BROADCOM MegaRAID 9560-8i RAID Controller Card

User Guide (Eagle Stream Platform)

Issue 01

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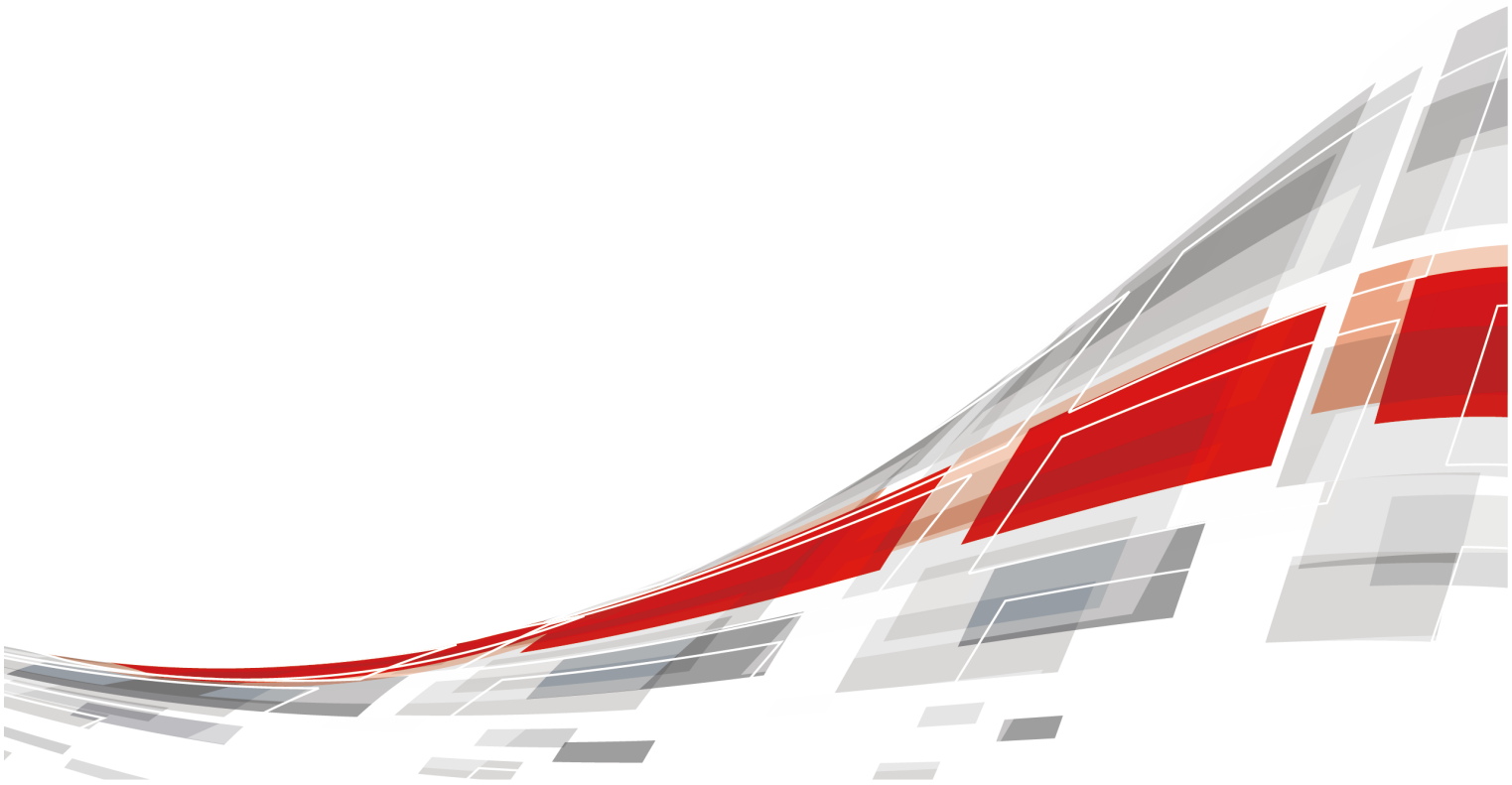

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xFusion Digital Technologies Co., Ltd.

Address: 9th Floor, Building 1, Zensun Boya Square, Longzihu Wisdom Island
Zhengdong New District 450046
Zhengzhou, Henan Province
People's Republic of China

Website: https://www.xfusion.com

About This Document

Purpose

This document describes the appearances and features of redundant array of independent disks (RAID) controller cards, initial and common configurations of RAID arrays, management screens, command-line tool installation, and common commands.

NOTE

The RAID controller card UI varies depending on the firmware version.

The RAID controller card supports secure boot only in EFI or UEFI mode and uses the security authentication mechanism provided by the BIOS.

Intended Audience

This document is intended for:

- Enterprise administrators
- Enterprise end users

The server maintenance personnel must have adequate knowledge about the server products and service skills to avoid injury to human body or damage to devices during maintenance.

Symbol Conventions

The symbols that may be found in this document are defined as follows:

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Symbol	Description
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue	Release Date	Change Description
01	2024-09-30	This issue is the first official release.

Contents

1 Overview

The MegaRAID 9500 series is the industry's first PCIe Gen 4.0 RAID adapter family, offering PCIe Gen 4.0 host and storage interfaces. The BROADCOM MegaRAID 9560-8i adapter (9560-8i) delivers much better PCIe performance of previous generations based on the SAS3908 high-port count PCIe 4.0 x8 RAID-on-Chip (RoC). Equipped with a powerful I/O storage engine, the 9560-8i can transparently execute data protection, verification, and restoration tasks.

The 9560-8i improves system performance, provides fault-tolerant data storage, and supports data storage in multiple drive partitions and read/write operations on multiple drives at the same time. This helps decrease the data access latency on drives.

The 9560-8i only supports configuration UEFI boot modes; it supports boot in Legacy and UEFI modes. To configure RAID arrays offline, switch to UEFI configuration first.

The 9560-8i enables you to use drives in a pass-through way or by creating a RAID array. For details about the pass-through mode, see **3.16 Drive Pass-Through**.

The 9560-8i RAID controller card is installed in the standard PCIe slots of the server.

The built-in cache improves the 9560-8i RAID controller card input/output (I/O) performance as follows:

- Data is written to the cache directly. The RAID controller card updates data to drives only when the data volume reaches the specified threshold. The cache provides higher read/write speed than drives. The high-speed cache and the batch data write mechanism improve the data write speed of the entire system.
- Some data can be directly obtained from the cache instead from drives. It reduces the drive seek operations and response time, and improves the data read speed.

NOTE

The supercapacitor connected to the RAID controller card implements power-off protection of cache data. For details about the installation location and installation method of the supercapacitor, see the user guide of the server you use.

Figure 1-1 and **Figure 1-2** show the architecture of the 9560-8i.

Figure 1-1 9560-8i (1)

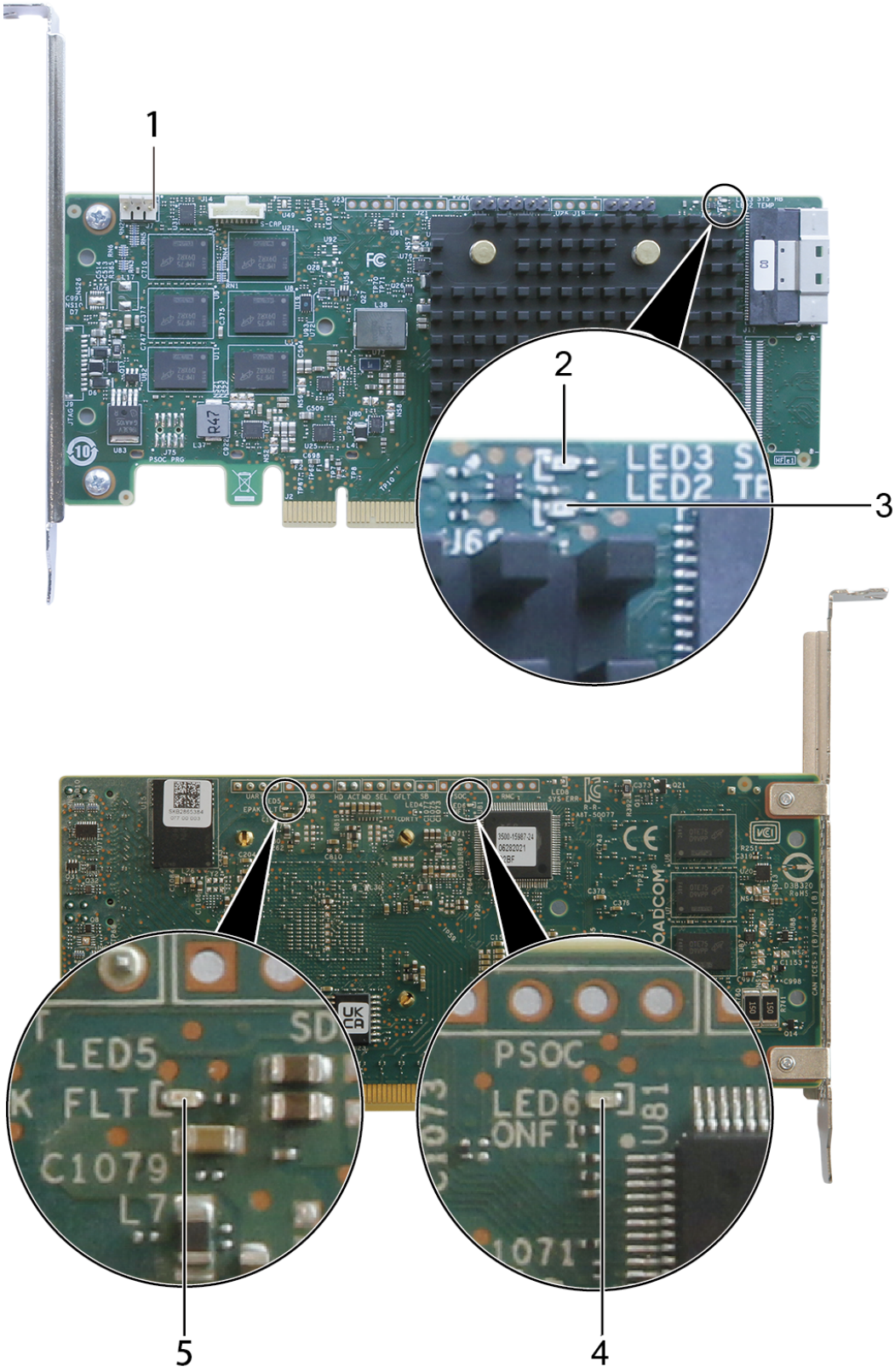
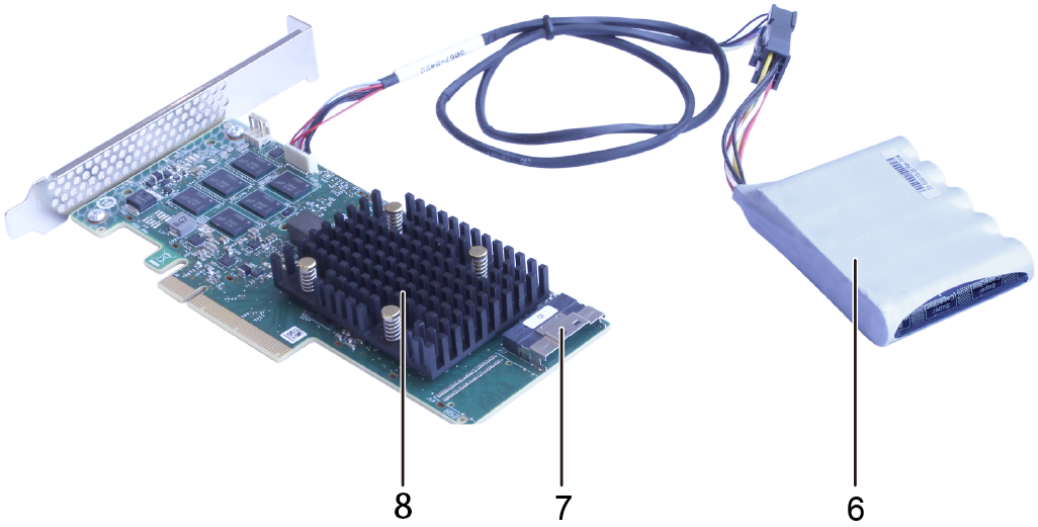


Figure 1-2 9560-8i (2)



1	RAID Key connector	2	Heartbeat indicator
3	Chip overtemperature indicator	4	Dirty data cache indicator
5	Supercapacitor fault indicator	6	Supercapacitor
7	SlimSAS connector (C0)	8	Heat sink

Table 1-1 describes the indicators on the 9560-8i.

Table 1-1 Indicators of the RAID controller card

Indicator	Color	Description
Chip overtemperature indicator	Yellow	• Steady on: The temperature sensor value exceeds the threshold. • Off: The device temperature is within the normal range.
Supercapacitor fault indicator	Yellow	• Steady on: The supercapacitor power module is failed or overheated. • Off: The supercapacitor is working properly.
Dirty data cache indicator	Green	• Steady on: Dirty data exists in the cache. • Off: No dirty data exists in the cache.
Heartbeat indicator	Green	• Blinking: The chip is running properly at a frequency of 1 Hz. • Off: The RAID controller card is not running or the firmware is abnormal.

2 Technical Specifications

Table 2-1 lists technical specifications of the RAID controller cards.

Table 2-1 Technical specifications of the RAID controller cards

Features	BROADCOM MegaRAID 9560-8i
Component name	9560-8i
Chip model	Broadcom 3908
Interface rate (Gbit/s)	12
Number of supported RAID arrays	240
Maximum number of drives in a RAID array	32
Maximum number of drives in all RAID arrays[a]	240
Support for JBOD function	Supported
Number of drives supported in JBOD mode	240
Maximum number of supported drives	240
RAID IOPS (4K RR)	3.0M
Support for CacheCade	No
Adjustable cache read/write ratio	N/A
Maximum number of SSDs supported by CacheCade	N/A
Maximum CacheCade capacity	N/A
RAID levels supported by CacheCade	N/A
Hot spare supported by CacheCade	N/A

Features	BROADCOM MegaRAID 9560-8i
Support for FastPath	Supported
Support for 4K drives	Supported
Supported RAID levels	0/1/10/5/50/6/60
Support for strip size configuration	Supported (Value: 64 KB/128 KB/256 KB/512 KB/1024 KB. The default value is 256 KB.)
Support for power failure protection by iBBU	No
Support for power failure protection by the supercapacitor	Supported
Support for global hot spare	Supported[b]
Support for dedicated hot spare	Supported[b]
Support for emergency hot spare	Supported
Number of supported hot spare drives	240
Support for online RAID level migration	Supported
Support for online capacity expansion	Supported
Support for automatic SMART scanning	Supported
Support for Patrol Read	Supported
Support for consistency check	Supported[b]
Support for crypto encryption	Supported
Support for out-of-band management	Supported
Support for cache	Supported
Support for a buzzer	No
Support for Firmware Device Order	Yes. Only the firmware or driver of MR720(5.200.xx-xxxx) version and later supports the function feature.
Support for automatic import of RAID configurations	Supported
a: The total number of drives of all RAID arrays is the sum of the hot spare drives, the idle drives (drives in the **Unconfigured Good** state), and the drives added in RAID arrays. b: Except RAID 0.	

Table 2-2 lists the reliability, read/write performance, and drive utilization of RAID levels supported by RAID controller cards.

Table 2-2 RAID level comparison

RAID Level	Reliability	Read Performance	Write Performance	Drive Usage
RAID 0	Low	High	High	100%
RAID 1	High	High	Medium	50%
RAID 5	Medium	High	Medium	(N – 1)/N
RAID 6	Medium	High	Medium	(N – 2)/N
RAID 10	High	High	Medium	50%
RAID 50	High	High	Better than medium	(N – M)/N
RAID 60	High	High	Better than medium	(N – M x 2)/N
Note: *N* indicates the number of member drives in a RAID array. *M* indicates the number of spans of a RAID array.				

Table 2-3 lists the interface types of drives supported by each RAID controller card.

Table 2-3 Supported interface types of drives

Interface Type	SAS HDD	SATA HDD	SAS SSD	SATA SSD	NVMe U.2 SSD	M.2 SATA SSD
BROADCOM MegaRAID 9560-8i	Supported	Supported	Supported	Supported	Not supported	Not supported

3 Functions

3.1 RAID 0, 1, 5, 6, 10, 50, and 60

Key features include:

- Connect up to 240 SAS/SATA devices per controller.
- Balance protection and performance for critical applications with RAID 0, 1, 5, 6, 10, 50 and 60.
- JBOD mode with RAID 0, 1, 10 and JBOD for Software Defined Storage (SDS) environments.
- Add more protection with CacheVault flash cache protection.

Table 3-1 lists the quantity of drives supported by the 9560-8i.

Table 3-1 RAID-Drive numbers

RAID Level	Supported Number of Drives	Spans	Total Drives per Span	Maximum Number of Faulty Drives
RAID 0	1 to 32	N/A	N/A	0
RAID 1	An even number from 2 to 32			Half the number of drives
RAID 5	3 to 32			1
RAID 6	4 to 32			2
RAID 10	An even number from 4 to 240	2 to 8 RAID 1	An even number from 2 to 32	Number of spans
RAID 50	6 to 240	2 to 8 RAID 5	3 to 32	Number of spans
RAID 60	8 to 240	2 to 8 RAID 6	4 to 32	Total spans x 2

NOTE

- RAID 00 is not supported.
- The number of the failed drives cannot be greater than the maximum number of the failed drives allowed by the current RAID array.
- A RAID array consists of multiple spans. For example, RAID 50 array consists of two RAID 5 spans.
- Each span of RAID 10 or 50 allows for only one failed drive.
- Each span of RAID 60 allows for only two failed drives.
- The number of drives in RAID 10, 50, and 60 is subject to the number of spans and the number of drives supported by each span.

3.2 Hot Spare Drive

The 9560-8i supports two types of hot spares: hot spare drives and emergency spare.

Hot Spare Drive

After RAID configuration of the drives of a server, configuration of hot spare drives increases security and reduces impact on services from drive faults.

- Global hot spare drive (Global HSP): shared by all RAID arrays of a controller, which can be configured with one or more global hot spare drives. A global hot spare drive automatically replaces a failed drive in any RAID array.

  For configuration details, see **5.1.1 Configuring a Global Hot Spare Drive**.
- Dedicated hot spare drive (Dedicated HSP): A dedicated hot spare drive can be used in a specified RAID array. One or more dedicated hot spare drives can be configured for each RAID array. A dedicated hot spare drive automatically replaces a failed drive of the same type in the specified RAID array.

  For configuration details, see **5.1.2 Configuring a Dedicated Hot Spare Drive**.

A hot spare drive must have at least the capacity of a member drive.

NOTE

- The HDDs and SSDs cannot be used as the hot spare drives.
- The HDDs include SAS HDDs and SATA HDDS. If the member drives of a RAID array are SAS drives, the SATA drives can be used as dedicated hot spare drives. If the member drives are SATA drives, the SAS drives cannot be used as dedicated hot spare drives.
- An idle drive that is not added to a RAID array can be configured as a hot spare drive.
- The type of hot spare drives must be the same as that of the member drives in the RAID array, and the capacity of hot spare drives must be greater than or equal to the maximum capacity of the member drives in the RAID array.
- All RAID arrays, except RAID 0, support hot spare drive.
- You cannot directly change a global hot spare drive to a dedicated hot spare drive or vice versa. You need to set the drive to idle state, and then set it as a global or dedicated hot spare drive as required.

Emergency Spares

After the emergency spare function is enabled for a RAID array that supports redundancy and has no hot spare drive specified, a spare drive in the **fail** or **prefail** state will automatically replace a member drive and rebuild data to avoid data loss.

The capacity of the idle drive used to rebuild data must be greater than or equal to that of a member drive.

Emergency spare involves two scenarios:

- A drive in the **fail** state replaces a failed member drive.
- A drive in the **prefail** state replaces a member drive in the prefail state.

For configuration details, see **5.2 Setting the Emergency Hot Spare Function**.

3.3 Drive Hot Swap

Hot swap allows removal and replacement of a failed drive without shutting down the system or changing any configuration. This feature improves system disaster recovery capability, expandability, and flexibility.

NOTE

- After removing a drive, install it after at least 30 seconds. Otherwise, the drive cannot be identified.
- Before removing and inserting a drive, check the logical state of the drive and the number of the failed drives allowed by the RAID level.
- If a drive in a RAID array is manually removed and inserted online, the drive is identified as a member of an external RAID array. As a result, the drive is considered failed. If this fault occurs, set the drive to **Unconfigured Good** and follow steps provided in **5.9 Importing or Deleting a Foreign Configuration** to restore the RAID array. You do not need to replace the drive.
- If you remove and insert a pass-through drive without powering off the OS, the drive letter in the system may change. Before removing and inserting a pass-through drive, record the drive letter in the system.

3.4 Copyback

If a member drive of a RAID array with redundancy fails, the hot spare drive automatically replaces the failed drive and starts data synchronization. Once the failed drive has been replaced with a newly installed data drive, data is copied from the hot spare drive to the new data drive. Once the data copyback is completed, the hot spare drive is restored to the hot spare state.

3.5 Drive Striping

Striping

Multiple processes accessing a drive at the same time may cause drive conflicts. Most drives are specified with thresholds for the access count (I/O operations per second) and data transmission rate (data volume transmitted per second). If the thresholds are reached when multiple processes concurrently access a drive, new access requests will be suspended.

Striping technology evenly distributes I/O loads across multiple physical drives. It divides continuous data into multiple blocks and saves them to different drives. This allows multiple processes to access these data blocks without conflict. Striping also optimizes concurrent processing performance in sequential access to the data.

The striping effect depends on:

- Strip width: the number of strips that can be concurrently read or written.

  It equals the number of physical drives in a RAID array. Increasing the strip width can improve the read/write performance of a RAID array. An increased number of drives indicates more strips for concurrent read/write operations. Under the same circumstances, a RAID array consisting of eight 18 GB drives provides

better transmission performance than a RAID array consisting of four 36 GB drives.

- Strip size: the size of a strip data block on each drive.

Strips

The storage space of each member drive in a RAID array is striped based on the strip size. The data written to the drives is also divided into blocks based on the strip size.

The 9560-8i supports variety of strip sizes, including 64 KB, 128 KB, 256 KB, 512 KB, and 1 MB. And the default value is 256 KB.

Usually, the default strip size is used during RAID array configuration.

3.6 RAID Array Level Migration

The RAID controller card supports RAID level migration, which allows RAID configuration to be changed without affecting data integrity. For details, see **5.5 Migrating RAID Level**.

The RAID controller card supports the following RAID level migration options:

- Migrate RAID 0 to RAID 1, 5, or 6.
- Migrate RAID 1 to RAID 0, 5, or 6.
- Migrate RAID 5 to RAID 0 or 6.
- Migrate RAID 6 to RAID 0 or 5.

Table 3-2 lists the number of drives required for RAID array level migration.

NOTE

Plan the hard drive capacity in advance to prevent data loss after RAID array level migration.

Table 3-2 Minimum number of drives to be added for RAID level migration

RAID Array Level Migration	Number of Existing Drives	Number of Drives in the Drive Group After Migration
RAID 0 -> RAID 1	1 to 32	An even number from 2 to 32
RAID 0 -> RAID 5	1 to 32	3 to 32
RAID 0 -> RAID 6	1 to 32	4 to 32
RAID 1 -> RAID 0	An even number from 2 to 32	2 to 32
RAID 1 -> RAID 5	An even number from 2 to 32	3 to 32

RAID Array Level Migration	Number of Existing Drives	Number of Drives in the Drive Group After Migration
RAID 1 -> RAID 6	An even number from 2 to 32	4 to 32
RAID 5 -> RAID 0	3 to 32	3 to 32
RAID 5 -> RAID 6	3 to 32	4 to 32
RAID 6 -> RAID 0	4 to 32	4 to 32
RAID 6 -> RAID 5	4 to 32	4 to 32

3.7 Initialization

VD Initialization

After creating a virtual drive (VD), you must initialize it so that it can be used by the OS. After a VD with the redundancy function is initialized, the data relationships between the member drives of the VD meet the corresponding RAID level requirements. 9560-8i provides the following VD initialization modes:

- Foreground initialization:
  - Fast initialization: This is a foreground initialization mode. In fast initialization, the firmware writes zeros to the first 100 MB space of the VD. During the initialization, the VD state is **Optimal**.
  - Slow initialization: This is a foreground initialization mode. To initialize a VD in this mode, the firmware needs to write zeros to the entire VD. During the initialization, the VD state is **Optimal**.
- Background initialization:
  - For RAID 1 and RAID 10: When the data is inconsistent between primary and secondary member drives, data will be copied from the primary drive to the secondary drive during background initialization to overwrite the original data on the secondary drive.
  - For RAID 5, RAID 6, RAID 50, and RAID 60: Background initialization reads data on all member drives and performs parity check. If the calculation result is inconsistent with the data on the parity drive, the newly generated data will overwrite the original data on the parity drive.

  NOTE

  - Generally, consistency checks (CC) and background initialization affect system performance.
  - Both CCs and background initialization implement a function similar to parity error correction. During a CC, the system records the areas with data inconsistency and can resolve the inconsistency, but background initialization does not provide this function. Besides, a CC can be started manually, but background initialization can only be started automatically.

Drive Initialization

The two types of initialization are:

- Initialize Drive: Writes zeros to the first 100 MB space.
- Drive Erase: Writes zeros to the entire space.

NOTE

SATA SSD initialization and erasure cannot be stopped on the 9560-8i.

3.8 Capacity Expansion

The 9560-8i supports two capacity expansion methods:

- Add new drives to an existing RAID array.
  For details, see **5.3 Adding a Drive to a RAID Array**.
- Increase the available space of VDs if they do not occupy the entire capacity of all member drives.
  For details, see **5.4 Expanding the Available Space of a Virtual Drive**.

NOTE

- Only RAID 0, RAID 1, RAID 5, and RAID 6 support capacity expansion through drive addition.
- RAID 10, RAID 50, and RAID 60 do not support capacity expansion through drive addition.
- If a RAID array contains two or more VDs, its capacity cannot be expanded through drive addition.
- During capacity expansion, you need to add two drives to RAID 1 each time, and only one drive to RAID 0, RAID 5, or RAID 6 each time.
- When the available capacity of a drive group is increased by replacing a member drive and the capacity to be expanded exceeds the original available capacity of the drive group, use the CLI to expand the capacity. For details, see **8.2.20 Expanding RAID Array Capacity by Increasing Member Drive Available Space**.

3.9 Secure Data Erasure

Permanently deleted data from a drive cannot be restored. The three levels of secure erasure are:

- Simple: erases data on a virtual drive or drive only one round.
- Normal: erases data on a virtual drive or drive three rounds.
- Thorough: erases data on a virtual drive or drive nine rounds.

A virtual drive or drive cannot be accessed by any host during the process.

9560-8i supports secure data erasure of drives and virtual drives.

3.10 Write Hole Protection

If a system failure (such as a power failure) causes incomplete write (not write failures), some strips, and even some parity data of strips, enter the uncertainty state.

Writing data into these strips will encounter errors. This phenomenon is called write hole.

Storing write failure data in the power failure protection zone and rewriting the data when appropriate can solve the write hole problem. The main protection scenarios are as follows:

- Write hole protection is only supported for RAID 5, 6, and 50.
  - Write hole data is stored and write hole protection is automatic. Available power failure protection device: write hole data is recovered on restart.
  - Unavailable power failure protection device: write hole data is lost on restart.
- When RAID 5 is degraded, the redundancy capability is lost and write hole protection is not supported.
- When a drive of RAID 6 goes offline, write hole protection is supported.
- When RAID 50 is partially degraded, write hole protection is supported and data will be restored by span. When RAID 50 is fully degraded, write hole protection is not supported.
- RAID 0, 1, and 10 do not support write hole protection.

3.11 Cache Data Read/Write

The 9560-8i supports cache data read/write to improve the data read/write performance. It supports the following read/write policies:

- Read: The 9560-8i uses the **Read Ahead** policy. The 9560-8i caches the data that comes after the data being read so that the cached data can be accessed quickly. This policy helps reduce drive seeks and shortens the read time.
- Write: The 9560-8i uses the **Write Back** policy. After the cache receives data sent from a host, the 9560-8i sends a signal to the host to indicate that the data transmission is complete.

  Data is directly written to the cache. The 9560-8i then updates accumulated cache data to drives in batches. Overall data write speed is higher since writing to the cache is faster than writing to the drive.

3.12 Power Failure Protection

The write speed on high-speed cache is faster than that on drives. Therefore, a large number of write operations use high-speed cache to improve system performance.

- Enabling high-speed cache on a RAID controller card greatly improves the server write performance. Whenever write pressure lowers or cache is nearly full, data is migrated from the high-speed cache to drives.
- However, caching increases the risk of data loss. For example, data gets lost if the server is powered off unexpectedly.

To improve the server read/write performance and the RAID controller card data security, configure supercapacitors for the 9560-8i.

If a power failure occurs, the supercapacitor supplies power for cache data to be written into the NAND flash of the RAID controller card.

NOTE

The 9560-8i includes cards that support a supercapacitor and cards that do not. Only RAID controller cards configured with a supercapacitor can enable data protection against power failures.

Supercapacitor Power Calibration

Data protection requires supercapacitors. The automatic power calibration mode is enabled by default for RAID controller cards to record supercapacitor discharge curves to monitor the supercapacitor state, such as maximum and minimum voltages, and extend supercapacitor lifespans.

RAID controller cards calibrate power in the following process to ensure power stability:

1. RAID controller cards charge supercapacitors with maximum power.
2. The calibration process automatically starts and partially discharges the supercapacitors.
3. RAID controller cards charge the supercapacitors again to their maximum power.

During the calibration process, the write policy of the RAID controller card is automatically changed to **Write Through** to ensure data integrity, and the RAID controller card performance decreases accordingly. The power calibration cycle depends on the supercapacitor discharge speed.

3.13 Patrol Read

Patrol read protects data integrity by detecting and rectifying physical drive failures before they cause data damage. Preventive maintenance scans and resolves potential problems of configured physical drives.

The resources for patrol read are adjustable to pending I/O operations. In other words, the system prioritizes I/O operations when the workload is high by allocating fewer resources to patrol read.

Patrol read cannot be performed on a drive undergoing:

- RAID hot spare drive recovery
- Dynamic drive expansion
- Full or background initialization
- Consistency check

3.14 Automatic SMART Scanning

The self-monitoring, analysis and reporting technology (SMART) tool monitors drive parts such as the head units, motor driver system, internal circuit, and drive media. When potential problems are detected, the RAID controller card reports alarms to users promptly to help avoid data loss.

The controller card supports periodic SMART scanning of managed drives. Set the interval period, which is 300 seconds by default. Detected SMART errors are logged.

3.15 Drive Energy Conservation

RAID controller cards provide the energy conservation feature for drives. This function allows drive to operate and stop based on drive configuration and I/O activity. All spinning SAS and SATA drives support this function.

The drive energy saving function is enabled by default.

When it is enabled and there is no I/O access in the specified time, the **Unconfigured Good** drives and idle hot spare drives are in the energy conservation state. Operations, such as RAID array creation, hot spare drive creation, dynamic capacity expansion, and rebuild, will wake the drives from energy conservation.

3.16 Drive Pass-Through

Drive pass-through, also called instruction-based transparent transmission, allows data to be transmitted without being processed by the transmission devices. It is a data transmission method used to ensure the transmission quality only.

The 9560-8i enables user commands to be directly transmitted to connected drives, facilitating drive access and control by upper-layer services or management software. For example, during OS installation on a server, a drive mounted to the 9560-8i instead of a configured virtual drive can be used as the installation drive.

The 9560-8i supports virtual drives and pass-through drives. If you need to use a drive in pass-through mode, set the drive state from **Unconfigured Good** to **JBOD**. For details, see **5.10 Setting a JBOD Drive**.

NOTE

- If you need to configure a pass-through drive as a virtual drive, set the state of the JBOD drive to **Unconfigured Good**.
- If a JBOD drive in the **Unconfigured Bad** state, the fault indicator on the drive is turned on and an alarm is generated on the iBMC.
- To switch the working mode of the RAID controller card from **RAID** to **JBOD**, ensure that all hard drives under the RAID controller are not in use and have a status of **Unconfigured Good**.

3.17 Drive Indicators

Each drive has two indicators. **Table Drive indicators** describes the indicator states.

Table 3-3 Drive indicators

Active Indicator (Green)	Fault Indicator (Red/ Blue)	Description
Off	Off	The drive is not detected.
Steady on	Off	The drive is detected.

Active Indicator (Green)	Fault Indicator (Red/ Blue)	Description
Blinking at 4 Hz	Off	Data is being read or written properly, or data on the primary drive is being rebuilt.
Steady on	Blinking blue at 4 Hz	The drive is being located.
Blinking at 1 Hz	Blinking red at 1 Hz synchronously	Data on the secondary drive is being rebuilt.
Off	Red steady on	A drive in a RAID array is removed.
Steady on	Red steady on	The drive is faulty.

NOTE

- For RAID controller cards that support out-of-band management, if a drive is in the **Unconfigured Good (Foreign)** state, an iBMC alarm will be generated but the fault indicator will not be lit.
- If a JBOD drive is in the **Unconfigured Bad** state, the fault indicator on the drive is turned on and an alarm is generated on the iBMC.

3.18 Drive Roaming

Drive roaming is an operation of migrating physical drives within a controller. After drive roaming, the controller automatically identifies the relocated physical drives and logically place them to virtual drives that belong to the same drive group. Drive roaming can be implemented only when the server OS is shut down.

To implement drive roaming, perform the following operations:

1. Power off the server.
2. Move a physical drive to a new position in the backplane.
3. Perform a security check to ensure that the physical drive is correctly inserted.
4. Power on the server.
5. Verify that the RAID controller detects the RAID configuration from the configuration data on the physical drive.

3.19 Import Foreign Configurations

When detecting a RAID configuration in a physical drive, a RAID controller card marks the physical drive as **Foreign**, indicating that the drive is a foreign drive.

If a foreign drive is detected, you can import the foreign configuration to the current RAID controller card for the foreign configuration to take effect. This import process is also called configuration migration.

3.20 Drive Failure History

The 9560-8i provides a function of maintaining information about the hard drives that have been previously used or failed.

- If this function is enabled, a new hard drive containing RAID array data with foreign RAID configuration is displayed with the **Unconfigured Bad** state. After the drive state is changed to **Unconfigured Good**, you can delete or import the foreign RAID configuration as required.
- If this function is disabled, a new hard drive with foreign RAID configuration is displayed as **Unconfigured Good**. The 9560-8i processes the drive (for example, performs data rebuild or copyback) based on the RAID array configuration. Data on the new drive may be overwritten.

This function is enabled for the 9560-8i by default. You can change the settings on the **Advanced Controller Properties** screen.

3.21 Consistency Check

For RAID arrays with redundancy (RAID 1, 5, 6, 10, 50, and 60), you can perform a consistency check for data in the RAID array. It can also verify and compute drive data, and compare the drive data and its redundant data. If any inconsistency is found, the system automatically attempts to recover data and saves error information.

For RAID arrays without redundancy (RAID 0), consistency checks are not supported.

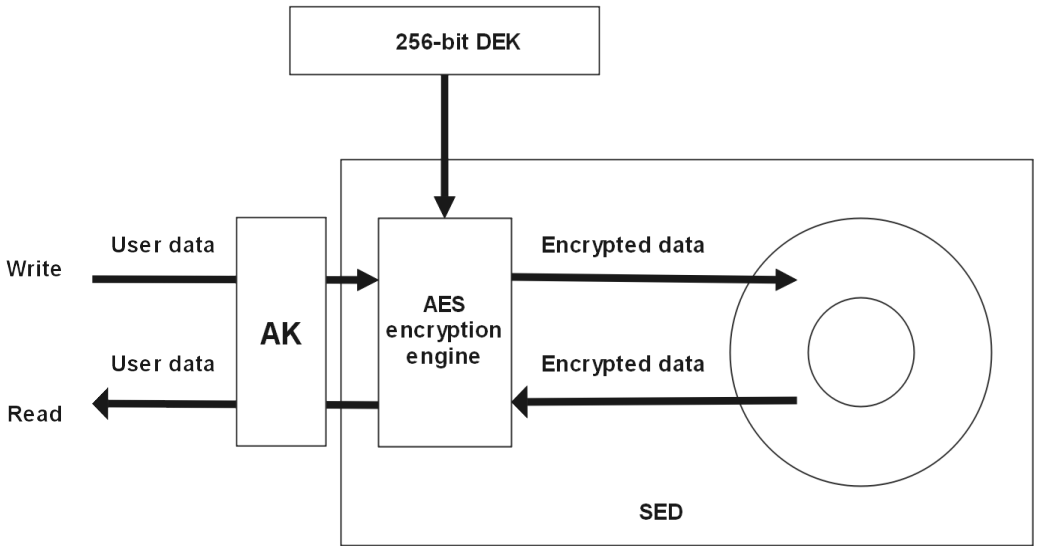
NOTE

It is recommended that you perform a consistency check at least once per month.

3.22 Drive Encryption

The RAID controller card supports the drive encryption feature, which provides common functions such as Auto-Lock and Instant Secure Erase to encrypt data, securely erase data, and offer secure storage services. The drive encryption feature supports only self-encrypting drives (SEDs).

Figure 3-1 Encryption principle



An SED has two layers of security protection, on which an authentication key (AK) and a data encryption key (DEK) are used respectively.

AK:

- The key used to unlock access to the drive.
- Once confirmed, the key is used to decrypt the DEK.

DEK:

- The key used to encrypt all user data on the drive.
- Generated by an SED drive and never leaves the drive.
- This key is stored on the drive after being encrypted by the AK.
- When the DEK is changed or erased, any pre-existing data cannot be decrypted.

After the drive encryption feature is enabled, the Auto-Lock function of the encrypted drive is enabled. When data is being read or written after AK authentication is passed, the drive obtains the DEK through its own circuit. The AES encryption engine encrypts the written data or decrypts the read data. Data is encrypted by the DEK after being written to the drive. The DEK of a drive cannot be obtained from outside the drive. Therefore, after a drive is removed or faulty, the information on the drive cannot be restored by mechanical reading. Generally, key management refers to the management of the AK.

The key management function of an encryption drive of a RAID controller card is used to manage the AK.

4 Initial Configuration

This chapter describes how to perform initial configurations if **Boot Type** is set to **UEFI Boot Type** on the BIOS.

All configurations described in this document about the 9560-8i are performed on the **Configuration Utility**, which is only accessible during server restart. If you want to obtain the RAID state and configuration information when the OS is running, use the **StorCLI** on the OS.

If the boot type is changed after the OS has been installed in Legacy or UEFI mode, the OS will be inaccessible. To access the OS, you need to change the boot type to that used when the OS is installed. If the OS needs to be reinstalled, select Legacy or UEFI mode.

If a server is configured with multiple boot devices, some devices may fail to boot in Legacy mode. In this case, you are advised to use UEFI boot mode, which supports more boot devices than Legacy mode. If Legacy mode is required, you are advised to disable serial port redirection or NIC preboot execution environment (PXE) based on actual service scenarios to ensure that the OS can be started properly. For details, see sections "Setting the PXE Function of an NIC" and "Setting Serial Port Redirection" in the *Server Eagle Stream Platform BIOS Parameter Reference*.

NOTE

The BIOS screen varies according to the platform. This section uses Eagle Stream as an example to describe initial configurations of the RAID controller card.

4.1 Logging In to the Configuration Utility

The 9560-8i supports UEFI configurations; it supports Legacy and UEFI boot modes.

Impact on the System

Before accessing the Configuration Utility, you need to restart the server, which will interrupt services on the server.

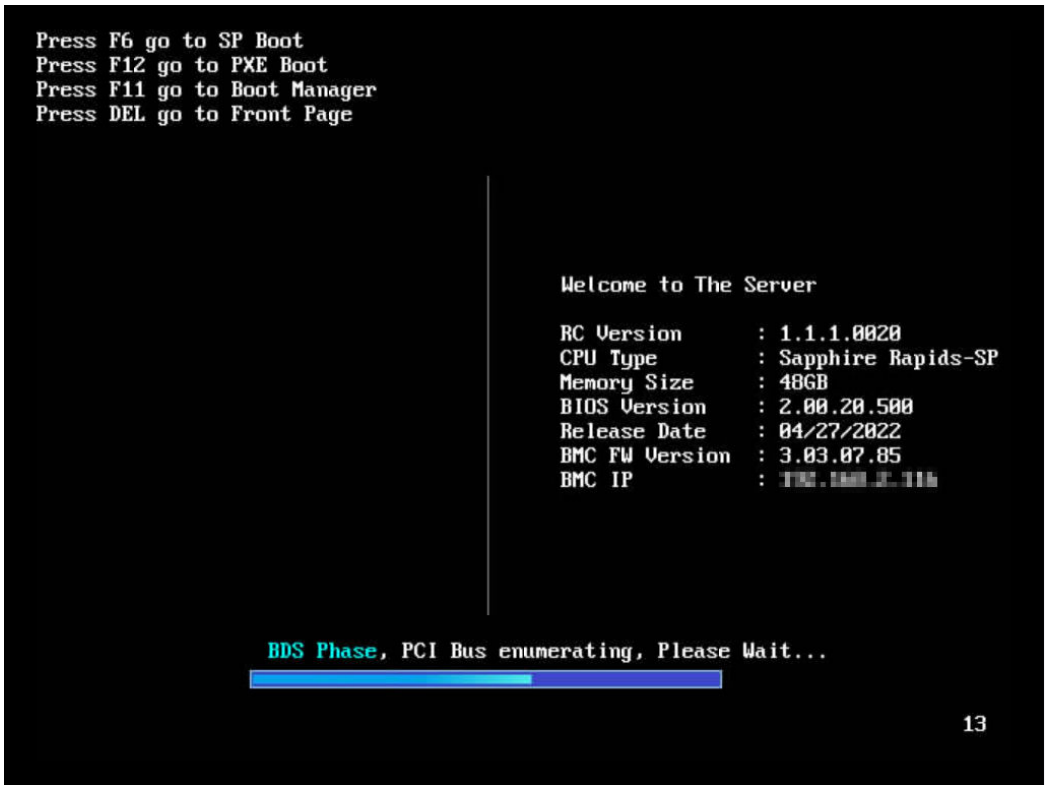
Procedure

Step 1 Access the server desktop using the Remote Virtual Console.

Step 2 Power on or restart the server.

Step 3 During the server boot process, press **Delete** or **Del** when information shown in **Figure 4-1** is displayed.

Figure 4-1 BIOS boot screen



NOTE

The default BIOS password is **Admin@9000**.

Step 4 Type the password and press **Enter**.

The screen shown in **Figure 4-2** is displayed.

Figure 4-2 Front page

Step 5 Select **Device Manager** and press **Enter**.

The screen shown in **Figure 4-3** is displayed.

Figure 4-3 Device Manager screen

NOTE

If an error message "Some drivers are not healthy" is displayed after you select the RAID controller card in **Device Manager**, see **6.4 The RAID Controller Card Is Not Healthy in Device Manager** to rectify the fault.

Step 6 Select **BROADCOM <MegaRAID 9560-8i> Configuration Utility** and press **Enter**.

The main screen is displayed, as shown in **Figure 4-4** and **Figure 4-5**. **Table 4-1** describes the parameters on the screen.

Figure 4-4 9560-8i screen (1)

Figure 4-5 9560-8i screen (2)

Table 4-1 Parameter description

Parameter	Description
Main Menu	Specifies the main menu of the RAID controller card. All operations on the RAID controller card are available.
Help	Specifies the help information.
Status	Specifies the state of the RAID controller card.
Backplane	Specifies the number of backplanes.
BBU	Specifies the installation state of the supercapacitor.
Enclosure	Specifies the number of components.
Drives	Specifies the number of drives.
Drive Groups	Specifies the number of drive groups.
Virtual Drives	Specifies the number of virtual drives.
View Server Profile	Displays and manages RAID controller card properties.

Parameter	Description
Configure	Allows you to create a RAID array, quickly create a RAID array, check drive group properties, clear all RAID configurations, and manage external ports.
Set Factory Defaults	Restores factory settings.
Update Firmware	Upgrades firmware.
Silence Alarm	Specifies the state of the onboard buzzer. **NOTE** This parameter does not take effect because the 9560-8i RAID controller card is not configured with a buzzer.
Virtual Drive Operations in Progress	Specifies whether virtual drive operations are performed on the background.
Drive Operations in Progress	Specifies whether physical drive operations are performed in the background.
MegaRAID xxx	Specifies the state of advanced properties.
Manage MegaRAID Advanced Software Options	Manages advanced properties.

