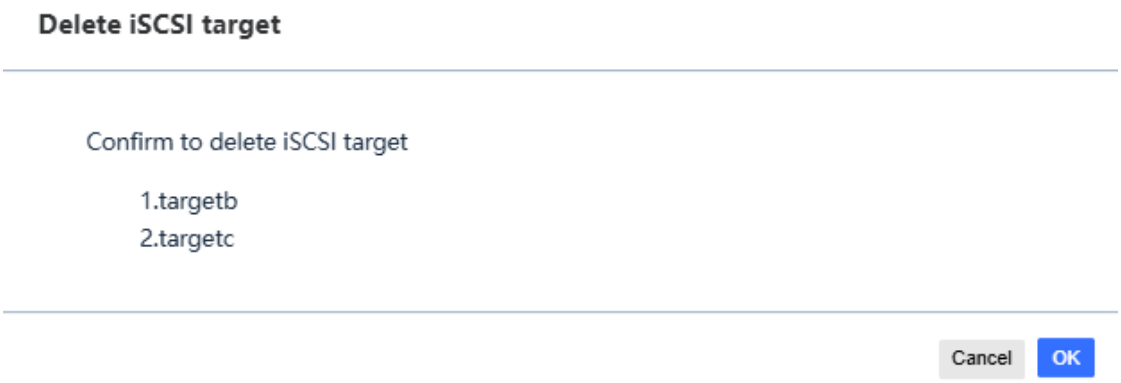


Figure 67.Delete an iSCSI Target

3.7 Storage Pool (Cluster Mode)

Click **Service** > **Storage Pool Management** in the navigation bar to enter the **Storage Pool Management** page.

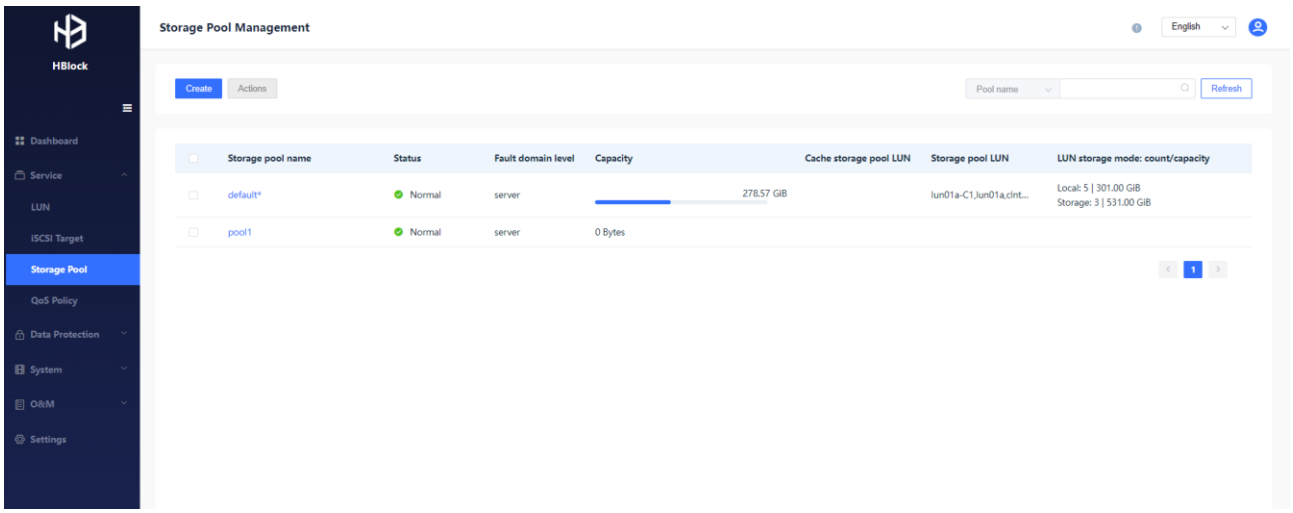


Figure 68. Storage Pool

3.7.1 Storage Pool List

On the **Storage Pool Management** page, you can view storage pool information. You can find the corresponding storage pool through storage pool name.

Name	Description
Storage pool name	The name of the storage pool. *: Indicates a base storage pool.
Status	Status of the storage pool: ● Normal. ● Deleting.
Fault domain level	Fault domain level: ● path. ● server ● rack. ● room.
Capacity	Total capacity of the storage pool.
Cache storage pool LUN	List of LUNs using this storage pool as a cache storage pool.
Storage pool LUN	List of LUNs using this storage pool as the final storage pool.
LUN storage mode: count/capacity	LUN information, including number and capacity of each mode's LUN.

3.7.2 Create a Storage Pool

On the **Storage Pool Management** page, click **Create** to create a storage pool. After creating a storage pool, you can click on the storage pool name to add a storage pool topology diagram. For specific details on the storage pool topology, please refer to View/Maintain Storage Pool.

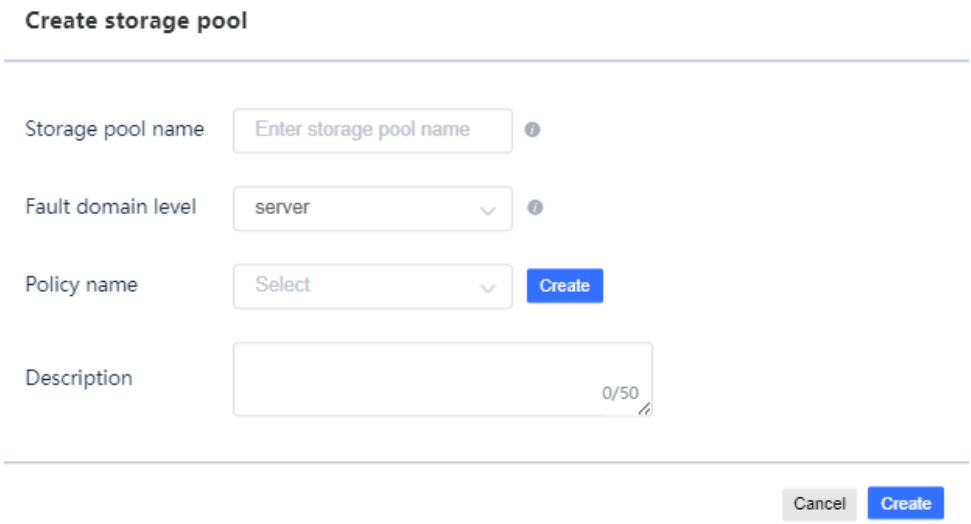


Figure 69. Create a Storage Pool

Name	Description
Storage pool name	Specifies the name of a storage pool. The value is a string of 1 to 16 case-sensitive characters. It can contain letters, digits, hyphens (-), and underscores (_). Only supports starting with a letter or a digit.
Fault domain level	Specifies the fault domain level of the storage pool. Value: ● path: disk path level. ● server: server level. ● rack: rack level. ● room: room level. The default value is server.
Policy name	QoS policy associated with the storage pool. **Note**: You can either select an existing QoS policy or click **Create** to create a new one; see **Create a QoS Policy** for details.
Description	The description for the storage pool. The value is a string of 1 to 50 characters.

3.7.3 View/Maintain a Storage Pool

On the **Storage Pool Management** page, click the specific storage pool, you can view and maintain the storage pool.

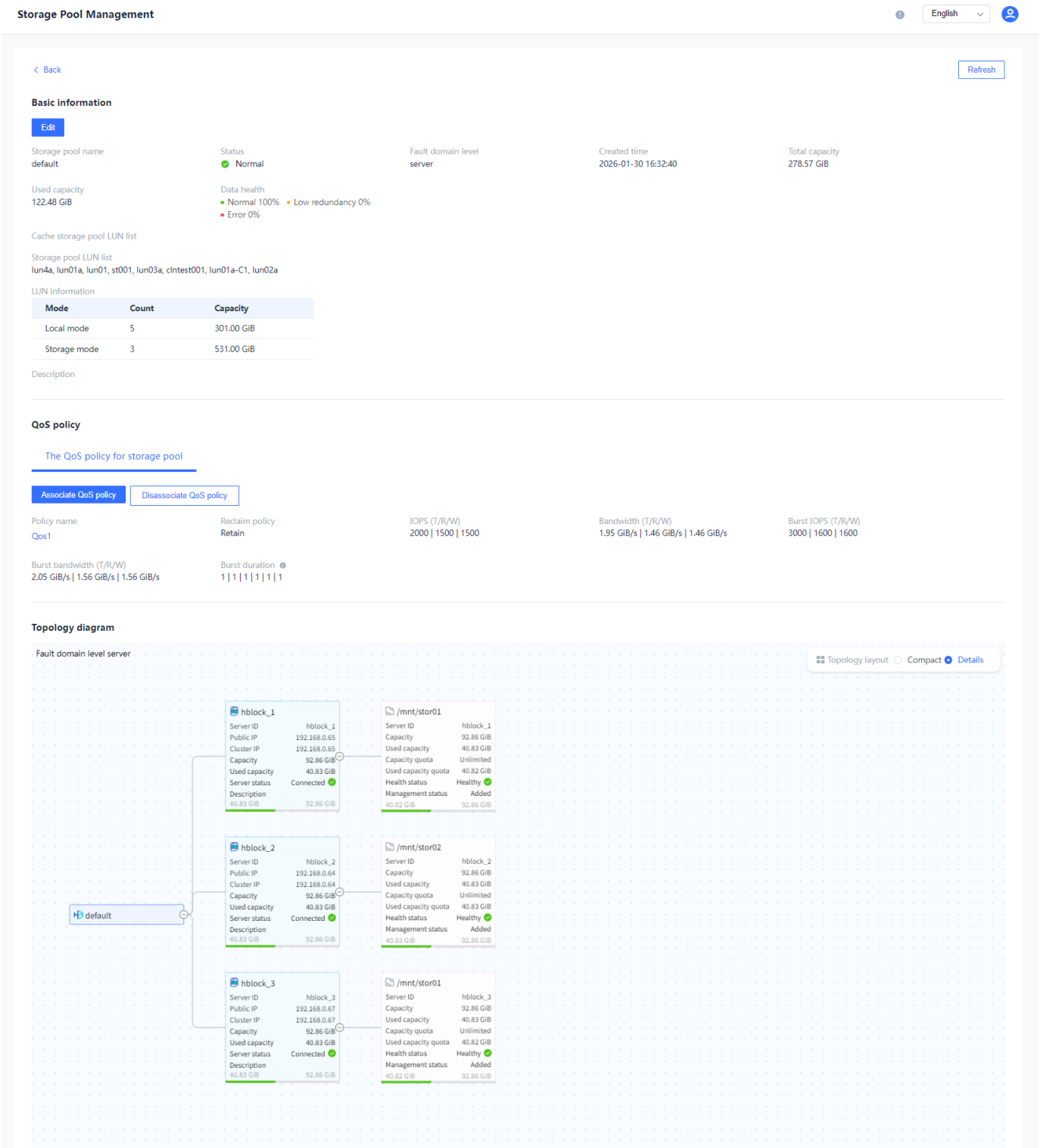


Figure 70.Storage Pool Details

Basic information

Name	Description	
Edit	Click **Edit**, you can modify the name and the description of the storage pool.	
	Storage pool name	Specifies a new name for the storage pool. The value is a string of 1 to 16 case-sensitive characters. It can contain letters, digits, hyphens (-), and underscores (_). Only supports starting with a letter or a digit.
	Description	The description for the storage pool. The value is a string of 1 to 50 characters.
Storage pool name	The name of the storage pool.	
Status	Status of the storage pool: ● Normal. ● Deleting.	
Fault domain level	The fault domain level of the storage pool: ● path. ● server. ● rack. ● room.	
Created time	Time when the storage pool is created.	
Total capacity	Total capacity of the storage pool.	
Used capacity	Used capacity of the storage pool.	
Data health	The data health status of the storage pool, including: the percentage of normal data (Normal) for all LUNs in this storage pool, the percentage of low redundancy data (Low redundancy) for all LUNs in this storage pool, and the percentage of erroneous data (Error) for all LUNs in this storage pool. If low redundancy data exists, low redundancy reconstruction progress will be provided.	
Cache storage pool LUN list	List of LUNs using this storage pool as a cache storage pool.	
Storage pool LUN list	List of LUNs using this storage pool as the final storage pool.	
LUN information	Mode	The storage mode of the LUN: ● Local mode. ● Cache mode. ● Storage mode.
	Count	The number of each mode's LUN.
	Capacity	The total capacity of the LUN in the same mode
Description	Description of the storage pool.	

QoS policy

Note:

- Under **QoS policy** > **The QoS policy for storage pool**, click **Associate QoS policy** to associate QoS policy with the storage pool, refer to **Associate QoS Policy with Storage Pools** for details.
- Under **QoS policy** > **The QoS policy for storage pool**, click **Disassociate QoS policy** to disassociate QoS policy from the storage pool, refer to **Disassociate QoS Policy from Storage Pools** for details.
- Under **QoS policy** > **The default QoS policy for LUNs in the pool**, click **Associate QoS policy** to set the default QoS policy for LUNs in the storage pool, refer to **Set the Default QoS Policy for LUNs in the Storage Pool** for details.
- Under **QoS policy** > **The default QoS policy for LUNs in the pool**, click **Disassociate QoS policy** to disassociate the default QoS policy for LUNs in the storage pool, refer to **Disassociate the Default QoS Policy for LUNs in the Storage Pool** for details.

Name	Description
Policy name	QoS policy name.
Reclaim policy	QoS policy reclaim policy: ● `Delete`: When all objects associated with the QoS policy are disassociated or deleted, the system will automatically remove the QoS policy. ● `Retain`: When all objects associated with the QoS policy are disassociated or deleted, the QoS policy itself remains and is not deleted.
IOPS (T/R/W)	The limit of total/read/ write operations per second.
Bandwidth (T/R/W)	The limit of total/read/write throughput per second.
Burst IOPS (T/R/W)	The burst limit of total/read/write operations per second.
Burst bandwidth (T/R/W)	The burst limit of total/read/write throughput per second.
Burst duration	The duration in seconds of I/O operations with burst limit. The corresponding sequence of QoS policy parameters is: burst IOPS (total/read/write), burst bandwidth (total/read/write).

Topology diagram

You can view the storage pool fault domain level. Different fault domains display different items on the topology diagram.

Name	Description
Root node	The root node of the topology diagram, which has the same name as the storage pool. Right-clicking on it allows you to choose to add or remove a storage pool node.
If the type of topology node is	Right click on the node name and select **Add** or **Remove** to add or remove the node from the storage pool.

room	Place the mouse over the node to view the following information:	
	Name	The name of the node.
	Type	The type of the node: room.
	Health status	Health status of the node: ● Healthy: A node is healthy and can be read and written normally. ● Warning: A node is in warning status and can be read. ● Error: A node is in error status and cannot be accessed.
	Description	The description information of the node.
If the type of topology node is rack	Right click on the node name and select **Add** or **Remove** to add or remove the node from the storage pool. Place the mouse over the node to view the following information:	
	Name	The name of the node.
	Type	The type of the node: rack.
	Health status	Health status of the node: ● Healthy: A node is healthy and can be read and written normally. ● Warning: A node is in warning status and can be read. ● Error: A node is in error status and cannot be accessed.
	Description	The description information of the node.
If the type of topology node is server	Right click on the node name and select **Add** or **Remove** to add or remove the node from the storage pool. Place the mouse over the node to view the following information:	
	Name	The name of the node.
	Type	The type of the node: server.
	Health status	Health status of the data service: ● Healthy: A node is healthy and can be read and written normally. ● Warning: A node is in warning status and can be read. ● Error: A node is in error status and cannot be accessed.
	Server ID	The server ID.
	Public IP	Cluster network IP of the topology diagram.
	Cluster IP	Public network IP of the topology diagram.
	Capacity	The total capacity of all disks where disk paths are located in topology.
	Used capacity	The used capacity of all disks where disk paths are located in topology.

	Server status	The status of the server: ● Connected. ● Disconnected. ● Removing.
	Description	The description information of the node.
If the type of topology node is path	Right click on the node name and select **Remove** to remove the node from the storage pool. Place the mouse over the node to view the following information:	
	Name	The name of the node.
	Type	The type of the node: path.
	Server ID	The server ID to which the disk path belongs.
	Capacity	The total capacity of the disk where the disk path resides.
	Used capacity	The used capacity of the disk where the disk path resides.
	Capacity quota	The capacity quota of the disk path.
	Used capacity quota	The total amount of data that has be written to the disk path by HBlock.
	Health status	The health status of the disk path: ● Healthy: The disk path is in a healthy status and can be read and written normally, and the disk usage of the disk path does not exceed the threshold (the system default value is 95%). ● Warning: The disk path is warning and is readable, but one or more of the following situations exist: slow disk, the utilization rate of the disk where the disk path resides exceeds the threshold (the system default value is 95%), the remaining disk space is less than 1GiB, HBlock stops writing to this path, the capacity quota usage of the disk path exceeds the threshold (the system default value is 95%), or the capacity quota of the disk path is set to 0. ● Error: The disk path is in an error status and cannot be accessed. The reasons may be that an I/O error occurs on the disk, resulting in the inability to read or write, or the disk path is not mounted correctly, etc.
	Management status	The management status of the disk path: ● Added. ● Removing.
	Management	If the path is being removed, the removal details will be

	sub status	displayed, including fault domain information (health, warning, errors), data status (safe, await reconstruction, await more fault domains, single-copy and corrupted), and corresponding alarm information.
	Health detail	The health details of the disk path. ● If the health status is Heathy, this item is empty. ● If the health status is Warning or Error, detailed information about the warning or error is displayed.

3.7.4 Add Nodes to a Storage Pool

On the **Storage Pool Management** page, click on the specific storage pool name to enter to the storage pool detailed information page. Nodes can be added to the storage pool in the topology diagram.

3.7.4.1 Add Nodes to a New Storage Pool

If the storage pool is a newly created storage pool and no nodes have been added, click the "Add" button in the topology diagram to pop up the "Add" page. Select the nodes that need to be added on this page and click "OK".

Note: If all nodes in the cluster topology already have a home storage pool, there are no nodes available for selection on the "Add" page that pops up. If you need to add a node to the storage pool at this point, you need to add a new node to the cluster topology or remove the node from other storage pools before adding it again.

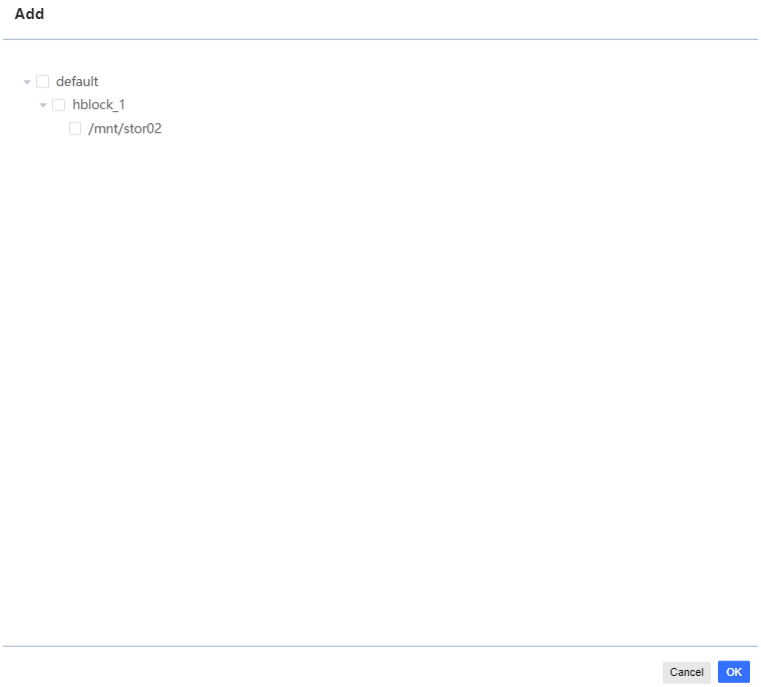


Figure 71. Add Nodes to a New Storage Pool

3.7.4.2 Add Nodes to the Storage Pool of Existing Nodes

If there are already nodes in the storage pool, right-click on the root node of the topology diagram, select the "Add" button in the pop-up box, and the "Add" page will pop up. On this page, select the nodes that need to be added and click "OK".

Note: If all nodes in the cluster topology already have a home storage pool, there are no nodes available for selection on the "Add" page that pops up. If you need to add a node to the storage pool at this point, you need to add a new node to the cluster topology or remove the node from other storage pools before adding it again.

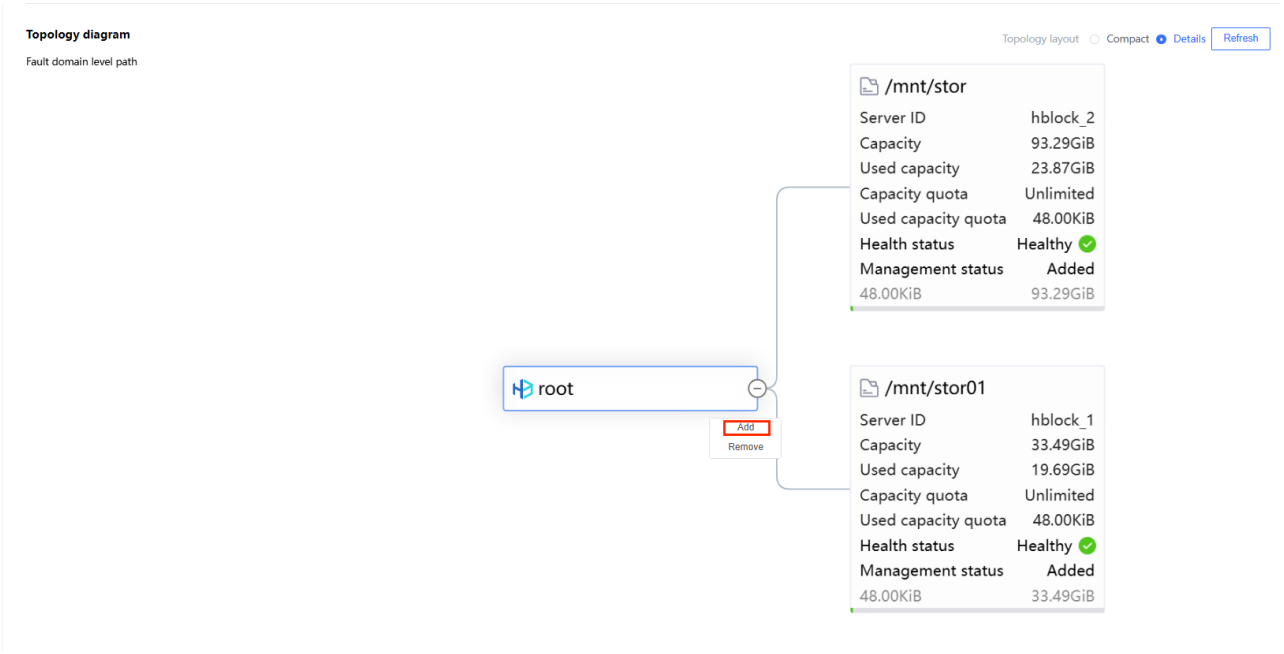


Figure 72.Add Nodes to the Storage Pool of Existing Nodes

3.7.5 Remove Nodes from a Storage Pool

On the **Storage Pool Management** page, click on the specific storage pool name to enter to the storage pool detailed information page. Nodes can be removed from the storage pool in the topology diagram.

3.7.5.1 Remove All Nodes from a Non-base Storage Pool

Right click on the root node of the non-base storage pool topology diagram and select the "Remove" button in the pop-up box to remove all nodes from the storage pool.
Note: If the storage pool has associated LUNs, only one fault domain can be removed at a time. If the node to be removed involves multiple fault domains, normal removal operations cannot be performed. If removal is necessary, only a forced removal can be used. Forced removal may result in data loss, so please proceed with caution.

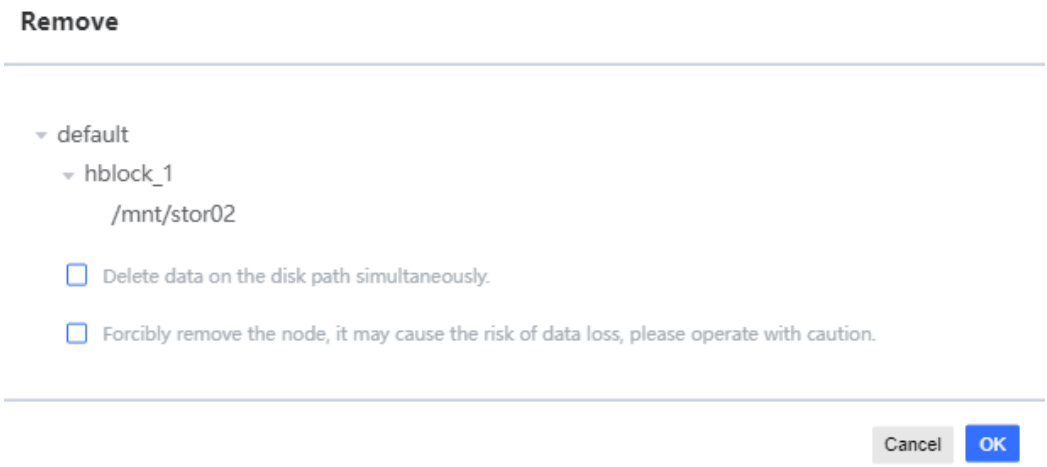


Figure 73.Remove All Nodes from a Non-base Storage Pool

3.7.5.2 Remove a Node from the Storage Pool

Right click on a node in the topology diagram and select the "Remove" button in the pop-up box to remove it from the storage pool.

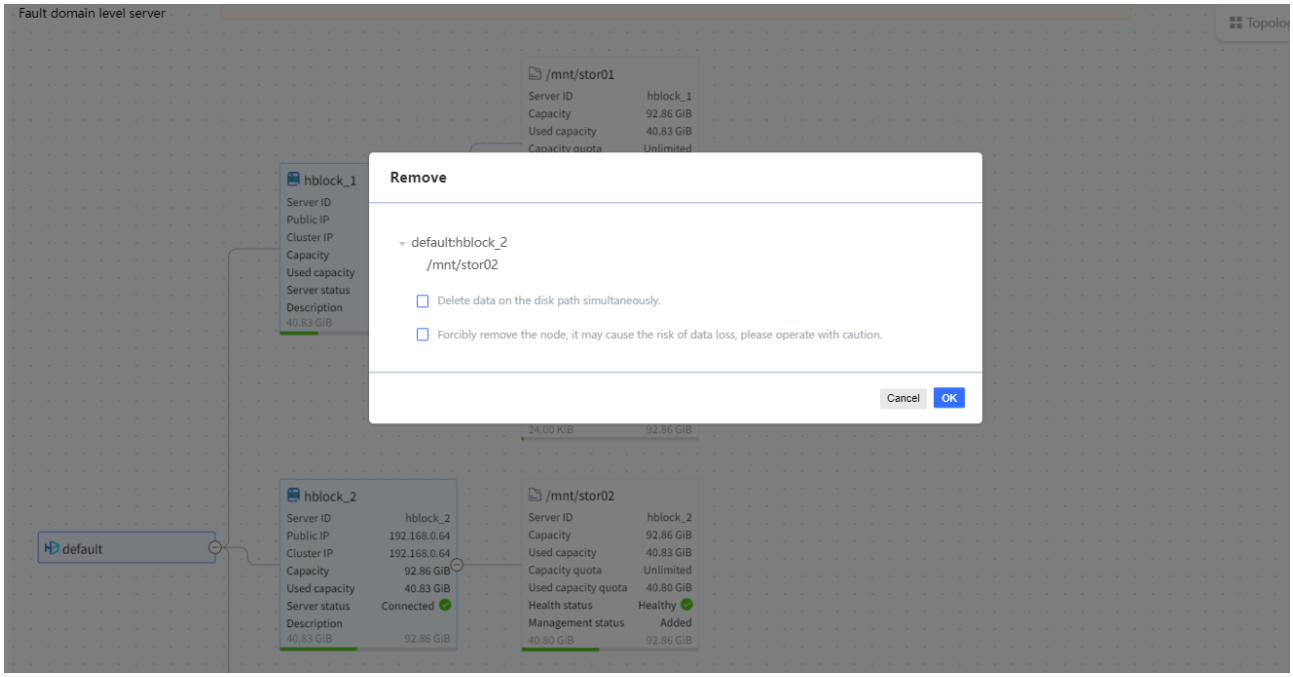


Figure 74.Remove a Node from the Storage Pool

3.7.6 Edit a Storage Pool

On the **Storage Pool Management** page, select a storage pool and go to **Actions > Edit** to edit the information of the storage pool.

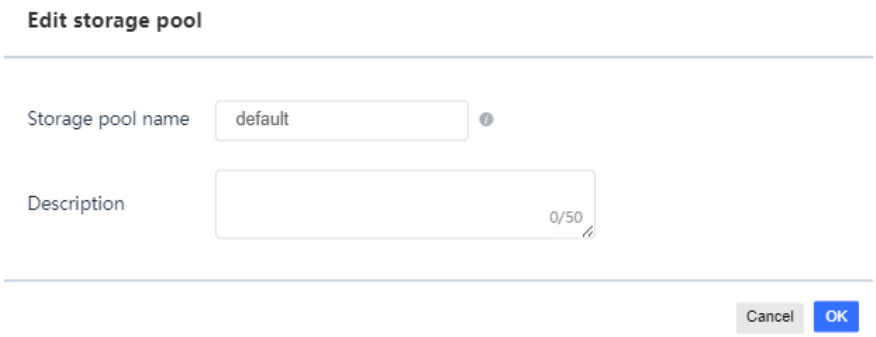


Figure 75.Edit a Storage Pool

Name	Description
Storage pool name	Specifies the new name of the storage pool. The value is a string of 1 to 16 case-sensitive characters. It can contain letters, digits, hyphens (-), and underscores (_). Only supports starting with a letter or a digit.
Description	Changes the description of the storage pool. The value is a string of 1 to 50 characters.

3.7.7 Delete a Non-base Storage Pool

On the **Storage Pool Management** page, select a non-base storage pool and go to **Actions > Delete** to delete a non-base storage pool.

Note:

- You cannot delete a base storage pool.
- A storage pool containing LUNs cannot be deleted.
- After a storage pool is deleted, the topology nodes in the storage pool do not belong to any storage pool, but remain in the cluster topology.

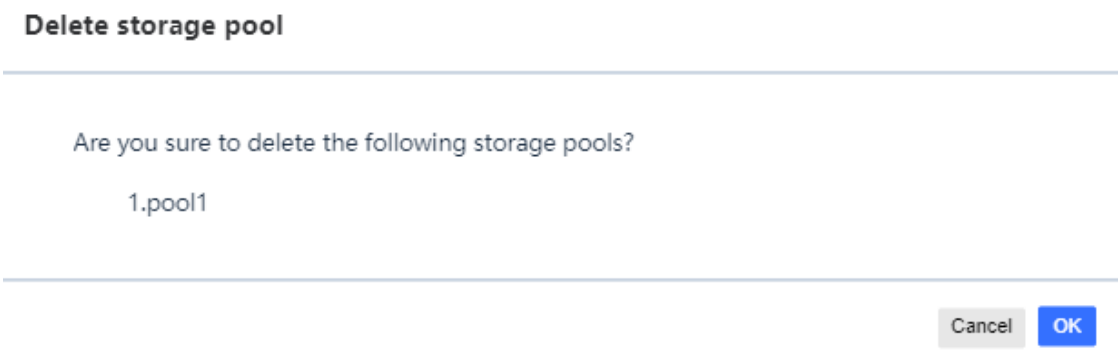


Figure 76.Delete a Non-base Storage Pool

3.7.8 Associate QoS Policy with Storage Pools

Note: The storage pool to be associated cannot be in Deleting status.

You can associate QoS policy with storages in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated storage pool (QoS policy for the pool)**, click **Associate object**. In the pop-up window, select the storage pools you want to associate with the policy and confirm.

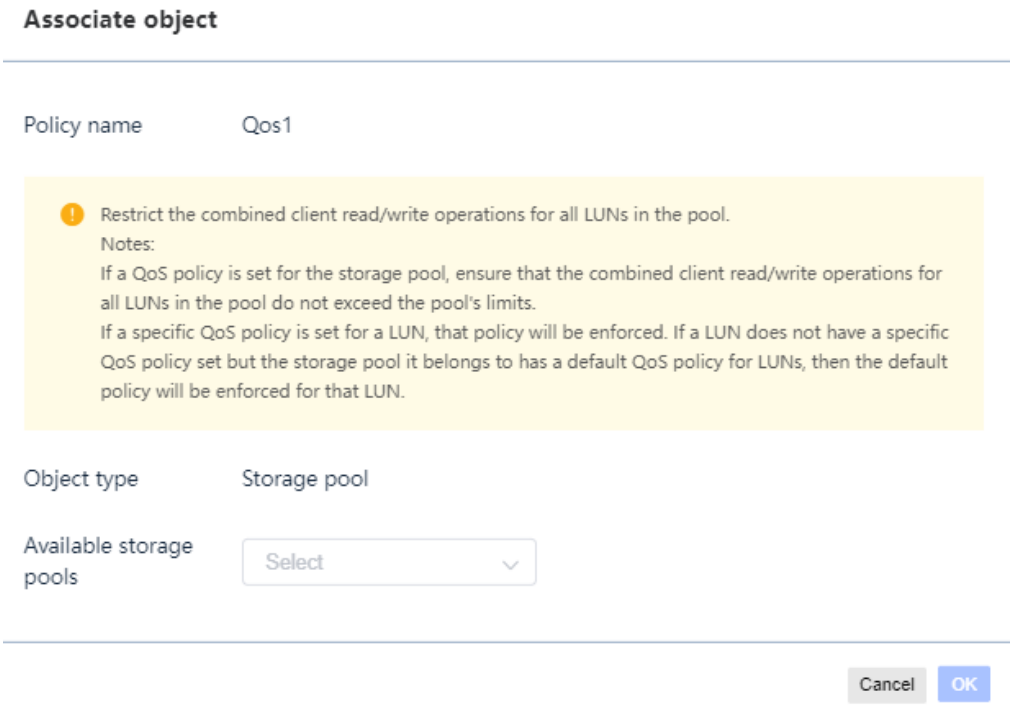


Figure 77.Associate QoS Policy with Storage Pool

- On the **Service** > **Storage Pool Management** page, select one or more storage pools and click **Actions** > **Associate QoS policy**. In the pop-up window, select the QoS policy you want to associate with storage pools and confirm.
- On the **Service** >**Storage Pool Management** page, click the target storage pool name to enter the storage pool details page. Under **QoS policy > The QoS policy for storage pool**, click **Associate QoS policy**. In the pop-up window, select the QoS policy you want to associate with the storage pool and confirm.

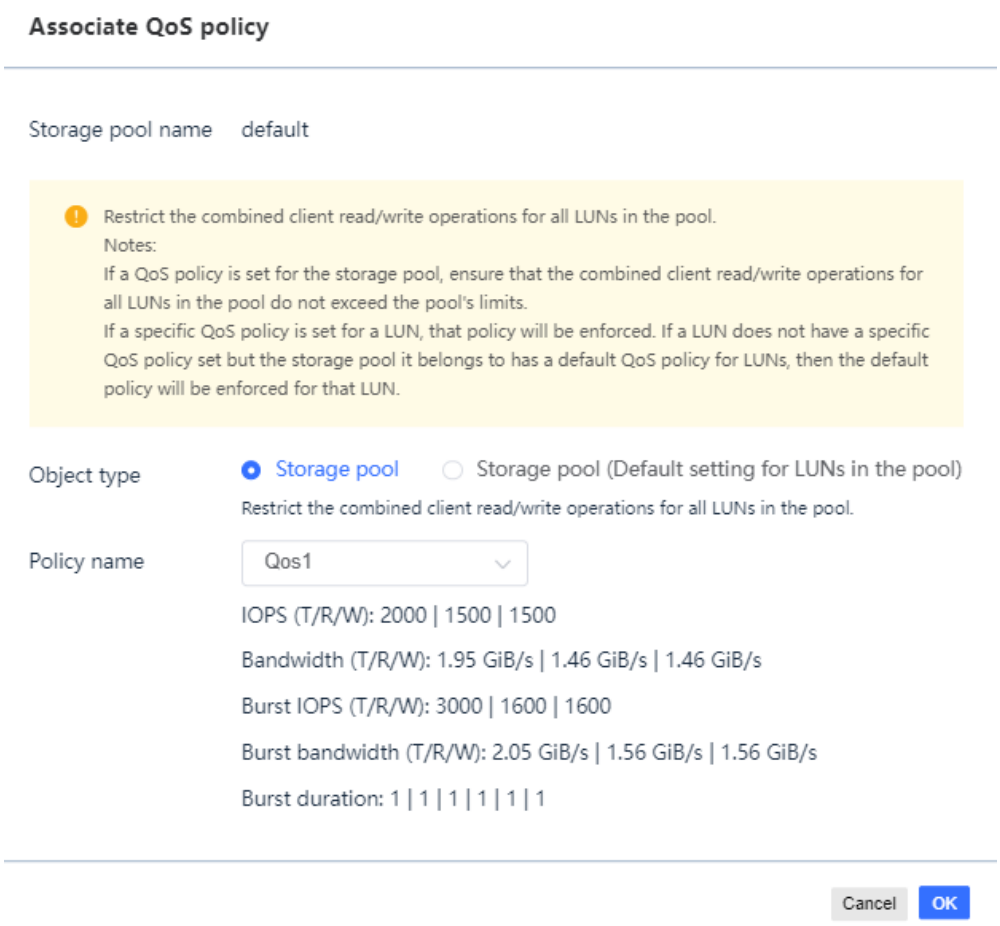


Figure 78.Associate QoS Policy with Storage Pools

3.7.9 Disassociate QoS Policy from Storage Pools

You can disassociate QoS policy from storages pools in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated storage pool (QoS policy for the pool)**, click **Disassociate object**. In the pop-up window, select storage pools you want to disassociate from the policy and confirm.

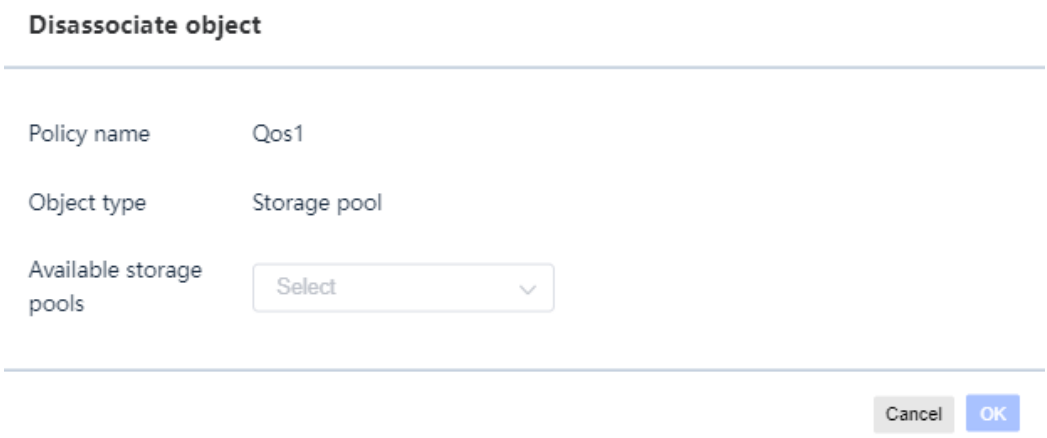


Figure 79.Disassociate QoS Policy from Storage Pools

- On the **Service** >**Storage Pool Management** page, click the target storage pool name to enter the storage pool details page. Under **QoS policy > The QoS policy for storage pool**, click **Disassociate QoS policy**. In the pop-up window, click **confirm**.

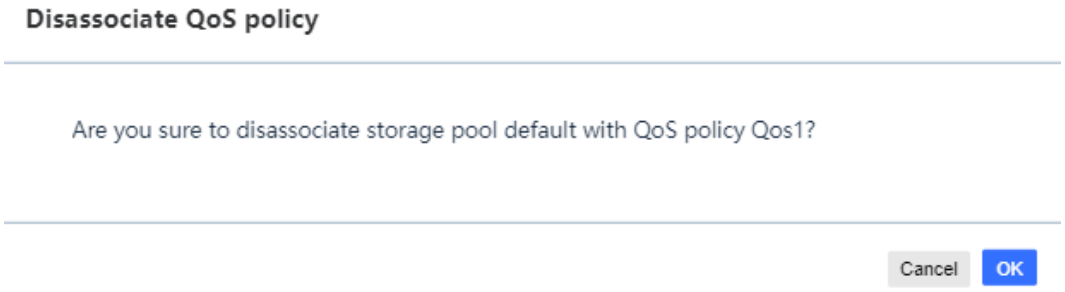


Figure 80. Disassociate QoS Policy from the Storage Pool

3.7.10 Set the Default QoS Policy for LUNs in the Storage Pool

Note: The storage pool to be associated cannot be in Deleting status.

You can set the default QoS policy for LUNs in the storage pool in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated storage pool (default QoS policy for LUNs in the pool)**, click **Associate object**. In the pop-up window, select storage pools for which you want to set default QoS policy for LUNs in the pool, and confirm.

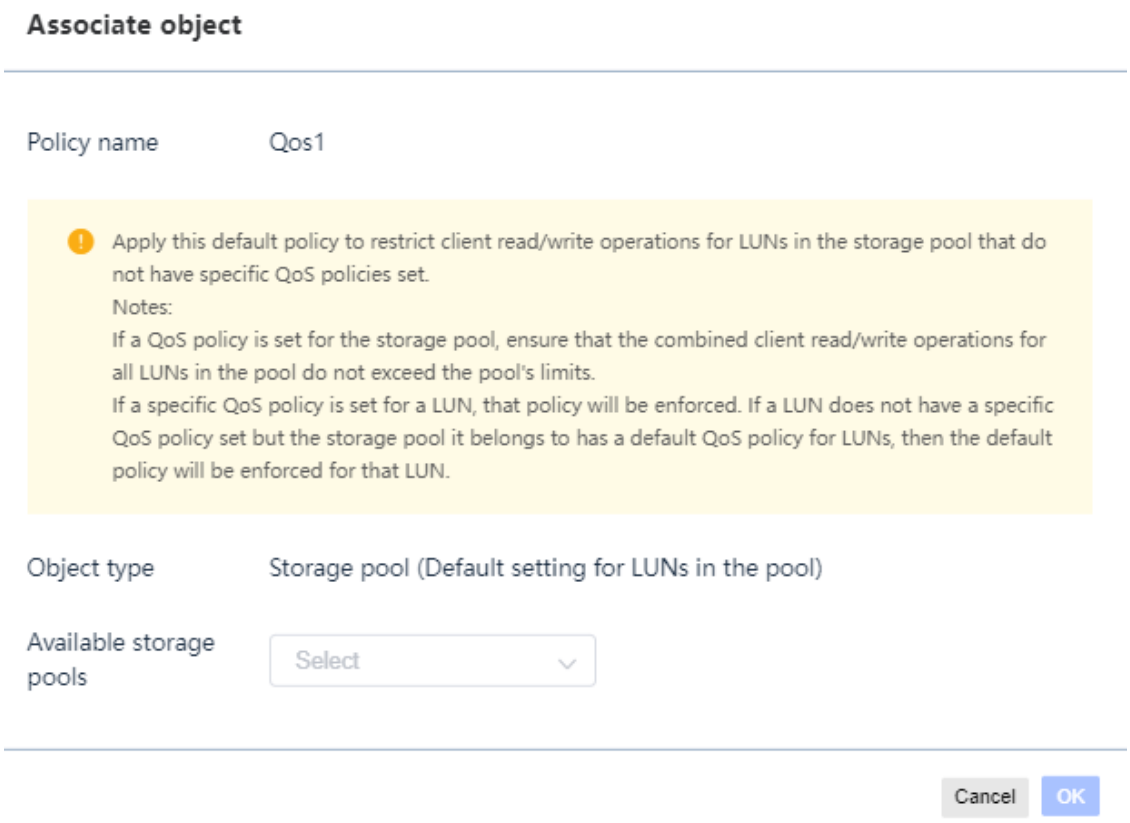


Figure 81.Set the Default QoS Policy for LUNs in the Storage Pool

- On the **Service** > **Storage Pool Management** page, select one or more storage pools and click **Actions** > **Associate QoS policy**. In the pop-up window, select the default QoS policy you want to set for LUNs in the pool and confirm.
- On the **Service** >**Storage Pool Management** page, click the target storage pool name to enter the storage pool details page. Under **QoS policy > The default QoS policy for LUNs in the pool**, click **Associate QoS policy**. In the pop-up window, select the default QoS policy you want to set for LUNs in the pool and confirm.

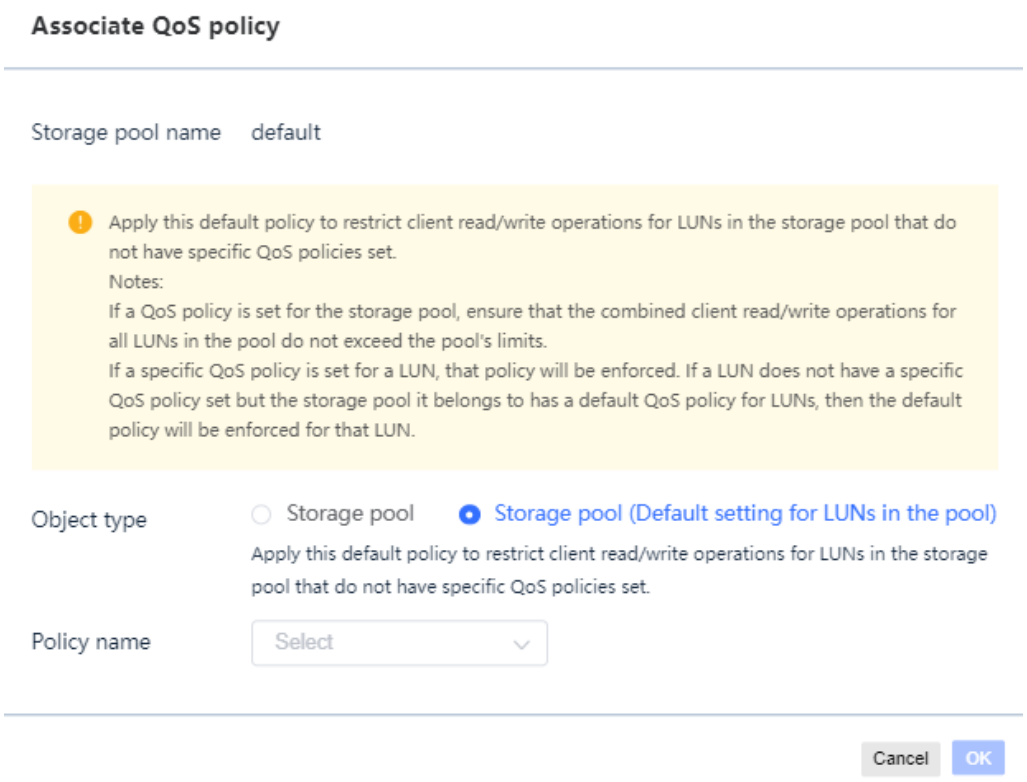


Figure 82. Set the Default QoS Policy for LUNs in the Storage Pool

3.7.11 Disassociate the Default QoS Policy for LUNs in the Storage Pool

You can disassociate the default QoS policy for LUNs in the storage pool in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated storage pool (default QoS policy for LUNs in the pool)**, click **Disassociate object**. In the pop-up window, select the storage pools you want to disassociate from the policy and confirm.

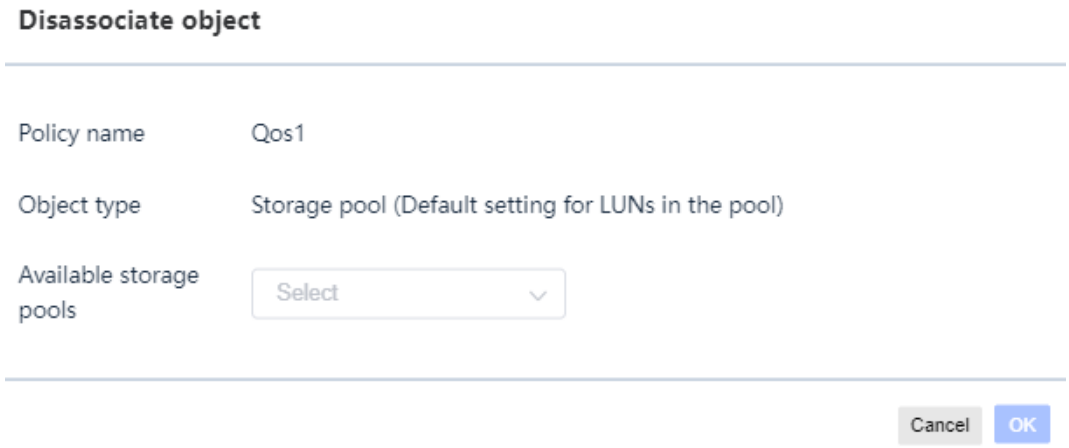


Figure 83. Disassociate the Default QoS Policy for LUNs in the Storage Pool

- On the **Service** >**Storage Pool Management** page, click the target storage pool name to enter the storage pool details page. Under **QoS policy > The default QoS policy for LUNs in the pool**, click **Disassociate QoS policy**. In the pop-up window, click **confirm**.

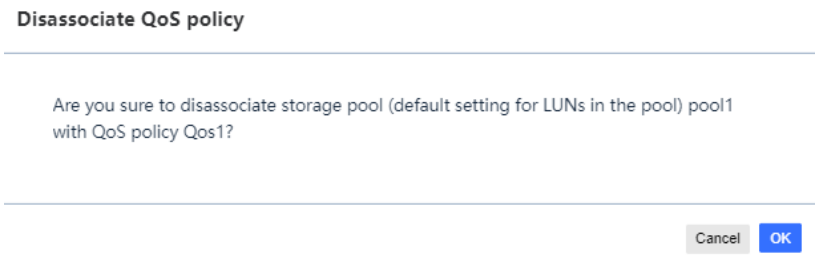


Figure 84. Disassociate the Default QoS Policy for LUNs in the Storage Pool

3.8 QoS Policy

Click **Data protection**> **QoS Policy** in the navigation bar to enter the **QoS Policy Management** page.

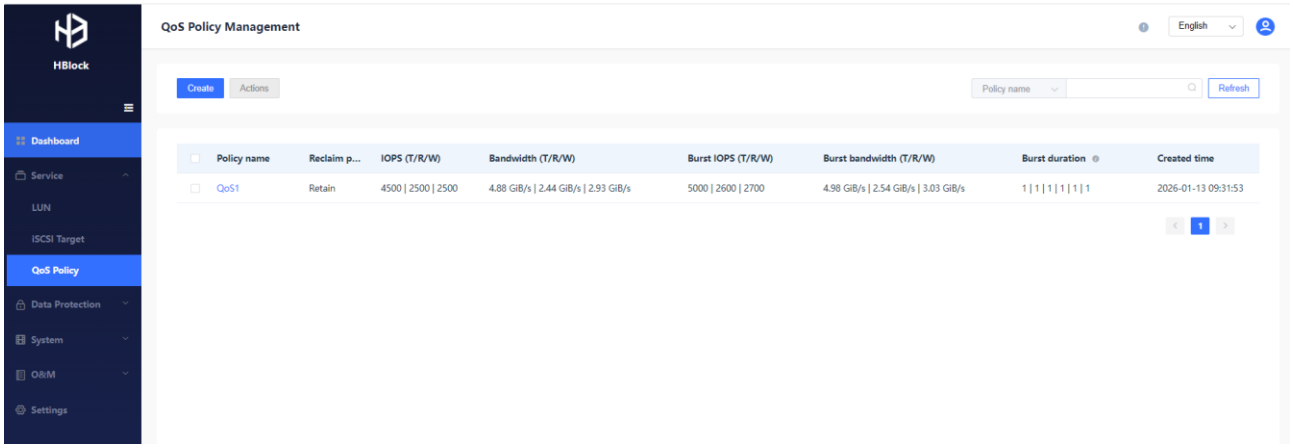


Figure 85. QoS Policy Management (Standalone Mode)

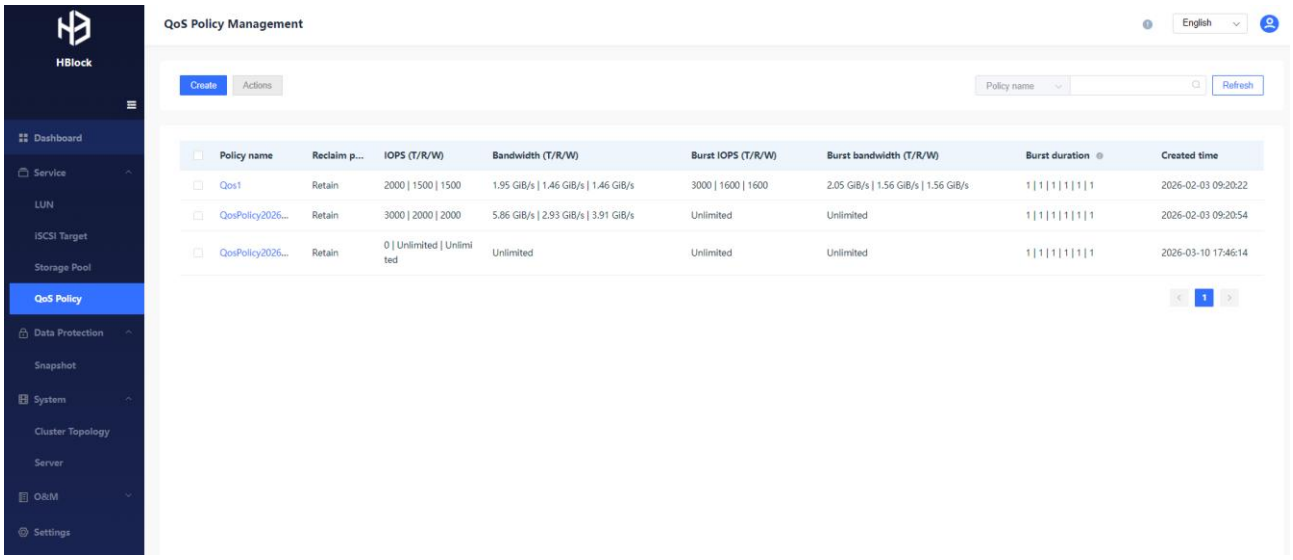


Figure 86. QoS Policy Management (Cluster Mode)

3.8.1 QoS Policy List

On the **QoS Policy Management** page, you can view QoS policy information. You can search for the corresponding QoS policy by QoS policy name.

Name	Description
Policy name	QoS policy name.
Reclaim policy	QoS policy reclaim policy: ● `Delete`: When all objects associated with the QoS policy are disassociated or deleted, the system will automatically

	remove the QoS policy. `Retain`: When all objects associated with the QoS policy are disassociated or deleted, the QoS policy itself remains and is not deleted.
IOPS (T/R/W)	The limit of total/read/ write operations per second.
Bandwidth (T/R/W)	The limit of total/read/write throughput per second.
Burst IOPS (T/R/W)	The burst limit of total/read/write operations per second.
Burst bandwidth (T/R/W)	The burst limit of total/read/write throughput per second.
Burst duration	The duration in seconds of I/O operations with burst limit. The corresponding sequence of QoS policy parameters is: burst IOPS (total/read/write), burst bandwidth (total/read/write).
Created time	The creation time of the QoS policy.

3.8.2 Create a QoS Policy

On the **QoS Policy Management** page, click **Create** to create a QoS policy.

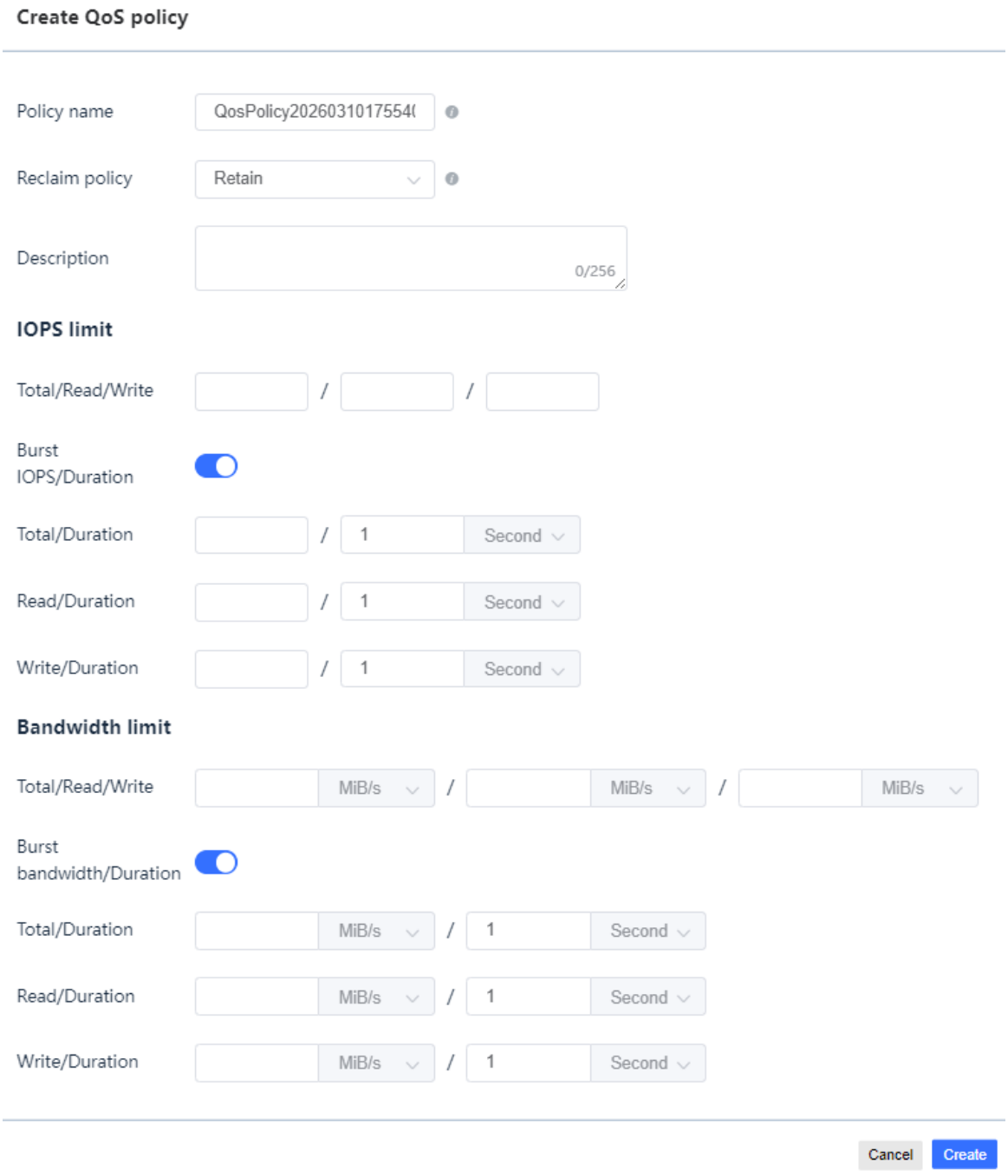


Figure 87.Create a QoS Policy

Name	Description
QoS name	Specifies the name of a QoS policy. The value is a string of 1 to 64 case-sensitive characters. It can contain letters, digits, and hyphens (-). Only supports starting with

	a letter or a digit.
Reclaim policy	Specifies the QoS policy reclaim policy. Value: ● Delete: When all objects associated with the QoS policy are disassociated or deleted, the system will automatically remove the QoS policy. ● Retain: When all objects associated with the QoS policy are disassociated or deleted, the QoS policy itself remains and is not deleted. The default value is Retain.
Description	Specifies the description for the QoS policy. The value is a string of 1 to 256 characters.

IOPS limit

Name		Description
Total/Read/Write		The limit of total/read/ write operations per second. The value is an integer that ranges from 0 to 999,999,999. If not set, it means no limit.
Burst IOPS/Duration	Total/Duration	When Burst is enabled, the total number of read/write operations or the duration (in seconds, minutes, or hours) it can be sustained. ● When using the Burst feature, the maximum total number of read/write operations is specified as an integer. The setting is effective only if the number of read/write operations is ⩾ 1 and the value is either left unset or set to a positive integer within the range (total IOPS, 999 999 999]. If not specified (default), no limit is imposed. ● Burst Duration: This setting is only effective when the IOPS Burst feature is enabled. The value is an integer, the default unit is seconds, the default value is 1. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.
	Read/Duration	When Burst is enabled, the total number of read operations or the duration (in seconds, minutes, or hours)

		it can be sustained. ● When using the Burst feature, the maximum total number of read operations is specified as an integer. The setting is effective only if the number of read operations is ⩾ 1 and the value is either left unset or set to a positive integer within the range (read IOPS, 999 999 999]. If not specified (default), no limit is imposed. ● Burst Duration: This setting is only effective when the read IOPS Burst feature is enabled. The value is an integer the default unit is seconds, the default value is 1. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.
	Write/Duration	When Burst is enabled, the total number of write operations or the duration (in seconds, minutes, or hours) it can be sustained. ● When using the Burst feature, the maximum total number of write operations is specified as an integer. The setting is effective only if the number of write operations is ⩾ 1 and the value is either left unset or set to a positive integer within the range (write IOPS, 999 999 999]. If not specified (default), no limit is imposed. ● Burst Duration: This setting is only effective when the write IOPS Burst feature is enabled. The value is an integer, the default unit is seconds, the default value is 1. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.

Bandwidth limit

Name		Description
Total/Read/Write		The limit of total/read/write throughput per second. The unit of bandwidth can be selected as B/s, KiB/s, MiB/s, GiB/s, or TiB/s. The value is an integer. If left unset (default), no limit is imposed. ● If the unit is B/s, the value is an integer that ranges from 0 to 4,096,000,000,000. ● If the unit is KiB/s, the value is an integer that ranges from 0 to 4,000,000,000. ● If the unit is MiB/s, the value is an integer that ranges from 0 to 3,906,250. ● If the unit is GiB/s, the value is an integer that ranges from 0 to 3,814. ● If the unit is TiB/s, the value is an integer that ranges from 0 to 3.
Burst bandwidth/Duration	Total/Duration	When Burst is enabled, the total bandwidth limit or the duration it can be sustained. The unit of bandwidth can be selected as B/s, KiB/s, MiB/s, GiB/s, or TiB/s. The unit of duration can be selected as second, minute, hour. ● Only when total bandwidth is greater than or equal to 1, and the units are the same, can this setting take effect within the following range of values: ■ If the unit is B/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,096,000,000,000]. ■ If the unit is KiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,000,000,000]. ■ If the unit is MiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,906,250]. ■ If the unit is GiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,814]. ■ If the unit is TiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3]. ● Burst Duration: This setting is only effective when

		the total bandwidth Burst feature is enabled. The value is an integer, the default value is 1 second. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.
	Read/Duration	When Burst is enabled, the read bandwidth limit or the duration it can be sustained. The unit of read bandwidth can be selected as B/s, KiB/s, MiB/s, GiB/s, or TiB/s. The unit of duration can be selected as second, minute, hour. ● Only when read bandwidth is greater than or equal to 1, and the units are the same, can this setting take effect within the following range of values: ■ If the unit is B/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,096,000,000,000]. ■ If the unit is KiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,000,000,000]. ■ If the unit is MiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,906,250]. ■ If the unit is GiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,814]. ■ If the unit is TiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3]. ● Burst Duration: This setting is only effective when the read bandwidth Burst feature is enabled. The value is an integer, the default value is 1 second. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.

	Write/Duration	When Burst is enabled, the write bandwidth limit or the duration it can be sustained. The unit of write bandwidth can be selected as B/s, KiB/s, MiB/s, GiB/s, or TiB/s. The unit of duration can be selected as second, minute, hour. ● Only when write bandwidth is greater than or equal to 1, and the units are the same, can this setting take effect within the following range of values: ■ If the unit is B/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,096,000,000,000]. ■ If the unit is KiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,000,000,000]. ■ If the unit is MiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,906,250]. ■ If the unit is GiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,814]. ■ If the unit is TiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3]. ● Burst Duration: This setting is only effective when the write bandwidth Burst feature is enabled. The value is an integer, the default value is 1 second. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.

3.8.3 View a QoS Policy

On the **QoS Policy Management** page, click the specific QoS policy to view/edit the QoS policy.

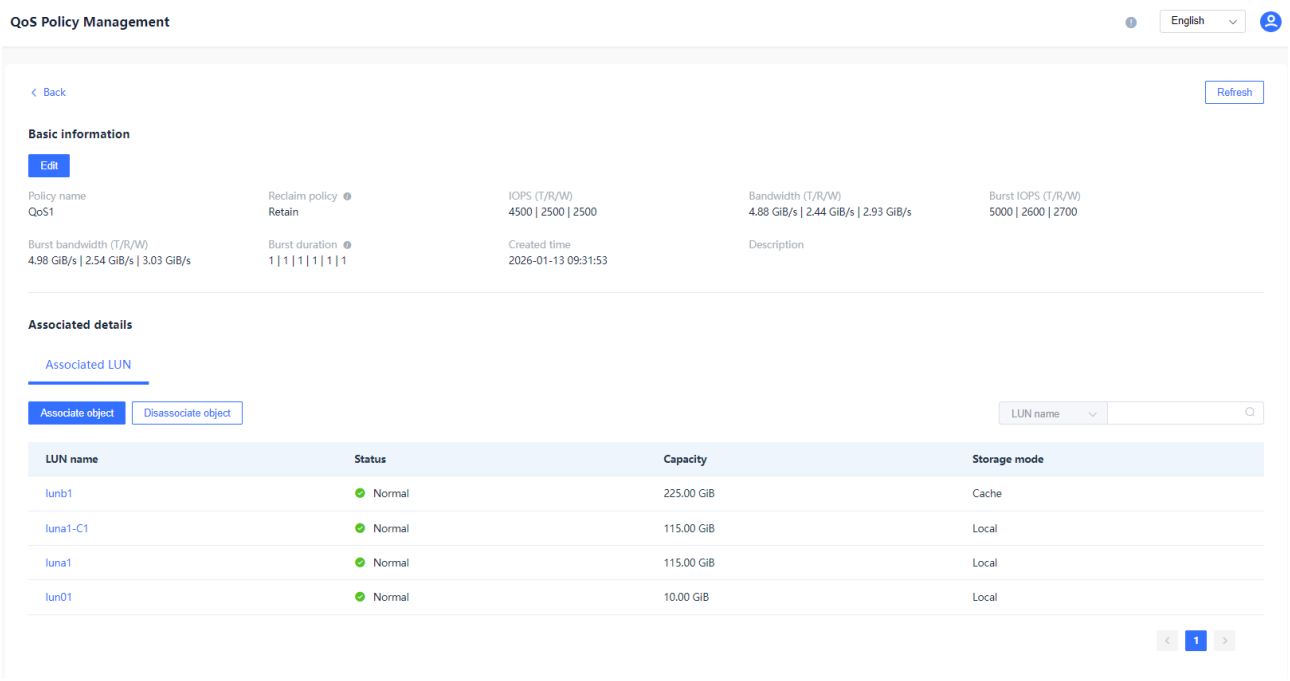


Figure 88. QoS Policy Details (Standalone Mode)

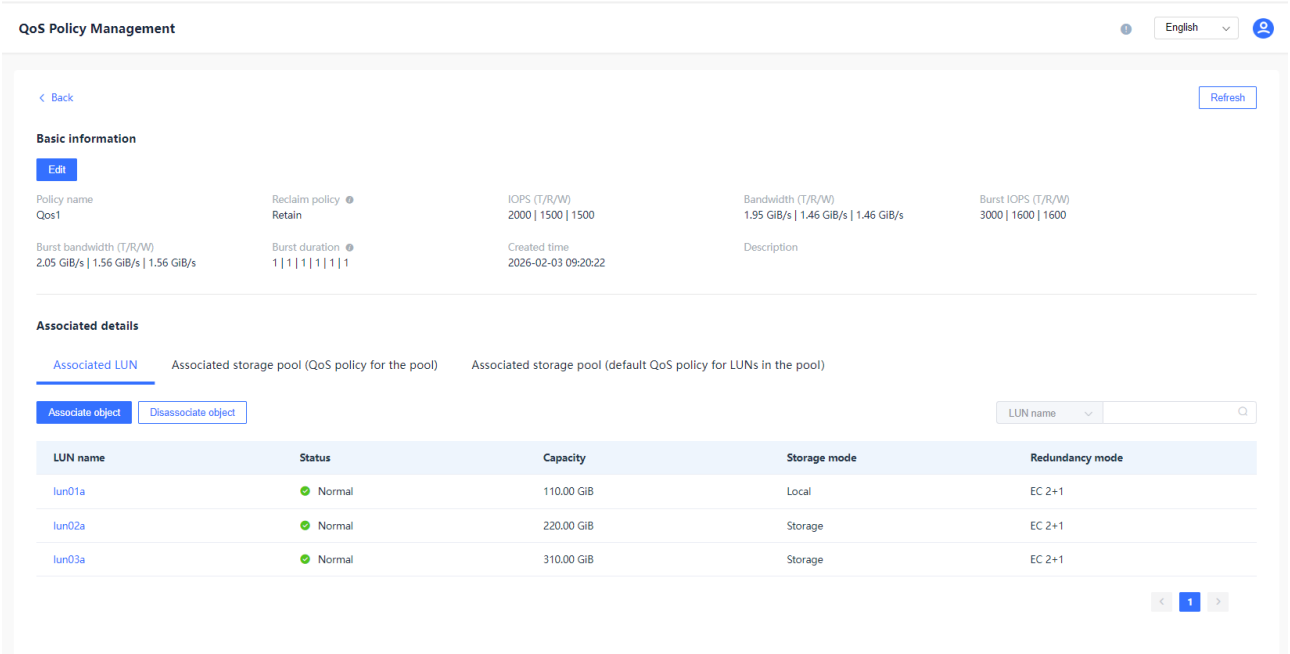


Figure 89. QoS Policy Details (Cluster Mode)

Basic information

Click **Edit** to edit the QoS policy, see **Edit a QoS Policy** for details.

Name	Description
Policy name	QoS policy name.
Reclaim policy	QoS policy reclaim policy: ● `Delete`: When all objects associated with the QoS policy are disassociated or deleted, the system will automatically remove the QoS policy. ● `Retain`: When all objects associated with the QoS policy are disassociated or deleted, the QoS policy itself remains and is not deleted.
IOPS (T/R/W)	The limit of total/read/ write operations per second.
Bandwidth (T/R/W)	The limit of total/read/write throughput per second.
Burst IOPS (T/R/W)	The burst limit of total/read/write operations per second.
Burst bandwidth (T/R/W)	The burst limit of total/read/write throughput per second.
Burst duration	The duration in seconds of I/O operations with burst limit. The corresponding sequence of QoS policy parameters is: burst IOPS (total/read/write), burst bandwidth (total/read/write).
Created time	The creation time of the QoS policy.
Description	The description of the QoS policy.

Associated details

Note: Click **Associate object**, you can associate QoS policy with LUNs or storage pools, or set the default QoS policy for LUNs in the storage pool, refer to **Associate QoS Policy with LUNs**, **Associate QoS Policy with Storage Pools (Cluster Mode)**, **Set the Default QoS Policy for LUNs in the Storage Pool (Cluster Mode)** for details. Click **Disassociate object**, you can disassociate QoS policy from LUNs or storage pools, or disassociate the default QoS policy for LUNs in the storage pool, refer to **Disassociate QoS Policy from LUNs**, **Disassociate QoS Policy from Storage Pools (Cluster Mode)**, **Disassociate the Default QoS Policy for LUNs in the Storage Pool (Cluster Mode)** for details.

- **Associated LUN**

Name	Description
LUN name	LUN name.
Status	LUN status.
Capacity	The storage capacity of LUN.
Storage mode	The storage mode for the LUN: ● Local: Store all data at local only. ● Cache: Store part of hot data at local and store all data in cloud asynchronously. ● Storage: Store all data at local and asynchronously store it in cloud.
Redundancy mode	LUN redundancy mode (only supported by cluster mode):

	• single-copy • 2-copy • 3-copy • EC N+M

- **Associated storage pool (QoS policy for the pool, default QoS policy for LUNs in the pool)**
  Note: Only supported by cluster mode.

Name	Description
Storage pool name	The name of the storage pool.
Status	Status of the storage pool: • Normal. • Deleting.
Fault domain level	Fault domain level of the storage pool: • path. • server. • rack. • room.
Capacity	Total capacity of the storage pool.

3.8.4 Edit a QoS Policy

On the **QoS Policy Management** page, you can edit a QoS policy in the following ways:

- Click the target QoS policy name to enter the QoS policy details page. Under **Basic information**, click **Edit**. In the pop-up window, edit the QoS policy.
- Select the target QoS policy and click **Actions** > **Edit**. In the pop-up window, edit the QoS policy.

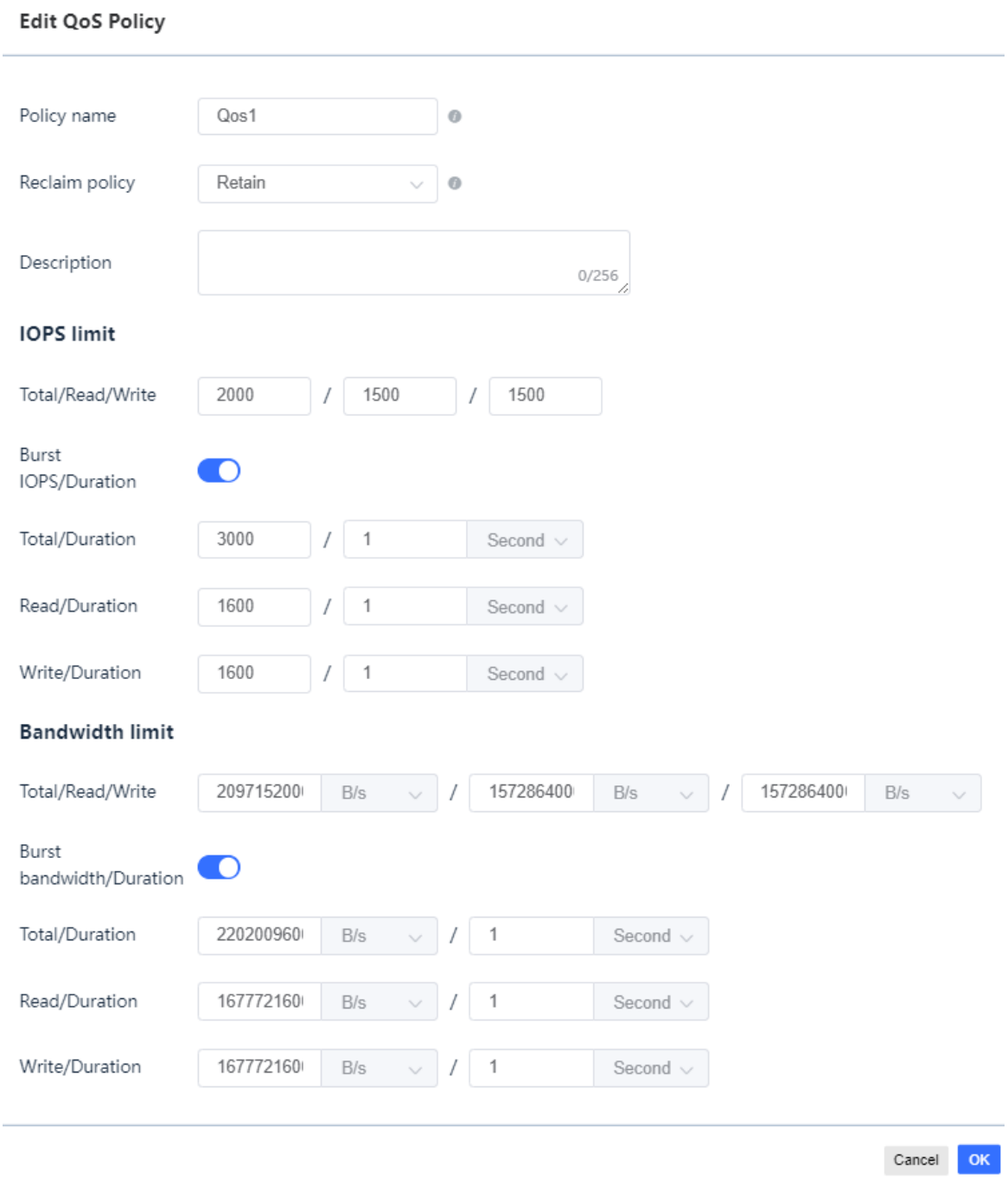


Figure 90. Edit the QoS Policy

Name	Description
QoS name	Specifies the name of a QoS policy. The value is a string of 1 to 64 case-sensitive characters. It can contain letters, digits, and hyphens (-). Only supports starting with a letter or a digit.
Reclaim policy	Specifies the QoS policy reclaim policy. Value: ● Delete: When all objects associated with the QoS policy are disassociated or deleted, the system will automatically remove the QoS policy. ● Retain: When all objects associated with the QoS policy are disassociated or deleted, the QoS policy itself remains and is not deleted.
Description	Specifies the description for the QoS policy. The value is a string of 1 to 256 characters.

IOPS limit

Name		Description
Total/Read/Write		The limit of total/read/ write operations per second. The value is an integer that ranges from 0 to 999,999,999.
Burst IOPS/Duration	Total/Duration	When Burst is enabled, the total number of read/write operations or the duration (in seconds, minutes, or hours) it can be sustained. ● When using the Burst feature, the maximum total number of read/write operations is specified as an integer. The setting is effective only if the number of read/write operations is ⩾ 1 and the value is either left unset or set to a positive integer within the range (total IOPS, 999 999 999]. ● Burst Duration: This setting is only effective when the IOPS Burst feature is enabled. The value is an integer. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.
	Read/Duration	When Burst is enabled, the total number of read

		operations or the duration (in seconds, minutes, or hours) it can be sustained. ● When using the Burst feature, the maximum total number of read operations is specified as an integer. The setting is effective only if the number of read operations is ⩾ 1 and the value is either left unset or set to a positive integer within the range (read IOPS, 999 999 999]. ● Burst Duration: This setting is only effective when the read IOPS Burst feature is enabled. The value is an integer. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.
	Write/Duration	When Burst is enabled, the total number of write operations or the duration (in seconds, minutes, or hours) it can be sustained. ● When using the Burst feature, the maximum total number of write operations is specified as an integer. The setting is effective only if the number of write operations is ⩾ 1 and the value is either left unset or set to a positive integer within the range (write IOPS, 999 999 999]. ● Burst Duration: This setting is only effective when the write IOPS Burst feature is enabled. The value is an integer. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.

Bandwidth limit

Name	Description
Total/Read/Write	The limit of total/read/write throughput per second.

		The unit of bandwidth can be selected as B/s, KiB/s, MiB/s, GiB/s, or TiB/s. The value is an integer. ● If the unit is B/s, the value is an integer that ranges from 0 to 4,096,000,000,000. ● If the unit is KiB/s, the value is an integer that ranges from 0 to 4,000,000,000. ● If the unit is MiB/s, the value is an integer that ranges from 0 to 3,906,250. ● If the unit is GiB/s, the value is an integer that ranges from 0 to 3,814. ● If the unit is TiB/s, the value is an integer that ranges from 0 to 3.
Burst bandwidth/Duration	Total/Duration	When Burst is enabled, the total bandwidth limit or the duration it can be sustained. The unit of bandwidth can be selected as B/s, KiB/s, MiB/s, GiB/s, or TiB/s. The unit of duration can be selected as second, minute, hour. ● Only when total bandwidth is greater than or equal to 1, and the units are the same, can this setting take effect within the following range of values: ■ If the unit is B/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,096,000,000,000]. ■ If the unit is KiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,000,000,000]. ■ If the unit is MiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,906,250]. ■ If the unit is GiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,814]. ■ If the unit is TiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3]. ● Burst Duration: This setting is only effective when the total bandwidth Burst feature is enabled. The value is an integer. ■ If the unit is second, the value is an integer

		that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.
	Read/Duration	When Burst is enabled, the read bandwidth limit or the duration it can be sustained. The unit of read bandwidth can be selected as B/s, KiB/s, MiB/s, GiB/s, or TiB/s. The unit of duration can be selected as second, minute, hour. ● Only when read bandwidth is greater than or equal to 1, and the units are the same, can this setting take effect within the following range of values: ■ If the unit is B/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,096,000,000,000]. ■ If the unit is KiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,000,000,000]. ■ If the unit is MiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,906,250]. ■ If the unit is GiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,814]. ■ If the unit is TiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3]. ● Burst Duration: This setting is only effective when the read bandwidth Burst feature is enabled. The value is an intege. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.
	Write/Duration	When Burst is enabled, the write bandwidth limit or the duration it can be sustained. The unit of write bandwidth can be selected as B/s,

		KiB/s, MiB/s, GiB/s, or TiB/s. The unit of duration can be selected as second, minute, hour. ● Only when write bandwidth is greater than or equal to 1, and the units are the same, can this setting take effect within the following range of values: ■ If the unit is B/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,096,000,000,000]. ■ If the unit is KiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 4,000,000,000]. ■ If the unit is MiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,906,250]. ■ If the unit is GiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3,814]. ■ If the unit is TiB/s, it must be set to –1 or to a positive integer within the range (total bandwidth, 3]. ● Burst Duration: This setting is only effective when the write bandwidth Burst feature is enabled. The value is an integer, the default value is 1 second. ■ If the unit is second, the value is an integer that ranges from 1 to 999,999,999. ■ If the unit is minute, the value is an integer that ranges from 1 to 16,666,666. ■ If the unit is hour, the value is an integer that ranges from 1 to 277,777.

3.8.5 Associate QoS Policy with LUNs

Note:

- The status of the LUN to be associated cannot be Deleting or Deletefailed.
- For cluster mode, QoS policy enforcement follows these rules:
  - If a LUN has a QoS policy attached, that policy takes precedence.
  - If a LUN has no QoS policy attached:
    - If the LUN has both a `cachePool` and a `pool`, its QoS policy is the default QoS policy for LUNs in the `cachePool`. If the `cachePool` has not defined such a default policy, the LUN has no QoS policy.
    - If the LUN has only a `pool`, its QoS policy is the default QoS policy for LUNs in that `pool`. If the `pool` has not defined such a default policy, the LUN has no QoS policy.

You can associate QoS policy with LUNs in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated LUN**, click **Associate object**. In the pop-up window, select the LUNs you want to associate with the policy and confirm.

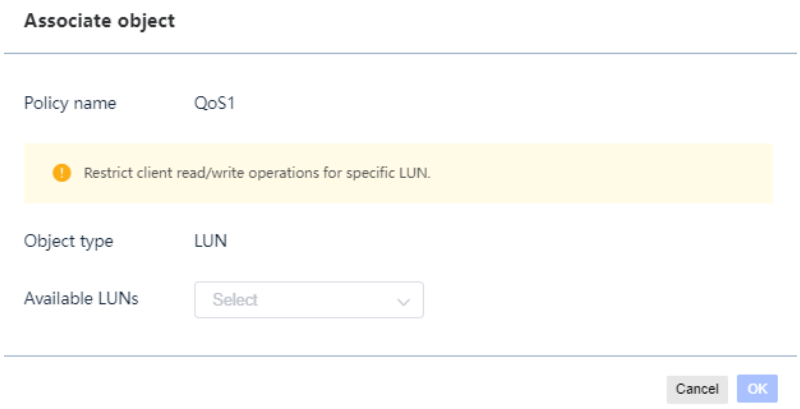


Figure 91. Associate QoS Policy with LUNs (Standalone Mode)

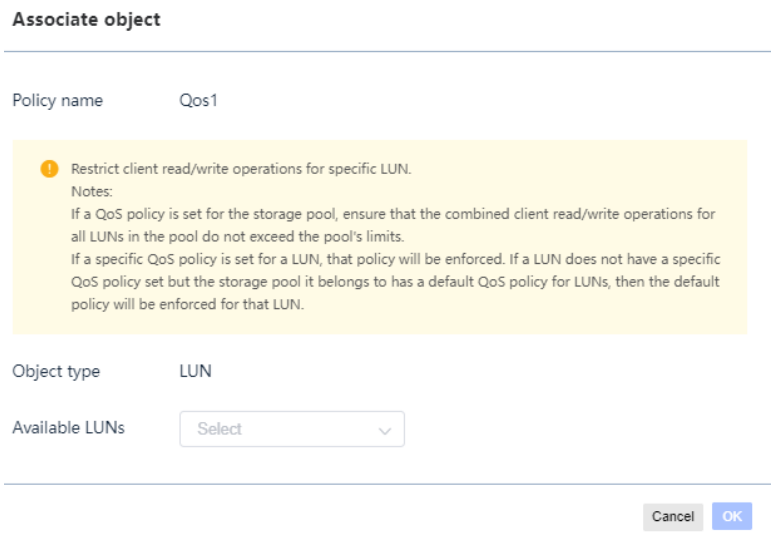


Figure 92. Associate QoS Policy with LUNs (Cluster Mode)

- On the **Service** >**LUN** page, click the target LUN name to enter the LUN details page. Under **QoS policy**, click **Associate QoS policy**. In the pop-up window, select the QoS policy you want to associate with the LUN and confirm.
- On the **Service** >**LUN** page, select one or more LUNs and click **Actions** > **Associate QoS policy**. In the pop-up window, select the QoS policy you want to associate with LUNs and confirm.

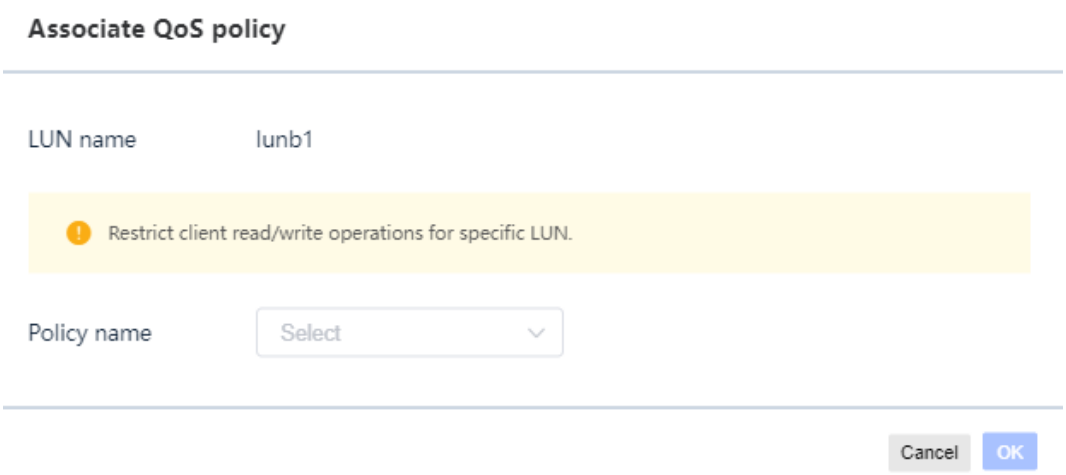


Figure 93. Associate Qos Policy with LUNs (Standalone Mode)

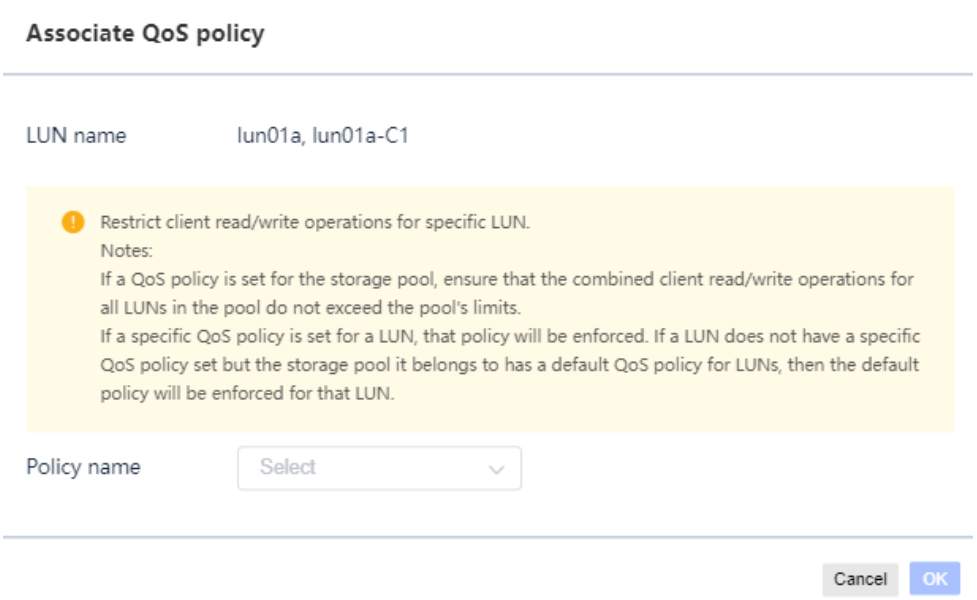


Figure 94. Associate Qos Policy with LUNs (Cluster Mode)

3.8.6 Disassociate QoS Policy from LUNs

You can disassociate QoS policy from LUNs in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated LUN**, click **Dissociate object**. In the pop-up window, select the LUNs you want to disassociate from the policy and confirm.

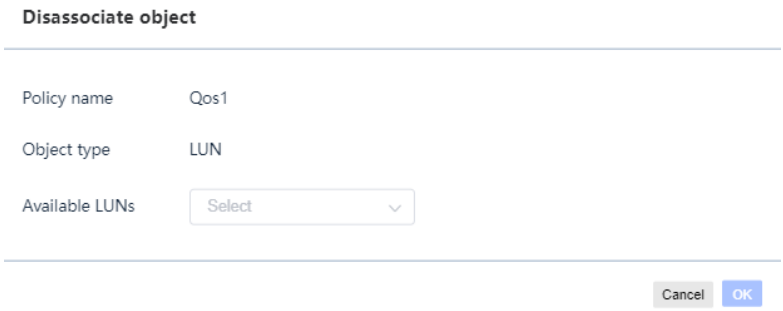


Figure 95. Disassociate QoS Policy from LUNs

- On the **Service** >**LUN** page, click the target LUN name to enter the LUN details page. Under **QoS policy**, click **Disassociate QoS policy**. In the pop-up window, click **confirm**.

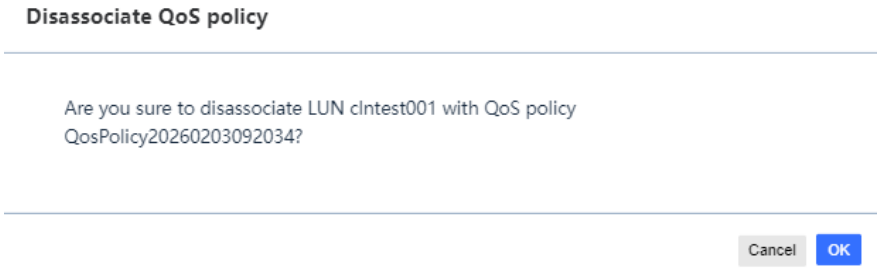


Figure 96. Disassociate Qos Policy from the LUN

3.8.7 Associate QoS Policy with Storage Pools (Cluster Mode)

Note: The storage pool to be associated cannot be in Deleting status.
You can associate QoS policy with storages in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated storage pool (QoS policy for the pool)**, click **Associate object**. In the pop-up window, select the storage pools you want to associate with the policy and confirm.

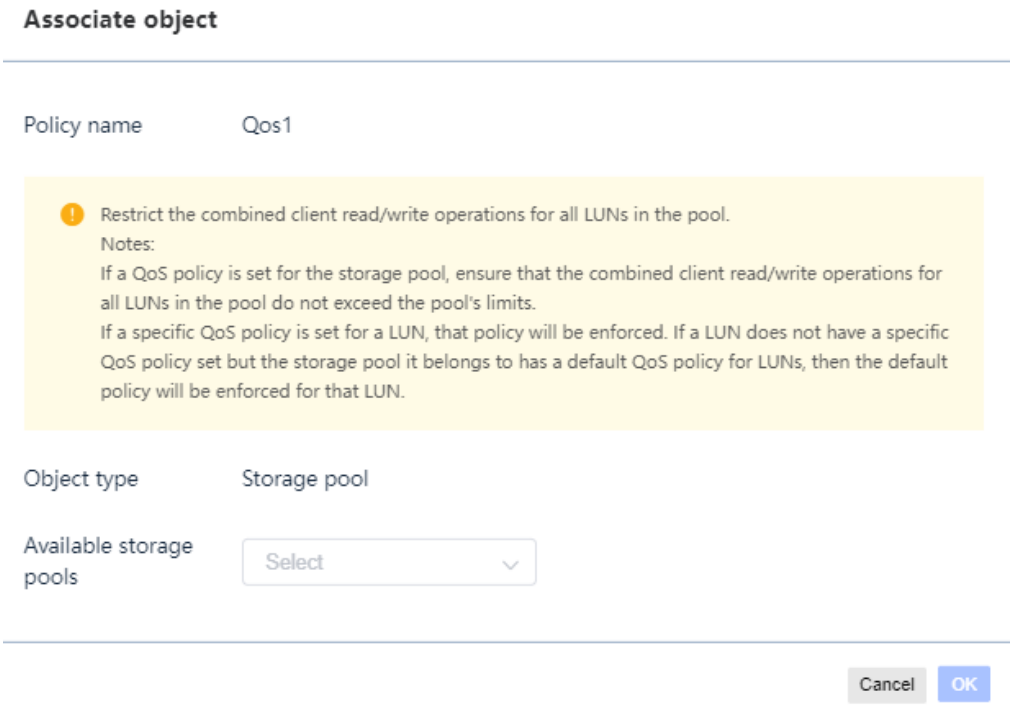


Figure 97.Associate QoS Policy with Storage Pool

- On the **Service** > **Storage Pool Management** page, select one or more storage pools and click **Actions** > **Associate QoS policy**. In the pop-up window, select the QoS policy you want to associate with storage pools and confirm.
- On the **Service** >**Storage Pool Management** page, click the target storage pool name to enter the storage pool details page. Under **QoS policy > The QoS policy for storage pool**, click **Associate QoS policy**. In the pop-up window, select the QoS policy you want to associate with the storage pool and confirm.

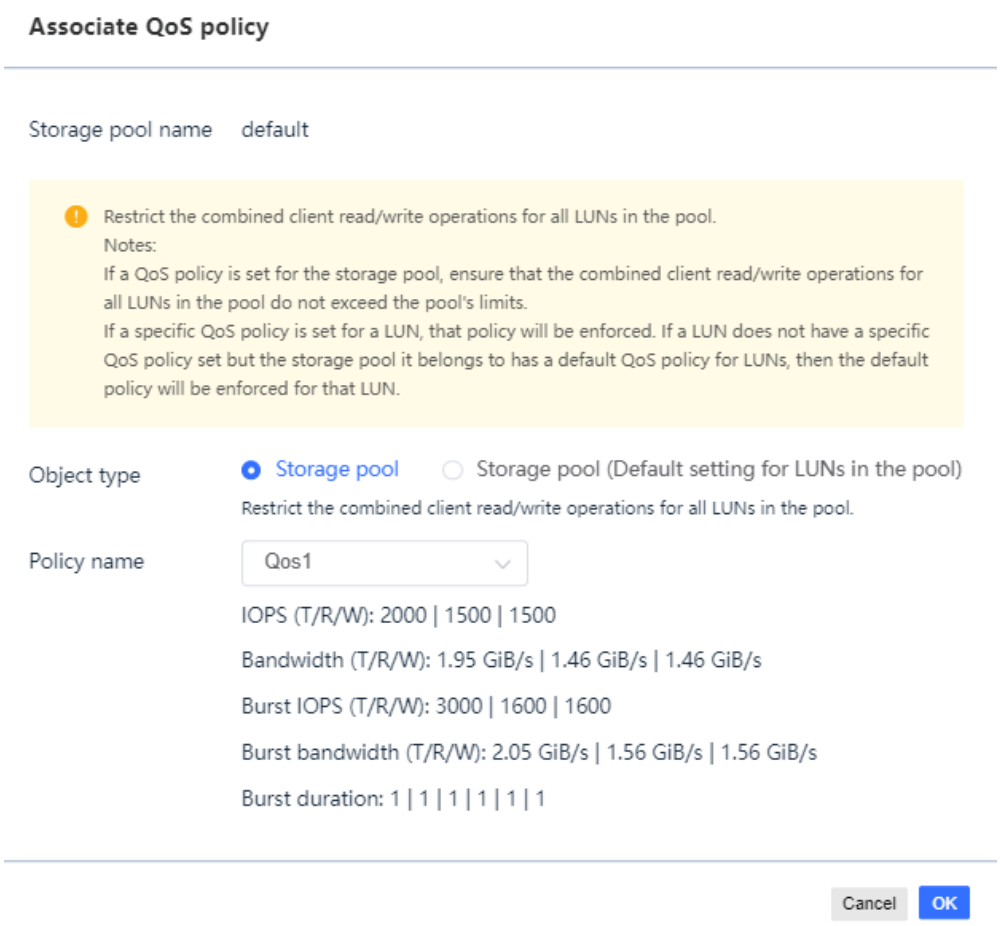


Figure 98. Associate Qos Policy with Storage Pools

3.8.8 Disassociate QoS Policy from Storage Pools (Cluster Mode)

You can disassociate QoS policy from storages pools in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated storage pool (QoS policy for the pool)**, click **Disassociate object**. In the pop-up window, select storage pools you want to disassociate from the policy and confirm.

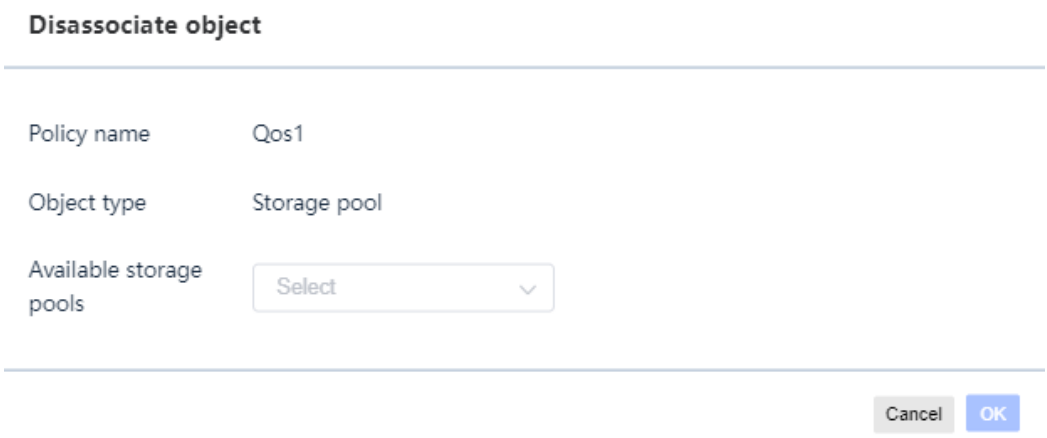


Figure 99. Disassociate QoS Policy from Storage Pools

- On the **Service** >**Storage Pool Management** page, click the target storage pool name to enter the storage pool details page. Under **QoS policy > The QoS policy for storage pool**, click **Disassociate QoS policy**. In the pop-up window, click **confirm**.

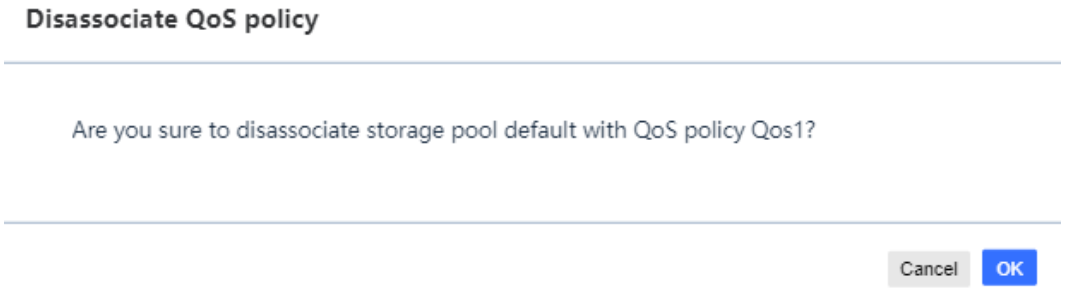


Figure 100. Disassociate QoS Policy from the Storage Pool

3.8.9 Set the Default QoS Policy for LUNs in the Storage Pool (Cluster Mode)

Note: The storage pool to be associated cannot be in Deleting status.

You can set the default QoS policy for LUNs in the storage pool in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated storage pool (default QoS policy for LUNs in the pool)**, click **Associate object**. In the pop-up window, select storage pools for which you want to set default QoS policy for LUNs in the pool, and confirm.

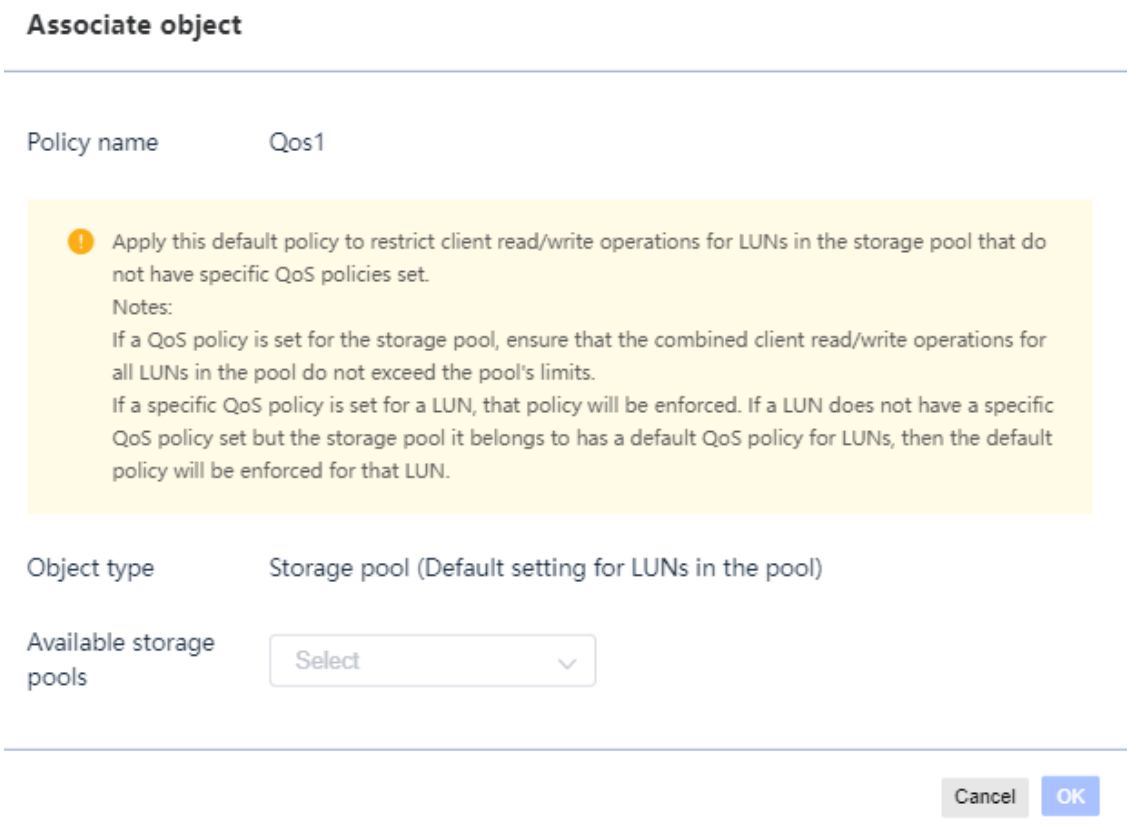


Figure 101. Set the Default QoS Policy for LUNs in the Storage Pool

- On the **Service** > **Storage Pool Management** page, select one or more storage pools and click **Actions** > **Associate QoS policy**. In the pop-up window, select the default QoS policy you want to set for LUNs in the pool and confirm.
- On the **Service** >**Storage Pool Management** page, click the target storage pool name to enter the storage pool details page. Under **QoS policy > The default QoS policy for LUNs in the pool**, click **Associate QoS policy**. In the pop-up window, select the default QoS policy you want to set for LUNs in the pool and confirm.

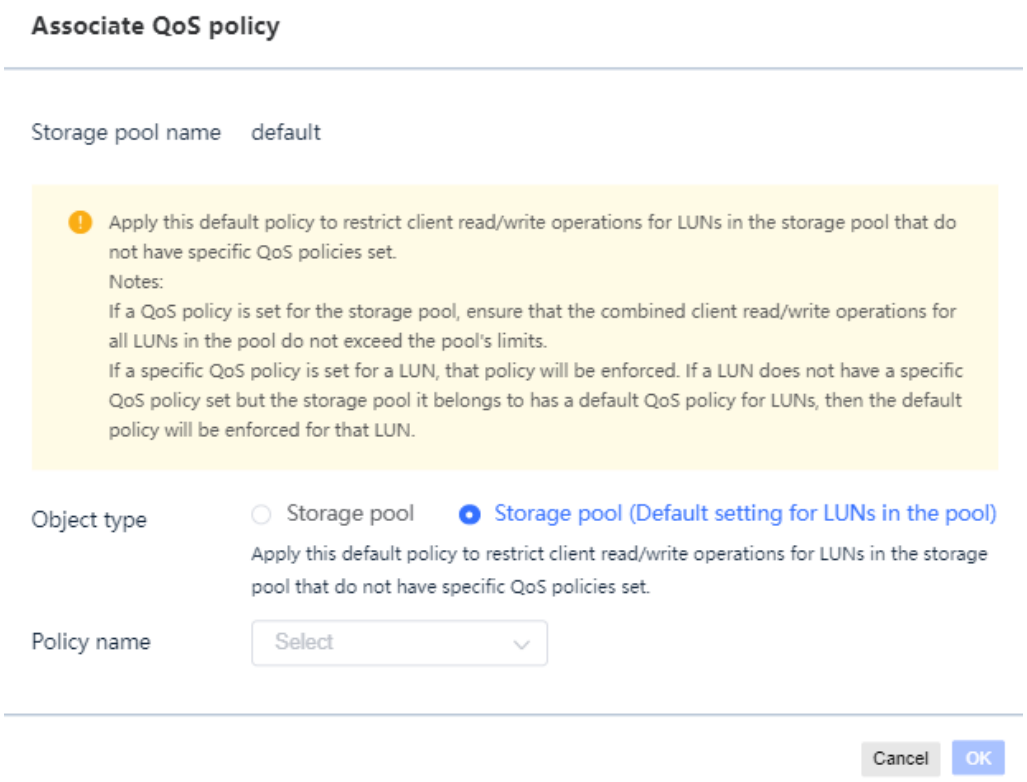


Figure 102. Set the Default QoS Policy for LUNs in the Storage Pool

3.8.10 Disassociate the Default QoS Policy for LUNs in the Storage Pool (Cluster Mode)

You can disassociate the default QoS policy for LUNs in the storage pool in the following ways:

- On the **Service** > **QoS Policy** page, click the target QoS policy name to enter the QoS policy details page. Under **Associated details** > **Associated storage pool (default QoS policy for LUNs in the pool)**, click **Disassociate object**. In the pop-up window, select the storage pools you want to disassociate from the policy and confirm.

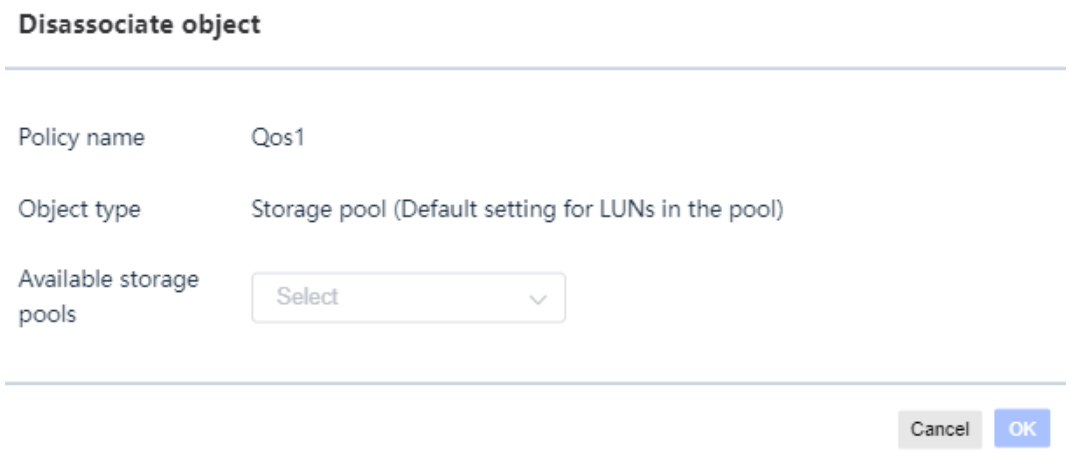


Figure 103. Disassociate the Default QoS Policy for LUNs in the Storage Pool

- On the **Service** >**Storage Pool Management** page, click the target storage pool name to enter the storage pool details page. Under **QoS policy > The default QoS policy for LUNs in the pool**, click **Disassociate QoS policy**. In the pop-up window, click **confirm**.

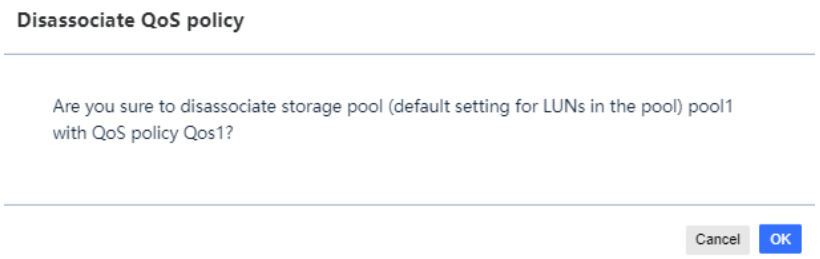


Figure 104. Disassociate the Default QoS Policy for LUNs in the Storage Pool

3.8.11 Delete QoS Policies

On the **QoS Policy Management** page, select target QoS policies, and click **Actions** > **Delete** to delete QoS policies.

Note: A QoS policy can only be deleted when it is not associated with any objects.

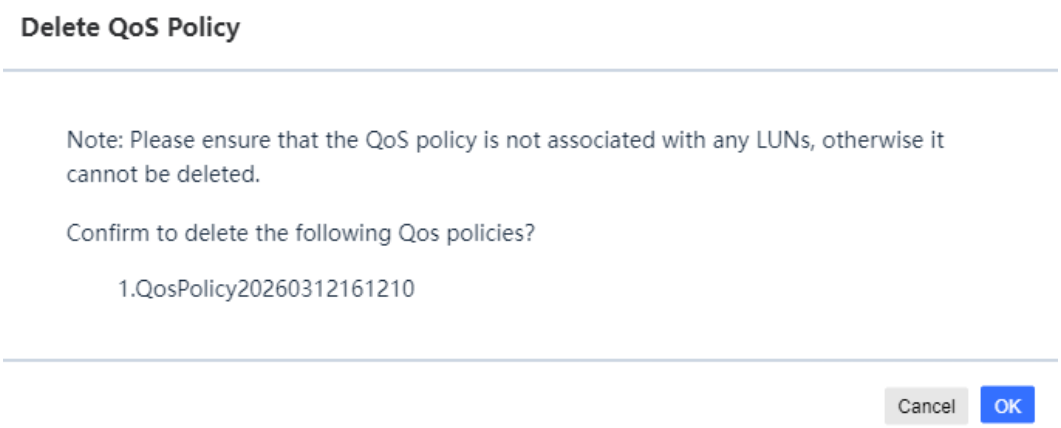


Figure 105. Delete QoS Polices

3.9 Snapshot

Click **Data protection**> **Snapshot** in the navigation bar to enter the **Snapshot Management** page. Click **Snapshot** to manage it, including: viewing, creating, editing, rolling back, deleting snapshots, or creating clone LUNs.

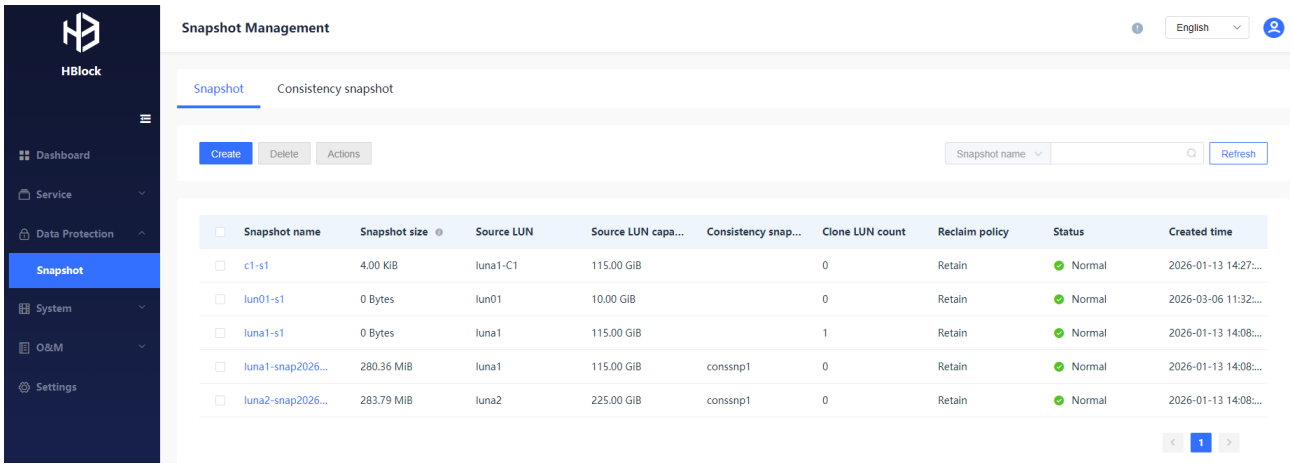


Figure 106. Snapshot List

3.9.1 Snapshot List

Click **Data protection**> **Snapshot** in the navigation bar to enter the **Snapshot Management** page. On the **Snapshot Management** page, click **Snapshot** to view snapshot information. You can search for the corresponding snapshot by snapshot name.

Name	Description
Snapshot name	The snapshot name.
Snapshot size	Snapshot size, representing the actual amount of data recorded in the snapshot. The unit is bytes. **Note**: Snapshot size may vary due to LUN issues or parent snapshot deletion.
Source LUN	The source LUN name.
Source LUN capacity	Source LUN capacity at snapshot creation.
Consistency snapshot	The name of the consistency snapshot it belongs to. **Note**: If not displayed, it indicates it's only a LUN snapshot.
Clone LUN count	The number of clone LUNs associated with the snapshot.
Retain policy	Snapshot reclaim policy: ● Delete: Automatically deleted when the snapshot has no associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). ● Retain: Retained when the snapshot has no associated

	clone LUNs and has at most one child node.
Status	Snapshot status: ● Normal. ● Error. ● Pending: The snapshot is being created. ● Deleting.
Created time	The creation time of the snapshot.

3.9.2 View/Edit a Snapshot

On the **Snapshot Management > Snapshot** page, click specific snapshot name to view the detailed information of the snapshot.

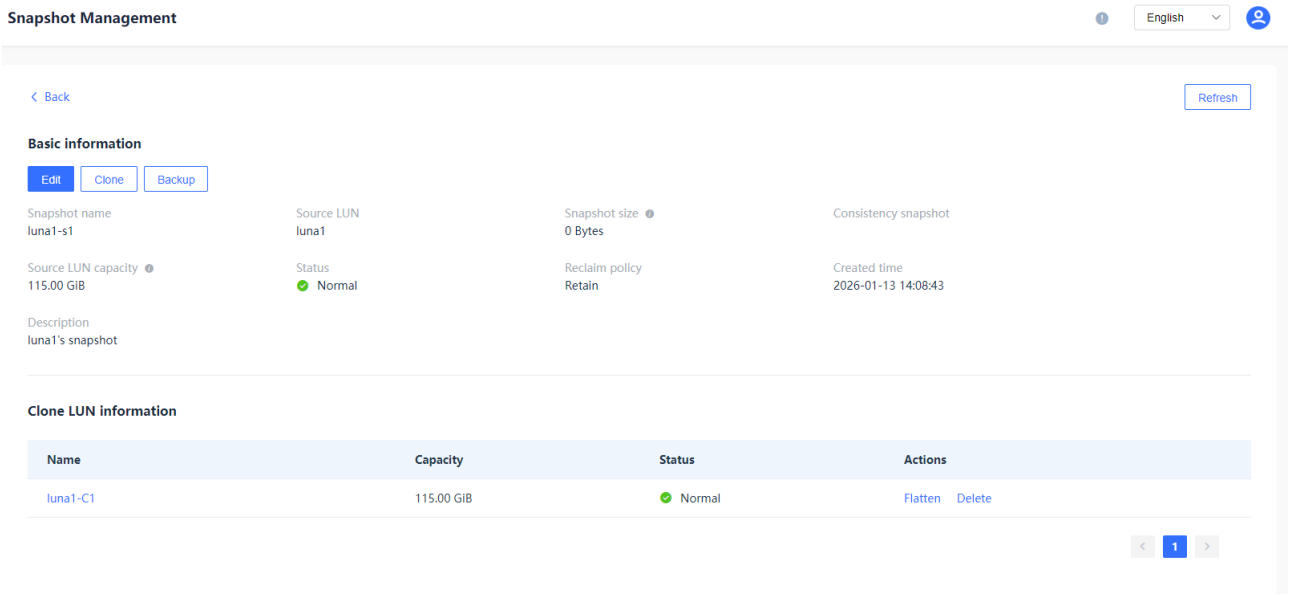


Figure 107. Snapshot Details

Basic information

Click **Edit** to edit the snapshot, see **Edit a Snapshot** for details. Click **Clone** to create a clone LUN, see **Create a Clone LUN** for details. Click **Backup** to create a backup, see **Create Backup (Local LUN)** for details.

Name	Description
Snapshot name	The snapshot name.
Source LUN	The source LUN name.
Snapshot size	Snapshot size, representing the actual amount of data recorded in the snapshot. The unit is bytes. **Note**: Snapshot size may vary due to LUN issues or parent snapshot deletion.
Consistency snapshot	The name of the consistency snapshot it belongs to. **Note**: If not displayed, it indicates it's only a LUN snapshot.
Source LUN capacity	Source LUN capacity at snapshot creation.
Status	Snapshot status: ● Normal. ● Error. ● Pending. ● Deleting.
Retain policy	Snapshot reclaim policy: ● Delete: Automatically deleted when the snapshot has no

	associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). ● Retain: Retained when the snapshot has no associated clone LUNs and has at most one child node.
Created time	The creation time of the snapshot.
Description	Snapshot description.