----End

4.2 Creating RAID 0

Scenarios

NOTICE

- Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or the data does not need to be retained.
- The RAID controller card supports SAS/SATA HDDs and SAS/SATA SSDs. Drives in a RAID array must use drives with the same interface and medium, but they can have different capacities or come from different manufacturers.
- The drives must be compatible with the server. For details about the drives supported by servers, see the *Compatibility List* on the Technical Support Website.
- For details about the number of drives required for each RAID level, see **3.1 RAID 0, 1, 5, 6, 10, 50, and 60**.

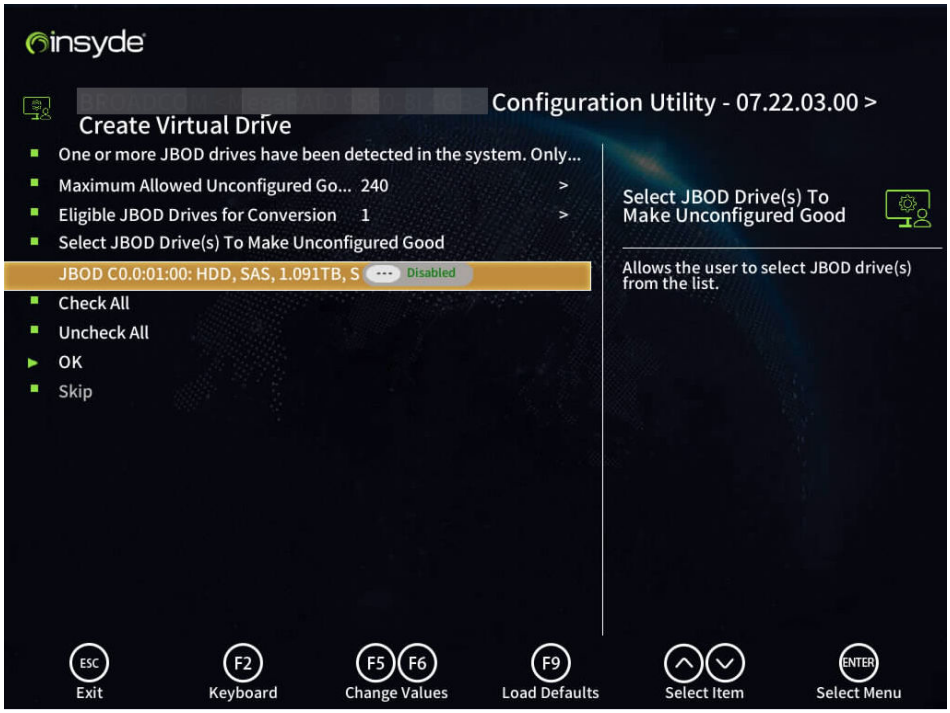
Procedure

Step 1 Back up data on drives and access the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Create Virtual Drive** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Configuration Management** and press **Enter**.
3. Select **Create Virtual Drive** and press **Enter**.
   – When all the drives are in the **JBOD** status, as shown in **Figure 4-6**, select the drives to be added to the RAID array, press **Enter**, click **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the selected drives to the **Unconfigured Good** status. The RAID array configuration screen is displayed.

Figure 4-6 Create Virtual Drive screen (1)

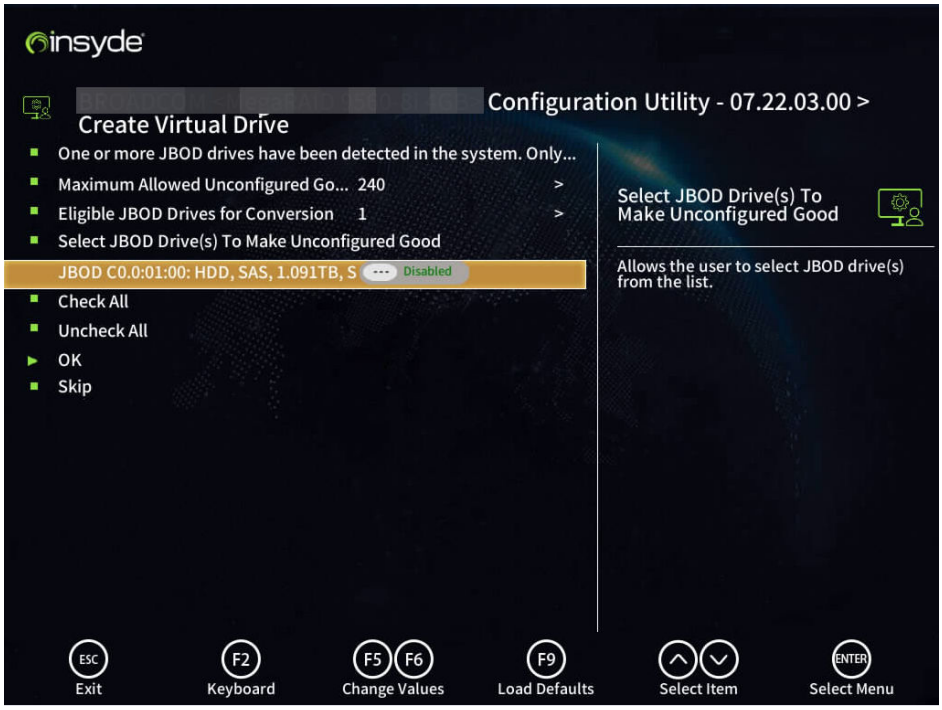


NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When both **JBOD** and **Unconfigured Good** drives exist, as shown in **Figure 4-7**, if you want to set the JBOD drives to the **Unconfigured Good** state, select the JBOD drives to be added to the RAID array, press **Enter**, select **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the status of the JBOD drives to **Unconfigured Good**. The RAID array configuration screen is displayed. If you do not need to change the status of the JBOD drives, select **Skip** and press **Enter**. The RAID array configuration screen is displayed.

Figure 4-7 Create Virtual Drive screen (2)



NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When all the drives are in the **Unconfigured Good** status, the RAID array configuration screen is displayed, as shown in **Figure 4-8** and **Figure 4-9**. **Table 4-2** describes the parameters on the screen.

Figure 4-8 Creating a virtual drive (3)

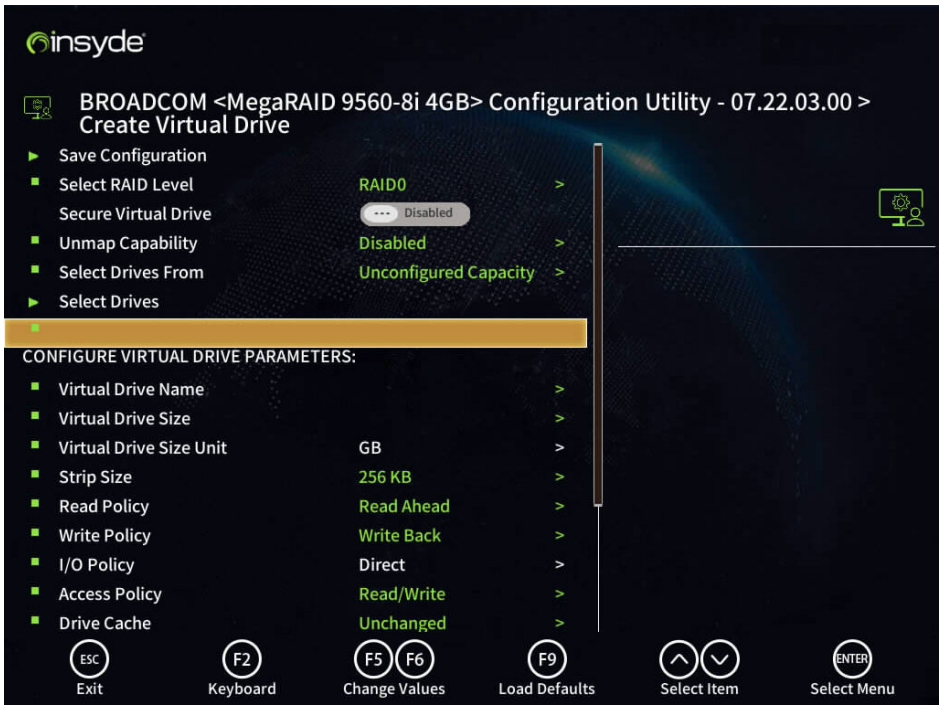


Figure 4-9 Creating a virtual drive (4)

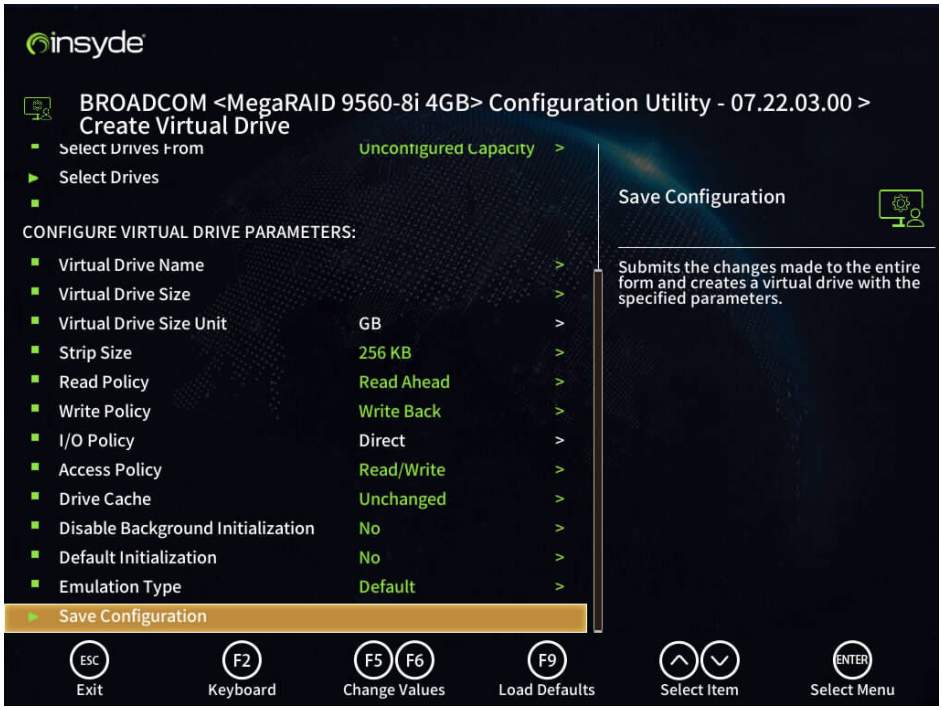


Table 4-2 Parameter description

Parameter	Description
Select RAID Level	Selects a RAID level.

Parameter	Description
Secure Virtual Drive	Specifies whether to enable the security virtual driver.
Unmap Capability	Specifies whether the virtual drive unmapping function is enabled. – Enabled – Disabled
Select Drives From	Specifies where the virtual member drives come from. The values include: – **Unconfigured Capacity**: idle drives that are not added to any virtual drives – **Free Capacity**: remaining space of the virtual drives
Select Drives	Selects the member drives to be added.
Virtual Drive Name	Specifies the name of a virtual drive.
Virtual Drive Size	Specifies the capacity of a virtual drive. The value is the maximum capacity supported by default. **NOTE** To create multiple virtual drives, set the capacity of the first virtual drive as required. After creating the first virtual drive, see **5.11 Creating Multiple Virtual Drives** to add other virtual drives.
Virtual Drive Size Unit	Specifies the unit of the virtual drive capacity.
Strip Size	Specifies the size of a virtual drive strip. Its value can be **64 KB**, **128 KB**, **256 KB**, **512 KB**, or **1 MB**. The default value is **256 KB**.
Read Policy	Specifies the read policy of a virtual drive. The options are as follows: – **No Read Ahead**: disables the Read Ahead function. – **Read Ahead**: enables the Read Ahead function. The controller pref-reads sequential data or the data predicted to be used and saves it in the cache. **NOTE** To achieve optimal drive performance, set the read policy to **Read Ahead** for HDDs and **No Read Ahead** for SSDs.

Parameter	Description
Write Policy	Specifies the write policy of a virtual drive. The options are as follows: – **Write Back**: When the controller cache receives all data, the controller sends the host a message indicating that data transmission is complete. If the RAID controller card does not have a supercapacitor or has a damaged supercapacitor, or the RAID controller card is on charge or discharge, the write policy is automatically switched to the Write Through mode. – **Write Through**: When the drive subsystem receives all data, the controller sends the host a message indicating that data transmission is complete. – **Always Write Back**: The controller enters the **Write Back** mode when supercapacitor is absent or faulty. **NOTE** – In **Always Write Back** mode, DDR (Cache) write data of the RAID controller card will be lost when the server is powered off and the supercapacitor is faulty, uninstalled, or charging. This mode is not recommended. – To achieve optimal drive performance, set the write policy to **Write Back** for HDDs and **Write Through** for SSDs.
I/O Policy	Specifies the I/O policy of a virtual drive. **NOTE** The 9560-8i RAID controller card does not support setting of this parameter.
Access Policy	Specifies the data access policy. The options are as follows: – **Read/Write**: Read and write operations are allowed. – **Read Only**: The virtual drive is read-only. – **Blocked**: The virtual drive is blocked from access.

Parameter	Description
Drive Cache	Specifies the cache policy for the physical drives. The options are as follows: – **Unchanged**: uses the current cache policy. – **Enable**: writes data to the cache before writing data to the drive. This option improves data write performance. However, data will be lost if there is no protection mechanism against power failures. – **Disable**: writes data to a drive without caching the data. Data is not lost if power failures occur.
Disable Background Initialization	Enables or disables background initialization. – **Yes**: background initialization is disabled. – **No**: background initialization is enabled. Default value: **No**.
Default Initialization	Specifies the default initialization mode. The options are as follows: – **No**: do not perform initialization. – **Fast**: perform fast initialization. – **Full**: perform full initialization. It is **No** by default.
Emulation Type	Sets the sector size reported to the OS. – **Default**: If there are any 512e drives in member drives, the physical sector size is 512e (4k). If there are no 512e drives, the physical sector size is 512n. – **Disable**: If there are no 512e drives in member drives, the physical sector size is 512n. – **Force**: Even though there are no 512e drives in member drives, the physical sector size is still 512e (4k). The default value is **Default**.
Save Configuration	Saves the settings.

Step 3 Select a RAID level.

1. Use ↑ and ↓ to select **Select RAID Level** and press **Enter**.
2. Select **RAID 0** and press **Enter**.

Step 4 Add member drives.

1. Use ↑ and ↓ to select **Select Drives From** and press **Enter**.

2. Select the source of member drives and press **Enter**.

   In this example, **Unconfigured Capacity** is selected.

3. Use ↑ and ↓ to select **Select Drives** and press **Enter**.

   The screen for adding member drives is displayed, as shown in **Figure 4-10**. **Table 4-3** describes the parameters on the screen.

Figure 4-10 Adding member drives

Table 4-3 Parameter description

Parameter	Description
Select Media Type	Selects a drive medium.
Select Interface Type	Specifies the type of a drive interface.
Logical Sector Size	Specifies the size of a logical sector.
Check All	Selects all drives.
Uncheck All	Deselects all drives.
Apply Changes	Saves the settings.

4. Set the filter criteria based on **Table 4-3**.
5. Use ↑ and ↓ to select the drive to be added and press **Enter**.

NOTE

- A drive is selected if its state is **Enabled**.
- RAID 0 supports 1 to 32 drives.
- If the total number of drives in all RAID arrays under a RAID controller card exceeds 240, no drive can be added to the RAID arrays.

6. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully." is displayed.

7. Select **OK** and press **Enter** to return to the previous screen.

Step 5 Set other properties of the virtual drive based on **Table 4-2**.

NOTE

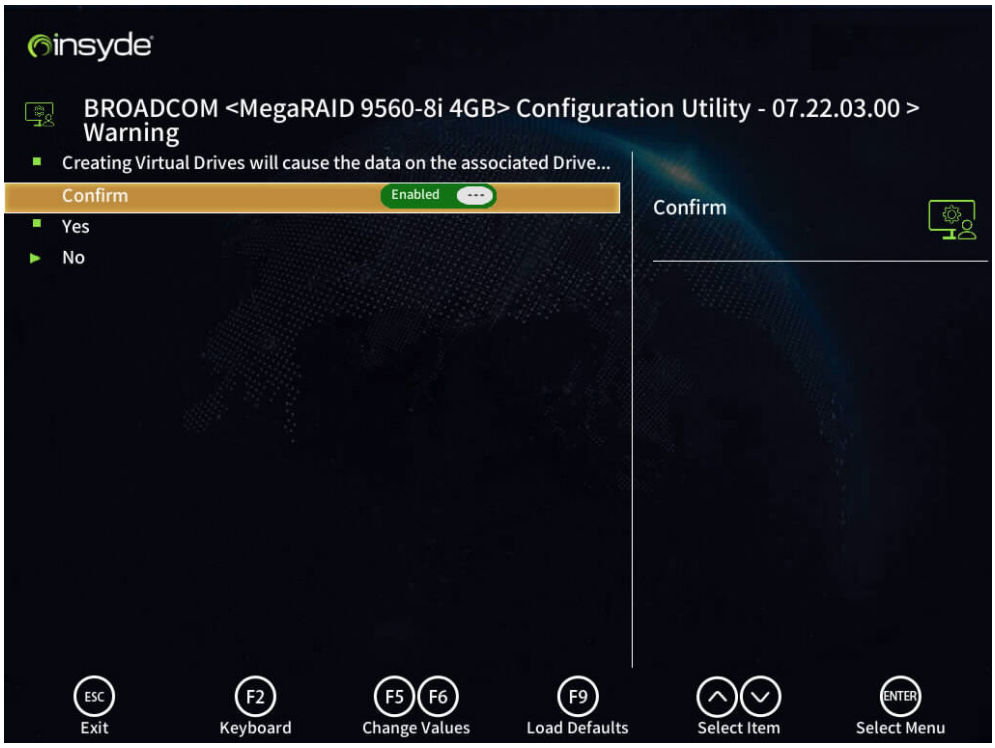
To create multiple virtual drives, set **Virtual Drive Size** as required. After creating the first virtual drive, add other virtual drives. For details, see **5.11 Creating Multiple Virtual Drives**.

Step 6 Save the settings.

1. Use ↑ and ↓ to select **Save Configuration** and press **Enter**, as shown in **Figure 4-11**.

   A confirmation screen is displayed.

Figure 4-11 Save Configuration screen (1)



2. Select **Confirm** and press **Enter**.
3. Select **Yes** and press **Enter**, as shown in **Figure 4-12**.

   The message "The operation has been performed successfully." is displayed.

Figure 4-12 Save Configuration screen (2)

4. Select **OK** and press **Enter**.

Step 7 Check the configuration result.

1. Press **Esc** to return to the previous screen.
2. Select **Virtual Drive Management** and press **Enter**.
   Current RAID information is displayed.

----End

4.3 Creating RAID 1

Scenarios

NOTICE

- Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or the data does not need to be retained.
- The RAID controller card supports SAS/SATA HDDs and SAS/SATA SSDs. Drives in a RAID array must use drives with the same interface and medium, but they can have different capacities or come from different manufacturers.
- The drives must be compatible with the server. For details about the drives supported by servers, see the *Compatibility List* on the Technical Support Website.
- For details about the number of drives required for each RAID level, see **3.1 RAID 0, 1, 5, 6, 10, 50, and 60**.

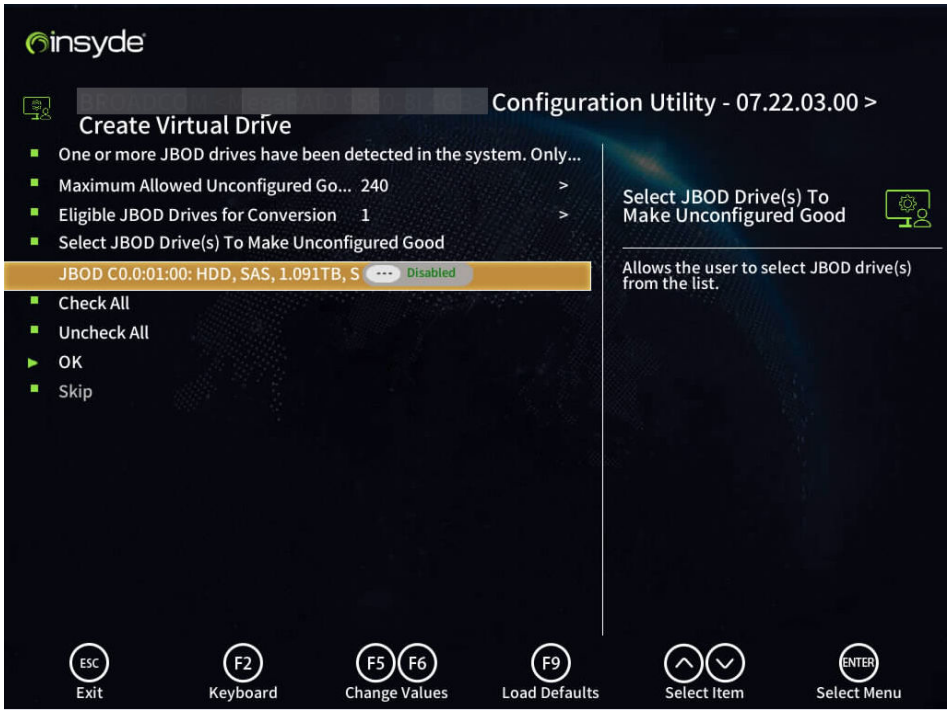
Procedure

Step 1 Back up data on drives and access the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Create Virtual Drive** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Configuration Management** and press **Enter**.
3. Select **Create Virtual Drive** and press **Enter**.
   – When all the drives are in the **JBOD** status, as shown in **Figure 4-13**, select the drives to be added to the RAID array, press **Enter**, click **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the selected drives to the **Unconfigured Good** status. The RAID array configuration screen is displayed.

Figure 4-13 Create Virtual Drive screen (1)



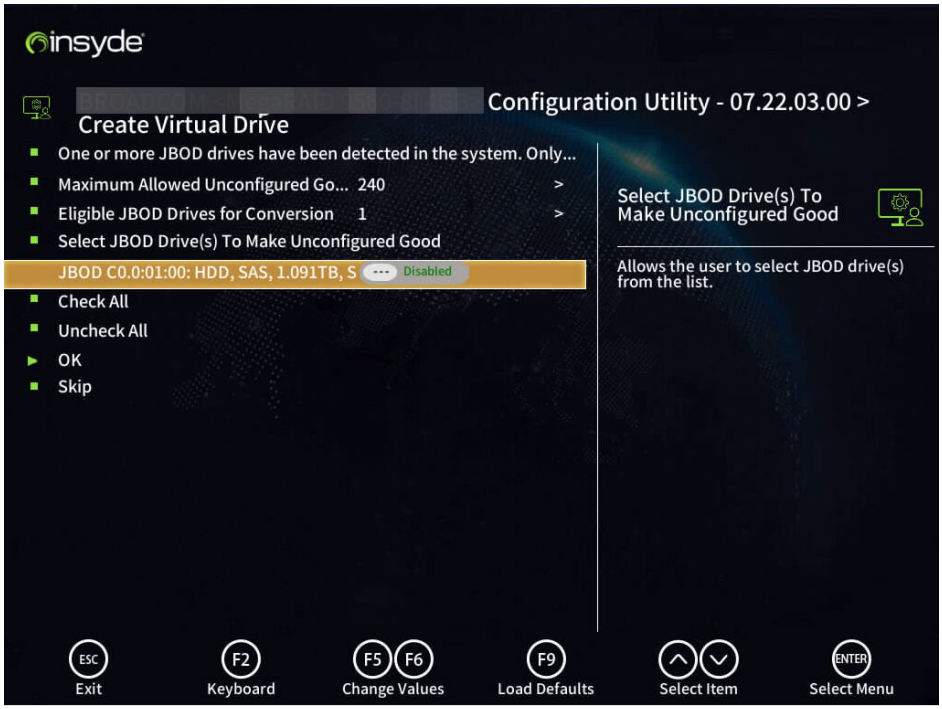
NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When both **JBOD** and **Unconfigured Good** drives exist, as shown in **Figure 4-14**, if you want to set the JBOD drives to the **Unconfigured Good** state, select the JBOD drives to be added to the RAID array, press **Enter**, select **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the status of the JBOD drives to **Unconfigured Good**. The RAID array configuration screen is displayed. If

you do not need to change the status of the JBOD drives, select **Skip** and press **Enter**. The RAID array configuration screen is displayed.

Figure 4-14 Create Virtual Drive screen (2)



NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When all the drives are in the **Unconfigured Good** status, the RAID array configuration screen is displayed, as shown in **Figure 4-15** and **Figure 4-16**. **Table 4-4** describes the parameters on the screen.

Figure 4-15 Creating a virtual drive (3)

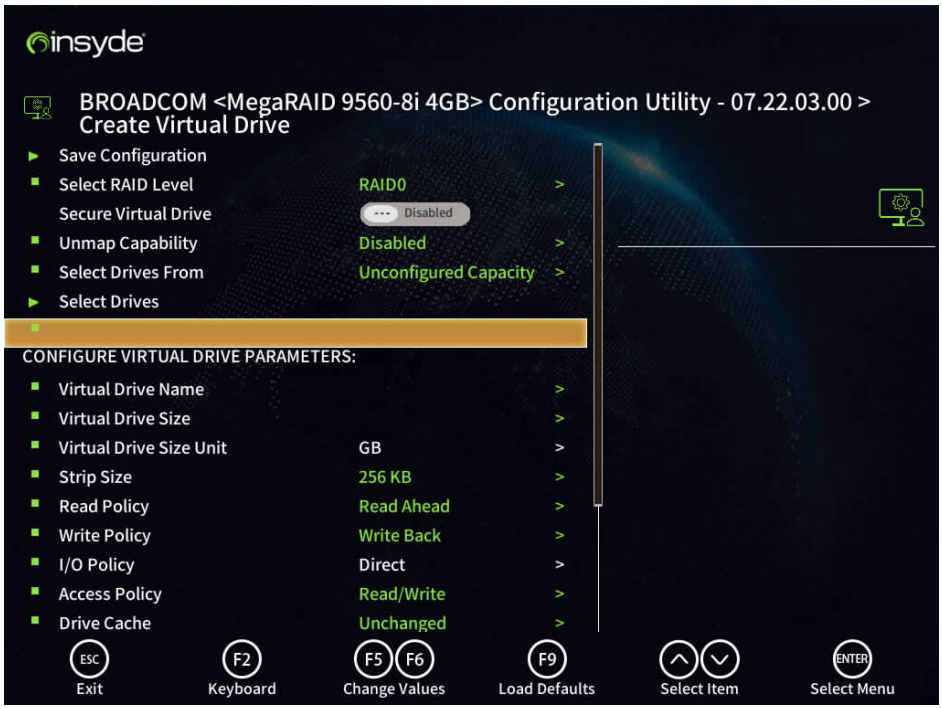


Figure 4-16 Creating a virtual drive (4)

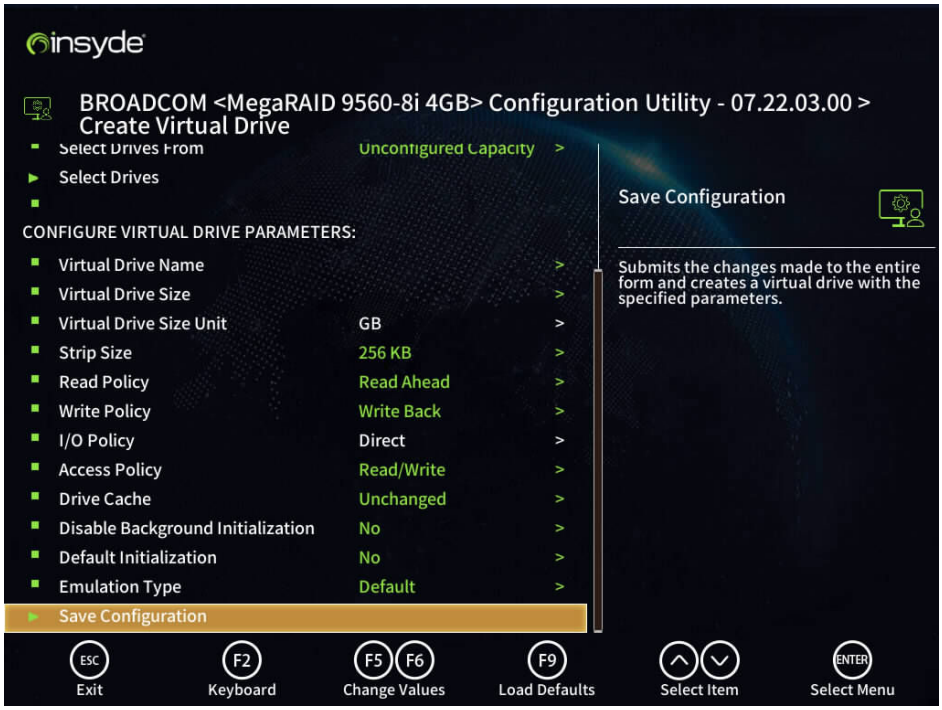


Table 4-4 Parameter description

Parameter	Description
Select RAID Level	Selects a RAID level.

Parameter	Description
Secure Virtual Drive	Specifies whether to enable the security virtual driver.
Unmap Capability	Specifies whether the virtual drive unmapping function is enabled. – Enabled – Disabled
Select Drives From	Specifies where the virtual member drives come from. The values include: – **Unconfigured Capacity**: idle drives that are not added to any virtual drives – **Free Capacity**: remaining space of the virtual drives
Select Drives	Selects the member drives to be added.
Virtual Drive Name	Specifies the name of a virtual drive.
Virtual Drive Size	Specifies the capacity of a virtual drive. The value is the maximum capacity supported by default. **NOTE** To create multiple virtual drives, set the capacity of the first virtual drive as required. After creating the first virtual drive, see **5.11 Creating Multiple Virtual Drives** to add other virtual drives.
Virtual Drive Size Unit	Specifies the unit of the virtual drive capacity.
Strip Size	Specifies the size of a virtual drive strip. Its value can be **64 KB**, **128 KB**, **256 KB**, **512 KB**, or **1 MB**. The default value is **256 KB**.
Read Policy	Specifies the read policy of a virtual drive. The options are as follows: – **No Read Ahead**: disables the Read Ahead function. – **Read Ahead**: enables the Read Ahead function. The controller pref-reads sequential data or the data predicted to be used and saves it in the cache. **NOTE** To achieve optimal drive performance, set the read policy to **Read Ahead** for HDDs and **No Read Ahead** for SSDs.

Parameter	Description
Write Policy	Specifies the write policy of a virtual drive. The options are as follows: – **Write Back**: When the controller cache receives all data, the controller sends the host a message indicating that data transmission is complete. If the RAID controller card does not have a supercapacitor or has a damaged supercapacitor, or the RAID controller card is on charge or discharge, the write policy is automatically switched to the Write Through mode. – **Write Through**: When the drive subsystem receives all data, the controller sends the host a message indicating that data transmission is complete. – **Always Write Back**: The controller enters the **Write Back** mode when supercapacitor is absent or faulty. **NOTE** – In **Always Write Back** mode, DDR (Cache) write data of the RAID controller card will be lost when the server is powered off and the supercapacitor is faulty, uninstalled, or charging. This mode is not recommended. – To achieve optimal drive performance, set the write policy to **Write Back** for HDDs and **Write Through** for SSDs.
I/O Policy	Specifies the I/O policy of a virtual drive. **NOTE** The 9560-8i RAID controller card does not support setting of this parameter.
Access Policy	Specifies the data access policy. The options are as follows: – **Read/Write**: Read and write operations are allowed. – **Read Only**: The virtual drive is read-only. – **Blocked**: The virtual drive is blocked from access.

Parameter	Description
Drive Cache	Specifies the cache policy for the physical drives. The options are as follows: – **Unchanged**: uses the current cache policy. – **Enable**: writes data to the cache before writing data to the drive. This option improves data write performance. However, data will be lost if there is no protection mechanism against power failures. – **Disable**: writes data to a drive without caching the data. Data is not lost if power failures occur.
Disable Background Initialization	Enables or disables background initialization. – **Yes**: background initialization is disabled. – **No**: background initialization is enabled. Default value: **No**.
Default Initialization	Specifies the default initialization mode. The options are as follows: – **No**: do not perform initialization. – **Fast**: perform fast initialization. – **Full**: perform full initialization. It is **No** by default.
Emulation Type	Sets the sector size reported to the OS. – **Default**: If there are any 512e drives in member drives, the physical sector size is 512e (4k). If there are no 512e drives, the physical sector size is 512n. – **Disable**: If there are no 512e drives in member drives, the physical sector size is 512n. – **Force**: Even though there are no 512e drives in member drives, the physical sector size is still 512e (4k). The default value is **Default**.
Save Configuration	Saves the settings.

Step 3 Select a RAID level.

1. Use ↑ and ↓ to select **Select RAID Level** and press **Enter**.
2. Select **RAID 1** and press **Enter**.

Step 4 Add member drives.

1. Use ↑ and ↓ to select **Select Drives From** and press **Enter**.

2. Select the source of member drives and press **Enter**.

   In this example, **Unconfigured Capacity** is selected.

3. Use ↑ and ↓ to select **Select Drives** and press **Enter**.

   The screen for adding member drives is displayed, as shown in **Figure 4-17**. **Table 4-5** describes the parameters on the screen.

Figure 4-17 Adding member drives

Table 4-5 Parameter description

Parameter	Description
Select Media Type	Selects a drive medium.
Select Interface Type	Specifies the type of a drive interface.
Logical Sector Size	Specifies the size of a logical sector.
Check All	Selects all drives.
Uncheck All	Deselects all drives.
Apply Changes	Saves the settings.

4. Set the filter criteria based on **Table 4-5**.
5. Use ↑ and ↓ to select the drive to be added and press **Enter**.

NOTE

- A drive is selected if its state is **Enabled**.
- A RAID 1 array supports an even number (from 2 to 32) of drives.
- If the total number of drives in all RAID arrays under a RAID controller card exceeds 240, no drive can be added to the RAID arrays.

6. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully." is displayed.

7. Select **OK** and press **Enter** to return to the previous screen.

Step 5 Set other properties of the virtual drive based on **Table 4-2**.

NOTE

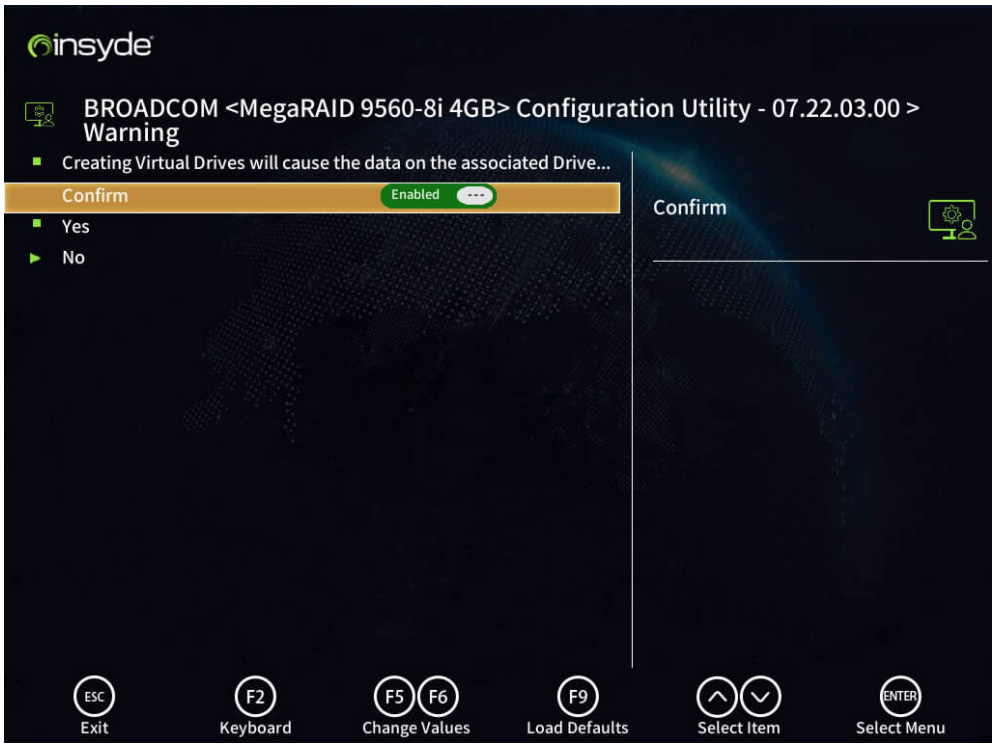
To create multiple virtual drives, set **Virtual Drive Size** as required. After creating the first virtual drive, add other virtual drives. For details, see **5.11 Creating Multiple Virtual Drives**.

Step 6 Save the settings.

1. Use ↑ and ↓ to select **Save Configuration** and press **Enter**, as shown in **Figure 4-18**.

   A confirmation screen is displayed.

Figure 4-18 Save Configuration screen (1)



2. Select **Confirm** and press **Enter**.
3. Select **Yes** and press **Enter**, as shown in **Figure 4-19**.

   The message "The operation has been performed successfully." is displayed.

Figure 4-19 Save Configuration screen (2)

4. Select **OK** and press **Enter**.

Step 7 Check the configuration result.

1. Press **Esc** to return to the previous screen.
2. Select **Virtual Drive Management** and press **Enter**.
   Current RAID information is displayed.

----End

4.4 Creating RAID 5

Scenarios

NOTICE

- Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or the data does not need to be retained.
- The RAID controller card supports SAS/SATA HDDs and SAS/SATA SSDs. Drives in a RAID array must use drives with the same interface and medium, but they can have different capacities or come from different manufacturers.
- The drives must be compatible with the server. For details about the drives supported by servers, see the *Compatibility List* on the Technical Support Website.
- For details about the number of drives required for each RAID level, see **3.1 RAID 0, 1, 5, 6, 10, 50, and 60**.

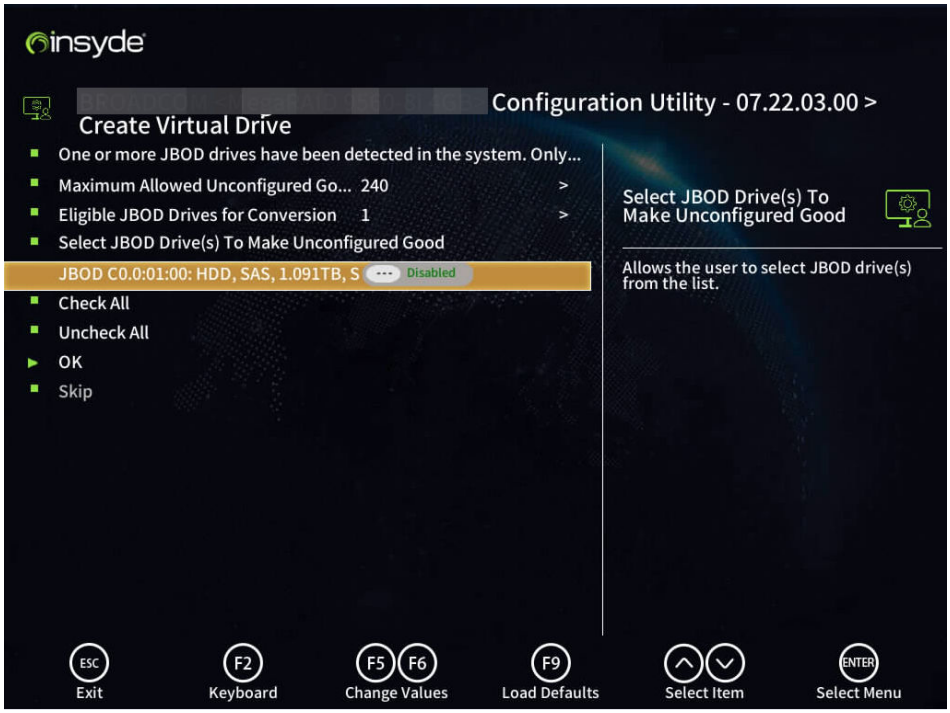
Procedure

Step 1 Back up data on drives and access the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Create Virtual Drive** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Configuration Management** and press **Enter**.
3. Select **Create Virtual Drive** and press **Enter**.
   – When all the drives are in the **JBOD** status, as shown in **Figure 4-20**, select the drives to be added to the RAID array, press **Enter**, click **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the selected drives to the **Unconfigured Good** status. The RAID array configuration screen is displayed.

Figure 4-20 Create Virtual Drive screen (1)



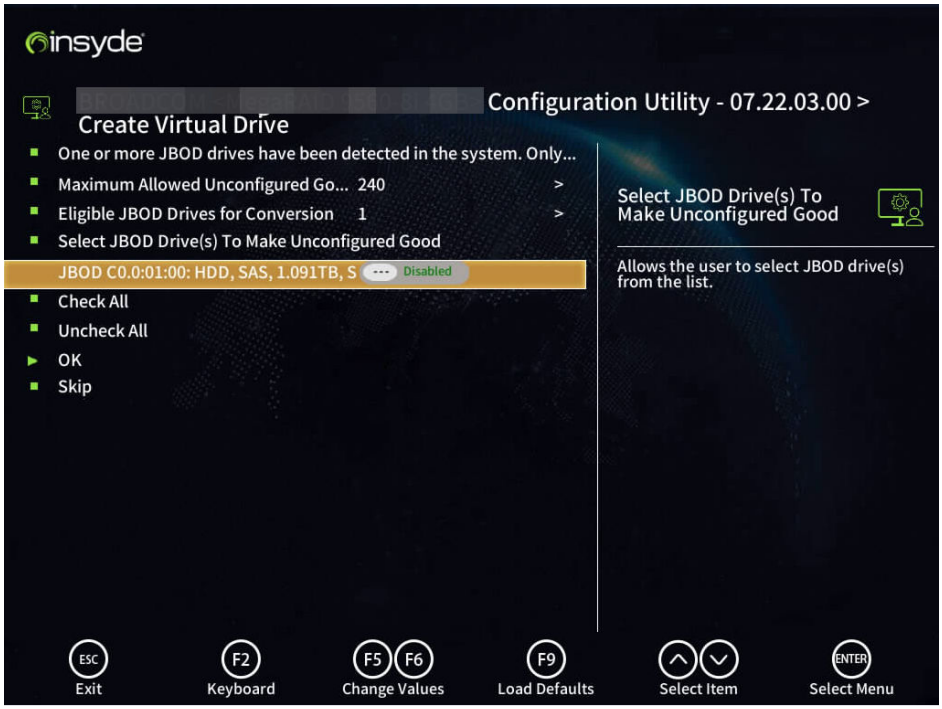
NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

   – When both **JBOD** and **Unconfigured Good** drives exist, as shown in **Figure 4-21**, if you want to set the JBOD drives to the **Unconfigured Good** state, select the JBOD drives to be added to the RAID array, press **Enter**, select **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the status of the JBOD drives to **Unconfigured Good**. The RAID array configuration screen is displayed. If

you do not need to change the status of the JBOD drives, select **Skip** and press **Enter**. The RAID array configuration screen is displayed.

Figure 4-21 Create Virtual Drive screen (2)



NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When all the drives are in the **Unconfigured Good** status, the RAID array configuration screen is displayed, as shown in **Figure 4-22** and **Figure 4-23**. **Table 4-6** describes the parameters on the screen.