Clone LUN information

Name	Description
Name	The clone LUN name.
Capacity	The clone LUN capacity.
Status	The clone LUN status: ● Normal. ● Deleting. ● DeleteFailed. ● Flattening. ● Rollbacking. ● Importing. ● Wiping. ● WipeFailed.
Actions	Click **Flatten** to disconnect the relationship between a clone LUN and a snapshot. After disconnection, the clone LUN becomes an independent one. Click **Delete** to delete the clone LUN.

3.9.3 Create a Snapshot

You can create a snapshot in the following ways:

- On the **Data protection** > **Snapshot Management** > **Snapshot** page, click **Create** to create a snapshot.
- On the **Service** > **LUN Management** page, select a LUN and click **Actions** > **Create snapshot** to create a snapshot.

Note:

- Before performing this operation, ensure all data on the source LUN is persistent. If the source LUN is mounted by a client, make sure the client's data has been synchronized to the LUN. Before creating a snapshot:
  - For Linux clients: If the client supports `sync -f` (check with `sync --help`), run `sync -f`; otherwise, run `sync`.
  - For Windows clients: Take the disk corresponding to the source LUN offline on the client before the snapshot, and bring it back online afterward.
- The source LUN needs to be in Normal status.

Usage restrictions:

- Maximum snapshots per LUN: 512.
- Maximum snapshots per system: 100,000.
- Maximum clones per snapshot: 512.
- Maximum snapshot depth per system: 512.

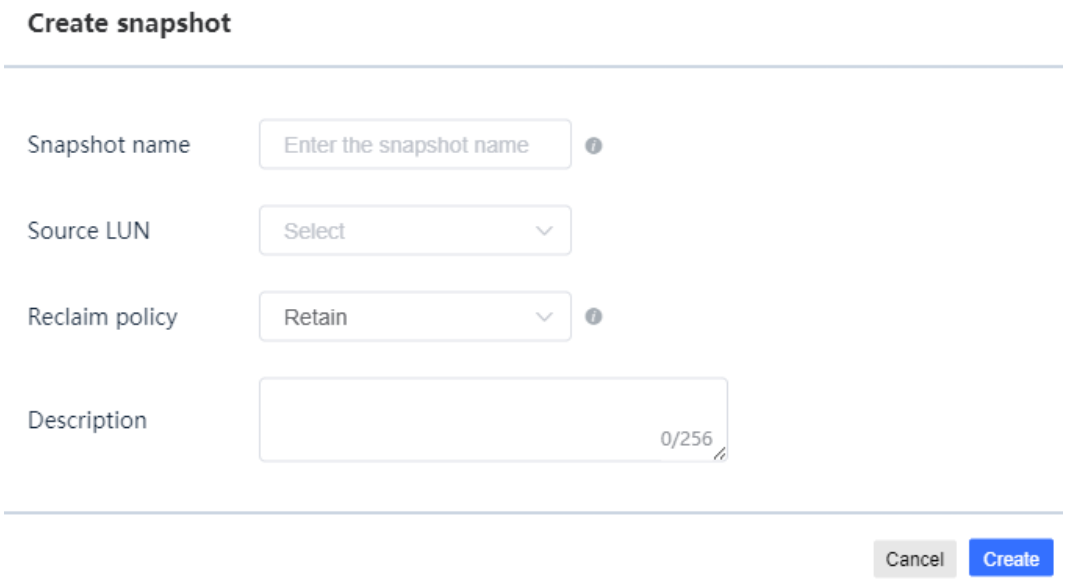


Figure 108. Create a Snapshot

Name	Description
Snapshot name	Specifies the snapshot name The value is a string of 1 to 256 case-sensitive characters. It can

	contain letters, digits, hyphens (-), or underscores (_). Only supports starting with a letter or a digit. **Note**: Snapshot names, consistency snapshot names, and names of single-LUN snapshots in a consistency snapshot must be unique and not duplicated across each other.
Source LUN	Specifies the source LUN for the snapshot. **Note**: Snapshots can only be created for local LUNs.
Reclaim policy	Specifies snapshot reclaim policy: ● Delete: Automatically deleted when the snapshot has no associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). **Note**: If the snapshot reclaim policy is set to `Delete`, the following operations will trigger snapshot deletion: rolling back a consistency snapshot, rolling back a snapshot, flattening a clone LUN, deleting a clone LUN, wiping a LUN, and deleting a snapshot. ● Retain: Retained when the snapshot has no associated clone LUNs and has at most one child node. The default value is Retain.
Description	Specifies the snapshot description. The value is a string of 1 to 256 characters.

3.9.4 Edit a Snapshot

You can edit snapshot information in the following ways:

- On the **Data protection** > **Snapshot Management** > **Snapshot** page, select the target snapshot, click **Actions** > **Edit**, and enter the **Edit snapshot** page to edit snapshot information.
- On the **Data protection** > **Snapshot Management** > **Snapshot** page, click the target snapshot to view its details. Click **Edit** in the **Basic information** section to access the **Edit snapshot** page to edit snapshot information.
- On the **Service** > **LUN Management** page, click the source LUN of the target snapshot. On the LUN details page, right-click the specific snapshot in the **Snapshot Tree**, select **Edit**, and enter the **Edit snapshot** page to edit snapshot information.
- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, click the target consistency snapshot to view its details. Select the target snapshot, click **Edit** in the **LUN Snapshots** section, and enter the **Edit snapshot** page to edit snapshot information.

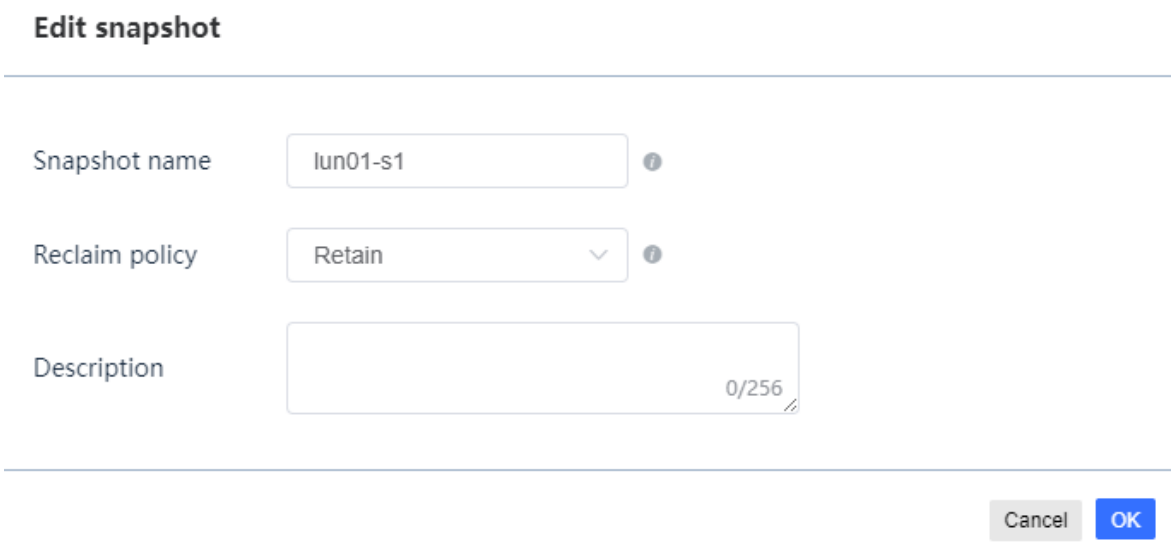


Figure 109. Edit a Snapshot

Name	Description
Snapshot name	Specifies the snapshot name. The value is a string of 1 to 256 case-sensitive characters. It can contain letters, digits, hyphens (-), or underscores (_). Only supports starting with a letter or a digit. **Note**: Snapshot names, consistency snapshot names, and names of single-LUN snapshots in a consistency snapshot must be unique and not duplicated across each other.
Reclaim policy	Specifies snapshot reclaim policy: ● Delete: Automatically deleted when the snapshot has no

	associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). ● Retain: Retained when the snapshot has no associated clone LUNs and has at most one child node.
Description	Specifies the snapshot description. The value is a string of 1 to 256 characters.

3.9.5 Roll Back a Snapshot

Prerequisite: Both the snapshot to be rolled back and the source LUN must be in Normal status.
You can roll back a snapshot in the following ways:

- On the **Data protection** > **Snapshot Management** > **Snapshot** page, select the target snapshot, and click **Actions** > **Rollback** to roll back the snapshot.
- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, click the target consistency snapshot to view its details. Select the target snapshot and click **Rollback** in the **LUN Snapshots** section to roll back the snapshot.
- On the **Service** > **LUN Management** page, click the source LUN of the target snapshot. On the LUN details page, right-click the specific snapshot in the **Snapshot Tree** and select **Rollback** to roll back the snapshot.

Note:

- This operation overwrites the source LUN's data with the snapshot's data. It is recommended to create a new snapshot of the source LUN to back up the data.
- If the source LUN of the snapshot is a clone LUN and is flattening operation, rollback using any snapshot of this clone LUN is not allowed.
- If the source LUN has a snapshot being created, you cannot perform the rollback operation.
- If the source LUN is mounted by a client, unmount it before rollback and remount it afterward:
  - For Linux clients:
    1. Before rollback, run the command on the client: **`umount`** *`DIRECTORY_NAME_OR_PATH`*
    2. After rollback, run the command on the client: **`mount`** *`/dev/sdx DIRECTORY_NAME_OR_PATH`*
  - For Windows clients:
    1. Before rollback, take the corresponding disk offline on the client.
    2. After rollback, bring the corresponding disk back online on the client.

For a LUN in rollback status:

- Read and write operations are not allowed.
- No new snapshots can be created.
- No further rollback operations are allowed.
- You cannot delete the snapshot being rolled back.
- The snapshot cannot be modified.
- The LUN cannot be modified.
- The LUN cannot be expanded.
- If it is a clone LUN, no relationship chain break operation can be performed.

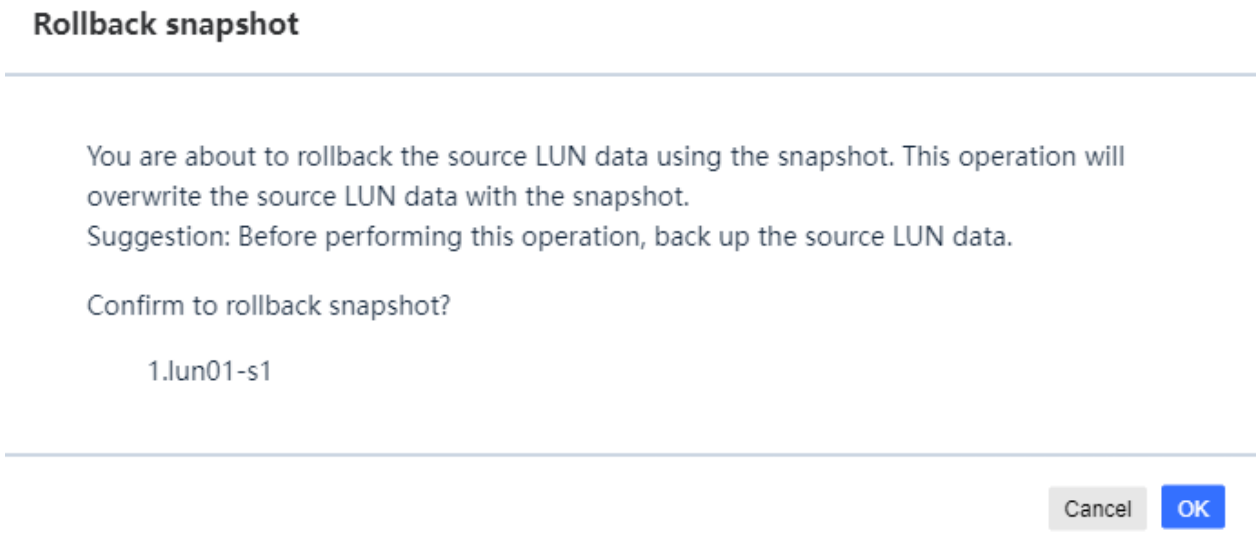


Figure 110. Roll Back a Snapshot

3.9.6 Create a Clone LUN

You can create a clone LUN in the following ways:

- For local LUNs with snapshots, go to the **LUN Management** page, click the LUN name to enter its details page, right-click a specific snapshot under the **Snapshot Tree**, select **Clone**, and you can create a clone LUN.
- On the **Data protection** > **Snapshot Management** > **Snapshot** page, select the target snapshot, click to enter its details page, click **Clone** in **Basic information**, and you can create a clone LUN.
- On the **Data protection** > **Snapshot Management** > **Snapshot** page, select the target snapshot and click **Clone** in **Actions** to create a clone LUN.
- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, select the target consistency snapshot, click to enter its details page, check a target LUN snapshot, and click **Clone** to create a clone LUN.

Prerequisite: The snapshot used for creating a clone LUN must be in "Normal" status.

Notes:

- Maximum clone LUNs supported by the system: 100,000.
- Maximum clone LUNs creatable from a single snapshot: 512.
- Maximum cloning depth supported by the system: 16.

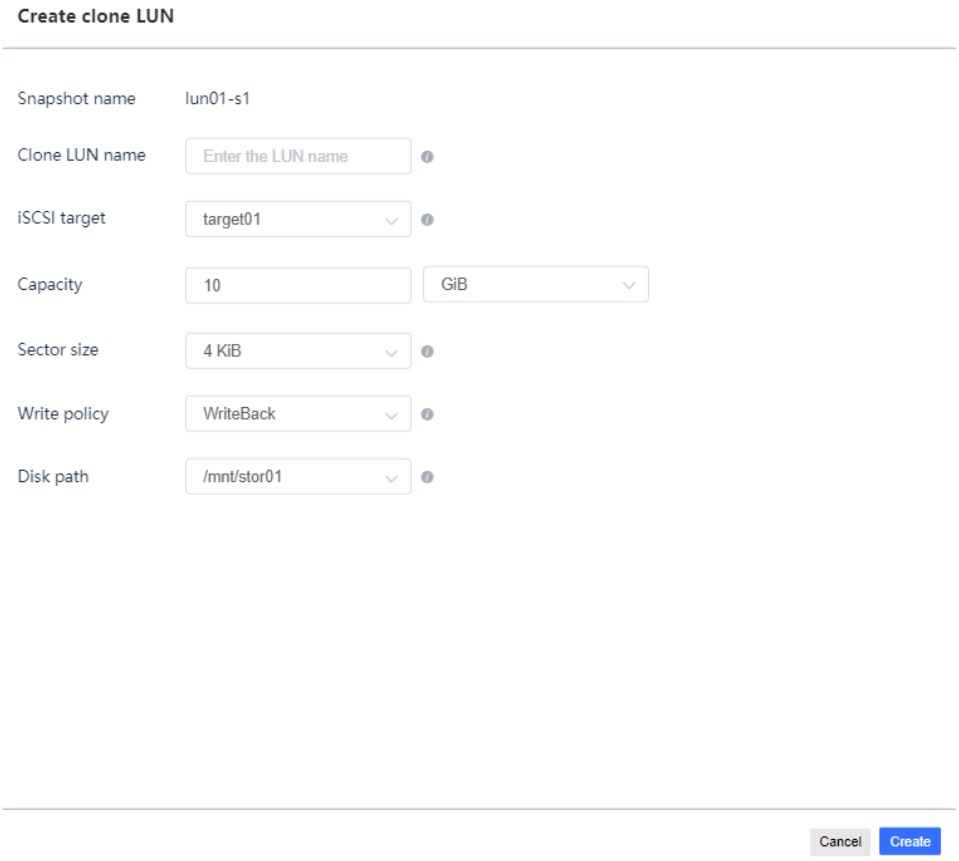


Figure 111. Create a Clone (Standalone Mode)

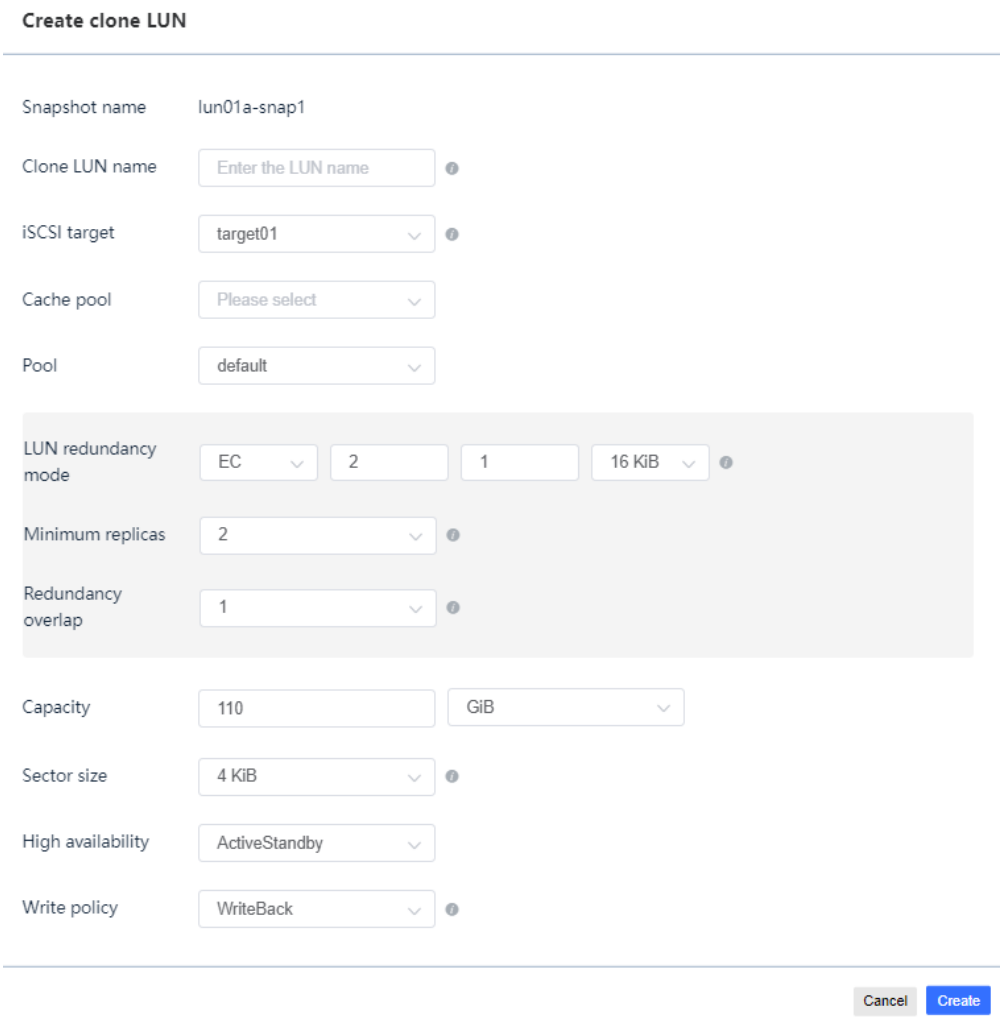


Figure 112. Create a Clone LUN (Cluster Mode)

Name	Description
Snapshot name	The name of the snapshot associated with the clone LUN.
Clone LUN name	Specifies the clone LUN name. The value is a string of 1 to 16 case-sensitive characters. It can contain letters, digits, or hyphens (-). Only supports starting with a letter or a digit.
iSCSI target	Specifies the name of the iSCSI target associated with the clone LUN, which can differ the from source LUN's iSCSI target. The value is a string of 1 to 16 case-sensitive characters. It can contain lowercase letters, dots (.), digits, or hyphens (-). Only supports starting with a letter or a digit. **Note**: If the specified iSCSI target name does not exist when creating a clone LUN, the iSCSI target will be created at the same time, the reclaim policy of the iSCSI target is Delete.

Cache pool	Specifies a cache storage pool, only supported by cluster mode. The default value matches the source LUN's configuration. **Note**: ● The `Pool` and Cache pool must not be the same. ● If the clone LUN's `Pool` and `Cache pool` settings match the source LUN's, no extra configuration is needed. If either the `Pool` or `Cache pool` for the clone LUN is set separately, the corresponding settings of the source LUN are overridden, and the configured parameter values are used. For example, if the source LUN has both `Cache pool` and `Pool` and the clone LUN only sets `Pool` without setting `Cache pool`, then the clone LUN will only use the newly set `Pool` and have no `Cache pool`. Conversely, if the clone LUN sets `Cache pool`, you must also set `Pool` or use the base storage pool.
Pool	Specifies the storage pool, only supported by cluster mode. The default value matches the source LUN's configuration. **Note**: ● The `Pool` and Cache pool must not be the same. ● If the clone LUN's `Pool` and `Cache pool` settings match the source LUN's, no extra configuration is needed. If either the `Pool` or `Cache pool` for the clone LUN is set separately, the corresponding settings of the source LUN are overridden, and the configured parameter values are used. For example, if the source LUN has both `Cache pool` and `Pool` and the clone LUN only sets `Pool` without setting `Cache pool`, then the clone LUN will only use the newly set `Pool` and have no `Cache pool`. Conversely, if the clone LUN sets `Cache pool`, you must also set `Pool` or use the base storage pool.
LUN redundancy mode	Specifies the clone LUN data storage redundancy mode, only supported by cluster mode. Value: ● single-copy. ● 2-copy. ● 3-copy. ● EC *N+M*: Erasure code mode. N and M are positive integers, N ≥ M, and N + M ≤ 128. This indicates that the data is divided into N fragments and M pieces of verification data are generated. The default value matches the source LUN's configuration. **Note**: (All scenarios are based on the premise of cluster availability): ● After an EC *N+M* LUN is created: ■ Data can be written to the LUN if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to

	the minimum number of replicas of the LUN. Data cannot be written to the LUN and an alarm is generated if the number of available fault domains in the storage pool where the LUN resides is smaller than the minimum number of replicas. ■ Data in the LUN is normal and will not degrade if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to N+M. Data in the LUN is being degraded if the number of available fault domains in the storage pool where the LUN resides is between [N, N+M]. We recommend that you add or repair the fault domains as soon as possible. Data written to the storage pool is corrupted if the number of available fault domains in the storage pool where the LUN resides is less than N. ● After a LUN in replica mode is created: ■ Data can be written to the LUN if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to the minimum number of replicas of the LUN. Data cannot be written to the LUN and an alarm is generated if the number of available fault domains in the storage pool where the LUN resides is smaller than the minimum number of replicas. ■ Data in the LUN is normal and will not degrade if the number of available fault domains in the storage pool where the LUN resides is greater than or equal to the number of replicas. For a two-replica or three-replica LUN, data in the LUN data is being degraded if the fault domain in the storage pool where the LUN resides is greater than or equal to 1, but less than the number of replicas. We recommend that you add or repair fault domains as soon as possible. Data written to the storage pool is corrupted if no fault domain is available in the storage pool where the LUN resides.
Minimum replicas	Specifies the minimum replica number, only supported by cluster mode. Click the **More** button after LUN redundancy mode to fill in minimum replica number. ● For a LUN in replica mode, assuming that the number of LUN replicas is X and the minimum replica number is Y (must satisfy Y <=X), each time the data is written to LUN, at least Y replicas of data are written successfully before this write request is considered successful. ● For a LUN in EC N + M mode, assuming that the minimum replica number of the LUN is set to Y (must satisfy N<=Y<=N + M), the data blocks and parity blocks that sum to at least Y blocks are written successfully before this write request is considered successful. Value: For a LUN in replica mode, the value is an integer that ranges from 1 to *N*, where *N* is the number of replicas. For a LUN in EC N + M mode, the value is an

	integer that ranges from *N* to *N* + *M*. The default value matches the source LUN's configuration.
Redundancy overlap	Specifies the number of copies/fragments from the same data which are allowed to be distributed in the same fault domain, only supported by cluster mode. Different copies/fragments of the same data are distributed in different fault domains generally. When the fault domain is damaged, it is allowed to place multiple copies/fragments in the same fault domain but different paths according to the redundancy overlap principle. **Note**: If fault domain level of the storage pool is path, this parameter does not take effect. Value: For a LUN in replica mode, the value is an integer that ranges from 1 to *N*, where *N* is the number of replicas. For a LUN in EC N + M mode, the value is an integer that ranges from 1 to *N* + *M*. The default value matches the source LUN's configuration.
Capacity	Specifies the storage capacity of the clone LUN. Integer format, with optional units (GiB, TiB, PiB) following the number. The default is the source LUN's capacity at the snapshot time. If reconfigured, it must be no less than the source LUN's capacity at the snapshot time.
Sector size	Specifies the sector size. The value is 512 Bytes or 4 KiB. The default value matches the source LUN's configuration. **Note**: Selection of sector size: According to your business scenario, under normal circumstances, if the data size of a single I/O operation is greater than or close to 4KiB, it is recommended to choose 4 KiB; if the data size of a single I/O operation is close to 512bytes, it is recommended to choose 512 Bytes.
High availability	Set the high availability type of the clone LUN, only supported by cluster mode: ● ActiveStandby: Enable active and standby. The LUN is associated with all IQNs under the corresponding target. ● Disabled: Disable active and standby LUNs. The LUN is associated with 1 target IQN under the corresponding target. The default value matches the source LUN's configuration.
Write policy	The write policy of the clone LUN ● WriteBack: After the data is written to the memory, it returns to the client successfully, and then the data is written to the disk asynchronously. It is suitable for scenarios with high performance requirements and low stability requirements. ● WriteThrough: The data is written to both memory and disk at the same time, and then returns to the client after successful writing. It is suitable for scenarios that the stability requirements are high, the write performance requirements are not high, and the recently written data will be read in a

	short time. ● WriteAround: Write data directly to the disk without writing to memory. It is suitable for scenarios with high stability requirements, low performance requirements, and more writing and less reading. The default value matches the source LUN's configuration.
Disk path	Specifies the disk path to store clone LUN data, only supported by standalone mode. The default disk path matches the source LUN's configuration. Value: It can only contain letters, numbers, Chinese characters, or the special characters ~ ! @ $ ( ) _ + - ; . :.

3.9.7 Create Backup (Local LUN)

Backups are divided into full backups and incremental backups:

- Full backup: Exports all data from the LUN's creation up to the selected snapshot into a backup file.
- Incremental backup: Exports only the changed data between two snapshots into a backup file. For example, creating an incremental backup from snap1 to snap2 exports the LUN's data between the time of snap1 and the time of snap2.

Note:

- Backups can only be created when all snapshots are in Normal status.
- Backups can only be created when the LUN is in Normal, Flattening, or Rollbacking status.
- When exporting a backup, the associated snapshots and LUN must not be deleted.
- Each server can export a maximum of 4 backups simultaneously. The server here refers to the server where the snapshot source LUN's Active IQN resides.

You can create backup in the following ways:

- On the **Service** > **LUN Management** page, select the target LUN and click **Actions** > **Create backup** to create either a full backup or an incremental backup.
  Note: Only LUNs that already have at least one snapshot can be used to create a backup.
- On the **Service** > **LUN Management** page, click the source LUN of the target snapshot. On the LUN details page, right-click the specific snapshot in the **Snapshot Tree** and select **Backup** to create either a full backup or an incremental backup.
- On the **Data protection** > **Snapshot Management** > **Snapshot** page, select the target snapshot and click **Actions** > **Create backup** to create either a full backup or an incremental backup of the snapshot.
- On the **Data protection** > **Snapshot Management** > **Snapshot** page, click the target snapshot name to enter the snapshot details page. Under **Basic information**, click **Backup** to create either a full backup or an incremental backup of the snapshot.
- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, click the target snapshot's consistency snapshot to the consistency snapshot details page. Select the target snapshot and click **Backup** in the **LUN Snapshots** section to create either a full backup or an incremental backup of the snapshot.

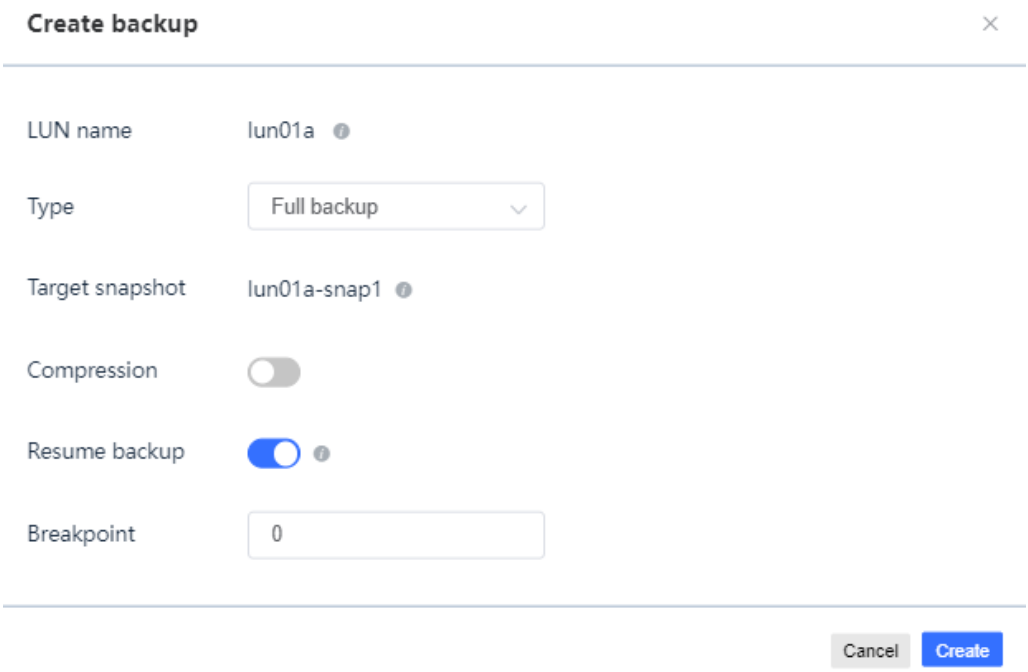


Figure 113. Create a Full Backup

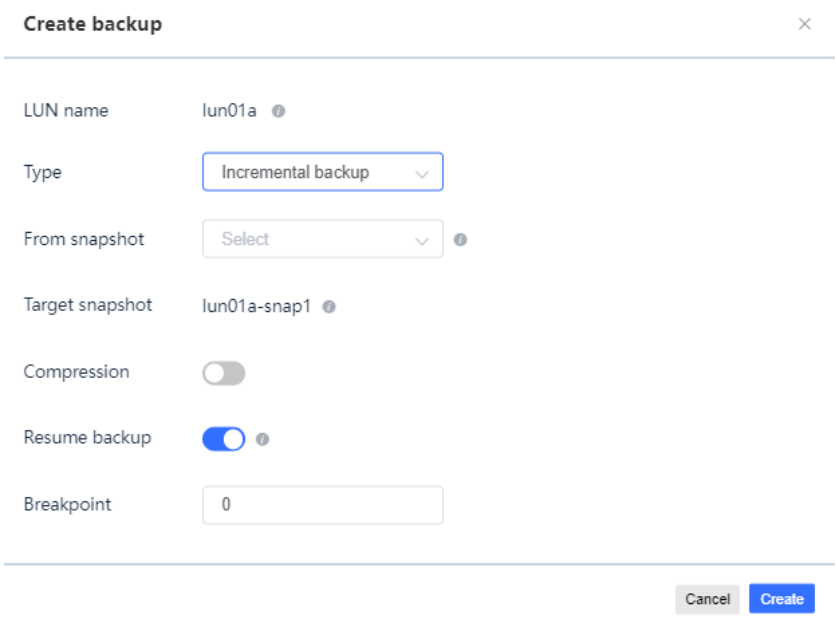


Figure 114. Create an Incremental Backup

Name	Description
LUN name	The LUN name.
Type	The backup type: ● Full backup. ● Increment backup.

From snapshot	Snapshot name, indicating that data created after this snapshot point will be exported. **Note**: This parameter must be provided for an incremental backup, where it serves as the starting snapshot.
Target snapshot	Snapshot name, indicating that the data captured at the snapshot point will be exported.
Compression	Whether to compress the backup file.
Resume backup	If the backup file export is interrupted unexpectedly, you can resume the task from the break point by supplying the size of the last valid slice that was successfully exported.
Breakpoint	Breakpoint position: the starting offset for this export task. If the previous export was interrupted, the task must resume from this offset. Value: The value must be a multiple of 268,435,456, the unit is bytes. Omitting the parameter or supplying 0 means exporting the entire data set. If the supplied value exceeds the backup-file size, an empty backup file is produced. **Note**: For non-compressed backups the file is made up of fixed-size chunks (256 MiB). When calculating the breakpoint of an export task, use the size of the already-exported backup file and the fixed chunk size to determine the size of the successfully exported chunks—this size is the breakpoint. **For example**: 3. After the first interruption, 257 MiB have been written, rounded down to 256 MiB. Breakpoint = 268,435,456 bytes (one complete 256 MiB chunk). 4. After the second interruption, the cumulative amount written is 256 MiB + 530 MiB = 786 MiB, rounded down to 768 MiB (three complete 256 MiB chunks). Breakpoint = 805,306,368 bytes. The same rule applies to any subsequent breakpoints.

3.9.8 Delete Snapshots

You can delete a snapshot in the following ways:

- On the **Data protection** > **Snapshot Management** > **Snapshot** page, select target snapshots, and click **Delete** to delete snapshots.
- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, click the target consistency snapshot to view its details. Select target snapshots and click **Delete** in the **LUN snapshots** section to delete snapshots.
- On the **Service** > **LUN Management** page, click the source LUN of the target snapshot. On the LUN details page, right-click the specific snapshot in the **Snapshot Tree** and select **Delete** to delete the snapshot.

Note:

- If a snapshot has clone LUNs that are still associated, it cannot be deleted.
- If a snapshot has two or more child nodes (indicating other snapshots depend on it or current writes are based on it), it cannot be deleted.
- When a snapshot is in the process of being deleted, only queries and re-deletion of the snapshot are allowed.

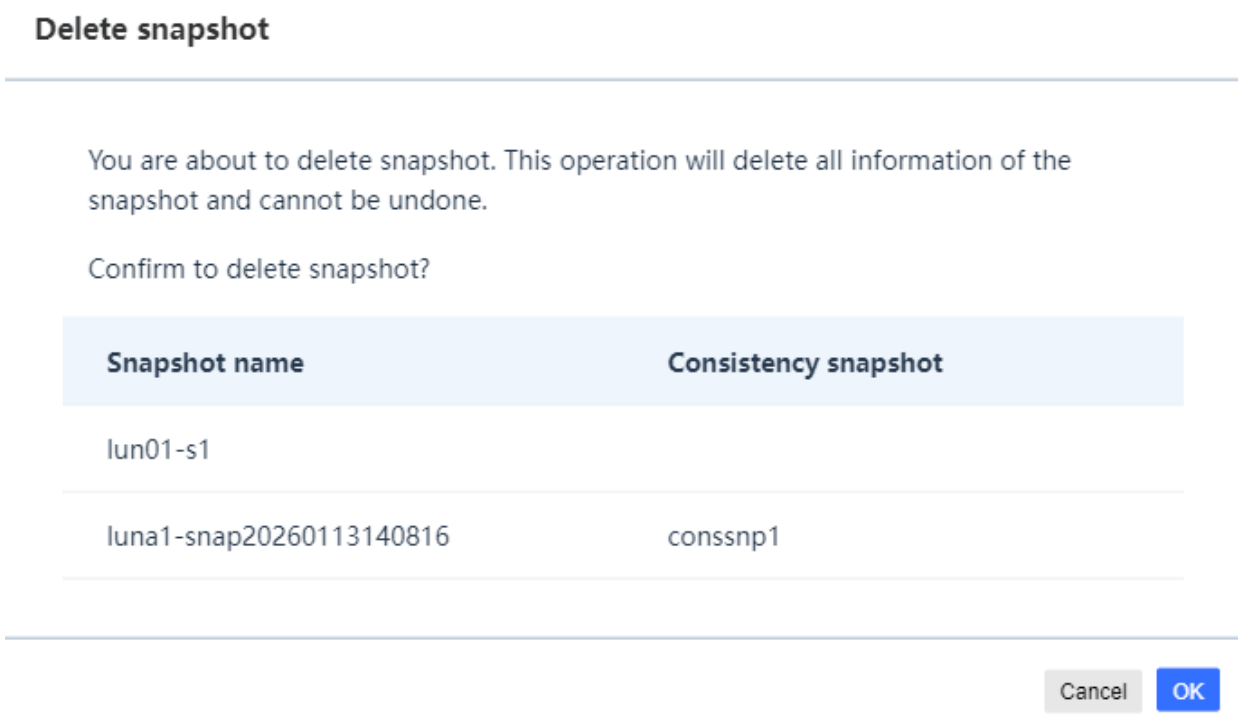


Figure 115. Delete Snapshots

3.10 Consistency Snapshot

Click **Data protection** > **Snapshot** in the navigation bar to enter the **Snapshot Management** page. Click **Consistency Snapshot** to manage consistency snapshots, including: viewing, creating, editing, rolling back, deleting consistency snapshots, or creating clone LUNs.

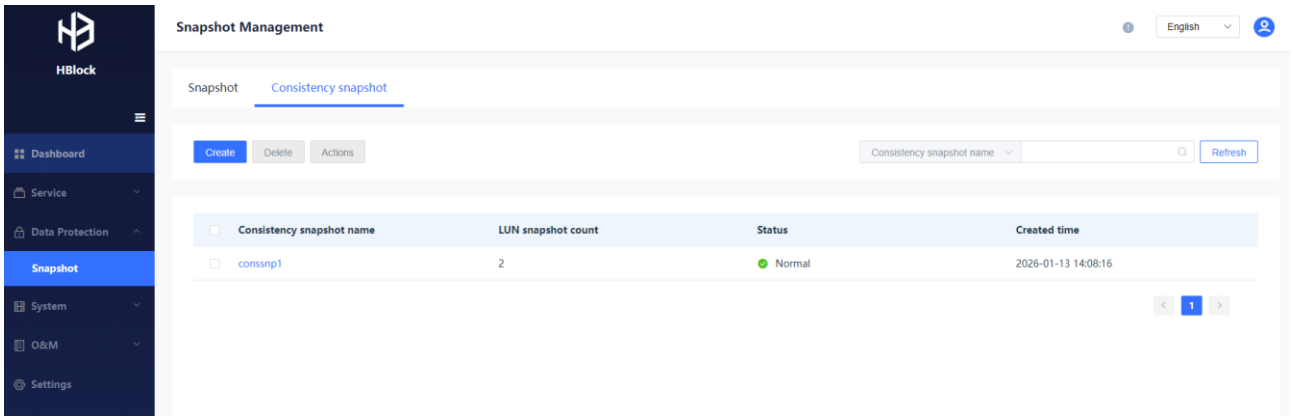


Figure 116. Consistency Snapshot List

3.10.1 Consistency Snapshot List

Click **Data protection**> **Snapshot** in the navigation bar to enter the **Snapshot Management** page. On the **Snapshot Management** page, click **Consistency Snapshot** to view consistency snapshot information. You can search for the corresponding consistency snapshot by consistency snapshot name.

Name	Description
Consistency snapshot name	The consistency snapshot name.
LUN snapshot count	Number of single-LUN snapshots in the consistency snapshot.
Status	Consistency snapshot status: ● Normal. ● Error. ● Pending: The consistency snapshot is being created. ● Deleting.
Created time	The creation time of the consistency snapshot.

3.10.2 View/Edit a Consistency Snapshot

On the **Snapshot Management >Consistency Snapshot** page, click specific consistency snapshot name to view the detailed information of the consistency snapshot.

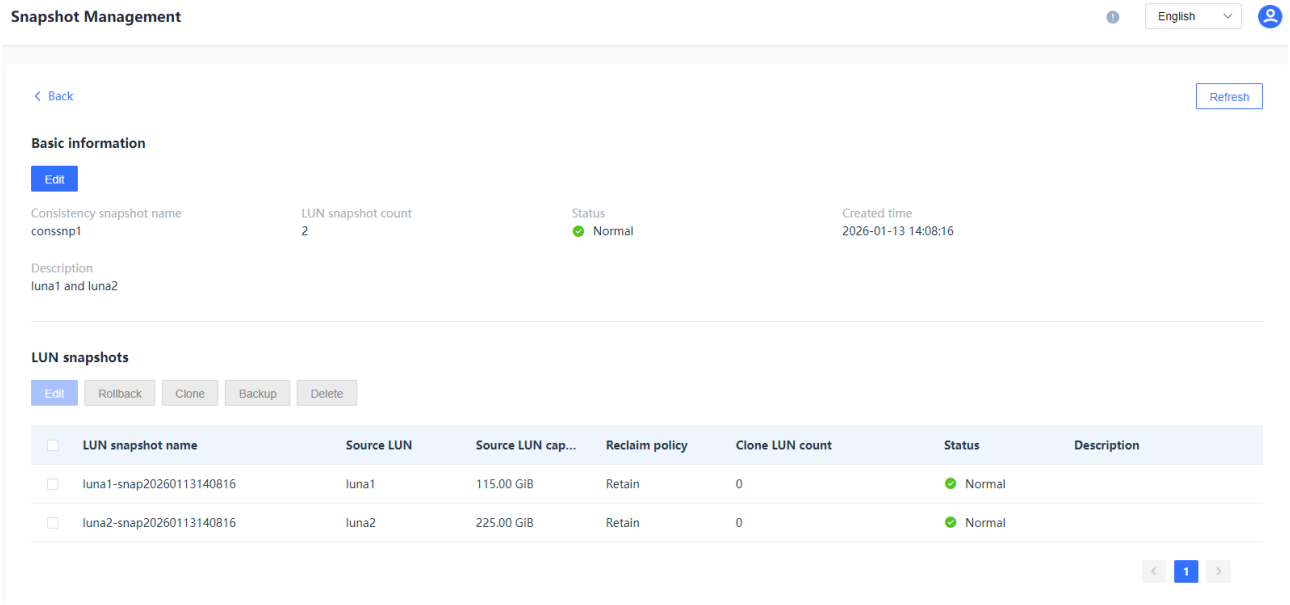


Figure 117. Consistency Snapshot Details

Basic information

Click **Edit** to edit the consistency snapshot information, see **Edit a Consistency Snapshot** for details.

Name	Description
Consistency snapshot name	The consistency snapshot name.
LUN snapshot count	Number of single-LUN snapshots in the consistency snapshot.
Status	Consistency snapshot status: ● Normal. ● Error. ● Pending: The consistency snapshot is being created. ● Deleting.
Created time	The creation time of the consistency snapshot.
Description	Consistency snapshot description.

LUN snapshots

Click **Edit** to edit the snapshot. See **Edit a Snapshot** for details. Click **Clone** to create a clone LUN, see **Create a Clone LUN** for details. Click **Backup** to create backup, see **Create Backup (Local LUN)** for details.

Name	Description
LUN snapshot name	The single-LUN snapshot name.
Source LUN	The source LUN name.

Source LUN capacity	Source LUN capacity at snapshot creation.
Reclaim policy	Snapshot reclaim policy: ● Delete: Automatically deleted when the snapshot has no associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). ● Retain: Retained when the snapshot has no associated clone LUNs and has at most one child node.
Clone LUN count	The number of clone LUNs.
Status	Snapshot status: ● Normal. ● Error. ● Pending. ● Deleting.
Description	Snapshot description.

3.10.3 Create a Consistency Snapshot

You can create a consistency snapshot in the following ways:

- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, click **Create** to create a consistency snapshot.
- On the **Service** > **LUN Management** page, select LUNs and click **Actions** > **Create consistency snapshot** to create a consistency snapshot.

Usage restrictions: Maximum number of LUNs for a consistency snapshot: 512.

Note:

- Before performing this operation, ensure all data on the source LUN is persistent. If the source LUN is mounted by a client, make sure the client's data has been synchronized to the LUN. Before creating a consistency snapshot:
  - For Linux clients: If the client supports `sync -f` (check with `sync --help`), run `sync -f`; otherwise, run `sync`.
  - For Windows clients: Take the disk corresponding to the source LUN offline on the client before the snapshot, and bring it back online afterward.
- The source LUNs need to be in Normal status.

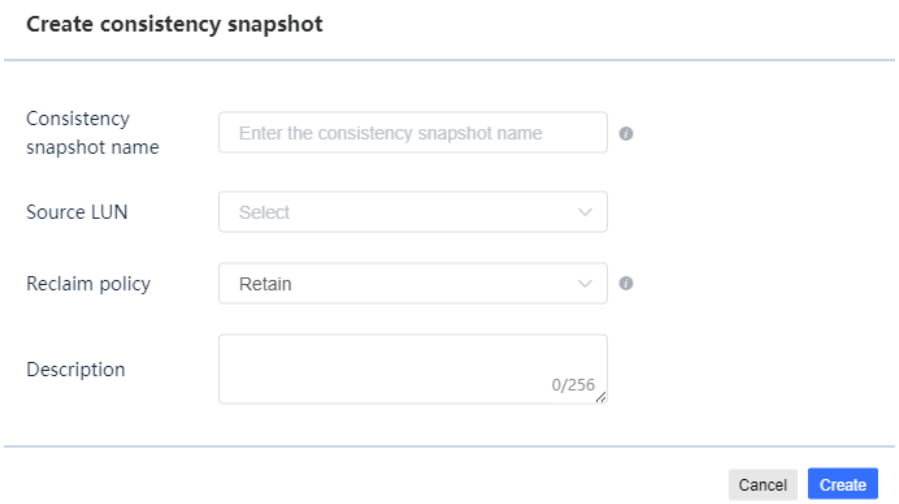


Figure 118. Create a Consistency Snapshot

Name	Description
Consistency snapshot name	Specifies the consistency snapshot name. The value is a string of 1 to 256 case-sensitive characters. It can contain letters, digits, hyphens (-), or underscores (_). Only supports starting with a letter or a digit. **Note**: Snapshot names, consistency snapshot names, and names of single-LUN snapshots in a consistency snapshot must be unique and not duplicated across each other.
Source LUN	Specifies source LUNs for the consistency snapshot. You can

	specify multiple source LUNs at once. **Note**: ● Consistency snapshot can only be created for local LUNs. ● Maximum number of LUNs for a consistency snapshot: 512.
Reclaim policy	Specifies reclaim policy for single-LUN snapshots in the consistency snapshot: ● Delete: Automatically deleted when the snapshot has no associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). ● Retain: Retained when the snapshot has no associated clone LUNs and has at most one child node. The default value is Retain.
Description	Specifies the consistency snapshot description. The value is a string of 1 to 256 characters.

3.10.4 Create a Consistency Snapshot from the Same Source LUNs

On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, select the target consistency snapshot and click **Actions** > **Same LUN create** to access the **Create consistency snapshot** page. The source LUNs for the new consistency snapshot will be the same as those of the selected consistency snapshot.

Note:

- Before performing this operation, ensure all data on the source LUN is persistent. If the source LUN is mounted by a client, make sure the client's data has been synchronized to the LUN. Before creating a consistency snapshot:
  - For Linux clients: If the sync version is 8.6 or higher (check with the `sync --version` command), run `sync -f` on the client. If the sync version is below 8.6, run the `sync` command.
  - For Windows clients: Take the disk corresponding to the source LUN offline on the client before the snapshot, and bring it back online afterward.
- The source LUNs need to be in Normal status.

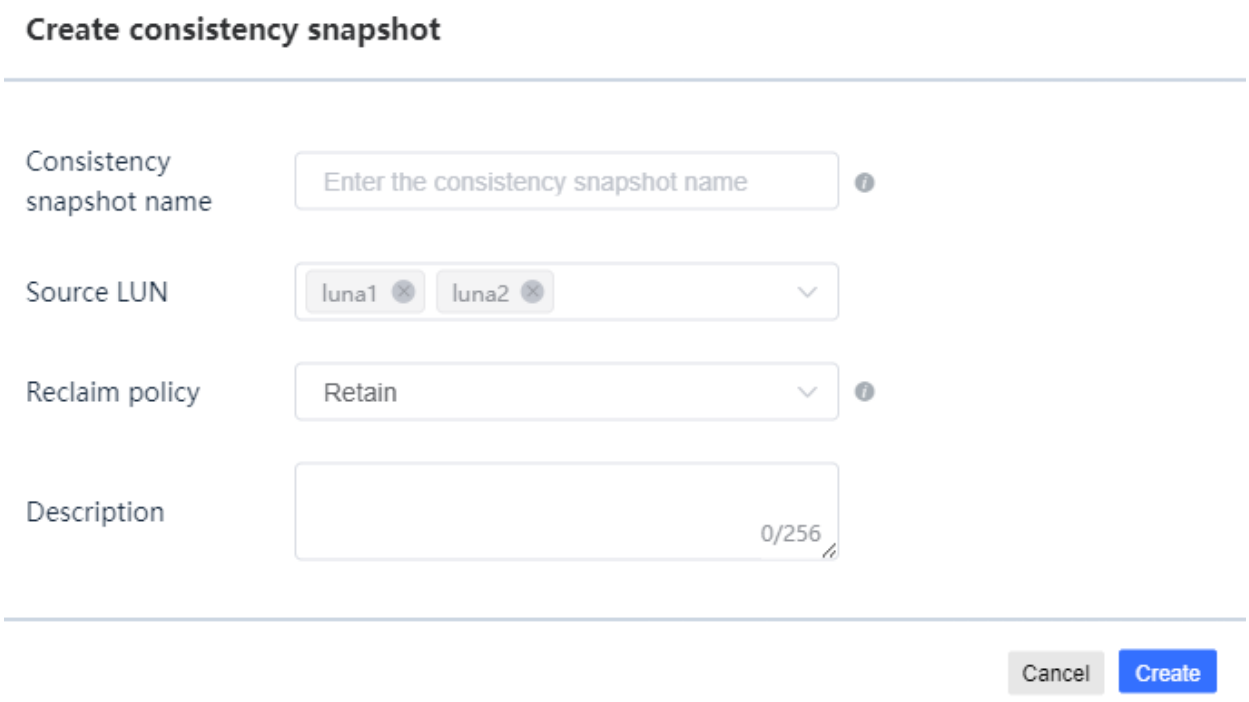


Figure 119. Create a Consistency Snapshot from the Same Source LUNs

Name	Description
Consistency snapshot name	Specifies the consistency snapshot name. The value is a string of 1 to 256 case-sensitive characters. It can contain letters, digits, hyphens (-), or underscores (_). Only supports starting with a letter or a digit.

	Note: Snapshot names, consistency snapshot names, and names of single-LUN snapshots in a consistency snapshot must be unique and not duplicated across each other.
Source LUN	The source LUNs corresponding to the consistency snapshot. By default, they're the same as the source LUNs of the target consistency snapshot.
Reclaim policy	Specifies reclaim policy for single-LUN snapshots in the consistency snapshot: ● Delete: Automatically deleted when the snapshot has no associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). ● Retain: Retained when the snapshot has no associated clone LUNs and has at most one child node. The default value is Retain.
Description	Specifies the consistency snapshot description. The value is a string of 1 to 256 characters.

3.10.5 Edit a Consistency Snapshot

You can edit consistency snapshot information in the following ways:

- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, select the target consistency snapshot, click **Actions** > **Edit**, and enter the **Edit consistency snapshot** page to edit consistency snapshot information.
- On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, click the target consistency snapshot to view its details. Click **Edit** in the **Basic information** section to access the **Edit consistency snapshot** page to edit consistency snapshot information.

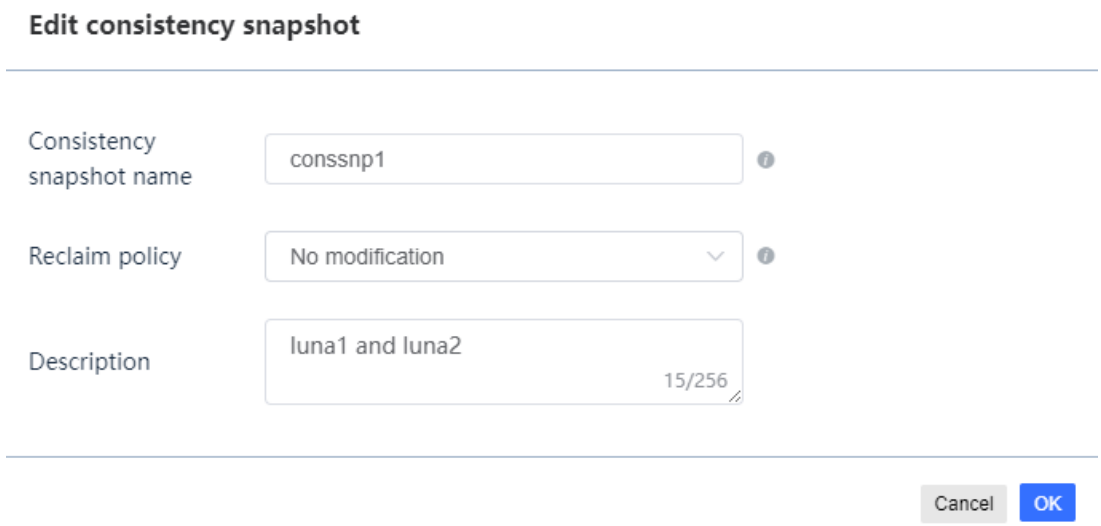


Figure 120. Edit a Consistency Snapshot

Name	Description
Consistency snapshot name	Specifies the consistency snapshot name. The value is a string of 1 to 256 case-sensitive characters. It can contain letters, digits, hyphens (-), or underscores (_). Only supports starting with a letter or a digit. **Note**: Snapshot names, consistency snapshot names, and names of single-LUN snapshots in a consistency snapshot must be unique and not duplicated across each other.
Reclaim policy	Specifies reclaim policy for single-LUN snapshots in the consistency snapshot: ● No modification: Maintain the current reclaim policy unchanged. ● Delete: Automatically deleted when the snapshot has no associated clone LUNs and has at most one child node (indicating no other snapshots depend on it or current write operations aren't based on it). ● Retain: Retained when the snapshot has no associated clone

	LUNs and has at most one child node.
Description	Specifies the consistency snapshot description. The value is a string of 1 to 256 characters.

3.10.6 Roll Back a Consistency Snapshot

Prerequisite: Both the consistency snapshot to be rolled back and source LUNs must be in Normal status.

On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, select the target consistency snapshot, click **Actions** > **Rollback** to roll back the consistency snapshot.

Note:

- This operation overwrites the source LUN's data with the consistency snapshot's data. It is recommended to create a new snapshot or consistency snapshot of source LUNs to back up the data.
- If the source LUN is mounted by a client, unmount it before rollback and remount it afterward:
  - For Linux clients:
    1. Before rollback, run the command on the client: **`umount`** *`DIRECTORY_NAME_OR_PATH`*
    2. After rollback, run the command on the client: **`mount`** */dev/sdx* *`DIRECTORY_NAME_OR_PATH`*
  - For Windows clients:
    1. Before rollback, take the corresponding disk offline on the client.
    2. After rollback, bring the corresponding disk back online on the client.
- If the source LUN of the consistency snapshot is a clone LUN and is flattening operation, rollback using any snapshot of this clone LUN is not allowed.

If a single-LUN snapshot in a consistency snapshot is in the deletion process, you can still roll back other snapshots in normal status within the same consistency snapshot. The snapshot in the deletion status won't be rolled back.

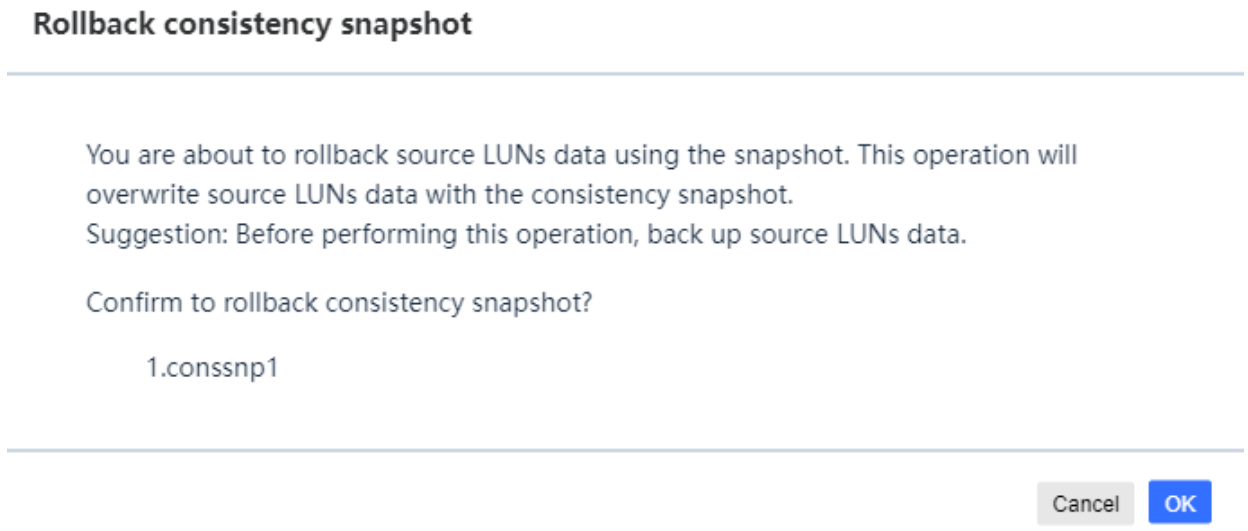


Figure 121. Roll Back a Consistency Snapshot

3.10.7 Delete Consistency Snapshots

On the **Data protection** > **Snapshot Management** > **Consistency Snapshot** page, select target consistency snapshots, and click **Delete** to delete consistency snapshots.

Note:

- If a single-LUN snapshot in a consistency snapshot has clone LUNs that are still associated, the consistency snapshot cannot be deleted.
- Deleting a consistency snapshot will delete all single-LUN snapshots under it.
- When a consistency snapshot is in the process of being deleted, only query is allowed.

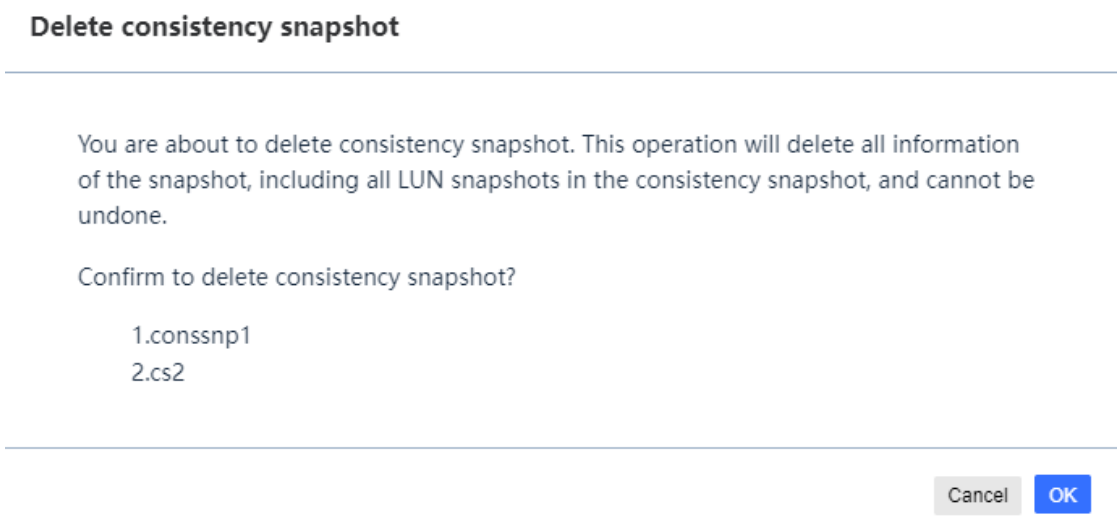


Figure 122. Delete Consistency Snapshots

3.11 Cluster Topology (Cluster Mode)

Click **System** > **Topology** in the navigation bar to enter the **Cluster Topology** page.

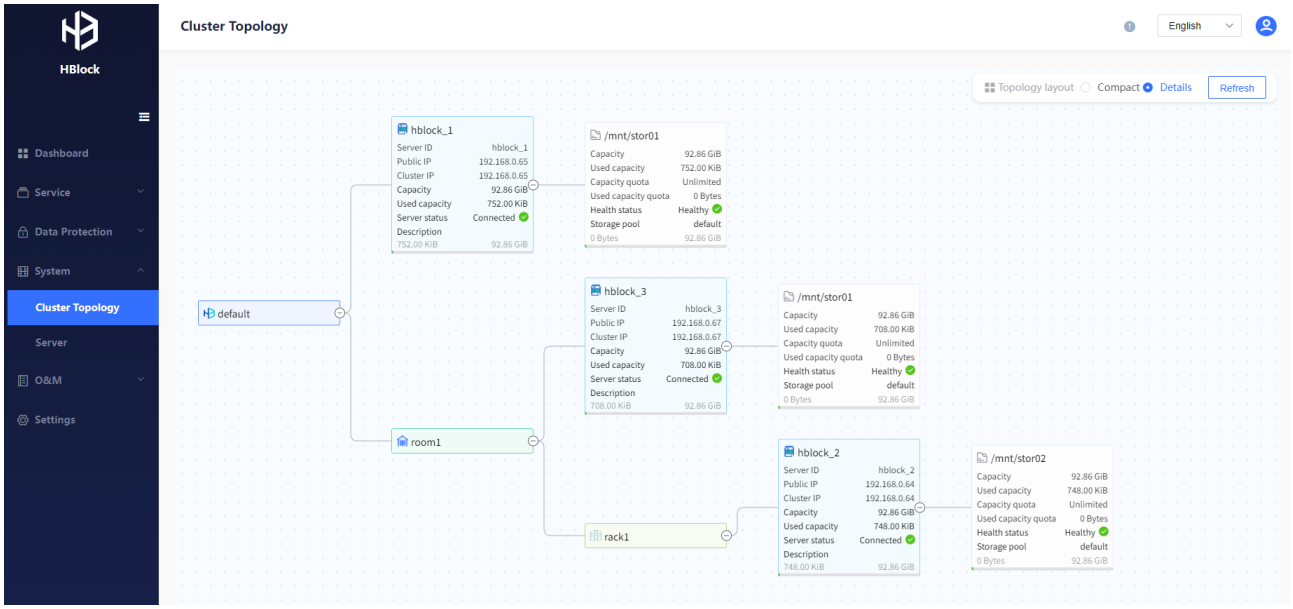


Figure 123. Cluster Topology

Name	Description	
root node	The name of the root node, the default name is default. Right click on the node name, you can select **Add node** or **Edit** to add nodes to the topology or edit the node information.	
	Add node	Parent node type.
		Parent node name.
		Child node type, you can select room, rack or server. ● When selecting room, you can edit the following information: ■ Child node name: The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit. ■ Description: The description information of the node. The value is a string of 1 to 50 characters. ● When selecting rack, you can edit the following information: ■ Child node name: The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit. ■ Description: The description information of the node. The

		value is a string of 1 to 50 characters. ● When selecting server, the HBlock service must be installed on the server to be added before the following information can be edited: ■ Child node name: The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit. ■ Server IP: Specifies the server IP to be added, supporting both IPv4 and IPv6 addresses. ■ Port: Specifies the API port. The value is an integer that ranges from 1 to 65535, the default value is 1443. It needs to be consistent with the API port number set when installing HBlock on the server. ■ Disk path: Click "Add" to add disk paths. Disk path: The disk path will be used for data storage. Capacity quota: Specifies the capacity quota of the disk path, that is, for each disk path added to server, the total amount of data that can be written by HBlock. Once the space used by HBlock reaches the quota, data writing is immediately blocked, and no more space is allowed to be used beyond the quota. It supports inputting numbers (default unit is GiB) or inputting "number + unit". The number should be accurate to two decimal places, and the unit can be KiB, MiB, GiB, TiB, or PiB. The quota needs to be no larger than the total capacity of the disk path. 0 indicates prohibiting writing; negative numbers or leaving it blank indicate no restriction. Actions: Click "Remove" to remove the disk path, or click "Add" to add the disk path. ■ Description: The description information of the node. The value is a string of 1 to 50 characters.
	Edit	Node name: Edit the node name. The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit.
		Description: Edit the description of the node. The description information of the node. The value is a string of 1 to 50 characters.
If the type of topology	The node type is room. Place the mouse over the node name to display the node name, type, and description information. Right click on the node name, you can	

<table>
<tr><td rowspan="5">node is room</td><td colspan="2">select Add node, Remove or Edit to add nodes, remove node or edit the node information.</td></tr>
<tr><td rowspan="4">Add node</td><td>Parent node type.</td></tr>
<tr><td>Parent node name.</td></tr>
<tr><td>Child node type, you can select rack or server.
● When selecting rack, you can edit the following information:
■ Child node name: The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit.
■ Description: The description information of the node. The value is a string of 1 to 50 characters.
● When selecting server, the HBlock service must be installed on the server to be added before the following information can be edited:
■ Child node name: The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit.
■ Server IP: Specifies the server IP to be added, supporting both IPv4 and IPv6 addresses.
■ Port: Specifies the API port. The value is an integer that ranges from 1 to 65535, the default value is 1443. It needs to be consistent with the API port number set when installing HBlock on the server.
■ Disk path:
Disk path: The disk path will be used for data storage.
Capacity quota: Specifies the capacity quota of the disk path, that is, for each disk path added to server, the total amount of data that can be written by HBlock. Once the space used by HBlock reaches the quota, data writing is immediately blocked, and no more space is allowed to be used beyond the quota. It supports inputting numbers (default unit is GiB) or inputting "number + unit". The number should be accurate to two decimal places, and the unit can be KiB, MiB, GiB, TiB, or PiB. The quota needs to be no larger than the total capacity of the disk path. 0 indicates prohibiting writing; negative numbers or leaving it blank indicate no restriction.
Actions: Click Remove to remove the disk path.</td></tr>
</table>

		■ Description: The description information of the node. The value is a string of 1 to 50 characters.
	Remove	When the room node has no child nodes, you can click **Remove** to delete the node.
	Edit	Node name: Edit the node name. The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit.
		Description: Edit the description of the node. The description information of the node. The value is a string of 1 to 50 characters.
If the type of topology node is rack	The node type is rack. Place the mouse over the node name to display the node name, type, and description information. Right click on the node name, you can select **Add node**, **Remove**, **Edit** or **Remap** to add nodes, remove node, edit the node information or change parent node.	
	Add node	Parent node type.
		Parent node name.
		Child node type, you can select server. The HBlock service must be installed on the server to be added before the following information can be edited: ● Child node name: The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit. ● Server IP: Specifies the server IP to be added, supporting both IPv4 and IPv6 addresses. ● Port: Specifies the API port. The value is an integer that ranges from 1 to 65535, the default value is 1443. It needs to be consistent with the API port number set when installing HBlock on the server. ● Disk path: Disk path: The disk path will be used for data storage. Capacity quota: Specifies the capacity quota of the disk path, that is, for each disk path added to server, the total amount of data that can be written by HBlock. Once the space used by HBlock reaches the quota, data writing is immediately blocked, and no more space is allowed to be used beyond the quota. It supports inputting numbers (default unit is GiB) or inputting "number + unit". The number should be accurate to two decimal places, and the unit can be KiB, MiB, GiB, TiB, or PiB. The quota needs to be no larger than the total capacity

		of the disk path. 0 indicates prohibiting writing; negative numbers or leaving it blank indicate no restriction. Actions: Click **Remove** to remove the disk path. ● Description: The description information of the node. The value is a string of 1 to 50 characters.
	Remove	When the room node has no child nodes, you can click **Remove** to delete the node.
	Edit	Node name: Edit the node name. The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit.
		Description: Edit the description of the node. The description information of the node. The value is a string of 1 to 50 characters.
	Remap	Change the parent node. Select the new parent node name through the dropdown menu.
If the type of topology node is server	The node type is server. Place the mouse over the node name to display the node name, type, server ID, public IP, cluster IP, capacity, used capacity, server status, and description information. Right click on the node name, you can select **Add node, Remove**, **Edit** or **Remap** to add nodes, remove node, edit the node information or change parent node.	
	Add node	Parent node type.
		Parent node name.
		Child node type, you can select path to add disk path to the topology: ● Disk path: The absolute path is used to store user data on the server. ● Capacity quota: Specifies the capacity quota of the disk path, that is, for each disk path added to server, the total amount of data that can be written by HBlock. Once the space used by HBlock reaches the quota, data writing is immediately blocked, and no more space is allowed to be used beyond the quota. It supports inputting numbers (default unit is GiB) or inputting "number + unit". The number should be accurate to two decimal places, and the unit can be KiB, MiB, GiB, TiB, or PiB. The quota needs to be no larger than the total capacity of the disk path. 0 indicates prohibiting writing; negative numbers or leaving it blank indicate no restriction. ● Actions: Click **Remove** to remove the disk path, or click **Add** to add the disk path.
	Remove	Remove the server from the cluster topology.

		Note: ● If you want to remove a damaged or crashed server, you need to use force removal. Forcefully removing the server may result in data loss, so please proceed with caution. ● If there is an iSCSI target on the server to be removed, and the high availability type of the LUN in the iSCSI target is ActiveStandby. When the server is removed, the service will not be interrupted, and the iSCSI target of the LUN on the server will be switched to another server, the client needs to reconnect to the iSCSI target. ● If there is an iSCSI target on the server to be removed, and the high availability type of the LUN in the iSCSI target is Disabled. When the server is removed, the service will be interrupted, and the iSCSI target of the LUN on the server will be switched to another server, the client needs to reconnect to the iSCSI target. ● If the collected log is saved in the server installation directory after log collection, it will be deleted after the server is removed. If the collected log is saved in the disk path of HBlock, and you delete the HBlock data on the disk paths of the server when the server is removed, the log will also be deleted. ● While a server is being removed, other servers cannot be removed. If it must be removed, please use force removal, but there is a risk of data loss. ● All disk paths on this node do not belong to any storage pool. Therefore, you can remove this server. Otherwise, the server cannot be removed. If you must remove the server, forcibly remove it, which may cause data loss. ● If a disk path of a server to remove belongs to the base storage pool and is the only node in the available fault domain in the base storage pool, the disk path cannot be removed.
	Edit	Node name: Edit the node name. The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit.
		Description: Edit the description of the node. The description information of the node. The value is a string of 1 to 50 characters.
	Remap	Change the parent node. Select the new parent node name

		through the dropdown menu.
If the type of topology node is path	The node type is path. Place the mouse over the node name to display the node name, type, capacity, used capacity, capacity quota, used capacity quota, health status, health detail and storage pool. Right click on the node name, you can select “Remove” to remove node. **Note**: ● Forcibly removing the disk path may cause risk of data loss. ● If the collected logs are saved in the disk path of HBlock after log collection is executed, and you choose to delete the HBlock data in the disk path when the disk path is removed, the log will be deleted. ● While a disk path is being removed, other disk paths cannot be removed. If it must be removed, please use force removal, but there is a risk of data loss.	

3.12 Server

Click **System** > **Server** in the navigation bar to enter **Server Management** page, you can manage HBlock servers, including viewing server list, adding a server (cluster mode), viewing the server, querying ports, migrating the base service (cluster mode), editing the node information (cluster mode), changing the parent node for the server (cluster mode), restarting HBlock on the server, removing a server (cluster mode).

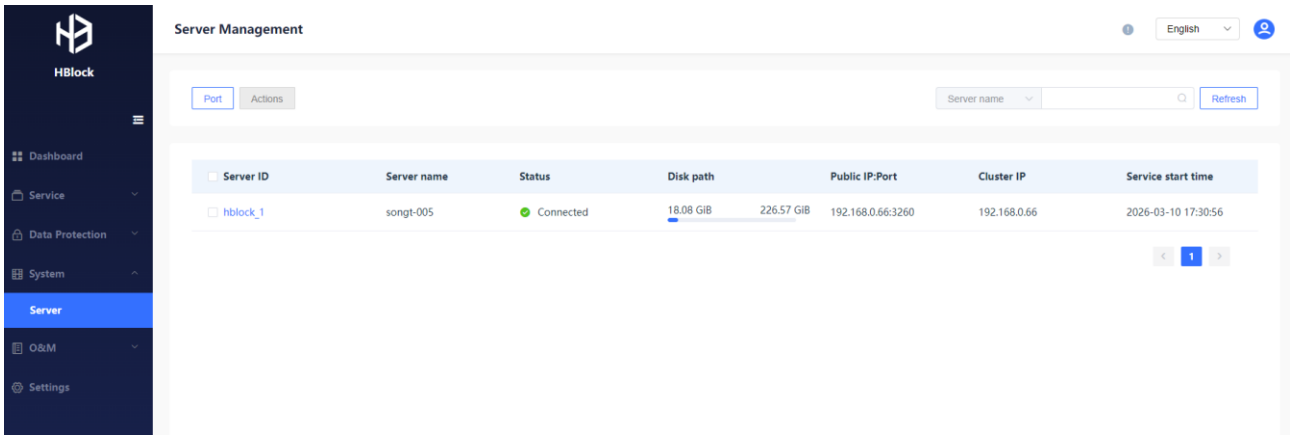


Figure 124. Server Management (Standalone Mode)

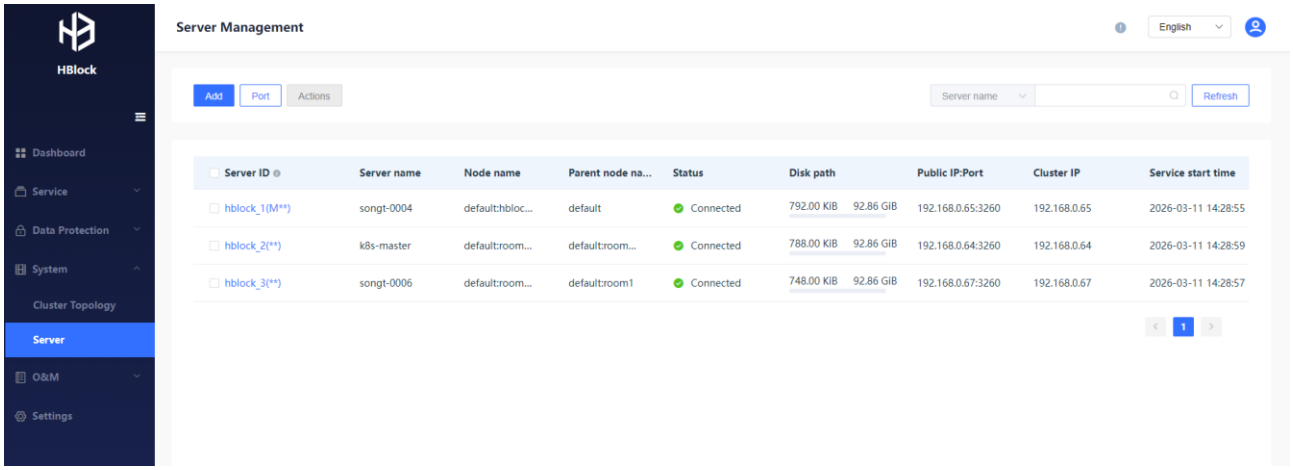


Figure 125. Server Management (Cluster Mode)

3.12.1 Server List

On the **Server Management** page, you can view server information. You can search for corresponding servers by server name or status (Connected, Disconnected, Removing).

Name	Description
Server ID	Server ID. ● M: Indicates the master server. ● **: Indicates a base node. ● If there is only a server ID, it belongs to a non-basic node server.
Server name	Server name.

Node name	The full path name of the server (only supported by cluster mode), starting from the root node, using the *name:name:name* format to uniquely identify the name of the node.
Parent node name	The parent node name of the server (only supported by cluster mode).
Status	Server status: ● Connected: The server is connected. ● Disconnected: The server is disconnected. ● Removing: The server is being removed from the cluster.
Disk path	The used and total capacity of the disk path. Used capacity and total capacity of the disk on which the disk path is located.
Public IP:Port	Public network IP and port.
Cluster IP	Cluster network IP and port.
Service start time	The last time the HBlock service was successfully started on the server. "-": Indicates HBlock service is in stopping status.

3.12.2 Add a Server (Cluster Mode)

On the **Server Management** page, click **Add** to enter the **Add server** page. On **Add server** page, click "**Add server"** button to add a server to the cluster.

Note: The server added to the cluster can only be added after installing HBlock. Only one server can be added to the cluster at a time.

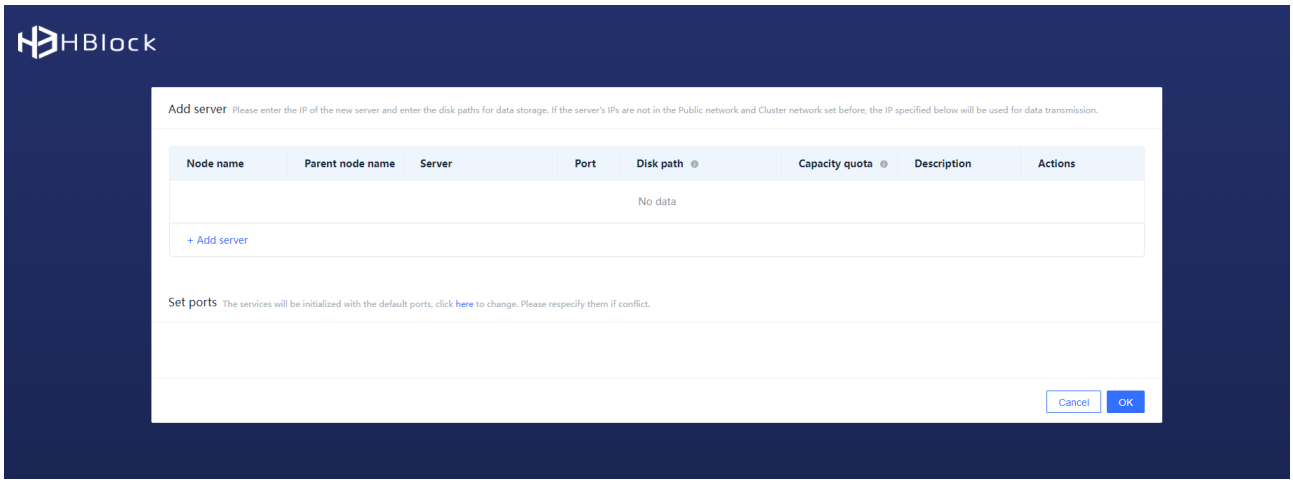


Figure 126. Added Server Details

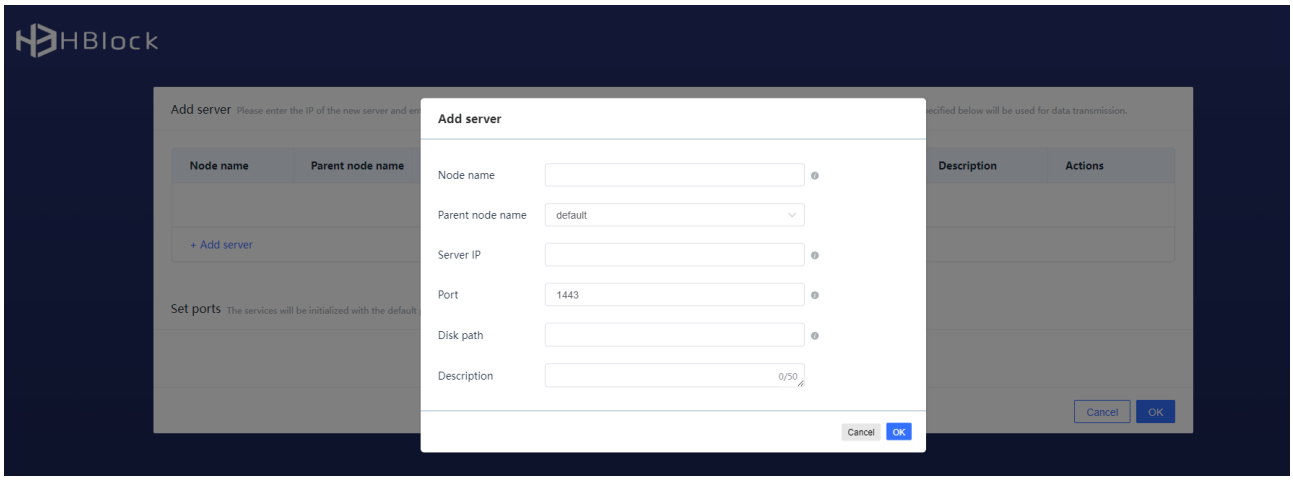


Figure 127. Add Server

Name	Description
Node name	Specifies the name of a server node. The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit. The server ID is used by default as node name.
Parent node name	Specifies the parent node. The root node is used by default.

Server IP	Specifies the server IP to be added, supporting IPv4 and IPv6 addresses.
Port	Specifies the API port number. The value is an integer that ranges from 1 to 65535, the default value is 1443. It needs to be consistent with the API port number set when installing HBlock on the server.
Disk path	The absolute path is used to store user data on the server. Multiple disk paths can be added at once, and separated by commas (,). Value: It can only contain letters, numbers, Chinese characters, or the special characters ~ ! @ $ ( ) _ + - ; . :.
Description	Specifies the description for the server. The value is a string of 1 to 50 characters.
Capacity quota	Specifies the capacity quota of the disk path, that is, for each disk path added to server, the total amount of data that can be written by HBlock. Once the space used by HBlock reaches the quota, data writing is immediately blocked, and no more space is allowed to be used beyond the quota. It supports inputting numbers (default unit is GiB) or inputting "number + unit". The number should be accurate to two decimal places, and the unit can be KiB, MiB, GiB, TiB, or PiB. The quota needs to be no larger than the total capacity of the disk path. 0 indicates prohibiting writing; negative numbers or leaving it blank indicate no restriction.
Actions	Click 'Edit' to edit the new server information.

When adding a server, the system initializes the service using the specified port and port range. If not specified, the default port numbers are used. If you need to modify port numbers, click the "here" button to modify port numbers of the newly added server.

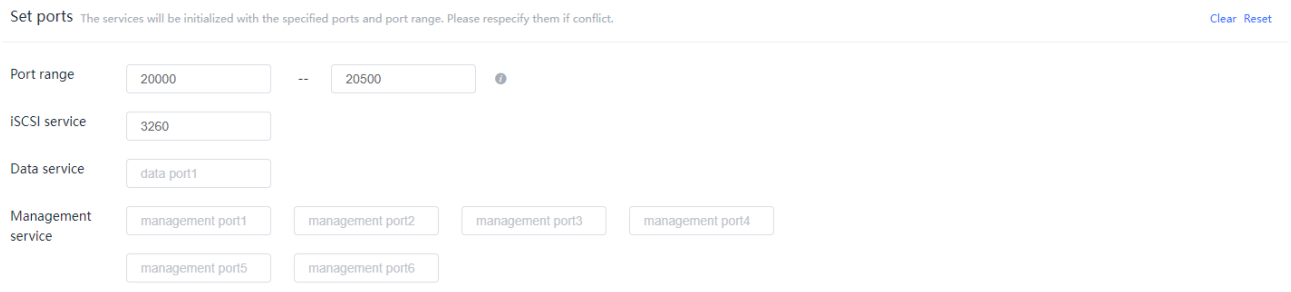


Figure 128. Set Ports

Note:

- Please ensure that the Linux user has permission for the required ports. By default, Linux systems do not open ports less than 1024 to ordinary users without root privileges.
- When setting the port range, please avoid overlapping with the local temporary port (ip_local_port_range) range of the Linux system, otherwise, the port used by the HBlock

service may be occupied. Run the command **cat /proc/sys/net/ipv4/ip_local_port_range** to view the local temporary port range.

Parameter	Description
Port range	Specifies the port range. Storage services and services without specified ports will automatically be assigned ports from this range. Value: The value is an integer that ranges from 1 to 65535. The default value is 20000-20500. **Note**: It is recommended that the specified port range contains at least 500 ports.
iSCSI Service	Specifies the iSCSI port number. The default port number is 3260.
Data service	Specifies the data service port.
Management Service	Specifies the management service port.

3.12.3 View/Edit the Server

On the **Server Management** page, click the specific server to view/edit the server.

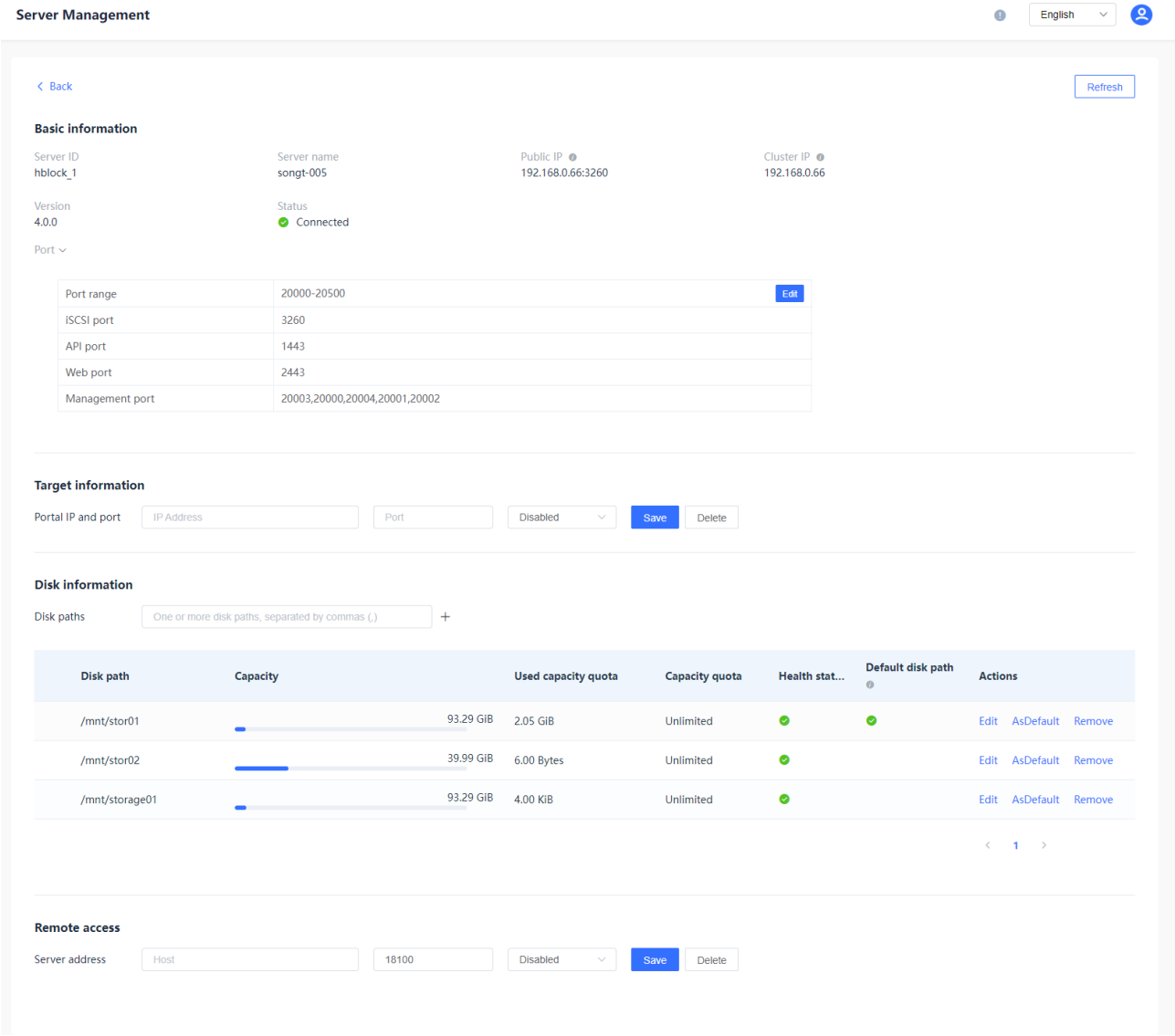


Figure 129. Server Detailed Information (Standalone Mode)

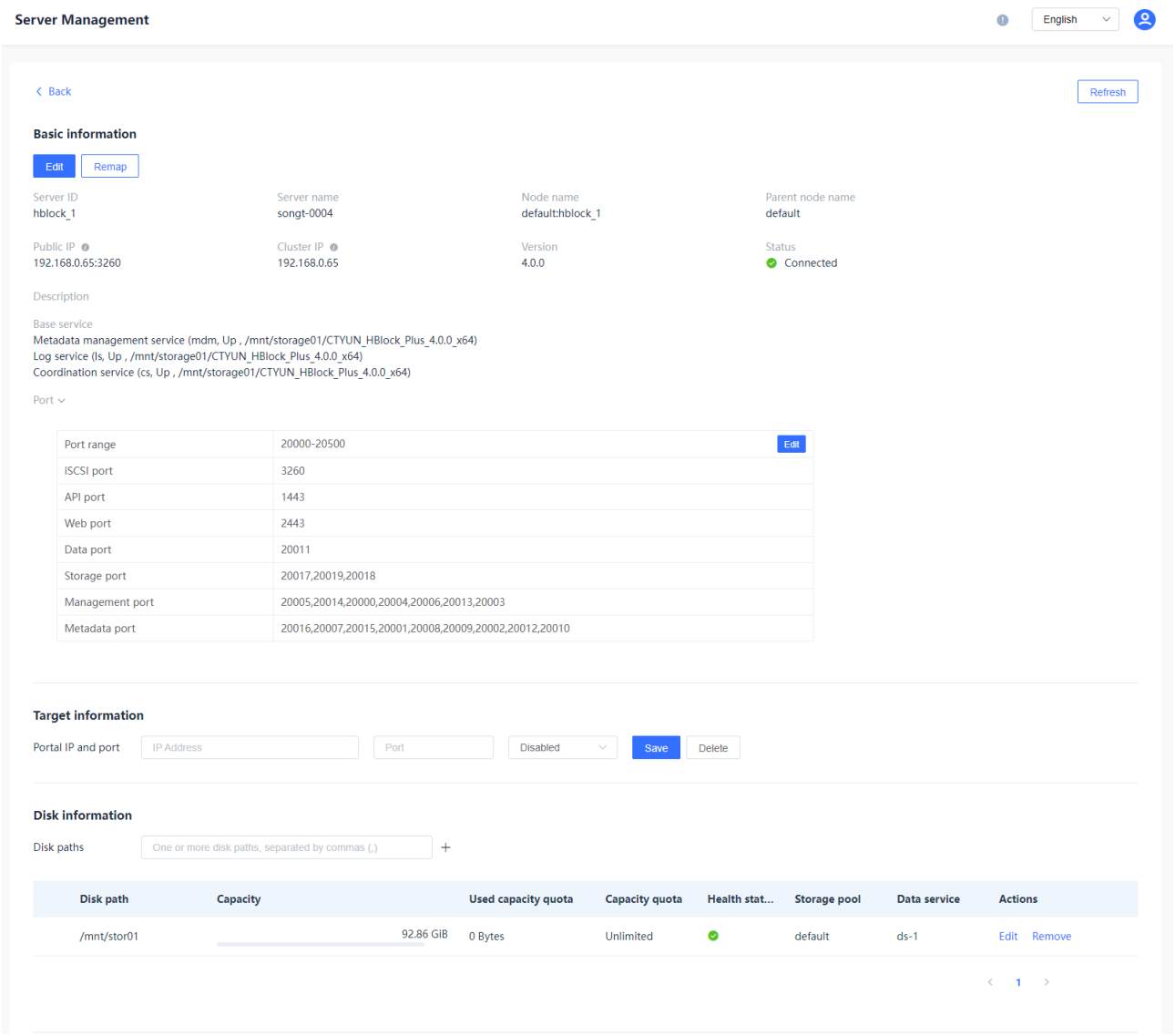


Figure 130. Server Detailed Information (Cluster Edition)

Basic information

Name	Description
Edit	Click the **Edit** button (only supported by cluster mode) to edit the node name and node description information.
Remap	Click the **Remap** button (only supported by cluster mode) to change the parent node name.
Server ID	Server ID.
Server name	Server name.
Node name	The full path name of the server (only supported by cluster mode), starting from the root node, using the *name:name:name* format to uniquely identify the name of the node.

Parent node name	The parent node name of the server (only supported by cluster mode).
Public IP	Public network IP and port.
Cluster IP	Cluster network IP and port.
Description	The description information of the node (only supported by cluster mode).
Base service	The base services on the base server (only supported by cluster mode), including the name of the basic service, the corresponding status, and the service directory. ● Base service name: ■ Metadata management service (mdm). ■ Log service (ls). ■ Coordination service (cs). ● The status of the base service: ■ Up. ■ Down. ■ Migrating. ■ Unknown.
Port	The ports currently occupied by HBlock: ● Port range: You can click the Edit button to edit the port range. It is recommended that the specified port range contains at least 500 ports. When editing the port range, please ensure that it does not overlap with the local temporary port range of the Linux system (ip_local_port_range). Otherwise, it may result in the ports used by the HBlock service being occupied. Use the command cat /proc/sys/net/ipv4/ip_local_port_range to view the local temporary port range. ● iSCSI port. ● Web port. ● Data port (Only supported by cluster mode). ● Storage port (Only supported by cluster mode). ● Management port. ● Metadata port (Only supported by cluster mode).
Version	HBlock version on this server.
Status	Server status: ● Connected: The server is connected. ● Disconnected: The server is disconnected. ● Removing: The server is removing from the cluster.

Target information

If the server and client are not in the same network segment (for example, the server is on the intranet and the client is on the extranet) and are connected through a NAT device (such as a router), you need to add the extranet address and port of the NAT device to the server, so that clients on the extranet can normally establish iSCSI connections with the target of the server.

Name	Description
Portal IP	iSCSI target portal IP. IPv4 or IPv6 format.
Port	iSCSI target portal port number. The value is an integer that ranges from 1 to 65535.
Whether to enable the iSCSI target portal	The iSCSI target portal IP and port can be enabled or disabled based on the dropdown options.
Delete	Click **Delete** to delete the iSCSI target portal IP and port.

Disk information

Disk paths: The absolute path used to store HBlock data in the server. Click the **+** button to add disk paths.

Note:

- For the newly added disk path, it is recommended to set up automatic mounting at startup, or use a path or sub-path that has been set up to be automatically mounted.
- Each HBlock server can only add up to 100 disk paths.

Name	Description
Disk path	The specific disk path. Value: It can only contain letters, numbers, Chinese characters, or the special characters ~ ! @ $ ( ) _ + - ; . :.
Capacity	The total capacity of the disk on which the disk path is located.
Used Capacity quota	The total amount of data that has be written to the disk path by HBlock. Once the space used by HBlock reaches the quota, data writing will be blocked immediately, and space exceeding the quota is not allowed to be used.
Capacity quota	Click the **Edit** button to edit the capacity quota.
Health status	The health status of the disk path: ● Healthy: The disk path is in a healthy status and can be read and written normally, and the disk usage of the disk path does not exceed the threshold (the system default value is 95%). ● Warning: The disk path is warning and is readable, but one or more of the following situations exist: slow disk, the utilization rate of the disk where the disk path resides exceeds the threshold (the system default value is 95%), the remaining disk space is less than 1GiB, HBlock stops writing to this path, the capacity quota usage of the

	disk path exceeds the threshold (the system default value is 95%), or the capacity quota of the disk path is set to 0. ● Error: The disk path is in an error state and cannot be accessed. The reasons may be that an I/O error occurs on the disk, resulting in the inability to read or write, or the disk path is not mounted correctly, etc. **Note**: If the Health status is Warning or Error, display the detailed warning or error information.
Default disk path	Whether it is the default disk path for storing LUN data, only supported by standalone mode.
Storage pool	The storage pool that the disk path is affiliated with, only supported by cluster mode.
Data service	The DS process corresponding to the disk path, only supported by cluster mode. **Note**: The DS process is displayed only after the disk path has been added to the storage pool.
Actions	● Click **Edit** to edit the capacity quota of the disk path. ● Click **AsDefault** to edit the default disk path, only supported by standalone mode. ● Click **Remove** to remove the disk path. **Note**: ■ For the standalone mode, specify another disk path as default before removing a default disk path. ■ Removing the disk path in the normal state may cause a risk of data loss. ■ If the disk path which collected log is saved in is removed, and delete the HBlock data on the disk path, the log will also be deleted. ■ While a disk path is being removed, other disk paths cannot be removed. If it must be removed, please use force removal, but there is a risk of data loss.

Remote access

Please contact the software vendor to get the host and PORT.

Note:

- The remote assistance is disabled by default and can be enabled at any time. When enabled, it means that the HBlock engineers are authorized to login to the HBlock system in the user's environment to diagnose the problems. When HBlock engineers are logging in, they have the following two user permissions: user who enables remote assistance and user who

installs HBlock. User can check logs/remoteaccess/remote_access.log to know all the operations done by the HBlock engineer during remote assistance.

- If user enables the remote assistance function, it means user trusts HBlock engineers and acknowledges to authorize HBlock engineers to access all the data in the HBlock system. We will try the best to diagnose the problems and ensure the data security, but due to the complicacy of the system environment, HBlock engineers is not responsible for any consequence caused by remote assistance.

Name	Description
Host	Specifies the remote assistance host. IP or domain name.
Port	Specifies the remote assistance port.
Whether to enable remote assistance.	Whether to enable remote assistance: ● Enabled. ● Disabled.

3.12.4 Query Ports

On the **Server Management** page, click Port to query ports, including Port range, iSCSI port, API port, Web port, Data port (only supported by cluster mode), Storage port (only supported by cluster mode), Management port, and Metadata port (only supported by cluster mode). In addition, by viewing the detailed information of the server, you can also query the port.

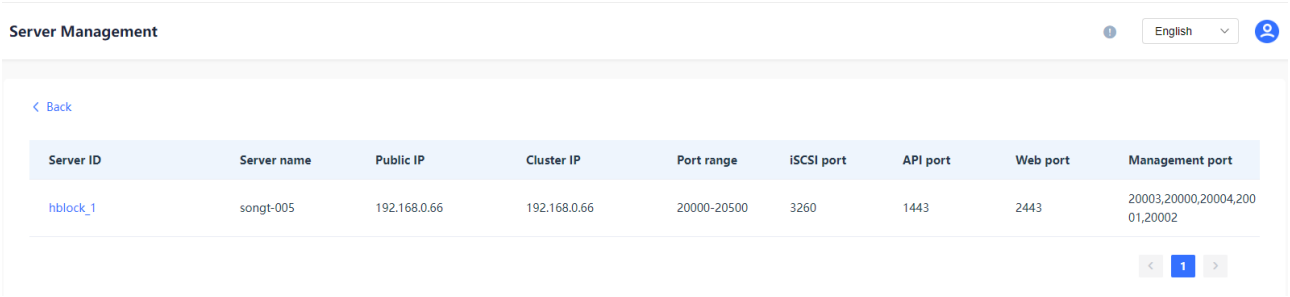


Figure 131. Query Port (Standalone Mode)

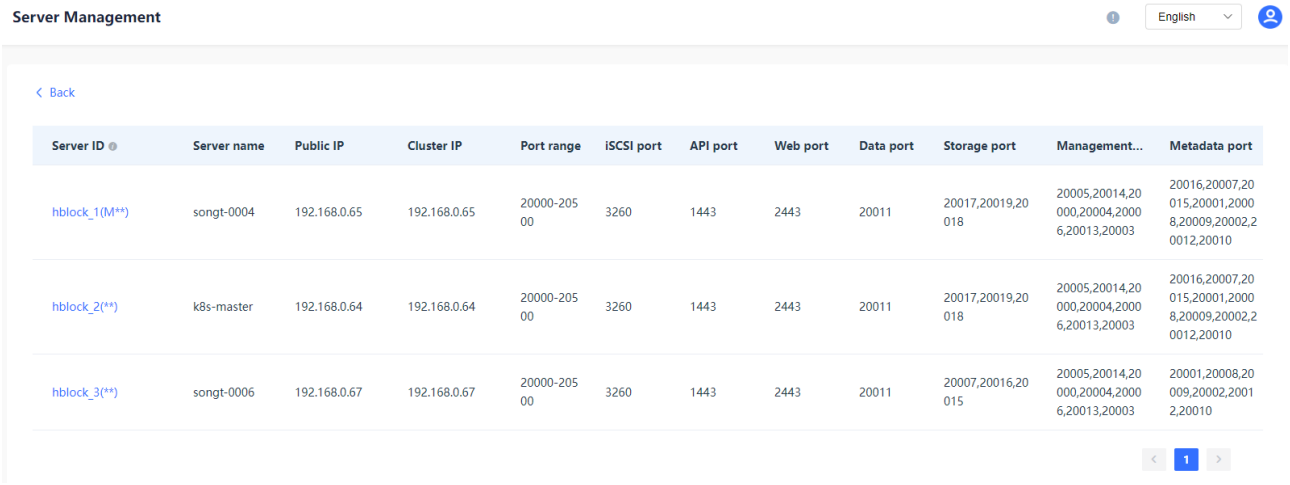


Figure 132. Query Port (Cluster Mode)

3.12.5 Migrate the Base Service (Cluster Mode)

In the cluster, base services can be migrated, including Metadata management service: mdm, Log service: ls, Coordination service: cs.

On the **Server Management** page, select the server that needs to migrate base service, click **Actions** > **Base service migrate**, and you can migrate the base services on this server to the specified server.

Note:

- When migrating the ls service, ensure that the two mdm services and the other two ls services are up and that ms services (management services) on all nodes except the source server are normal. The service status can be obtained by viewing the server.
- When migrating the mdm service, ensure that another mdm service is up and that the ps service (protocol resolution service) and ms service (management service) on all nodes except the source server are normal. The service status can be obtained by viewing the server.
- When migrating the cs service, ensure that the other two cs services are up and that the ps service (protocol resolution service) and ms service (management service) on all nodes except the source server are normal. The service status can be obtained by viewing the server.

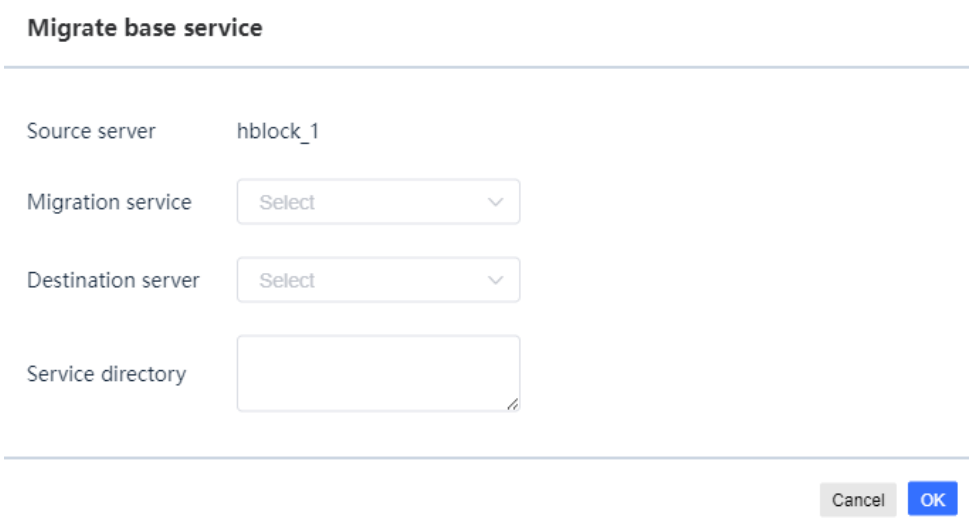


Figure 133. Migrate the Base Service

Name	Description
Source server	The source HBlock server ID.
Migrate service	The base services to be migrated.
Destination server	The destination server ID.
Service directory	The disk path of the migration service is used to store relevant data information of the basic service.

	Value: It can only contain letters, numbers, Chinese characters, or the special characters ~ ! @ $ ( ) _ + - ; . :. The default value is the installation disk path. **Note**: In order to improve read-write performance, it is recommended that the disk path of the migration service be independent of the installation disk path and the disk path where data is stored.

3.12.6 Edit the Node Information (Cluster Mode)

On the **Server Management** page, select the server and click **Actions** > **Edit** to edit the node information.

Figure 134. Edit the None Information

Name	Description
Node name	The node name. The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit.
Description	The description for the node. The value is a string of 1 to 50 characters.

3.12.7 Change Parent Node for the Server (Cluster Mode)

On the **Server Management** page, select the server and click **Actions** > **Remap** to change parent node for the server.

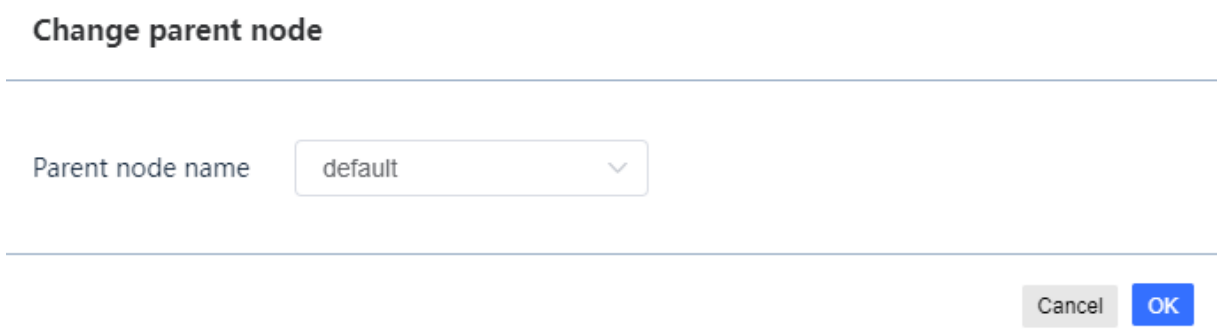


Figure 135. Change Parent Node

Name	Description
Parent node name	Select the parent node from the drop-down menu.

3.12.8 Restart HBlock on the Server

On the **Server Management** page, select servers and click **Actions** > **Restart** to restart HBlock on the specified server.

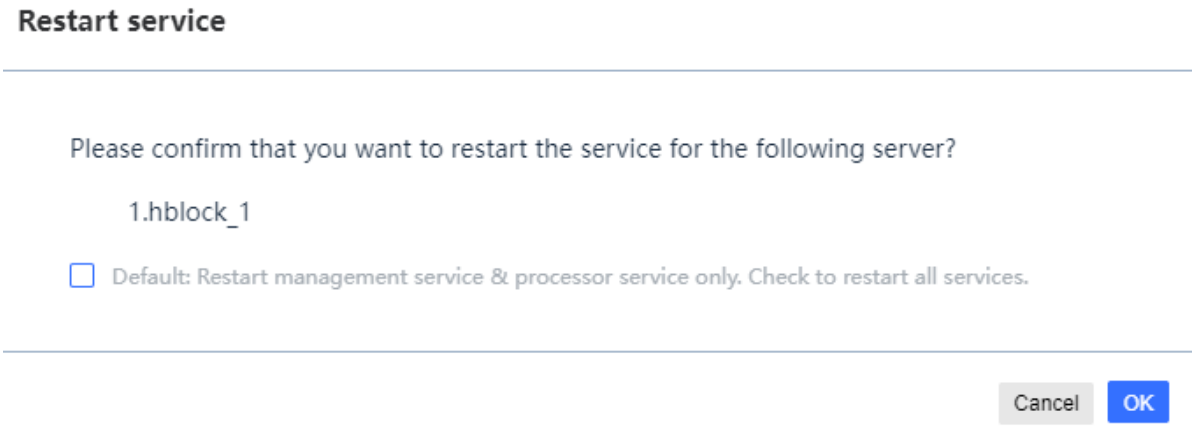


Figure 136. Restart HBlock on the Server

3.12.9 Remove a Server (Cluster Mode)

On the **Server Management** page, select the server and click **Actions** > **Remove** to remove the server.

Note:

- If you want to remove a damaged or crashed server, you need to use force removal. Forcefully removing the server may result in data loss, so please proceed with caution.
- If there is an iSCSI target on the server to be removed, and the high availability type of the LUN in the iSCSI target is ActiveStandby. When the server is removed, the service will not be interrupted, and the iSCSI target of the LUN on the server will be switched to another server, the client needs to reconnect to the iSCSI target.
- If there is an iSCSI target on the server to be removed, and the high availability type of the LUN in the iSCSI target is Disabled. When the server is removed, the service will be interrupted, and the iSCSI target of the LUN on the server will be switched to another server, the client needs to reconnect to the iSCSI target.
- If the collected log is saved in the server installation directory after log collection, it will be deleted after the server is removed. If the collected log is saved in the disk path of HBlock, and you delete the HBlock data on the disk paths of the server when the server is removed, the log will also be deleted.
- While a server is being removed, other servers cannot be removed. If it must be removed, please use force removal, but there is a risk of data loss.
- All disk paths on this node do not belong to any storage pool. Therefore, you can remove this server. Otherwise, the server cannot be removed. If you must remove the server, forcibly remove it, which may cause data loss.
- If a disk path of a server to remove belongs to the base storage pool and is the only node in the available fault domain in the base storage pool, the disk path cannot be removed.
- If base services are running on the server, the server must not be removed.

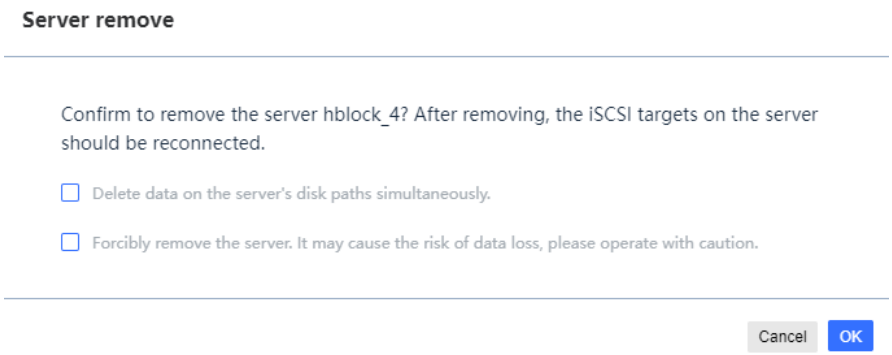


Figure 137. Remove a Server

3.13 Operation and Maintenance

3.13.1 Monitoring

Click **O&M** > **Monitoring** in the navigation bar to enter **Monitor** page, view performance data of System (only supported by cluster mode), Storage Pool (only supported by cluster mode), Server, Disk and LUN.

Note:

- The monitoring data is recorded based on the system time of server. Adjusting server time, or inconsistent time of servers, may cause inaccurate monitoring data. But the user's business data will not be affected.
- If the indicator icon in the curve is gray, the data of this item is not displayed. Click the corresponding icon to display it.

3.13.1.1 System (Cluster Mode)

Click **System** on the **Monitor** page to view system performance data, including Disk path utilization, Capacity quota utilization, Disk path used capacity, Disk path total capacity, Used quota, Quota, Read Bandwidth, Write Bandwidth, Total Bandwidth, Read IPOS, Write IPOS, Total IPOS, Read Latency, Write Latency, Total Latency, Cloud upload bandwidth, Cloud download bandwidth, and Total cloud bandwidth.

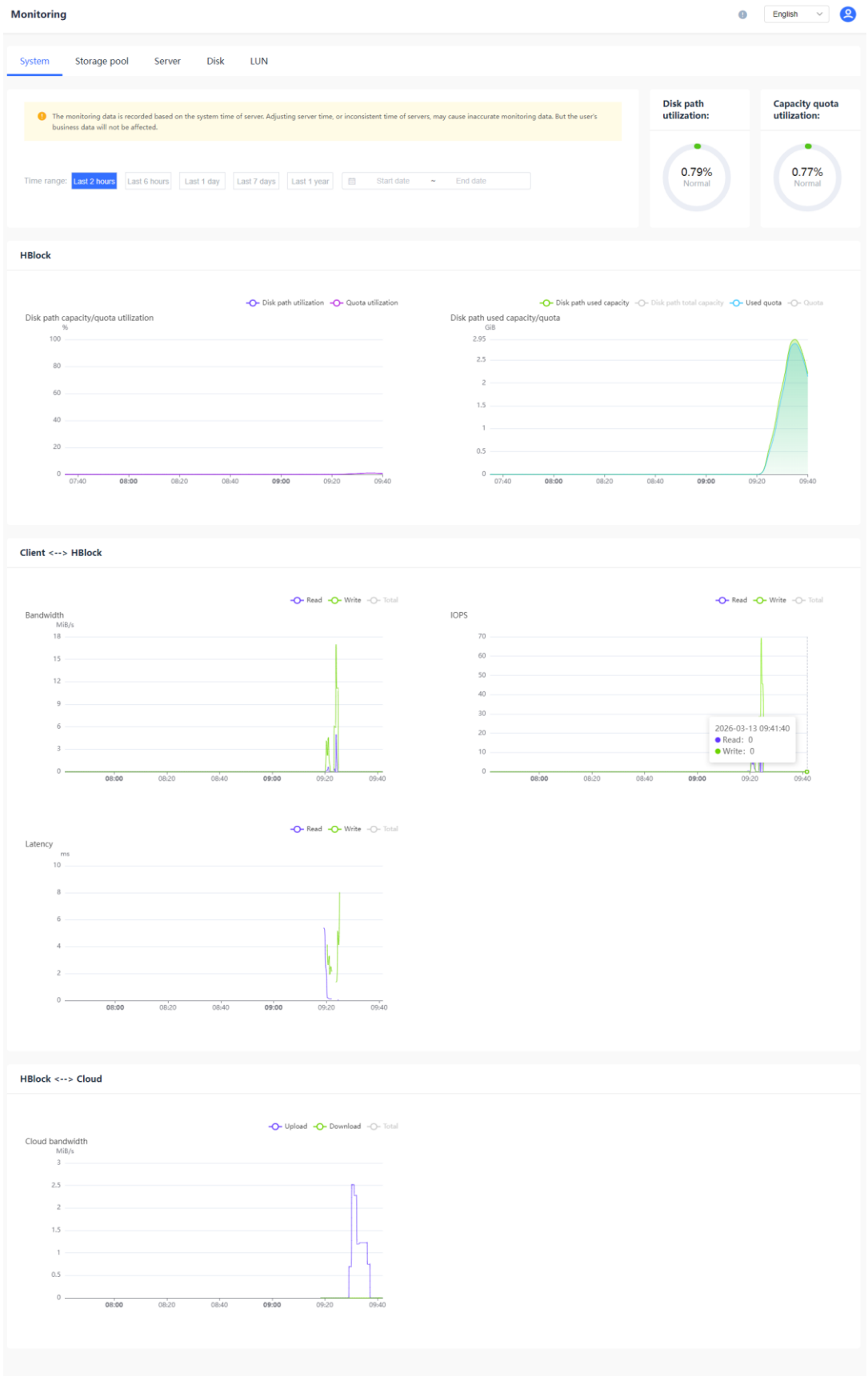


Figure 138. System Performance Data (Cluster Mode)

Name	Description
Time range	Specifies the time range: ● Last 2 hours ● Last 6 hours ● Last 1 day ● Last 7 days ● Last 1 year ● According to the calendar button, select Start Date and End Date, accurate to days. **Note**: The start date must be earlier than the end date, and must be no earlier than last 1 year starts from the current server time.
Disk path utilization	Average disk usage rate of all disks where disk paths are located.
Capacity quota utilization	Average quota usage rate of all disks where disk paths are located.
HBlock	HBlock server side.
Disk path used capacity	Total used capacity of all disks where HBlock disk paths are located.
Disk path total capacity	Total capacity of all disks where HBlock disk paths are located.
Used quota	The total amount of data that has be written to disk paths by HBlock.
Quota	Total HBlock quota for all disk paths in the cluster.
Client<-->HBlock	The data transmission performance between the client and HBlock.
Read Bandwidth	The bandwidth when the client reads data from HBlock.
Write Bandwidth	The bandwidth when the client write data to HBlock.
Total Bandwidth	The total bandwidth between the client and HBlock.
Read IOPS	The IOPS when the client reads data from HBlock.
Write IOPS	The IOPS when the client writes data to HBlock.
Total IOPS	Total IOPS between the client and HBlock.
Read Latency	The latency when the client reads data from HBlock. The average read latency of all LUNs in a collection cycle.
Write Latency	The latency when the client writes data to HBlock. The average write latency of all LUNs in a collection cycle.
Total Latency	The total latency between the client and HBlock. The average write/read latency of all LUNs in a collection cycle.
HBlock <--> Cloud	The data transmission performance between the HBlock and Cloud.
Cloud upload bandwidth	Bandwidth when HBlock upload data to cloud.
Cloud download bandwidth	Bandwidth when HBlock download data from cloud.
Total cloud bandwidth	The total bandwidth between HBlock and the cloud.

3.13.1.2 Storage Pool (Cluster Mode)

Click **Storage Pool** on the **Monitor** page to view storage pool performance data, including Path (Total/Used/Rate), Quota (Total/Used/Rate), and Bandwidth with client (T/R/W).

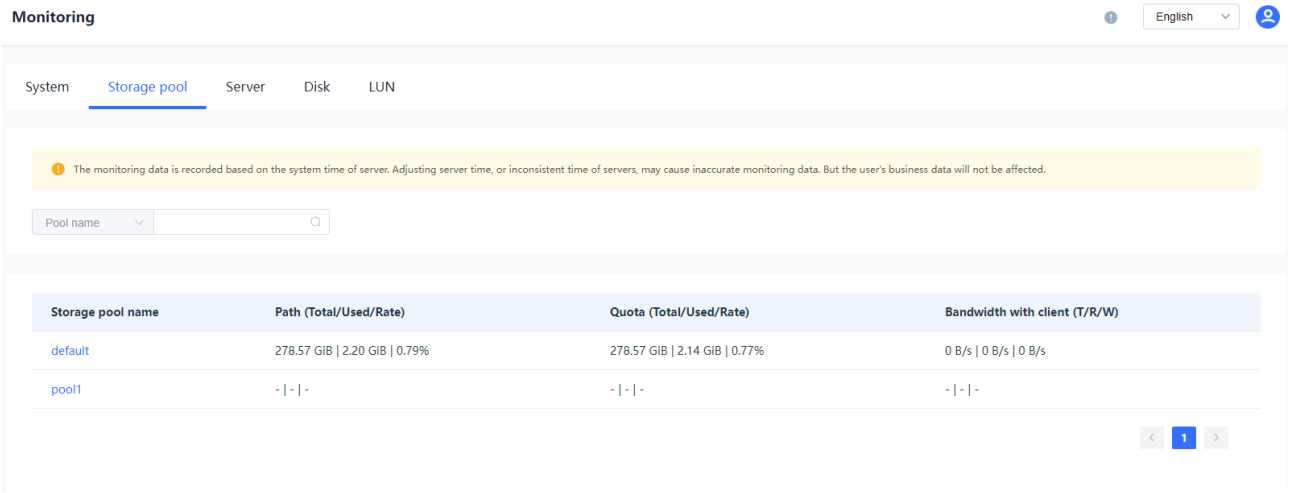


Figure 139. Real-Time Performance Data of Storage Pool (Cluster Mode)

Name	Description
Storage pool name	The server ID.
Path (Total/Used/Rate)	Total capacity, used capacity, and average usage rate of all disks where disk paths are located in the storage pool.
Quota (Total/Used/Rate)	HBlock total capacity quota, used capacity quota, and capacity quota usage rate of all disk paths in a storage pool.
Bandwidth with client (T/R/W)	Total bandwidth, read bandwidth and write bandwidth between the client and HBlock.