Figure 4-22 Creating a virtual drive (3)

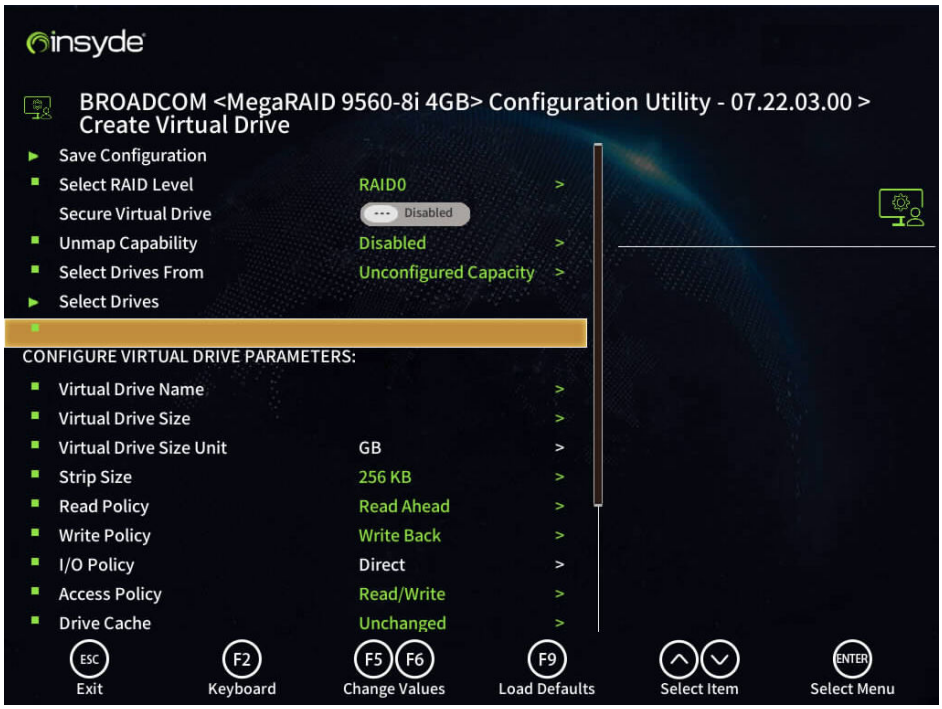


Figure 4-23 Creating a virtual drive (4)

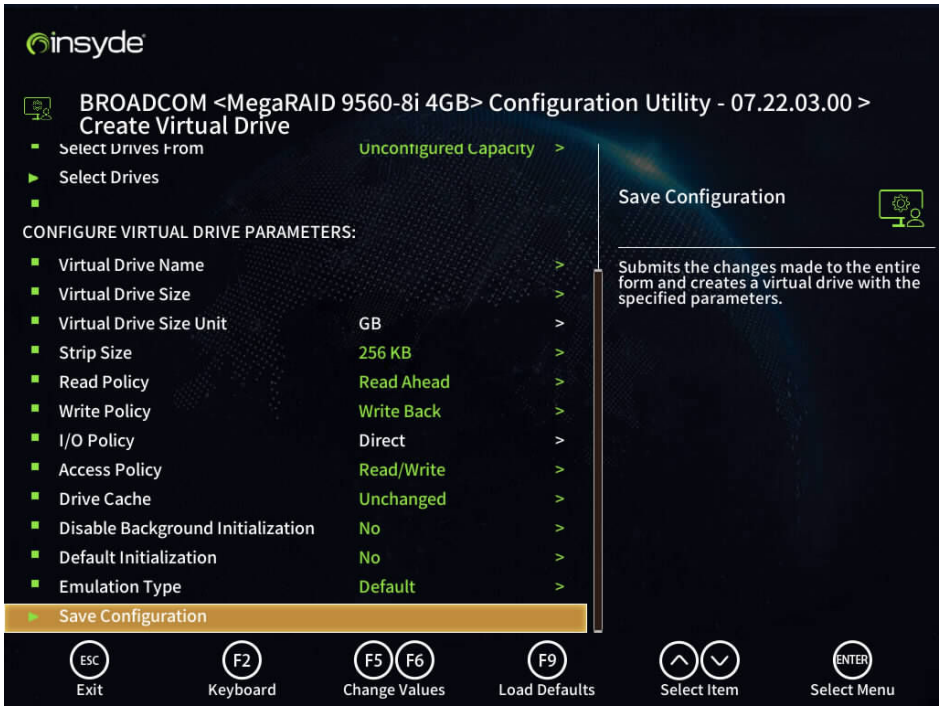


Table 4-6 Parameter description

Parameter	Description
Select RAID Level	Selects a RAID level.

Parameter	Description
Secure Virtual Drive	Specifies whether to enable the security virtual driver.
Unmap Capability	Specifies whether the virtual drive unmapping function is enabled. – Enabled – Disabled
Select Drives From	Specifies where the virtual member drives come from. The values include: – **Unconfigured Capacity**: idle drives that are not added to any virtual drives – **Free Capacity**: remaining space of the virtual drives
Select Drives	Selects the member drives to be added.
Virtual Drive Name	Specifies the name of a virtual drive.
Virtual Drive Size	Specifies the capacity of a virtual drive. The value is the maximum capacity supported by default. **NOTE** To create multiple virtual drives, set the capacity of the first virtual drive as required. After creating the first virtual drive, see **5.11 Creating Multiple Virtual Drives** to add other virtual drives.
Virtual Drive Size Unit	Specifies the unit of the virtual drive capacity.
Strip Size	Specifies the size of a virtual drive strip. Its value can be **64 KB**, **128 KB**, **256 KB**, **512 KB**, or **1 MB**. The default value is **256 KB**.
Read Policy	Specifies the read policy of a virtual drive. The options are as follows: – **No Read Ahead**: disables the Read Ahead function. – **Read Ahead**: enables the Read Ahead function. The controller pref-reads sequential data or the data predicted to be used and saves it in the cache. **NOTE** To achieve optimal drive performance, set the read policy to **Read Ahead** for HDDs and **No Read Ahead** for SSDs.

Parameter	Description
Write Policy	Specifies the write policy of a virtual drive. The options are as follows: – **Write Back**: When the controller cache receives all data, the controller sends the host a message indicating that data transmission is complete. If the RAID controller card does not have a supercapacitor or has a damaged supercapacitor, or the RAID controller card is on charge or discharge, the write policy is automatically switched to the Write Through mode. – **Write Through**: When the drive subsystem receives all data, the controller sends the host a message indicating that data transmission is complete. – **Always Write Back**: The controller enters the **Write Back** mode when supercapacitor is absent or faulty. **NOTE** – In **Always Write Back** mode, DDR (Cache) write data of the RAID controller card will be lost when the server is powered off and the supercapacitor is faulty, uninstalled, or charging. This mode is not recommended. – To achieve optimal drive performance, set the write policy to **Write Back** for HDDs and **Write Through** for SSDs.
I/O Policy	Specifies the I/O policy of a virtual drive. **NOTE** The 9560-8i RAID controller card does not support setting of this parameter.
Access Policy	Specifies the data access policy. The options are as follows: – **Read/Write**: Read and write operations are allowed. – **Read Only**: The virtual drive is read-only. – **Blocked**: The virtual drive is blocked from access.

Parameter	Description
Drive Cache	Specifies the cache policy for the physical drives. The options are as follows: – **Unchanged**: uses the current cache policy. – **Enable**: writes data to the cache before writing data to the drive. This option improves data write performance. However, data will be lost if there is no protection mechanism against power failures. – **Disable**: writes data to a drive without caching the data. Data is not lost if power failures occur.
Disable Background Initialization	Enables or disables background initialization. – **Yes**: background initialization is disabled. – **No**: background initialization is enabled. Default value: **No**.
Default Initialization	Specifies the default initialization mode. The options are as follows: – **No**: do not perform initialization. – **Fast**: perform fast initialization. – **Full**: perform full initialization. It is **No** by default.
Emulation Type	Sets the sector size reported to the OS. – **Default**: If there are any 512e drives in member drives, the physical sector size is 512e (4k). If there are no 512e drives, the physical sector size is 512n. – **Disable**: If there are no 512e drives in member drives, the physical sector size is 512n. – **Force**: Even though there are no 512e drives in member drives, the physical sector size is still 512e (4k). The default value is **Default**.
Save Configuration	Saves the settings.

Step 3 Select a RAID level.

1. Use ↑ and ↓ to select **Select RAID Level** and press **Enter**.
2. Select **RAID 5** and press **Enter**.

Step 4 Add member drives.

1. Use ↑ and ↓ to select **Select Drives From** and press **Enter**.

2. Select the source of member drives and press **Enter**.

   In this example, **Unconfigured Capacity** is selected.

3. Use ↑ and ↓ to select **Select Drives** and press **Enter**.

   The screen for adding member drives is displayed, as shown in **Figure 4-24**. **Table 4-7** describes the parameters on the screen.

Figure 4-24 Adding member drives

Table 4-7 Parameter description

Parameter	Description
Select Media Type	Selects a drive medium.
Select Interface Type	Specifies the type of a drive interface.
Logical Sector Size	Specifies the size of a logical sector.
Check All	Selects all drives.
Uncheck All	Deselects all drives.
Apply Changes	Saves the settings.

4. Set the filter criteria based on **Table 4-7**.
5. Use ↑ and ↓ to select the drive to be added and press **Enter**.

NOTE

- A drive is selected if its state is **Enabled**.
- A RAID 5 array supports 3 to 32 drives.
- If the total number of drives in all RAID arrays under a RAID controller card exceeds 240, no drive can be added to the RAID arrays.

6. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully." is displayed.

7. Select **OK** and press **Enter** to return to the previous screen.

Step 5 Set other properties of the virtual drive based on **Table 4-2**.

NOTE

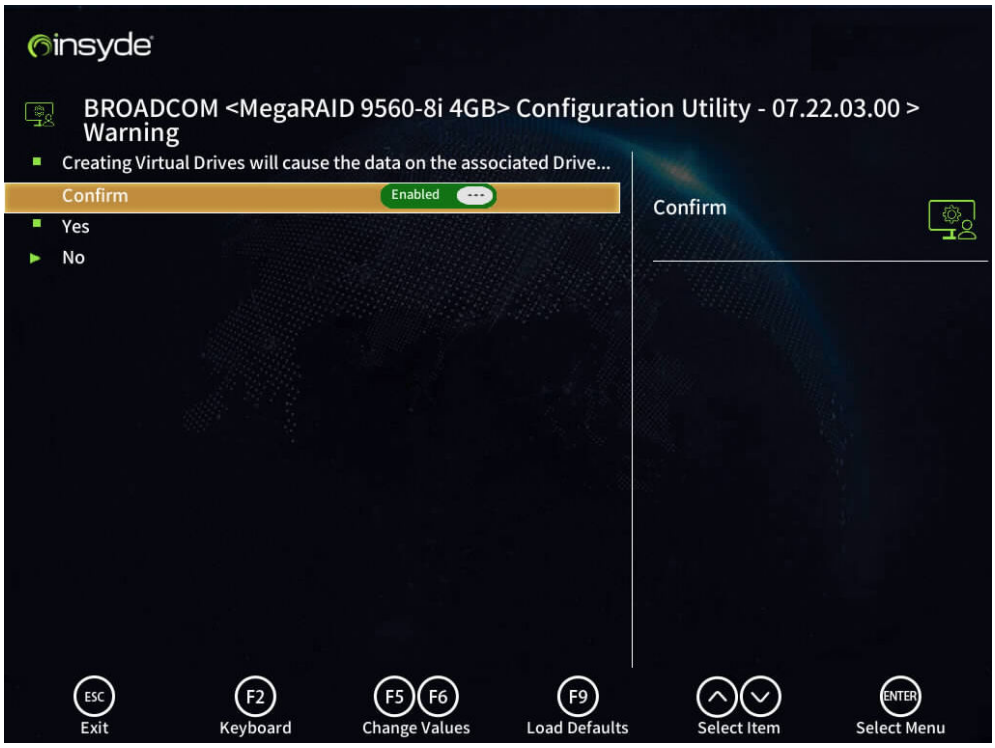
To create multiple virtual drives, set **Virtual Drive Size** as required. After creating the first virtual drive, add other virtual drives. For details, see **5.11 Creating Multiple Virtual Drives**.

Step 6 Save the settings.

1. Use ↑ and ↓ to select **Save Configuration** and press **Enter**, as shown in **Figure 4-25**.

   A confirmation screen is displayed.

Figure 4-25 Save Configuration screen (1)



2. Select **Confirm** and press **Enter**.
3. Select **Yes** and press **Enter**, as shown in **Figure 4-26**.

   The message "The operation has been performed successfully." is displayed.

Figure 4-26 Save Configuration screen (2)

4. Select **OK** and press **Enter**.

Step 7 Check the configuration result.

1. Press **Esc** to return to the previous screen.
2. Select **Virtual Drive Management** and press **Enter**.
   Current RAID information is displayed.

----End

4.5 Creating RAID 6

Scenarios

NOTICE

- Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or the data does not need to be retained.
- The RAID controller card supports SAS/SATA HDDs and SAS/SATA SSDs. Drives in a RAID array must use drives with the same interface and medium, but they can have different capacities or come from different manufacturers.
- The drives must be compatible with the server. For details about the drives supported by servers, see the *Compatibility List* on the Technical Support Website.
- For details about the number of drives required for each RAID level, see **3.1 RAID 0, 1, 5, 6, 10, 50, and 60**.

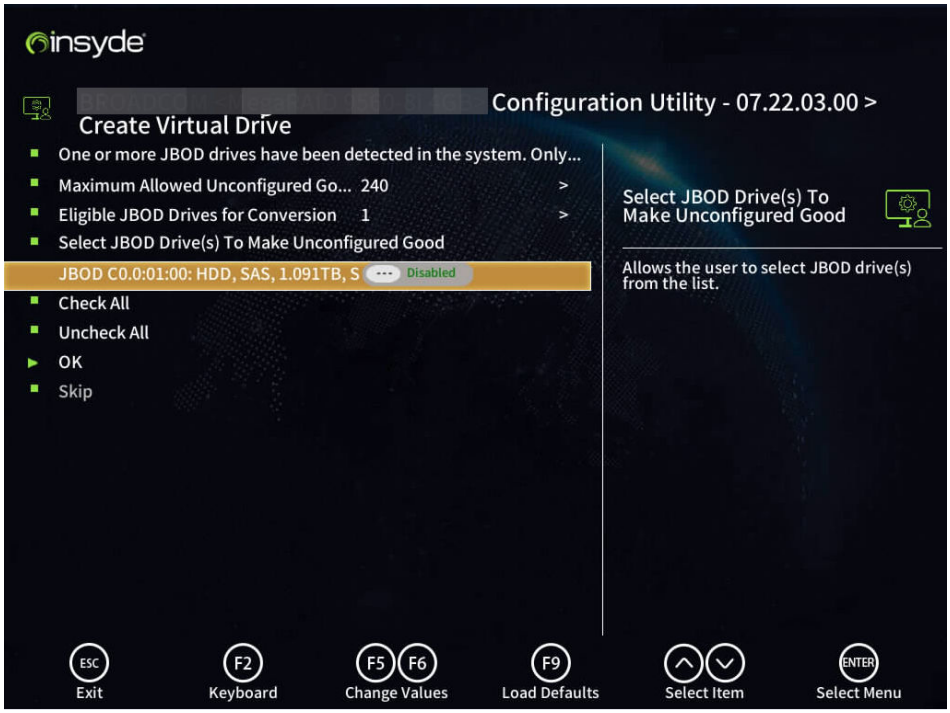
Procedure

Step 1 Back up data on drives and access the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Create Virtual Drive** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Configuration Management** and press **Enter**.
3. Select **Create Virtual Drive** and press **Enter**.
   – When all the drives are in the **JBOD** status, as shown in **Figure 4-27**, select the drives to be added to the RAID array, press **Enter**, click **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the selected drives to the **Unconfigured Good** status. The RAID array configuration screen is displayed.

Figure 4-27 Create Virtual Drive screen (1)



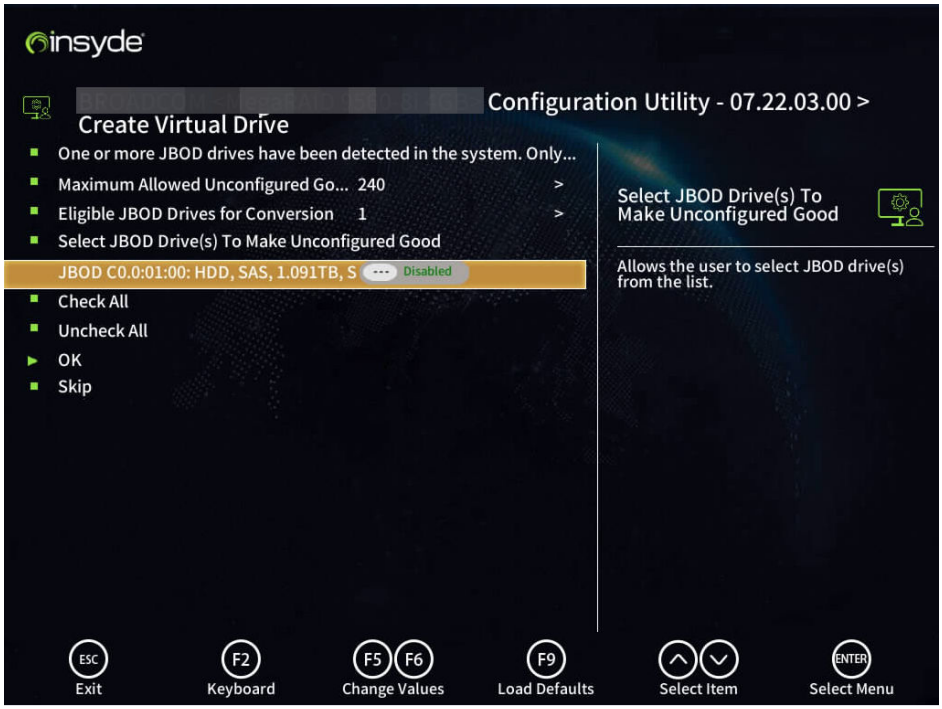
NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When both **JBOD** and **Unconfigured Good** drives exist, as shown in **Figure 4-28**, if you want to set the JBOD drives to the **Unconfigured Good** state, select the JBOD drives to be added to the RAID array, press **Enter**, select **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the status of the JBOD drives to **Unconfigured Good**. The RAID array configuration screen is displayed. If

you do not need to change the status of the JBOD drives, select **Skip** and press **Enter**. The RAID array configuration screen is displayed.

Figure 4-28 Create Virtual Drive screen (2)



NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When all the drives are in the **Unconfigured Good** status, the RAID array configuration screen is displayed, as shown in **Figure 4-29** and **Figure 4-30**. **Table 4-8** describes the parameters on the screen.

Figure 4-29 Creating a virtual drive (3)

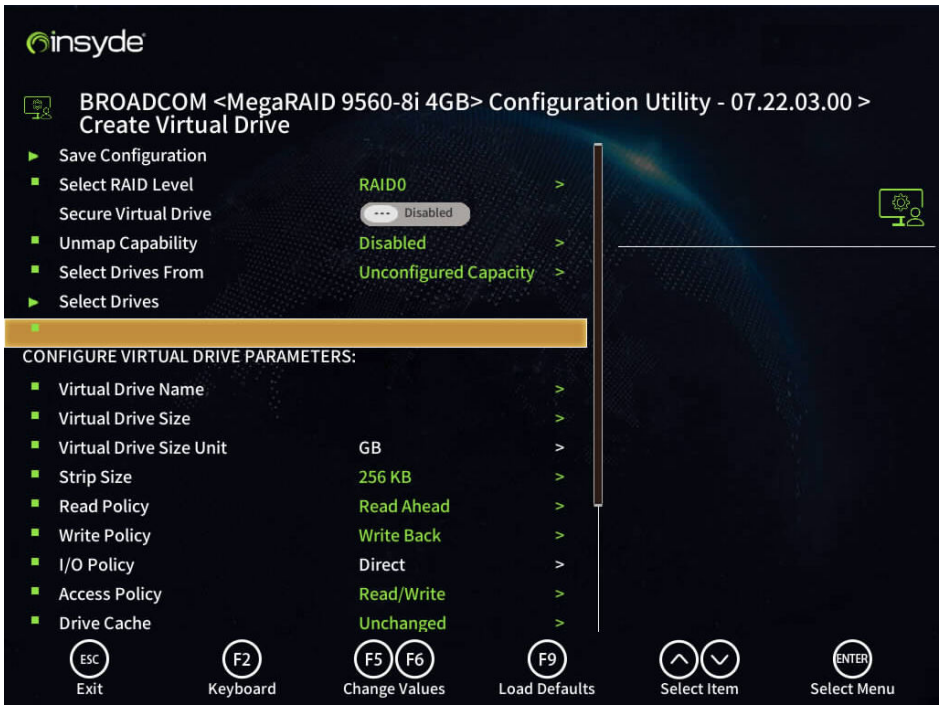


Figure 4-30 Creating a virtual drive (4)

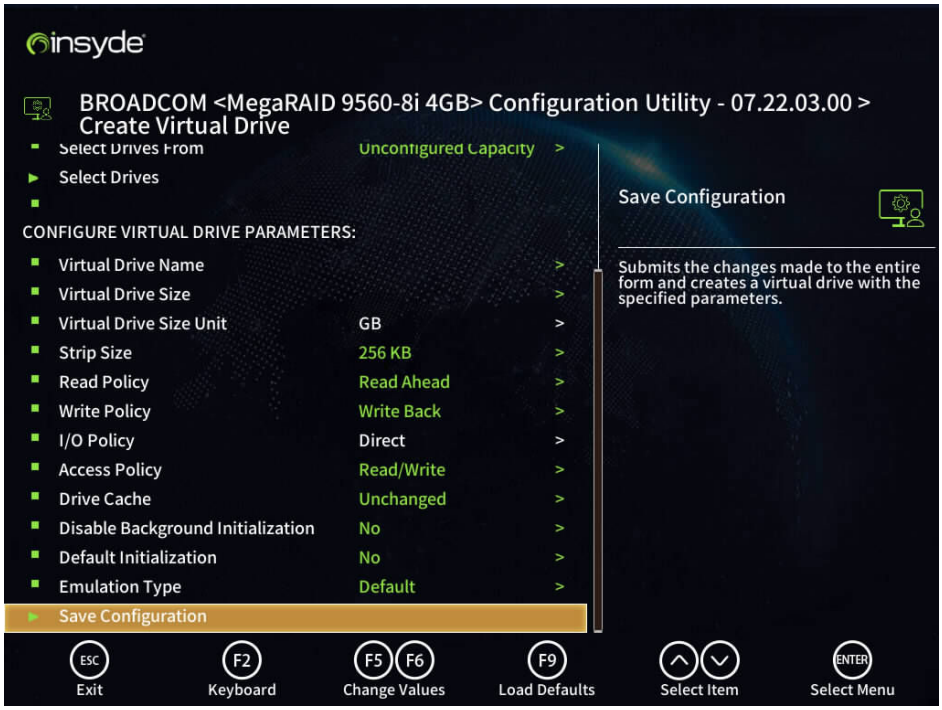


Table 4-8 Parameter description

Parameter	Description
Select RAID Level	Selects a RAID level.

Parameter	Description
Secure Virtual Drive	Specifies whether to enable the security virtual driver.
Unmap Capability	Specifies whether the virtual drive unmapping function is enabled. – Enabled – Disabled
Select Drives From	Specifies where the virtual member drives come from. The values include: – **Unconfigured Capacity**: idle drives that are not added to any virtual drives – **Free Capacity**: remaining space of the virtual drives
Select Drives	Selects the member drives to be added.
Virtual Drive Name	Specifies the name of a virtual drive.
Virtual Drive Size	Specifies the capacity of a virtual drive. The value is the maximum capacity supported by default. **NOTE** To create multiple virtual drives, set the capacity of the first virtual drive as required. After creating the first virtual drive, see **5.11 Creating Multiple Virtual Drives** to add other virtual drives.
Virtual Drive Size Unit	Specifies the unit of the virtual drive capacity.
Strip Size	Specifies the size of a virtual drive strip. Its value can be **64 KB**, **128 KB**, **256 KB**, **512 KB**, or **1 MB**. The default value is **256 KB**.
Read Policy	Specifies the read policy of a virtual drive. The options are as follows: – **No Read Ahead**: disables the Read Ahead function. – **Read Ahead**: enables the Read Ahead function. The controller pref-reads sequential data or the data predicted to be used and saves it in the cache. **NOTE** To achieve optimal drive performance, set the read policy to **Read Ahead** for HDDs and **No Read Ahead** for SSDs.

Parameter	Description
Write Policy	Specifies the write policy of a virtual drive. The options are as follows: – **Write Back**: When the controller cache receives all data, the controller sends the host a message indicating that data transmission is complete. If the RAID controller card does not have a supercapacitor or has a damaged supercapacitor, or the RAID controller card is on charge or discharge, the write policy is automatically switched to the Write Through mode. – **Write Through**: When the drive subsystem receives all data, the controller sends the host a message indicating that data transmission is complete. – **Always Write Back**: The controller enters the **Write Back** mode when supercapacitor is absent or faulty. **NOTE** – In **Always Write Back** mode, DDR (Cache) write data of the RAID controller card will be lost when the server is powered off and the supercapacitor is faulty, uninstalled, or charging. This mode is not recommended. – To achieve optimal drive performance, set the write policy to **Write Back** for HDDs and **Write Through** for SSDs.
I/O Policy	Specifies the I/O policy of a virtual drive. **NOTE** The 9560-8i RAID controller card does not support setting of this parameter.
Access Policy	Specifies the data access policy. The options are as follows: – **Read/Write**: Read and write operations are allowed. – **Read Only**: The virtual drive is read-only. – **Blocked**: The virtual drive is blocked from access.

Parameter	Description
Drive Cache	Specifies the cache policy for the physical drives. The options are as follows: – **Unchanged**: uses the current cache policy. – **Enable**: writes data to the cache before writing data to the drive. This option improves data write performance. However, data will be lost if there is no protection mechanism against power failures. – **Disable**: writes data to a drive without caching the data. Data is not lost if power failures occur.
Disable Background Initialization	Enables or disables background initialization. – **Yes**: background initialization is disabled. – **No**: background initialization is enabled. Default value: **No**.
Default Initialization	Specifies the default initialization mode. The options are as follows: – **No**: do not perform initialization. – **Fast**: perform fast initialization. – **Full**: perform full initialization. It is **No** by default.
Emulation Type	Sets the sector size reported to the OS. – **Default**: If there are any 512e drives in member drives, the physical sector size is 512e (4k). If there are no 512e drives, the physical sector size is 512n. – **Disable**: If there are no 512e drives in member drives, the physical sector size is 512n. – **Force**: Even though there are no 512e drives in member drives, the physical sector size is still 512e (4k). The default value is **Default**.
Save Configuration	Saves the settings.

Step 3 Select a RAID level.

1. Use ↑ and ↓ to select **Select RAID Level** and press **Enter**.
2. Select **RAID 6** and press **Enter**.

Step 4 Add member drives.

1. Use ↑ and ↓ to select **Select Drives From** and press **Enter**.

2. Select the source of member drives and press **Enter**.

   In this example, **Unconfigured Capacity** is selected.

3. Use ↑ and ↓ to select **Select Drives** and press **Enter**.

   The screen for adding member drives is displayed, as shown in **Figure 4-31**. **Table 4-9** describes the parameters on the screen.

Figure 4-31 Adding member drives

Table 4-9 Parameter description

Parameter	Description
Select Media Type	Selects a drive medium.
Select Interface Type	Specifies the type of a drive interface.
Logical Sector Size	Specifies the size of a logical sector.
Check All	Selects all drives.
Uncheck All	Deselects all drives.
Apply Changes	Saves the settings.

4. Set the filter criteria based on **Table 4-9**.
5. Use ↑ and ↓ to select the drive to be added and press **Enter**.

NOTE

- A drive is selected if its state is **Enabled**.
- A RAID 6 array supports 4 to 32 drives.
- If the total number of drives in all RAID arrays under a RAID controller card exceeds 240, no drive can be added to the RAID arrays.

6. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully." is displayed.

7. Select **OK** and press **Enter** to return to the previous screen.

Step 5 Set other properties of the virtual drive based on **Table 4-2**.

NOTE

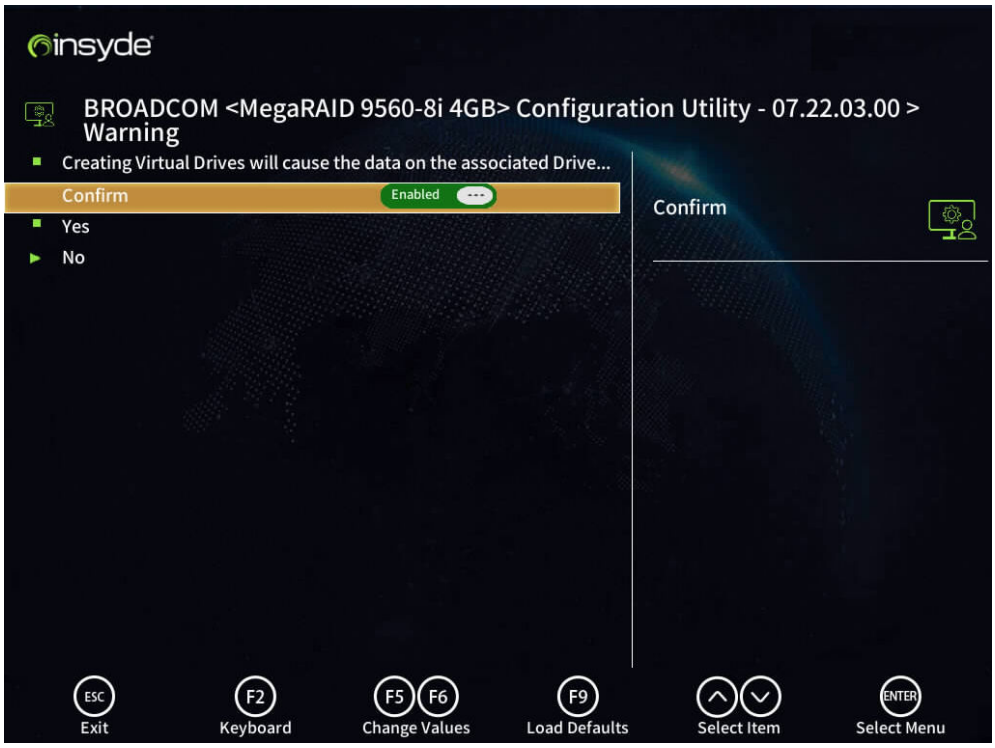
To create multiple virtual drives, set **Virtual Drive Size** as required. After creating the first virtual drive, add other virtual drives. For details, see **5.11 Creating Multiple Virtual Drives**.

Step 6 Save the settings.

1. Use ↑ and ↓ to select **Save Configuration** and press **Enter**, as shown in **Figure 4-32**.

   A confirmation screen is displayed.

Figure 4-32 Save Configuration screen (1)



2. Select **Confirm** and press **Enter**.
3. Select **Yes** and press **Enter**, as shown in **Figure 4-33**.

   The message "The operation has been performed successfully." is displayed.

Figure 4-33 Save Configuration screen (2)

4. Select **OK** and press **Enter**.

Step 7 Check the configuration result.

1. Press **Esc** to return to the previous screen.
2. Select **Virtual Drive Management** and press **Enter**.
   Current RAID information is displayed.

----End

4.6 Creating RAID 10

Scenarios

NOTICE

- Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or the data does not need to be retained.
- The RAID controller card supports SAS/SATA HDDs and SAS/SATA SSDs. Drives in a RAID array must use drives with the same interface and medium, but they can have different capacities or come from different manufacturers.
- The drives must be compatible with the server. For details about the drives supported by servers, see the *Compatibility List* on the Technical Support Website.
- For details about the number of drives required for each RAID level, see **3.1 RAID 0, 1, 5, 6, 10, 50, and 60**.

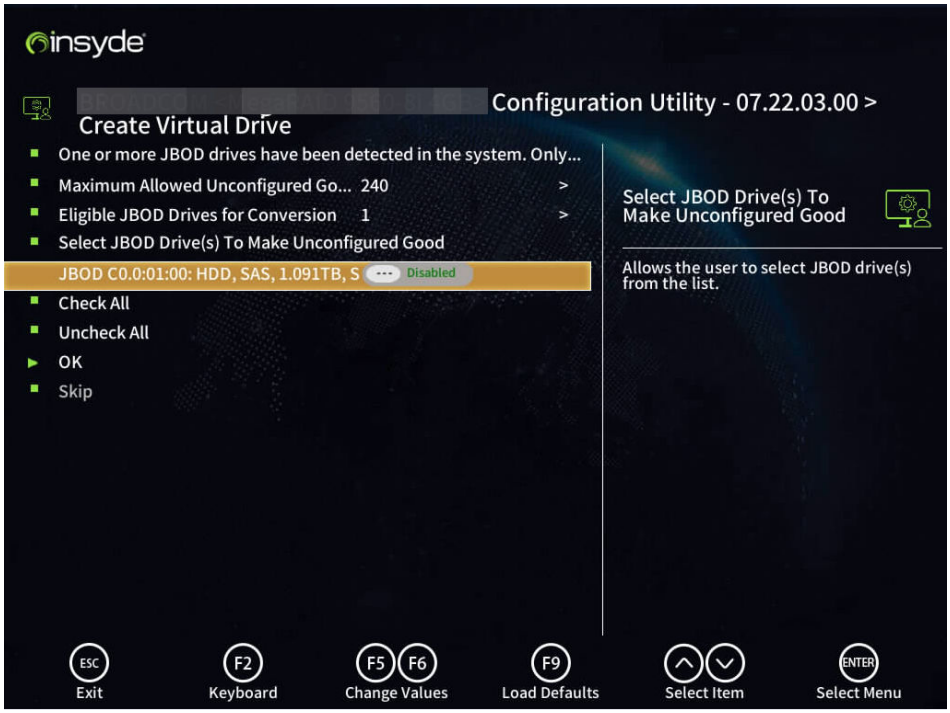
Procedure

Step 1 Back up data on drives and access the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Create Virtual Drive** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Configuration Management** and press **Enter**.
3. Select **Create Virtual Drive** and press **Enter**.
   – When all the drives are in the **JBOD** status, as shown in **Figure 4-34**, select the drives to be added to the RAID array, press **Enter**, click **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the selected drives to the **Unconfigured Good** status. The RAID array configuration screen is displayed.

Figure 4-34 Create Virtual Drive screen (1)



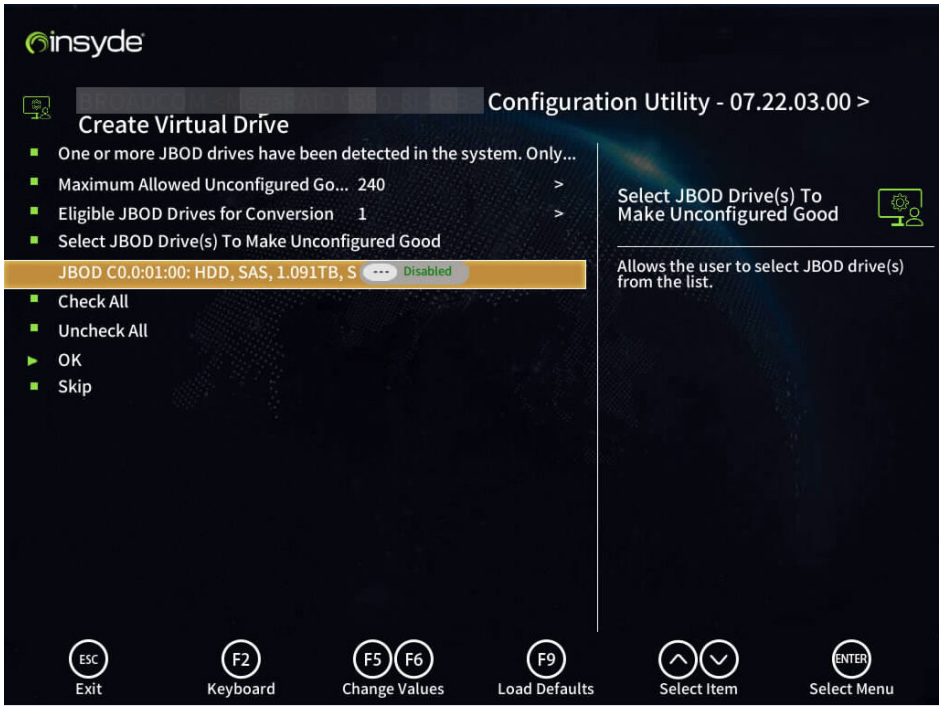
NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

   – When both **JBOD** and **Unconfigured Good** drives exist, as shown in **Figure 4-35**, if you want to set the JBOD drives to the **Unconfigured Good** state, select the JBOD drives to be added to the RAID array, press **Enter**, select **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the status of the JBOD drives to **Unconfigured Good**. The RAID array configuration screen is displayed. If

you do not need to change the status of the JBOD drives, select **Skip** and press **Enter**. The RAID array configuration screen is displayed.

Figure 4-35 Create Virtual Drive screen (2)



NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When all the drives are in the **Unconfigured Good** status, the RAID array configuration screen is displayed, as shown in **Figure 4-36** and **Figure 4-37**. **Table 4-10** describes the parameters on the screen.

Figure 4-36 Creating a virtual drive (3)

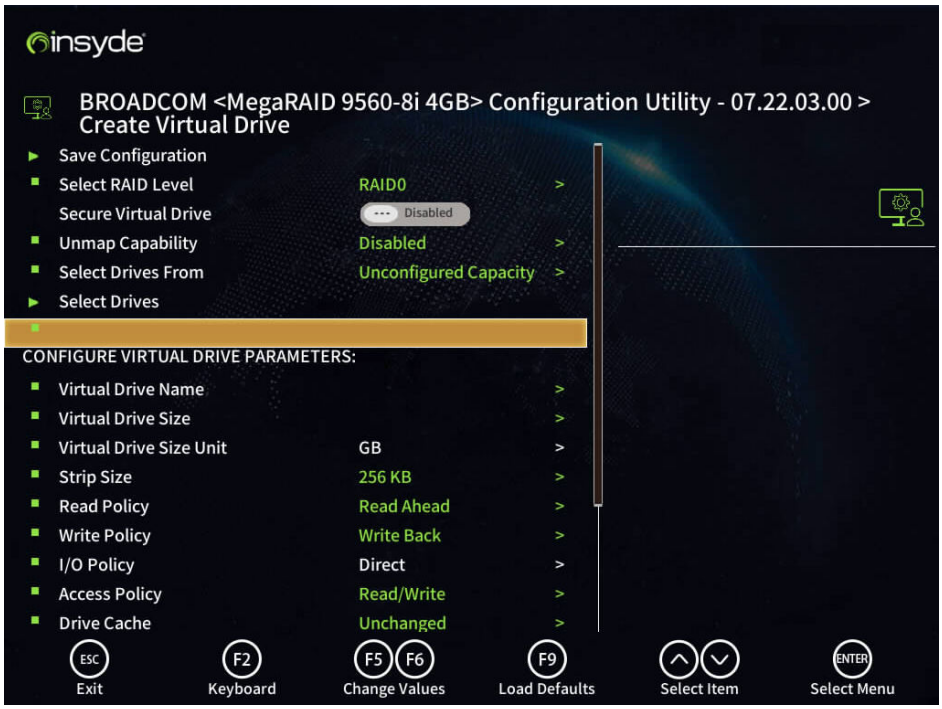


Figure 4-37 Creating a virtual drive (4)

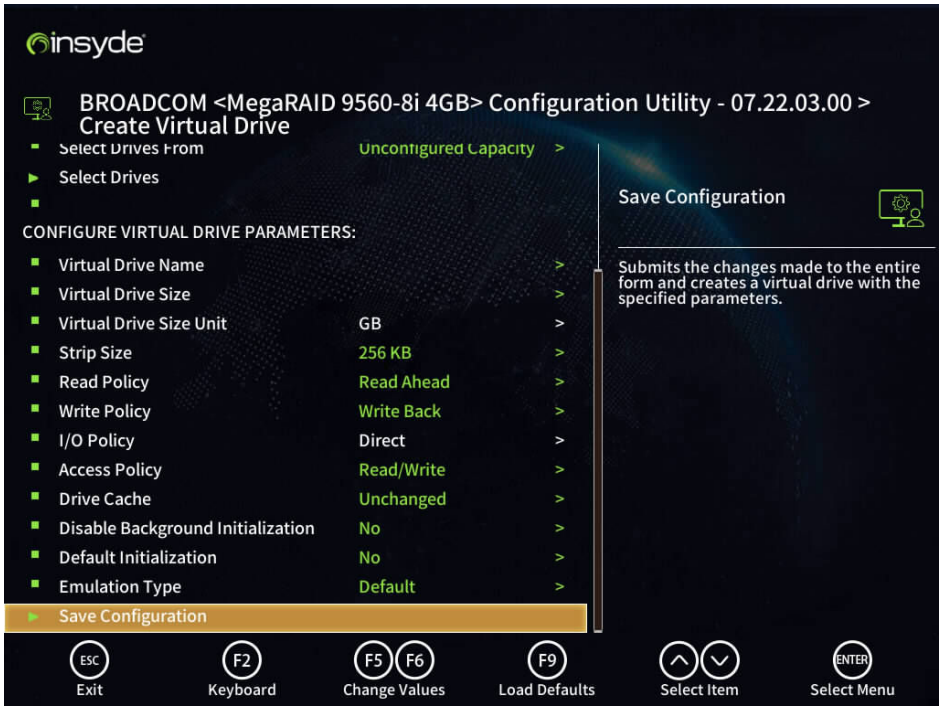


Table 4-10 Parameter description

Parameter	Description
Select RAID Level	Selects a RAID level.

Parameter	Description
Secure Virtual Drive	Specifies whether to enable the security virtual driver.
Unmap Capability	Specifies whether the virtual drive unmapping function is enabled. – Enabled – Disabled
Select Drives From	Specifies where the virtual member drives come from. The values include: – **Unconfigured Capacity**: idle drives that are not added to any virtual drives – **Free Capacity**: remaining space of the virtual drives
Select Drives	Selects the member drives to be added.
Virtual Drive Name	Specifies the name of a virtual drive.
Virtual Drive Size	Specifies the capacity of a virtual drive. The value is the maximum capacity supported by default. **NOTE** To create multiple virtual drives, set the capacity of the first virtual drive as required. After creating the first virtual drive, see **5.11 Creating Multiple Virtual Drives** to add other virtual drives.
Virtual Drive Size Unit	Specifies the unit of the virtual drive capacity.
Strip Size	Specifies the size of a virtual drive strip. Its value can be **64 KB**, **128 KB**, **256 KB**, **512 KB**, or **1 MB**. The default value is **256 KB**.
Read Policy	Specifies the read policy of a virtual drive. The options are as follows: – **No Read Ahead**: disables the Read Ahead function. – **Read Ahead**: enables the Read Ahead function. The controller pref-reads sequential data or the data predicted to be used and saves it in the cache. **NOTE** To achieve optimal drive performance, set the read policy to **Read Ahead** for HDDs and **No Read Ahead** for SSDs.

Parameter	Description
Write Policy	Specifies the write policy of a virtual drive. The options are as follows: – **Write Back**: When the controller cache receives all data, the controller sends the host a message indicating that data transmission is complete. If the RAID controller card does not have a supercapacitor or has a damaged supercapacitor, or the RAID controller card is on charge or discharge, the write policy is automatically switched to the Write Through mode. – **Write Through**: When the drive subsystem receives all data, the controller sends the host a message indicating that data transmission is complete. – **Always Write Back**: The controller enters the **Write Back** mode when supercapacitor is absent or faulty. **NOTE** – In **Always Write Back** mode, DDR (Cache) write data of the RAID controller card will be lost when the server is powered off and the supercapacitor is faulty, uninstalled, or charging. This mode is not recommended. – To achieve optimal drive performance, set the write policy to **Write Back** for HDDs and **Write Through** for SSDs.
I/O Policy	Specifies the I/O policy of a virtual drive. **NOTE** The 9560-8i RAID controller card does not support setting of this parameter.
Access Policy	Specifies the data access policy. The options are as follows: – **Read/Write**: Read and write operations are allowed. – **Read Only**: The virtual drive is read-only. – **Blocked**: The virtual drive is blocked from access.

Parameter	Description
Drive Cache	Specifies the cache policy for the physical drives. The options are as follows: – **Unchanged**: uses the current cache policy. – **Enable**: writes data to the cache before writing data to the drive. This option improves data write performance. However, data will be lost if there is no protection mechanism against power failures. – **Disable**: writes data to a drive without caching the data. Data is not lost if power failures occur.
Disable Background Initialization	Enables or disables background initialization. – **Yes**: background initialization is disabled. – **No**: background initialization is enabled. Default value: **No**.
Default Initialization	Specifies the default initialization mode. The options are as follows: – **No**: do not perform initialization. – **Fast**: perform fast initialization. – **Full**: perform full initialization. It is **No** by default.
Emulation Type	Sets the sector size reported to the OS. – **Default**: If there are any 512e drives in member drives, the physical sector size is 512e (4k). If there are no 512e drives, the physical sector size is 512n. – **Disable**: If there are no 512e drives in member drives, the physical sector size is 512n. – **Force**: Even though there are no 512e drives in member drives, the physical sector size is still 512e (4k). The default value is **Default**.
Save Configuration	Saves the settings.

Step 3 Select a RAID level.

1. Use ↑ and ↓ to select **Select RAID Level** and press **Enter**.
2. Select **RAID 10** and press **Enter**.

Step 4 Create span 1.

1. Use ↑ and ↓ to select **Select Drives From** and press **Enter**.

2. Select the source of member drives and press **Enter**.

   In this example, **Unconfigured Capacity** is selected.

3. Use ↑ and ↓ to select **Select Drives** and press **Enter**.

   The screen for adding member drives is displayed, as shown in **Figure 4-38**. **Table 4-11** describes the parameters on the screen.

Figure 4-38 Adding member drives

Table 4-11 Parameter description

Parameter	Description
Select Media Type	Selects a drive medium.
Select Interface Type	Specifies the type of a drive interface.
Logical Sector Size	Specifies the size of a logical sector.
Check All	Selects all drives.
Uncheck All	Deselects all drives.
Apply Changes	Saves the settings.