On the **Monitor** > **Storage Pool** page, click the corresponding storage pool name to view the performance data of the storage pool with the specified time, including Disk path utilization, Capacity quota utilization, Disk path used capacity, Disk path total capacity, Used quota, Quota, Read Bandwidth, Write Bandwidth, Total Bandwidth, Read IPOS, Write IPOS, Total IPOS, Read Latency, Write Latency, and Total Latency.

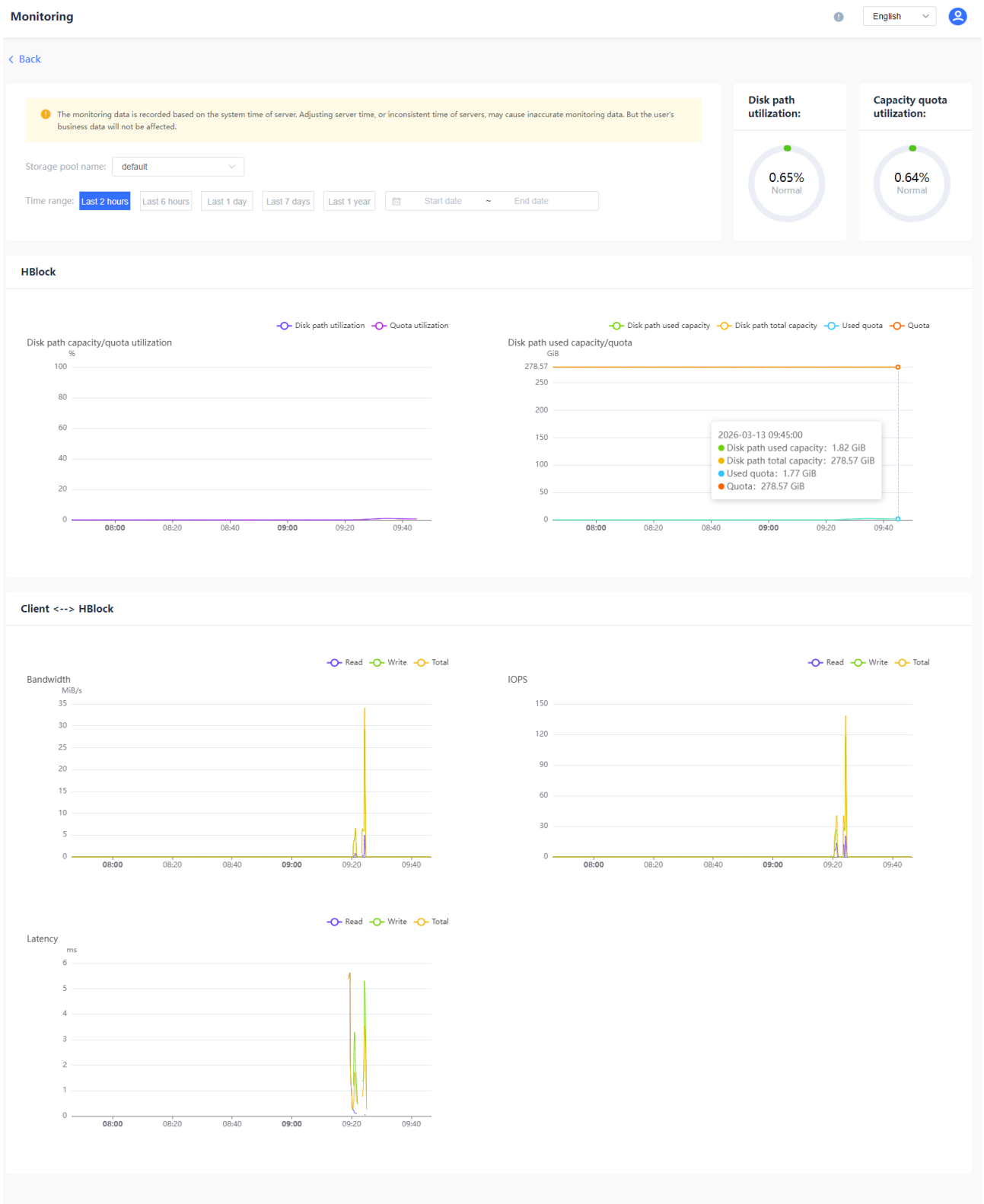


Figure 140. Storage Pool Performance Data (Cluster Mode)

Name	Description
Storage Pool name	Storage pool name, where you can select the storage pool through the dropdown box.
Time range	Specifies the time range: ● Last 2 hours ● Last 6 hours ● Last 1 day ● Last 7 days ● Last 1 year ● According to the calendar button, select Start Date and End Date, accurate to days. **Note**: The start date must be earlier than the end date, and must be no earlier than last 1 year starts from the current server time.
Disk path utilization	Average disk usage rate of all disks where disk paths are located in the storage pool.
Quota utilization	Average quota usage rate of all disks where disk paths are located in the storage pool.
Disk path used capacity	Total used capacity of all disks where HBlock disk paths are located in the storage pool.
Disk path total capacity	Total capacity of all disks where HBlock disk paths are located in the storage pool.
Used quota	The total amount of data that has be written to disk paths by HBlock in the storage pool.
Quota	Total HBlock quota for all disk paths in the storage.
Client<-->HBlock	The data transmission performance between the client and HBlock.
Read Bandwidth	The bandwidth when the client reads data from the storage pool.
Write Bandwidth	The bandwidth when the client write data to the storage pool.
Total Bandwidth	The total bandwidth between the client and the storage pool.
Read IOPS	The IOPS when the client reads data from the storage pool.
Write IOPS	The IOPS when the client writes data to the storage pool.
Total IOPS	Total IOPS between the client and the storage pool.
Read Latency	The latency when the client reads data from the storage pool. The average read latency of all LUNs in a collection cycle.
Write Latency	The latency when the client writes data to the storage pool. The average write latency of all LUNs in a collection cycle.
Total Latency	The total latency between the client and the storage pool. The average write/read latency of all LUNs in a collection cycle.

3.13.1.3 Server (Standalone Mode)

Click **Server** on the **Monitor** page to view server performance data, including Disk path utilization, Capacity quota utilization, CPU utilization, Used memory, Total memory, Disk path used capacity, Disk path total capacity, Used quota, Quota, Read Bandwidth, Write Bandwidth, Total Bandwidth, Read IPOS, Write IPOS, Total IPOS, Read Latency, Write Latency, Total Latency, Cloud upload bandwidth, Cloud download bandwidth, and Total cloud bandwidth.

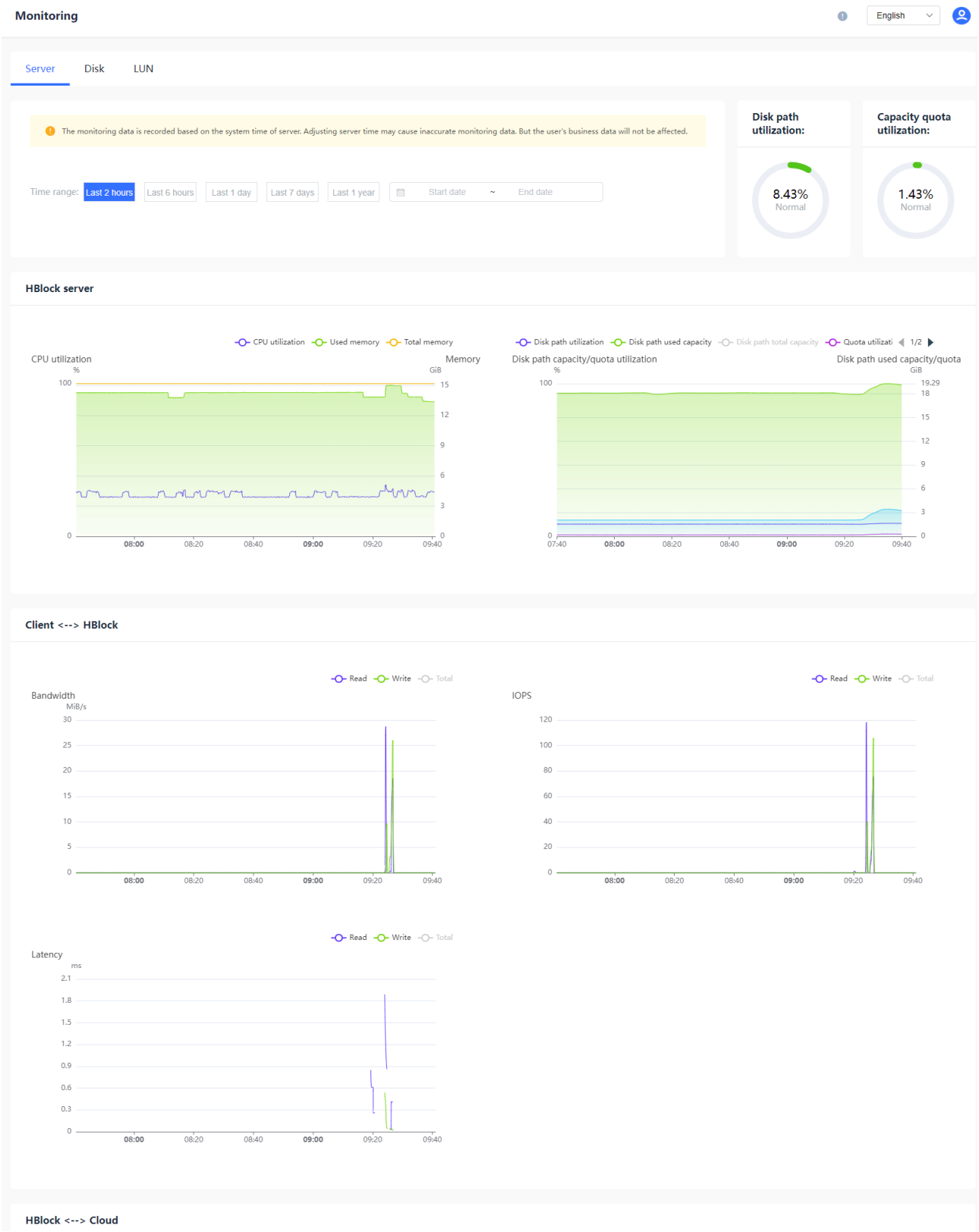


Figure 141. Server Performance Data (Standalone Mode)

Name	Description
Time range	Specifies the time range: ● Last 2 hours ● Last 6 hours ● Last 1 day ● Last 7 day ● Last 1 year ● According to the calendar button, select Start Date and End Date, accurate to days. **Note**: The start date must be earlier than the end date and must be no earlier than last 1 year starts from the current server time.
Disk path utilization	Average disk usage rate of all disks where disk paths are located.
Capacity quota utilization	Average quota usage rate of all disks where disk paths are located.
HBlock server	HBlock server side.
CPU utilization	The CPU usage rate of the server.
Used memory	The memory usage of the server.
Total memory	The total memory of the server.
Disk path used capacity	Total used capacity of all disks where HBlock disk paths are located.
Disk path total capacity	Total capacity of all disks where HBlock disk paths are located.
Used quota	The total amount of data that has be written to disk paths by HBlock.
Quota	Total HBlock quota for all disk paths of HBlock.
Client<-->HBlock	The data transmission performance between the client and HBlock.
Read bandwidth	The bandwidth when the client reads data from HBlock server.
Write bandwidth	The bandwidth when the client write data to HBlock server.
Total bandwidth	The total bandwidth between the client and HBlock server.
Read IOPS	The IOPS when the client reads data from HBlock server.
Write IOPS	The IOPS when the client writes data to HBlock server.
Total IOPS	Total IOPS between the client and HBlock server.
Read Latency	The latency when the client reads data from HBlock. The average read latency of all LUNs in a collection cycle.
Write Latency	The latency when the client writes data to HBlock. The average write latency of all LUNs in a collection cycle.
Total Latency	The total latency between the client and HBlock. The average write/read latency of all LUNs in a collection cycle.
HBlock <--> Cloud	The data transmission performance between the HBlock and Cloud.
Cloud upload bandwidth	Bandwidth when HBlock upload data to cloud.
Cloud download bandwidth	Bandwidth when HBlock download data from cloud.
Total cloud bandwidth	The total bandwidth between HBlock and the cloud.

3.13.1.4 Server (Cluster Mode)

Click **Server** on the **Monitor** page to view performance data of HBlock servers, including CPU utilization, Memory (Total/Used/Rate), path (Total/Used/Rate), quota (Total/Used/Rate), Bandwidth with client (T/R/W), and Cloud bandwidth (T/U/D).

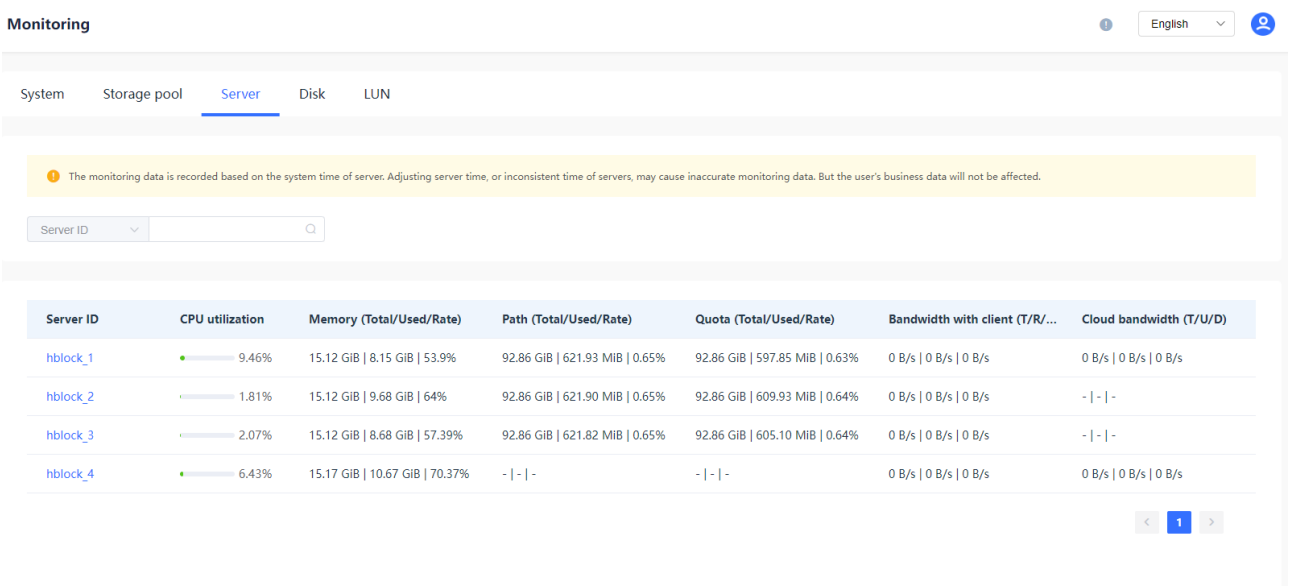


Figure 142. Real-Time Performance Data of Servers (Cluster Mode)

Name	Description
Server ID	The server ID.
CPU utilization	The CPU usage rate of the server.
Memory (Total/Used/Rate)	Total server memory, used memory, and memory usage rate.
Path (Total/Used/Rate)	Total capacity, used capacity, and usage rate of all disks where disk paths are located.
Quota (Total/Used/Rate)	HBlock total capacity quota, used capacity quota, and capacity quota usage rate.
Bandwidth with client (T/R/W)	Total bandwidth, read bandwidth and write bandwidth between the client and HBlock server.
Cloud bandwidth (T/U/D)	Total bandwidth, upload bandwidth and download bandwidth between HBlock and cloud.

On the **Monitor** > **Server page**, click the corresponding server ID to view the performance data of the server with the specified time, including Disk path utilization, Capacity quota utilization, CPU utilization, Used memory, Total memory, Disk path used capacity, Disk path total capacity, Used quota, Quota, Read Bandwidth, Write Bandwidth, Total Bandwidth, Read IPOS, Write IPOS, Total IPOS, Read Latency, Write Latency, Total Latency, Cloud upload bandwidth, Cloud download bandwidth, and Total cloud bandwidth.

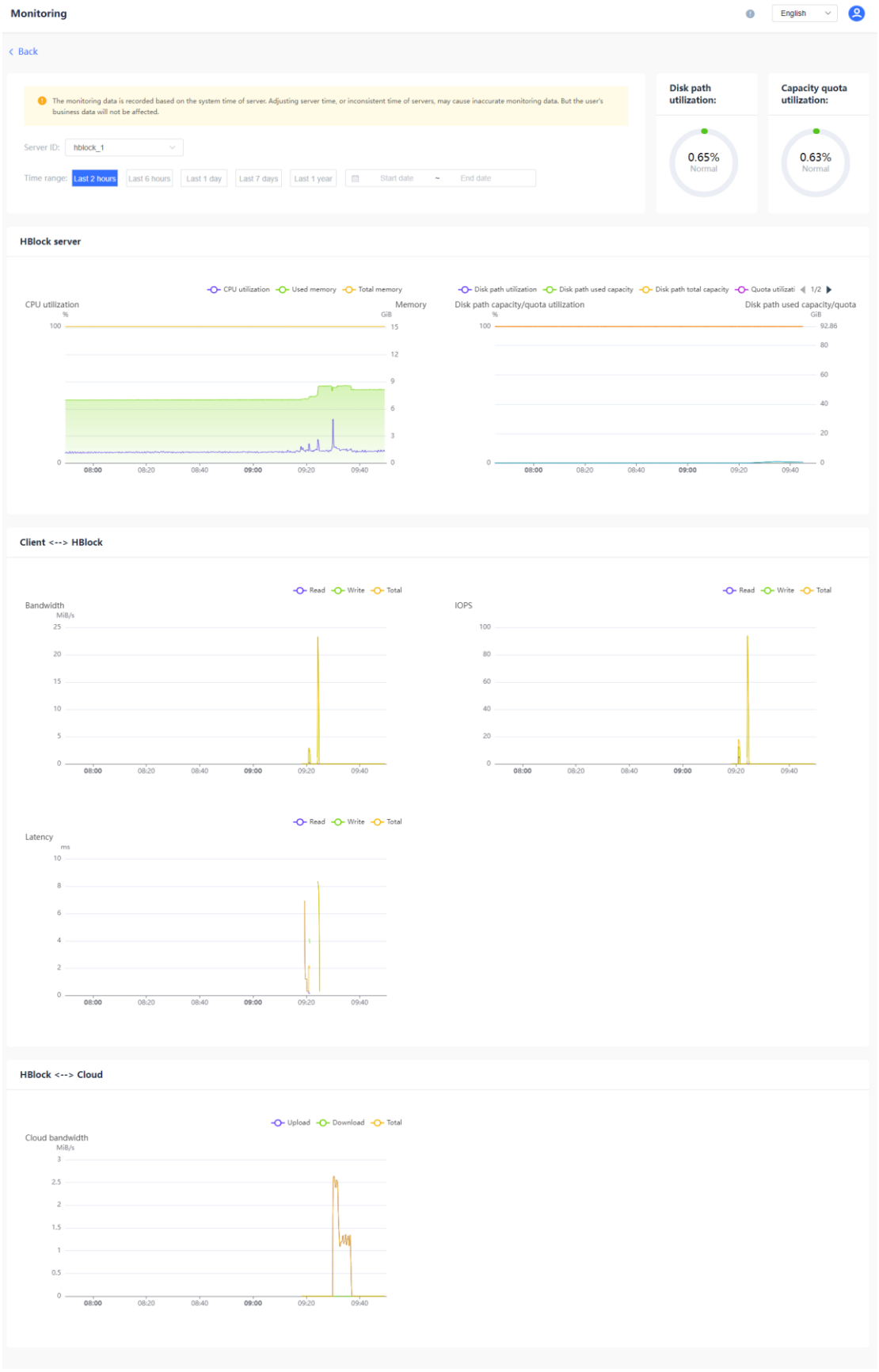


Figure 143. Server Performance Data (Cluster Mode)

Name	Description
Server ID	Server ID, where you can select the server through the dropdown box.
Time range	You can specify the time range: ● Last 2 hours ● Last 6 hours ● Last 1 day ● Last 7 day ● Last 1 year ● According to the calendar button, select Start Date and End Date, accurate to days. **Note**: The start date must be earlier than the end date and must be no earlier than last 1 year starts from the current server time.
Disk path utilization	Average disk usage rate of all disks where disk paths are located.
Quota utilization	Average quota usage rate of all disks where disk paths are located.
HBlock server	HBlock server side.
CPU utilization	The CPU usage rate of the server.
Used memory	The memory usage of the server.
Total memory	The total memory of the server.
Disk path used capacity	Total used capacity of all disks where HBlock disk paths are located.
Disk path total capacity	Total capacity of all disks where HBlock disk paths are located.
Used quota	The total amount of data that has be written to disk paths by HBlock.
Quota	Total HBlock quota for all disk paths of HBlock.
Client<-->HBlock	The data transmission performance between the client and HBlock.
Read bandwidth	The bandwidth when the client reads data from HBlock server.
Write bandwidth	The bandwidth when the client write data to HBlock server.
Total bandwidth	The total bandwidth between the client and HBlock server.
Read IOPS	The IOPS when the client reads data from HBlock server.
Write IOPS	The IOPS when the client writes data to HBlock server.
Total IOPS	Total IOPS between the client and HBlock server.
Read latency	The latency when the client reads data from HBlock. The average read latency of all LUNs in a collection cycle.
Write latency	The latency when the client writes data to HBlock. The average write latency of all LUNs in a collection cycle.
Total latency	The total latency between the client and HBlock. The average write/read latency of all LUNs in a collection cycle.
HBlock <--> Cloud	The data transmission performance between the HBlock and Cloud.
Cloud upload bandwidth	Bandwidth when HBlock upload data to cloud.
Cloud download bandwidth	Bandwidth when HBlock download data from cloud.

Total cloud bandwidth	The total bandwidth between HBlock and the cloud.

3.13.1.5 Disk

Click **Disk** on the **Monitor** page to view the performance data of the corresponding disk where disk path is located: Disk path capacity, Disk path used capacity, Disk path utilization, Capacity quota, Used capacity quota, Capacity quota utilization, Health status, and Health detail.

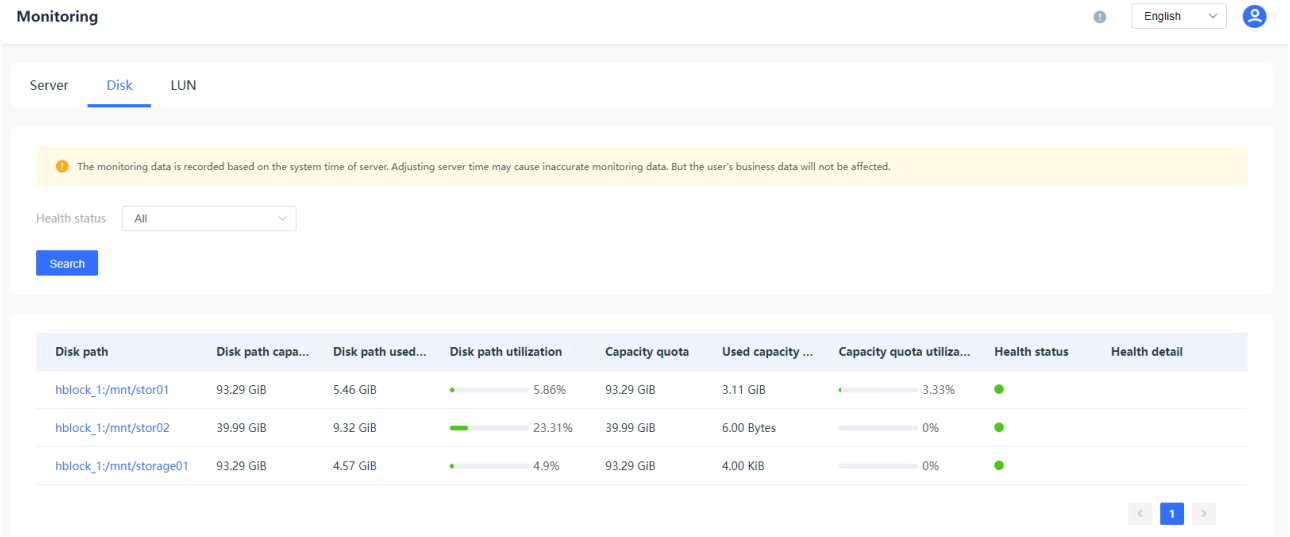


Figure 144. Real-time Disk Performance Data (Standalone Mode)

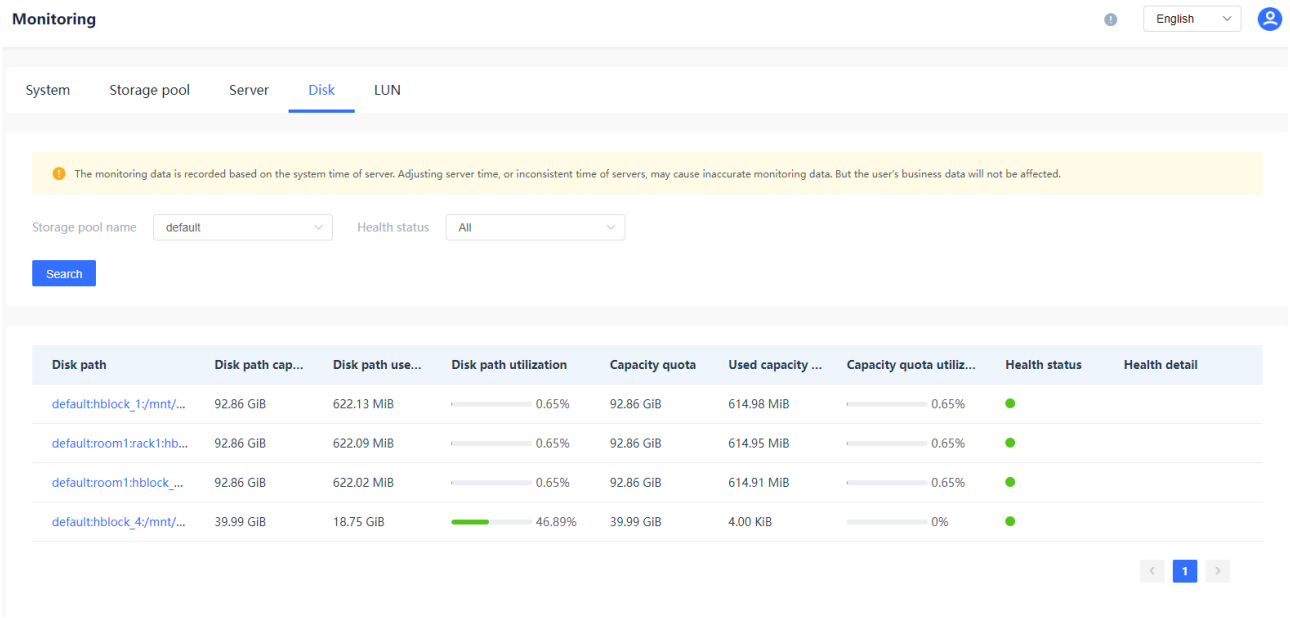


Figure 145. Real-time Disk Performance Data (Cluster Mode)

Name	Description
Disk path	Specific disk path.
Disk path capacity	The capacity of the disk where the disk path resides.
Disk path used capacity	The used capacity of the disk where the disk path resides.
Disk path utilization	Disk usage rate where the data is located.

Capacity quota	Disk path capacity quota.
Used capacity quota	The total amount of data that has be written to the disk path by HBlock.
Capacity quota utilization	The quota usage rate of the disk where disk path is located.
Health status	The health status of the disk path: ● Healthy: The disk path is in a healthy status and can be read and written normally, and the disk usage of the disk path does not exceed the threshold (the system default value is 95%). ● Warning: The disk path is warning and is readable, but one or more of the following situations exist: slow disk, the utilization rate of the disk where the disk path resides exceeds the threshold (the system default value is 95%), the remaining disk space is less than 1GiB, HBlock stops writing to this path, the capacity quota usage of the disk path exceeds the threshold (the system default value is 95%), or the capacity quota of the disk path is set to 0. ● Error: The disk path is in an error state and cannot be accessed. The reasons may be that an I/O error occurs on the disk, resulting in the inability to read or write, or the disk path is not mounted correctly, etc.
Health detail	Disk path health status details. ● If the health status is Heathy, this column is empty. ● If the health status is Warning or Error, detailed information about the warning or error is displayed.

On the **Monitor** > **Disk** page, click the corresponding disk path to view the performance data of the disk path with the specified time: Disk path utilization, Capacity quota utilization, Disk path used capacity, Disk path total capacity, Used quota, and Quota.

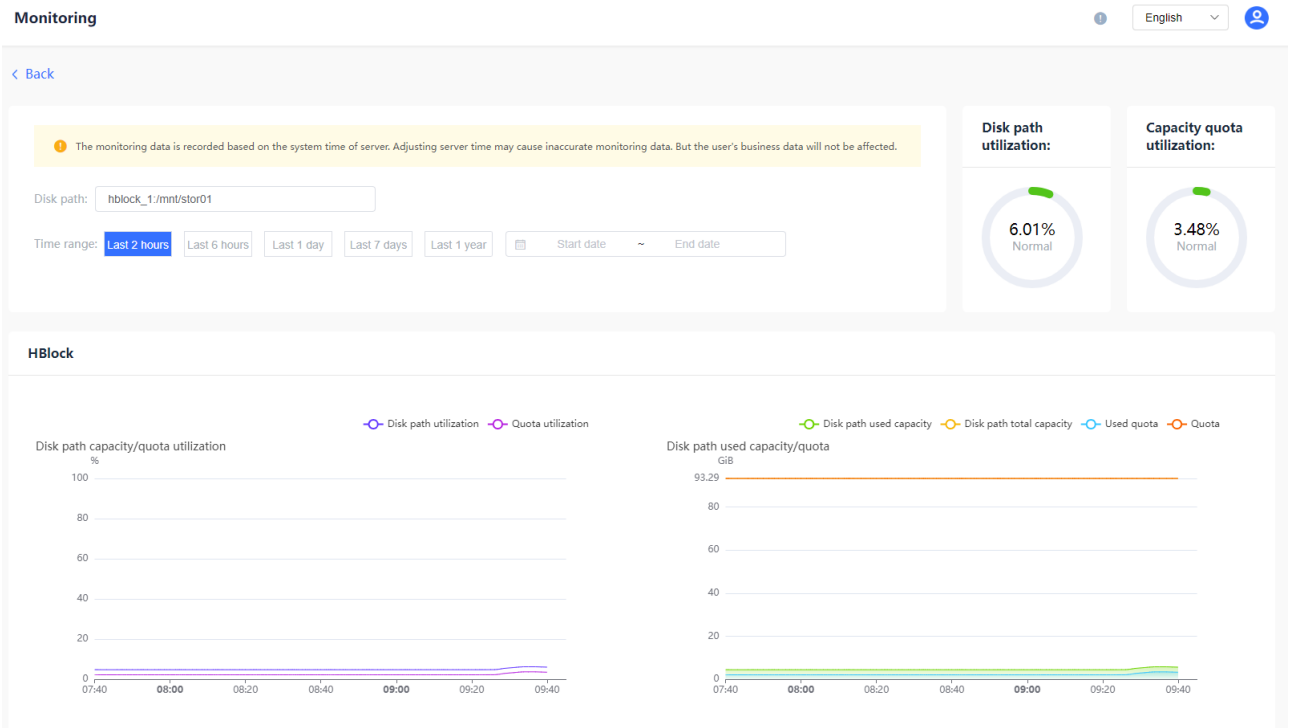


Figure 146. Disk Performance Data (Standalone Mode)

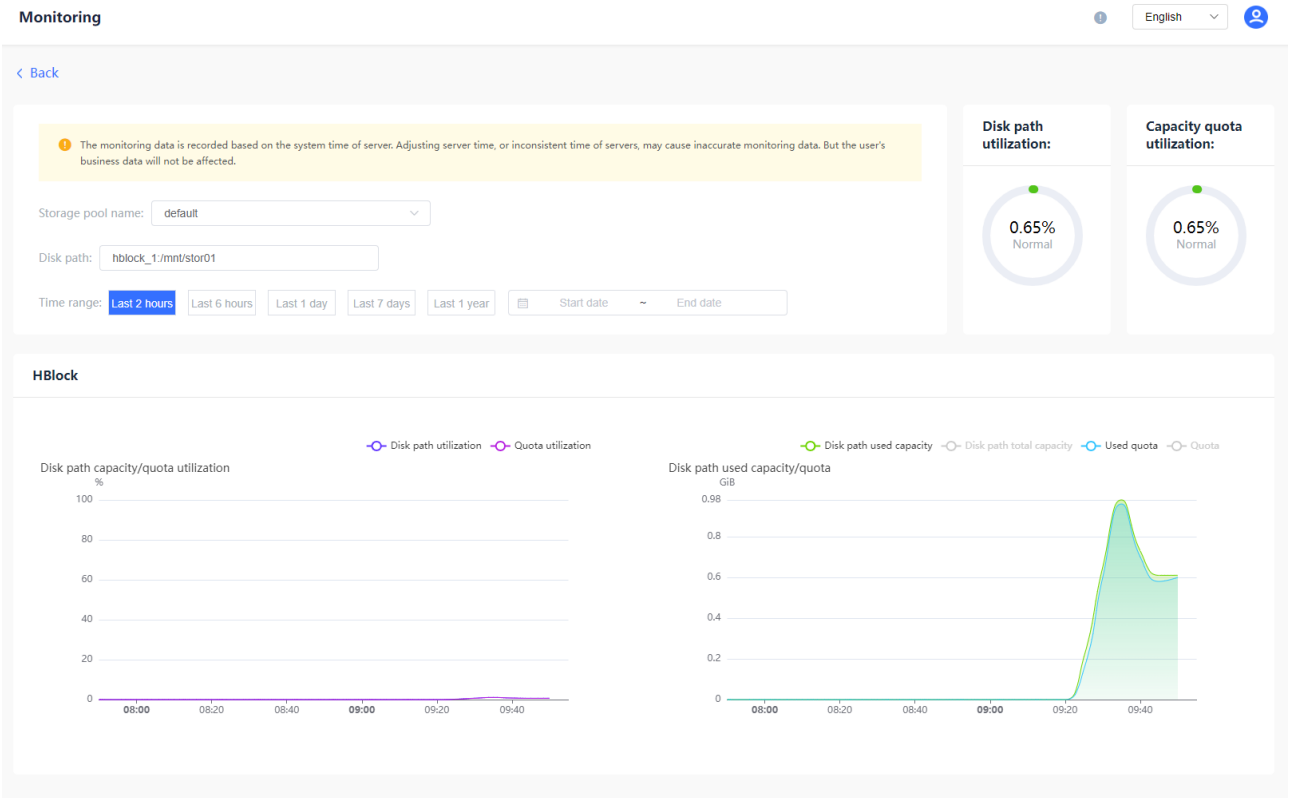


Figure 147. Disk path Monitoring Information (Cluster Mode)

Name	Description
Disk path	Specific disk path.
Time range	Specifies the time range: ● Last 2 hours ● Last 6 hours ● Last 1 day ● Last 7 day ● Last 1 year ● According to the calendar button, select Start Date and End Date, accurate to days. **Note**: The start date must be earlier than the end date and must be no earlier than last 1 year starts from the current server time.
Disk path utilization	Disk usage rate where the data is located.
Quota utilization	The quota usage rate of the disk where disk path is located.
Disk path capacity	The capacity of the disk where the disk path resides.
Disk path used capacity	The used capacity of the disk where the disk path resides.
Quota	Disk path capacity quota.
Used quota	The total amount of data that has be written to the disk path by HBlock.

3.13.1.6 LUN

Click **LUN** on the **Monitor** page to view real-time performance data of LUNs, including IOPS (T/R/W), Bandwidth with client (T/R/W), Latency (T/R/W), Cloud bandwidth (T/U/D) and Wait upload.

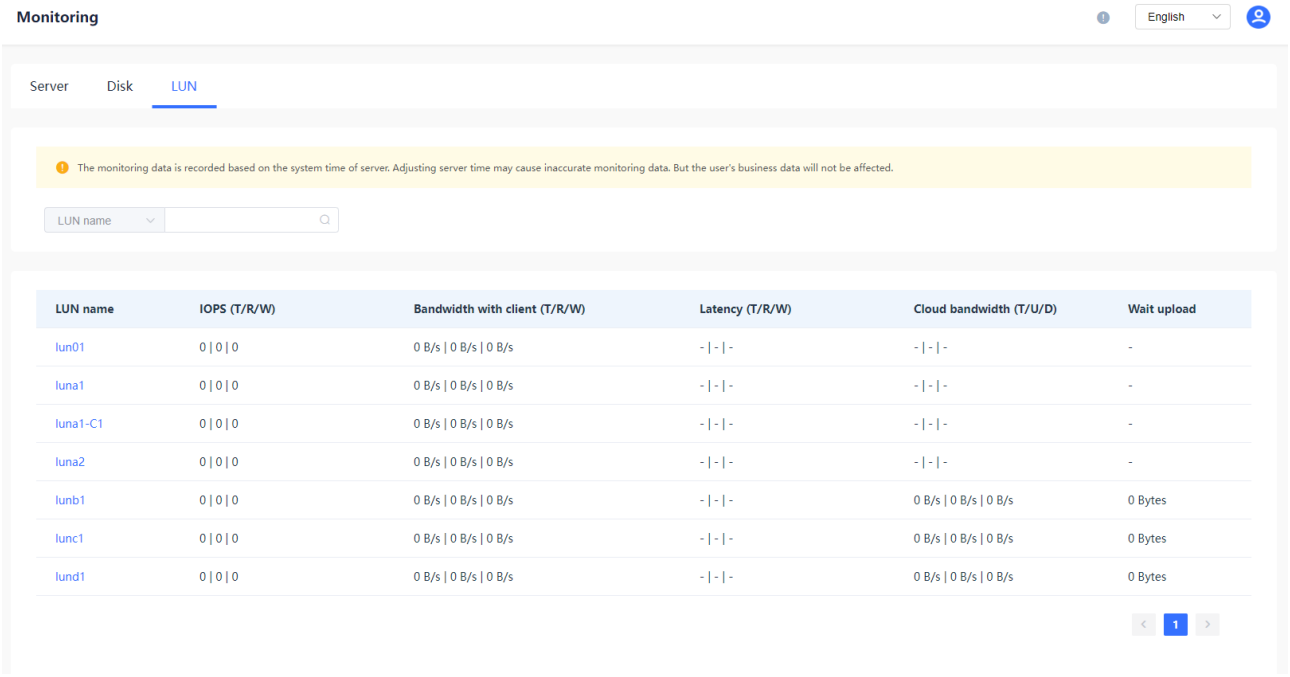


Figure 148. LUN Real-time Performance Data of LUNs (Standalone Mode)

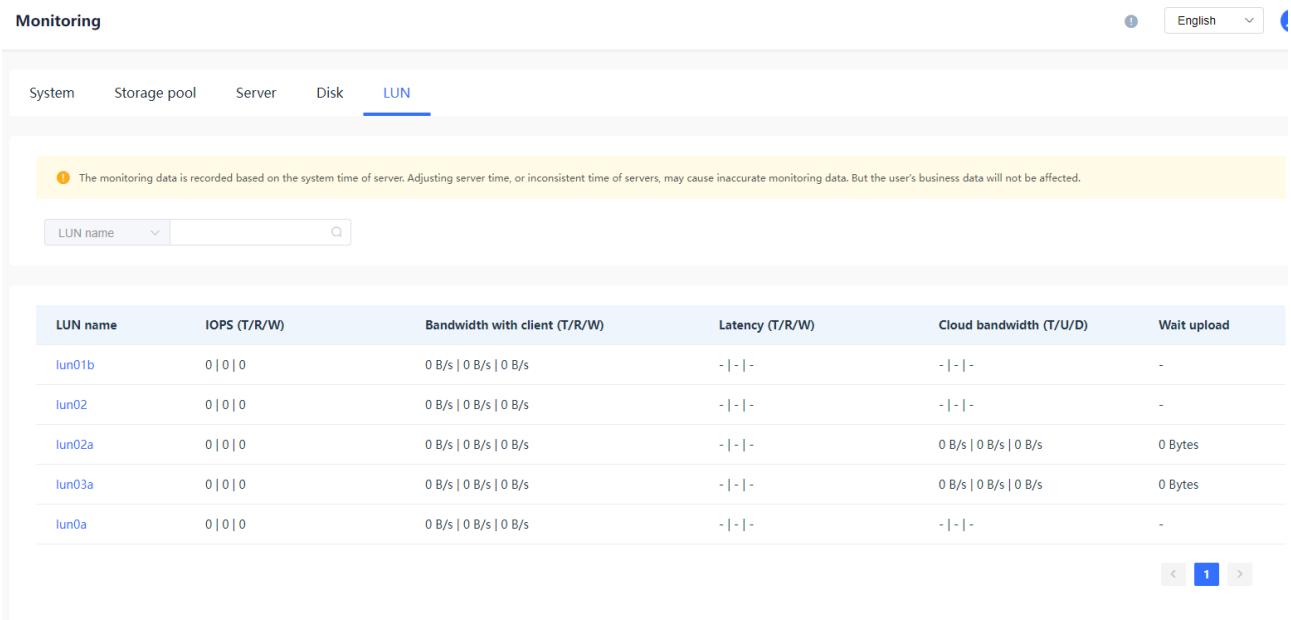


Figure 149. LUN Real-time Performance Data of LUNs (Cluster Mode)

Name	Description
LUN name	The LUN name.
IOPS (T/R/W)	Total IOPS, read IOPS and write IOPS between the client and HBlock.
Bandwidth with client (T/R/W)	Total bandwidth, read bandwidth and write bandwidth between the client and HBlock.
Latency (T/R/W)	Total latency, read latency and write latency between the client and HBlock.
Cloud bandwidth (T/U/D)	Total bandwidth, upload bandwidth and download bandwidth between HBlock LUN and cloud.
Wait upload	The amount of data to be uploaded to the cloud.

On the **Monitor** > **LUN** page, click the corresponding LUN name to view the performance data of the LUN with the specified time, including Read Bandwidth, Write Bandwidth, Total Bandwidth, Read IPOS, Write IPOS, Total IPOS, Read Latency, Write Latency, Total Latency, Cloud upload bandwidth, Cloud download bandwidth, Total cloud bandwidth, Wait upload.

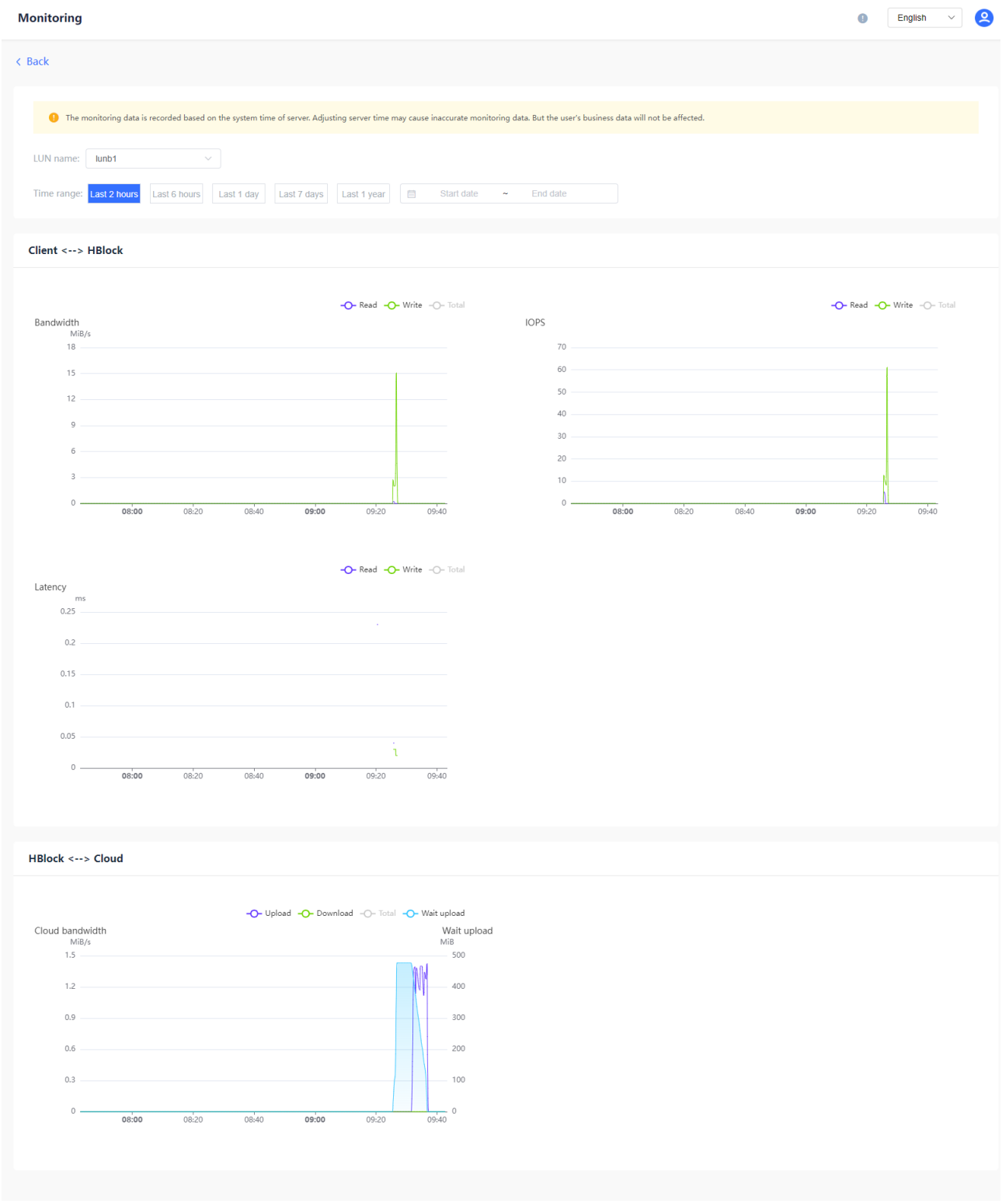


Figure 150. Performance Data of the LUN (Standalone Mode)

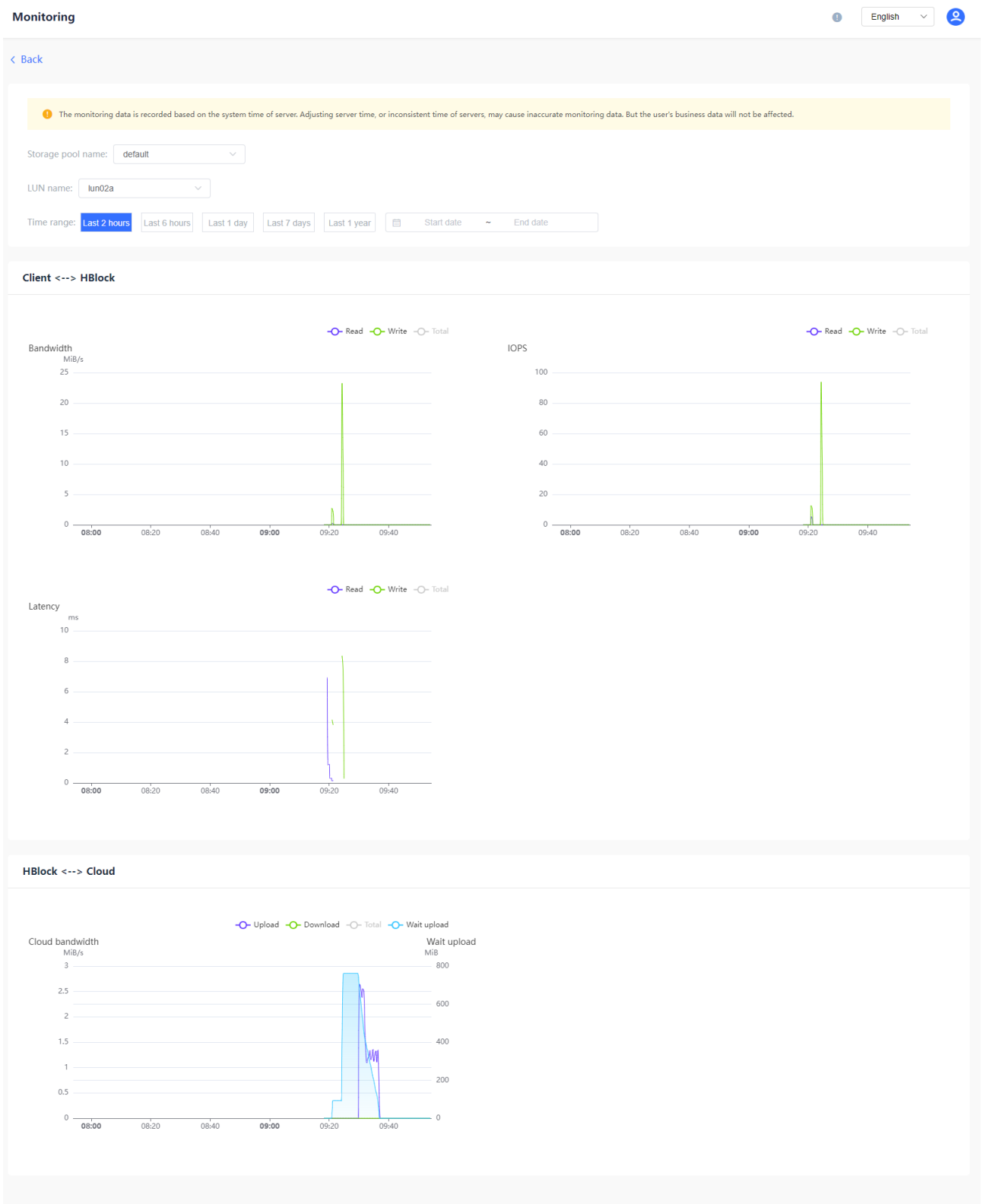


Figure 151. Performance Data of the LUN (Cluster Mode)

Name	Description
LUN name	LUN name, which can be selected from the drop-down box.
Time range	Specifies the time range: ● Last 2 hours ● Last 6 hours ● Last 1 day ● Last 7 days ● Last 1 year ● According to the calendar button, select Start Date and End Date, accurate to days. **Note**: The start date must be earlier than the end date and must be no earlier than last 1 year starts from the current server time.
Client <-->HBlock	The data transmission performance between the client and HBlock LUN.
Read Bandwidth	The bandwidth when the client reads data from HBlock LUN.
Write Bandwidth	The bandwidth when the client write data to HBlock LUN.
Total Bandwidth	The total bandwidth between the client and HBlock LUN.
Read IOPS	The IOPS when the client reads data from HBlock LUN.
Write IOPS	The IOPS when the client writes data to HBlock LUN.
Total IOPS	Total IOPS between the client and HBlock LUN.
Read Latency	The latency when the client reads data from HBlock. The read latency of a LUN in a collection cycle reflects the duration of HBlock LUN processing read requests.
Write Latency	The latency for the client to write data to HBlock. The write latency of a LUN in a collection cycle reflects the duration of HBlock LUN processing write requests.
Total Latency	The total latency between the client and HBlock. The total latency of a LUN in a collection cycle reflects the duration of HBlock LUN processing read and write requests.
Cloud upload bandwidth	Bandwidth when HBlock LUN upload data to cloud.
Cloud download bandwidth	Bandwidth when HBlock LUN download data from cloud.
Total cloud bandwidth	The total bandwidth between HBlock LUN and the cloud.
Wait upload	The amount of data to be uploaded to the cloud.

3.13.2 Alarm

Click **O&M** > **Alarm** to enter Alarm page, view unresolved alarms, resolved alarms and expired alarms. Please refer to **Alarm List** for alarm conditions, automatic resolution conditions and alarm expiration conditions.

Note: The alarm data is recorded based on the system time of server. Adjusting server time, or inconsistent time of servers, may cause inaccurate alarm data. But the user's business data will not be affected.

3.13.2.1 Unresolved Alarm

Click `Unresolved` on `Alarm` page to view unresolved alarms information. You can view unresolved alarms by filtering mute status, severity, alarm rule and alarm time.

Note: The limit of the data in 'Unresolved' status is 10,000. If the limit is reached, new alarms cannot be displayed or notified. At that time, please fix the related problem, or try to manually resolve the alarm.

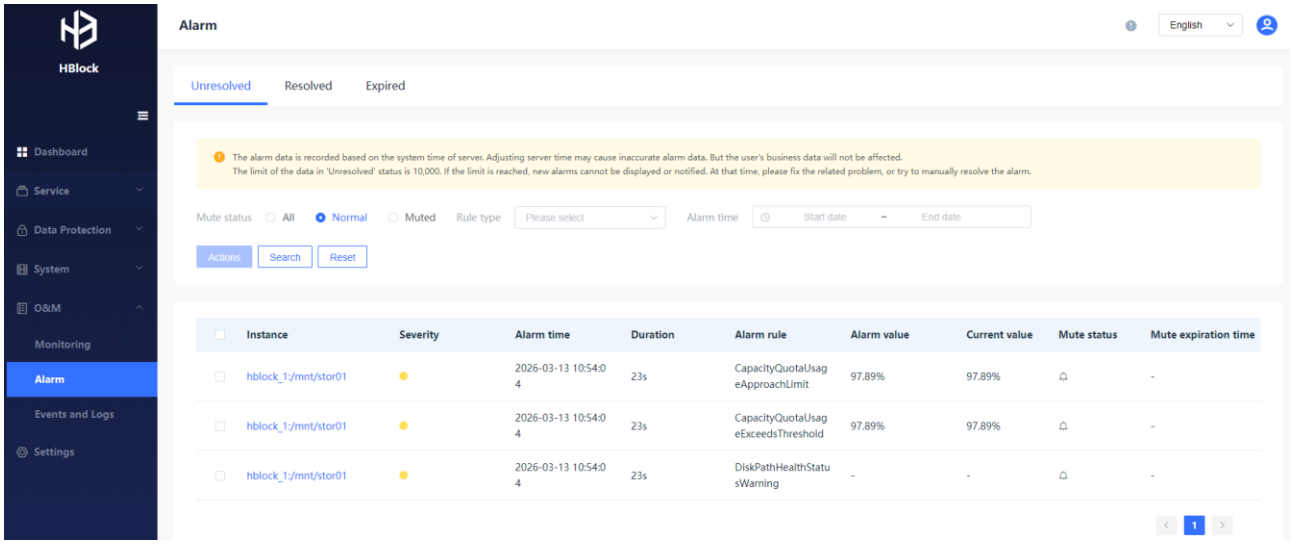


Figure 152. Unresolved Alarms

The description of selection bars

Name	Description
Mute status	Alarm mute status: ● All ● Normal ● Muted
Rule Type	Select based on alarm level and alarm rules. Alarm level: ● Warning ● Major ● Critical

	For detailed information on alarm rule names, please refer to **Alarm List**.
Alarm time	Based on the alarm occurrence time, filter the alarms that occur between *Start Date* and *End Date*.
Actions	Select specific alarms and click Action to perform the following operations: ● Mute: Mute alarms. When mute alarms, you need to enter the reason for this operation and select mute expiration time. The reason cannot exceed 50 characters. After the alarm is muted, the email for the alarm will not be sent before mute expiration time. ● Unmute: Unmute alarms. When unmute alarms, you need to enter the reason for this operation. The reason cannot exceed 50 characters. ● Resolve: Manually resolve alarms. When manually resolve alarms, you need to enter the reason for this operation. The reason cannot exceed 50 characters. If the problem still exists, it will be alarmed again.
Search	Click the Search button to display the alarm list according to the filtering conditions.
Reset	Click Reset button to reset the filtering conditions to the default values: all unresolved alarm records whose mute status is "normal".

The description of alarms

Name	Description
Instance	Alarm instance name.
Severity	Alarm level: ● Warning ● Major ● Critical
Alarm time	Time when an alarm is occurred.
Duration	Alarm duration.
Alarm rule	Alarm rule. For detailed information on alert rule names, please refer to **Alarm List**.
Alarm value	The value when the alarm occurs. Only an alarm corresponding to a numerical indicator will display values. The following alarm rules involve numerical indicators: ● AlarmNumberApproachingLimit: The number of unresolved alarms is close to the upper limit. Displays (total number of unresolved alarms /upper limit of number of unresolved alarms) as percentage. The unit is %. Calculation formula: (total number of unresolved alarms /upper limit of number of unresolved alarms)*100%. ● ResourceUsageApproachingLimit: The resource usage is

	close to the upper limit, showing the license used capacity usage as a percentage, the unit is %. Calculation formula: (total local LUN capacity/capacity allowed by the license)*100%. ● CapacityQuotaUsageExceedsThreshold: The quota usage exceeds the threshold, showing the quota usage (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● CapacityQuotaUsageApproachLimit: The quota is exhausted, showing the quota usage rate (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● DiskUsageExceedsThreshold: The disk usage exceeds the threshold, showing the usage (Path_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● InsufficientSpaceonInstallationPath: The remaining space of the installation directory is insufficient, showing the remaining space of the file system of the disk where the directory is located, in GiB.
Current value	Current numerical value Only an alarm corresponding to a numerical indicator will display values. The following alarm rules involve numerical indicators: ● AlarmNumberApproachingLimit: The number of unresolved alarms is close to the upper limit. Displays (total number of unresolved alarms /upper limit of number of unresolved alarms) as percentage. The unit is %. Calculation formula: (total number of unresolved alarms /upper limit of number of unresolved alarms)*100%. ● ResourceUsageApproachingLimit: The resource usage is close to the upper limit, showing the license used capacity usage as a percentage, the unit is %. Calculation formula: (total local LUN capacity/capacity allowed by the license)*100%. ● CapacityQuotaUsageExceedsThreshold: The quota usage exceeds the threshold, showing the quota usage (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● CapacityQuotaUsageApproachLimit: The quota is exhausted, showing the quota usage rate

	(Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● DiskUsageExceedsThreshold: The disk usage exceeds the threshold, showing the usage (Path_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● InsufficientSpaceonInstallationPath: The remaining space of the installation directory is insufficient, showing the remaining space of the file system of the disk where the directory is located, in GiB.
Mute status	Alarm mute status: ● Normal ● Muted
Mute expiration time	Alarm mute expiration time.

Click the specific alarm to view the alarm details.

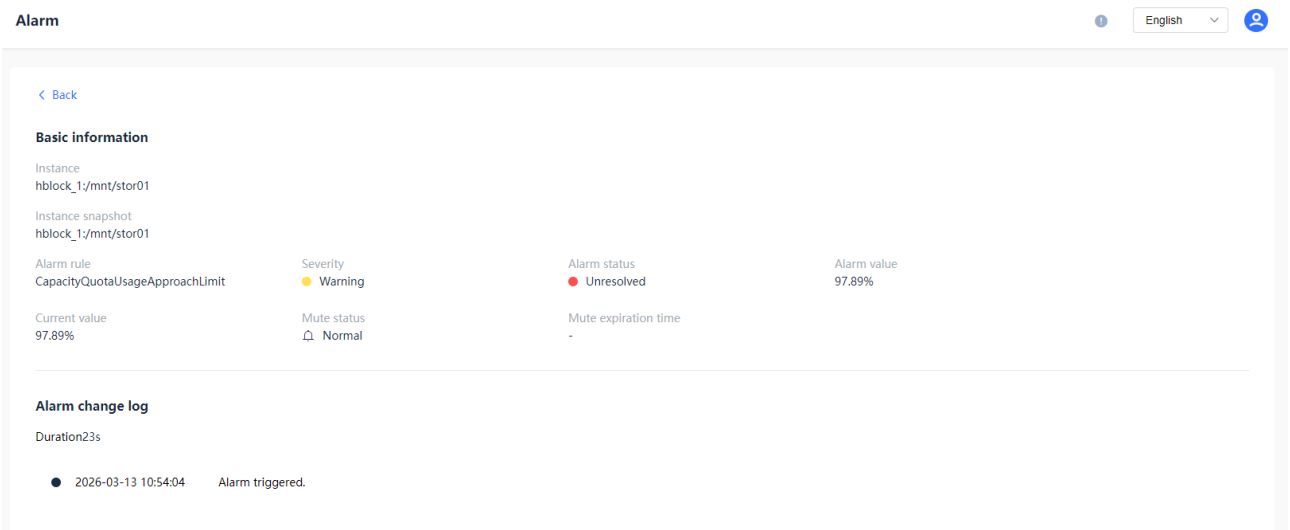


Figure 153. Unresolved Alarm Details

The description of alarm details

Name	Description
Alarm instance	Alarm instance name.
Instance snapshot	Alarm instance snapshot, that is, the detailed information of the alarm instance when the alarm occurs.
Alarm rule	Alarm rule. For detailed information on alarm rule names, please refer to **Alarm List**.
Severity	Alarm level:

	● Warning ● Major ● Critical
Alarm status	Alarm status.
Alarm value	The value when the alarm occurs. Only an alarm corresponding to a numerical indicator will display values. The following alarm rules involve numerical indicators: ● AlarmNumberApproachingLimit: The number of unresolved alarms is close to the upper limit. Displays (total number of unresolved alarms /upper limit of number of unresolved alarms) as percentage. The unit is %. Calculation formula: (total number of unresolved alarms /upper limit of number of unresolved alarms)*100%. ● ResourceUsageApproachingLimit: The resource usage is close to the upper limit, showing the license used capacity usage as a percentage, the unit is %. Calculation formula: (total local LUN capacity/capacity allowed by the license)*100%. ● CapacityQuotaUsageExceedsThreshold: The quota usage exceeds the threshold, showing the quota usage (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● CapacityQuotaUsageApproachLimit: The quota is exhausted, showing the quota usage rate (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● DiskUsageExceedsThreshold: The disk usage exceeds the threshold, showing the usage (Path_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● InsufficientSpaceonInstallationPath: The remaining space of the installation directory is insufficient, showing the remaining space of the file system of the disk where the directory is located, in GiB.
Current value	Current numerical value Only an alarm corresponding to a numerical indicator will display values. The following alarm rules involve numerical indicators: ● AlarmNumberApproachingLimit: The number of unresolved alarms is close to the upper limit. Displays (total number of unresolved alarms /upper limit of number of unresolved alarms) as percentage. The unit is %. Calculation formula: (total number of unresolved alarms /upper limit of number of unresolved alarms)*100%. ● ResourceUsageApproachingLimit: The resource usage is close to the upper limit, showing the license used capacity usage as a percentage, the unit is %. Calculation formula: (total local LUN capacity/capacity allowed by the license)*100%.

	● CapacityQuotaUsageExceedsThreshold: The quota usage exceeds the threshold, showing the quota usage (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● CapacityQuotaUsageApproachLimit: The quota is exhausted, showing the quota usage rate (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● DiskUsageExceedsThreshold: The disk usage exceeds the threshold, showing the usage (Path_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● InsufficientSpaceonInstallationPath: The remaining space of the installation directory is insufficient, showing the remaining space of the file system of the disk where the directory is located, in GiB.
Mute status	Alarm mute status: ● Normal ● Muted
Mute expiration time	Alarm mute expiration time.
Alarm change log	A complete life cycle description of the alarm from generation to resolution or expiration.

3.13.2.2 Resolved Alarm

Click **Resolved** on **Alarm** page to view resolved alarms information. You can view resolved alarms by filtering severity, alarm rule, resolve type, alarm time and resolve time.

Note: Only the latest 10,000 data supports online query, click the blue text to download all.

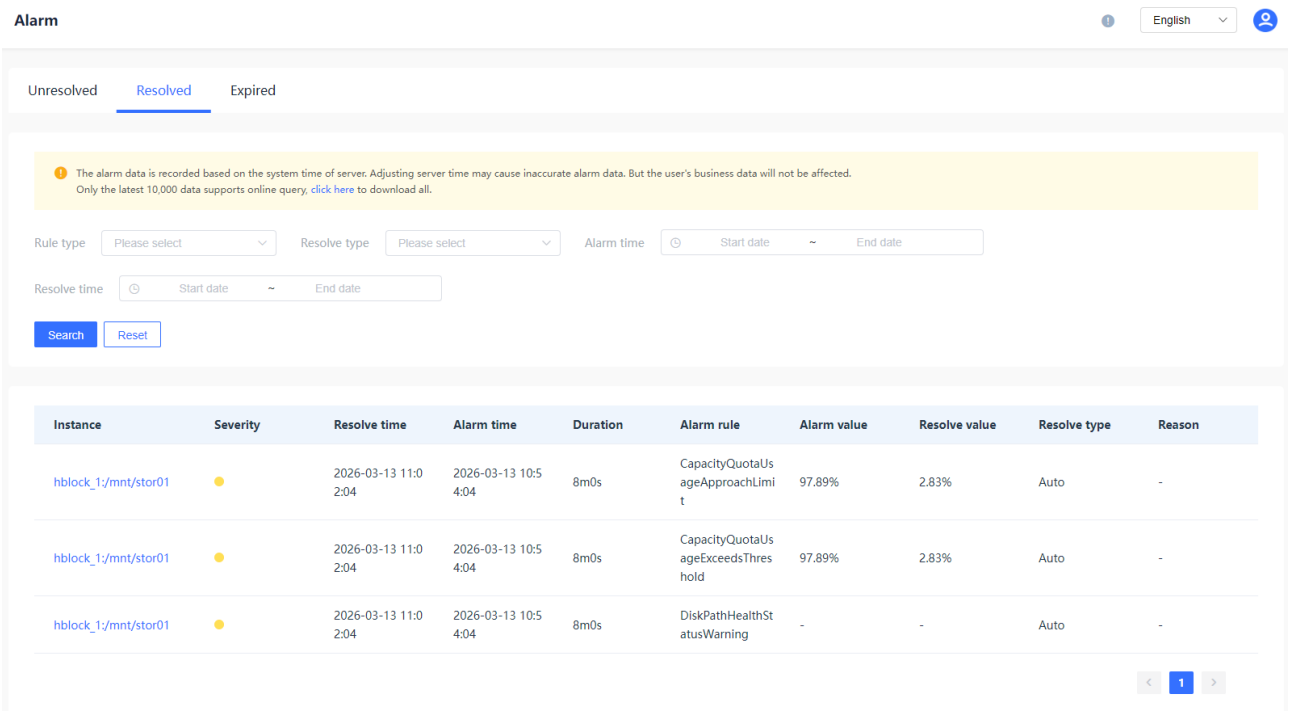


Figure 154. Resolved Alarms

The description of selection bars

Name	Description
Rule Type	Select based on alarm level and alarm rules. Alarm level: ● Warning ● Major ● Critical For detailed information on alarm rule names, please refer to **Alarm List**.
Resolve type	Alarm resolve type: ● Manual ● Auto
Alarm time	Based on the alarm occurrence time, filter the alarms that occur between *Start Date* and *End Date*.
Resolve time	Based on the resolve time of the alarm, filter the alarms resolved between *Start Date* and *End Date*.
Search	Click the Search button to display the alarm list according to the filtering

	conditions.
Reset	Click Reset button to reset the filtering conditions to the default values: all resolved alarm records.

The description of alarms

Name	Description
Instance	Alarm instance name.
Severity	Alarm level: ● Warning ● Major ● Critical
Resolve time	Time when the alarm is resolved.
Alarm time	Time when the alarm occurred.
Duration	Alarm duration.
Alarm rule	Alarm rule. For detailed information on alert rule names, please refer to **Alarm List**.
Alarm value	The value when the alarm occurs. Only an alarm corresponding to a numerical indicator will display values. The following alarm rules involve numerical indicators: ● AlarmNumberApproachingLimit: The number of unresolved alarms is close to the upper limit. Displays (total number of unresolved alarms /upper limit of number of unresolved alarms) as percentage. The unit is %. Calculation formula: (total number of unresolved alarms /upper limit of number of unresolved alarms)*100%. ● ResourceUsageApproachingLimit: The resource usage is close to the upper limit, showing the license used capacity usage as a percentage, the unit is %. Calculation formula: (total local LUN capacity/capacity allowed by the license)*100%. ● CapacityQuotaUsageExceedsThreshold: The quota usage exceeds the threshold, showing the quota usage (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● CapacityQuotaUsageApproachLimit: The quota is exhausted, showing the quota usage rate (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● DiskUsageExceedsThreshold: The disk usage exceeds the threshold, showing the usage (Path_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● InsufficientSpaceonInstallationPath: The remaining space of the installation directory is insufficient, showing the remaining space of the file system of the disk where the directory is located, in GiB.

Resolve value	Current numerical value. Only an alarm corresponding to a numerical indicator will display values. The following alarm rules involve numerical indicators: ● AlarmNumberApproachingLimit: The number of unresolved alarms is close to the upper limit. Displays (total number of unresolved alarms /upper limit of number of unresolved alarms) as percentage. The unit is %. Calculation formula: (total number of unresolved alarms /upper limit of number of unresolved alarms)*100%. ● ResourceUsageApproachingLimit: The resource usage is close to the upper limit, showing the license used capacity usage as a percentage, the unit is %. Calculation formula: (total local LUN capacity/capacity allowed by the license)*100%. ● CapacityQuotaUsageExceedsThreshold: The quota usage exceeds the threshold, showing the quota usage (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● CapacityQuotaUsageApproachLimit: The quota is exhausted, showing the quota usage rate (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● DiskUsageExceedsThreshold: The disk usage exceeds the threshold, showing the usage (Path_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● InsufficientSpaceonInstallationPath: The remaining space of the installation directory is insufficient, showing the remaining space of the file system of the disk where the directory is located, in GiB.
Resolve type	Alarm resolve type: ● Auto ● Manual
Reason	The resolved reasons. If the alarm is resolved manually, the reason for resolving the alarm will be displayed.

Click the specific resolved alarm to view the resolved alarm details.

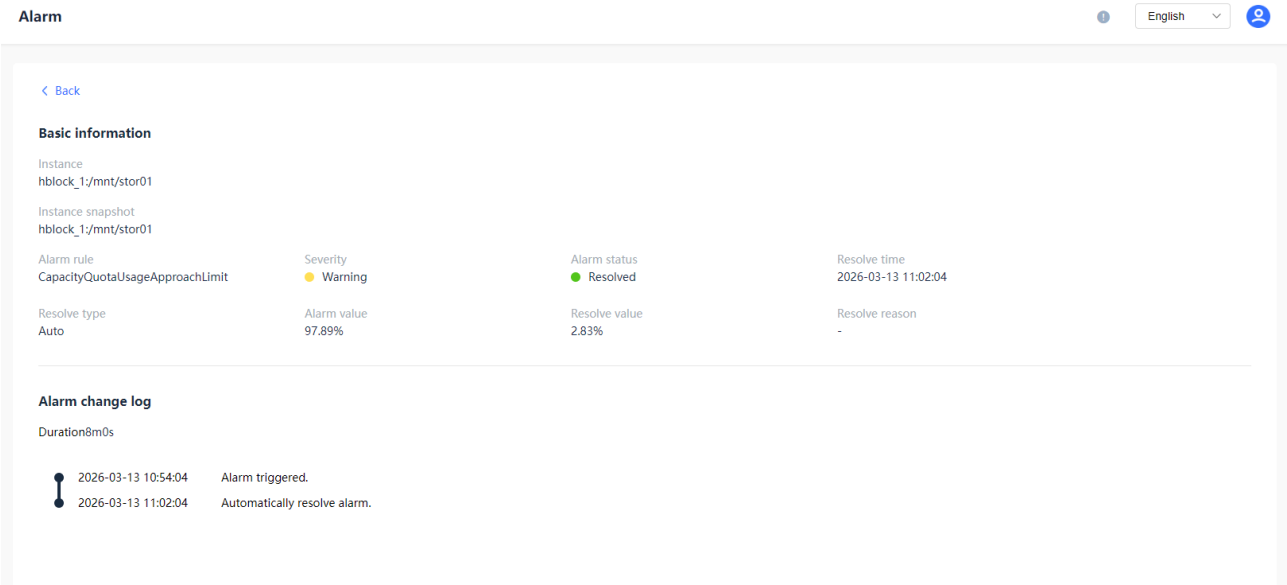


Figure 155. Details of the Resolved Alarm

The description of alarm details

Name	Description
Alarm instance	Alarm instance name.
Instance snapshot	Alarm instance snapshot, that is, the detailed information of the alarm instance when the alarm occurs.
Alarm rule	Alarm rule. For detailed information on alarm rule names, please refer to **Alarm List**.
Severity	Alarm level: ● Warning ● Major ● Critical
Alarm status	Alarm status.
Resolve time	Time when the alarm is resolved.
Resolve type	Alarm resolve type: ● Manual ● Auto
Alarm value	The value when the alarm occurs. Only an alarm corresponding to a numerical indicator will display values. The following alarm rules involve numerical indicators: ● AlarmNumberApproachingLimit: The number of unresolved alarms is close to the upper limit. Displays (total number of unresolved alarms /upper limit of number of unresolved alarms) as percentage. The unit is %. Calculation formula: (total number of unresolved alarms /upper

	limit of number of unresolved alarms)*100%. ● ResourceUsageApproachingLimit: The resource usage is close to the upper limit, showing the license used capacity usage as a percentage, the unit is %. Calculation formula: (total local LUN capacity/capacity allowed by the license)*100%. ● CapacityQuotaUsageExceedsThreshold: The quota usage exceeds the threshold, showing the quota usage (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● CapacityQuotaUsageApproachLimit: The quota is exhausted, showing the quota usage rate (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● DiskUsageExceedsThreshold: The disk usage exceeds the threshold, showing the usage (Path_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● InsufficientSpaceonInstallationPath: The remaining space of the installation directory is insufficient, showing the remaining space of the file system of the disk where the directory is located, in GiB.
Resolve value	The value when an alarm is resolved. Only an alarm corresponding to a numerical indicator will display values. The following alarm rules involve numerical indicators: ● AlarmNumberApproachingLimit: The number of unresolved alarms is close to the upper limit. Displays (total number of unresolved alarms /upper limit of number of unresolved alarms) as percentage. The unit is %. Calculation formula: (total number of unresolved alarms /upper limit of number of unresolved alarms)*100%. ● ResourceUsageApproachingLimit: The resource usage is close to the upper limit, showing the license used capacity usage as a percentage, the unit is %. Calculation formula: (total local LUN capacity/capacity allowed by the license)*100%. ● CapacityQuotaUsageExceedsThreshold: The quota usage exceeds the threshold, showing the quota usage (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● CapacityQuotaUsageApproachLimit: The quota is exhausted, showing the quota usage rate (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● DiskUsageExceedsThreshold: The disk usage exceeds the threshold, showing the usage (Path_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● InsufficientSpaceonInstallationPath: The remaining space of the installation directory is insufficient, showing the remaining space of

	the file system of the disk where the directory is located, in GiB.
Resolve reason	The reason for manually resolving the alarm.
Alarm change log	A complete life cycle description of the alarm from generation to resolution or expiration.

3.13.2.3 Expired Alarm

Click **Expired** on **Alarm** page to view expired alarms information. You can view expired alarms by filtering severity, alarm rule, alarm time and expiration time.

Note: Only the latest 10,000 data supports online query, click the blue text to download all.

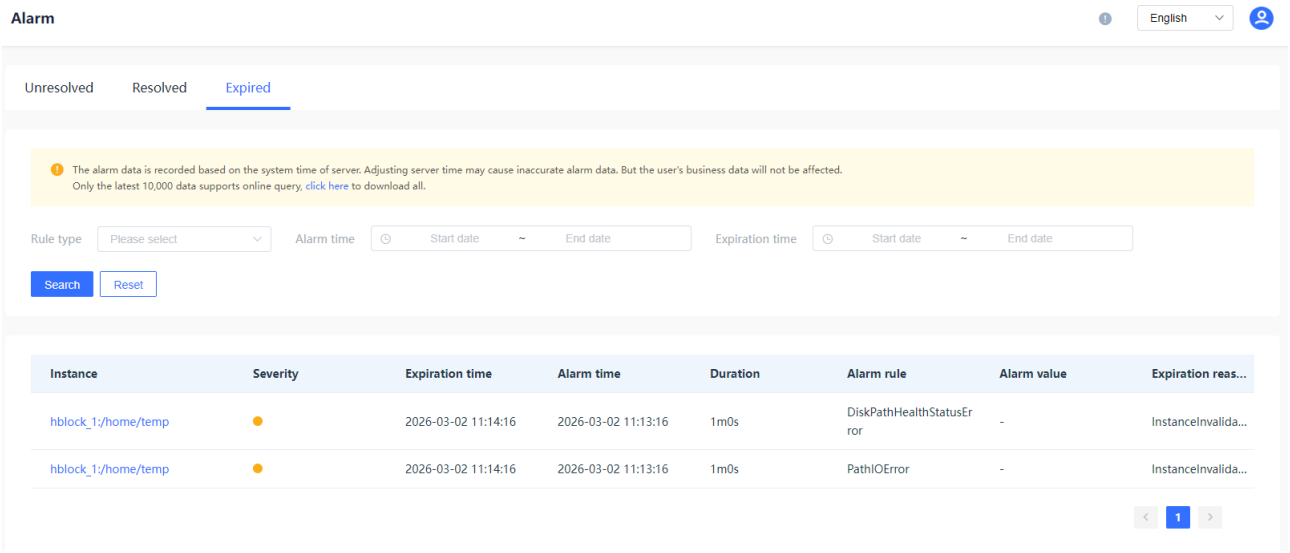


Figure 156. Expired Alarms

The description of selection bars

Name	Description
Rule Type	Select based on alarm level and alarm rules. Alarm level: ● Warning ● Major ● Critical For detailed information on alarm rule names, please refer to **Alarm List**.
Alarm time	Based on the alarm occurrence time, filter the alarms that occur between *Start Date* and *End Date*.
Expiration Time	Based on the alarm expiration time, filter the alarms that occur between *Start Date* and *End Date*.
Search	Click the Search button to display the alarm list according to the filtering conditions.
Reset	Click Reset button to reset the filtering conditions to the default values: all expired alarm records.

The description of alarms

Name	Description
Instance	Alarm instance name.
Severity	Alarm level:

	● Warning ● Major ● Critical
Expiration time	Time when the alarm is expired.
Alarm time	Time when the alarm occurred.
Duration	Alarm duration.
Alarm rule	Alarm rule. For detailed information on alert rule names, please refer to **Alarm List**.
Alarm value	The value when the alarm occurs. Only an alarm corresponding to a numerical indicator will display values. The following alarm rules involve numerical indicators: ● AlarmNumberApproachingLimit: The number of unresolved alarms is close to the upper limit. Displays (total number of unresolved alarms /upper limit of number of unresolved alarms) as percentage. The unit is %. Calculation formula: (total number of unresolved alarms /upper limit of number of unresolved alarms)*100%. ● ResourceUsageApproachingLimit: The resource usage is close to the upper limit, showing the license used capacity usage as a percentage, the unit is %. Calculation formula: (total local LUN capacity/capacity allowed by the license)*100%. ● CapacityQuotaUsageExceedsThreshold: The quota usage exceeds the threshold, showing the quota usage (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● CapacityQuotaUsageApproachLimit: The quota is exhausted, showing the quota usage rate (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● DiskUsageExceedsThreshold: The disk usage exceeds the threshold, showing the usage (Path_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● InsufficientSpaceonInstallationPath: The remaining space of the installation directory is insufficient, showing the remaining space of the file system of the disk where the directory is located, in GiB.
Expiration reason	Reason for alarm expiration.

Click the specific expired alarm to view the expired alarm details.

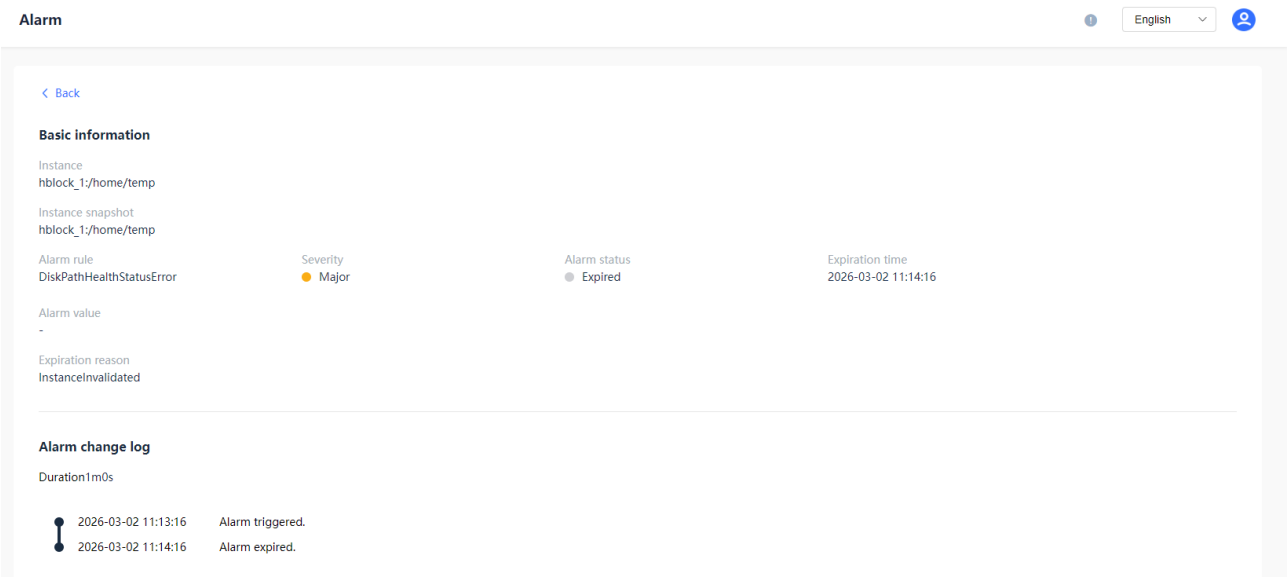


Figure 157. Details of Expired Alarm

The description of alarm details

Name	Description
Alarm instance	Alarm instance name.
Instance snapshot	Alarm instance snapshot, that is, the detailed information of the alarm instance when the alarm occurs.
Alarm rule	Alarm rule. For detailed information on alarm rule names, please refer to **Alarm List**.
Severity	Alarm level: ● Warning ● Major ● Critical
Alarm status	Alarm status.
Expiration Time	Time when the alarm is expired.
Alarm value	The value when the alarm occurs. Only an alarm corresponding to a numerical indicator will display values. The following alarm rules involve numerical indicators: ● AlarmNumberApproachingLimit: The number of unresolved alarms is close to the upper limit. Displays (total number of unresolved alarms /upper limit of number of unresolved alarms) as percentage. The unit is %. Calculation formula: (total number of unresolved alarms /upper limit of number of unresolved alarms)*100%. ● ResourceUsageApproachingLimit: The resource usage is close to the upper limit, showing the license used capacity usage as a

	percentage, the unit is %. Calculation formula: (total local LUN capacity/capacity allowed by the license)*100%. ● CapacityQuotaUsageExceedsThreshold: The quota usage exceeds the threshold, showing the quota usage (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● CapacityQuotaUsageApproachLimit: The quota is exhausted, showing the quota usage rate (Path_Cap_Quota_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● DiskUsageExceedsThreshold: The disk usage exceeds the threshold, showing the usage (Path_Rate) of the disk associated with the storage pool or disk path, in percentage (%). ● InsufficientSpaceonInstallationPath: The remaining space of the installation directory is insufficient, showing the remaining space of the file system of the disk where the directory is located, in GiB.
Expiration reason	Reason for alarm expiration.
Alarm change log	A complete life cycle description of the alarm from generation to resolution or expiration.

3.13.3 Events and Logs

Click **O&M** > **Event and Logs** to enter **Event and Logs** page, view user events, system events and log collection.

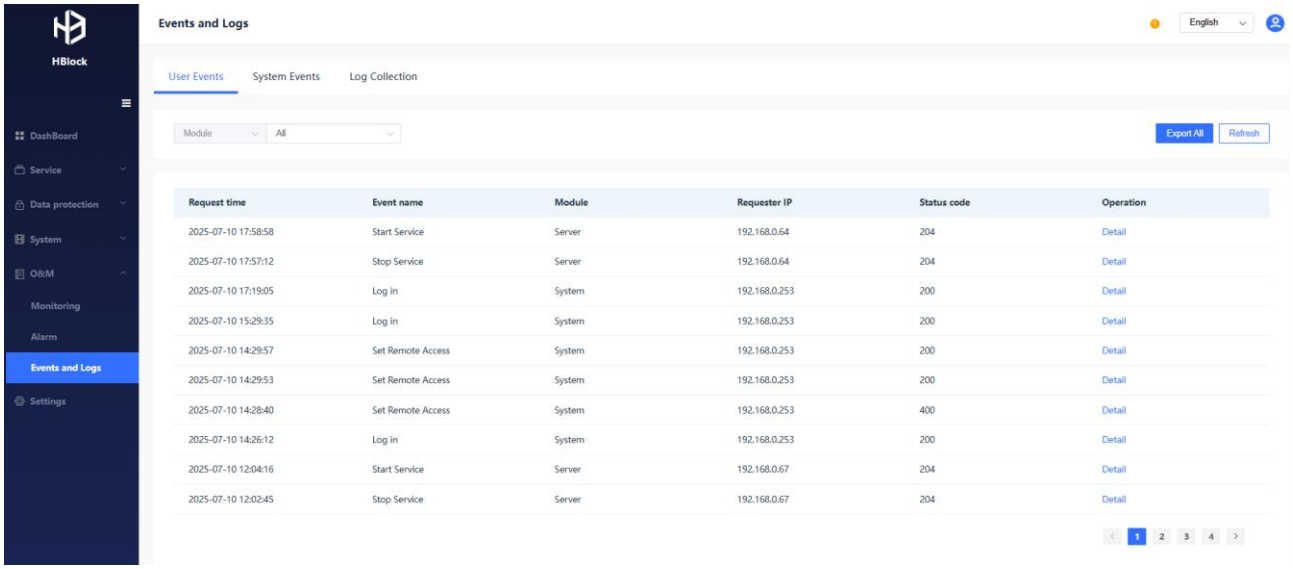


Figure 158. Events and Logs

3.13.3.1 User Events

Click **User Events** on **User Events and Logs** page to view or export user events. You can search events by Module, Requester IP and EventName. Click Export All to export user events information.

Note: This page displays up to last 1,000 user events.

Name	Description
Request time	The time when HBlock received the event request.
Event Name	User event name, you can refer to **User Event List** for more details of user event name.
Module	The module of user event: ● LUN ● Server ● System ● Target ● Storage Pool (only supported by cluster mode) ● Cluster Topology (only supported by cluster mode)
Requester IP	The source IP address of the request.
Status Code	Response status code of user event.
Operation	Click Detail to view the details of the event.

3.13.3.2 System Event

Click **System Events** on **User Events** and Logs page to view or export system events. You can search events by Module and EventName. Click **Export All** to export system events information.
Note: This page displays up to last 1,000 system events.

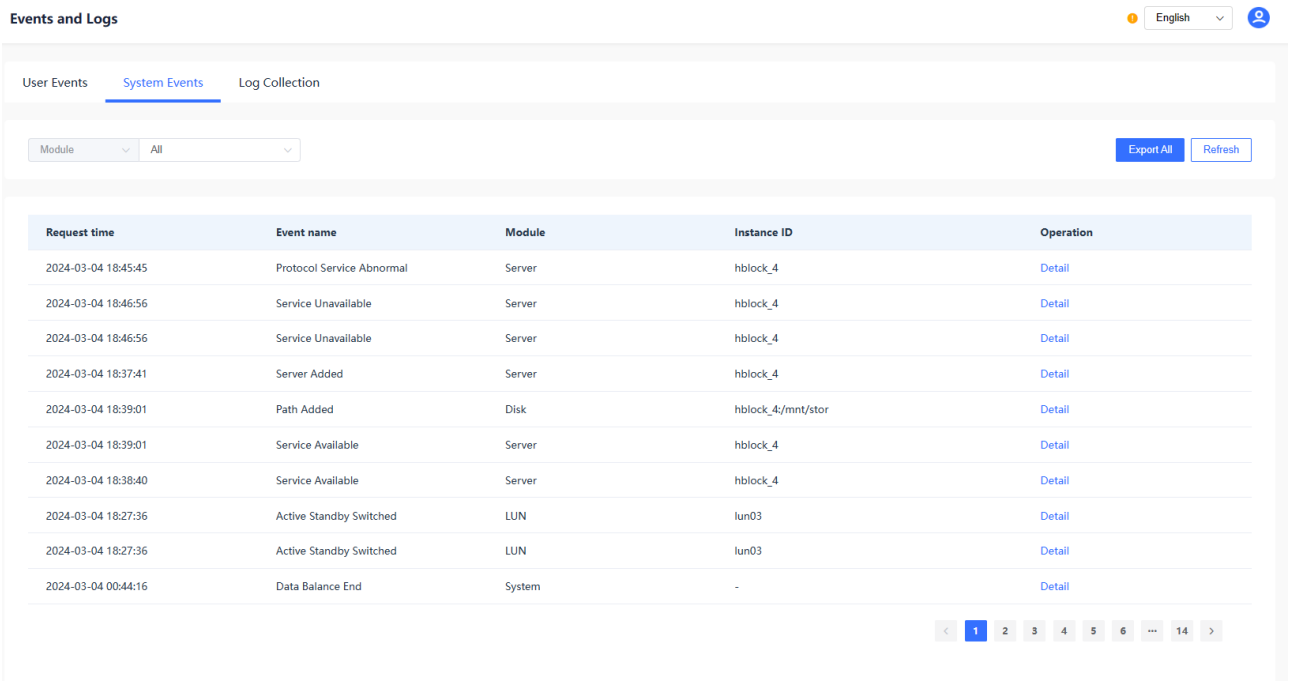


Figure 159. System Event

Name	Description
Request time	HBlock system event occurrence time.
Event Name	System event name, you can refer to **System Event List** for more details of system event name.
Module	The module of system event: ● LUN ● System ● Server ● Disk ● Fault Domain (only supported by cluster mode) ● Target ● Storage Pool (only supported by cluster mode)
Instance ID	The instance ID of the system event. "-": Indicates no instance ID.
Operation	Click "Detail": to view the details of the event.

3.13.3.3 Log Collection

Click **Log Collection** on **User Events and Logs** page to view collected logs and new collection.

Note: The log info is recorded based on the system time of server. Adjusting server time, or inconsistent time of servers, may cause inaccurate log info. But the user's business data will not be affected.

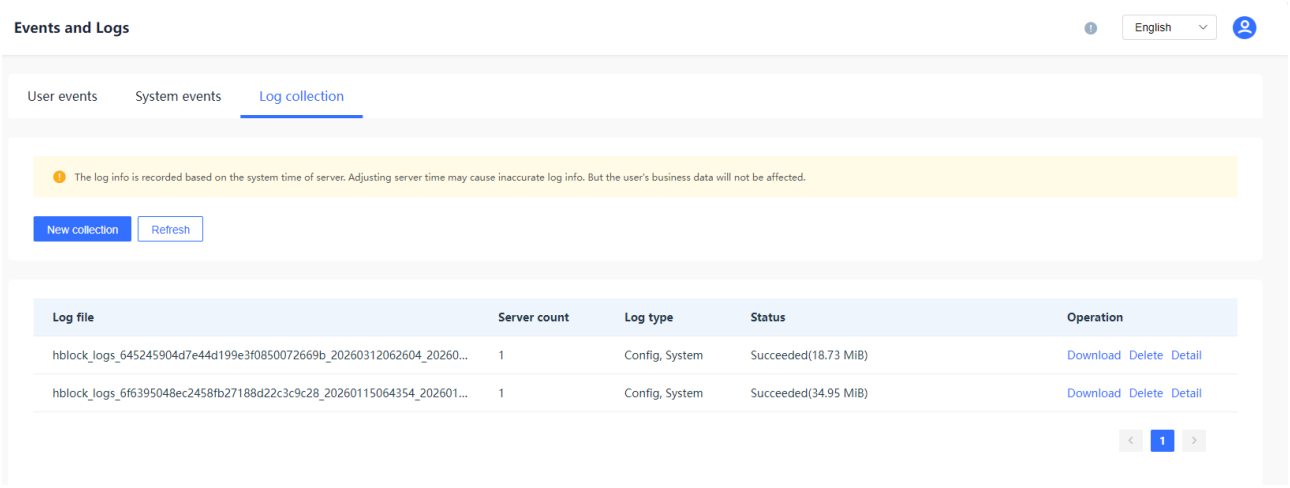


Figure 160. Log Collection (Standalone Mode)

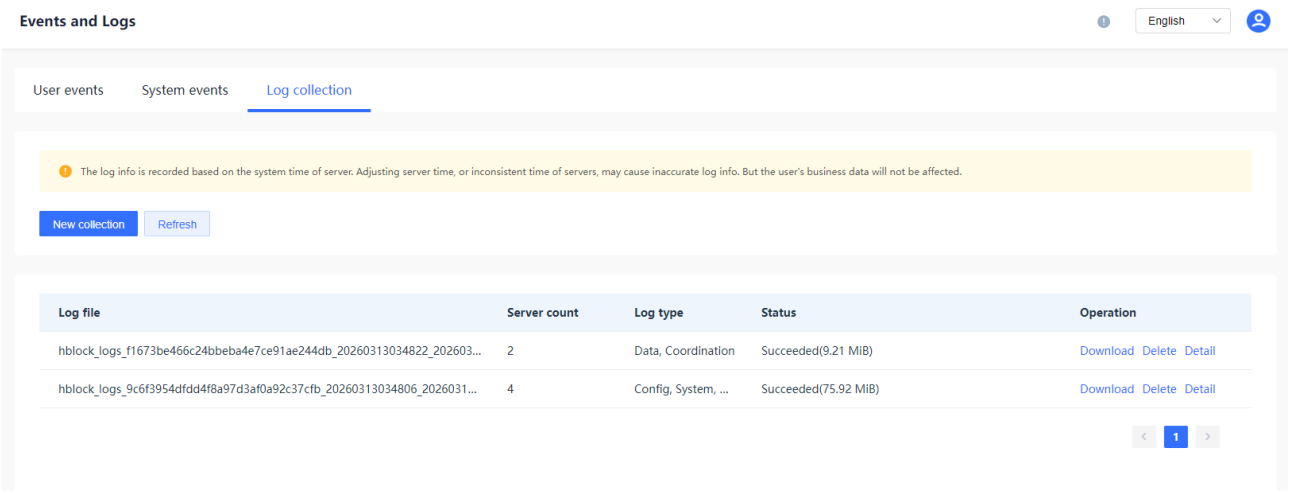


Figure 161. Log Collection (Cluster Mode)

Name	Description
Log file	Log file name. The naming method is: collected_logs/HBlock_logs_*id_yyyyMMddHHmmss_yyyyMMddHHmmss*.zip. Where: ● *id* is the unique identifier of this log request. ● *yyyyMMddHHmmss* is the start time and end time of log collection, UTC+0 time.

Server count	Number of servers for log collection.
Log type	Log type: ● Configure ● System ● Data (only supported by cluster Mode) ● Coordination (only supported by cluster Mode)
Status	Status of log collection: ● Processing ● Succeeded ● PartiallySucceeded ● Failed
Operation	You can perform the following operations: ● Download: Download the log file. ● Delete: Delete the log file. ● Detail: View log file details.

- **New Collection**

Click **New collection** to new log collection.

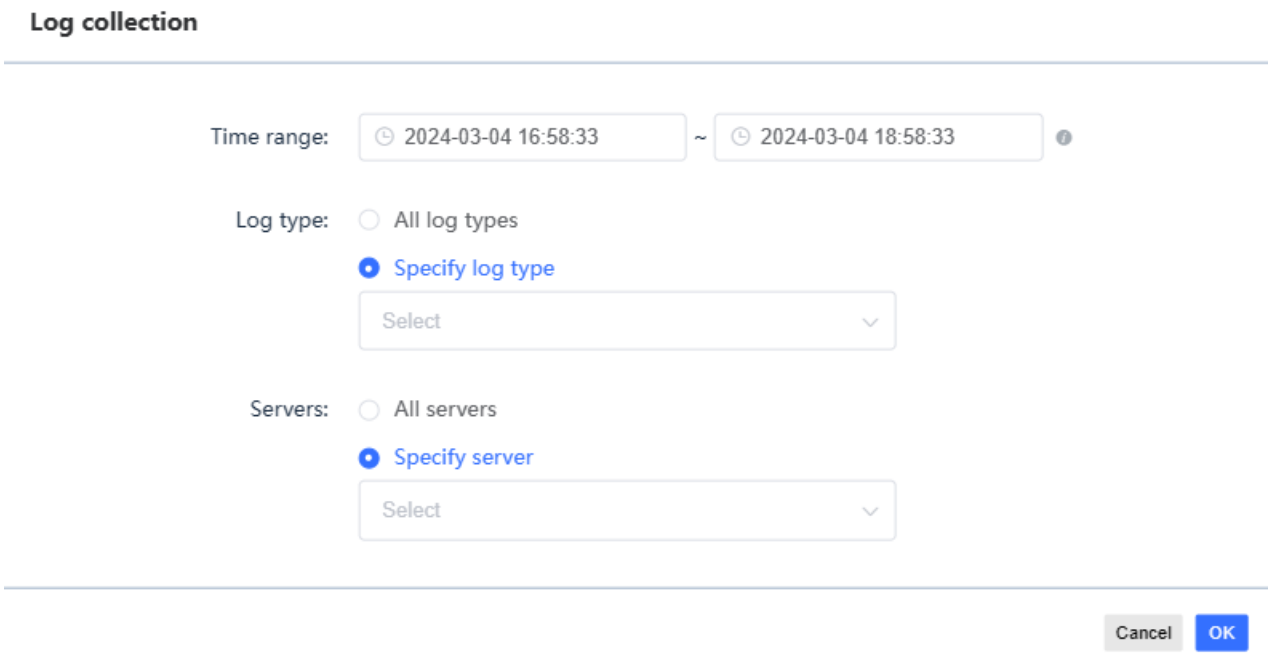


Figure 162. New Log Collection

Name	Description
Time range	According to the calendar button, select start time and end time for log collection. Collect last 2 hours logs by default.
Log type	The Log type:

	● All log types ● Specify log type (You can select one or more log types): ■ Config ■ System ■ Data (only supported by cluster Mode) ■ Coordination (only supported by cluster Mode)
Servers	Servers for log collection: ● All servers. ● Specify server: You can select one or more servers.

3.14 Settings

Click **Settings** in the navigation bar, enter the **Settings** page to manage the email configuration, remote access configuration, admin password, software license and upgrade.

3.14.1 Email Notification

On the **Settings** page, click **Notification** to edit email settings, delete email settings, or send test emails.

Note: If the email server address is IPv6 address, to ensure successful email sending, it is recommended that each HBlock server has an IPv6 address that can connect to the email server.

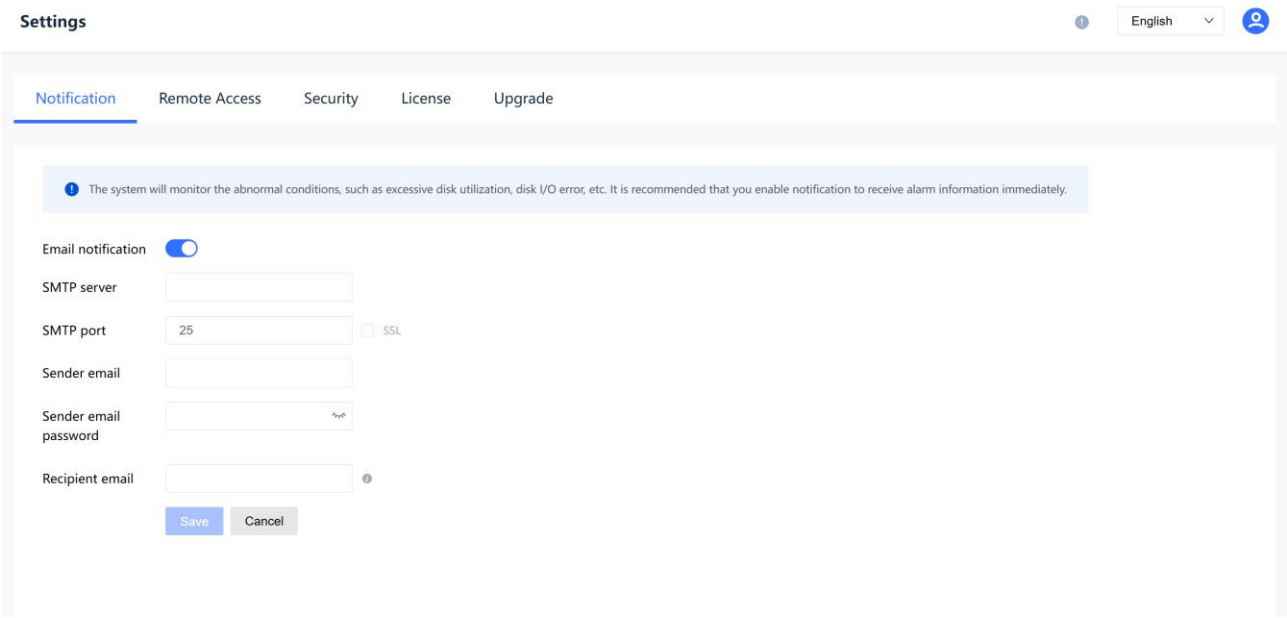


Figure 163. Email Notification

Name	Description
Email notification	Whether to enable email notification function.
SMTP server	Specifies the SMTP server. The value is the domain name or IP of SMTP server.
SMTP port	Specifies the SMTP port. The value is an integer that ranges from 1 to 65535. If SSL function is enabled, the default value is 465. If SSL function is not enabled, the default value is 25.
SSL	Whether to enable SSL function: ● Check: Enable SSL function. ● Uncheck: Disable SSL function.
Sender email	Specifies the sender email. The email format is *local-part*@*domain*:

	● *local-part*: The value is a string of 1 to 64 characters. It can contain lowercase letters, uppercase letters, digits, or special characters (! # $ % & * + - / = ? ^ _ ` { | }~ .). A dot (.) cannot be used as a starting or ending character, nor can it appear consecutively. ● *domain*: The value is a string of 1 to 255 characters separated by dots (.). Each string separated by a dot(.) needs to meet the following requirements: ■ A string of 1 to 63 characters. ■ It can contain lowercase letters, uppercase letters, digits, or hyphens (-). ■ The top-level domain name cannot consist of pure digits. ■ The hyphen (-) cannot be used as the first and last characters.
Sender email password	Specifies authorization code of the sender email. **Note**: Email authorization code is a special password issued by the mailbox and used for third-party client login.
Recipient email	Specifies the receiver email. Multiple emails can be specified at one time, separated by comma (,). The email format is *local-part*@*domain*: ● *local-part*: The value is a string of 1 to 64 characters. It can contain lowercase letters, uppercase letters, digits, or special characters (! # $ % & * + - / = ? ^ _ ` { | }~ .). A dot (.) cannot be used as a starting or ending character, nor can it appear consecutively. ● *domain*: The value is a string of 1 to 255 characters separated by dots (.). Each string separated by a dot(.) needs to meet the following requirements: ■ A string of 1 to 63 characters. ■ It can contain lowercase letters, uppercase letters, digits, or hyphens (-). ■ The top-level domain name cannot consist of pure digits. ■ The hyphen (-) cannot be used as the first and last characters.

3.14.2 Remote Acess

On the **Settings** page, click **Remote Access** to view remote access connection information and disable the remote access setting of the specified server.

Please follow the steps below to enable the remote access function for help:

1. Inform our engineers of the HBlock ID and the problem. Engineers will feedback the Host and port number of the remote assistance server, and when to log in to the server.
2. Select the server to enable remote access on the Server page, enter the Host and port of the remote access service, and enable it.
3. Engineers log in to the server, help to diagnose the problem remotely.

If the Host and port of the remote access service are already offered, you can enable the remote access directly, send the remote access code and the problems you encountered to our engineers. They will help in time with remote access.

Note:

- By default, the remote access is disabled, can be enabled at any time. When enabled, it means that our engineers are authorized to log in to your system to diagnose the problems. When they log in, they will have authorities of the user who enabled remote access and user who installed HBlock. You can check all operations performed by the engineer through the server log file logs/remoteaccess/remote_access.log.
- If the remote access function is enabled, it means that you trust our engineers and authorize them to access all the data in the system. We will do our best to diagnose the problems and ensure the data security, but due to the complexity of the system environment, we are not responsible for any consequences caused by remote access.

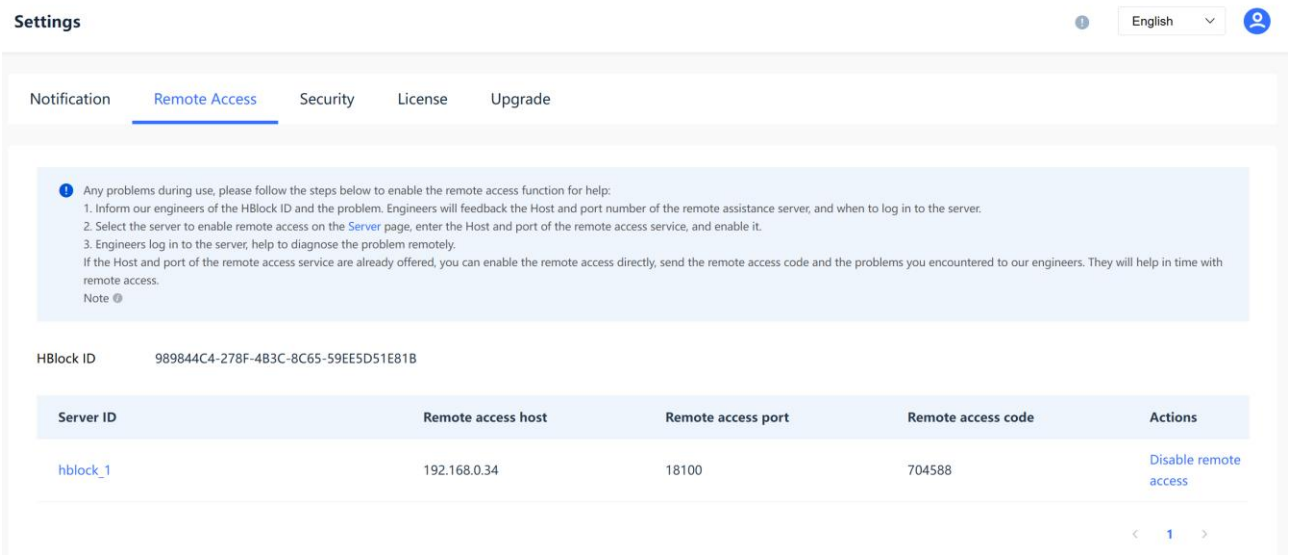


Figure 164. Remote Access

Name	Description
Server ID	Server ID.

Remote access host	Remote access host.
Remote access port	Remote access port.
Remote access code	Remote access code.
Action	Click Disable remote access, and you can disable remote access setting of this server.

3.14.3 Security

On the **Settings** page, click **Security** to edit the administrator password.

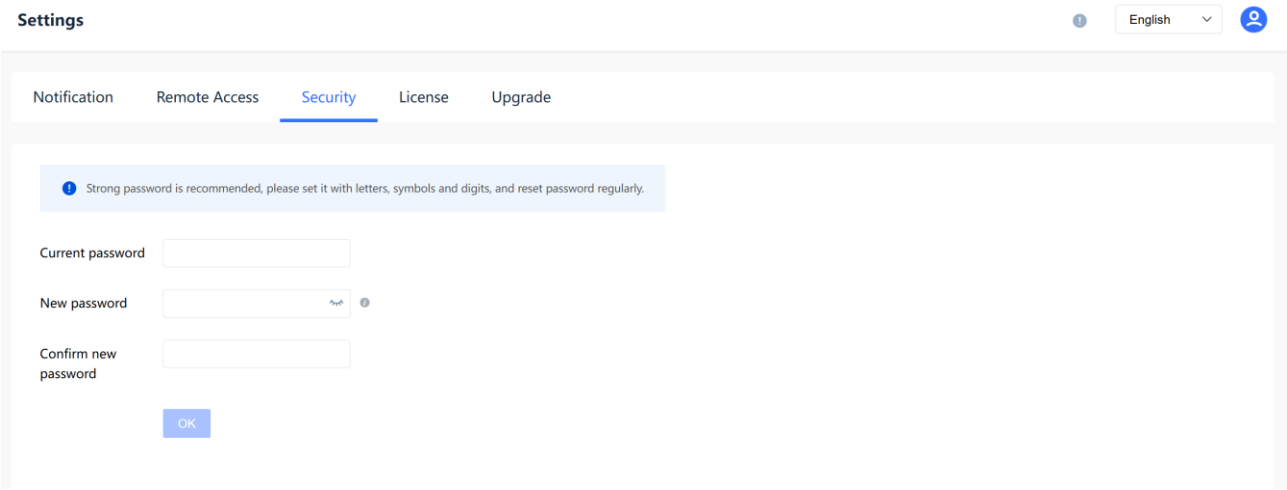


Figure 165. Resetting Administrator Password

Name	Description
Current password	Administrator's current password.
New password	New password for administrator. The value is a string of 8 to 16 case-sensitive characters: ● The password must contain at least three of the following: lowercase letters, uppercase letters, digits, or special characters. The special characters only include ~ ! @ # $ % ^ & * ( ) _ + [ ] { } | ; : , . / < > ?. ● The password cannot contain t 3 consecutive repeating characters, 3 consecutive or in-reverse order of digits or letters (case-insensitive), 3 consecutive or in-reverse order of keyboard sequences (case-insensitive).
Confirm new password	Be consistent with the new password entered.

3.14.4 Pro Trial (Free Edition)

On the **Settings** page, click **Pro trial** to enable the Pro Trial for the free edition.

Note:

- The free edition includes 2 years of upgrade service; upgrades will not be supported after expiration. If the user has never enabled the Pro Trial, it can still be enabled normally after 2 years.
- For the free edition, the Pro Trial can only be enabled once. After enabling the Pro Trial, advanced features can be trialed for 1 month; after 1 month, advanced features will be disabled. When advanced features are disabled, if you wish to use the commercial edition, please contact the software vendor to obtain a formal software license and load it.

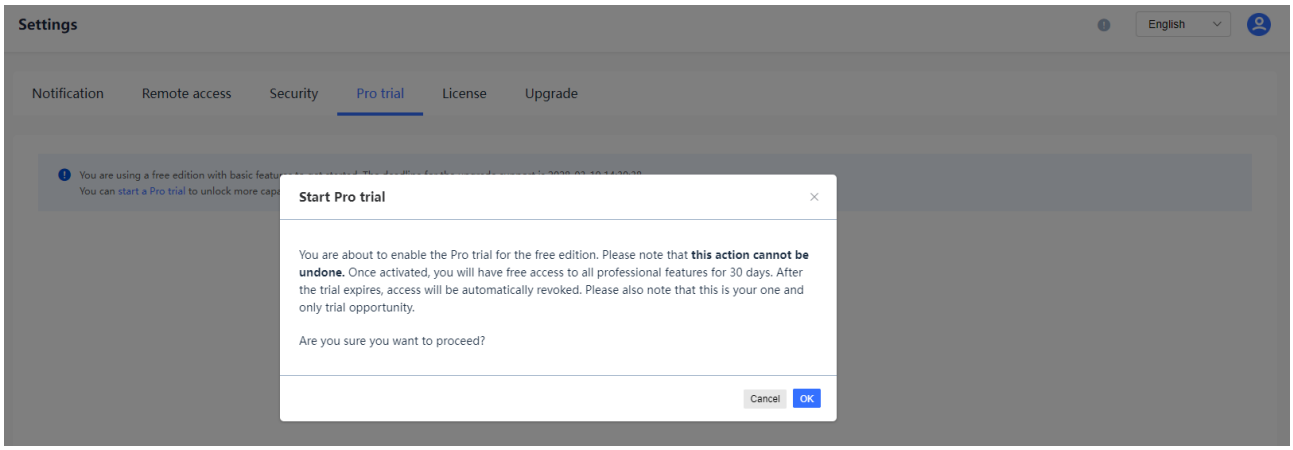


Figure 166. Enable Pro Trial

After enabling the Pro Trial, some advanced features of the commercial edition can be trialed. For differences between the commercial edition and the free edition, see **Commercial Edition and Free Edition**.

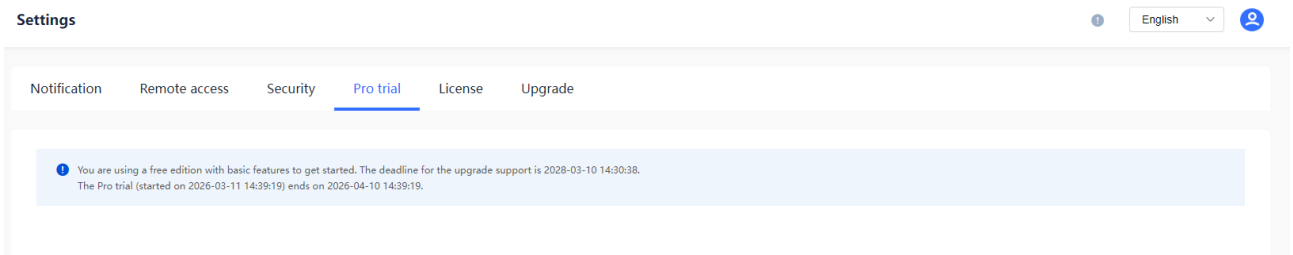


Figure 167. Pro Trial

3.14.5 Software License

On the **Settings** page, click **License** to import the software license or view the software license status.

- Software Trial Period

Since initialization, HBlock has a 30-day trial period. Click the "!" in the upper right corner to view software version. It will show the expiration date here for trial version.

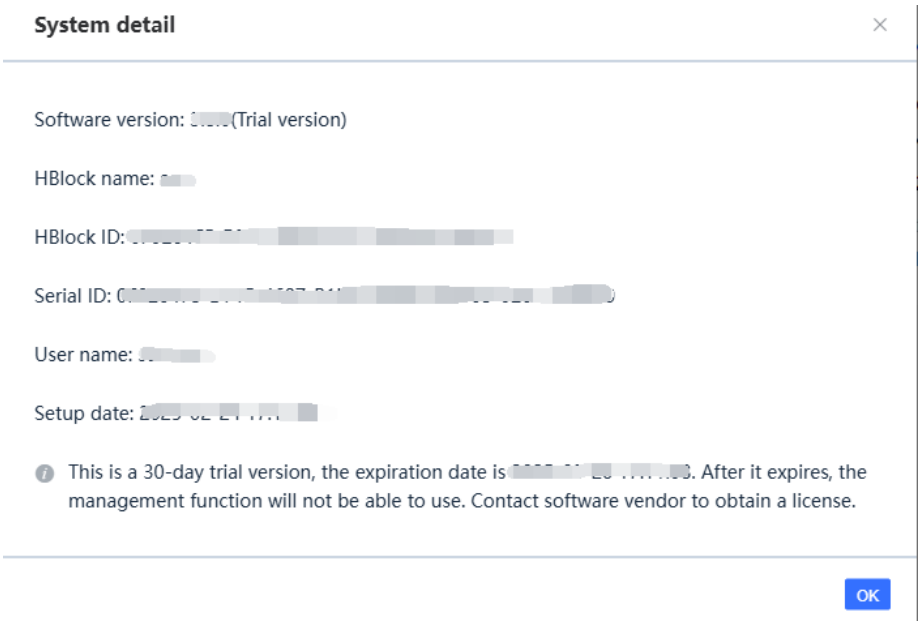


Figure 168. System Details (Standalone Mode)

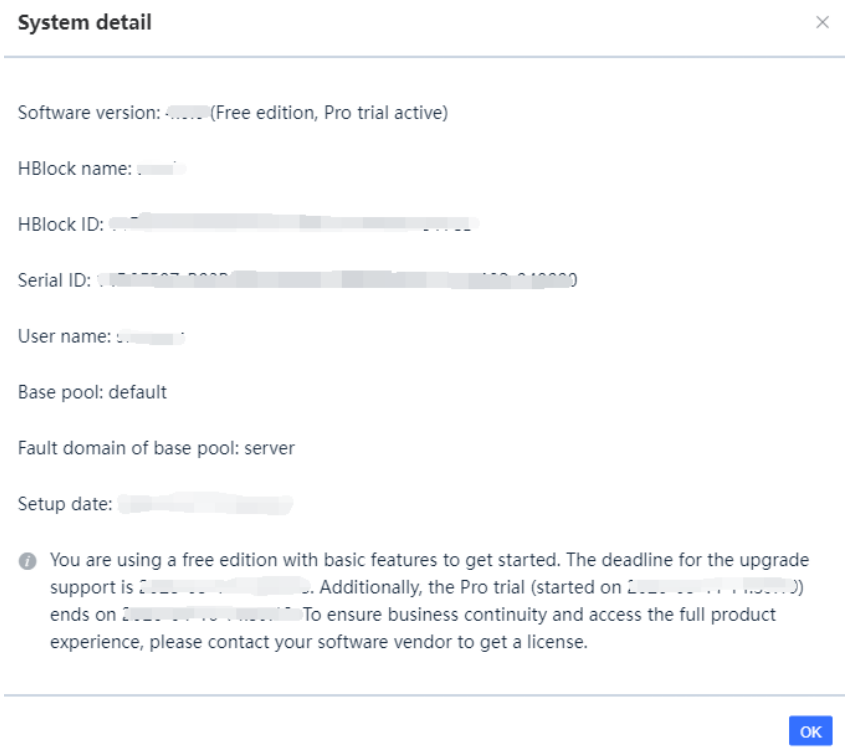


Figure 169. System Details (Cluster Mode)

- Import a Software License

If no software license has been imported, or you need to renew software license. Please obtain and import software license as follows:

1. Click **Get the serial ID**.
2. Please contact software vendor to obtain the software license.

Click **Import the license** to import the software license.