4. Set the filter criteria based on **Table 4-11**.
5. Use ↑ and ↓ to select the drive to be added and press **Enter**.

NOTE

- A drive is selected if its state is **Enabled**.
- RAID 10 supports 2 to 8 spans. Each span supports an even number (from 2 to 32) of drives. The number of drives in each span must be the same.
- A RAID 10 array supports an even number (from 4 to 240) of drives.
- If the total number of drives in all RAID arrays under a RAID controller card exceeds 240, no drive can be added to the RAID arrays.

6. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.

7. Select **OK** and press **Enter**.

Step 5 Create span 2.

Configure multiple spans for RAID 10. **Figure 4-39** shows the configuration screen.

Figure 4-39 RAID 10 configuration screen

1. Select **Add More Spans** and press **Enter**.
2. Select **Select Drives** and press **Enter**.
3. Select the member drives of span 2.

   NOTE

   The number of drives in each span must be the same.

4. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.

5. Select **OK** and press **Enter**.

Step 6 Repeat **Step 5** to create multiple spans on idle drives.

NOTE

At least two spans must be created for a RAID 10 array. A maximum of eight spans can be created.

Step 7 Set other properties of the virtual drive based on **Table 4-2**.

NOTE

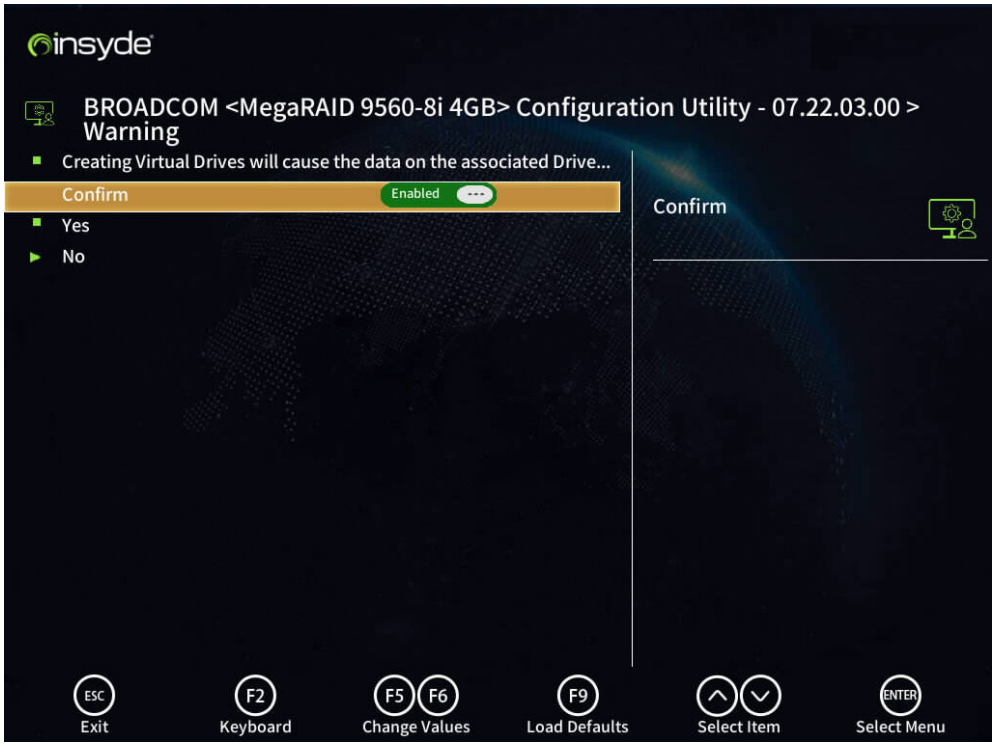
To create multiple virtual drives, set **Virtual Drive Size** as required. After creating the first virtual drive, add other virtual drives. For details, see **5.11 Creating Multiple Virtual Drives**.

Step 8 Save the settings.

1. Use ↑ and ↓ to select **Save Configuration** and press **Enter**, as shown in **Figure 4-40**.

   A confirmation screen is displayed.

Figure 4-40 Save Configuration screen (1)



2. Select **Confirm** and press **Enter**.
3. Select **Yes** and press **Enter**, as shown in **Figure 4-41**.

   The message "The operation has been performed successfully." is displayed.

Figure 4-41 Save Configuration screen (2)

4. Select **OK** and press **Enter**.

Step 9 Check the configuration result.

1. Press **Esc** to return to the previous screen.
2. Select **Virtual Drive Management** and press **Enter**.
   Current RAID information is displayed.

----End

4.7 Creating RAID 50

Scenarios

NOTICE

- Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or the data does not need to be retained.
- The RAID controller card supports SAS/SATA HDDs and SAS/SATA SSDs. Drives in a RAID array must use drives with the same interface and medium, but they can have different capacities or come from different manufacturers.
- The drives must be compatible with the server. For details about the drives supported by servers, see the *Compatibility List* on the Technical Support Website.
- For details about the number of drives required for each RAID level, see **3.1 RAID 0, 1, 5, 6, 10, 50, and 60**.

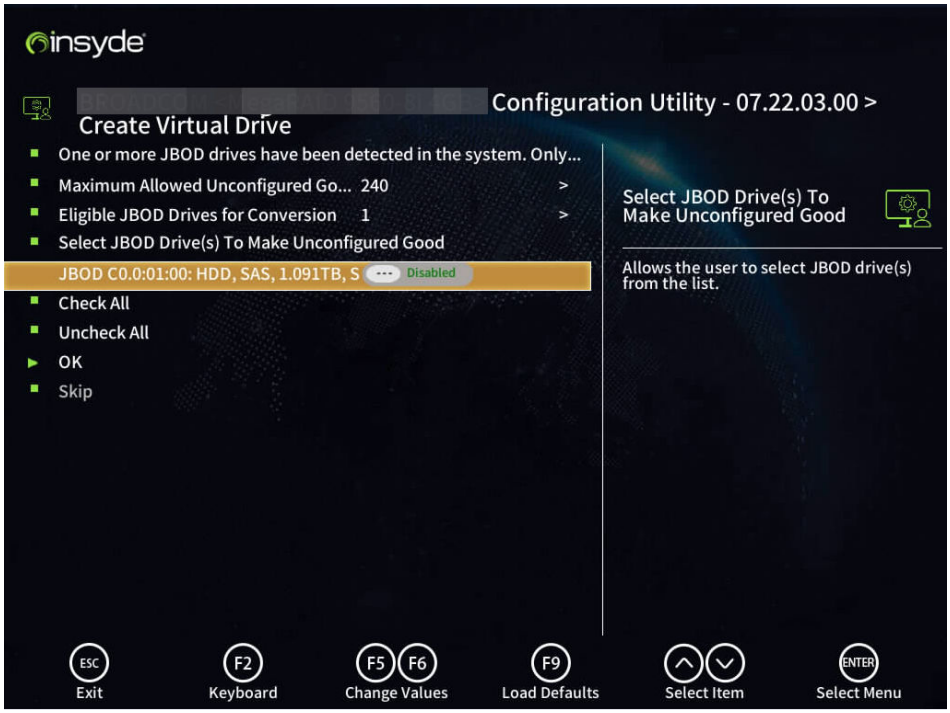
Procedure

Step 1 Back up data on drives and access the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Create Virtual Drive** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Configuration Management** and press **Enter**.
3. Select **Create Virtual Drive** and press **Enter**.
   – When all the drives are in the **JBOD** status, as shown in **Figure 4-42**, select the drives to be added to the RAID array, press **Enter**, click **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the selected drives to the **Unconfigured Good** status. The RAID array configuration screen is displayed.

Figure 4-42 Create Virtual Drive screen (1)



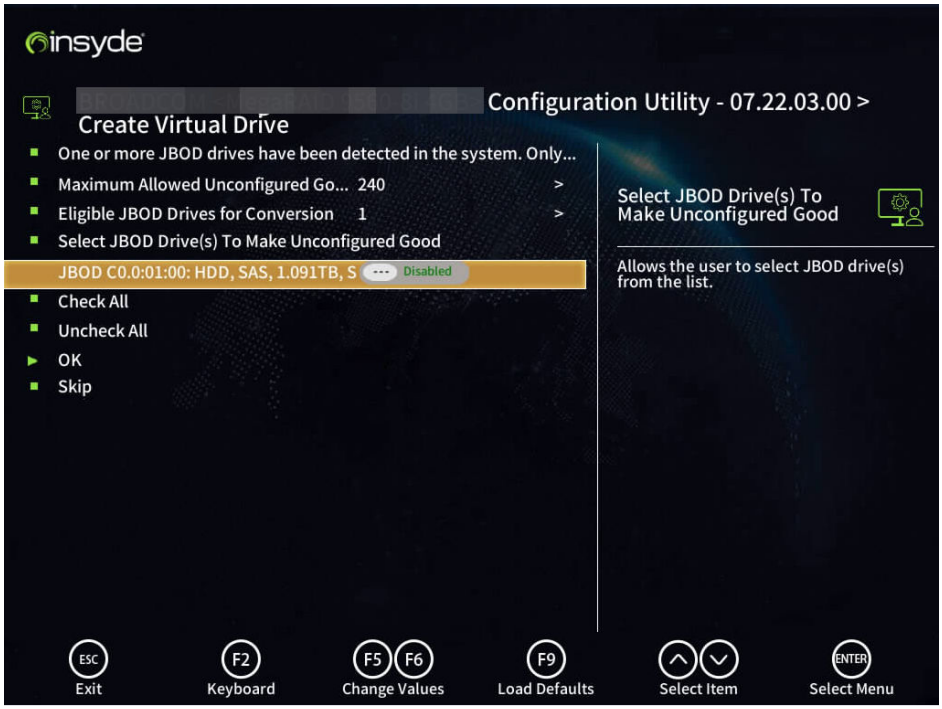
NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When both **JBOD** and **Unconfigured Good** drives exist, as shown in **Figure 4-43**, if you want to set the JBOD drives to the **Unconfigured Good** state, select the JBOD drives to be added to the RAID array, press **Enter**, select **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the status of the JBOD drives to **Unconfigured Good**. The RAID array configuration screen is displayed. If

you do not need to change the status of the JBOD drives, select **Skip** and press **Enter**. The RAID array configuration screen is displayed.

Figure 4-43 Create Virtual Drive screen (2)



NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When all the drives are in the **Unconfigured Good** status, the RAID array configuration screen is displayed, as shown in **Figure 4-44** and **Figure 4-45**. **Table 4-12** describes the parameters on the screen.

Figure 4-44 Creating a virtual drive (3)

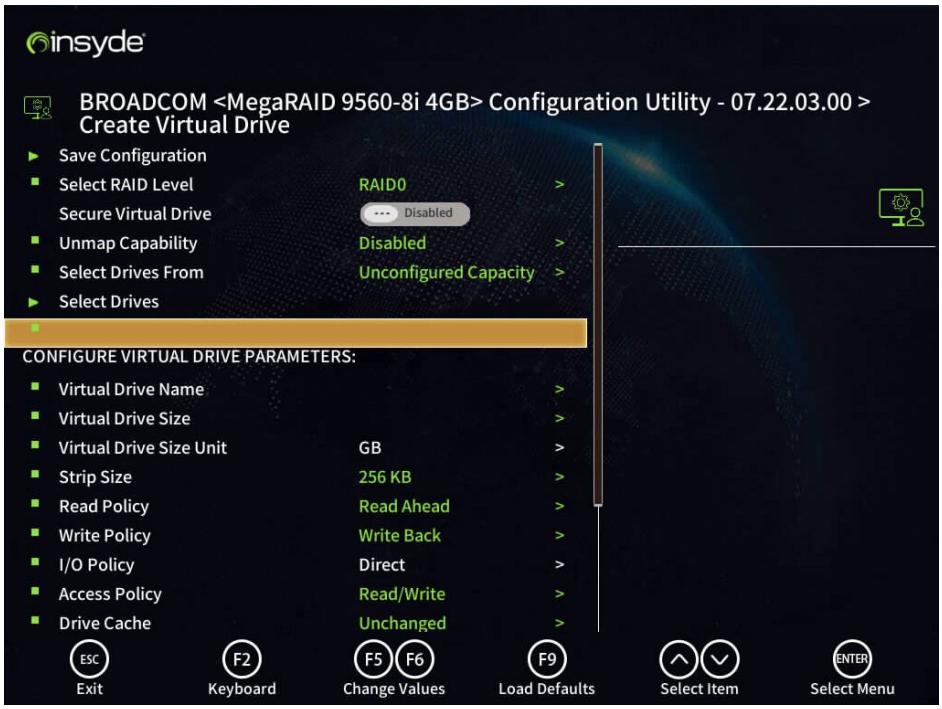


Figure 4-45 Creating a virtual drive (4)

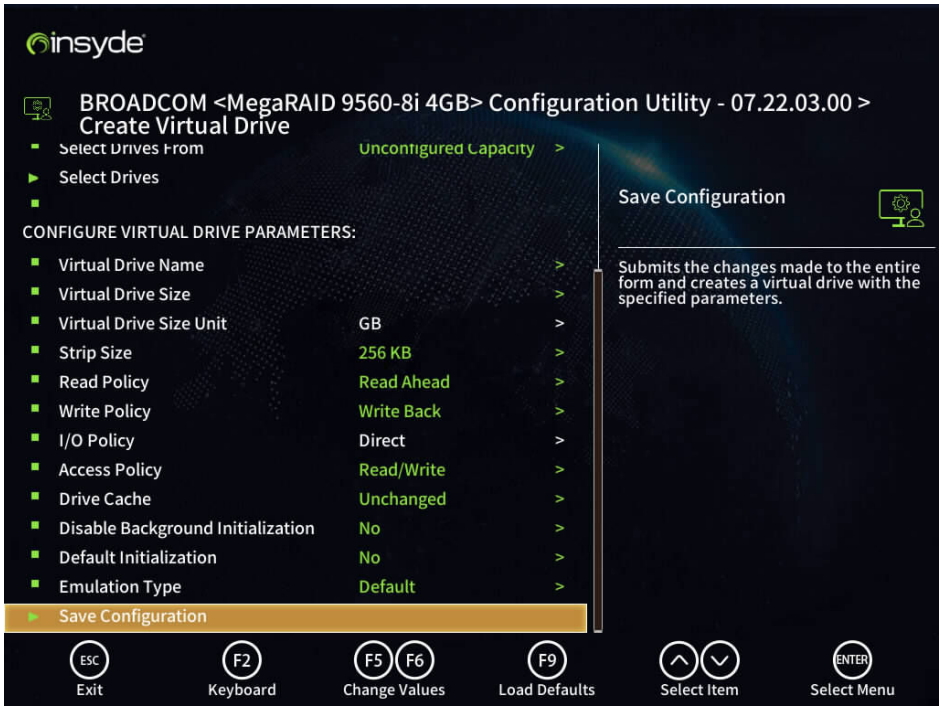


Table 4-12 Parameter description

Parameter	Description
Select RAID Level	Selects a RAID level.

Parameter	Description
Secure Virtual Drive	Specifies whether to enable the security virtual driver.
Unmap Capability	Specifies whether the virtual drive unmapping function is enabled. – Enabled – Disabled
Select Drives From	Specifies where the virtual member drives come from. The values include: – **Unconfigured Capacity**: idle drives that are not added to any virtual drives – **Free Capacity**: remaining space of the virtual drives
Select Drives	Selects the member drives to be added.
Virtual Drive Name	Specifies the name of a virtual drive.
Virtual Drive Size	Specifies the capacity of a virtual drive. The value is the maximum capacity supported by default. **NOTE** To create multiple virtual drives, set the capacity of the first virtual drive as required. After creating the first virtual drive, see **5.11 Creating Multiple Virtual Drives** to add other virtual drives.
Virtual Drive Size Unit	Specifies the unit of the virtual drive capacity.
Strip Size	Specifies the size of a virtual drive strip. Its value can be **64 KB**, **128 KB**, **256 KB**, **512 KB**, or **1 MB**. The default value is **256 KB**.
Read Policy	Specifies the read policy of a virtual drive. The options are as follows: – **No Read Ahead**: disables the Read Ahead function. – **Read Ahead**: enables the Read Ahead function. The controller pref-reads sequential data or the data predicted to be used and saves it in the cache. **NOTE** To achieve optimal drive performance, set the read policy to **Read Ahead** for HDDs and **No Read Ahead** for SSDs.

Parameter	Description
Write Policy	Specifies the write policy of a virtual drive. The options are as follows: – **Write Back**: When the controller cache receives all data, the controller sends the host a message indicating that data transmission is complete. If the RAID controller card does not have a supercapacitor or has a damaged supercapacitor, or the RAID controller card is on charge or discharge, the write policy is automatically switched to the Write Through mode. – **Write Through**: When the drive subsystem receives all data, the controller sends the host a message indicating that data transmission is complete. – **Always Write Back**: The controller enters the **Write Back** mode when supercapacitor is absent or faulty. **NOTE** – In **Always Write Back** mode, DDR (Cache) write data of the RAID controller card will be lost when the server is powered off and the supercapacitor is faulty, uninstalled, or charging. This mode is not recommended. – To achieve optimal drive performance, set the write policy to **Write Back** for HDDs and **Write Through** for SSDs.
I/O Policy	Specifies the I/O policy of a virtual drive. **NOTE** The 9560-8i RAID controller card does not support setting of this parameter.
Access Policy	Specifies the data access policy. The options are as follows: – **Read/Write**: Read and write operations are allowed. – **Read Only**: The virtual drive is read-only. – **Blocked**: The virtual drive is blocked from access.

Parameter	Description
Drive Cache	Specifies the cache policy for the physical drives. The options are as follows: – **Unchanged**: uses the current cache policy. – **Enable**: writes data to the cache before writing data to the drive. This option improves data write performance. However, data will be lost if there is no protection mechanism against power failures. – **Disable**: writes data to a drive without caching the data. Data is not lost if power failures occur.
Disable Background Initialization	Enables or disables background initialization. – **Yes**: background initialization is disabled. – **No**: background initialization is enabled. Default value: **No**.
Default Initialization	Specifies the default initialization mode. The options are as follows: – **No**: do not perform initialization. – **Fast**: perform fast initialization. – **Full**: perform full initialization. It is **No** by default.
Emulation Type	Sets the sector size reported to the OS. – **Default**: If there are any 512e drives in member drives, the physical sector size is 512e (4k). If there are no 512e drives, the physical sector size is 512n. – **Disable**: If there are no 512e drives in member drives, the physical sector size is 512n. – **Force**: Even though there are no 512e drives in member drives, the physical sector size is still 512e (4k). The default value is **Default**.
Save Configuration	Saves the settings.

Step 3 Select a RAID level.

1. Use ↑ and ↓ to select **Select RAID Level** and press **Enter**.
2. Select **RAID 50** and press **Enter**.

Step 4 Create span 1.

1. Use ↑ and ↓ to select **Select Drives From** and press **Enter**.

2. Select the source of member drives and press **Enter**.

   In this example, **Unconfigured Capacity** is selected.

3. Use ↑ and ↓ to select **Select Drives** and press **Enter**.

   The screen for adding member drives is displayed, as shown in **Figure 4-46**. **Table 4-13** describes the parameters on the screen.

Figure 4-46 Adding member drives

Table 4-13 Parameter description

Parameter	Description
Select Media Type	Selects a drive medium.
Select Interface Type	Specifies the type of a drive interface.
Logical Sector Size	Specifies the size of a logical sector.
Check All	Selects all drives.
Uncheck All	Deselects all drives.
Apply Changes	Saves the settings.

4. Set the filter criteria based on **Table 4-13**.
5. Use ↑ and ↓ to select the drive to be added and press **Enter**.

NOTE

- A drive is selected if its state is **Enabled**.
- A RAID 50 array supports 2 to 8 spans. Each span supports 3 to 32 drives. The number of drives in each span must be the same.
- A RAID 50 array supports 6 to 240 drives.
- If the total number of drives in all RAID arrays under a RAID controller card exceeds 240, no drive can be added to the RAID arrays.

6. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.

7. Select **OK** and press **Enter**.

Step 5 Create span 2.

Configure multiple spans for RAID 50. **Figure 4-47** shows the configuration screen.

Figure 4-47 RAID 50 configuration screen

1. Select **Add More Spans** and press **Enter**.
2. Select **Select Drives** and press **Enter**.
3. Select the member drives of span 2.

   NOTE

   The number of drives in each span must be the same.

4. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.

5. Select **OK** and press **Enter**.

Step 6 Repeat **Step 5** to create multiple spans on idle drives.

NOTE

At least two spans must be created for a RAID 50 array. A maximum of eight spans can be created.

Step 7 Set other properties of the virtual drive based on **Table 4-2**.

NOTE

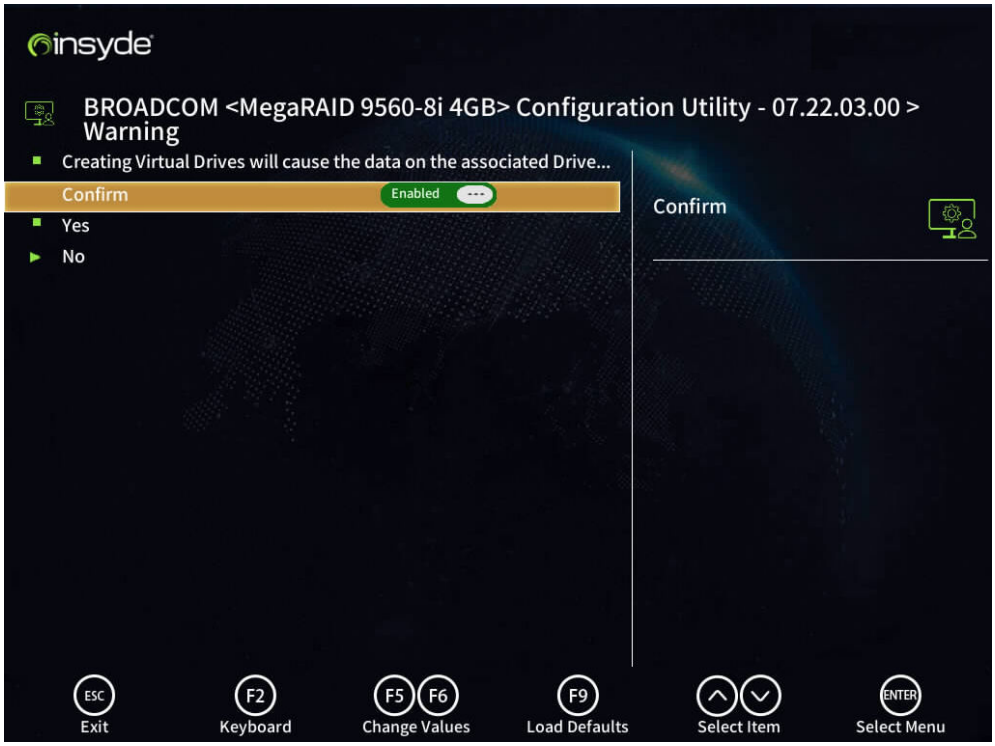
To create multiple virtual drives, set **Virtual Drive Size** as required. After creating the first virtual drive, add other virtual drives. For details, see **5.11 Creating Multiple Virtual Drives**.

Step 8 Save the settings.

1. Use ↑ and ↓ to select **Save Configuration** and press **Enter**, as shown in **Figure 4-48**.

   A confirmation screen is displayed.

Figure 4-48 Save Configuration screen (1)



2. Select **Confirm** and press **Enter**.
3. Select **Yes** and press **Enter**, as shown in **Figure 4-49**.

   The message "The operation has been performed successfully." is displayed.

Figure 4-49 Save Configuration screen (2)

4. Select **OK** and press **Enter**.

Step 9 Check the configuration result.

1. Press **Esc** to return to the previous screen.
2. Select **Virtual Drive Management** and press **Enter**.
   Current RAID information is displayed.

----End

4.8 Creating RAID 60

Scenarios

NOTICE

- Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or the data does not need to be retained.
- The RAID controller card supports SAS/SATA HDDs and SAS/SATA SSDs. Drives in a RAID array must use drives with the same interface and medium, but they can have different capacities or come from different manufacturers.
- The drives must be compatible with the server. For details about the drives supported by servers, see the *Compatibility List* on the Technical Support Website.
- For details about the number of drives required for each RAID level, see **3.1 RAID 0, 1, 5, 6, 10, 50, and 60**.

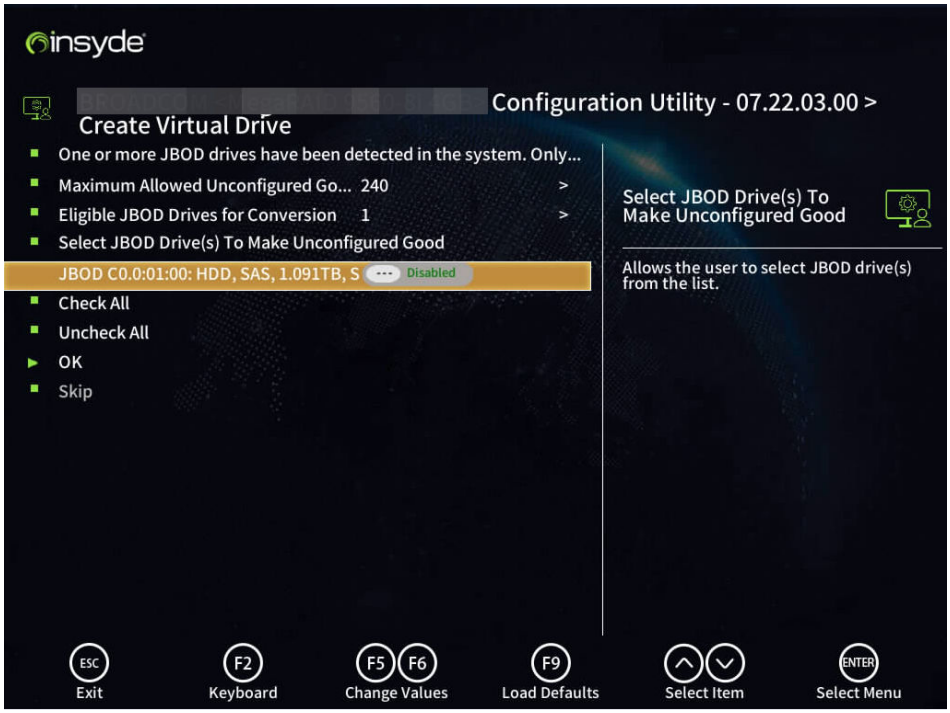
Procedure

Step 1 Back up data on drives and access the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Create Virtual Drive** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Configuration Management** and press **Enter**.
3. Select **Create Virtual Drive** and press **Enter**.
   – When all the drives are in the **JBOD** status, as shown in **Figure 4-50**, select the drives to be added to the RAID array, press **Enter**, click **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the selected drives to the **Unconfigured Good** status. The RAID array configuration screen is displayed.

Figure 4-50 Create Virtual Drive screen (1)



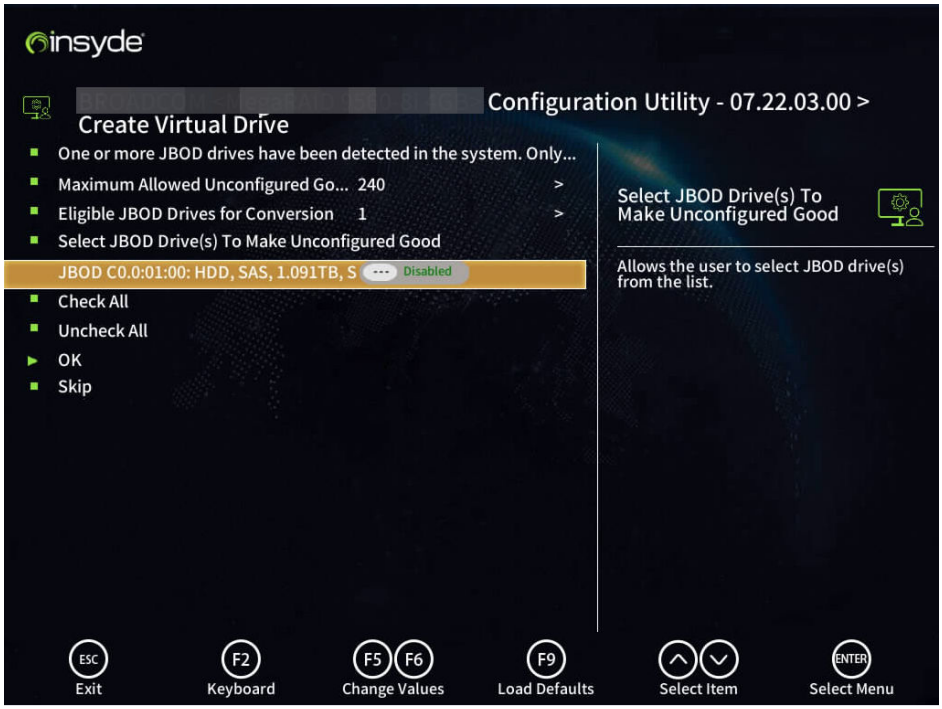
NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When both **JBOD** and **Unconfigured Good** drives exist, as shown in **Figure 4-51**, if you want to set the JBOD drives to the **Unconfigured Good** state, select the JBOD drives to be added to the RAID array, press **Enter**, select **OK**, and press **Enter**, a confirmation screen is displayed, select **Confirm** and press **Enter** again to set the status of the JBOD drives to **Unconfigured Good**. The RAID array configuration screen is displayed. If

you do not need to change the status of the JBOD drives, select **Skip** and press **Enter**. The RAID array configuration screen is displayed.

Figure 4-51 Create Virtual Drive screen (2)



NOTICE

Data will be cleared from the drives added to a RAID array. Before creating an array, check that the drives to be added have no data or that the data does not need to be retained.

– When all the drives are in the **Unconfigured Good** status, the RAID array configuration screen is displayed, as shown in **Figure 4-52** and **Figure 4-53**. **Table 4-14** describes the parameters on the screen.

Figure 4-52 Creating a virtual drive (3)

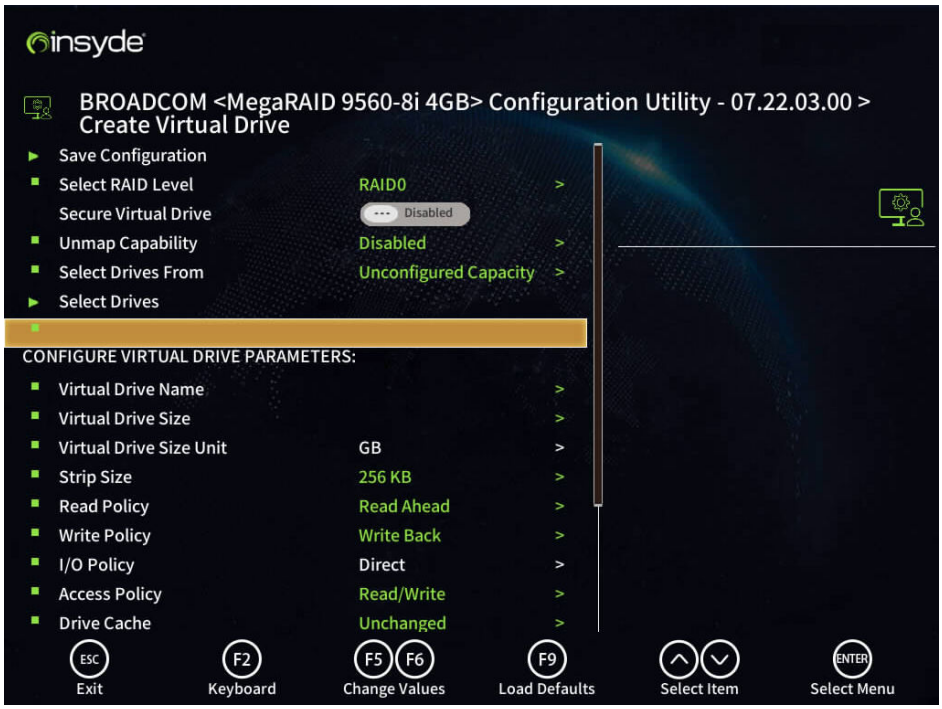


Figure 4-53 Creating a virtual drive (4)

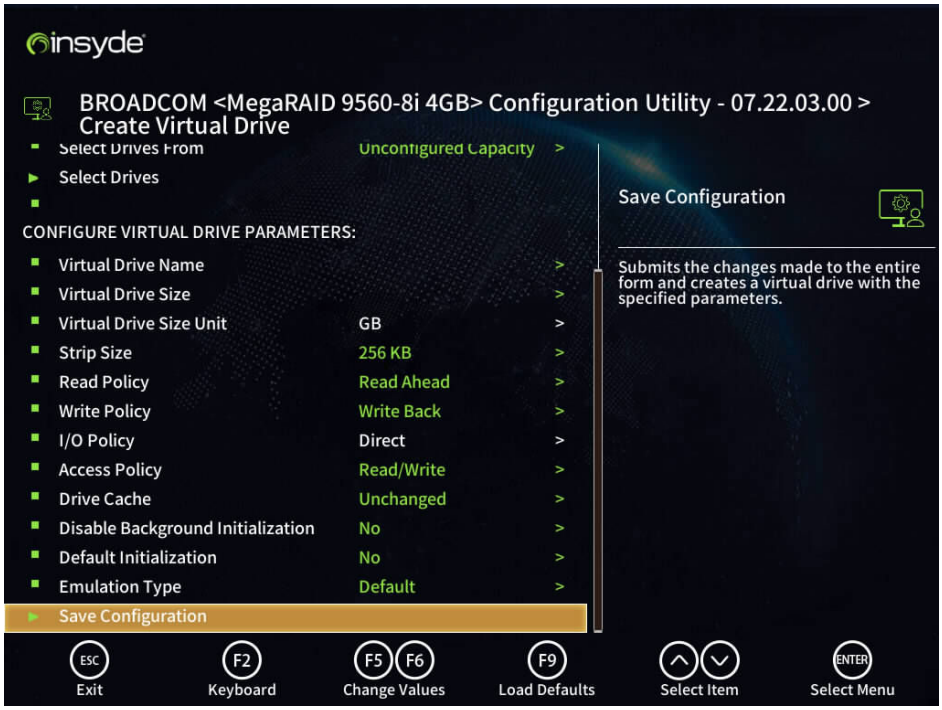


Table 4-14 Parameter description

Parameter	Description
Select RAID Level	Selects a RAID level.

Parameter	Description
Secure Virtual Drive	Specifies whether to enable the security virtual driver.
Unmap Capability	Specifies whether the virtual drive unmapping function is enabled. – Enabled – Disabled
Select Drives From	Specifies where the virtual member drives come from. The values include: – **Unconfigured Capacity**: idle drives that are not added to any virtual drives – **Free Capacity**: remaining space of the virtual drives
Select Drives	Selects the member drives to be added.
Virtual Drive Name	Specifies the name of a virtual drive.
Virtual Drive Size	Specifies the capacity of a virtual drive. The value is the maximum capacity supported by default. **NOTE** To create multiple virtual drives, set the capacity of the first virtual drive as required. After creating the first virtual drive, see **5.11 Creating Multiple Virtual Drives** to add other virtual drives.
Virtual Drive Size Unit	Specifies the unit of the virtual drive capacity.
Strip Size	Specifies the size of a virtual drive strip. Its value can be **64 KB**, **128 KB**, **256 KB**, **512 KB**, or **1 MB**. The default value is **256 KB**.
Read Policy	Specifies the read policy of a virtual drive. The options are as follows: – **No Read Ahead**: disables the Read Ahead function. – **Read Ahead**: enables the Read Ahead function. The controller pref-reads sequential data or the data predicted to be used and saves it in the cache. **NOTE** To achieve optimal drive performance, set the read policy to **Read Ahead** for HDDs and **No Read Ahead** for SSDs.

Parameter	Description
Write Policy	Specifies the write policy of a virtual drive. The options are as follows: – **Write Back**: When the controller cache receives all data, the controller sends the host a message indicating that data transmission is complete. If the RAID controller card does not have a supercapacitor or has a damaged supercapacitor, or the RAID controller card is on charge or discharge, the write policy is automatically switched to the Write Through mode. – **Write Through**: When the drive subsystem receives all data, the controller sends the host a message indicating that data transmission is complete. – **Always Write Back**: The controller enters the **Write Back** mode when supercapacitor is absent or faulty. **NOTE** – In **Always Write Back** mode, DDR (Cache) write data of the RAID controller card will be lost when the server is powered off and the supercapacitor is faulty, uninstalled, or charging. This mode is not recommended. – To achieve optimal drive performance, set the write policy to **Write Back** for HDDs and **Write Through** for SSDs.
I/O Policy	Specifies the I/O policy of a virtual drive. **NOTE** The 9560-8i RAID controller card does not support setting of this parameter.
Access Policy	Specifies the data access policy. The options are as follows: – **Read/Write**: Read and write operations are allowed. – **Read Only**: The virtual drive is read-only. – **Blocked**: The virtual drive is blocked from access.

Parameter	Description
Drive Cache	Specifies the cache policy for the physical drives. The options are as follows: – **Unchanged**: uses the current cache policy. – **Enable**: writes data to the cache before writing data to the drive. This option improves data write performance. However, data will be lost if there is no protection mechanism against power failures. – **Disable**: writes data to a drive without caching the data. Data is not lost if power failures occur.
Disable Background Initialization	Enables or disables background initialization. – **Yes**: background initialization is disabled. – **No**: background initialization is enabled. Default value: **No**.
Default Initialization	Specifies the default initialization mode. The options are as follows: – **No**: do not perform initialization. – **Fast**: perform fast initialization. – **Full**: perform full initialization. It is **No** by default.
Emulation Type	Sets the sector size reported to the OS. – **Default**: If there are any 512e drives in member drives, the physical sector size is 512e (4k). If there are no 512e drives, the physical sector size is 512n. – **Disable**: If there are no 512e drives in member drives, the physical sector size is 512n. – **Force**: Even though there are no 512e drives in member drives, the physical sector size is still 512e (4k). The default value is **Default**.
Save Configuration	Saves the settings.

Step 3 Select a RAID level.

1. Use ↑ and ↓ to select **Select RAID Level** and press **Enter**.
2. Select **RAID 60** and press **Enter**.

Step 4 Create span 1.

1. Use ↑ and ↓ to select **Select Drives From** and press **Enter**.

2. Select the source of member drives and press **Enter**.

   In this example, **Unconfigured Capacity** is selected.

3. Use ↑ and ↓ to select **Select Drives** and press **Enter**.

   The screen for adding member drives is displayed, as shown in **Figure 4-54**. **Table 4-15** describes the parameters on the screen.

Figure 4-54 Adding member drives

Table 4-15 Parameter description

Parameter	Description
Select Media Type	Selects a drive medium.
Select Interface Type	Specifies the type of a drive interface.
Logical Sector Size	Specifies the size of a logical sector.
Check All	Selects all drives.
Uncheck All	Deselects all drives.
Apply Changes	Saves the settings.

4. Set the filter criteria based on **Table 4-15**.
5. Use ↑ and ↓ to select the drive to be added and press **Enter**.

NOTE

- A drive is selected if its state is **Enabled**.
- A RAID 60 array supports 2 to 8 spans. Each span supports 4 to 32 drives. The number of drives in each span must be the same.
- A RAID 60 array supports 8 to 240 drives.
- If the total number of drives in all RAID arrays under a RAID controller card exceeds 240, no drive can be added to the RAID arrays.

6. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.

7. Select **OK** and press **Enter**.

Step 5 Create span 2.

Configure multiple spans for RAID 60. **Figure 4-55** shows the configuration screen.

Figure 4-55 RAID 60 configuration screen

1. Select **Add More Spans** and press **Enter**.
2. Select **Select Drives** and press **Enter**.
3. Select the member drives of span 2.

   NOTE

   The number of drives in each span must be the same.

4. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.

5. Select **OK** and press **Enter**.

Step 6 Repeat **Step 5** to create multiple spans on idle drives.

NOTE

At least two spans must be created for a RAID 60 array. A maximum of eight spans can be created.

Step 7 Set other properties of the virtual drive based on **Table 4-2**.

NOTE

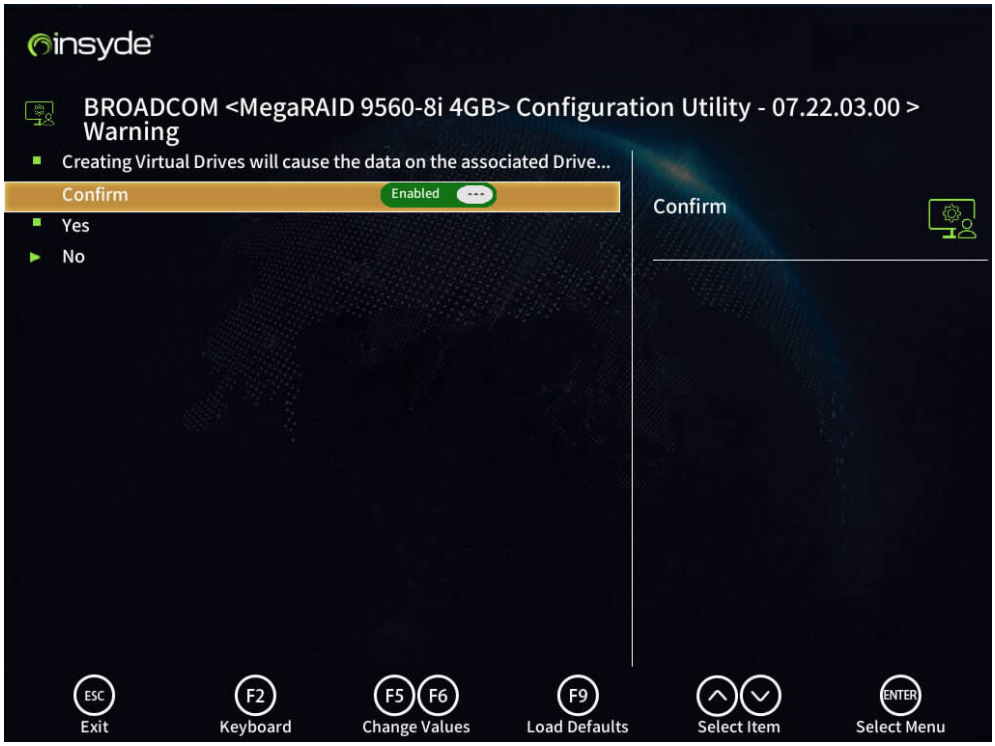
To create multiple virtual drives, set **Virtual Drive Size** as required. After creating the first virtual drive, add other virtual drives. For details, see **5.11 Creating Multiple Virtual Drives**.

Step 8 Save the settings.

1. Use ↑ and ↓ to select **Save Configuration** and press **Enter**, as shown in **Figure 4-56**.

   A confirmation screen is displayed.

Figure 4-56 Save Configuration screen (1)



2. Select **Confirm** and press **Enter**.
3. Select **Yes** and press **Enter**, as shown in **Figure 4-57**.

   The message "The operation has been performed successfully." is displayed.

Figure 4-57 Save Configuration screen (2)

4. Select **OK** and press **Enter**.

Step 9 Check the configuration result.

1. Press **Esc** to return to the previous screen.
2. Select **Virtual Drive Management** and press **Enter**.
   Current RAID information is displayed.

----End

4.9 Setting Boot Devices

4.9.1 Setting Boot Devices for a RAID Controller Card

Use **Select Boot Device**, as shown in **Figure 7-9**.

4.9.2 Setting Boot Devices for a Server

If a server is configured with one RAID controller card, the drive under the RAID controller card is the boot device for the server. For details, see **4.9.1 Setting Boot Devices for a RAID Controller Card**.

If the server is configured with multiple RAID controller cards, you need to set the boot device in the BIOS. For details, see "Common Operations > Setting the Server Boot Device" in the Server BIOS Parameter Reference.

5 Common Tasks

NOTE

The BIOS screen varies according to the platform. This section uses Eagle Stream as an example to describe initial configurations of the RAID controller card.

5.1 Managing Hot Spare Drives

After RAID configuration of the drives of a server, configuration of hot spare drives increases security and reduces impact on services from drive faults.

The 9560-8i supports two types of hot spare drives:

- Global hot spare drive: shared by all RAID arrays of a RAID controller card, which can be configured with one or more global hot spare drives. A global hot spare drive automatically replaces a failed drive in any RAID array.
- Dedicated hot spare drive: replaces a failed drive of the same type as the hot spare drive only in a specified RAID array, which can be configured with one or

more dedicated hot spare drives. A dedicated hot spare drive automatically replaces a failed drive of the same type in the specified RAID array.