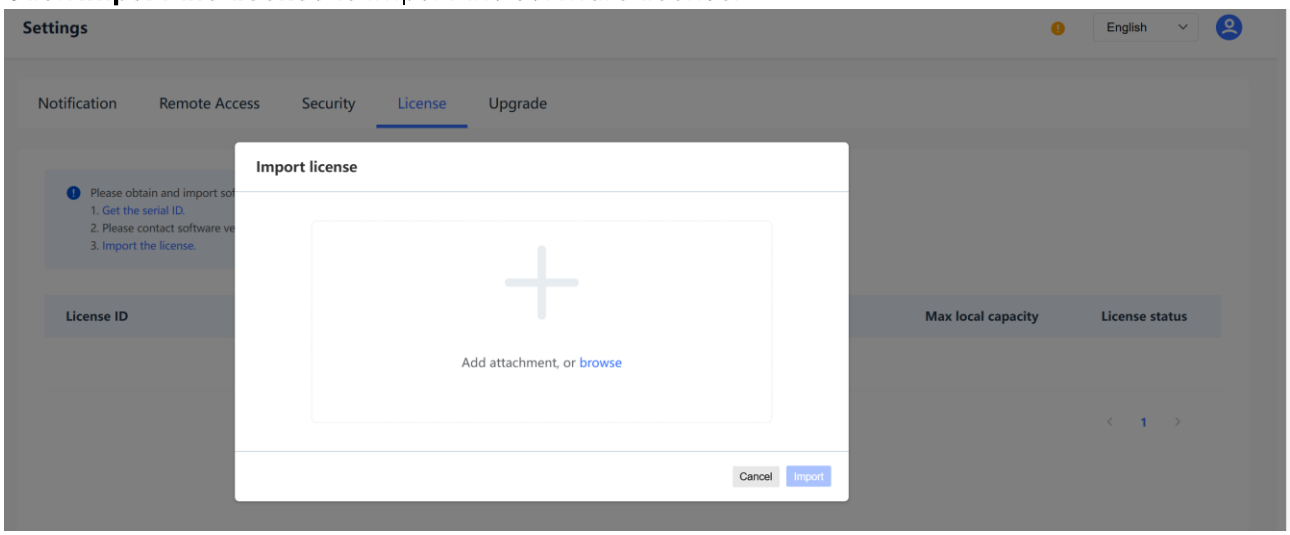


Figure 170. Import Software License

Software License List

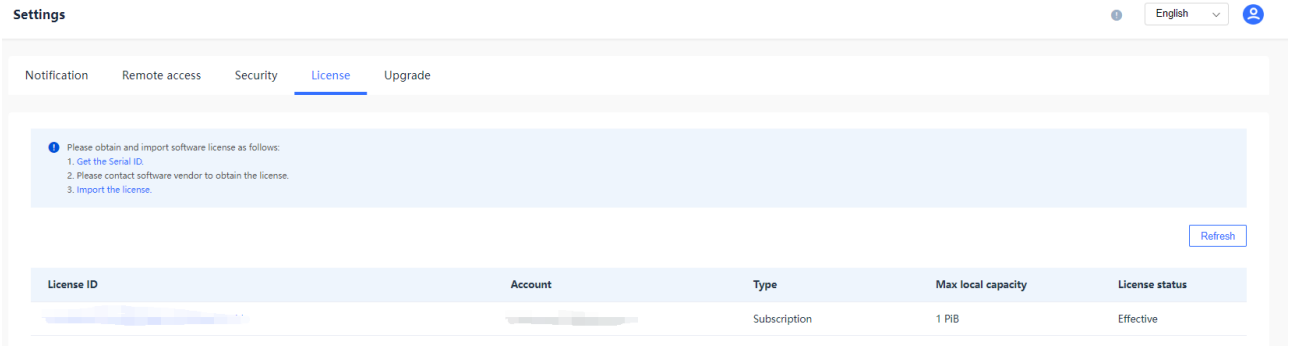


Figure 171. Software License List

Name	Description
License ID	Software license ID.
Account	The email address used by users when applying for software licenses.
Type	Software license purchase types: ● Subscription: Subscription mode. ● Perpetual: Perpetual license mode.
Max local capacity	The total capacity allowed for all local LUNs. -: Indicates that the local LUN capacity is not limited.
License status	Software license status: ● Effective. ● Expired. ● Invalid: After importing a new license, the previously effective license will become expired. **Note**: There is no expired status for perpetual license.

View the Software License

On the **License** page, click a specific license ID to view details of the License.

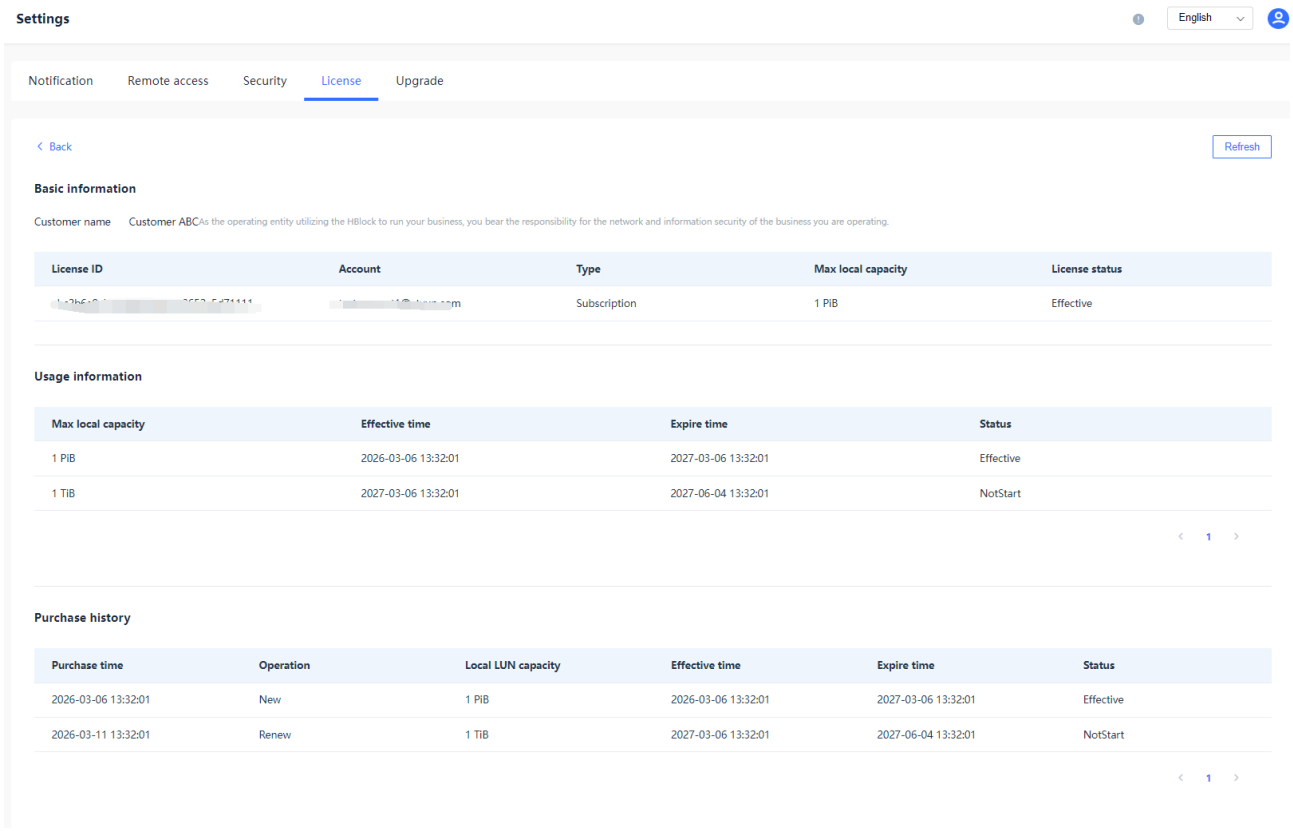


Figure 172. Software License Details (Subscription License)

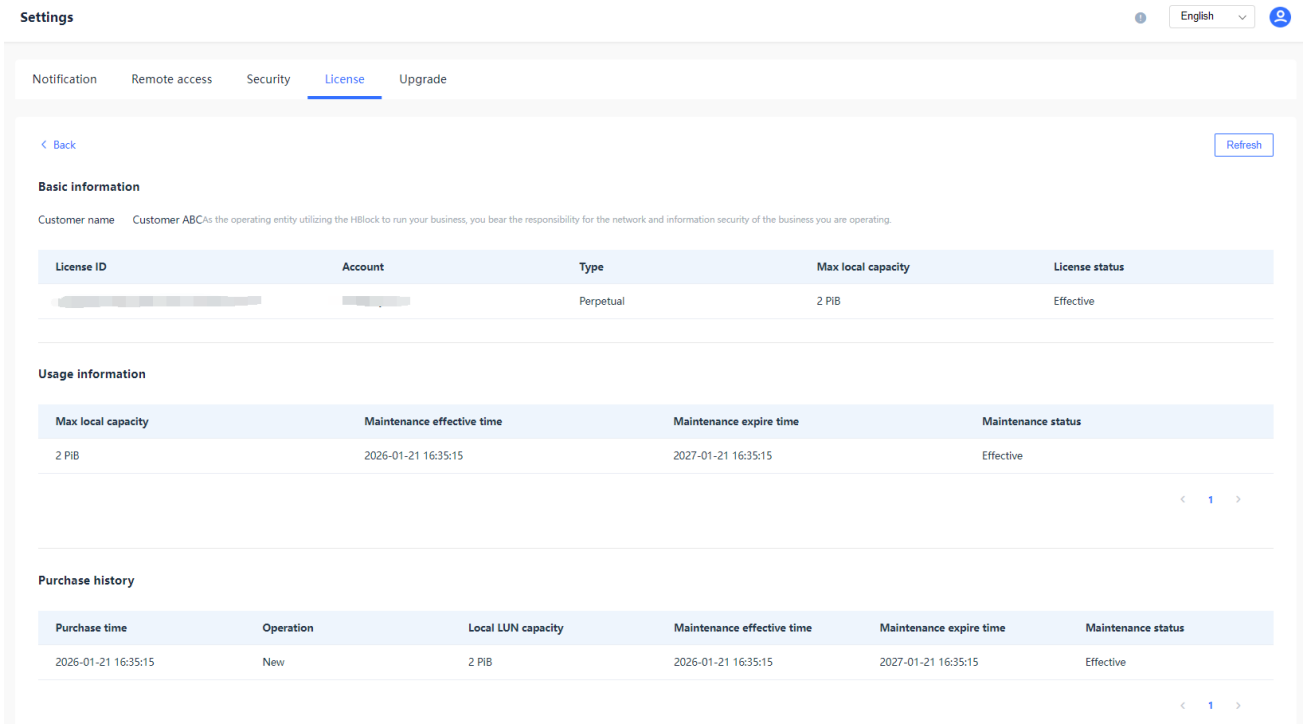


Figure 173. Software License Details (Perpetual License)

Basic information

Name	Description
Customer name	Customer name. **Note**: This field will not be displayed if it was left blank when applying for the software license.
License ID	Software license ID.
Account	The email address used by users when applying for software licenses.
Type	Software license purchase types: ● Subscription. ● Perpetual.
Max local capacity	The total capacity allowed for all local LUNs. -: Indicates that the local LUN capacity is not limited.
License status	Software license status: ● Effective. ● Expired. ● Invalid: After importing a new license, the previously effective license will become expired. **Note**: There is no expired status for perpetual mode license.

Usage information

Name	Description
Max local capacity	The total capacity allowed for all local LUNs within the specified period. -: Indicates that the local LUN capacity is not limited.
Effective Time	For subscription software licenses, the time when the software license becomes effective.
Expire Time	For subscription software licenses, the software license expiration time.
Maintenance effective time	For perpetual software licenses, the software license maintenance effective time.
Maintenance expire time	For perpetual software licenses, the software license maintenance expiration time.
Status	The status for subscription mode software licenses: ● Effective. ● Expired. ● NoStart.
Maintenance status	The status for perpetual mode licenses: ● Effective. ● Expired. ● NoStart.

Purchase history

Name	Description
Purchase time	The purchase time of the purchase action.
Operation	Software license purchase record: ● New. ● Expand. ● Renew.
Local LUN capacity	Permitted local LUN capacity for this software license purchase.
Effective Time	The effective time of the subscription license in this purchase.
Expire time	The expiration time of the subscription license in this purchase.
Maintenance effective time	The maintenance effective time of the perpetual license in this purchase.
Maintenance expire time	The maintenance expiration time of the perpetual license in this purchase.
Status	The status for subscription license: ● NotStart. ● Effective. ● Expired.
Maintenance status	The status for perpetual license: ● NotStart ● Effective ● Expired

3.14.6 Upgrade

On the **Settings** page, click **Upgrade**. On the Upgrade page, click the **Upgrade** button to upgrade the HBlock service.

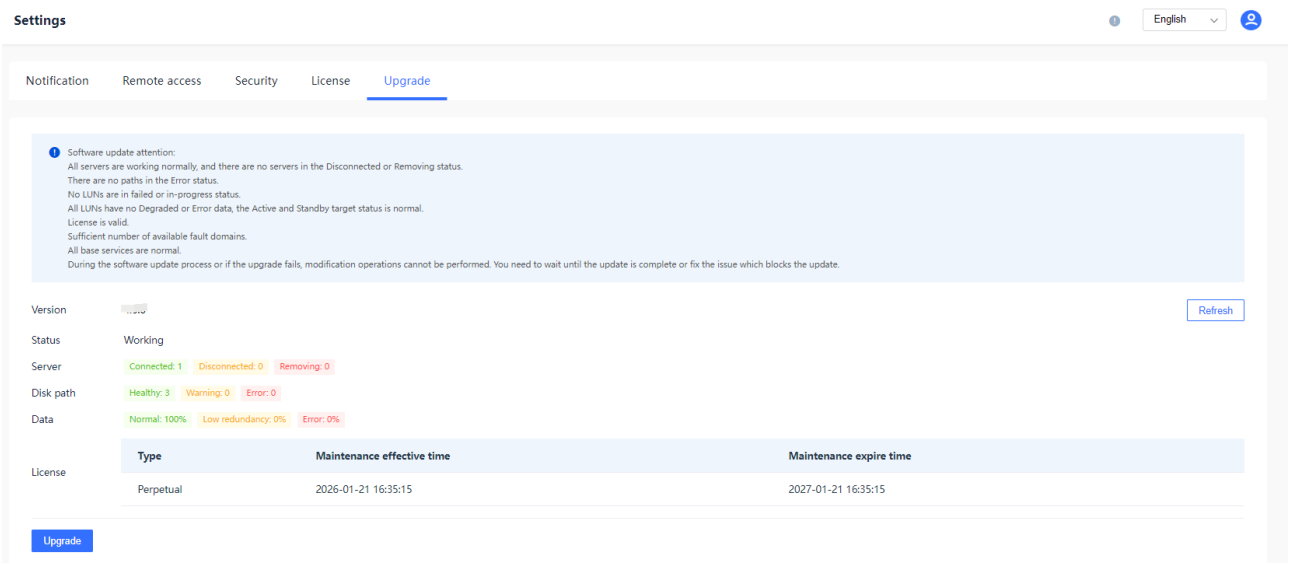


Figure 174. Upgrade (Standalone Mode)

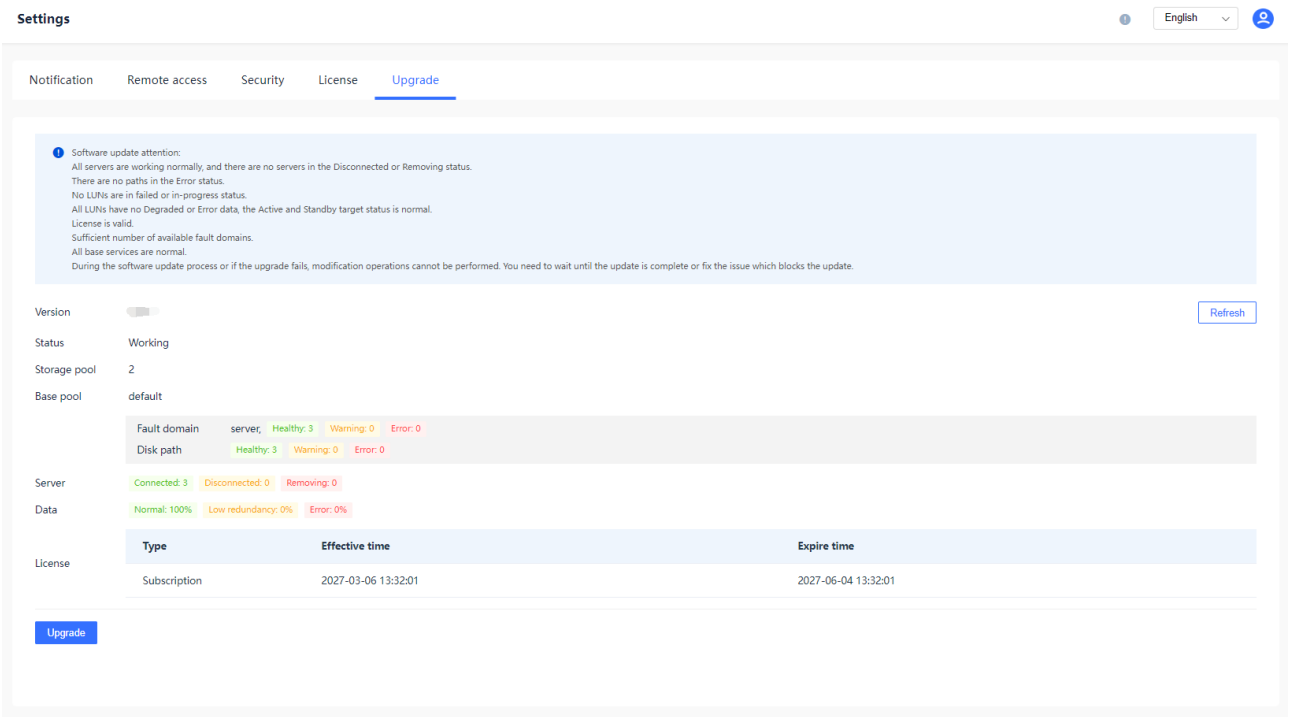


Figure 175. Upgrade (Cluster Mode)

Name	Description
Version	The current version of the HBlock.
Status	System Status:

	• Working. • Upgrading.
Storage Pool	The number of storage pools in the system (only supported by cluster mode).
Base Pool	Information about the base storage pool (only supported by cluster mode), including fault domain level, fault domain status, and disk path status.
Server	The number of servers in each status, including: Connected, Disconnected, Removing.
Disk path	The number of disk paths in each status (only supported by standalone mode), including: Healthy, Warning, Error.
Data	The proportion of data in each status, including: Normal, Low Redundancy, Error.
License	The type, effective time, and expiration time of the license.

Click the **Upgrade** button, the **System upgrade** window will pop up. Click **Upload upgrade Files** to import the target version installation package, and then click **Upgrade** to perform the HBlock upgrade.

Note: If the cluster consists of servers with different architectures, please add upgrade files (target version installation packages) for all architectures and keep the versions consistent.

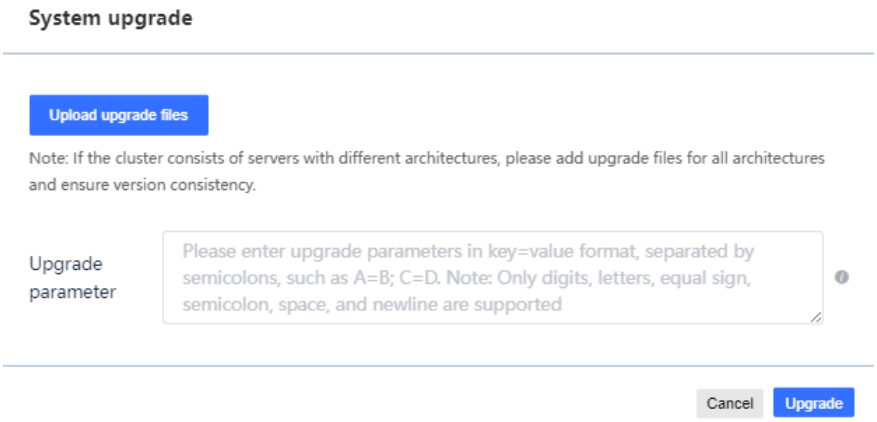


Figure 176. System Upgrade

Name	Description
Upgrade parameter	During the upgrade, parameters must be configured according to the requirements of the target version and validated by it. If parameters for multiple target versions are needed, enter them in the format *key=value*. Separate multiple parameters with a semicolon (;). **Note**: Only digits, letters, equal signs (=), semicolons (;), spaces, and newline characters are supported.

4 Client Operations

4.1 Windows Client – Standalone Mode

(I) Prepare the client operating system.

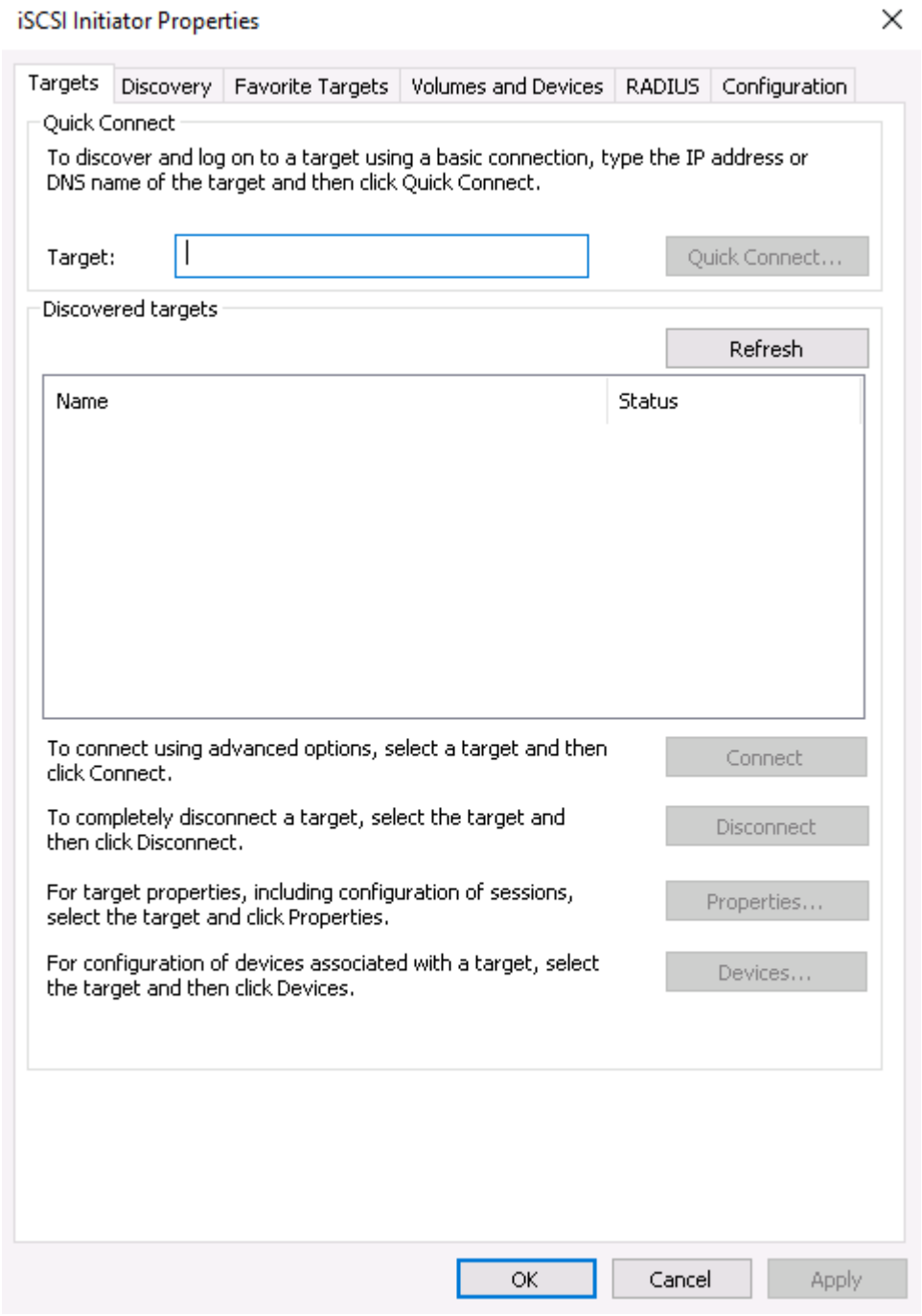
It is recommended to use Windows 10, Windows Server 2012 R2, Windows Server 2016 R2 and other high versions of Windows operating systems. Because these systems have iSCSI initiator, it is unnecessary to install components separately.

Different operating system versions of the client support different single-LUN capacities. Please refer to the following table:

Windows Version	Block Size	Maximum Capacity of a Single LUN
Windows Server 2008R2	512 bytes / 4KiB	256 TiB
Windows Server 2012R2	512 bytes / 4KiB	256 TiB
Windows Server 2016	512 bytes / 4KiB	256 TiB
Windows 10	512 bytes / 4KiB	1 PiB

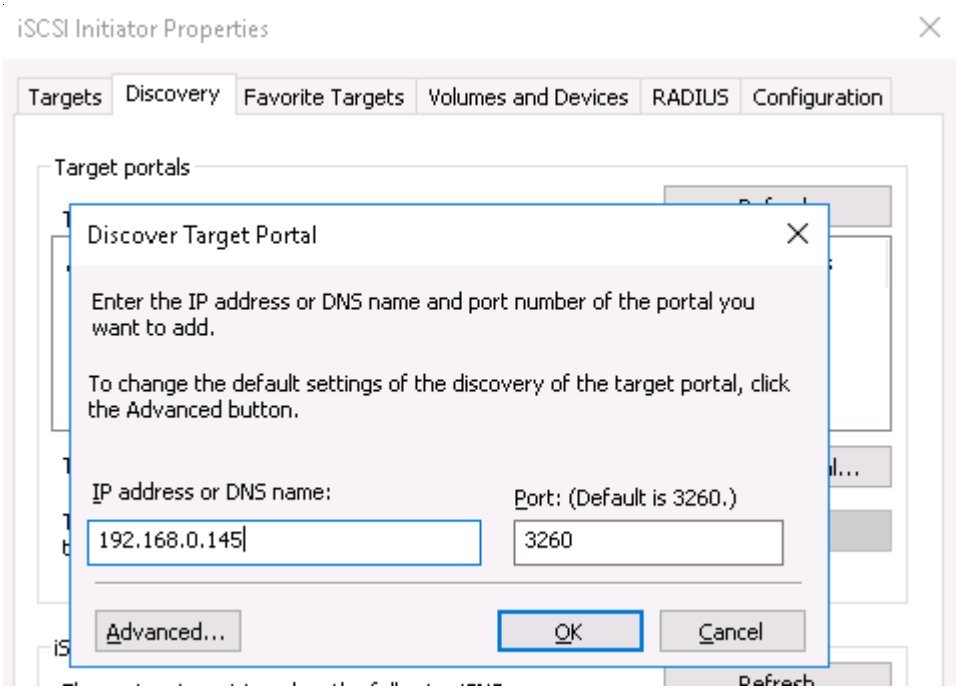
(II) Run iSCSI initiator.

Run **iSCSI Initiator Properties** on the Windows client, as shown in the following figure:



1. Configure iSCSI initiator.

   Enter the server IP and port in **Discovery Target Portal** of **Discovery**, as shown in the following figure:

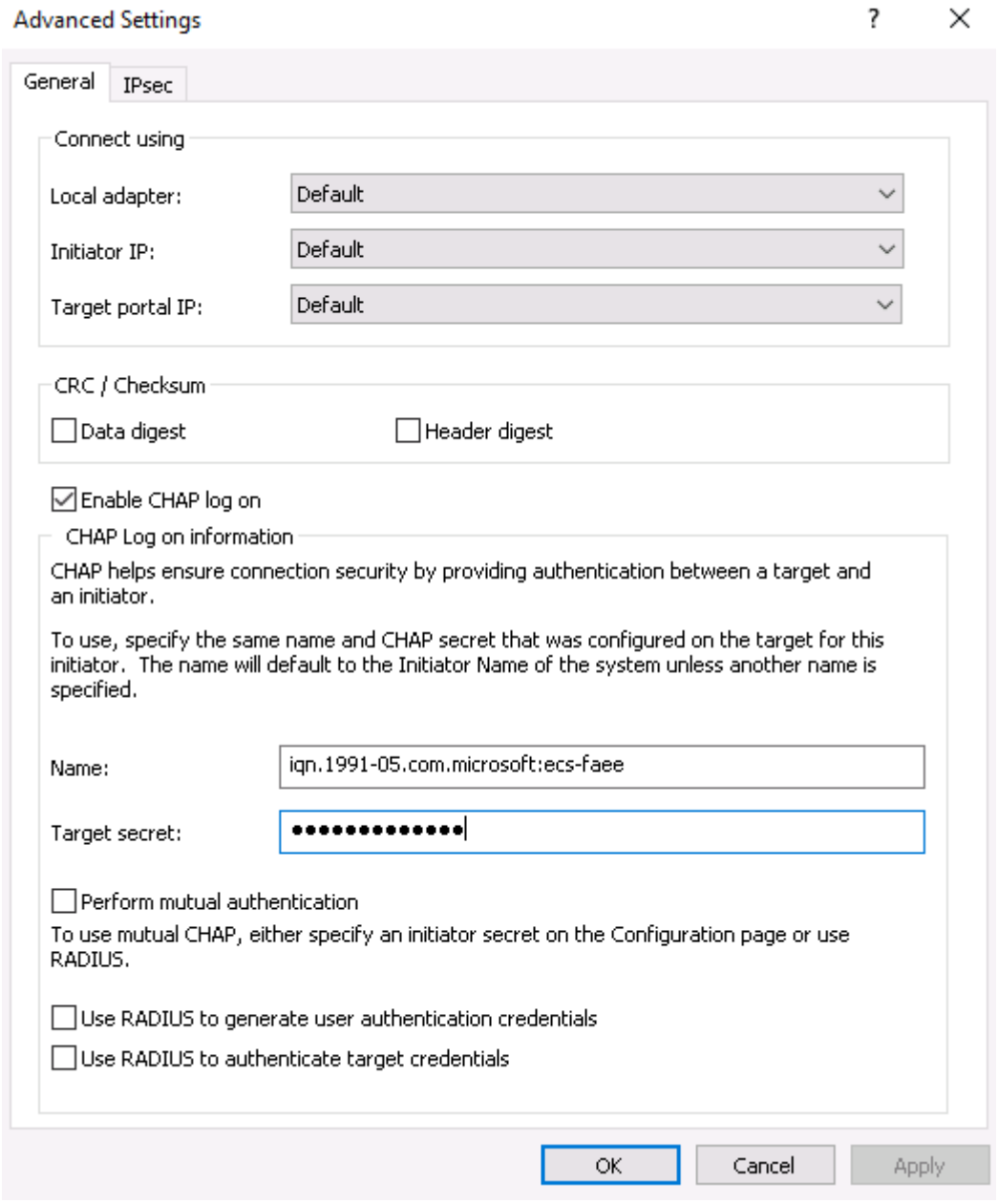


Search the iSCSI target issued by HBlock in **Discovered targets of Targets,** check that the status is **Inactive**, and click **Connect**.

2. Enable CHAP authentication.

   If your iSCSI target has enabled CHAP authentication, click **Advanced** in the pop-up dialog box **Connect to Target**. Please ignore this step and direct connect if CHAP authentication is disabled.

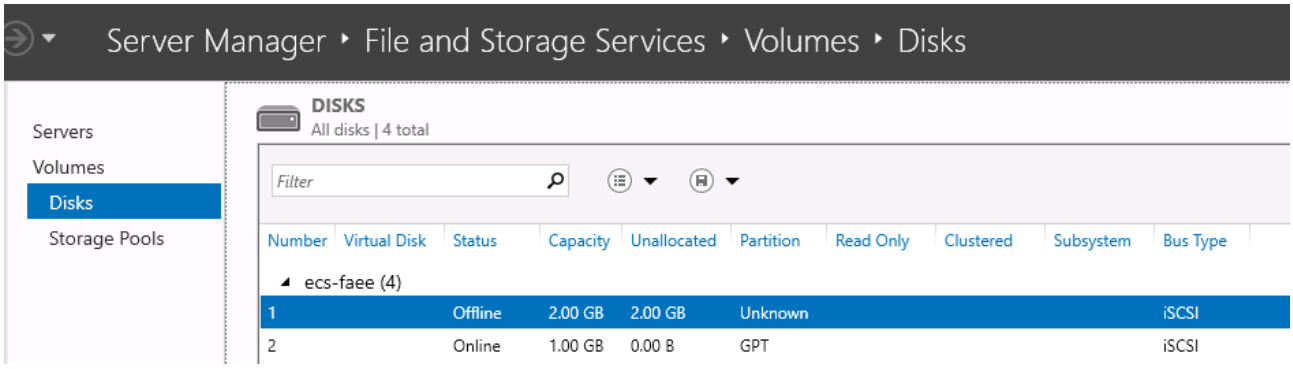
   Select **Enable CHAP log on**, enter the same name and CHAP password that was configured on the target, and then click **OK**, as shown in the following figure.



3. Using iSCSI shared disks on the client.

   Go to **Server Manager** > **File and Storage Services** > **Volumes** > **Disks**, and connect the disk with status off-line. Then **Initialize and New Volume**, specify the disk letter and format the disk. Start the **This PC**, you can see the new added disk and its capacity, and since then, you can use the iSCSI disk issued by as a local disk.

   Note: During initialization of disk, if the storage capacity of LUN is less than or equal to 2TiB, either MBR or GPT can be used for partition; if the storage capacity of LUN is larger than 2TiB, only GPT can be used for partition.



Open the **This PC** and you can see the drive letter and capacity of the newly added disk. At this time, you can use the iSCSI disk released by HBlock according to the habit of using local disks.

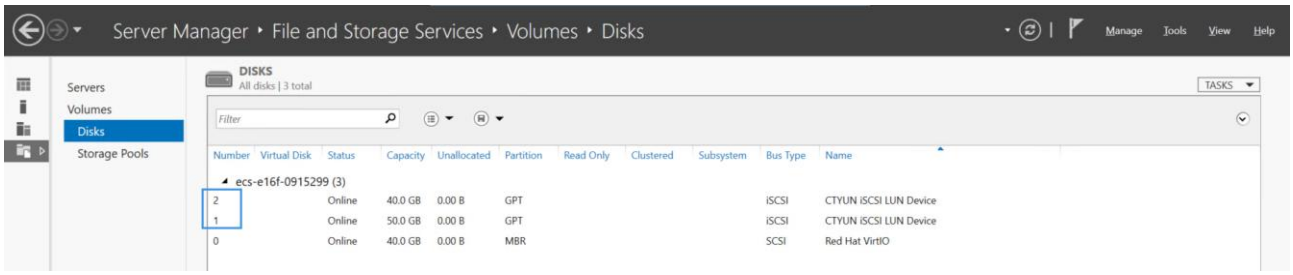
Note:

- If client needs to be disconnected or delete the disk, you need to go offline the disk first and then disconnect iSCSI target.
- If the client needs to disconnect and then re-connect, there is no need to initialize or create a new volume, and the disk can be seen after reconnecting.

Note: If you want to query the disk corresponding to HBlock LUN, you can enter the following command line on the client side to query.

```
wmic diskdrive get Name, Manufacturer, Model, InterfaceType, MediaType, SerialNumber
```

As shown in the following example, the query information "Name" column corresponds to the "Number" column on the "DISKs". SerialName corresponds to the name and uuid of HBlock LUN.



4.2 Windows Client – Cluster Mode

Microsoft provides a common DSM (Device Specific Module) in Server 2008, 2012, and 2016, supports ALUA (Asymmetric Logical Unit Access), which can be used in conjunction with SPC (SCSI Primary Commands) compliant storage devices to configure MPIO (Multipath I/O) environments. MPIO ensures that the normal operation of the business will not be affected when switching between Active target and Standby target. Therefore, it is recommended to use Microsoft Server 2008, 2012, and 2016 as the client of HBlock and configure MPIO. Windows 7, 8, and 10 do not support MPIO, and it is not recommended to use this system as the HBlock client.

(I) Install Native MPIO software.

- Windows Server 2008 R2
  1. Open **Server Manager Management Console**.
  2. Go to **Features** > **Features Summary** > **Add Features**, and open **Add Features Wizard**.
  3. Click **Next**, select **Multipath I/O**, and install.
  4. Restart Windows.
- Windows Server 2012 or 2016
  1. Open **Server Manager** and select **Add roles and features**.
  2. Click **Next** and check **Multipath I/O** in the **Features**.
  3. Click Next and select Restart the destination server automatically if required.
  4. Install, click **Yes**.

(II) Open the MPIO tool to add a storage array.

1. Click MPIO in Administrative Tools.
2. Click **Discover Multi-Paths**, select **Add support for iSCSI device**, and then click **Add**, select **Yes** in the dialog box.
3. Restart Windows.

(III) Adjust MPIO configuration

1. Open **Powershell** and enable path detection and custom path recovery functions.

```
Get-MPIOSetting    # View current configuration
Set-MPIOSetting -NewPathVerificationState Enabled    # Enable path verification
Set-MPIOSetting -CustomPathRecovery Enabled    # Enable custom path recovery function
```

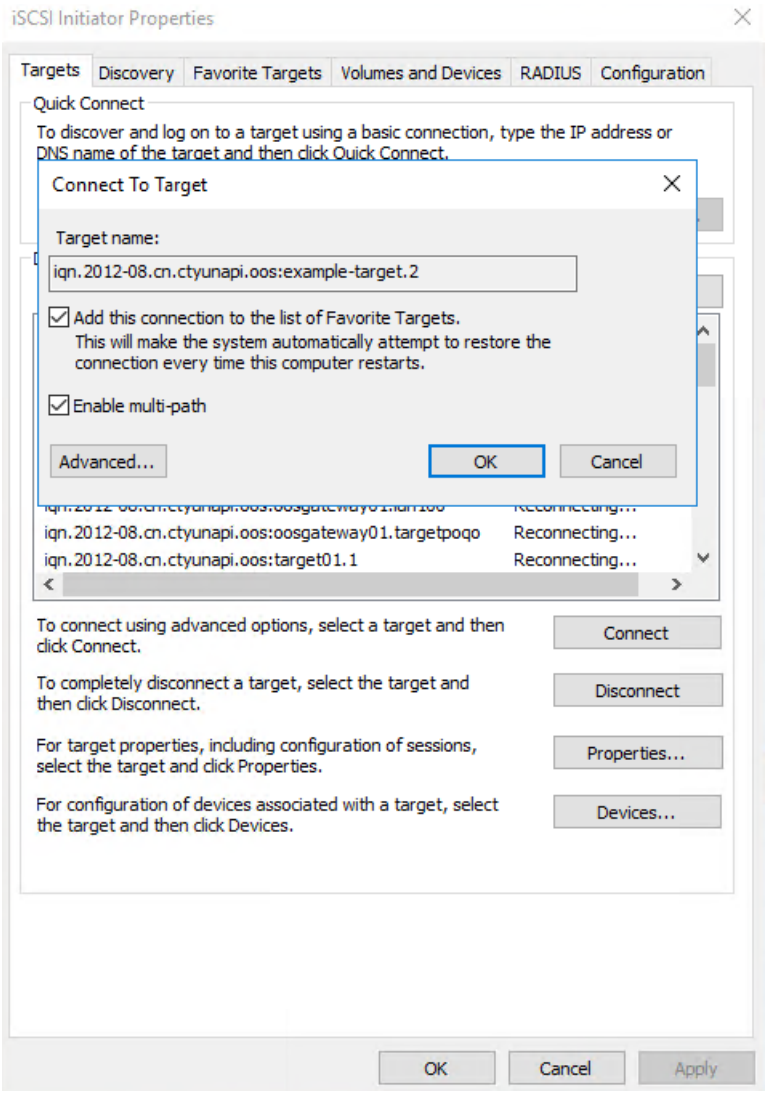
2. Restart Windows.

(IV) Run iSCSI initiator

1. Run the **iSCSI Initiator Properties** on the Windows Client. Enter iSCSI in **Start > Search Programs and Files** to open the iSCSI initiator.
2. Configure iSCSI initiator **In Discovery > Discovery Portal**.
   Enter the server IP and port in **Discovery Target Portal of Discovery**. You can use the command **./stor lun ls** on the server to query the ACTIVE target and STANDBY target of the LUN.

```
./stor lun ls  #View the server IP and Port of the target corresponding to the LUN
```

3. Search for the iSCSI target
   Search iSCSI target issued by HBlock in **Discovered targets of Target**, check that the status is **Inactive,** click Connect, select **Enable multi-path**, and then click **OK**.
   Note: You need to connect to the ACTIVE target first, and then connect to the STANDBY target.
   Note:
   - Windows Server 2012 or 2016: The same target can correspond to multiple LUNs. When one target can correspond to multiple LUNs, if the ACTIVE target and STANDBY target corresponding to different LUNs are different, it will take a while for the iSCSI connection to recognize all the LUNs. Therefore, it is recommended that each target corresponds to one LUN.
   - Windows Server 2008: One target can only correspond to one LUN, and the iSCSI connection established first must be an ACTIVE target, and then the STANDBY target connection is established, otherwise the MPIO device cannot operate normally.



4. Enable CHAP authentication (Please ignore this step and direct connect if CHAP authentication is disabled)
   If your iSCSI target has enabled CHAP authentication, click **Advanced** in the pop-up dialog box and check **Connect to Target**. Select **Enable CHAP log on**, enter the same name and CHAP password that was configured on the target for this initiator, and then click **OK**.

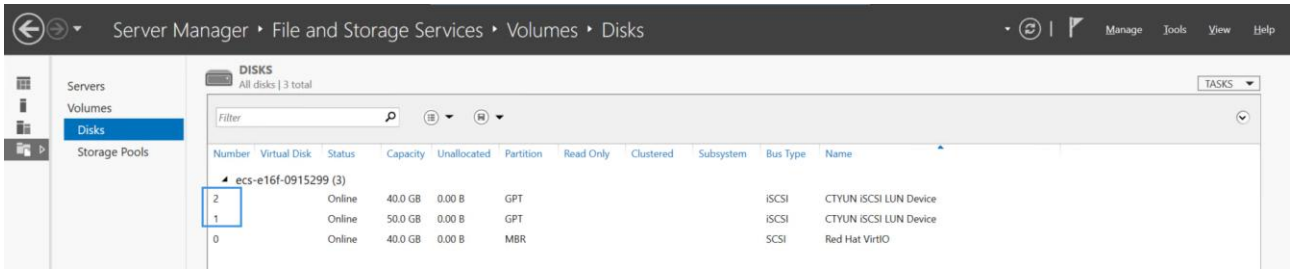
5. Using iSCSI shared disks on the client.
   Go to **Server Manager** > **File and Storage Services** > **Volumes** > **Disks** and connect the disk with status **off-line**. Then **Initialize** and **New Volume**, specify the disk letter and format the disk. Start the **This PC**, you can see the new added disk and its capacity, and since then, you can use the iSCSI disk issued by HBlock as a local disk.
   Note:

- During initialization of disk, if the storage capacity of LUN is less than or equal to 2TiB, either MBR or GPT can be used for partition; if the storage capacity of LUN is larger than 2TiB, only GPT can be used for partition.
- If client needs to be disconnected or delete the disk, you need to enter **Server Manager** > **File and Storage Services** > **Volumes** > **Disks**, right click on the disk and click **Take Offline** to go offline the disk. Then disconnect the iSCSI target on **iSCSI Initaitor**.
- If the client needs to disconnect and then re-connect, there is no need to initialize or create a new volume, and the disk can be seen after reconnecting.

Note: If you want to query the disk corresponding to HBlock LUN, you can enter the following command line on the client side to query.

```
wmic diskdrive get Name, Manufacturer, Model, InterfaceType, MediaType, SerialNumber
```

As shown in the following example, the query information "Name" column corresponds to the "Number" column on the "DISKs". SerialName corresponds to the name and uuid of HBlock LUN.



4.3 Linux Client – Standalone Mode

4.3.1 Client Configuration

Prerequisites

- The LUNs have been successfully created on HBlock server side.
- Prepare the Linux Client.
  Note: Root permission is required to configure the initiator.

  If client is CentOS/RHEL, please install iscsi-initiator-utils. The installation command is as follows:

```
yum -y install iscsi-initiator-utils
```

  Note: Install iSCSI initiator version 6.2.0-874-10 or above.
  If client is Ubuntu/Debian, the installation command is as follows:

```
apt install open-iscsi
```

Steps

- **HBlock server side**: Query the detailed information of the LUN to be connected and its corresponding iSCSI target.

```
./stor lun ls { -n | --name } LUN_NAME
./stor target ls { -n | --name } TARGET_NAME
```

- **Linux Client**

(I) Discover HBlock's target.

```
iscsiadm -m discovery -t st -p SERVER_IP
```

(II) Log in to iSCSI storage.
If your iSCSI target does not enable CHAP authentication, please directly proceed to step 4 **Login to the target**.

1. Enable authentication

```
iscsiadm -m node -T iSCSI_TARGET_IQN -o update --name node.session.auth.authmethod --
value=CHAP
```

2. Enter CHAP username

```
iscsiadm -m node -T iSCSI_TARGET_IQN -o update --name node.session.auth.username --
value=USER
```

3. Enter CHAP password

```
iscsiadm -m node -T iSCSI_TARGET_IQN -o update --name node.session.auth.password --
value=PASSWORD
```

4. Login to the target

```
iscsiadm -m node -T iSCSI_TARGET_IQN -p SERVER_IP -l
```

(III) Display the session status and view the current iSCSI connection.

```
iscsiadm -m session
```

(IV) View the iSCSI disk and its corresponding LUN. You can view the wwid of the LUN by using the command `lsscsi -i`.

```
lsblk
lsscsi -i
```

(V) Format the iSCSI disk.

Note: If the disk has been connected and formatted before, you can directly mount the iSCSI disk without formatting the disk after reconnection.

Use the following command to format the newly added iSCSI disk partition.

```
mkfs.ext4 /dev/sdX
```

or

```
mkfs.xfs /dev/sdX
```

Note: Common file systems include ext4 and XFS. It is determined based on user need.

(VI) Mount iSCSI disk

Mount the iSCSI disk partition to a local directory, and data can be written after mounting.

```
mount /dev/sdX PATH   # PATH is the disk path
```

Note: If the user needs to disconnect or delete the disk, perform the following steps:

1. Ensure that no processes are using the folder of the file system before uninstalling it.
2. Use the command `sync` to ensure that all pending write operations have been written to disk.
3. Use the command `umount` to properly uninstall the file system and disconnect the iSCSI connection.

```
umount DIRECTORY_NAME_OR_PATH
iscsiadm -m node -T iSCSI_TARGET_IQN -p SERVER_IP -u
```

Example:

```
[root@client ~]# sync
[root@client ~]# umount /mnt/disk_sda
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target1.1 -p
192.168.0.32 -u
Logging out of session [sid: 1, target: iqn.2012-08.cn.ctyunapi.oos:target1.1, portal:
192.168.0.32,3260]
Logout of [sid: 1, target: iqn.2012-08.cn.ctyunapi.oos:target1.1, portal:
192.168.0.32,3260] successful.
```

4.3.2 Examples

Scenarios

- Linux clients need to connect to LUNs of HBlock standalone mode.
- The LUNs of HBlock standalone mode that need to be connected are lund1 and lunf1, with lund1 having CHAP authentication.

Prerequisites

- For client that need to connect to the HBlock LUNs, preparations have been made according to **Client Configuration**.
- The lund1 and f1 have been successfully created on HBlock server.

Steps

- **HBlock server side**: Query the detailed information of the LUN to be connected and its corresponding iSCSI target.

```
[root@hblockserver CTYUN_HBlock_Plus_4.0.0_x64]# ./stor lun ls -n lund1
LUN Name: lund1 (LUN 0)
Storage Mode: Local
Capacity: 500 GiB
Status: Normal
iSCSI Target: iqn.2012-08.cn.ctyunapi.oos:targetd.4(192.168.0.32:3260,Active)
Create Time: 2024-05-21 10:00:34
Local Sector Size: 4096 Bytes
Data Health: 100% normal, 0% low redundancy, 0% error
Write Policy: WriteBack
WWID: 33000000068f2f320
UUID: lun-uuid-3ddcc779-bf34-42b9-ac5e-0339dae28821
Path: /mnt/storage01
Snapshot Count: 0
Snapshot Size: 0 B (Note: Snapshot size may vary due to LUN issues or parent snapshot
deletion.)
[root@hblockserver CTYUN_HBlock_Plus_4.0.0_x64]# ./stor target ls -n targetd
Target Name: targetd
Max Sessions: 2
Create Time: 2024-05-21 09:59:12
iSCSI Target: iqn.2012-08.cn.ctyunapi.oos:targetd.4(192.168.0.32:3260)
LUN: lund1(LUN 0)
```

```
Reclaim Policy: Retain
CHAP: testd,T12345678912,Enabled
[root@hblockserver CTYUN_HBlock_Plus_4.0.0_x64]# ./stor lun ls -n lunf1
LUN Name: lunf1 (LUN 0)
Storage Mode: Local
Capacity: 600 GiB
Status: Normal
iSCSI Target: iqn.2012-08.cn.ctyunapi.oos:targetf.5(192.168.0.32:3260,Active)
Create Time: 2024-05-21 10:00:56
Local Sector Size: 4096 Bytes
Data Health: 100% normal, 0% low redundancy, 0% error
Write Policy: WriteBack
WWID: 33000000030f798a5
UUID: lun-uuid-7b7f91d8-b75e-4de2-ac69-621e4be7a0cf
Path: /mnt/storage01
Snapshot Count: 0
Snapshot Size: 0 B (Note: Snapshot size may vary due to LUN issues or parent snapshot
deletion.)
[root@hblockserver CTYUN_HBlock_Plus_4.0.0_x64]# ./stor target ls -n targetf
Target Name: targetf
Max Sessions: 2
Create Time: 2024-05-21 10:00:15
iSCSI Target: iqn.2012-08.cn.ctyunapi.oos:targetf.5(192.168.0.32:3260)
LUN: lunf1(LUN 0)
Reclaim Policy: Retain
```

- **Linux Client**

(I) Discover targets of lund1 and lunf1.

```
[root@client ~]# iscsiadm -m discovery -t st -p 192.168.0.32
192.168.0.32:3260,1 iqn.2012-08.cn.ctyunapi.oos:targetf.5
192.168.0.32:3260,1 iqn.2012-08.cn.ctyunapi.oos:targetd.4
192.168.0.32:3260,1 iqn.2012-08.cn.ctyunapi.oos:targetc.3
```

(II) Log in to iSCSI storage.

- Log in to iSCSI storage of lund1, and CHAP authentication is required.

```
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:targetd.4 -o update --
name node.session.auth.authmethod --value=CHAP
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:targetd.4 -o update --
name node.session.auth.username --value=testd
```

```
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:targetd.4 -o update --
name node.session.auth.password --value=*************
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:targetd.4 -p
192.168.0.32:3260 -l
Logging in to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:targetd.4, portal:
192.168.0.32,3260] (multiple)
Login to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:targetd.4, portal:
192.168.0.32,3260] successful.
```

- Log in to iSCSI storage of lunf1.

```
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:targetf.5 -p
192.168.0.32:3260 -l
Logging in to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:targetf.5, portal:
192.168.0.32,3260] (multiple)
Login to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:targetf.5, portal:
192.168.0.32,3260] successful.
```

(III) Display the session status and view the current iSCSI connection.

```
[root@client ~]# iscsiadm -m session
tcp: [1] 192.168.0.32:3260,1 iqn.2012-08.cn.ctyunapi.oos:targetd.4 (non-flash)
tcp: [2] 192.168.0.32:3260,1 iqn.2012-08.cn.ctyunapi.oos:targetf.5 (non-flash)
```

(IV) View the iSCSI disk and its corresponding LUN. You can view the wwid of the LUN by using the command `lsscsi -i`.

```
[root@client ~]# lsblk
NAME   MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda      8:0    0  500G  0 disk
sdb      8:16   0  600G  0 disk
vda    253:0    0   40G  0 disk
├─vda1 253:1    0    4G  0 part
└─vda2 253:2    0   36G  0 part /
vdb    253:16   0  100G  0 disk
└─vdb1 253:17   0  100G  0 part /mnt/storage01
vdc    253:32   0  100G  0 disk
vdd    253:48   0  100G  0 disk
[root@client ~]# lsscsi -i
[2:0:0:0]    disk    CTYUN    iSCSI LUN Device 1.00  /dev/sda   33000000068f2f320
[3:0:0:0]    disk    CTYUN    iSCSI LUN Device 1.00  /dev/sdb   33000000030f798a5
```

Note: It can be seen that /dev/sda corresponds to HBlock LUN lund1 (LUN WWID 3300000068f2F320), and /dev/sdb corresponds to HBlock LUN lunf1 (LUN WWID 3300000030f798a5).

(V) Format the iSCSI disk.

```
[root@client ~]# mkfs.ext4 /dev/sda
mke2fs 1.42.9 (28-Dec-2013)
/dev/sda is entire device, not just one partition!
Proceed anyway? (y,n) y
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
32768000 inodes, 131072000 blocks
6553600 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=2279604224
4000 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
  32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
  4096000, 7962624, 11239424, 20480000, 23887872, 71663616, 78675968,
  102400000

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

[root@client ~]# mkfs.ext4 /dev/sdb
mke2fs 1.42.9 (28-Dec-2013)
/dev/sdb is entire device, not just one partition!
Proceed anyway? (y,n) y
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
39321600 inodes, 157286400 blocks
7864320 blocks (5.00%) reserved for the super user
First data block=0
```

```
Maximum filesystem blocks=2304770048
4800 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
  32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
  4096000, 7962624, 11239424, 20480000, 23887872, 71663616, 78675968,
  102400000

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done
```

(VI) Mount iSCSI disk

Mount the iSCSI disk partition to a local directory, and data can be written after mounting.

```
[root@client ~]# mount /dev/sda /mnt/disk_sda
[root@client ~]# mount /dev/sdb /mnt/disk_sdb
[root@client ~]# lsblk
NAME   MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda      8:0    0  500G  0 disk /mnt/disk_sda
sdb      8:16   0  600G  0 disk /mnt/disk_sdb
vda    253:0    0   40G  0 disk
├─vda1 253:1    0    4G  0 part
└─vda2 253:2    0   36G  0 part /
vdb    253:16   0  100G  0 disk
└─vdb1 253:17   0  100G  0 part /mnt/storage01
vdc    253:32   0  100G  0 disk
vdd    253:48   0  100G  0 disk
```

4.4 Linux Client – Cluster Mode

4.4.1 Client Configuration

- The LUNs have been successfully created on HBlock server side.
- Prepare the Linux Client

(I) Install the Linux Client.

Note: Root permission is required to configure the initiator.

If client is CentOS/RHEL, please install iscsi-initiator-utils. The installation command is as follows:

```
yum -y install iscsi-initiator-utils
```

Note: Please install iSCSI initiator 6.2.0-874-10 or above.

If client is Ubuntu/Debian, the installation command is as follows:

```
apt install open-iscsi
```

(II) Install MPIO.

- For CentOS

```
yum install device-mapper-multipath device-mapper-multipath-libs
```

- For Ubuntu

```
apt install multipath-tools
```

(III) Configure MPIO.

1. Copy **/usr/share/doc/device-mapper-multipath-*X.Y.Z*/multipath.conf** to **/etc/multipath.conf**, where *X.Y.Z* is the actual version number of multipath.
2. Add the following configuration in **/etc/multipath.conf**:

   Note: In multipath.conf, if the multipath section has the same parameters as the devices section, the parameter values in multipath override those in devices. In order to use HBlock volumes properly, you must delete the same parameters as the following fields in multipath.

```
defaults {
       user_friendly_names yes
       find_multipaths yes
       uid_attribute "ID_WWN"
}
devices {
       device {
            vendor "CTYUN"
            product "iSCSI LUN Device"
            path_grouping_policy failover
```

```
            path_checker tur
            path_selector "round-robin 0"
            hardware_handler "1 alua"
            rr_weight priorities
            no_path_retry queue
            prio alua
          }
}
```

(IV) Restart the multipathd service.

- For CentOS

```
systemctl restart multipathd
systemctl enable multipathd
```

- For Ubuntu

```
systemctl restart multipath-tools.service
systemctl enable multipath-tools.service
```

Steps

- **HBlock server side**: Query the detailed information of the LUN to be connected and its corresponding iSCSI target.

```
./stor lun ls { -n | --name } LUN_NAME
./stor target ls { -n | --name } TARGET_NAME
```

- **Linux Client**

(I) Discover HBlock's target.

Note: If the LUN corresponds to multiple target IQNs, it is recommended to connect all of them.

```
iscsiadm -m discovery -t st -p ACTIVE_IP
iscsiadm -m discovery -t st -p STANDBY_IP
iscsiadm -m discovery -t st -p ColdStandby_IP
```

(II) Log in to iSCSI storage: establish multiple iSCSI connections (including target IQN with status Active, Standby, and ColdStandby).

Note: If your iSCSI target does not enable CHAP authentication, please directly proceed to step 4 Login to the target.

1. Enable authentication.

```
iscsiadm -m node -T iSCSI_TARGET_IQN -o update --name node.session.auth.authmethod --
```

```
value=CHAP
```

2. Enter the CHAP username.

```
iscsiadm -m node -T iSCSI_TARGET_IQN -o update --name node.session.auth.username --
value=USER
```

3. Enter the CHAP password.

```
iscsiadm -m node -T iSCSI_TARGET_IQN -o update --name node.session.auth.password --
value=PASSWORD
```

4. Login to the target

```
iscsiadm -m node -T iSCSI_TARGET_IQN -p SERVER_IP -l
```

(III) Display the session status and view the current iSCSI connection.

```
iscsiadm -m session
lsscsi
```

(IV) View MPIO devices, the iSCSI disk's corresponding LUN WWID.

```
multipath -ll   # You can add parameter -v 3 to display more detailed information
ll /dev/mapper/mpathX
/lib/udev/scsi_id --whitelisted --device=/dev/sdX  # View the iSCSI disk's corresponding LUN WWID
```

(V) Operate MPIO devices.

Mount the iSCSI disk partition to a local directory, and data can be written after mounting. Note: If the disk has been connected and formatted before, you can directly mount the iSCSI disk without formatting the disk after reconnection.

```
lsblk
mkfs -t ext4 /dev/mapper/mpathX # Formatted into ext4
mkdir DIRECTORY_NAME_OR_PATH #Create directory
mount /dev/mapper/mpath X DIRECTORY_NAME_OR_PATH #Mount mpath X to the directory
lsblk
```

Note: Common file systems include ext4 and XFS. It is determined based on user need.

Note: If the user needs to disconnect or delete the disk, perform the following steps:

1. Ensure that no processes are using the folder of the file system before uninstalling it.
2. Use the command `sync` to ensure that all pending write operations have been written to disk.
3. Use the command `umount` to properly uninstall the file system and disconnect the iSCSI connection.

```
umount DIRECTORY_NAME_OR_PATH
iscsiadm -m node -T iSCSI_TARGET_IQN -p SERVER_IP -u
```

Example:

```
[root@client ~]# sync
```

```
[root@client ~]# umount /mnt/disk_mpatha
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target01.1 -p
192.168.0.102 -u
Logging out of session [sid: 2, target: iqn.2012-08.cn.ctyunapi.oos:target01.1, portal:
192.168.0.102,3260]
Logout of [sid: 2, target: iqn.2012-08.cn.ctyunapi.oos:target01.1, portal:
192.168.0.102,3260] successful.
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target01.2 -p
192.168.0.110 -u
Logging out of session [sid: 3, target: iqn.2012-08.cn.ctyunapi.oos:target01.2, portal:
192.168.0.110,3260]
Logout of [sid: 3, target: iqn.2012-08.cn.ctyunapi.oos:target01.2, portal:
192.168.0.110,3260] successful.
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target01.3 -p
192.168.0.192 -u
Logging out of session [sid: 4, target: iqn.2012-08.cn.ctyunapi.oos:target01.3, portal:
192.168.0.192,3260]
Logout of [sid: 4, target: iqn.2012-08.cn.ctyunapi.oos:target01.3, portal:
192.168.0.192,3260] successful.
```

4.4.2 Examples

Scenarios

- Linux clients need to connect to LUNs of HBlock cluster mode.
- The LUNs of HBlock cluster mode that need to be connected are lun6a and lun7a, with lun7a having CHAP authentication.

Prerequisites

- For client that need to connect to the HBlock LUNs, preparations have been made according to Client Configuration.
- The lun6a and 7a have been successfully created on HBlock server.