NOTE

- The HDDs and SSDs cannot be used as the hot spare drives.
- The HDDs include SAS HDDs and SATA HDDS. If the member drives of a RAID array are SAS drives, the SATA drives can be used as dedicated hot spare drives. If the member drives are SATA drives, the SAS drives cannot be used as dedicated hot spare drives.
- An idle drive that is not added to a RAID array can be configured as a hot spare drive.
- The type of hot spare drives must be the same as that of the member drives in the RAID array, and the capacity of hot spare drives must be greater than or equal to the maximum capacity of the member drives in the RAID array.
- All RAID arrays, except RAID 0, support hot spare drive.
- You cannot directly change a global hot spare drive to a dedicated hot spare drive or vice versa. You need to set the drive to idle state, and then set it as a global or dedicated hot spare drive as required.

5.1.1 Configuring a Global Hot Spare Drive

Procedure

Step 1 Log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Drive Management** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Choose **Drive Management**, and press **Enter**.
3. Select a hot spare drive and press **Enter**. The drive detail screen is displayed, as shown in **Figure 5-1**.

Figure 5-1 Drive Management screen

Step 3 Set the drive as a global hot spare drive.

1. Set **Operation** to **Assign Global Hot Spare Drive**.
2. Select **Go** and press **Enter**.

   The message "The operation has been performed successfully" is displayed. Select **OK**.
3. Press **Esc** to finish the configuration and return to the previous screen. If the state of the drive is **Hot Spare** in the drive list, the drive is configured.

----End

5.1.2 Configuring a Dedicated Hot Spare Drive

Procedure

NOTE

If the member drives of a RAID array are SAS drives, the SATA drives can be used as dedicated hot spare drives. If the member drives of a RAID array are SATA drives, the SATA drives cannot be used as dedicated hot spare drives.

Step 1 Log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Drive Management** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Choose **Drive Management**, and press **Enter**.
3. Select a drive and press **Enter**. The drive detail screen is displayed, as shown in **Figure 5-2**.

Figure 5-2 Drive Management screen

Step 3 Configure a drive as a dedicated hot spare drive.

1. Set **Operation** to **Assign Dedicated Hot Spare Drive**.
2. Select **Go** and press **Enter**.

   The virtual drive list is displayed.
3. Select the virtual drive to be associated and press **Enter**.
4. Select **OK** and press **Enter**.

   The message "The operation has been performed successfully" is displayed. Select **OK**.
5. Press **Esc** to finish the configuration and return to the previous screen. If the state of the drive is **Hot Spare** in the drive list, the drive is configured.

----End

5.1.3 Deleting a Hot Spare Drive

Scenarios

If the number of member drives in a RAID array is insufficient, you can delete a hot spare drive to enable it to function as a common drive.

Procedure

Step 1 Log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Drive Management** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Choose **Drive Management**, and press **Enter**.
3. Select a hot spare drive and press **Enter**. The drive detail screen is displayed, as shown in **Figure 5-3**.

Figure 5-3 Drive Management screen

Step 3 Delete a hot spare drive.

1. Set **Operation** to **Unassign Hot Spare Drive**.
2. Select **Go** and press **Enter**.

   A confirmation screen is displayed.
3. Select **Confirm** and press **Enter**.
4. Select **Yes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.
5. Press **Esc** to finish the configuration and return to the previous screen.

----End

5.2 Setting the Emergency Hot Spare Function

Procedure

Step 1 Log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Advanced Controller Properties** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Choose **Controller Management**, and press **Enter**.
3. Select **Advanced Controller Properties** and press **Enter**.

   The **Advanced Controller Properties** screen is displayed, as shown in **Figure 5-4** and **Figure 5-5**.

Figure 5-4 Advanced Controller Properties screen (1)

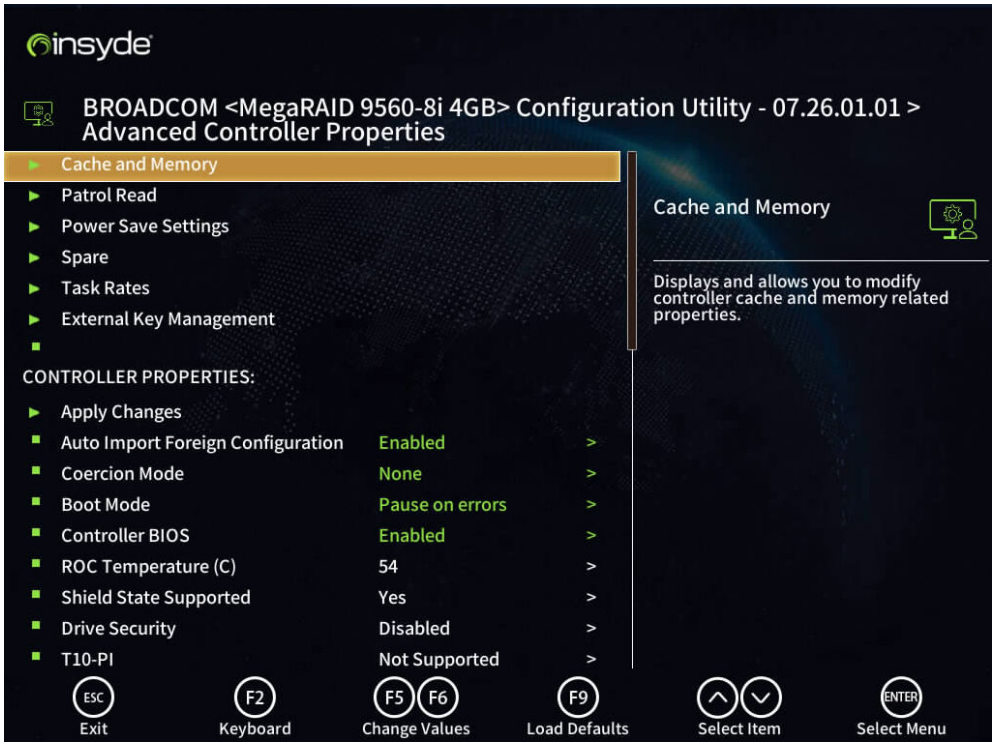
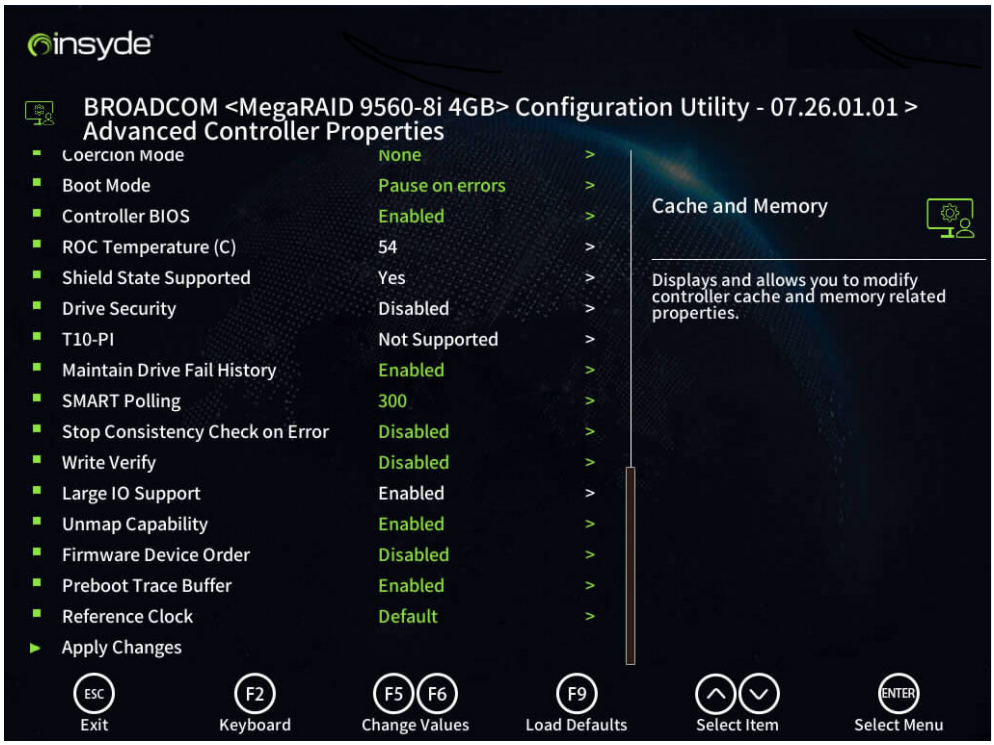


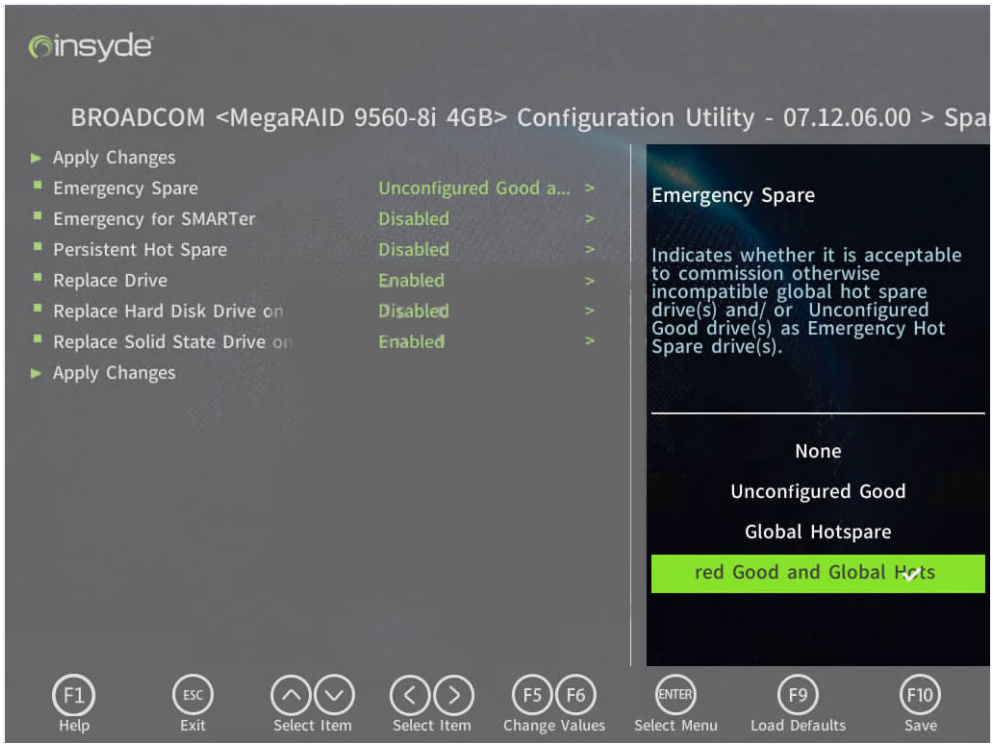
Figure 5-5 Advanced Controller Properties screen (2)



Step 3 Set an emergency spare drive.

1. Select **Spare** and press **Enter**.
2. Set **Emergency Spare** to **Unconfigured Good and Global Hotspare**, as shown in **Figure 5-6**.

Figure 5-6 Spare



3. Select **Apply Changes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.

4. Select **OK** and press **Enter**.

----End

5.3 Adding a Drive to a RAID Array

Scenarios

NOTICE

- Only RAID 0, RAID 1, RAID 5, and RAID 6 support capacity expansion through drive addition.
- RAID 10, RAID 50, and RAID 60 do not support capacity expansion through drive addition.
- If a RAID array contains two or more VDs, its capacity cannot be expanded through drive addition.
- The RAID controller card does not allow users to reconfigure two RAID arrays (that is, reconfigure virtual drives, including adding drives or migrating RAID levels) at the same time. Perform operations on the next RAID array after the current process is complete.
- Before adding drives for capacity expansion, ensure that there are drives in the **Unconfigured Good** state and not added to the RAID array yet.

If a drive fault occurs during capacity expansion through drive addition, the following will occur:

- If a RAID array has a failed drive but does not contain any redundant data (for example, a drive fails during RAID 0 capacity expansion), the RAID array fails.
- If a failed drive exists and the RAID array still contains redundant data (for example, during RAID 1 array expansion), the expansion continues. When the expansion is complete, replace the failed drive and rebuild the RAID array.

Perform capacity expansion through drive addition with caution.

Procedure

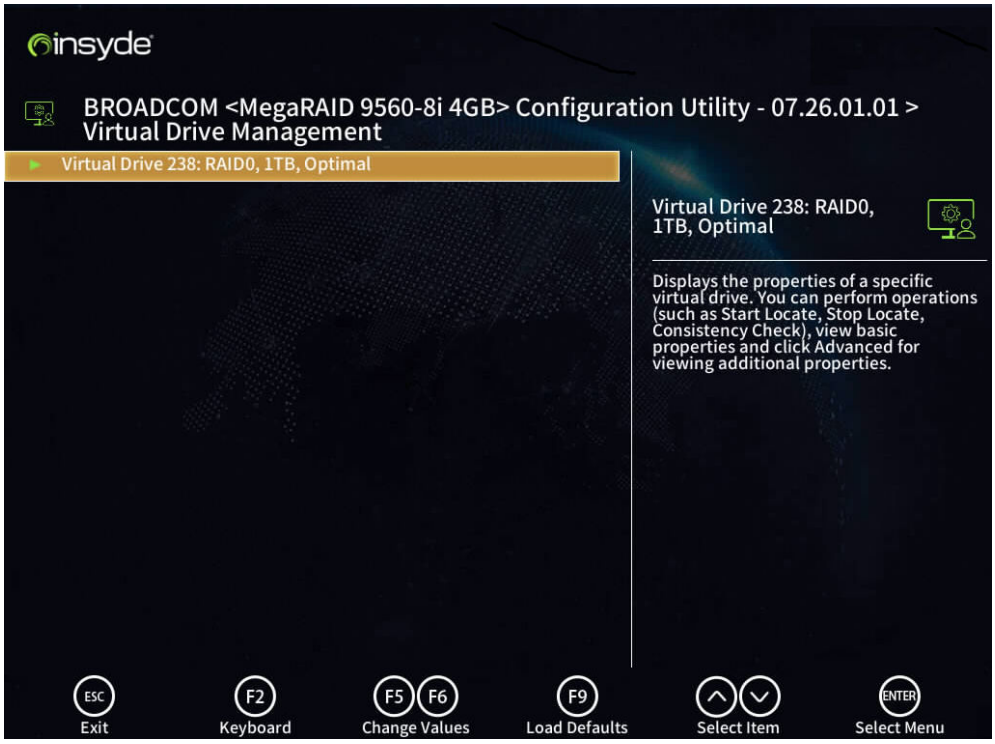
Step 1 Log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Virtual Drive Management** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. On the main screen, select **Virtual Drive Management** .

   The **Virtual Drive Management** screen is displayed, as shown in **Figure 5-7**.

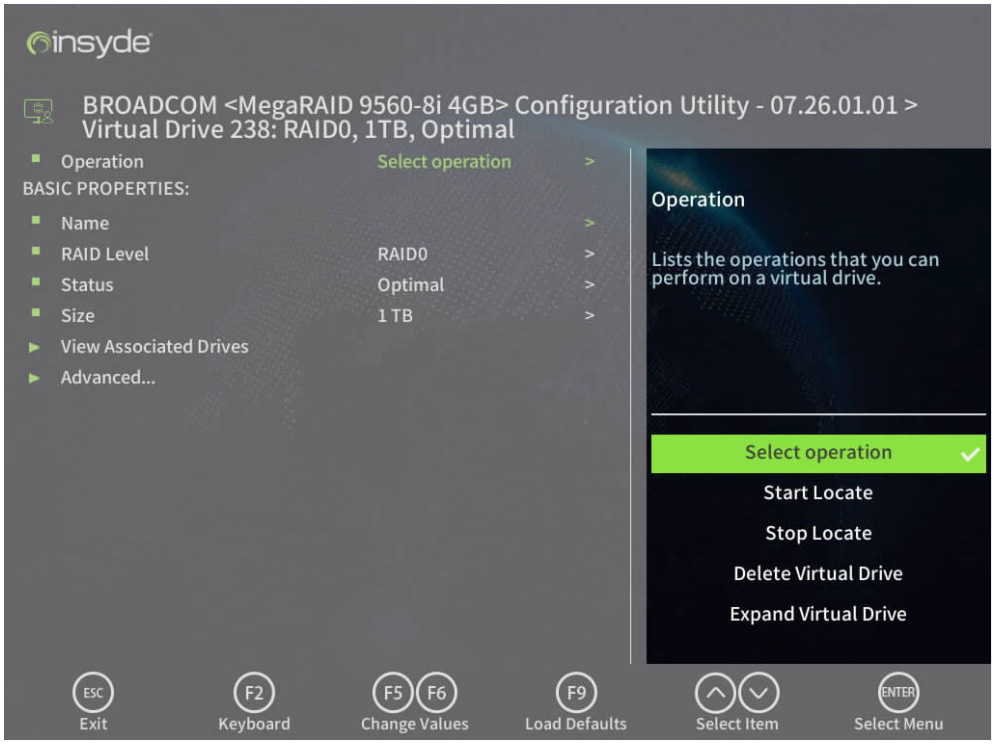
Figure 5-7 Virtual Drive Management screen



Step 3 Add drives.

1. Select the RAID array whose capacity is to be expanded and press **Enter**.
2. Select **Operation** and press **Enter**.
   The screen shown in **Figure 5-8** is displayed.

Figure 5-8 Options screen



3. Select **Reconfigure Virtual Drives** and press **Enter**.
4. Select **Go** and press **Enter**.
5. Select a RAID level.

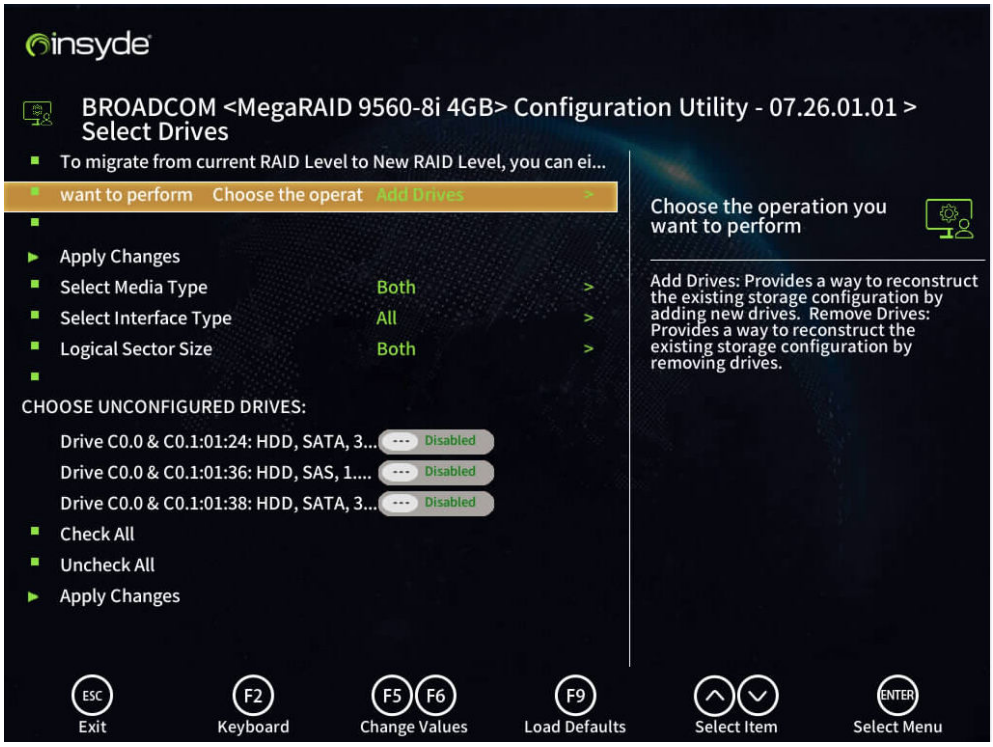
NOTICE

When adding drives to a RAID array for capacity expansion, ensure that the RAID level remains unchanged.

6. Select **Choose the Operation** and press **Enter**.

   The screen shown in **Figure 5-9** is displayed.

Figure 5-9 Choosing the operation



7. Select the drive to be added and press **Apply Changes**.

   A confirmation message is displayed.

   NOTE

   - The types and specifications of the drive to be added must be the same as those of the member drives in the RAID array. The capacity of the drive must be greater than or equal to the capacity of the smallest drive in the RAID array.
   - During capacity expansion, you need to add two drives to RAID 1 each time, and only one drive to RAID 0, RAID 5, or RAID 6 each time.
   - A RAID controller card does not support capacity expansion of two or more RAID arrays at the same time.

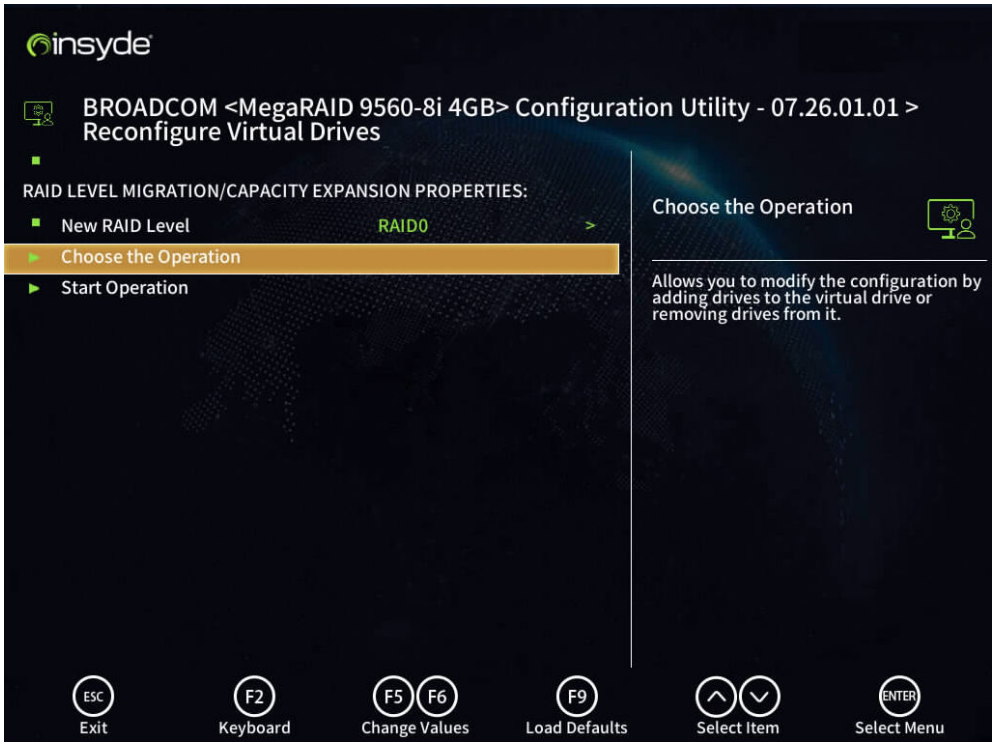
8. Select **Confirm** and press **Enter**.
9. Select **Yes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.

10. Select **OK** and press **Enter**.

    The screen shown in **Figure 5-10** is displayed.

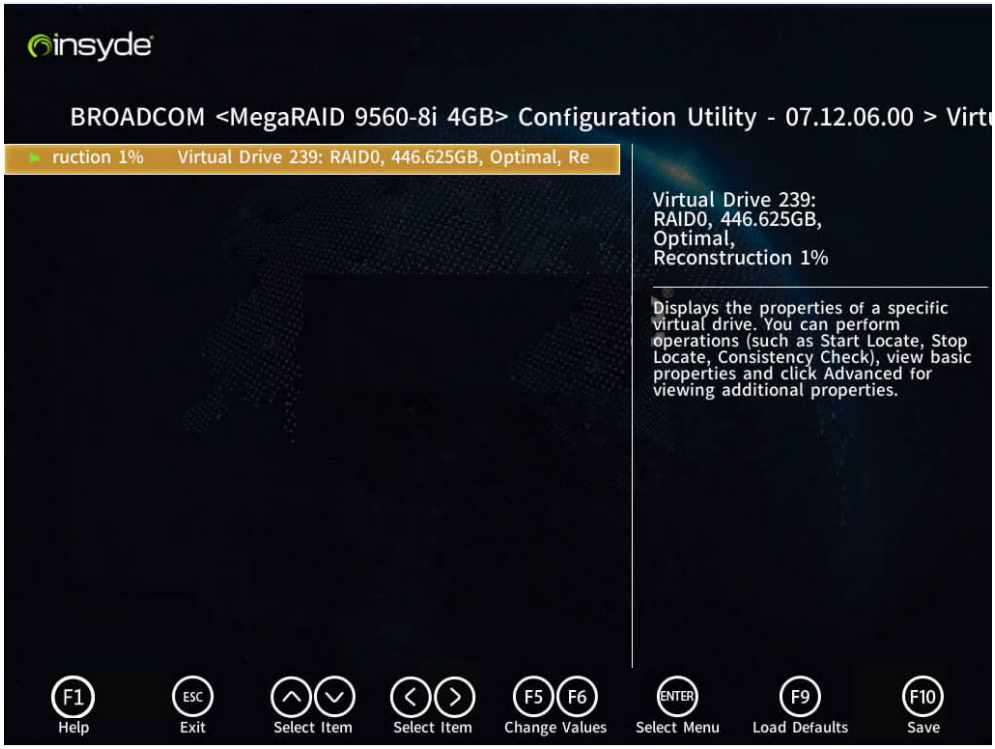
    Figure 5-10 Choosing the operation



11. Select **Start Operation** and press **Enter**.

    The system displays a message indicating that the operation is successful. Select **OK**. If information similar to **Figure 5-11** is displayed, RAID expansion is being performed.

Figure 5-11 Virtual Drive Management screen



----End

5.4 Expanding the Available Space of a Virtual Drive

Scenarios

Increase the available space of virtual drives if they do not occupy the entire capacity of all member drives.

Procedure

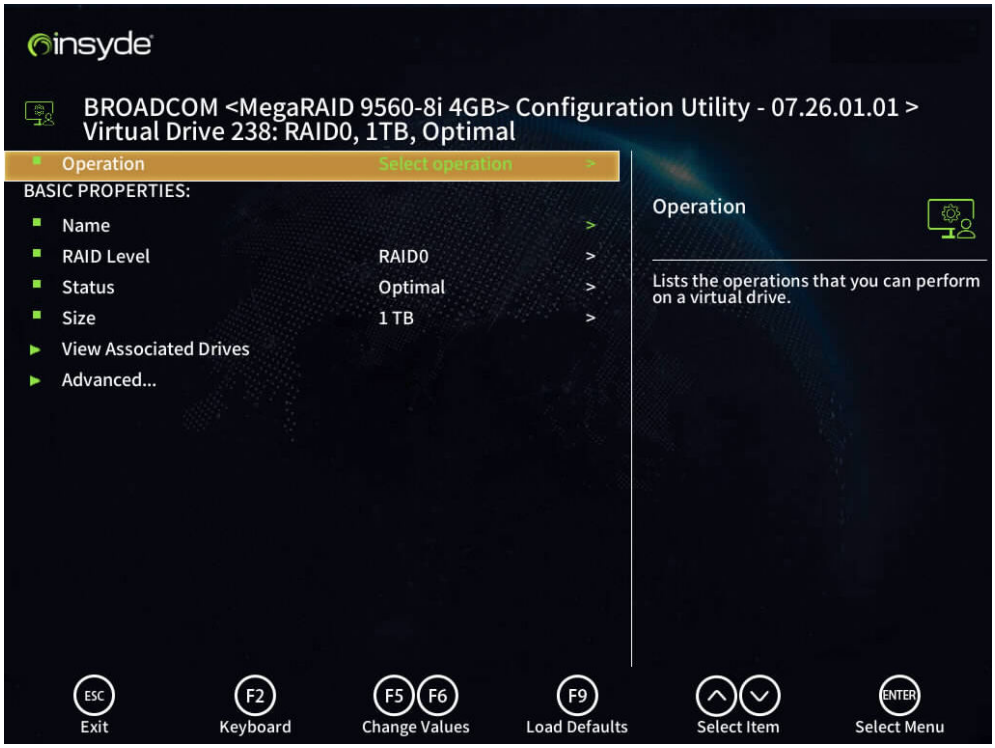
Step 1 Back up data on drives and log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Go to the screen of the target virtual drive.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Virtual Drive Management** and press **Enter**.
3. Select a virtual drive and press **Enter**.

   The basic information about the virtual drive is displayed, as shown in **Figure 5-12**.

Figure 5-12 Virtual Drive Management screen



Step 3 Expand the virtual drive capacity.

1. Set **Operation** to **Expand Virtual Drive**.
2. Select **Go** and press **Enter**.

   The virtual drive capacity expansion screen is displayed, as shown in **Figure 5-13**. **Table 5-1** describes the parameters on the screen.

Figure 5-13 Expand Virtual Drive screen

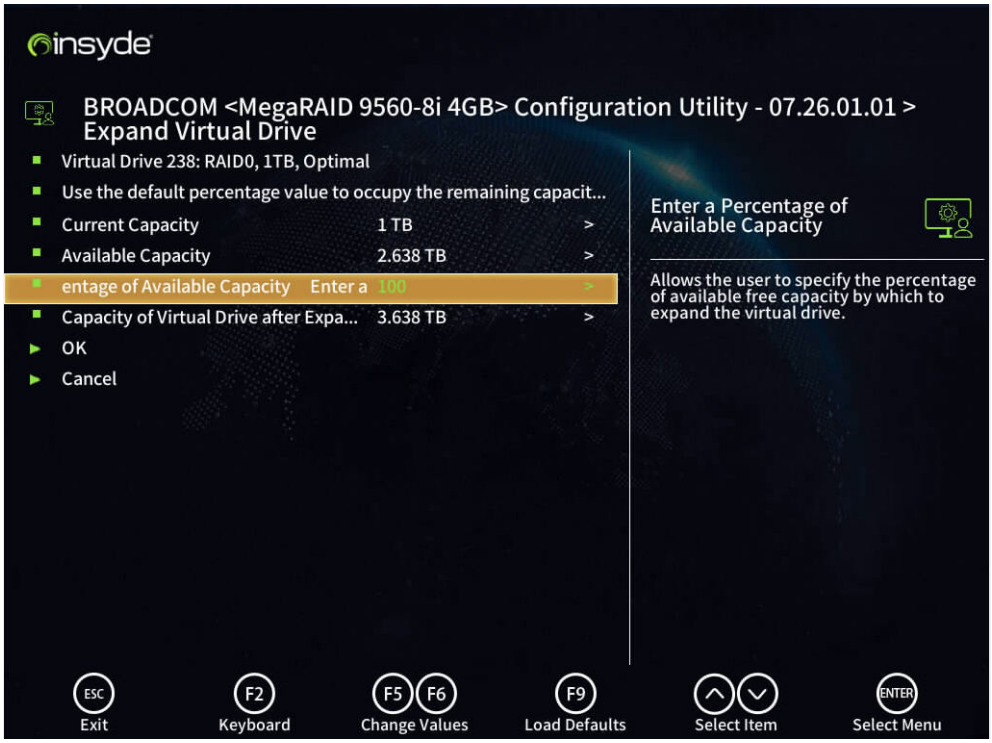


Table 5-1 Parameter description

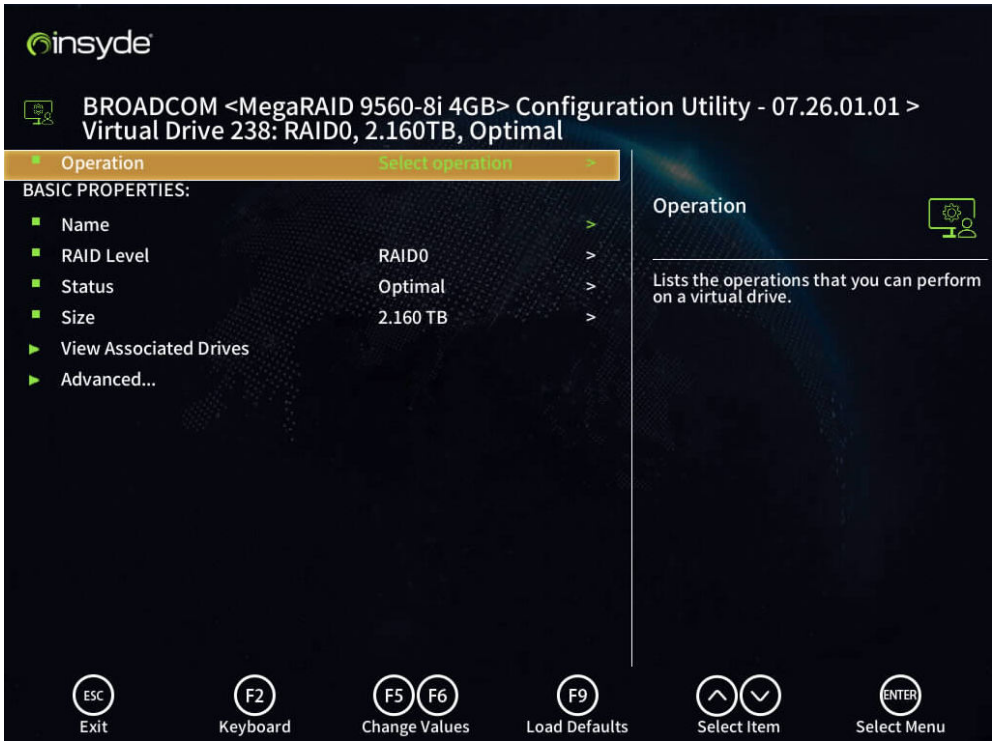
Parameter	Description
Current Capacity	Current capacity of the virtual drive
Available Capacity	Capacity that can be used for expansion
Enter a Percentage of Available Capacity	Capacity expansion percentage
Capacity of Virtual Drive after Expansion	Virtual drive capacity after expansion

3. Set the expansion percentage.
4. Select **OK** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.
5. Select **OK** and press **Enter** to finish the configuration and return to the previous screen.

   You can go to the **Virtual Drive Management** screen and check the capacity expansion result, as shown in **Figure 5-14**.

Figure 5-14 Checking the capacity expansion result



----End

5.5 Migrating RAID Level

Scenarios

RAID level migration is a process of converting one RAID configuration to another. RAID controller cards support RAID level migration as the data volume and number of drives increase in the system.

During RAID level migration of virtual drives, users can increase or keep the number of drives unchanged. You can use the WebBIOS to migrate RAID levels for existing virtual drives.

The 9560-8i supports the following RAID level migration options:

- Migrate RAID 0 to RAID 1, 5, or 6.
- Migrate RAID 1 to RAID 0, 5, or 6.
- Migrate RAID 5 to RAID 0 or 6.
- Migrate RAID 6 to RAID 0 or 5.

Table 3-2 lists the minimum numbers of drives to be added for RAID level migration.

NOTE

- If a RAID array contains two or more VDs, it does not support RAID level migration.
- The RAID controller card does not allow users to reconfigure two RAID arrays (that is, reconfigure virtual drives, including adding drives or migrating RAID levels) at the same time. Perform operations on the next RAID array after the current process is complete.
- Only drives of the same type and specifications as the member drives of the RAID array can be added.
- To avoid data loss, back up data in the current RAID array before RAID level migration.
- Only RAID arrays in the **Optimal** state can be migrated.

If a drive fault occurs during RAID level migration, the following may occur:

- If a RAID array has a failed drive but does not contain any redundant data (for example, a drive fails during RAID 0 level migration), the RAID array fails.
- If a failed drive exists and the RAID array still contains redundant data (for example, during RAID 1 array migration), the expansion continues. When the migration is complete, replace the failed drive and rebuild the RAID array.

Perform RAID level migration with caution.

Procedure

Step 1 Log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Virtual Drive Management** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Virtual Drive Management** and press **Enter**.
   The **Virtual Drive Management** screen is displayed, as shown in **Figure 5-15**.

Figure 5-15 Virtual Drive Management screen

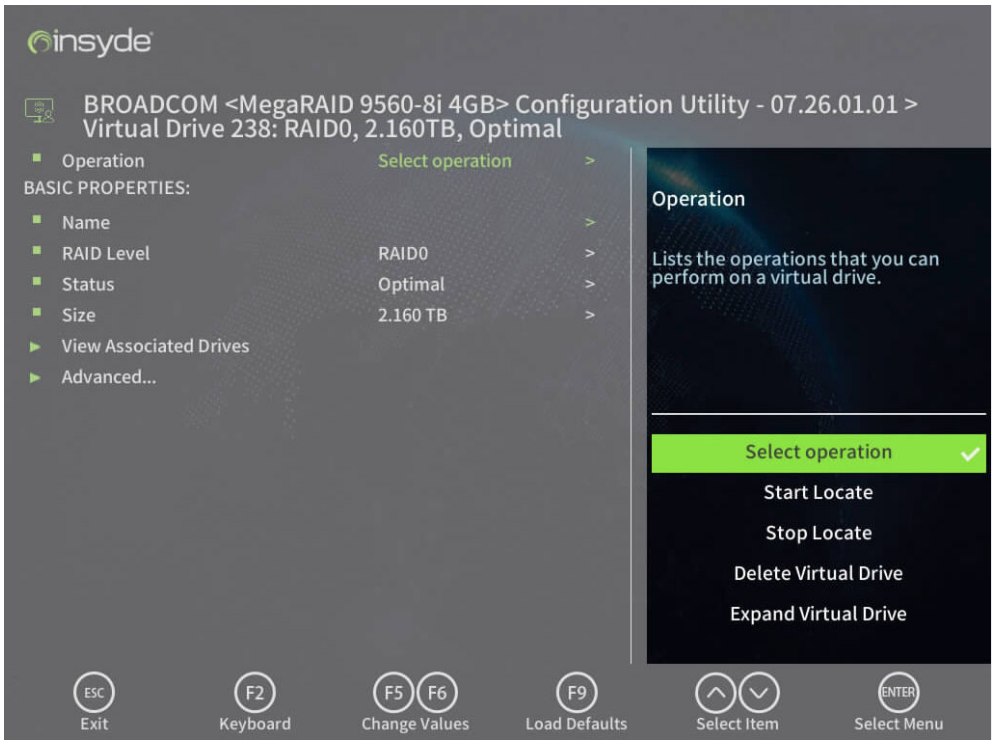
Step 3 Select a new RAID array level.

The following part describes migration from RAID 0 to RAID 1.

1. Select the RAID array to be migrated and press **Enter**.
2. Select **Operation** and press **Enter**.

   The **Operation** screen is displayed, as shown in **Figure 5-16**.

Figure 5-16 Options screen



3. Select **Reconfigure Virtual Drives** and press **Enter**.
4. Select **Advanced...** and press **Enter** to set other properties for the RAID array, as shown in **Figure 5-17** and **Figure 5-18**. If the parameters are not set, the settings of the original RAID array are used by default.

Figure 5-17 Advanced... screen (1)

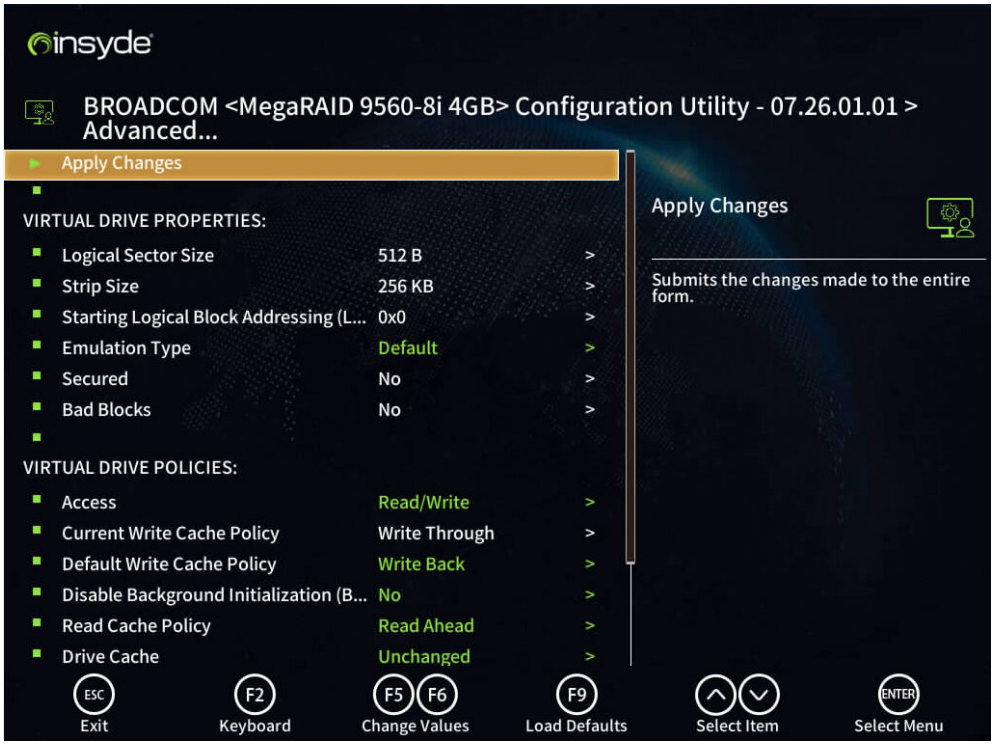
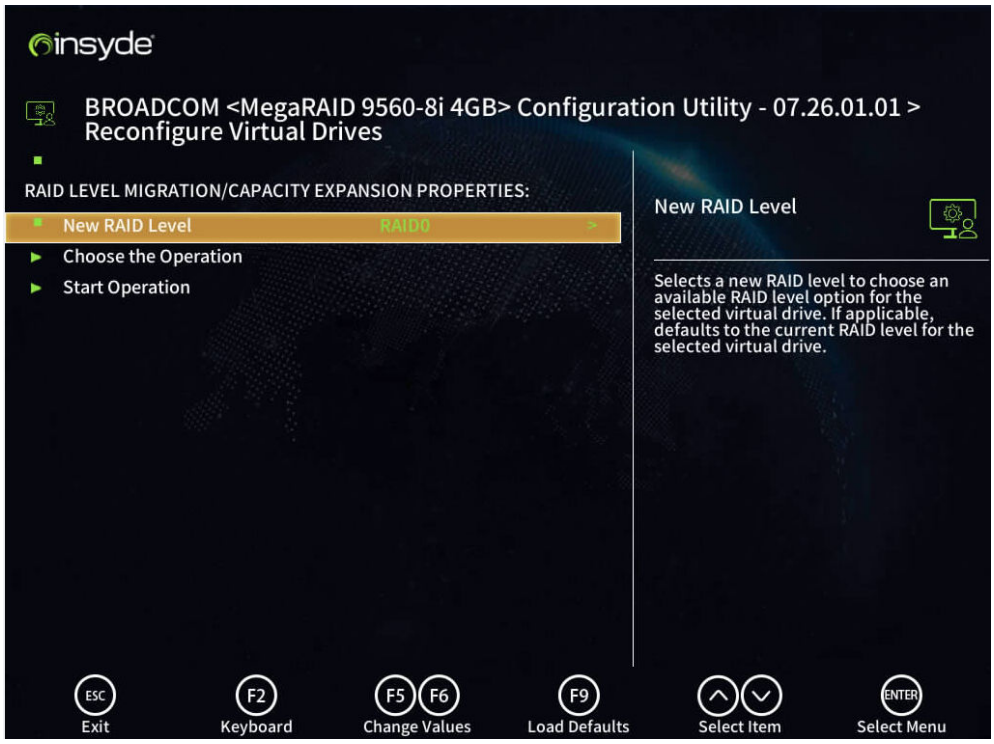


Figure 5-18 Advanced... screen (2)

5. Select **Go** and press **Enter**.

   The **Reconfigure Virtual Drives** screen is displayed, as shown in **Figure 5-19**.