Steps

- **HBlock server side**: Query the detailed information of the LUN to be connected and its corresponding iSCSI target.

```
[root@hblockserver CTYUN_HBlock_Plus_4.0.0_x64]# ./stor lun ls -n lun6a
LUN Name: lun6a (LUN 0)
Storage Mode: Cache
Capacity: 500 GiB
Status: Normal
Auto Failback: Enabled
iSCSI Target: iqn.2012-08.cn.ctyunapi.oos:target6.12(192.168.0.192:3260,Active)
              iqn.2012-08.cn.ctyunapi.oos:target6.11(192.168.0.110:3260,Standby)
              iqn.2012-08.cn.ctyunapi.oos:target6.13(192.168.0.102:3260,ColdStandby)
Create Time: 2024-05-21 14:14:48
Local Storage Class: EC 2+1+16 KiB
Minimum Replicas: 2
Redundancy Overlap: 1
Local Sector Size: 4096 Bytes
Storage Pool: default
Data Health: 100% normal, 0% low redundancy, 0% error
High Availability: ActiveStandby
Write Policy: WriteBack
WWID: 33fffffffc69cbabb
UUID: lun-uuid-40731bfd-d0e5-49fb-9784-1d825635daf8
Object Storage Info:
+-------------------+----------------------------+
```

```
| Provider          | OOS                         |
| Bucket Name       | hblocktest3                 |
| Prefix            | stor2                       |
| Endpoint          | https://oos-cn.ctyunapi.cn  |
| Signature Version | v2                          |
| Region            |                             |
| Storage Class     | STANDARD                    |
| Access Key        | cb22b08b1f9229f85874        |
| Object Size       | 1024 KiB                    |
| Compression       | Enabled                     |
+-------------------+-----------------------------+
[root@hblockserver CTYUN_HBlock_Plus_4.0.0_x64]# ./stor target ls -n target6
Target Name: target6
Max Sessions: 2
Create Time: 2024-05-21 14:12:44
Number of Servers: 3
iSCSI Target: iqn.2012-08.cn.ctyunapi.oos:target6.11(192.168.0.110:3260)
              iqn.2012-08.cn.ctyunapi.oos:target6.12(192.168.0.192:3260)
              iqn.2012-08.cn.ctyunapi.oos:target6.13(192.168.0.102:3260)
LUN: lun6a(LUN 0)
Reclaim Policy: Retain
ServerID: hblock_1,hblock_2,hblock_3
[root@hblockserver CTYUN_HBlock_Plus_4.0.0_x64]# ./stor lun ls -n lun7a
LUN Name: lun7a (LUN 0)
Storage Mode: Local
Capacity: 500 GiB
Status: Normal
Auto Failback: Enabled
iSCSI Target: iqn.2012-08.cn.ctyunapi.oos:target7.14(192.168.0.110:3260,Active)
              iqn.2012-08.cn.ctyunapi.oos:target7.15(192.168.0.192:3260,Standby)
Create Time: 2024-05-21 14:15:22
Local Storage Class: EC 2+1+16 KiB
Minimum Replicas: 2
Redundancy Overlap: 1
Local Sector Size: 4096 Bytes
Storage Pool: default
Data Health: 100% normal, 0% low redundancy, 0% error
High Availability: ActiveStandby
Write Policy: WriteBack
WWID: 330000000727497eb
```

```
UUID: lun-uuid-3429b79f-cd7d-47cb-9fb6-c79136deb237
Snapshot Count: 0
Snapshot Size: 0 B (Note: Snapshot size may vary due to LUN issues or parent snapshot
deletion.)
[root@hblockserver CTYUN_HBlock_Plus_4.0.0_x64]# ./stor target ls -n target7
Target Name: target7
Max Sessions: 1
Create Time: 2024-05-21 14:13:27
Number of Servers: 2
iSCSI Target: iqn.2012-08.cn.ctyunapi.oos:target7.14(192.168.0.110:3260)
              iqn.2012-08.cn.ctyunapi.oos:target7.15(192.168.0.192:3260)
LUN: lun7a(LUN 0)
Reclaim Policy: Retain
CHAP: test2,T12345678912,Enabled
ServerID: hblock_1,hblock_2
```

- **Linux Client**

(I) Discover targets of lun6a and lun7a.

```
[root@client ~]# iscsiadm -m discovery -t st -p 192.168.0.110
192.168.0.110:3260,1 iqn.2012-08.cn.ctyunapi.oos:target7.14
192.168.0.110:3260,1 iqn.2012-08.cn.ctyunapi.oos:target02.3
192.168.0.110:3260,1 iqn.2012-08.cn.ctyunapi.oos:target04.7
192.168.0.110:3260,1 iqn.2012-08.cn.ctyunapi.oos:target6.11
[root@client ~]# iscsiadm -m discovery -t st -p 192.168.0.192
192.168.0.192:3260,1 iqn.2012-08.cn.ctyunapi.oos:target7.15
192.168.0.192:3260,1 iqn.2012-08.cn.ctyunapi.oos:target6.12
192.168.0.192:3260,1 iqn.2012-08.cn.ctyunapi.oos:test.10
192.168.0.192:3260,1 iqn.2012-08.cn.ctyunapi.oos:target04.8
[root@client ~]# iscsiadm -m discovery -t st -p 192.168.0.102
192.168.0.102:3260,1 iqn.2012-08.cn.ctyunapi.oos:target02.4
192.168.0.102:3260,1 iqn.2012-08.cn.ctyunapi.oos:target6.13
192.168.0.102:3260,1 iqn.2012-08.cn.ctyunapi.oos:test.9
```

(II) Log in to iSCSI storage.

- Log in to iSCSI storage of lun6a, and establish multiple iSCSI connections in the order of Active target, Standby target, and ColdStandby target.

```
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target6.12 -p
192.168.0.192:3260 -l
Logging in to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:target6.12, portal:
```

```
192.168.0.192,3260] (multiple)
Login to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:target6.12, portal:
192.168.0.192,3260] successful.
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target6.11 -p
192.168.0.110:3260 -l
Logging in to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:target6.11, portal:
192.168.0.110,3260] (multiple)
Login to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:target6.11, portal:
192.168.0.110,3260] successful.
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target6.13 -p
192.168.0.102:3260 -l
Logging in to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:target6.13, portal:
192.168.0.102,3260] (multiple)
Login to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:target6.13, portal:
192.168.0.102,3260] successful.
```

- Log in to iSCSI storage of lun7a, and CHAP authentication is required.

```
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target7.14 -o update --
name node.session.auth.authmethod --value=CHAP
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target7.14 -o update --
name node.session.auth.username --value=test2
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target7.14 -o update --
name node.session.auth.password --value=*************
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target7.14 -p
192.168.0.110:3260 -l
Logging in to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:target7.14, portal:
192.168.0.110,3260] (multiple)
Login to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:target7.14, portal:
192.168.0.110,3260] successful.
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target7.15 -o update --
name node.session.auth.authmethod --value=CHAP
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target7.15 -o update --
name node.session.auth.username --value=test2
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target7.15 -o update --
name node.session.auth.password --value=*************
[root@client ~]# iscsiadm -m node -T iqn.2012-08.cn.ctyunapi.oos:target7.15 -p
192.168.0.192:3260 -l
Logging in to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:target7.15, portal:
192.168.0.192,3260] (multiple)
Login to [iface: default, target: iqn.2012-08.cn.ctyunapi.oos:target7.15, portal:
192.168.0.192,3260] successful.
```

(III) Display the session status and view the current iSCSI connection.

```
[root@client ~]# iscsiadm -m session
tcp: [3] 192.168.0.192:3260,1 iqn.2012-08.cn.ctyunapi.oos:target6.12 (non-flash)
tcp: [4] 192.168.0.110:3260,1 iqn.2012-08.cn.ctyunapi.oos:target6.11 (non-flash)
tcp: [5] 192.168.0.102:3260,1 iqn.2012-08.cn.ctyunapi.oos:target6.13 (non-flash)
tcp: [6] 192.168.0.110:3260,1 iqn.2012-08.cn.ctyunapi.oos:target7.14 (non-flash)
tcp: [7] 192.168.0.192:3260,1 iqn.2012-08.cn.ctyunapi.oos:target7.15 (non-flash)
[root@client ~]# lsscsi
[4:0:0:0]    disk    CTYUN    iSCSI LUN Device 1.00  /dev/sdc
[5:0:0:0]    disk    CTYUN    iSCSI LUN Device 1.00  /dev/sdd
[6:0:0:0]    disk    CTYUN    iSCSI LUN Device 1.00  /dev/sde
[7:0:0:0]    disk    CTYUN    iSCSI LUN Device 1.00  /dev/sdf
[8:0:0:0]    disk    CTYUN    iSCSI LUN Device 1.00  /dev/sdg
```

(IV) View MPIO devices, the iSCSI disk's corresponding LUN WWID.

```
[root@client ~]# multipath -ll
mpathc (0x30000000727497eb) dm-1 CTYUN   ,iSCSI LUN Device
size=500G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|-+- policy='round-robin 0' prio=50 status=active
| `- 7:0:0:0 sdf 8:80 active ready running
`-+- policy='round-robin 0' prio=1 status=enabled
  `- 8:0:0:0 sdg 8:96 active ghost running
mpathb (0x3fffffffc69cbabb) dm-0 CTYUN   ,iSCSI LUN Device
size=500G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|-+- policy='round-robin 0' prio=50 status=active
| `- 4:0:0:0 sdc 8:32 active ready running
|-+- policy='round-robin 0' prio=1 status=enabled
| `- 5:0:0:0 sdd 8:48 active ghost running
`-+- policy='round-robin 0' prio=0 status=enabled
  `- 6:0:0:0 sde 8:64 failed faulty running
[root@client ~]# ll /dev/mapper/mpathc
lrwxrwxrwx 1 root root 7 May 21 15:03 /dev/mapper/mpathc -> ../dm-1
[root@client ~]# ll /dev/mapper/mpathb
lrwxrwxrwx 1 root root 7 May 21 14:57 /dev/mapper/mpathb -> ../dm-0
[root@client ~]# /lib/udev/scsi_id --whitelisted --device=/dev/sdc
33fffffffc69cbabb
[root@client ~]# /lib/udev/scsi_id --whitelisted --device=/dev/sdd
33fffffffc69cbabb
[root@client ~]# # /lib/udev/scsi_id --whitelisted --device=/dev/sde
33fffffffc69cbabb
```

```
[root@client ~]# /lib/udev/scsi_id --whitelisted --device=/dev/sdf
330000000727497eb
[root@client ~]# /lib/udev/scsi_id --whitelisted --device=/dev/sdg
330000000727497eb
```

Note: It can be seen that /dev/mapper/mpathb (/dev/sdc, /dev/sdd, /dev/sde) corresponds to HBlock LUN lun6a (LUN WWID 33ffffffc69cbabb), and /dev/mapper/mpathc (/dev/sdf,/dev/sdg) corresponds to HBlock LUN lun7a (LUN WWID 30000000727497eb).

(V) Operate MPIO devices.

Mount the iSCSI disk partition to a local directory, and data can be written after mounting.

- Mount iSCSI disk /dev/mapper/mpathb.

```
[root@client ~]# lsblk
sdc         8:32   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath
sdd         8:48   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath
sde         8:64   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath
sdf         8:80   0  500G  0 disk
└─mpathc 252:1    0  500G  0 mpath
sdg         8:96   0  500G  0 disk
└─mpathc 252:1    0  500G  0 mpath
vda       253:0    0   40G  0 disk
├─vda1    253:1    0    4G  0 part
└─vda2    253:2    0   36G  0 part  /
vdb       253:16   0  100G  0 disk
└─vdb1    253:17   0  100G  0 part  /mnt/storage01
vdc       253:32   0  100G  0 disk
vdd       253:48   0  100G  0 disk
[root@client ~]# mkfs -t ext4 /dev/mapper/mpathb
mke2fs 1.42.9 (28-Dec-2013)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
32768000 inodes, 131072000 blocks
6553600 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=2279604224
```

```
4000 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
  32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
  4096000, 7962624, 11239424, 20480000, 23887872, 71663616, 78675968,
  102400000

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

[root@client ~]# mkdir /mnt/disk_mpathb
[root@client ~]# mount /dev/mapper/mpathb /mnt/disk_mpathb
[root@client ~]# lsblk
NAME     MAJ:MIN RM  SIZE RO TYPE  MOUNTPOINT
sdc        8:32   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath /mnt/disk_mpathb
sdd        8:48   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath /mnt/disk_mpathb
sde        8:64   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath /mnt/disk_mpathb
sdf        8:80   0  500G  0 disk
└─mpathc 252:1    0  500G  0 mpath
sdg        8:96   0  500G  0 disk
└─mpathc 252:1    0  500G  0 mpath
vda      253:0    0   40G  0 disk
├─vda1   253:1    0    4G  0 part
└─vda2   253:2    0   36G  0 part  /
vdb      253:16   0  100G  0 disk
└─vdb1   253:17   0  100G  0 part  /mnt/storage01
vdc      253:32   0  100G  0 disk
vdd      253:48   0  100G  0 disk
```

- Mount iSCSI disk /dev/mapper/mpathc.

```
[root@client ~]# lsblk
NAME     MAJ:MIN RM  SIZE RO TYPE  MOUNTPOINT
sdc        8:32   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath /mnt/disk_mpathb
sdd        8:48   0  500G  0 disk
```

```
└─mpathb 252:0    0  500G  0 mpath /mnt/disk_mpathb
sde        8:64   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath /mnt/disk_mpathb
sdf        8:80   0  500G  0 disk
└─mpathc 252:1    0  500G  0 mpath
sdg        8:96   0  500G  0 disk
└─mpathc 252:1    0  500G  0 mpath
vda      253:0    0   40G  0 disk
├─vda1   253:1    0    4G  0 part
└─vda2   253:2    0   36G  0 part  /
vdb      253:16   0  100G  0 disk
└─vdb1   253:17   0  100G  0 part  /mnt/storage01
vdc      253:32   0  100G  0 disk
vdd      253:48   0  100G  0 disk
[root@client ~]# mkfs -t ext4 /dev/mapper/mpathc
mke2fs 1.42.9 (28-Dec-2013)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
32768000 inodes, 131072000 blocks
6553600 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=2279604224
4000 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
  32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
  4096000, 7962624, 11239424, 20480000, 23887872, 71663616, 78675968,
  102400000

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

[root@client ~]# mkdir /mnt/disk_mpathc
[root@client ~]# mount /dev/mapper/mpathc /mnt/disk_mpathc
```

```
[root@client ~]# lsblk
NAME     MAJ:MIN RM  SIZE RO TYPE  MOUNTPOINT
sdc        8:32   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath /mnt/disk_mpathb
sdd        8:48   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath /mnt/disk_mpathb
sde        8:64   0  500G  0 disk
└─mpathb 252:0    0  500G  0 mpath /mnt/disk_mpathb
sdf        8:80   0  500G  0 disk
└─mpathc 252:1    0  500G  0 mpath /mnt/disk_mpathc
sdg        8:96   0  500G  0 disk
└─mpathc 252:1    0  500G  0 mpath /mnt/disk_mpathc
vda      253:0    0   40G  0 disk
├─vda1   253:1    0    4G  0 part
└─vda2   253:2    0   36G  0 part  /
vdb      253:16   0  100G  0 disk
└─vdb1   253:17   0  100G  0 part  /mnt/storage01
vdc      253:32   0  100G  0 disk
vdd      253:48   0  100G  0 disk
```

5 Appendix

5.1 HBlock Service

Service	Service Name	Effect
stor:mdm	Metadata management services (only supported by cluster mode)	Manage metadata for the entire system.
stor:fc	Failover control service (only supported by cluster mode)	Perform system health check and implement failover control.
stor:ls	Ledger service (only supported by cluster mode)	Provides log-based data synchronization function.
stor:ds-*x*	Data service (only supported by cluster mode)	Manage user's file data blocks.
stor:cs	Coordination service (only supported by cluster mode)	Monitor the status of each server and trigger notification events to ensure high availability of cluster services.
stor:ms	Management services	Process request information and maintain cluster operating status.
stor:ws	Watchdog service	Monitor the status of each service and be responsible for starting the service.
stor:ps	Processor service	Responsible for iSCSI protocol parsing and data storage.
stor:ag	Aggregator service	Responsible for acquiring performance data.
stor:ua	Upgrade agent service	Responsible for receiving upgrade requests and performing upgrade-related operations.

5.2 User Event List

Server

Event	Description
AddServer	Add server
RemoveServer	Recover server
SetServer	Set server properties
DeleteTargetPortalIP	Delete server target portal IP
RestartService	Restart service
AddPath	Add disk path
RemovePath	Remove disk path
StartService	Start service
StopService	Stop service
SetPath	Edit disk path
MigrateService	Migrate service

iSCSI target

Event	Description
CreateTarget	Create target
DeleteTarget	Delete target
SetTarget	Set target property
MigrateTarget	Migrate target
DeleteCHAP	Delete CHAP
DeleteConnection	Delete Connection
DeletetargetAllowlist	Delete target allow list
SettargetAllowlist	Set target allow list

LUN

Event	Description
CreateLUN	Create a LUN
DeleteLUN	Delete a LUN
SetLUN	Set LUN properties
ExpandLUN	Expand a LUN
SwitchLUN	LUN active/backup switching

Event	Description
RecoverLUN	Recover a LUN
ResumeLUNRecovery	Resume recovery of a previously failed LUN
SetBatchLUN	Set LUNs in batch
CreateCloneLUN	Create Clone LUN
FlattenCloneLUN	Flatten Clone LUN
LUNDataResidue	LUN Data Residue
WipeLUN	Wipe LUN
DeleteLUNXattr	Delete LUN xattr
SetLUNXattr	Set LUN xattr
SuspendLUN	Suspend LUN
ResumeLUN	Resume LUN

System

Event	Description
Login	Log in
SetMailConfig	Set up email notification
DeleteMailConfig	Delete email notification
SendTestMail	Send test email
SetRemoteAccess	Set up remote assistance
DeleteRemoteAccess	Delete remote assistance
ImportLicense	Import software license
SetPassword	Set password
StartLogCollect	Initiate a log collection request
DeleteLogCollect	Delete log collection request
SetAlarmMuteStatus	Edit alarm silent status
ManuallyResolveAlarm	Manually Resolve the Alarm
Setup	Initialize
AddMonitorConfig	Add monitor config
SetMonitorConfig	Set monitor config
DeleteMonitorConfig	Delete monitor config

Cluster Topology

Event	Description
SetNode	Modify node information
CreateNode	Create a node
DeleteNode	Delete a node

Storage Pool

Event	Description
CreateStoragePool	Create a storage pool
DeleteStoragePool	Delete a storage pool
SetStoragePool	Modify storage pool information
AddNodeToPool	Add a node to a pool
RemoveNodeFromPool	Remove a node from a pool

Upgrade

Event	Description
StartUpgrade	Start the upgrade

Snapshot

Event	Description
CreateSnapshot	Create Snapshot
SetSnapshot	Set Snapshot
DeleteSnapshot	Delete Snapshot
RollbackSnapshot	Rollback Snapshot
CreateConsistencySnapshot	Create Consistency Snapshot
SetConsistencySnapshot	Set Consistency Snapshot
RollbackConsistencySnapshot	Rollback Consistency Snapshot
DeleteConsistencySnapshot	Delete Consistency Snapshot

QoS Policy

Event	Description

Event	Description
CreateQoSPolicy	Create QoS Policy
SetQoSPolicy	Set QoS Policy
DeleteQoSPolicy	Delete QoS Policy
AssociateQoSPolicy	Associate QoS Policy
DisassociateQoSPolicy	Disassociate QoS Policy

Backup

Event	Description
ExportBackup	Export Backup
ImportBackup	Import Backup

5.3 System Event List

Server

Event	Description
ServiceUnavailable	Service unavailable
ServiceAvailable	Service available
ServerAdded	Server added
ServerRemoved	Server removed
ProtocolServiceAbnormal	Protocol parsing service exception
ProtocolServiceResumed	Protocol parsing service resumed
InsufficientSpaceonInstallationPath	The remaining space of the installation directory is insufficient.
SpaceonInstallationPath	The remaining space of the installation directory meets service running requirements
BaseServiceAbnormal	Base service exception
BaseServiceResumed	Base service resumed
ServiceMigrated	Service migration completed
ServiceMigrateAbnormal	Service migration exception
InsufficientSpaceonMetaDir	Insufficient space on the disk where the base service data directory is located
SufficientSpaceonMetaDir	Sufficient space on the disk where the base service data directory is located
InsufficientMemory	Insufficient memory
ServiceRestartRequired	Service restart required

Disk

Event	Description
DiskIOError	Disk I/O error
DiskIOResumed	Disk I/O resumed
DiskWriteSpeedTooSlow	Disk write speed is slow
DiskWriteSpeedResumed	Disk write speed returns to normal
PathAdded	Add disk path
PathRemoved	Remove disk path
CapacityQuotaUsageExceedsThreshold	Quota usage exceeds threshold
CapacityQuotaUsageBelowThreshold	Quota usage returns to normal
CapacityQuotaUsageApproachLimit	Quota exhausted
CapacityQuotaUsageBelowLimit	Quota usage rate is lower than the upper limit
DiskUsageExceedsThreshold	Disk usage exceeds threshold
DiskUsageBelowThreshold	Disk usage returns to normal
DiskPathHealthStatusWarning	Disk path health status warning

DiskPathHealthStatusError	Disk path health status error
DiskPathHealthStatusResumed	Disk path health status resumed
DataServiceHealthStatusWarning	Data service health status warning
DataServiceHealthStatusError	Data service health status error
DataServiceHealthStatusResumed	Data service health status resumed

LUN

Event	Description
ActiveStandbySwitched	LUN active/standby switching
InsufficientFDForLUNToWrite	The number of available fault domains does not meet the LUN write requirements
SufficientFDForLUNToWrite	Number of available fault domains meets LUN write requirements
LUNRecovered	LUN recovered
CannotConnectToCloud	Cannot connect to cloud
ConnectWithCloudResumed	Connect with cloud resumed
CloudAccountAbnormal	Cloud account abnormal
CloudAccountNormal	Cloud account normal
LUNCloudDataConflict	LUN cloud data conflict
LUNCloudDataConflictResolved	LUN cloud data conflict resolved
LUNCloudHeartbeatConflict	LUN cloud heartbeat conflict
LUNCloudHeartbeatNormal	LUN cloud heartbeat normal
LUNFlattened	LUN flattened
LUNResumed	LUN resumed
LUNDataLowRedundancy	LUN data low redundancy
LUNDataRedundancyResumed	LUN data redundancy resumed
LUNDataAccessResumed	LUN data access resumed
LUNDataAccessFailed	LUN data access failed

Target

Event	Description
InitiatorConnectionFailed	Initiator connection failed
InitiatorConnectionNormal	Initiator connection normal

System

Event	Description
ReachLicenseMaxCapacity	License capacity reached upper limit
LicenseMaintenanceExpired	License out of warranty
LicenseExpired	License expired

LicenseImported	License import
DataLowRedundancy	Data low redundancy
DataRedundancyResumed	Data redundancy resumed
DataResumed	Data resumed
DataBalanceStart	Data balancing begin
DataBalanceProgress	Data balancing process
DataBalanceFailed	Data balancing failed
DataBalanceEnd	Data balancing end
DataAccessFailed	Data cannot be accessed
DataAccessResumed	Data access resumed
ProTrialActive	Pro Trial active

Fault Domain Module

Event	Description
FaultDomainWarning	Fault domain status changes to warning
FaultDomainError	Fault domain status changes to Error
FaultDomainResumed	The fault domain status returns to normal

Storage Pool

Event	Description
CapacityQuotaUsageExceedsThreshold	Quota usage exceeds threshold
CapacityQuotaUsageBelowThreshold	Quota usage returns to normal
CapacityQuotaUsageApproachLimit	Quota exhausted
CapacityQuotaUsageBelowLimit	Quota is lower than the upper limit
DiskUsageExceedsThreshold	Disk usage exceeds threshold
DiskUsageBelowThreshold	Disk usage returns to normal
PoolDataLowRedundancy	Pool data low redundancy
PoolDataRedundancyResumed	Pool data redundancy resumed
PoolDataAccessResumed	Pool data access resumed
PoolDataAccessFailed	Pool data access failed

5.4 Monitoring Metrics

- **Data Granularity**
  The granularities of monitoring metrics are "Fine" and "Coarse". The following table lists the meanings of the metrics.

Category	Data Granularity	Data Retention Period	Description
Fine	20 seconds	2 hours	Acquires real-time data every 20 seconds. One data point is generated, and each data point is retained for two hours.
	1 minute	6 hours	Based on data of 20s granularity, aggregates the data of 1-minute granularity and retains it for 6 hours.
	5 minutes	1 day	Based on data of 20s granularity, aggregates the data of 5-minute granularity and retains it for 1 day.
	1 hour	7 days	Based on data of 20s granularity, aggregates the data of 1-hour granularity and retains it for 7 days.
	1 day	1 year	Based on data of 20s granularity, aggregates the data of 1-day granularity and retains it for 1 year.
Coarse	5 minutes	2 hours	Based on data of 20s granularity, aggregates the data of 5-minute granularity and retains it for 2 hours.
	1 hour	1 day	Based on data of 20s granularity, aggregates the data of 1-hour granularity and retains it for 1 day.
	1 day	1 month	Based on data of 20s granularity, aggregates the data of 1-day granularity and retains it for 1 month.
	1 week	6 months	Based on data of 20s granularity, aggregates the data of 1-week granularity and retains it for 6 months.
	1 month	1 year	Based on data of 20s granularity, aggregates the data of 1-month granularity and retains it for 1 year.

- Monitoring Metrics

Monitoring Dimension	Monitoring Metric	Description	Unit	Data Granularity
system	IOPS	Total IOPS between the client and HBlock.	None	Fine
	R_IOPS	IOPS when the client reads data from HBlock.	None	Fine
	W_IOPS	IOPS when the client writes data to HBlock.	None	Fine

	Bandwith	Total bandwidth between the client and HBlock.	B/s	Fine
	R_Bandwith	Bandwidth when the client reads data from HBlock.	B/s	Fine
	W_Bandwith	Bandwidth when the client writes data to HBlock.	B/s	Fine
	Latency	Total latency between the client and HBlock. The average latency of read and write operations in the system within an acquisition cycle reflects the time that HBlock takes to process read and write requests.	ms	Fine
	W_Latency	Latency when the client writes data to HBlock. The average latency of write operations in the system within an acquisition cycle reflects the time that HBlock takes to process write requests.	ms	Fine
	R_Latency	Latency when the client reads data from HBlock. The average latency of read operations in the system within an acquisition cycle reflects the time that HBlock takes to process read requests.	ms	Fine
	Path_Cap	Total capacity of disks where all HBlock disk paths reside in the system.	bytes	Coarse
	Path_Used	Used capacity of disks where all HBlock disk paths reside in the system.	bytes	Coarse
	Path_Rate	Average usage rate of disks where HBlock disk paths reside in the system, i.e., Path_Used/Path_Cap.	%	Coarse
	Path_Cap_Quota	Available space for HBlock in the system, i.e., the total capacity quota allocated by the user to HBlock for all HBlock disk paths.	bytes	Coarse
	Path_Cap_Quota_Used	Space occupied by HBlock data on disks where all HBlock disk paths reside in the system.	bytes	Coarse
	Path_Cap_Quota_Rate	Average usage rate of HBlock disk path capacity quota in the system, i.e., Path_Cap_Quota_Used/Path_Cap_Quota.	%	Coarse
	Cloud_Bandwidth	The total bandwidth between HBlock and the cloud.	B/s	Fine
	Cloud_U_Bandwidth	Bandwidth when HBlock upload data to cloud.	B/s	Fine
	Cloud_D_Bandwidth	Bandwidth when HBlock download data from cloud.	B/s	Fine
server	CPU_Rate	CPU usage rate of the server.	%	Fine
	Mem_Rate	Memory usage rate of the server.	%	Fine
	Mem_Total	Total memory of the server.	bytes	Fine
	Mem_Used	Memory usage of the server.	bytes	Fine
	IOPS	Total IOPS between the client and HBlock.	None	Fine
	R_IOPS	IOPS when the client reads data from HBlock.	None	Fine

	W_IOPS	IOPS when the client writes data to HBlock.	None	Fine
	Bandwith	Total bandwidth between the client and HBlock.	B/s	Fine
	R_Bandwith	Bandwidth when the client reads data from HBlock.	B/s	Fine
	W_Bandwith	Bandwidth when the client writes data to HBlock.	B/s	Fine
	Latency	Total latency between the client and HBlock. The average read-write latency of the server-associated LUNs during the data acquisition period.	ms	Fine
	W_Latency	Latency when the client writes data to HBlock. The average write latency of the server-associated LUNs during the acquisition period.	ms	Fine
	R_Latency	Latency when the client reads data from HBlock. The average read latency of the server-associated LUNs during the acquisition period.	ms	Fine
	Path_Cap	Total capacity of disks where all HBlock disk paths reside on the HBlock server.	bytes	Coarse
	Path_Used	Used capacity of disks where all HBlock disk paths reside on the HBlock server.	bytes	Coarse
	Path_Rate	Average usage rate of disks where HBlock disk paths reside on the HBlock server, i.e., Path_Used/Path_Cap.	%	Coarse
	Path_Cap_Quota	Available space for HBlock on the HBlock server, i.e., the total capacity quota allocated by the user to HBlock for all disk paths.	bytes	Coarse
	Path_Cap_Quota_Used	Space occupied by HBlock data on disks where all disk paths reside on the HBlock server.	bytes	Coarse
	Path_Cap_Quota_Rate	Average usage rate of HBlock disk path capacity quota on the HBlock server, i.e., Path_Cap_Quota_Used/Path_Cap_Quota.	%	Coarse
	Cloud_Bandwidth	The total bandwidth between HBlock server and the cloud.	B/s	Fine
	Cloud_U_Bandwidth	Bandwidth when HBlock server upload data to cloud.	B/s	Fine
	Cloud_D_Bandwidth	Bandwidth when HBlock server download data from cloud.	B/s	Fine
disk	Path_Cap	Total capacity of disks where HBlock disk paths reside.	bytes	Coarse
	Path_Used	Used capacity of disks where HBlock disk paths reside.	bytes	Coarse
	Path_Rate	Usage rate of disks where HBlock disk paths reside.	%	Coarse
	Path_Cap_Quota	Available space for HBlock, i.e., the capacity quota	bytes	Coarse

		allocated by the user to HBlock.		
	Path_Cap_Quota_Used	Space occupied by HBlock data on disks where HBlock disk paths reside.	bytes	Coarse
	Path_Cap_Quota_Rate	Usage rate of HBlock disk path capacity quota, i.e., Path_Cap_Quota_Used/Path_Cap_Quota.	%	Coarse
LUN	IOPS	Total IOPS between the client and HBlock LUN.	None	Fine
	R_IOPS	IOPS when the client reads data from the HBlock LUN.	None	Fine
	W_IOPS	IOPS when the client writes data to the HBlock LUN.	None	Fine
	Bandwith	Total bandwidth between the client and the HBlock LUN.	B/s	Fine
	R_Bandwith	Bandwidth when the client reads data from the HBlock LUN.	B/s	Fine
	W_Bandwith	Bandwidth when the client writes data to the HBlock LUN.	B/s	Fine
	Latency	Total latency between the client and the HBlock LUN. The average latency of read and write operations of the LUN within an acquisition cycle reflects the time that the HBlock LUN takes to process read and write requests.	ms	Fine
	W_Latency	Latency when the client writes data to the HBlock LUN. The average latency of write operations of the LUN within an acquisition cycle reflects the time that the HBlock LUN takes to process write requests.	ms	Fine
	R_Latency	Latency when the client reads data from the HBlock LUN. The average latency of read operations in the system within an acquisition cycle reflects the time that the HBlock LUN takes to process read requests.	ms	Fine
	Cloud_Bandwidth	The total bandwidth between HBlock LUN and the cloud.	B/s	Fine
	Cloud_U_Bandwidth	Bandwidth when HBlock LUN upload data to cloud.	B/s	Fine
	Cloud_D_Bandwidth	Bandwidth when HBlock LUN download data from cloud.	B/s	Fine
	Wait_Upload	The amount of data to be uploaded from HBlock LUN to the cloud.	bytes	Fine
pool (only supported by	IOPS	Total IOPS between the client and HBlock.	None	Fine
	R_IOPS	IOPS when the client reads data from the HBlock.	None	Fine

cluster mode)	W_IOPS	IOPS when the client writes data to HBlock.	None	Fine
	Bandwidth	Total bandwidth between the client and HBlock.	B/s	Fine
	R_Bandwidth	Bandwidth when the client reads data from HBlock.	B/s	Fine
	W_Bandwidth	Bandwidth when the client writes data to HBlock.	B/s	Fine
	Latency	Total latency between the client and HBlock. The average latency of read and write operations in the system within an acquisition cycle reflects the time that HBlock takes to process read and write requests.	ms	Fine
	W_Latency	Latency when the client writes data to HBlock. The average latency of write operations in the system within an acquisition cycle reflects the time that HBlock takes to process write requests.	ms	Fine
	R_Latency	Latency when the client reads data from HBlock. The average latency of read operations in the system within an acquisition cycle reflects the time that HBlock takes to process read requests.	ms	Fine
	Path_Cap	Total capacity of HBlock disk paths, i.e., total capacity of disks where all disk paths reside in the storage pool.	bytes	Rough
	Path_Used	Used capacity of HBlock disk paths, i.e., used capacity of disks where all disk paths reside in the storage pool.	bytes	Rough
	Path_Rate	Average usage rate of HBlock disk paths in the storage pool, i.e., Path_Used/Path_Cap.	%	Rough
	Path_Cap_Quota	Available space for HBlock, i.e., total capacity quota allocated by the user to HBlock on disks where all HBlock disk paths reside in the storage pool.	bytes	Rough
	Path_Cap_Quota_Used	Space occupied by HBlock data on disks where all HBlock disk paths reside in the storage pool.	bytes	Rough
	Path_Cap_Quota_Rate	Average usage rate of HBlock disk path capacity quota in the storage pool, i.e., Path_Cap_Quota_Used/Path_Cap_Quota.	%	Rough

5.5 Alarm List

Alarm Rule Name	Alarm Level	Alarm Condition	Automatic Resolution Condition	Alarm Expiration Condition	Allow Manual Resolving	Alert Email Sending Frequency
PathIOError	Major	The disk path status is error.	The disk path status is normal.	● The disk path is removed. ● The disk path is removed from the storage pool. ● The server where the disk path located is removed.	Yes	One time a day
DiskWriteSlow	Warning	The disk where the disk path resides is slow to write.	The disk where the disk path resides returns to normal.	● The disk path is removed. ● The disk path is removed from the storage pool. ● The server where	Yes	One time a day

				the disk path located is removed.		
LicenseWillExpire	Warning	The current time (the system time of the server where the alarm module is located) is <= 15 days and > 0 days from the expiration time of the last imported license.	The current time (the system time of the server where the alarm module is located) is > 15 days from the expiration time of the alarm license.	● The license has expired. ● A new license (license with a different ID) has been imported.	Yes	One time a day
LicenseExpired	Critical	The current time (the system time of the server where the alarm module is located) is <= 0 days from the expiration time of the last imported license.	The current time (the system time of the server where the alarm module is located) is > 0 days from the expiration time of the alarm license.	A new license (license with a different ID) is imported.	Yes	Send one time
LicenseMaintenanceWillExpire	Warning	The current time (the system time of the server where the alarm module is located) is <= 15 days and > 0 days from the maintenance expiration time of the last imported license.	The current time (the system time of the server where the alarm module is located) is > 15 days from the maintenance expiration date of the alarm license.	● The license has expired. ● A new license (license with a different ID) has been	Yes	One time a day

				imported.		
LicenseMaintenanceExpired	Warning	The current time (the system time of the server where the alarm module is located) is <= 0 days from the maintenance expiration time of the last imported license.	The current time (the system time of the server where the alarm module is located) is > 0 days from the maintenance expiration date of the alarm license.	A new license is imported.	Yes	Send one time
TrialVersionWillExpire	Warning	No valid license is currently imported, and the current time (the system time of the server where the alarm module is located) is <= 15 days and >= 0 days away from the trial period expiration time.	There are no conditions for resolving and can only be resolved manually.	A new license is imported.	Yes	One time a day
ResourceUsageApproachingLimit	Major	Total local LUN capacity >= 80% of license capacity	Total local LUN capacity < 75% of license capacity	A new license is imported.	Yes	Send one time
AlarmNumberApproachingLimit	Critical	The number of unresolved alarms >= 8000	Number of alarms < 7500	None	Yes	One time a day
FailToSendAlarmEmail	Critical	Alarm email failed to be sent.	Alarm email sent successfully.	● The email configuration is deleted. ● The email sending setting	Yes	One time a day

				is disabled.		
CapacityQuotaUsageExceedsThreshold	Warning	Path_Cap_Quota_Rate of disks associated with disk paths in a storage pool is greater than or equal to 80%. Path_Cap_Quota_Rate of the disk associated with disk paths at the disk path level is greater than or equal to 80%. **Note**: If no capacity quota is set for disk paths, capacity quota = total disk capacity.	Path_Cap_Quota_Rate of disks associated with the disk paths in the storage pool is lower than 75%, or Path_Cap_Quota_Rate of the disks associated with disk paths at the disk path level is lower than 75%. **Note**: If no capacity quota is set for disk paths capacity quota = total disk capacity.	● The name of a storage pool is changed. ● All disk paths in the storage pool are removed.	Yes	One time a day
CapacityQuotaUsageApproachLimit	Critical	The total disk quota usage of disk paths in a base storage pool is greater than or equal to 95%.	The total disk quota usage of disk paths in a base storage pool is lower than 90%.	The storage pool name has been modified.	Yes	One time a day
CapacityQuotaUsageApproachLimit	Warning	The total disk quota usage of disk paths in a non-base storage pool is greater than or equal to 95%, or the disk quota usage of disk paths is greater than or equal to 95%.	The total disk quota usage of disk paths in a non-base storage pool is lower than 90%, or the disk quota usage of disk paths is lower than 90%.	● The storage pool name has been modified. ● All disk paths in the storage pool are	Yes	One time a day

				removed		
DiskUsageExceedsThreshold	Warning	Path_Rate of disks where disk paths are located in a storage pool is greater than or equal to 80%, or Path_Rate of disks where disk paths are located in is greater than or equal to 80%.	Path_Rate of the disks where disk paths are located in in a storage pool is lower than 75%, or Path_Rate of disks where disk paths are located in is lower than 75%.	● The storage pool name has been modified. ● All disk paths in the storage pool are removed	Yes	One time a day
InsufficientFDForLUNToWrite	Warning	The number of available fault domains and the number of health disk paths in the cache storage pool or storage pool where the LUN resides do not meet the minimum number of replicas of a LUN.	The number of available fault domains and the number of health disk paths in the warning alarm storage pool meets the minimum number of replicas of a LUN.	● The LUN is deleted. ● The LUN deletion failed. ● The LUN recovered failed. ● The LUN is being suspended. ● The LUN is suspended. ● The LUN failed to be suspended. ● The name of the storage	Yes	One time a day

				pool is changed.		
DiskPathHealthStatusWarning	Warning	Disk path health status changes to Warning.	Disk path health status returns to normal.	● Disk path removed. ● The disk path is removed from the storage pool. ● Disk path health status changes to "Error".	Yes	One time a day
DiskPathHealthStatusError	Major	Disk path health status changes to Error.	Disk path health status returns to normal.	● The disk path is removed. ● The disk path is removed from the storage pool.	Yes	One time a day
DataServiceHealthStatusWarning	Warning	Data service health status changes to Warning.	Data service health status returns to normal.	● The server is removed. ● The disk path is removed. ● The disk path is	Yes	One time a day

				removed from the storage pool. ● The health status of the disk path changes to Error. ● The name of a storage pool is changed.		
DataServiceHealthStatus Error	Major	Data service health status changes to Error.	Data service health status returns to normal.	● The server is removed. ● The disk path is removed. ● The disk path is removed from the storage pool. ● The name of a storage pool is changed.	Yes	One time a day
ProtocolServiceAbnormal	Major	Protocol	Protocol	● Server	Yes	One

		resolution service exception.	resolution service returns to normal.	removed. ● The target is deleted. ● The target is migrated.		time a day
FaultDomainWarning	Warning	Fault domain status changes to Warning.	Fault domain status returns to normal.	● Server is removed. ● Disk path is removed. ● Fault domain health status changes to "Error". ● The name of the storage pool is changed or the name of any node in the full path name of the fault domain is changed	Yes	One time a day

				. ● All disk paths in the fault domain are removed.		
FaultDomainError	Major	Fault domain status changes to Error	Fault domain status returns to normal.	● Server removed. ● Disk path removed. ● The disk path is removed from the storage pool. ● The name of the storage pool is changed or the name of any node in the full path name of the fault domain is changed. ● All disk	Yes	One time a day

				paths in the fault domain are removed.		
CannotConnectToCloud	Critical	Disconnected from the cloud for more than 10 minutes.	The LUN successfully reads data from the HBlock server to the cloud or writes data from the cloud once.	● The LUN is deleted. ● The LUN deletion failed. ● The LUN recovered failed. ● The LUN failed to be suspended. ● The LUN is suspended. ● The sever has been removed. ● The target is migrated.	Yes	One time a day
CloudAccountAbnormal	Critical	Failed to read data from the cloud or write data to the cloud: frozen overdue fees, frozen overdue	Successfully read data from the cloud or successfully write data to the cloud.	● The LUN is deleted. ● The LUN deletion failed.	Yes	One time a day

		fees, or illegally frozen fees.		• The LUN recovered failed. • The LUN failed to be suspended. • The LUN is suspended.		
LUNCloudDataConflict	Critical	The cloud data corresponding to the LUN has a more recent version than the local version.	The cloud data version corresponding to the LUN is all older than the local version.	• The LUN is deleted. • The LUN deletion failed. • The LUN recovered failed. • The LUN failed to be suspended. • The LUN is suspended.	Yes	One time a day
LUNCloudHeartbeatConflict	Critical	A heartbeat from a non local cluster appears in the cloud of the LUN.	A heartbeat from the local cluster appears in the cloud of the LUN.	• The LUN is deleted. • The LUN deletion failed. • The LUN recovered failed. • The LUN	Yes	One time a day

				failed to be suspended. ● The LUN is suspended.		
LUNDataResidue	Warning	Forcefully delete the LUN. The LUN data is left over: ● Local leftover data: Due to a local disk failure, the LUN data cannot be synchronized for deletion. ● Cloud leftover data: When deleting the cloud data, the data cannot be synchronized for deletion because the cloud data storage location is inaccessible (including network connection failures, account abnormalities, etc.).	The alarm cannot be cleared automatically and can only be cleared manually.	● Local data leftover: The data directory is removed from the machine. ● Cloud data leftover: It won't be cleared automatically. After cleaning up the residual cloud data, the alert can be cleared manually.	Yes	One time a day

InitiatorConnectionFailed	Warning	Due to the client's fault, HBlock was unable to receive the client's heartbeat, causing HBlock to believe that the connection with the client was disconnected and immediately raise an alarm. Except in cases where the client actively disconnects.	The client has successfully connected to target.	● The target where the IQN of the alarm is located has been deleted. ● The target is migrated.	Yes	One time a day
InsufficientSpaceonInstallationPath	Critical	The remaining space of the file system on the disk where the installation directory is located is less than or equal to 4 GiB.	The remaining space of the file system on the disk where the installation directory is located is greater than 5 GiB.	The server is removed.	Yes	One time a day
BaseServiceAbnormal	Critical	An alarm is generated when any of the following situations occur: ● The metadata management service is abnormal: There are two stor:mdm services in the cluster, and only either of them can fail. An alarm is	The matching alarm instance has been restored to the following levels: ● The metadata management service stor:mdm has been restored to normal on the alarming machine. ● The failover	Base services on the alarming machine are migrated successfully.	Yes	One time a day

		generated when a fault occurs. ● The failover control service is abnormal: There are two stor:fc services in the cluster and only either of them can fail. An alarm is generated when a fault occurs. ● The log service is abnormal: There are three stor:ls services in the cluster, and only one of them can fail. An alarm is generated when a fault occurs. ● The coordination service is abnormal: There are three stor:cs services in the cluster, and only one of them can fail.	control service stor:fc has been restored to normal on the alarming machine. ● The log service stor:ls has been restored to normal on the alarming machine. ● The coordination service stor:cs has been restored to normal on the alarming machine.machine.			

		An alarm is generated when a fault occurs.				
InsufficientSpaceonMetaDir	Critical	The remaining space of the file system on the disk where the base service data directory is located is less than or equal to 4GiB.	The remaining space of the file system on the disk where the base service data directory is located is greater than 5GiB.	The service begins to migrate.	Yes	One time a day
LUNDataLowRedundancy	Warning	LUN data low redundancy percentage (including cache pool and final pool data) > 10%, persisting for more than 10 minutes (low redundancy percentage remains below or equal to 10% within the 10-minute window).	UN data low redundancy percentage (including cache pool and final pool data) = 0%.	● The LUN is deleted. ● The LUN deletion failed.	Yes	One time a day
LUNDataCorrupted	Major	LUN data Error percentage (including cache pool and final pool data) > 0%.	LUN data Error percentage (including cache pool and final pool data) = 0%.	● The LUN is deleted. ● The LUN deletion failed.	Yes	One time a day
PoolDataLowRedundancy	Major	Base storage pool data low redundancy percentage > 10%, persisting for more than 10 minutes (low redundancy	Base storage pool data low redundancy percentage = 0%.	The storage pool name has been modified.	Yes	One time a day

		percentage remains below or equal to 10% within the 10-minute window).				
PoolDataLowRedundancy	Warning	Non-base storage pool data low redundancy percentage > 10%, persisting for more than 10 minutes (low redundancy percentage remains below or equal to 10% within the 10-minute window).	Non-base storage pool data low redundancy percentage = 0%.	● The storage pool name has been modified. ● The storage pool is deleted.	Yes	One time a day
PoolDataCorrupted	Critical	Base storage pool data Error percentage > 0%.	Base storage pool data Error percentage = 0%.	The storage pool name has been modified.	Yes	One time a day
PoolDataCorrupted	Warning	Non-base storage pool data Error percentage > 0%.	Non-base storage pool data Error percentage = 0%.	● The storage pool name has been modified. ● The storage pool is deleted.	Yes	One time a day

5.6 OOS Endpoint and Region

The endpoints of Object Storage Network, Object Storage Network 2, Hongkong and other regions are different.

5.6.1 Object Storage Network

For Object Storage Network, the OOS Endpoint is oos-cn.ctyunapi.cn, region is cn.
Note: For Object Storage Network, if your data is stored in a certain region, it is recommended that you can directly use the region endpoint. The Endpoint list is as follows (the Endpoint list is only a description of the access information of the region Endpoint, and is not related to the region status):

Area	OOS API Endpoint	Region
ZhengZhou	oos-hazz.ctyunapi.cn	hazz
ShenYang	oos-lnsy.ctyunapi.cn	lnsy
ChengDu	oos-sccd.ctyunapi.cn	sccd
WuLuMuQi	oos-xjwlmq.ctyunapi.cn	xjwlmq
LanZhou	oos-gslz.ctyunapi.cn	gslz
QingDao	oos-sdqd.ctyunapi.cn	sdqd
GuiYang	oos-gzgy.ctyunapi.cn	gzgy
WuHan	oos-hbwh.ctyunapi.cn	hbwh
WuHu	oos-ahwh.ctyunapi.cn	ahwh
ShenZhen	oos-gdsz.ctyunapi.cn	gdsz
SuZhou	oos-jssz.ctyunapi.cn	jssz
SH2	oos-sh2.ctyunapi.cn	sh2

5.6.2 Object Storage Network 2

For Object Storage Network 2, the OOS Endpoint is oos-cn2.ctyunapi.cn, region is cn2.
Note: For Object Storage Network 2, if your data is stored in a certain region, it is recommended that you can directly use the region endpoint. The Endpoint list is as follows (the Endpoint list is only a description of the access information of the region Endpoint, and is not related to the region status):

Area	OOS API Endpoint	Region
NeiMeng1	oos-nm1.ctyunapi.cn	nm1
HangZhou1	oos-hz1.ctyunapi.cn	hz1

5.6.3 Hongkong Node

Hongkong nodes has two modes: high quality network and normal network. For Hongkong high quality network, OOS Endpoint is oos-cnhk-hqnet.ctyunapi.cn, region is cnhk-hqnet. For Hongkong normal network, OOS Endpoint is oos-cnhk-nqnet.ctyunapi.cn, region is cnhk-nqnet.

5.6.4 Other Region

Note: Other regions only support V2 signature, V4 signature is not supported.
Endpoint list for other regions is as follows.
region status):

Area	OOS API Endpoint	Region
BeiJing2	oos-bj2.ctyunapi.cn	bj2
NeiMeng2	oos-nm2.ctyunapi.cn	nm2
HangZhou	oos-hz.ctyunapi.cn	hz
JiangSu	oos-js.ctyunapi.cn	js
BeiJing	oos-hq-bj.ctyunapi.cn	hq-bj
ShangHai	oos-hq-sh.ctyunapi.cn	hq-sh

5.7 Operating System Monitoring Metrics Which HBlock can Push

Category	Monitoring Metric	Description
server	hblock_cpu_seconds_user	User time.
	hblock_cpu_seconds_nice	Nice time.
	hblock_cpu_seconds_system	System time.
	hblock_cpu_seconds_idle	Idle time.
	hblock_cpu_seconds_iowait	I/O waiting time.
	hblock_cpu_seconds_irq	Hard interrupt time.
	hblock_cpu_seconds_softirq	Soft interrupt time.
	hblock_cpu_seconds_steal	The time spent forcibly waiting for another virtual CPU to finish processing.
	hblock_cpu_guest_seconds_user	The CPU time spent running a virtual machine. When the system runs a virtual machine in a virtualized environment, this field counts the CPU time used by the virtual machine.
	hblock_cpu_guest_seconds_nice	The CPU time spent running low priority virtual machines. Similar to the guest field, this field calculates the CPU time used to run low priority virtual machines.
	hblock_memory_MemTotal_bytes	Total memory sizes of the system.
	hblock_memory_MemFree_bytes	Unused memory size of the system.
	hblock_memory_MemAvailable_bytes	The available memory size of the system.
	Meminfo metrics for operating systems such as hblock_cemory_Buffers_bytes	Other meminfo indicators. After enabling pushgate function, you can view the specific indicator names on Promethus.
	hblock_memory_oom_kill	The number of oom killers occurring in the operating system.
load	hblock_load1	The average load in the past minute.
	hblock_load5	The average load in the past 5 minutes.
	hblock_load15	The average load in the past 15 minutes.
interface	hblock_network_receive_bytes	The total number of bytes received by the interface.
	hblock_network_transmit_bytes	The total number of bytes sent by the interface.
	hblock_network_receive_packets	The number of packets received by the interface.
	hblock_network_transmit_packets	The number of packets sent by the interface.
	hblock_network_receive_errs	The number of erroneous packets that occurred during the interface reception process.

	hblock_network_transmit_errs	The number of erroneous packets that occurred during the interface sending process.
	hblock_network_receive_drop	The number of packets discarded during interface reception.
	hblock_network_transmit_drop	The number of packets discarded during the interface sending process.
	hblock_network_bandwidth	The interface bandwidth.
	hblock_network_status	Interface status, such as: ● down: 0 ● up: 1 ● unknown: 2 ● notpresent: 3 ● lowerlayerdown: 4 ● testing: 5 ● dormant: 6
	hblock_network_up_count	Interface up times.
	hblock_network_down_count	Interface down times.
tcp	hblock_netstat_tcp_RetransSegs	The number of TCP retransmitted packets.
	hblock_netstat_tcp_OutSegs	The number of TCP output packets.
	hblock_netstat_tcp_InSegs	The number of packets received by TCP.
	hblock_netstat_tcp_ActiveOpens	The current number of TCP connections in ActiveOpen status.
	hblock_netstat_tcp_CurrEstab	The current number of TCP connections in CurrEstab status.
	hblock_netstat_tcp_PassiveOpens	The number of TCP connections in the current PassiveOpens status.
	hblock_sockstat_tcp_mem	The number of TCP connections in the current mem status.
	hblock_sockstat_tcp_alloc	The current number of TCP connections in alloc status.
	hblock_sockstat_tcp_inuse	The current number of TCP connections in the inuse status.
	hblock_sockstat_tcp_orphan	The number of TCP connections in the current orphan status.
	hblock_sockstat_tcp_tw	The number of TCP connections in the current tw status.
disk	hblock_disk_read_bytes	The amount of data read from the disk.
	hblock_disk_written_bytes	The amount of data written to the disk.
	hblock_disk_reads_completed	The number of disk read requests.
	hblock_disk_read_time_seconds	Time of disk read request.

	hblock_disk_writes_completed	The number of disk write requests.
	hblock_disk_write_time_seconds	Time of disk write request.
	hblock_disk_io_time_seconds	The time for disk processing of I/O operations.
	hblock_disk_io_time_weighted_seconds	Weighted time for disk processing of I/O operations.
	hblock_disk_io_now	The actual number of I/O requests on the currently running disk.
fileSystem	hblock_fileSystem_size_bytes	Total file system capacity.
	hblock_fileSystem_free_bytes	Remaining capacity of file system.
	hblock_fileSystem_free_inode_count	Number of idle inodes.
	hblock_fileSystem_total_inode_count	Total number of inodes.
	hblock_fileSystem_readonly	Is the file system read-only.
	hblock_os_boot_time_seconds	The last startup time of the server.
OS	hblock_os_boot_time_seconds	The last boot time of the server.
Cloud	hblock_cloud_wait_upload_bytes	Data to be uploaded to the cloud.
	hblock_cloud_upload_size_bytes	Data already uploaded to the cloud.
	hblock_cloud_download_size_bytes	Data already downloaded from the cloud.
LUN	hblock_blockDevice_read_count	I/O read count (including successful and failed reads).
	hblock_blockDevice_read_fail_count	Number of I/O read failures.
	hblock_blockDevice_read_time_seconds	I/O read cumulative time (including successful and failed reads).
	hblock_blockDevice_read_fail_time_seconds	Cumulative time of I/O read failures.
	hblock_blockDevice_read_bytes	Size of successfully read I/O data.
	hblock_blockDevice_write_count	I/O write count (including successful and failed writes).
	hblock_blockDevice_write_fail_count	Number of I/O write failures.
	hblock_blockDevice_write_time_seconds	Cumulative time of I/O writes (including both successful and failed writes).
	hblock_blockDevice_write_fail_time_seconds	Cumulative time of I/O write failures.
	hblock_blockDevice_write_bytes	Size of successfully written I/O data.
diskpath	hblock_dataDir_total_bytes	The total capacity of the disk where the disk path resides.
	hblock_dataDir_avail_bytes	The available capacity of the disk where the disk path resides.
	hblock_dataDir_quota_total_bytes	The capacity quota of the disk where the disk path resides.
	hblock_dataDir_quota_used_bytes	The total amount of data that has be written to

		the disk path by HBlock.
status	hblock_status_system	System status: ● 0: Working ● 1: Upgrading ● 2: Uninstalling ● 3: Unknown
	hblock_status_data	System data health status, unit is %.
	hblock_status_license	Software license status: ● 0: Subscription license is effective. ● 1: Perpetual license is effective. ● 2: The license has not been imported. ● 3: Perpetual license has expired. ● 4: Subscription license has expired.
	hblock_status_licenseExpiredTime	License expiration time, Unix timestamp.
	hblock_status_poolDomain	Status of each fault domain in the storage pool: ● 0: Healthy ● 1: Warning ● 2: Error ● 3: Unknown
	hblock_status_baseService	Base service status: ● 0: Normal ● 1: Abnormal ● 2: Unknown
	hblock_status_dataService	Data service status: ● 0: Healthy ● 1: Warning ● 2: Error ● 3: Unknown

5.8 Cluster Topology File

A cluster topology displays the topological structure of all nodes within a cluster, including their names, statuses, and compositions. You can create a cluster topology file and import it during initialization. The topology file is a JSON file in the UTF-8 encoding format.

Note:

- When the parent node is root, the child node can be room, rack, or server.
- When the parent node is room, the child node can be rack or server.
- When the parent node is rack, the child node can only be server.
- When the parent node is server, the child node can only be path.

Parameter		Description	Required
name		The name of a root node. Type: String The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit. The default value is default.	No
type		Type of a root node. Type: String Value: root. The default value is root.	No
childNodes		A collection of child node information. Parameters vary with child node type. Type: Array	Yes
The child node type is room	name	The name of a child node. Type: String The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit.	Yes
	type	Type of child node. Type: String Value: room.	Yes
	description	Description of a child node.	No

		Type: String The value is a sting of 1 to 50 characters.	
	childNodes	A collection of child node information. Parameters vary with child node type. A child node can be either rack or server. Type: Array	No
The child node type is rack	name	The name of a child node. Type: String The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit.	Yes
	type	Type of child node. Type: String Value: rack.	Yes
	description	Description of a child node. Type: String The value is a sting of 1 to 50 characters.	No
	childNodes	A collection of child node information. The child node can only be server. Type: Array	No
The child node type is server	name	The name of a child node. Type: String The value is a string of 1 to 63 case-sensitive characters. It can contain letters, digits, dots (.), hyphens (-), and underscores (_). Only supports starting with a letter or a digit. The default value is server ID.	No
	type	Type of child node. Type: String Value: server, indicating server type.	Yes
	description	Description of a child node. Type: String The value is a sting of 1 to 50 characters.	No

	ip	IP address of the HBlock server. The value is IPv4 or [IPv6] address.	Yes
	apiPort	Manage API ports. Type: integer The value is an integer that ranges from 1 to 65535. The default value is 1443. The setting must be the same as the API port number set when HBlock is installed on the server.	No
	childNodes	A collection of child node information. The child node type is path.	Yes
The child node type is path	name	The name of a child node. Type: String Value: Specifies the disk path.	Yes
	type	Type of child node. Type: String Value: path.	Yes
	capacityQuota	Specifies the capacity quota of the disk path, that is, for each disk path added to server, the total amount of data that can be written by HBlock. Once the space used by HBlock reaches the quota, data writing is immediately blocked, and no more space is allowed to be used beyond the quota. Type: long integer Value: The value is smaller than the total capacity of the disk where the disk path resides. A negative integer means unlimited writing and 0 means write inhibit. Writes are not limited by default. **Note:** If the same disk path appears multiple times, the capacity quota of the first occurrence will be used.	No

Example of a topology file:

```
{
  "name": "default",
```

```
"childNodes": [
  {
    "name": "room1",
    "type": "room",
    "childNodes": [
      {
        "type": "server",
        "name": "server1",
        "ip": "192.168.0.1",
        "apiPort": 1443,
        "childNodes": [
          {
            "name": "/mnt/storage01",
            "type": "path",
            "capacityQuota": 96636764160
          },
          {
            "name": "/mnt/storage02",
            "type": "path"
          }
        ]
      },
      {
        "type": "server",
        "name": "server2",
        "ip": "192.168.0.2",
        "apiPort": 1443,
        "childNodes": [
          {
            "name": "/mnt/storage01",
            "type": "path",
            "capacityQuota": 96636764160
          }
        ]
      },
      {
        "type": "server",
        "name": "server3",
        "ip": "192.168.0.3",
        "apiPort": 1443,
```

```
          "childNodes": [
            {
              "name": "/mnt/storage01",
              "type": "path"
            },
            {
              "name": "/mnt/storage02",
              "type": "path"
            }
          ]
        }
      ]
    }
  ]
}
```