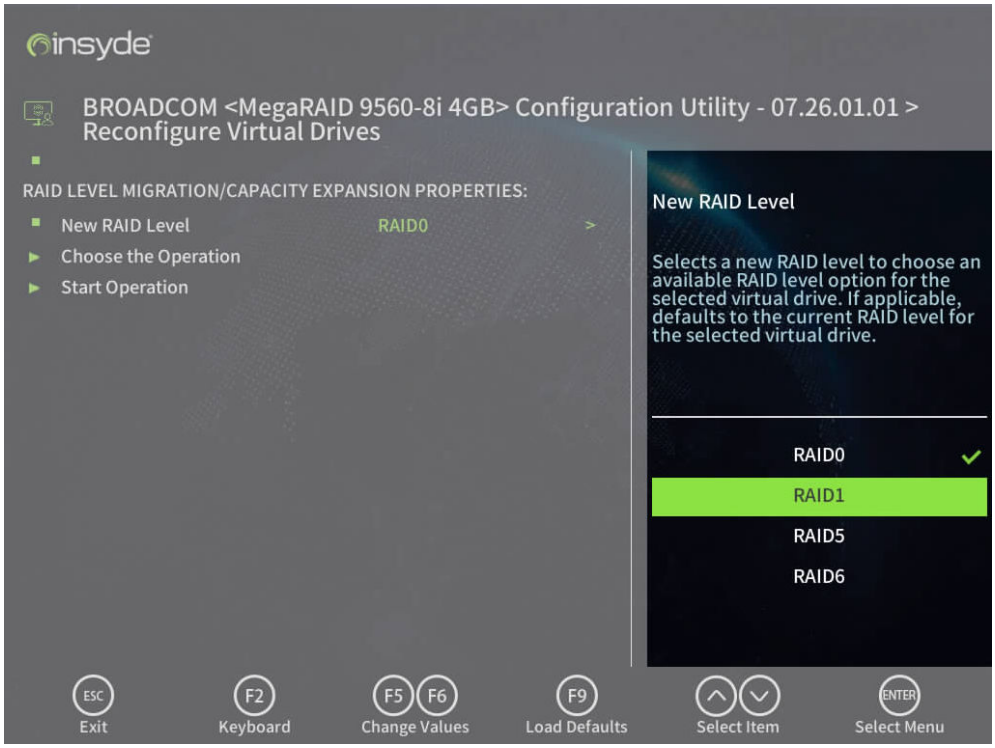
Figure 5-19 Reconfigure Virtual Drives screen



6. Select **New RAID Level** and press **Enter**.

   The dialog box shown in **Figure 5-20** is displayed.

Figure 5-20 Selecting a new RAID level



7. Select **RAID 1** and press **Enter**.

Step 4 Add drives.

1. Select **Choose the Operation** and press **Enter**.

   The drive selection dialog box is displayed.

2. Select the drives to be added and press **Enter**.

   NOTE

   - **Table 3-2** lists the number of drives required for RAID array level migration.
   - The types and specifications of the added drives must be the same as those of the member drives in the RAID array.

3. Select **Apply Changes** and press **Enter**.

   A confirmation dialog box is displayed.

4. Select **Confirm** and press **Enter**.
5. Select **Yes** and press **Enter**.

   A message is displayed, indicating that the operation is successful.

6. Select **OK** and press **Enter** to finish the configuration and go to the screen shown in **Figure 5-19**.

Step 5 Migrate the RAID level.

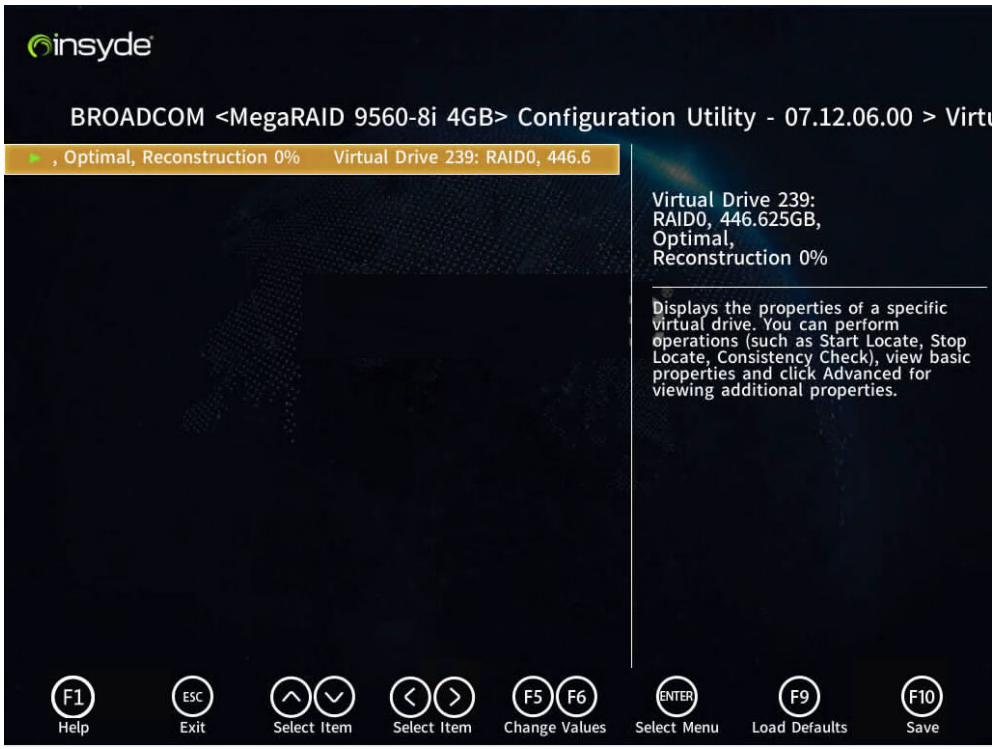
1. Select **Start Operation** and press **Enter**.

   A message is displayed, indicating that the operation is successful.

Step 6 Check the migration result.

1. Go to the **Virtual Drive Management** screen and check the result. The screen shown in **Figure 5-21** indicates that the migration is going on.

Figure 5-21 Checking the migration result



NOTE

- If the server is restarted during migration, the task continues after the server is restarted.
- After the migration is complete, the background initialization of the RAID array automatically starts. The background initialization is a self-check of the RAID array and does not result in configuration data loss.

2. Select a virtual drive and press **Enter**. The migration is successful when the RAID level changes from **RAID 0** to **RAID 1**, the RAID array capacity changes, and the value of **Status** changes to **Optimal**.

----End

5.6 Deleting a RAID Array

Scenarios

NOTICE

A deleted RAID array cannot be restored. Exercise caution when deleting a RAID array.

Procedure

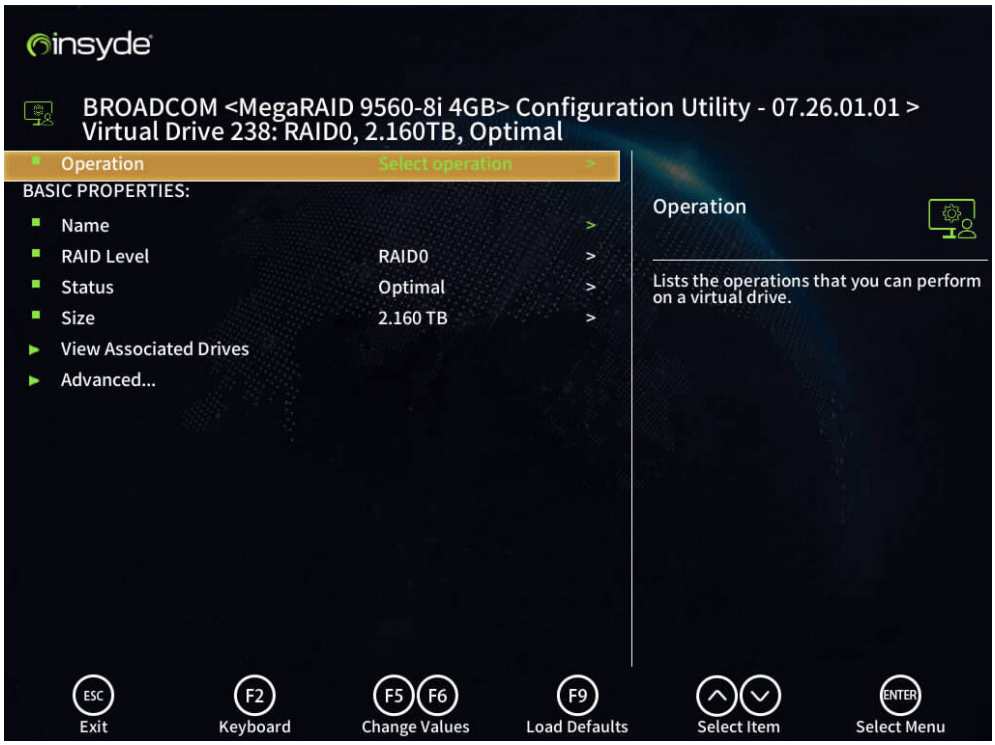
Step 1 Back up data on drives and log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Virtual Drive Management** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Virtual Drive Management** and press **Enter**.
3. Select a virtual drive and press **Enter**.

   The basic information about the virtual drive is displayed, as shown in **Figure 5-22**.

Figure 5-22 Virtual Drive Management screen



Step 3 Delete the virtual drive.

1. Set **Operation** to **Delete Virtual Drive**.
2. Select **Go** and press **Enter**.

   A confirmation screen is displayed.
3. Select **Confirm** and press **Enter**.
4. Select **Yes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.
5. Select **OK** and press **Enter** to finish the configuration and return to the previous screen.

----End

5.7 Rebuilding RAID Data

Scenarios

This section describes how to rebuild a drive with foreign configurations. For details about how to rebuild a drive without foreign configurations, see **6.1 Drive Faults**.

Procedure

Step 1 On the **Main Menu** screen, select **Drive Management** and press **Enter**.

Step 2 Select the drive to be rebuilt and press **Enter**.

Step 3 Set **Operation** to **Make Unconfigured Good**.

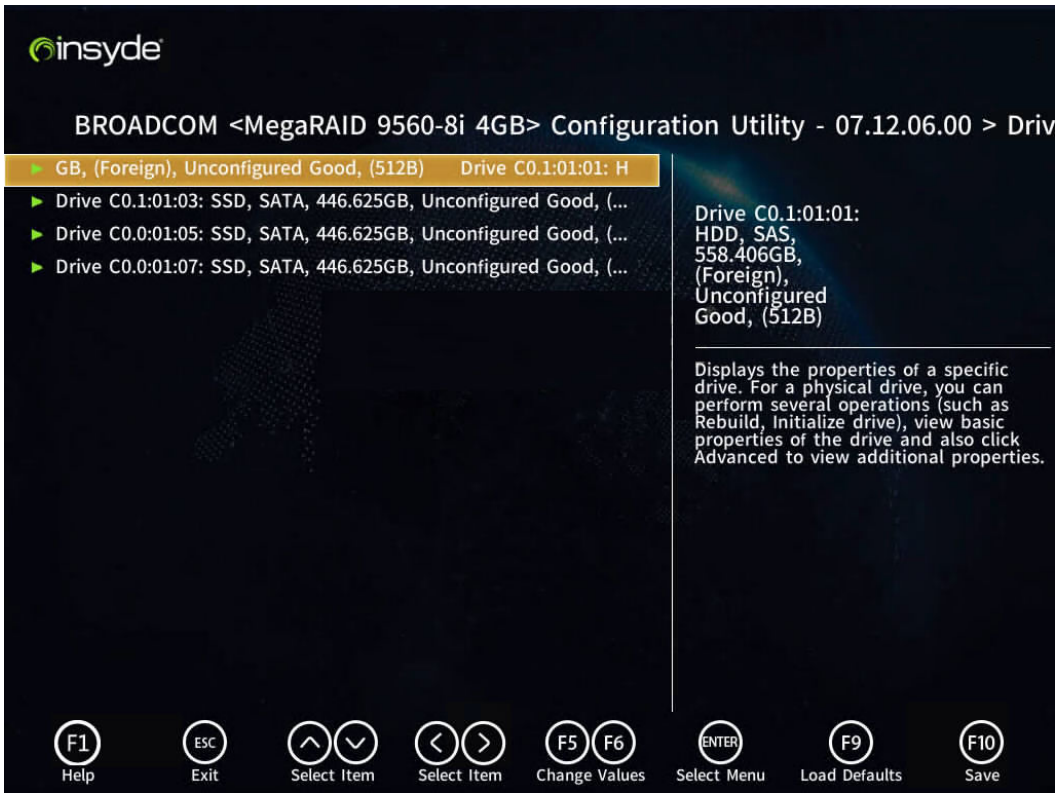
Step 4 Select **Go** and press **Enter**.

The message "The operation has been performed successfully." is displayed.

Step 5 Select **OK** to finish the configuration.

The drive state changes to **(Foreign),Unconfigured Good**, as shown in **Figure 5-23**.

Figure 5-23 Rebuilding RAID data



Step 6 Clear foreign configurations. For details, see **5.9 Importing or Deleting a Foreign Configuration**.

The RAID array data is being rebuilt. You can go to the **Drive Management** screen and check the configuration result and rebuild progress.

----End

NOTE

To prevent data inconsistency of a RAID array, do not directly place an offline drive online. Choose **Rebuild** and add the offline drive to the RAID array.

5.8 Viewing RAID Controller Card Properties

Scenarios

Check whether the current RAID controller card meets the actual requirements by viewing RAID controller card properties.

Procedure

Step 1 Log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Access the **Controller Management** screen.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Controller Management** and press **Enter**.

   The basic information about the RAID controller card is displayed, as shown in **Figure 5-24**. **Table 5-2** describes the parameters.

Figure 5-24 Controller Management screen

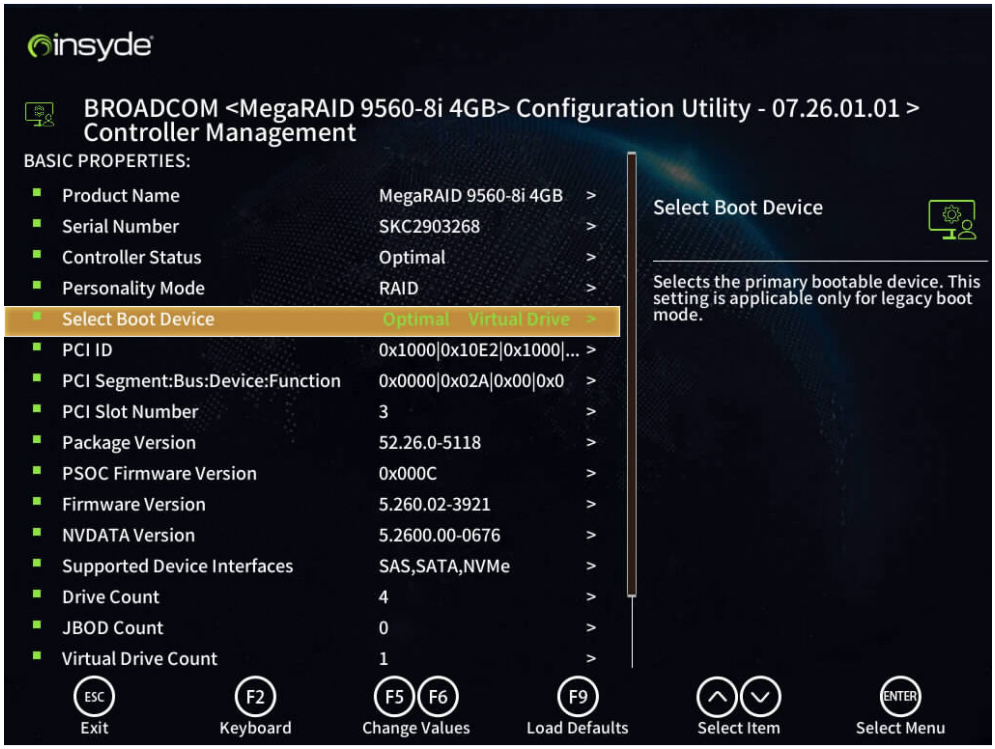


Table 5-2 Parameter description

Parameter	Description
Product Name	Specifies the name of a RAID controller card.
Serial Number	Specifies the serial number of a RAID controller card.
Controller Status	Specifies the operating state of a RAID controller card.
Personality Mode	Specifies the operating mode of a RAID controller card.

Parameter	Description
Select Boot Device	Specifies the current boot device. **NOTE** The boot device is set in Legacy mode and takes effect only in Legacy mode. For boot configuration methods in EFI/UEFI mode, see **4.9 Setting Boot Devices**.
PCI ID	Specifies the PCI ID of a RAID controller card.
PCI Slot Number	Specifies the PCI slot number of a RAID controller card.
Package Version	Specifies the package version of a RAID controller card.
Firmware Version	Specifies the firmware version of a RAID controller card.
NVDATA Version	Specifies the version of a RAID controller card in the configuration information.
Drive Count	Specifies the number of drives mounted to a RAID controller card.
Virtual Drive Count	Specifies the number of existing virtual drives on a RAID controller card.
Advanced Controller Management	Specifies more operations that can be performed on a controller.
Advanced Controller Properties	Displays and modifies advanced controller properties.

Step 3 View advanced controller properties.

Select **Advanced Controller Properties** and press **Enter**.

The **Advanced Controller Properties** screen is displayed, as shown in **Figure 5-25** and **Figure 5-26**. **Table 5-3** describes the parameters.

You can view and modify the advanced properties of the RAID controller card on this screen.

Figure 5-25 Advanced Controller Properties screen (1)

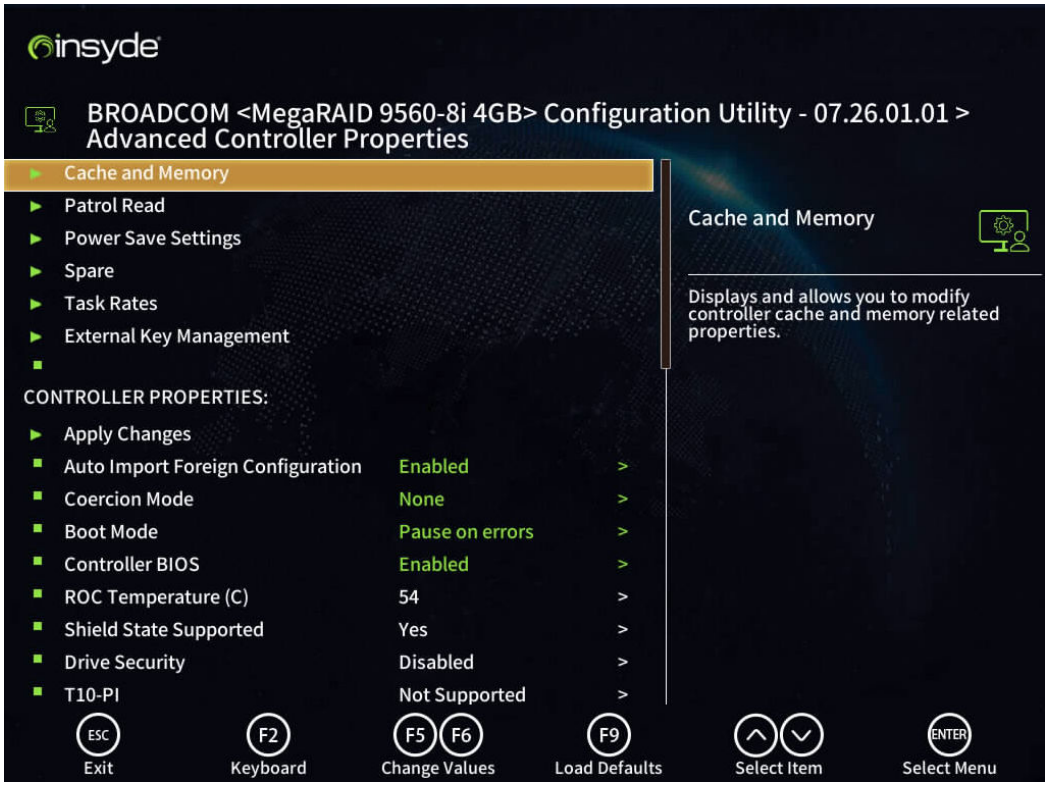


Figure 5-26 Advanced Controller Properties screen (2)

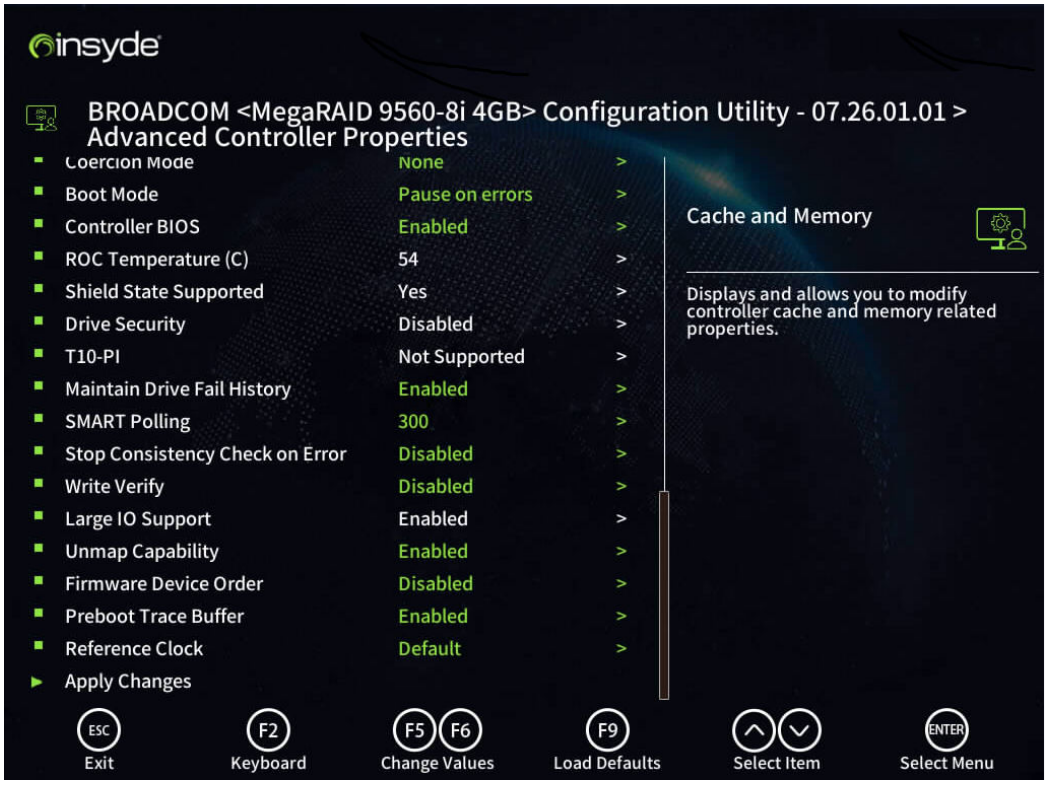


Table 5-3 Parameter description

Parameter	Description
Cache and Memory	Displays cache and memory information about a controller.
Patrol Read	Specifies the patrol read feature.
Power Save Settings	Sets the drive sleep mode.
Spare	Sets the hot spare state.
Task Rates	Sets the handling speed of various tasks.
External Key Management	Specifies the external key management.
Apply Changes	Saves the settings.
Alarm Control	This parameter does not take effect because the 9560-8i RAID controller card is not configured with a buzzer.
Auto Import Foreign Configuration	Specifies whether to automatically import foreign configurations.
Coercion Mode	Specifies the drive capacity compression mode.
Boot Mode	Specifies the action to be taken when the BIOS detects an exception. The value options are as follows: ● **Stop on Errors**: The controller BIOS stops the startup when detecting an exception and continues the startup only with your confirmation. ● **Pause on Errors**: – In the Preserved Cache scenario, the controller BIOS stops startup when detecting an exception. You need to confirm whether to continue the startup. – In other scenarios, the controller BIOS pauses startup when detecting an exception. After a period of time, the controller BIOS continues the startup if you do not confirm. ● **Ignore Errors**: The controller BIOS continues the startup when detecting an exception. This option is usually used for system diagnosis. ● **Safe Mode on Errors**: The controller BIOS enters the safe startup mode when detecting an exception. It is **Pause on Errors** by default.
Controller BIOS	Specifies the BIOS enablement state.

Parameter	Description
ROC Temperature (C)	Specifies the controller temperature.
Shield State Supported	Specifies whether I/O interruption is supported for drive diagnosis. It is **Yes** by default.
Drive Security	Specifies the state of drive encryption.
T10-PI	Specifies the state of information protection technology.
Maintain Drive Fail History	Specifies the state of the fault recording function for drives. The default value is **Enabled**. **NOTE** ● When this parameter is set to **Disabled**: – When a new drive is inserted no matter whether the drive has RAID configurations or when a drive in the redundant RAID array is hot-swapped, the failed drive automatically rebuilds data. ● When this parameter is set to **Enabled**: – When a new drive without RAID configurations is inserted, the failed drive automatically rebuilds data. – When a new drive with RAID configurations is inserted or when a drive in the redundant RAID array is hot-swapped, the drive state is marked as **Unconfigured Bad (Foreign)** and the rebuild operation is not automatically performed. If the RAID array needs to be rebuilt for the drive, set the drive to **Unconfigured Good**. For details, see **5.9 Importing or Deleting a Foreign Configuration**. – After a JBOD drive controlled by a RAID controller card is removed and then inserted, the drive state is marked as **Unconfigured Bad**. If the JBOD drive needs to be enabled again, set the drive to **Unconfigured Good**. Then set the drive as a JBOD drive.
SMART Polling	Specifies the SMART polling interval. The default value is **300**.
Stop Consistency Check on Error	Specifies whether consistency check is stopped in case of errors.
Write Verify	Verifies data write.

Parameter	Description
Drive Detection Type	Media errors often occur on drives over time, which may degrade the performance of drives and the entire system. The firmware attempts to detect drives with poor performance. You can set the controller attributes based on site requirements. The options are as follows: ● Disabled ● High Latency ● Aggressive ● Default It is **Disabled** by default.
Drive Corrective Action	Media errors often occur on drives over time, which may degrade the performance of drives and the entire system. If the I/O latency continuously decreases due to a certain number of affected media on the drive, the firmware fails the drive. As a result, the drive starts rebuild or copyback. The firmware also records some events to generate alarms for users. ● **Disabled**: This function is disabled. ● **Enabled**: This function is enabled. It is **Disabled** by default.
Drive Error Threshold	Sets the appropriate controller properties. ● Every 8 hours ● Every 1 hours ● Every 15 mins ● Every 5 mins It is **Every 8 hours** by default.
Large IO Support	Enables or disables large I/O support. ● **Disabled**: This function is disabled. ● **Enabled**: This function is enabled. It is **Enabled** by default.
Unmap Capability	Specifies the unmapping capability. If this function is enabled, SAS drives that support the Unmap function are marked as **Unmap**. ● **Disabled**: This function is disabled. ● **Enabled**: This function is enabled. It is **Enabled** by default.
Apply Changes	Saves the settings.

----End

5.9 Importing or Deleting a Foreign Configuration

Scenarios

- After replacing a RAID controller card, import the original configuration to the new RAID controller card.
- If a drive newly installed on a server already has a RAID configuration that the user needs or does not need, you can import or clear the configuration.

NOTICE

- If you replace a RAID controller card when a RAID array has been configured on the server, the RAID configuration will be considered a foreign configuration. If you clear the foreign configuration, the RAID configuration will be lost. Exercise caution when performing this operation.
- To avoid configuration import failure, replace the original RAID controller card with a new card of the same type.
- If the number of failed or missing drives exceeds the maximum number allowed by the RAID array, the RAID array cannot be imported.

Procedure

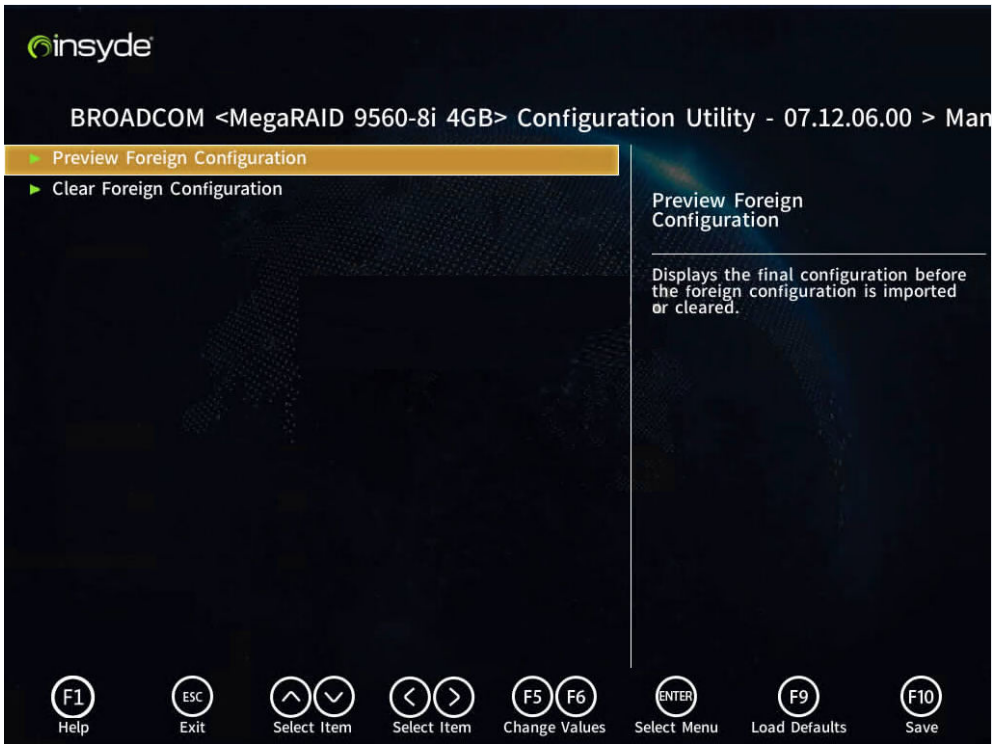
Step 1 Log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 The **Manage Foreign Configuration** screen is displayed.

1. On the main screen, select **Main Menu** and press **Enter**.
2. Select **Configuration Management** and press **Enter**.
3. Select **Manage Foreign Configuration** and press **Enter**.

   The **Manage Foreign Configuration** screen is displayed, as shown in **Figure 5-27**.

Figure 5-27 Manage Foreign Configuration screen



Step 3 Import a foreign configuration.

1. Select **Preview Foreign Configuration** and press **Enter**.

   The **Preview Foreign Configuration** screen displays existing foreign configurations.
2. Select **Import Foreign Configuration** and press **Enter**.

   A confirmation screen is displayed.
3. Select **Confirm** and press **Enter**.
4. Select **Yes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.
5. Press **Esc** to finish the configuration and return to the previous screen.

Step 4 Clear foreign configurations.

1. Select **Clear Foreign Configuration** and press **Enter**.

   A confirmation screen is displayed.
2. Select **Confirm** and press **Enter**.
3. Select **Yes** and press **Enter**.

   The message "The operation has been performed successfully" is displayed.
4. Press **Esc** to finish the configuration and return to the previous screen.

----End

5.10 Setting a JBOD Drive

This section describes how to set a drive in the **Unconfigured Good** state to pass-through mode.

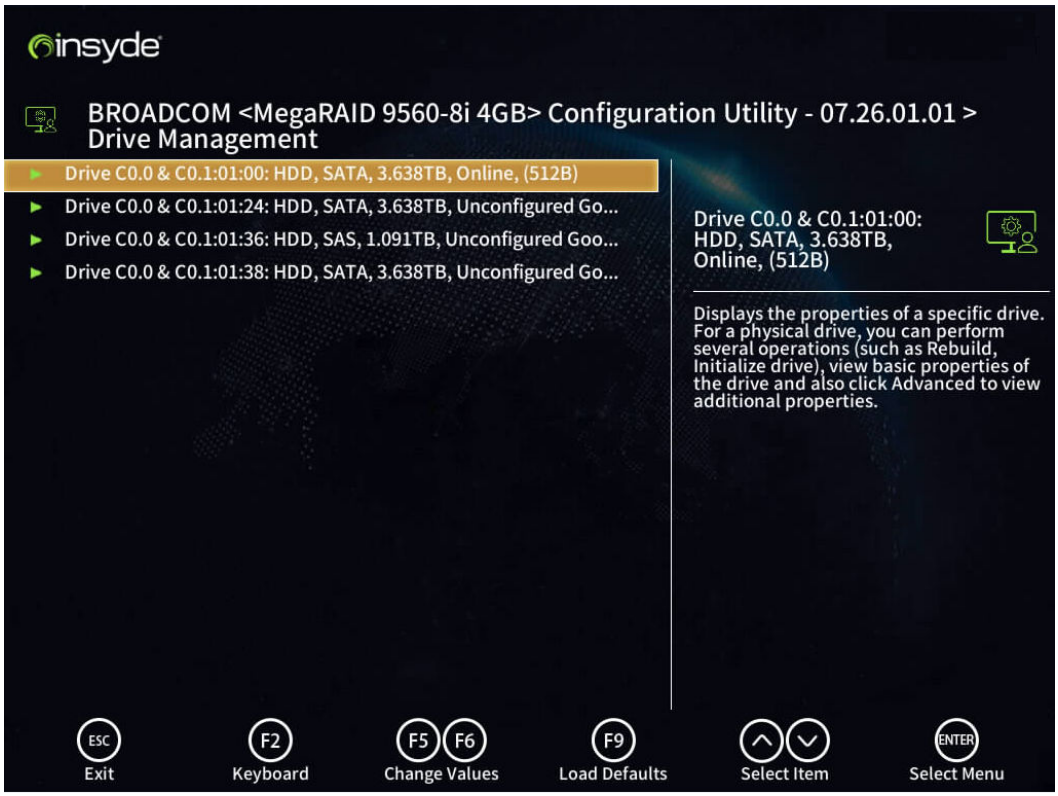
NOTE

- If a JBOD drive is in the **Unconfigured Bad** state, the fault indicator on the drive is turned on and an alarm is generated on the iBMC.
- You can set the **Auto-Configure Behavior** parameter as required. For details, see **Setting the Current Working Mode of the RAID Controller Card**.

Step 1 Log in to the **Configuration Utility** main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Choose **Main Menu** > **Drive Management**, as shown in **Figure 5-28**.

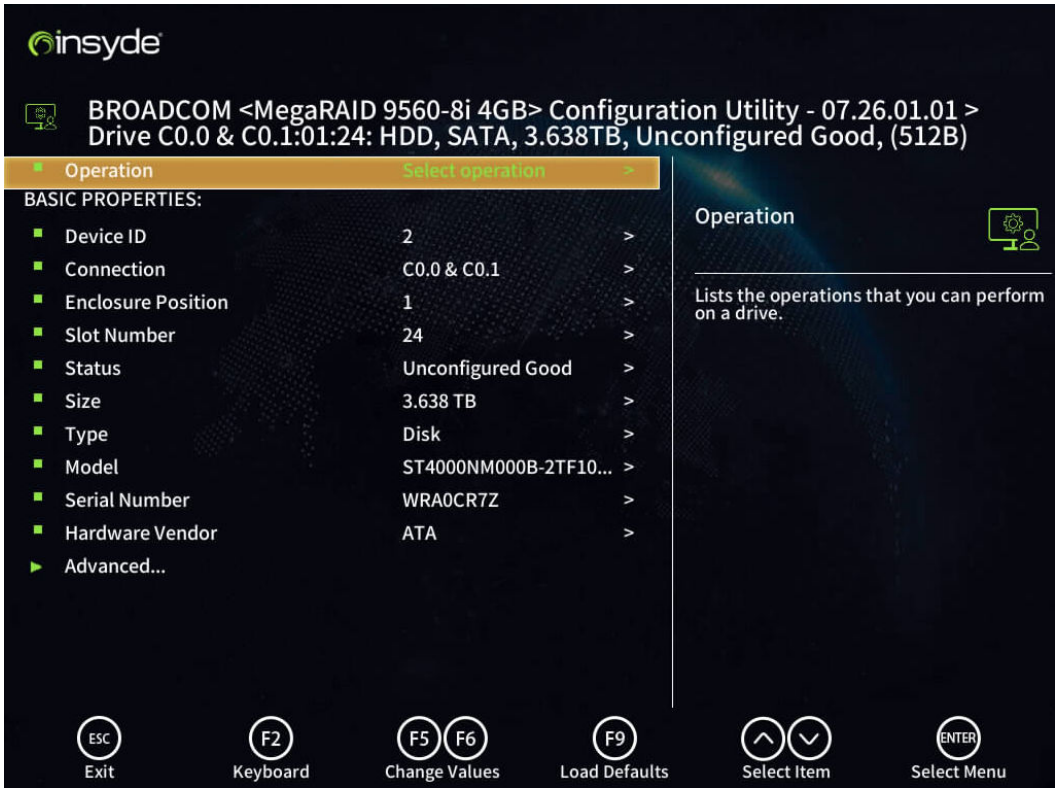
Figure 5-28 Drive Management screen



Step 3 Select a drive to be operated and press **Enter**.

Step 4 Set **Operation** to **Make JBOD**, as shown in **Figure 5-29**.

Figure 5-29 Operation screen



Step 5 Select **Go** and press **Enter**. Select **Confirm** and press **Enter**.

Step 6 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully." is displayed.

Step 7 Select **OK** and press **Enter** to finish the configuration.

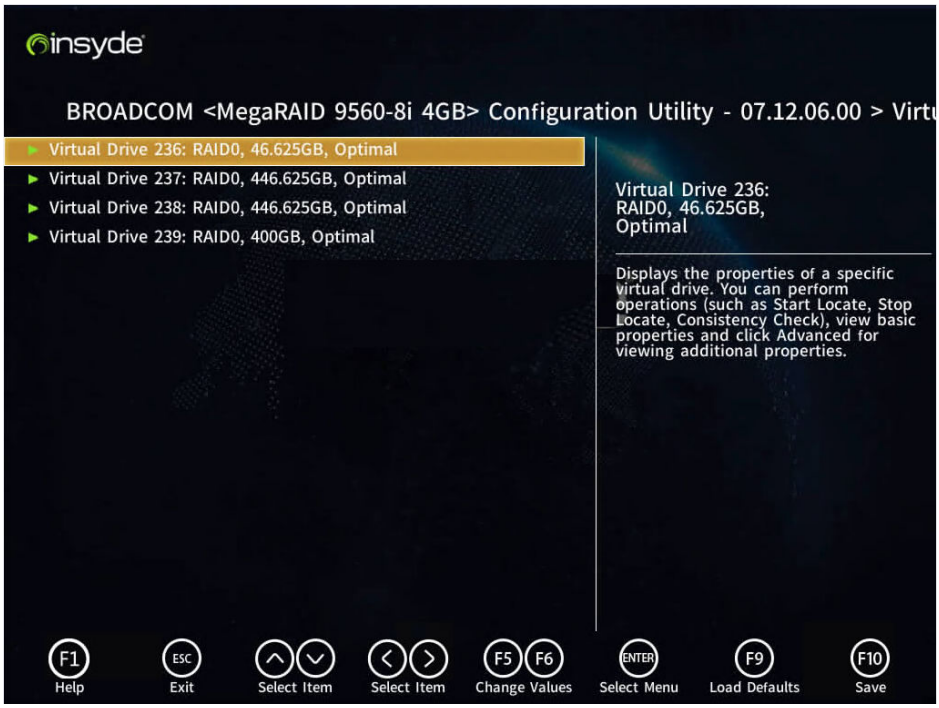
----End

5.11 Creating Multiple Virtual Drives

NOTE

The new VD IDs start from 239 and decrease according to the creation sequence, as shown in **Figure 5-30**.

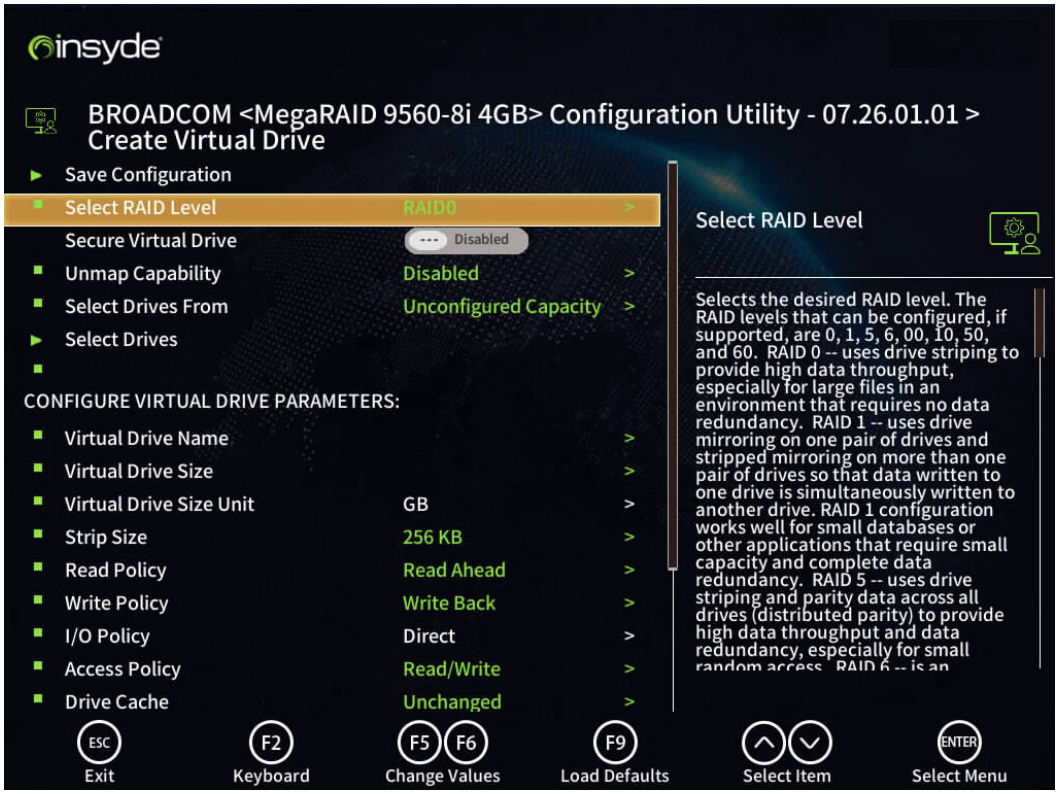
Figure 5-30 Querying VD Information



Create multiple VDs for a RAID array that already has one or more VDs. The following procedure uses a RAID 0 array that has one VD as an example.

Step 1 Choose **Main Menu > Configuration Management > Create Virtual Drive**. The **Create Virtual Drive** screen is displayed, as shown in **Figure 5-31**.

Figure 5-31 Create Virtual Drive screen



Step 2 Set **Select Drives From** to **Free Capacity**, as shown in **Figure 5-32**.

Figure 5-32 Create Virtual Drive screen

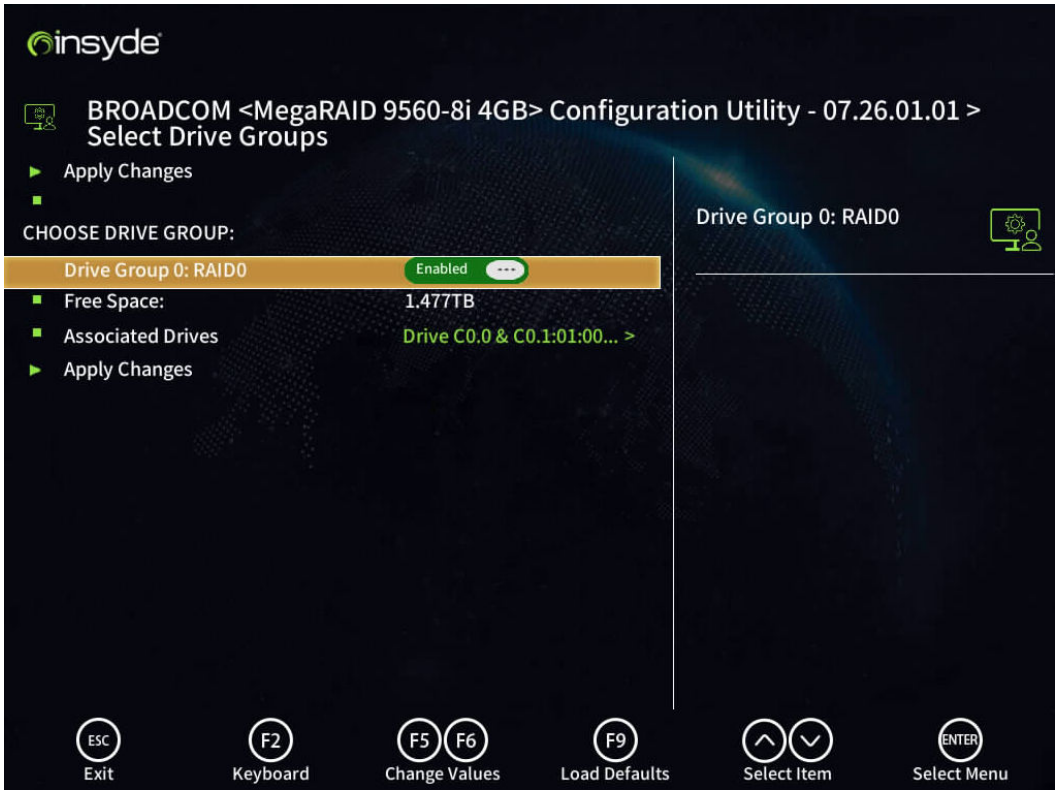
Step 3 Choose **Select Drive Groups** and press **Enter**.

The existing RAID arrays (drive groups) are displayed, as shown in **Figure 5-33**.

Figure 5-33 Select Drive Groups screen

Step 4 Select the RAID array in which multiple VDs are created and press **Enter**, as shown in **Figure 5-34**.

Figure 5-34 Select Drive Groups screen



Step 5 Select **Apply Changes** and press **Enter**.

A message is displayed, indicating that the operation is successful.

Step 6 Select **OK** and press **Enter** to return to the screen shown in **Figure 5-35** and **Figure 5-36**. For details about the parameters, see **Table 4-2**.

Figure 5-35 Create Virtual Drive screen (1)

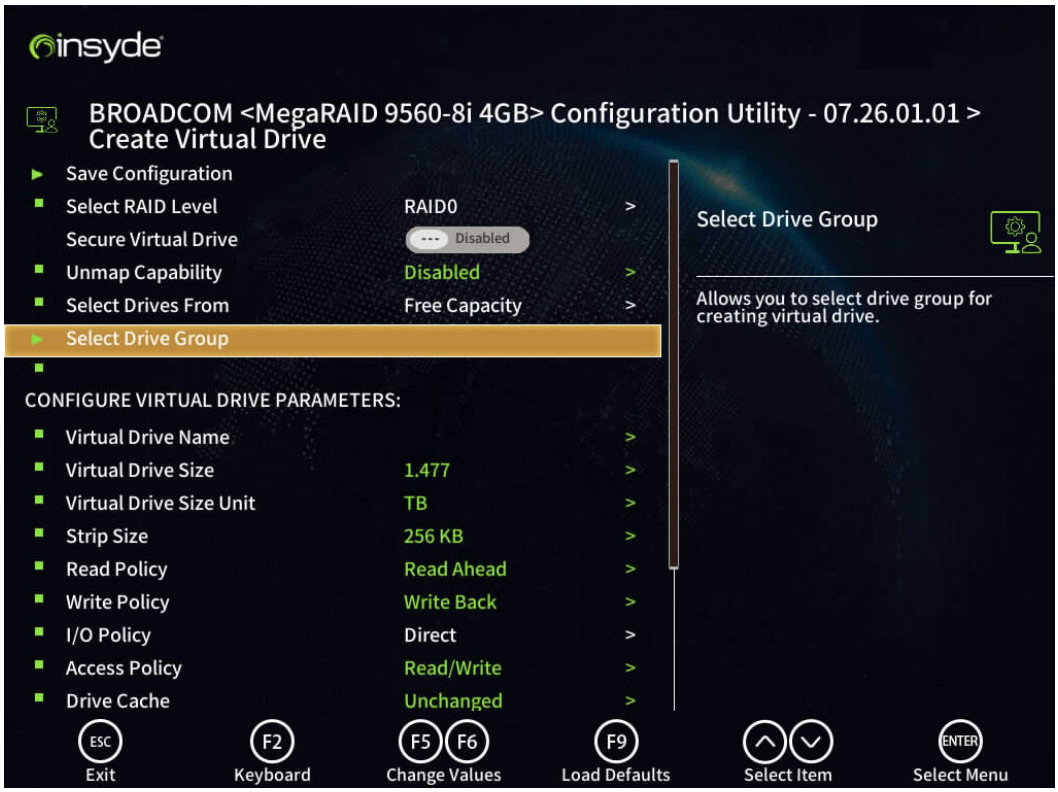
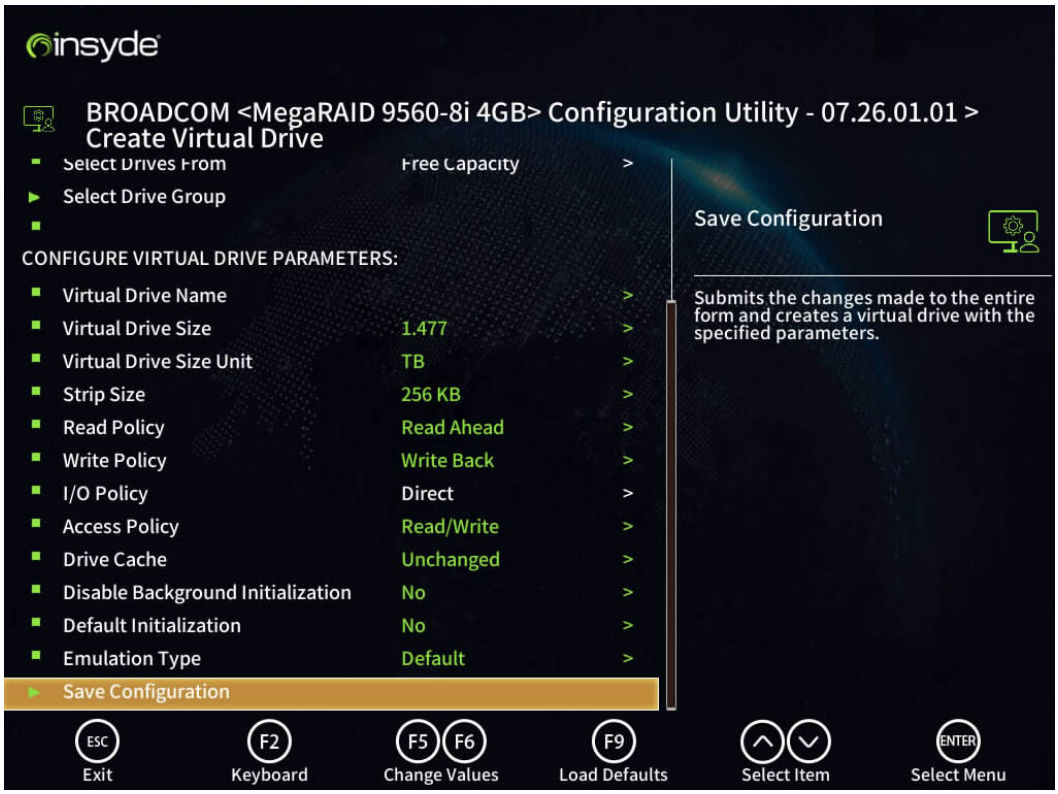


Figure 5-36 Create Virtual Drive screen (2)



Step 7 Set VD properties, as shown in **Table 4-2**.

Step 8 Select **Save Configuration** and press **Enter**.

A confirmation screen is displayed.

Step 9 Select **Confirm** and press **Enter**.

Step 10 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed.

Step 11 Select **OK** and press **Enter**.

You can check the VDs on the **Virtual Drive Management** screen. **Figure 5-37** shows the VDs configured.

Figure 5-37 Virtual Drive Management screen

----End

NOTE

A RAID array supports a maximum of 16 VDs. To create another VD, repeat **Step 1** to **Step 11**.

5.12 Querying the Firmware Version of a RAID Controller Card

You can use either of the following methods to query the RAID controller card firmware version:

- Log in to the iBMC WebUI. For details, see "System Information" in the *iBMC User Guide*.

- After the server is started, use the RAID controller card CLI tool to query the firmware version of the RAID controller card on the OS. For details, see **8.2.1 Querying RAID Controller Card Configuration**.

  NOTE

  In the command output, the **FW Version** field indicates the firmware version of the RAID controller card.

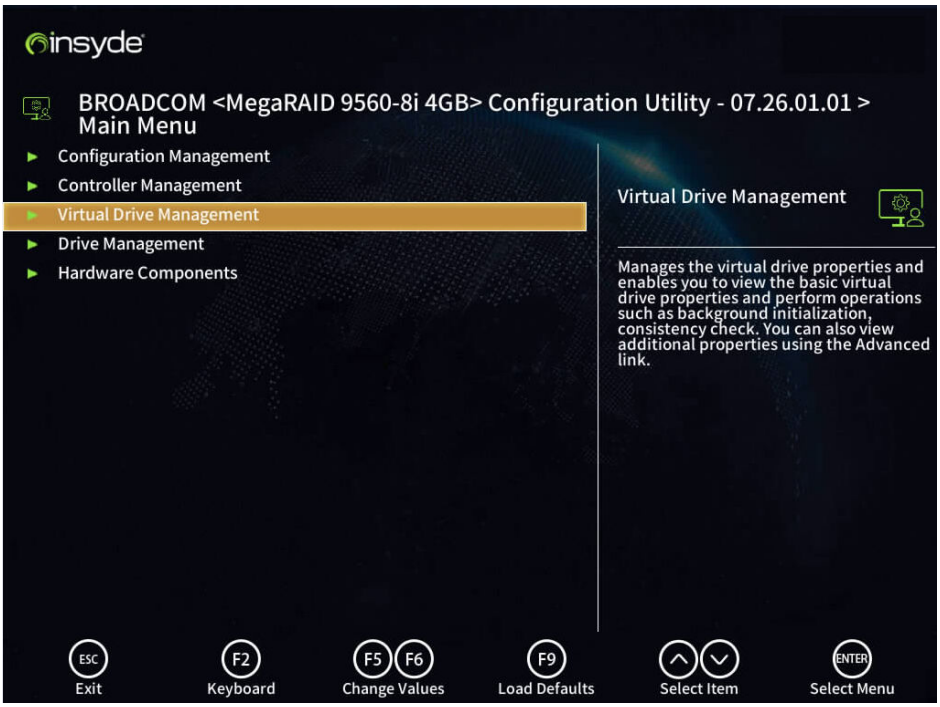
- Query the firmware version on the **Configuration Utility** screen of the RAID controller card.

  a. Log in to the **Configuration Utility** screen of the RAID controller card. For details, see **4.1 Logging In to the Configuration Utility**.

  b. On the main screen, select **Main Menu** and press **Enter**.

  The **Main Menu** screen is displayed, as shown in **Figure 5-38**.

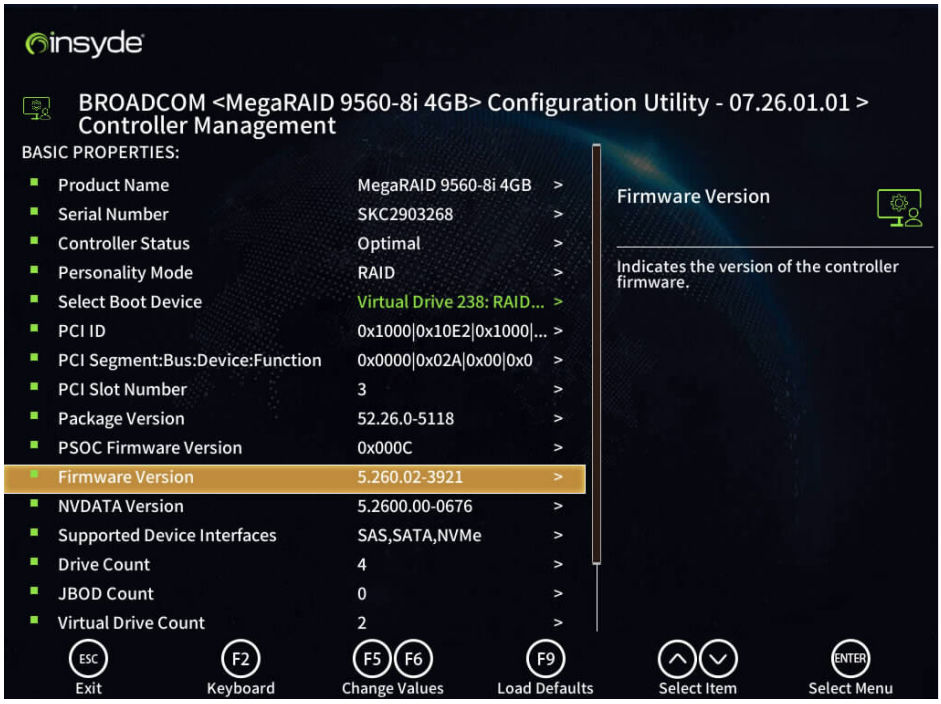
  Figure 5-38 Main Menu screen

  c. Select **Controller Management**, and press **Enter**.

  The basic information about the RAID controller card is displayed. **Firmware Version** indicates the firmware version of the RAID controller card, as shown in **Figure 5-39**.

Figure 5-39 Controller Management screen

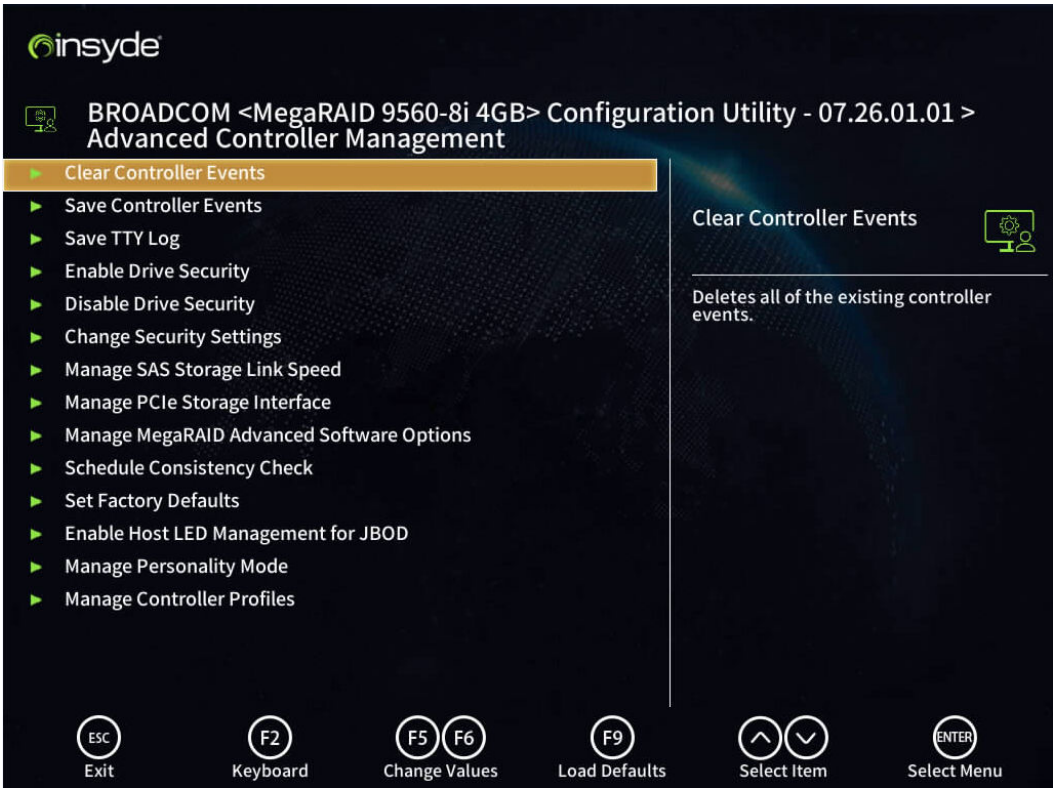


5.13 Managing the Security Key

5.13.1 Enabling the Encryption Function

Step 1 Choose **Main Menu** > **Controller Management** > **Advanced Controller Management**. The **Advanced Controller Management** screen is displayed, as shown in **Figure 5-40**. Advanced Controller Management

Figure 5-40 Advanced Controller Management



Step 2 Select **Enable Drive Security** and press **Enter**.

The **Enable Drive Security** screen is displayed, as shown in **Figure 5-41**.

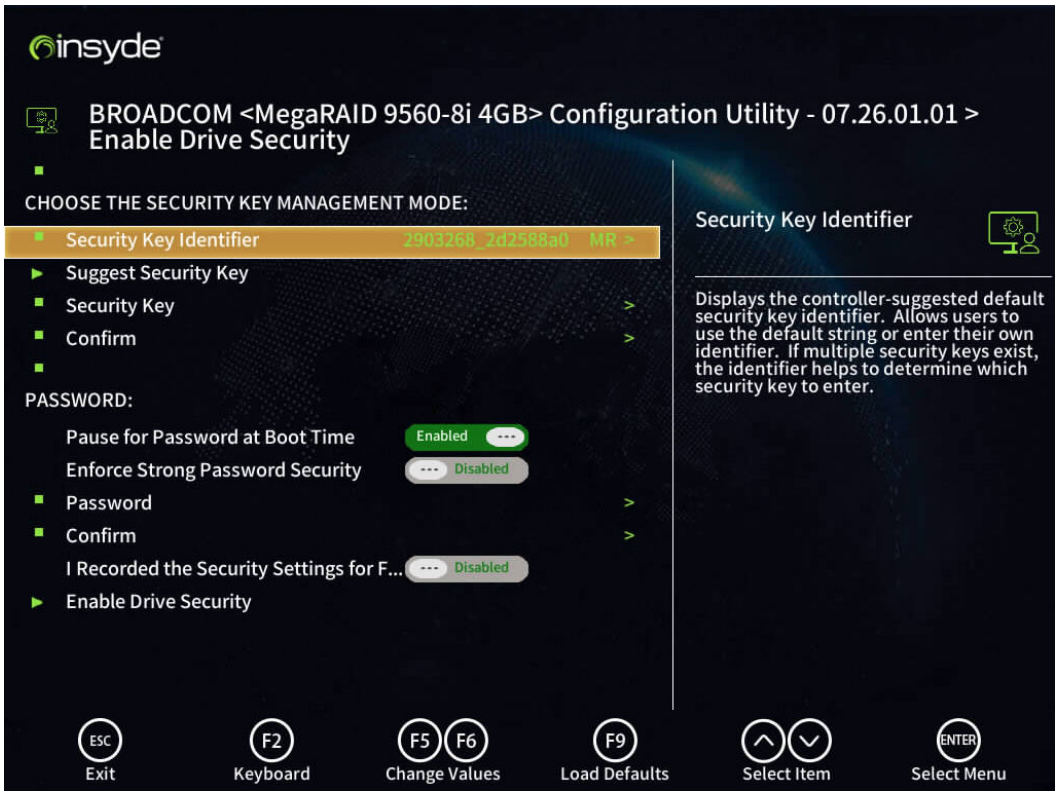
Figure 5-41 Enable Drive Security

Step 3 Press the **Enter** key to set **Local Key Management (LKM)** to **Enabled**.

Step 4 Select **OK** and press **Enter**.

The password setup screen is displayed, as shown in **Figure 5-42**.

Figure 5-42 Setting the password



Step 5 In the **Security Key Identifier** box, enter the encryption key name, for example, **key1**.

NOTE

You are advised to use the default value generated by the system for **Security Key Identifier**.

Step 6 In the **Security Key** box, enter the encryption key to be set, and press **Enter**.

NOTE

- The encryption key entered in the **Security Key** box must be kept properly. When the encryption function is enabled again after the RAID controller card is replaced, you need to enter the encryption key.
- The encryption keys are case-sensitive and must meet the following requirements:
  - Contain 8 to 32 characters.
  - Contain at least one digit, uppercase letter, lowercase letter, and one special character (such as <> @ +).
  - Cannot contain spaces.

Step 7 In the **Confirm** box, enter the encryption key again, and press **Enter**.

NOTE

The encryption keys entered in **Step 6** and **Step 7** must be the same, and the keys must be kept properly.

Step 8 Press the **Enter** key to set **Pause for Password at Boot Time** to **Enabled** or **Disabled**.

- **Enabled** => **Step 9**

- **Disabled** => **Step 12**

NOTE

You are advised to set **Pause for Password at Boot Time** to **Disabled**. If this parameter is set to **Enabled**, you need to enter the password set in **Step 10** every time you restart the RAID controller card.

Step 9 Press the **Enter** key to set **Enforce Strong Password Security** to **Enabled** or **Disabled**. Enables or disables enhanced password security.

NOTE

- Disabled: Disables enhanced password security. The password can contain 8 to 32 characters.
- Enabled: Enables enhanced password security. The password must contain 8 to 32 characters and at least one digit, one lowercase letter, one uppercase letter, and one special character (such as <> @ +). Spaces are not allowed, and the password is case-sensitive.
- You are advised to set this parameter to Disabled.

Step 10 In the **Password** box, enter the password for starting the RAID controller card, and press **Enter**.

Step 11 In the **Confirm** box, enter the password for starting the RAID controller card again, and press **Enter**.

NOTE

The passwords entered in **Step 10** and **Step 11** must be the same, and the keys must be kept properly.

Step 12 Press **Enter** to set **I Recorded the Security Settings for Future Reference** to **Enabled** or **Disabled**.

Step 13 Select **Enable Drive Security** and press **Enter**.

A confirmation dialog box is displayed.

Step 14 Select **Confirm** and press **Enter**.

Step 15 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed.

Step 16 Select **OK** and press **Enter** to finish the configuration and go to the previous screen.

----End

5.13.2 Disabling the Encryption Function

Step 1 Choose **Main Menu > Controller Management > Advanced Controller Management**. The **Advanced Controller Management** screen is displayed, as shown in **Figure 5-43**. **Table 5-4** describes the parameters.

Figure 5-43 Advanced Controller Management

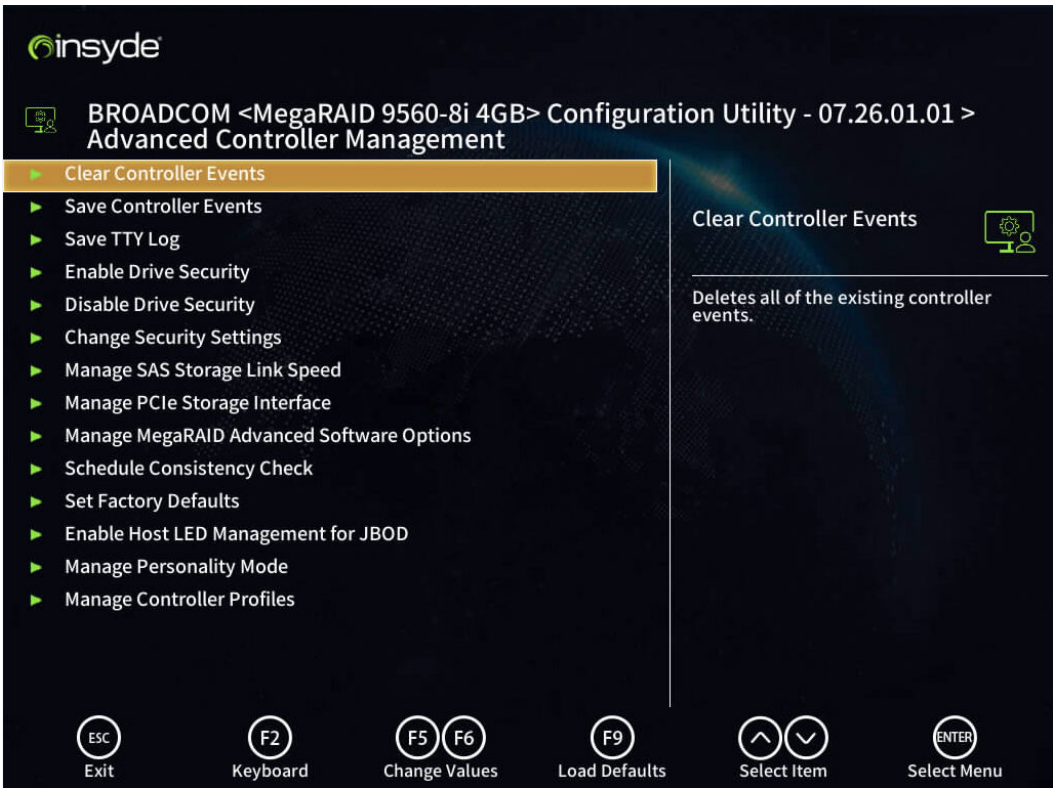


Table 5-4 Parameter description

Parameter	Description
Clear Controller Events	Clears the event logs of the controller.
Save Controller Events	Saves the event logs of the controller.
Save TTY Log	Saves the operation logs of the terminal.
Enable Drive Settings	Enables the encryption function of the drive.
Disable Drive Settings	Disables the encryption function of the drive.
Change Security Settings	Changes the security settings.
Manage SAS Storage Link Speed	Manages the port rate.
Manage PCIe Storage Interface	Manages the link width of the RAID controller card and the lane rate.
Manage MegaRAID Advanced Software Options	Manages the advanced software options.
Schedule Consistency Check	Sets the consistency check parameters.
Set Factory Defaults	Restores factory settings.

Parameter	Description
Enable Host LED Management for JBOD	Manages the Host LED in the JBOD mode.
Manage Personality Mode	Specifies the current working mode of the RAID controller card.
Manage Controller Profiles	Views and manages the configuration files of the controller.

Step 2 Select **Disable Drive Security** and press **Enter**.

A confirmation dialog box is displayed.

Step 3 Select **Confirm** and press **Enter**.

Step 4 Select **Yes** and press **Enter**.

Information is displayed indicating that the operation is successful.

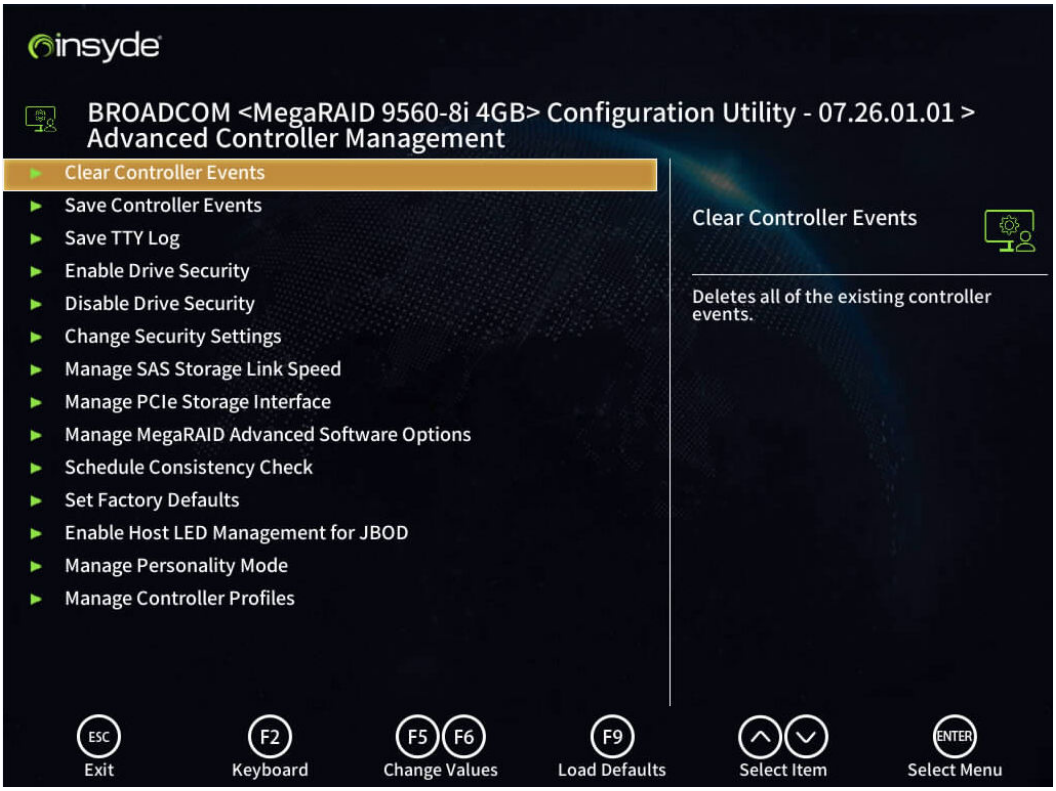
Step 5 Select **OK** and press **Enter** to return to the previous screen.

----End

5.13.3 Changing the Password

Step 1 On the **Main Menu** tab, choose **Main Menu** > **Controller Management** > **Advanced Controller Management**. The **Advanced Controller Management** screen is displayed, as shown in **Figure 5-44**.

Figure 5-44 Advanced Controller Management



Step 2 Select **Change Security Settings** and press **Enter**.

The screen shown in **Figure 5-45** is displayed. **Table 5-5** describes the parameters.

Figure 5-45 Change Security Settings

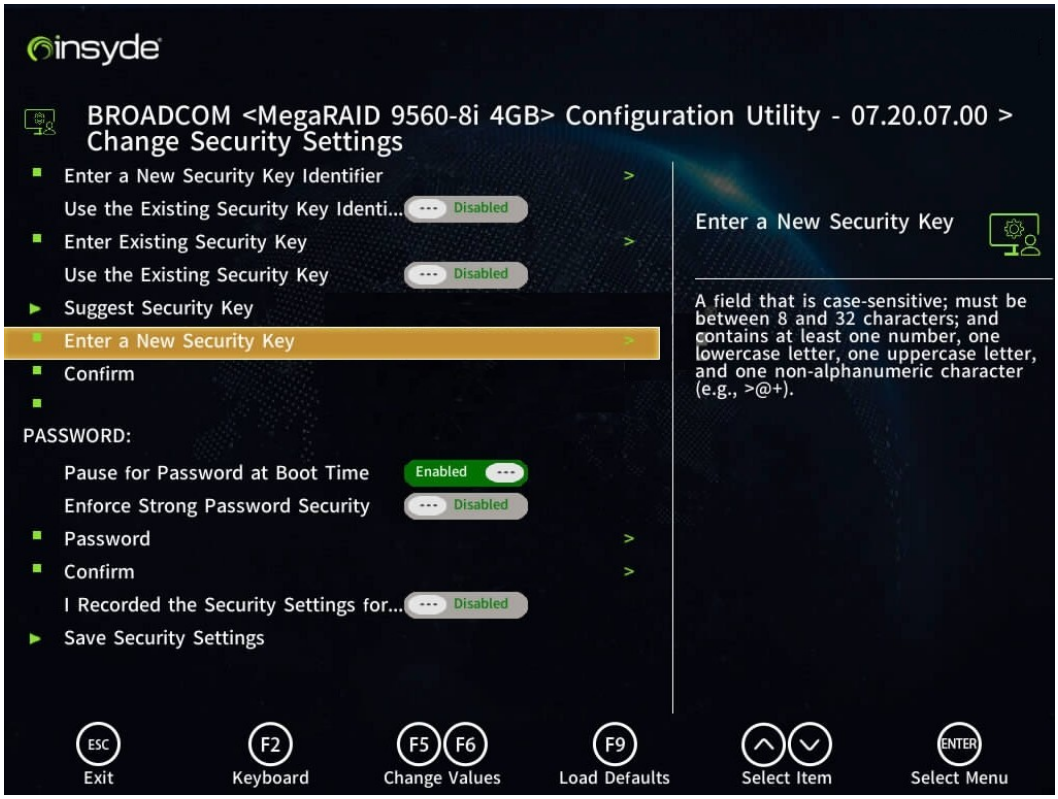


Table 5-5 Parameter description

Parameter	Description
Enter a New Security Key Identifier	Name the encryption key.
Use the Existing Security Key Identifier	Use the name of the encryption key that has been set. If this function is enabled, the configured encryption key name is displayed automatically.
Enter Existing Security Key	Enter the configured encryption key.
Use the Existing Security Key	Use the configured encryption key. If enabled, the option to create a new encryption key is not available and the encryption key cannot be changed.
Suggest Security Key	Use the encryption key password created by the system.

Parameter	Description
Enter a New Security Key	Enter a new encryption key password. The encryption key passwords are case-sensitive and must meet the following requirements: ● Contain 8 to 32 characters. ● Contain at least one digit, uppercase letter, lowercase letter, and one special character (such as <> @ +). ● Cannot contain spaces.
Confirm	Enter the password again for confirmation.
Pause for Password at Boot Time	If this option is selected, a password is required when the RAID card starts.
Enforce Strong Password Security	Enforce security of the password. If this option is selected, the passwords are case-sensitive and must meet the following requirements: ● Contain 8 to 32 characters. ● Contain at least one digit, uppercase letter, lowercase letter, and one special character (such as <> @ +). ● Cannot contain spaces.
Password	Set the RAID controller card start password.
Confirm	Enter the password again for confirmation.
I Recorded the Security Settings for Future Reference	Confirm the content changed.
Change Security Key	Confirm the password change.

Step 3 In **Enter a New Security Key Identifier** box, enter the encryption key name, for example, **key2**, and press **Enter**.

Step 4 In **Enter Existing Security Key** box, enter the current encryption key, and press **Enter**.

Step 5 In **Enter a New Security Key** box, enter the new encryption key, and press **Enter**.

Step 6 In **Confirm** box, enter the new encryption key again, and press **Enter**.

NOTE

In **Step 5** and **Step 6** must be the same, and the keys must be kept properly.

Step 7 Press the **Enter** key to set **Pause for Password at Boot Time** to **Enabled** or **Disabled**.

- **Enabled** => **Step 8**

- **Disabled** => **Step 11**

Step 8 Press the **Enter** key to set **Enforce Strong Password Security** to **Enabled** or **Disabled**.

Step 9 In the **Password** box, enter the password for starting the RAID controller card, and press **Enter**.

Step 10 In the **Confirm** box, enter the password for starting the RAID controller card again, and press **Enter**.

NOTE

In **Step 9** and **Step 10** must be the same, and the keys must be kept properly.

Step 11 Press the **Enter** key to set **I Recorded the Security Settings for Future Reference** to **Enabled** or **Disabled**.

Step 12 Select **Save Security Settings** and press **Enter**.

Step 13 Select **Confirm** and press **Enter**.

Step 14 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed.

Step 15 Select **OK** and press **Enter** to finish the configuration and go to the previous screen.

----End

5.13.4 Encrypting a JBOD Drive

NOTE

The hard drive must be an SED encrypted drive.

Step 1 On the Main Menu tab, choose **Main Menu** > **Drive Management**. The **Drive Management** screen is displayed.

Step 2 Select the idle drive to be operated and press **Enter**.

Step 3 Set **Operation** to **Make JBOD**.

Step 4 Select **Go** and press **Enter**. Select **Confirm** and press **Enter**.

Step 5 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed. Select **OK** to complete configuration.

Step 6 Return to the **Drive Management** screen, select the JBOD drive set in **3**, and set **Operation** to **Secure JBOD**.

Step 7 Select **Go** and press **Enter**. Select **Confirm** and press **Enter**.

Step 8 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed. Select **OK** to complete configuration.

Step 9 Return to the **Drive Management** screen, the key word **Secured** is displayed.

----End

5.13.5 Querying and Importing the Encrypted Foreign Configuration Information

Prerequisites

The encryption function of the RAID controller card is enabled. For details, see **5.13.1 Enabling the Encryption Function**.

Procedure

Step 1 On the Main Menu tab, choose **Main Menu** > **Configuration Management** > **Manage Foreign Configuration**. The **Manage Foreign Configuration** screen is displayed.

Step 2 Import a foreign configuration.

1. Select **Enter Security Key for Locked Drives** and press **Enter**. The **Enter Security Key for Locked Drives** screen is displayed.
2. Select **Security Key** and press **Enter**.

   Enter the encryption key.
3. Select **OK** and press **Enter**.

   The message "All locked drives have been unlocked." is displayed.
4. Press **Esc** to complete configuration and return to the previous screen.

Step 3 Query the imported foreign information.

1. Access the **Virtual Drive Management** screen.
2. Select the hard drive to which is to be imported foreign information and press **Enter**.
3. Select **Advanced** and press **Enter**. The state of **Secured** is **Yes**.

----End

6 Troubleshooting

This section describes how to rectify common faults of drives, RAID controller cards, batteries, and supercapacitors. For more troubleshooting cases, see the *Server Troubleshooting* or contact technical support.

6.1 Drive Faults

6.1.1 Drive Faults

Symptoms

A drive fails if any of the following conditions occurs:

- The drive fault indicator is on.
- After the server is powered on, the drive indicator is off.
- A drive fault alarm is generated.

Solution

Step 1 Determine the slot number of the failed drive.

NOTE

If a drive in JBOD mode is in the **Unconfigured Bad** state, the fault indicator on the drive will be turned on and the iBMC will generate an alarm.

- Locate the failed drive based on the fault indicator, which is steady orange. For details, see the drive numbering section in the user guide of the server you use.
- Locate the failed drive based on the iBMC drive alarm information. For details, see the *iBMC Alarm Handling*.

- Locate the failed drive using the RAID controller card GUI. For details, see **7.2.4 Drive Management**.
- Locate the failed drive using the RAID controller card CLI tool. For details, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Step 2 Replace the drive.

NOTICE

- Before removing a drive, determine its location. If a drive is removed by mistake, the RAID array will fail. For details, see **Step 1**. If the drive fault is caused by manual removal and installation of the drive or a failed backplane, set the drive to **Unconfig Good** and restore the RAID array. For details, see **5.9 Importing or Deleting a Foreign Configuration**.
- If the failed drive is a pass-through drive or belongs to a RAID array without redundancy (for example, RAID 0), the drive data cannot be restored.
- If the faulty drive belongs to a RAID array with redundancy and the number of failed drives does not exceed the maximum number of faulty drives allowed in the RAID array, the RAID array data will not be lost. Otherwise, the RAID array data will be lost. For details about the maximum number of faulty drives allowed in a RAID array, see **Table 3-1**.
- After disconnecting a drive from its backplane, wait for 30 seconds and then remove the drive from the server. The drive fault alarm will be cleared after the RAID array (except RAID 0) is rebuilt. Do not hot remove or install drives frequently.
- The newly inserted drive cannot contain RAID configurations. If the installed drive has RAID information configurations, delete the RAID configurations from the RAID controller card of the same model as the original RAID controller card or perform low-level formatting on the drive. For details, see the user guide of the RAID controller card you use.

Remove the failed drive and install a new drive. The new drive can be restored in the following ways based on the RAID configuration of the failed drive:

- If the RAID array has redundancy feature and has no hot spare drive, the newly installed drive automatically rebuilds data. After data is copied to the new drive, the hot spare drive restores to the hot backup state.
- If the RAID array has redundancy feature and has no hot spare drive, the newly installed drive automatically rebuilds data. If the number of the failed drives in a RAID array exceeds 1, replace the failed drives one by one based on the drive fault time. Replace the next drive only after the current drive data is rebuilt.
- If the failed drive is a pass-through drive, replace it.
- If the failed drive belongs to a RAID array without redundancy (for example, RAID 0), create RAID 0 again.
  - For details about how to create a RAID 0 array in UEFI mode, see **4.2 Creating RAID 0**.

– For details about how to create a RAID 0 array by running commands, see **8.2.9 Creating and Deleting a RAID Array**.

----End

6.1.2 Fail or Prefail Drive

Symptoms

Normally, after the emergency spare function is enabled for a RAID array that supports redundancy and has no hot spare drive specified, a spare drive in the **fail** or **prefail** state will automatically replace a member drive and rebuild data to avoid data loss.

If emergency hot spare is not configured for the RAID controller card and the state of member drive is displayed as **fail** or **prefail**, perform the following operations.

Solution

Step 1 Use the StorCLI tool. For details, see **8.1 Downloading and Installing StorCLI**.

Step 2 Run the following command to set the state of the member drives of the RAID array to **offline**. For details, see **8.2.26 Setting Drive State**.

storcli64 */c**controller_id**/**e**enclosure_id*/**s**slot_id* **set offline** [force]

NOTE

- **controller_id**: specifies the ID of a RAID controller card for drives.
- **enclosure_id**: specifies the ID of the enclosure where the drive is installed.
- **slot_id**: specifies the slot number of a physical drive.

Step 3 Replace the offline drive.

Step 4 The RAID array is rebuilt automatically.

Wait until the rebuild is complete.

----End

6.1.3 Unconfigured Bad or UBad Drive

Symptoms

The drive state is **Unconfigured Bad** or **UBad**. Check the drive status as follows.

- Determine drive status and fault handling methods through the iBMC. For details, see the corresponding version of *iBMC User Guide* "**System** > **Storage Management**".
- Locate drive status using the RAID controller card HII. For details, see **7.2.4 Drive Management**, For details, see **RAID controller card HII Solution**.
- Locate drive status using the RAID controller card CLI. For details, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**, For details, see **RAID controller card CLI Solution**.

RAID controller card HII Solution

Step 1 Access the Configuration Utility main screen. For details, see **4.1 Logging In to the Configuration Utility**.

Step 2 Choose **Main Menu** > **Drive Management** on the main page, as shown in **Figure 6-1**. Select the target hard drive and press **Enter**.

Figure 6-1 Drive Management screen

Step 3 Select **Operation** and press **Enter**.

Step 4 Select **Make Unconfigured Good** and press **Enter**.

Step 5 Select **Go** and press **Enter**.

The operation has been performed successfully is displayed.

Step 6 Select **OK** and press **Enter**.

Step 7 Check whether the drive status is changed to **Unconfigured Good** or **Ugood**. For details, see **7.2.4 Drive Management**.

- If the fault is rectified, no further action is required.
- If the fault persists, go to **Step 8**.

Step 8 Check whether the drive has foreign configurations. If the drive has foreign configurations, import or clear the foreign configurations. For details, see **5.9 Importing or Deleting a Foreign Configuration**.

NOTE

If encryption is enabled, see **5.13.5 Querying and Importing the Encrypted Foreign Configuration Information**.

- If the fault is rectified, no further action is required.
- If the fault persists, go to contact technical support.

----End

RAID controller card CLI Solution

Step 1 Use the StorCLI tool. For details, see **8.1 Downloading and Installing StorCLI**.

Step 2 Run the following command to set the status of the member drives in the RAID array to **good**. For details, see **8.2.26 Setting Drive State**.

storcli64 /c*controller_id*/**e***enclosure_id*/**s***slot_id* **set good** [force]

NOTE

- *controller_id*: ID of the RAID controller card where the drive resides
- *enclosure_id*: ID of the enclosure housing the drive
- *slot_id*: slot ID of the physical drive
- Forcibly sets the hard disk status. This parameter is optional. If the OS or file system exists on the hard drive, **force** must be added when the hard drive status is changed from **JBOD** to **ugood**. (This parameter is only available for the RAID mode.)

Step 3 Check whether the drive status is changed to **Unconfigured Good** or **Ugood**. For details, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

- If the fault is rectified, no further action is required.
- If the fault persists, go to **Step 4**.

Step 4 Check whether the drive has foreign configurations. If the drive has foreign configurations, import or clear the foreign configurations. For details, see **8.2.37 Viewing, Importing, and Clearing Foreign Configurations**.

NOTE

If encryption is enabled, see **8.2.42 Querying, Importing, and Deleting the Secured Foreign Configuration Information**.

- If the fault is rectified, no further action is required.
- If the fault persists, go to contact technical support.

----End

6.2 RAID Controller Card Faults

Symptoms

If any of the following symptoms occurs on a server, a RAID controller card fault may occur:

- Data cannot be written into the drives controlled by the RAID controller card.
- The server reports an alarm indicating a controller card fault.

Solution

Step 1 Log in to the iBMC WebUI to view the alarm information.

Step 2 Rectify the fault based on the alarm information. For details, see *iBMC Alarm Handling*.

- If the fault is rectified, no further action is required.
- If the fault persists, go to **Step 3**.

Step 3 Collect and view logs and other necessary fault information.

Step 4 Use the *Knowledge Base* or contact technical support.

----End

NOTE

If the encryption function is enabled, after replacing the RAID card, please refer to **5.13.5 Querying and Importing the Encrypted Foreign Configuration Information** to restore the RAID group. Other operations are the same as if the encryption function was not enabled.

6.3 Supercapacitor Faults

Symptoms

The supercapacitor of a RAID controller card on a server fails if any of the following symptoms occurs:

- The server read/write speed greatly decreases.
- The **Configuration Utility** screen of the RAID controller card indicates an abnormal supercapacitor state.

Solution

Step 1 Check whether the RAID controller card in use supports supercapacitors.

- If yes, go to **Step 2**.
- If no, go to **Step 7**.

Step 2 Go to the **Configuration Utility** screen of the controller card and check whether the supercapacitor state is **Optimal**.

You can obtain supercapacitor state information from **Battery Status** on **7.2.5 Hardware Components**.

- If yes, no further action is required.
- If no, go to **Step 3**.

Step 3 Power off the server, open the chassis cover, and check whether the RAID controller card is connected to a supercapacitor.

- If yes, go to **Step 5**.
- If no, go to **Step 4**.

Step 4 Install the supercapacitor based on the system configuration, and check whether the supercapacitor state is **Optimal**.

- If yes, no further action is required.
- If no, go to **Step 7**.

Step 5 Remove and install the supercapacitor and check whether the supercapacitor state is **Optimal**.

- If yes, no further action is required.
- If no, go to **Step 6**.

Step 6 Replace the supercapacitor, and check whether the supercapacitor state is **Optimal** and whether the fault is rectified.

- If yes, no further action is required.
- If no, go to **Step 7**.

Step 7 Contact technical support.

----End

6.4 The RAID Controller Card Is Not Healthy in Device Manager

Symptoms

As show in **Figure 6-2**, select **BROADCOM <MegaRAID 9560-8i 4GB> Configuration Utility** on the **Device Manager** screen and press **Enter**. An error message is displayed, indicating that the RAID controller card management screen is not available.

Figure 6-2 State information

Solution

Step 1 Check the print information about the problem.

1. On the **Device Manager** screen, select **Drive Health Manage** and press **Enter**.
2. On the **Drive Health Manage** screen, select **BROADCOM EFI SAS Drive MegaRAID 9560-8i 4GB** and press **Enter**. The **Device Manager** screen is displayed.
3. Select **BROADCOM MegaRAID <MegaRAID 9560-8i 4GB Drive Health Protocol Utility** and press **Enter** to view the print information as shown in **Figure 6-3**.

Figure 6-3 Problem display

- If the message "The following VDs have missing disks." is displayed, see **6.4.1 The Following VDs Have Missing Disks**.
- If the message "There are offline or missing virtual drives with preserved cache." is displayed, see **6.4.2 There Are Offline or Missing Virtual Drives with Preserved Cache**.
- If the message "All of the disks from your previous configuration are gone" is displayed, see **6.4.3 All of Disks from Your Previous Configuration Are Gone**.
- If the message "Some configured disks have been removed from your system" is displayed, see **6.4.4 Some Configured Disks Have Been Removed from Your System**.

- If the message "Memory/battery problems were detected / Unexpected power-loss occurred" is displayed, see **6.4.5 Memory/Battery Problems Were Detected/Unexpected Power-loss Occurred**.

----End

NOTE

For description of messages displayed during startup of the RAID controller card and handling suggestions displayed on the management screen, see **A.2 Common Errors and Troubleshooting Methods During the RAID Controller Card Boot**.

6.4.1 The Following VDs Have Missing Disks

Symptom

On the **Driver Healthy Protocol Utility** screen, the message "The following VDs have missing disks" is displayed.

Solution

Step 1 Repair the RAID controller card.

1. Select **Enter Your Input Here** and press **Enter**.
   An input box is displayed.
2. Type **c**, select **Yes**, and press **Enter**.
   The **Driver Healthy Protocol Utility** screen is displayed.
3. Select **Enter Your Input Here** and press **Enter**.
   An input box is displayed.
4. Type **y**, select **Yes**, and press **Enter**.
   The message "Critical Message handling completed. Please exit." is displayed.

Step 2 Press **Esc**. A confirmation dialog box is displayed.

Select **Yes** and press **Enter**. The **Device Manager** screen is displayed.

Step 3 Select **Driver Health Manager** and press **Enter**.

Select **AVAGO EFI SAS Driver 9560-8i** and press **Enter**. The **Device Manager** screen is displayed.

Step 4 Restart the server. On the **Device Manager** screen, check whether the RAID controller card information is displayed.

- If yes, no further action is required.
- If no, contact technical support.

----End

6.4.2 There Are Offline or Missing Virtual Drives with Preserved Cache

Symptoms

On the **Driver Healthy Protocol Utility** screen, the message "There are offline or missing virtual drives with preserved cache" is displayed.

Solution

Step 1 Select **Enter Your Input Here** and press **Enter**. An input box is displayed.

Step 2 Input any characters, select **Yes**, and press **Enter**.

The message "Critical Message handling completed. Please exit" is displayed.

Step 3 Press **Esc** to return to the **Device Manager** screen.

Step 4 Select **Yes** and press **Enter**.

The **Device Manager** screen is displayed.

Step 5 Select **Driver Health Manager** and press **Enter**.

Step 6 Select **BROADCOM EFI SAS Driver MegaRAID 9560-8i 4GB** and press **Enter**.

The **Device Manager** screen is displayed.

Step 7 Select **BROADCOM MegaRAID < MegaRAID 9560-16i 8GB > Configuration Utility** and press **Enter**. The RAID controller card **Configuration Utility** screen is displayed.

Step 8 Select **Discard Preserved Cache** and press **Enter**. A confirmation dialog box is displayed.

Step 9 Select **Confirm** and press **Enter**.

Step 10 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed.

Step 11 Select **OK** and press **Enter**.

Step 12 Restart the server. On the **Device Manager** screen, check whether the RAID controller card **Configuration Utility** screen is displayed.

- If yes, no further action is required.
- If no, contact technical support.

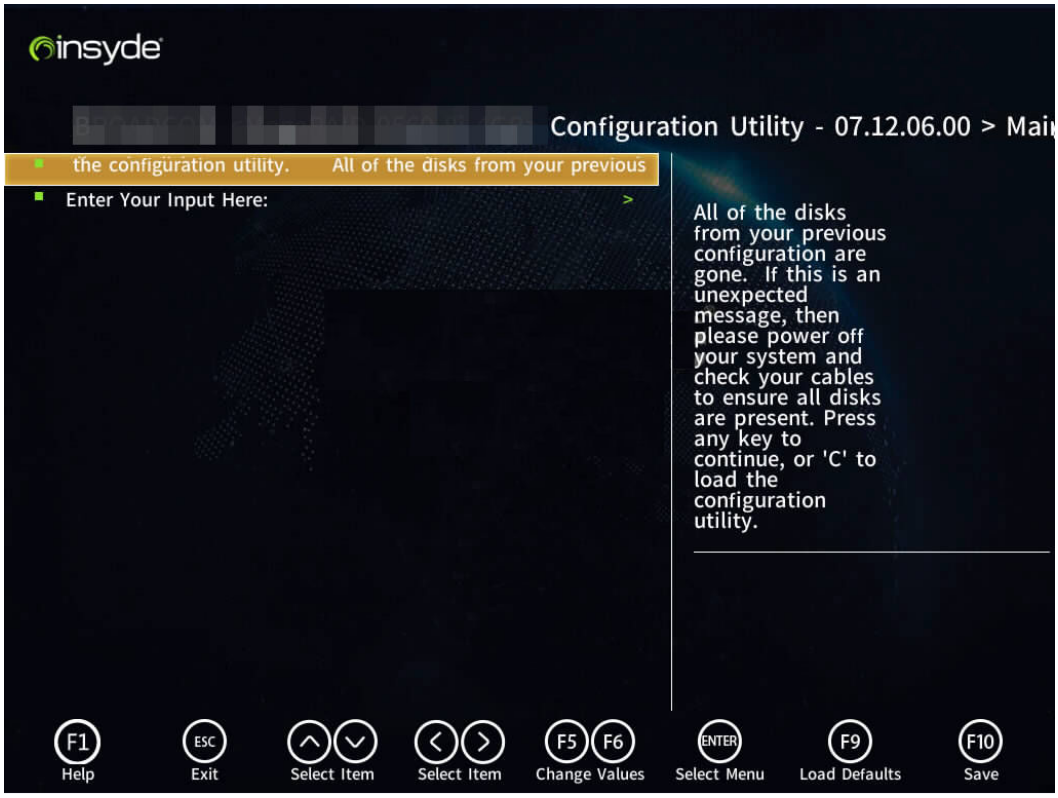
----End

6.4.3 All of Disks from Your Previous Configuration Are Gone

Symptoms

Access the **Driver Healthy Protocol Utility** screen as shown in **Figure 6-4**, the message "All of the disks from your previous configuration are gone" is displayed.

Figure 6-4 State information



Solution

NOTE

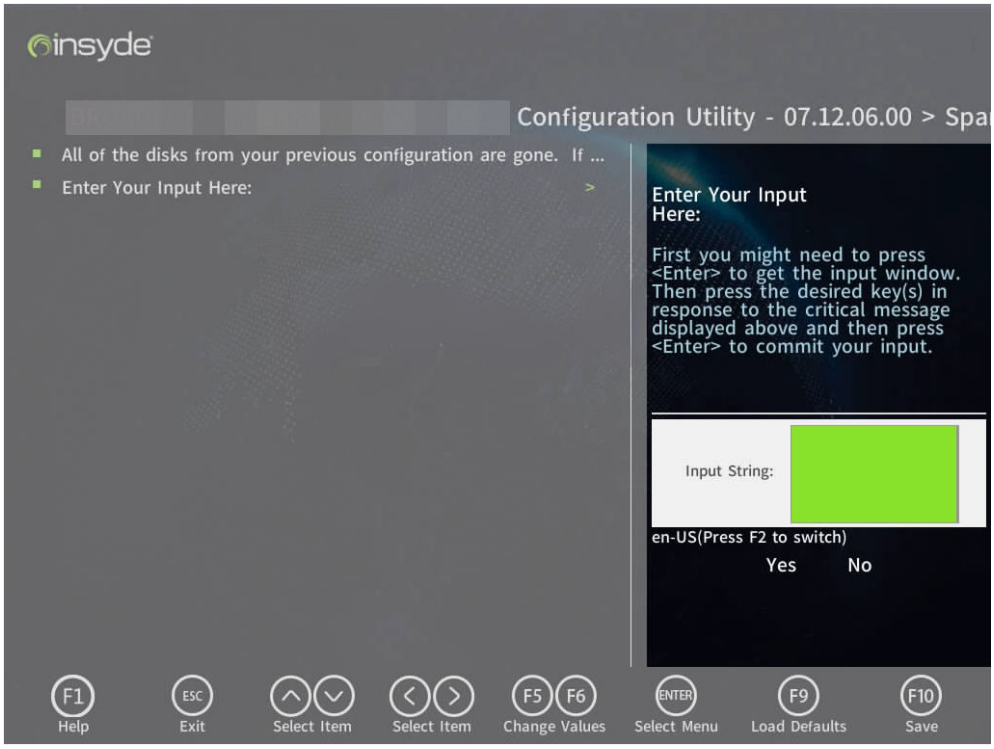
If the print information is displayed, power off the server, remove the cable from the RAID controller card, and power on the server to rectify the fault.

Step 1 Repair the RAID controller card.

1. Select **Enter Your Input Here** as shown in **Figure 6-4** and press **Enter**.

   A input box is displayed, as shown in **Figure 6-5**.

Figure 6-5 Input box



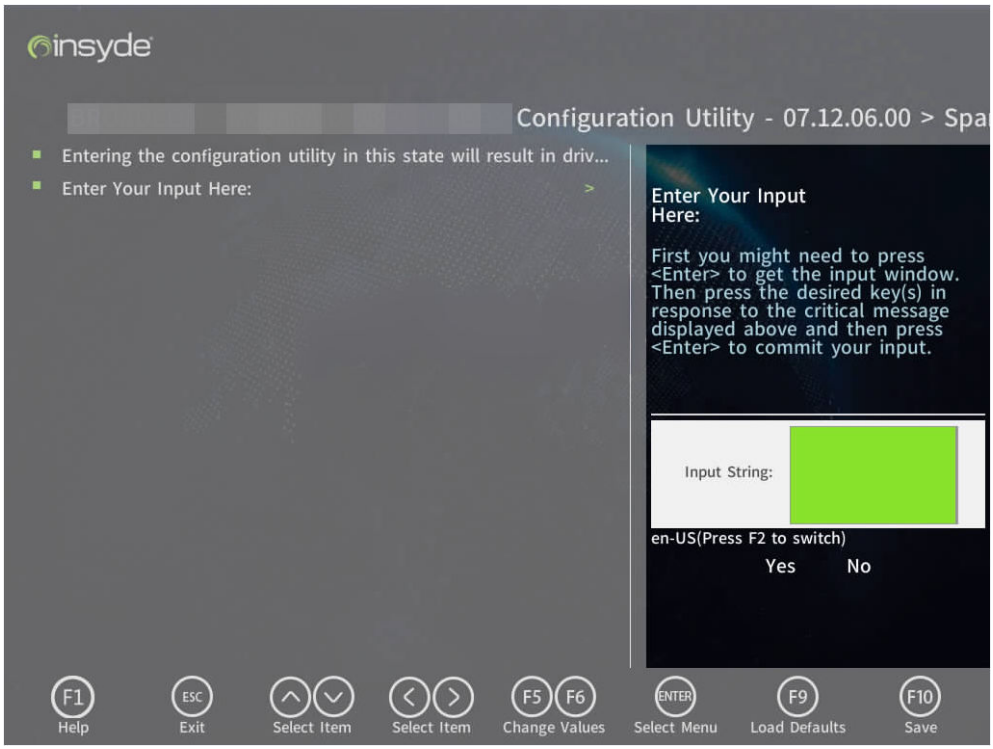
2. Type **C** and press **Enter**.

   The **Driver Healthy Protocol Utility** screen is displayed, as shown in **Figure 6-6**.

Figure 6-6 Driver Healthy Protocol Utility

3. Select **Enter Your Input Here** and press **Enter**.
   A input box is displayed, as shown in **Figure 6-7**.

Figure 6-7 Input box



4. Type **Y** and press **Enter**.
   The message "Critical Message handling completed. Please exit." is displayed.
5. Press **Esc**. The message "Exit Discarding Changes" is displayed.
   Select **Yes** and press **Enter**. The repair is completed.

Step 2 Clear all RAID configurations. Before the operation, ensure that the cable of the RAID controller card is removed and no drive is connected to the RAID controller card.

1. Return to the **Driver Healthy Manager** screen. Select **RAID Management** and press **Enter**.
2. Select **Main Menu** and press **Enter**.
3. Select **Configuration Management** and press **Enter**.
4. Select **Clear Configuration** and press **Enter** to clear the configuration.
5. Select **Confirm** and press **Enter**. Select **Yes** and press **Enter** to confirm the clearance.
   The message "The operation has been performed successfully." is displayed.
6. Select **OK** and press **Enter**.
7. Click **Esc** until the message "Exit Discarding Changes" is displayed.
   Select **Yes** and press **Enter** to save the settings and exit. The clearing is completed.

Step 3 Restart the server and check whether the message "The platform is healthy" is displayed on the **Device Manager** screen.

- If yes, no further action is required. Power off the server, connect the RAID controller card cable, and power on the server.
- If no, contact technical support.

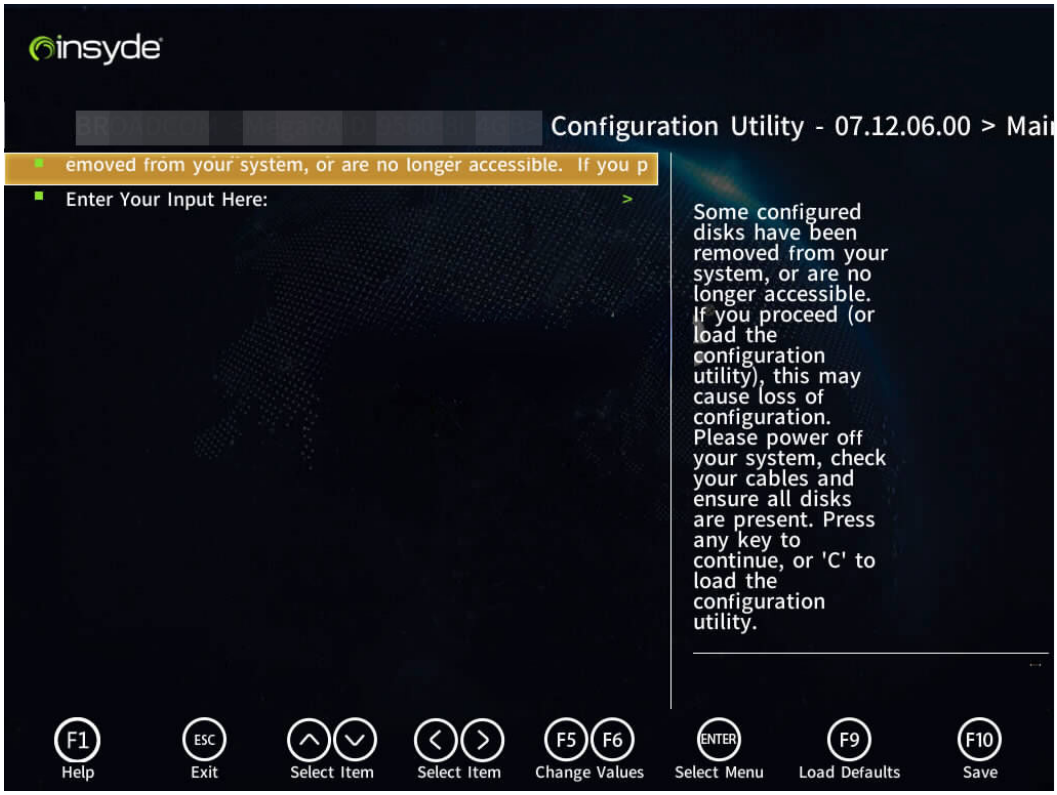
----End

6.4.4 Some Configured Disks Have Been Removed from Your System

Description

Access the **Driver Healthy Protocol Utility** screen as shown in **Figure 6-8**, the message "Some configured disks have been removed from your system" is displayed.

Figure 6-8 State information



Solution

Step 1 Repair the RAID controller card.

1. Select **Enter Your Input Here** and press **Enter**.

   An input box is displayed.

2. Type **c** and press **Enter**. Select **Yes** and press **Enter**.

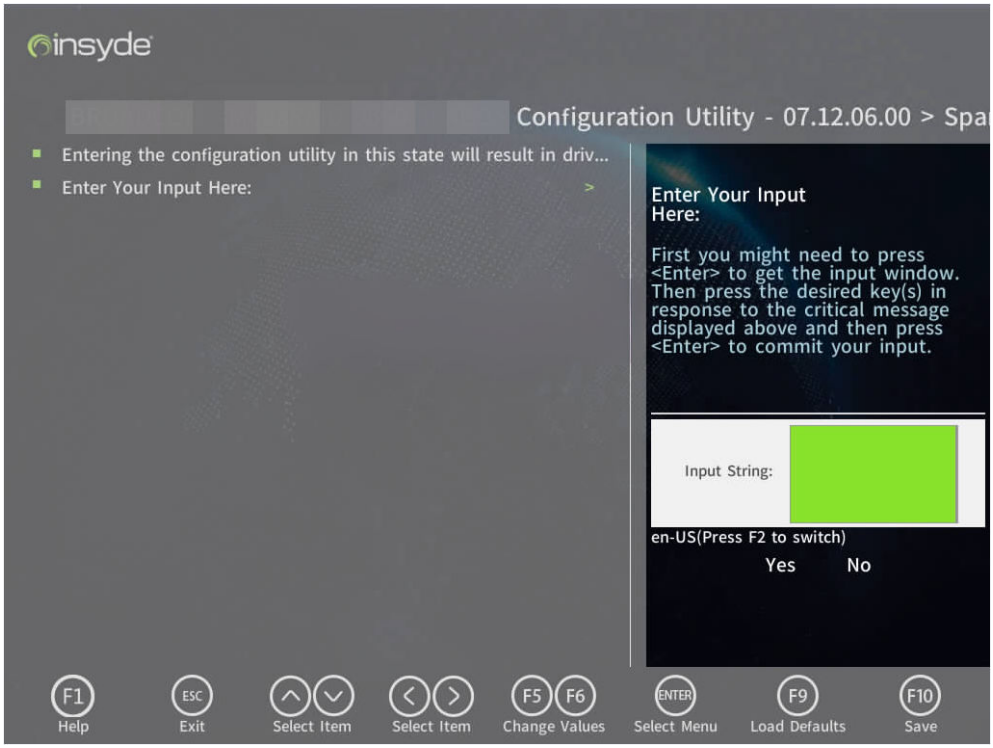
   The **Driver Healthy Protocol Utility** screen is displayed, as shown in **Figure 6-9**.

Figure 6-9 Driver Healthy Protocol Utility screen

3. Select **Enter Your Input Here** and press **Enter**.

   A input box is displayed, as shown in **Figure 6-10**.

Figure 6-10 Input box



4. Type **y** and press **Enter**. Select **Yes** and press **Enter**.

The message "Critical Message handling completed. Please exit" is displayed, as shown in **Figure 6-11**, indicating that the repairing is complete.

Figure 6-11 The repairing is complete.

Step 2 Restart the server. On the **Device Manager** screen, check whether the RAID controller card **Configuration Utility** screen is displayed.

- If yes, no further action is required.
- If no, contact technical support.

----End

6.4.5 Memory/Battery Problems Were Detected/Unexpected Power-loss Occurred

Symptoms

Access the **Driver Healthy Protocol Utility** screen, the message "Memory/battery problems were detected / Unexpected power-loss occurred" is displayed.

Solution

Step 1 Select **Enter Your Input Here** and press **Enter**.

An input box is displayed.

Step 2 Enter any content and press **Enter**.

Select **Yes** and press **Enter**.

The message "Critical Message handling completed. Please exit" is displayed. The repairing is complete.

Step 3 Restart the server. On the **Device Manager** screen, check whether the RAID controller card information is displayed.

- If yes, no further action is required.
- If no, contact technical support.

----End

7 Management Screens

NOTE

The BIOS WebUI varies according to the platform. This section uses Eagle Stream as an example to describe the management screens of the RAID controller card.

7.1 Logging In to the Configuration Utility

The 9560-8i supports UEFI configurations; it supports Legacy and UEFI boot modes.

Impact on the System

Before accessing the Configuration Utility, you need to restart the server, which will interrupt services on the server.

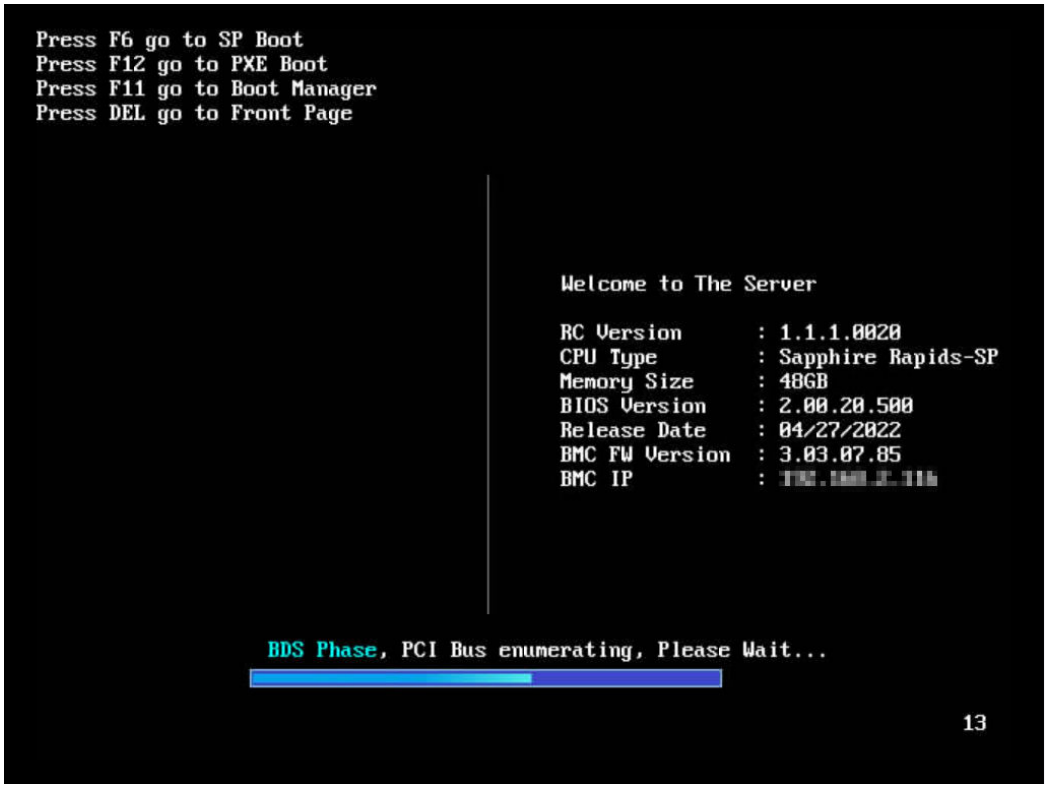
Procedure

Step 1 Access the server desktop using the Remote Virtual Console.

Step 2 Power on or restart the server.

Step 3 During the server boot process, press **Delete** or **Del** when information shown in **Figure 7-1** is displayed.

Figure 7-1 BIOS boot screen



NOTE

The default BIOS password is **Admin@9000**.

Step 4 Type the password and press **Enter**.

The screen shown in **Figure 7-2** is displayed.

Figure 7-2 Front page

Step 5 Select **Device Manager** and press **Enter**.

The screen shown in **Figure 7-3** is displayed.

Figure 7-3 Device Manager screen

NOTE

If an error message "Some drivers are not healthy" is displayed after you select the RAID controller card in **Device Manager**, see **6.4 The RAID Controller Card Is Not Healthy in Device Manager** to rectify the fault.

Step 6 Select **BROADCOM <MegaRAID 9560-8i> Configuration Utility** and press **Enter**.

The main screen is displayed, as shown in **Figure 7-4** and **Figure 7-5**. **Table 7-1** describes the parameters on the screen.

Figure 7-4 9560-8i screen (1)

Figure 7-5 9560-8i screen (2)

Table 7-1 Parameter description

Parameter	Description
Main Menu	Specifies the main menu of the RAID controller card. All operations on the RAID controller card are available.
Help	Specifies the help information.
Status	Specifies the state of the RAID controller card.
Backplane	Specifies the number of backplanes.
BBU	Specifies the installation state of the supercapacitor.
Enclosure	Specifies the number of components.
Drives	Specifies the number of drives.
Drive Groups	Specifies the number of drive groups.
Virtual Drives	Specifies the number of virtual drives.
View Server Profile	Displays and manages RAID controller card properties.

Parameter	Description
Configure	Allows you to create a RAID array, quickly create a RAID array, check drive group properties, clear all RAID configurations, and manage external ports.
Set Factory Defaults	Restores factory settings.
Update Firmware	Upgrades firmware.
Silence Alarm	Specifies the state of the onboard buzzer. **NOTE** This parameter does not take effect because the 9560-8i RAID controller card is not configured with a buzzer.
Virtual Drive Operations in Progress	Specifies whether virtual drive operations are performed on the background.
Drive Operations in Progress	Specifies whether physical drive operations are performed in the background.
MegaRAID xxx	Specifies the state of advanced properties.
Manage MegaRAID Advanced Software Options	Manages advanced properties.

----End

7.2 Main Menu

This screen allows you to configure and manage the RAID controller card.

Screen Overview

Figure 7-6 shows the **Main Menu** screen. **Table 7-2** describes the parameters on the screen.

Figure 7-6 Main Menu screen

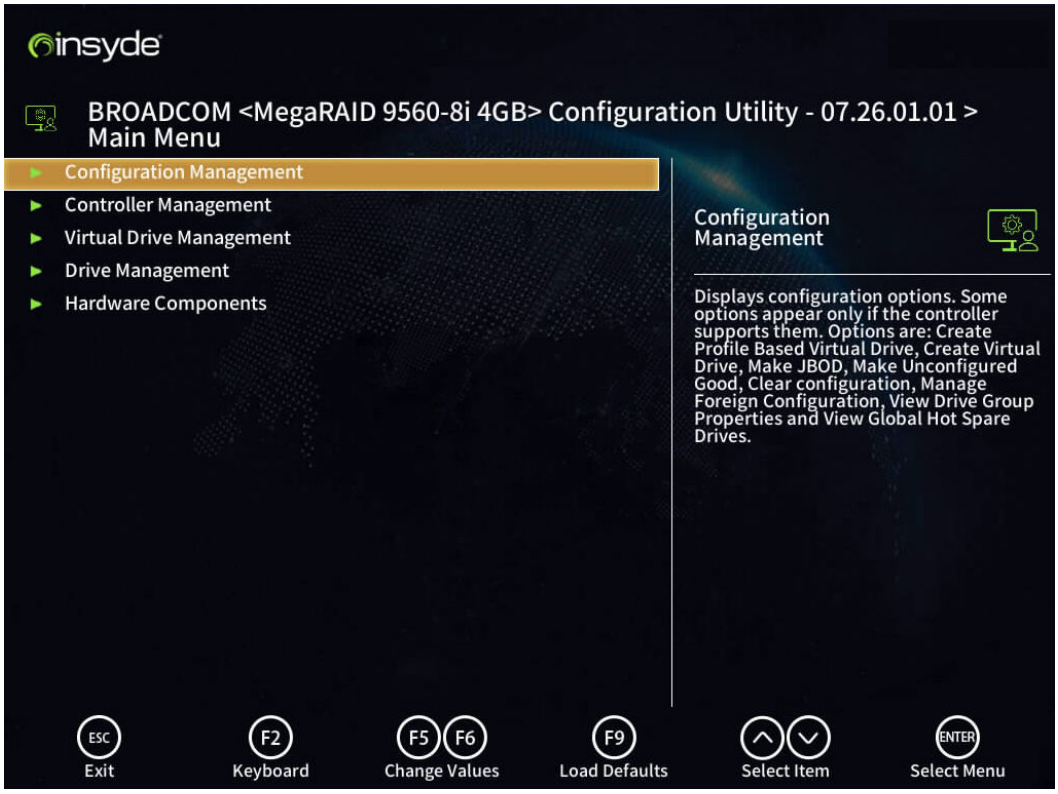


Table 7-2 Parameter description

Parameter	Description
Configuration Management	Configures and manages RAID arrays.
Controller Management	Manages the RAID controller.
Virtual Drive Management	Manages virtual drives.
Drive Management	Manages the drives.
Hardware Components	Queries the component information.

7.2.1 Configuration Management

This screen allows you to configure and manage virtual drives, drive groups, and foreign configurations, as well as delete configurations.

Screen Overview

Figure 7-7 shows the **Configuration Management** screen. Table 7-3 describes the parameters on the screen.

Figure 7-7 Configuration Management screen

Table 7-3 Parameter description

Parameter	Description
Auto Configure RAID 0	Automatically creates a single-drive RAID 0 for all drives in the **Unconfigured Good** state.
Create Virtual Drive	Creates a RAID array.
Create Profile Based Virtual Drive	Creates a RAID array of a certain level for all drives in the **Unconfigured Good** state.
View Drive Group Properties	Displays drive group properties.
Make JBOD	Enables the pass-through function, which makes drives be used without being added to the RAID array.
Clear Configuration	Clears all RAID configurations.

Deleting a RAID Configuration

Step 1 Select **Clear Configuration** and press **Enter**.

A confirmation screen is displayed.

Step 2 Select **Confirm** and press **Enter**.

Step 3 Select **Enabled** and press **Enter**.

Step 4 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed.

Step 5 Select **OK** and press **Enter**.

The configuration is complete.

----End

Viewing Drive Group Properties

On the screen shown in **Figure 7-7**, select **View Drive Group Properties** and press **Enter**.

Figure 7-8 shows the screen displayed. **Table 7-4** describes the parameters on the screen.

Figure 7-8 View Drive Group Properties screen

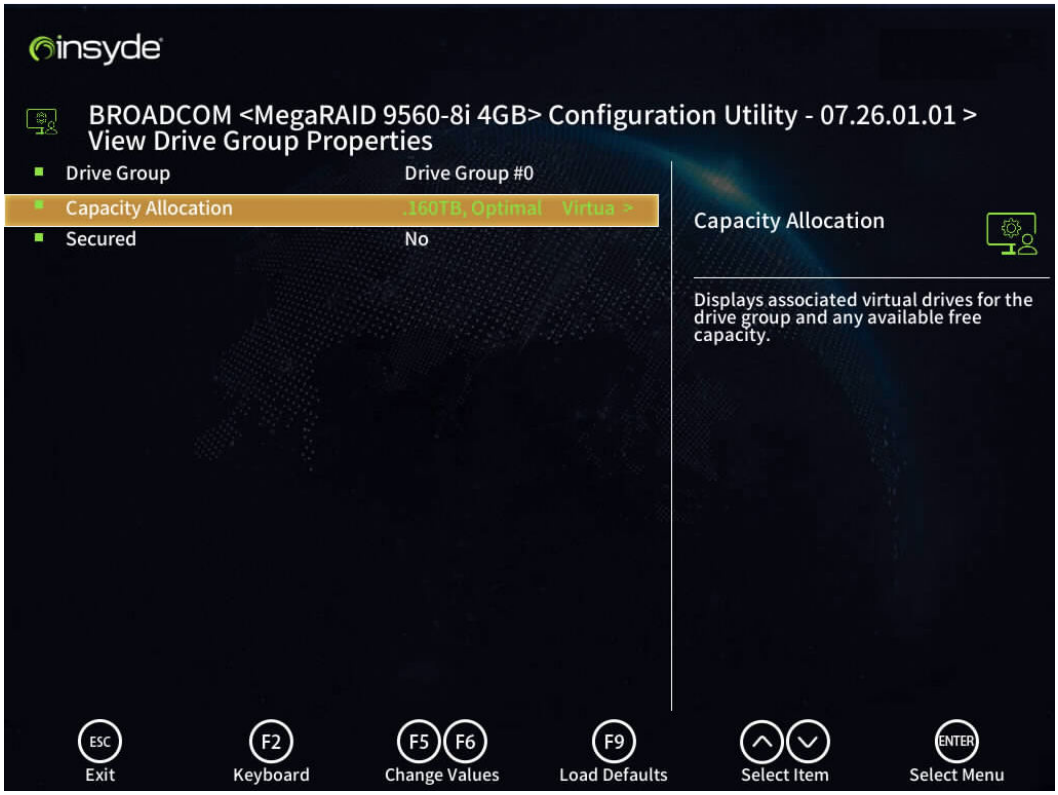


Table 7-4 Parameter description

Parameter	Description
Drive Group	Specifies the name of a drive group.
Capacity Allocation	Specifies the capacity of a drive group. Names, RAID levels, capacities, and states of the virtual drives in the drive group are also included.

Parameter	Description
Secured	Specifies whether the encryption function of a RAID array is supported.

7.2.2 Controller Management

This screen allows you to manage the controller by viewing and modifying controller parameters.

Screen Overview

Figure 7-9 shows the **Controller Management** screen. **Table 7-5** describes the parameters on the screen.

Figure 7-9 Controller Management screen

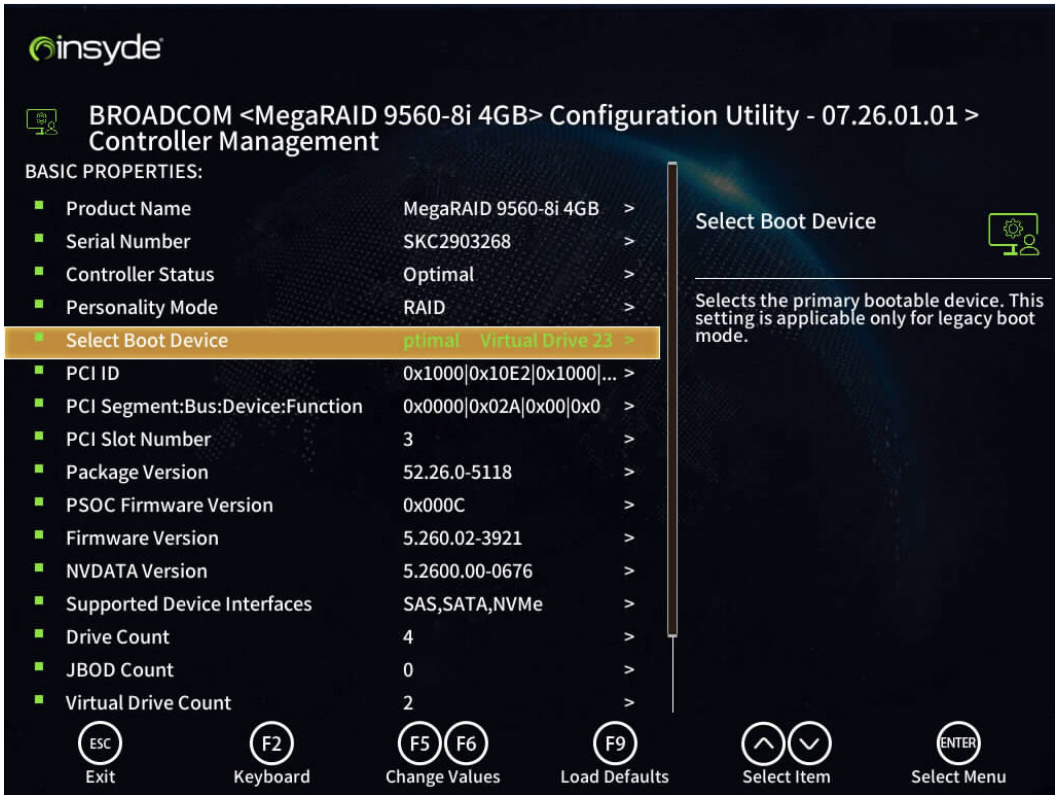


Table 7-5 Parameter description

Parameter	Description
Product Name	Specifies the name of a RAID controller card.
Serial Number	Specifies the serial number of a RAID controller card.

Parameter	Description
Controller Status	Specifies the operating state of a RAID controller card.
Personality Mode	Specifies the operating mode of a RAID controller card.
Select Boot Device	Specifies the current boot device. **NOTE** The boot device is set in Legacy mode and takes effect only in Legacy mode. For boot configuration methods in EFI/UEFI mode, see **4.9 Setting Boot Devices**.
PCI ID	Specifies the PCI ID of a RAID controller card.
PCI Slot Number	Specifies the PCI slot number of a RAID controller card.
Package Version	Specifies the package version of a RAID controller card.
Firmware Version	Specifies the firmware version of a RAID controller card.
NVDATA Version	Specifies the version of a RAID controller card in the configuration information.
Drive Count	Specifies the number of drives mounted to a RAID controller card.
Virtual Drive Count	Specifies the number of existing virtual drives on a RAID controller card.
Advanced Controller Management	Specifies more operations that can be performed on a controller.
Advanced Controller Properties	Displays and modifies advanced controller properties.

More Operations on the Controller

On the screen shown in **Figure 7-9**, select **Advanced Controller Management** and press **Enter**.

Figure 7-10 shows the screen. **Table 7-6** describes the parameters on the screen.

Figure 7-10 Advanced Controller Management screen

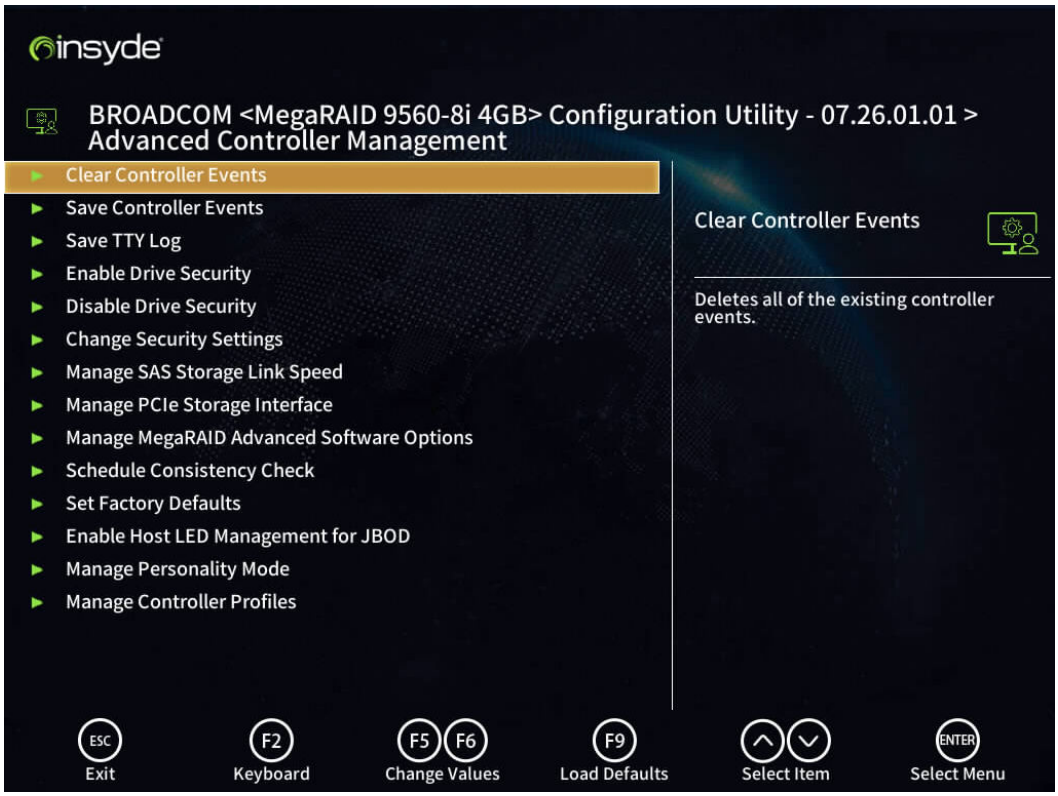


Table 7-6 Parameter description

Parameter	Description
Clear Controller Events	Clears the event logs of the controller.
Save Controller Events	Saves the event logs of the controller.
Save TTY Log	Saves the operation logs of the terminal.
Enable Drive Settings	Enables the encryption function of the drive.
Disable Drive Settings	Disables the encryption function of the drive.
Change Security Settings	Changes the security settings.
Manage SAS Storage Link Speed	Manages the port rate.
Manage PCIe Storage Interface	Manages the link width of the RAID controller card and the lane rate.
Manage MegaRAID Advanced Software Options	Manages the advanced software options.
Schedule Consistency Check	Sets the consistency check parameters.
Set Factory Defaults	Restores factory settings.

Parameter	Description
Enable Host LED Management for JBOD	Manages the Host LED in the JBOD mode.
Manage Personality Mode	Specifies the current working mode of the RAID controller card.
Manage Controller Profiles	Views and manages the configuration files of the controller.

Setting the Current Working Mode of the RAID Controller Card

Step 1 Select **Manage Personality Mode** and press **Enter**, as shown in **Figure 7-10**.

Figure 7-11 shows the screen. **Table 7-7** describes the parameters on the screen.

Figure 7-11 Manage Personality Mode

Table 7-7 Parameter description

Parameter	Description
Personality Mode	Specifies the current working mode of the RAID controller card.

Parameter	Description
Auto-Configure Behavior	Sets the automatic configuration mode. ● **JBOD**: indicates that the new drive inserted is in the **JBOD** state by default. ● **RAID-0**: indicates that a single-drive RAID 0 array is created by default for the new drive inserted. ● **None**: indicates that the new drive inserted is in the **Unconfigured Good** state by default. It is **None** by default.
SES Management	Specifies the enclosure management
Auto Secure SED	Automatically supports SED drive security.
Apply Changes	Saves the settings.
Switch to JBOD mode/ Switch to RAID mode	Switches the working mode of the RAID controller card. The default mode is **RAID**. If the current working mode of the RAID controller card is **RAID**, the message "Switch to JBOD mode" is displayed. If the current working mode is **JBOD**, the message "Switch to RAID mode" is displayed.

----End

Viewing and Modifying Advanced Controller Properties

Step 1 On the screen shown in **Figure 7-9**, select **Advanced Controller Properties** and press **Enter**.

Figure 7-12 and **Figure 7-13** show the screen. **Table 7-8** describes the parameters on the screen.

Figure 7-12 Advanced Controller Properties screen (1)

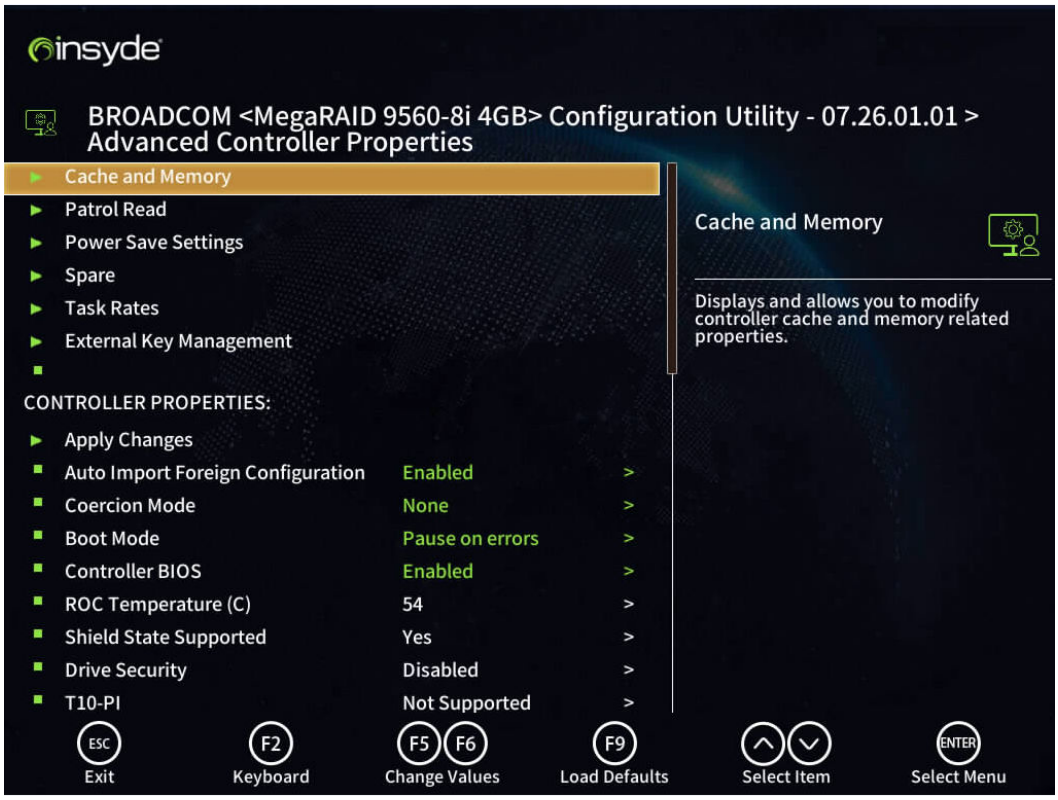


Figure 7-13 Advanced Controller Properties screen (2)

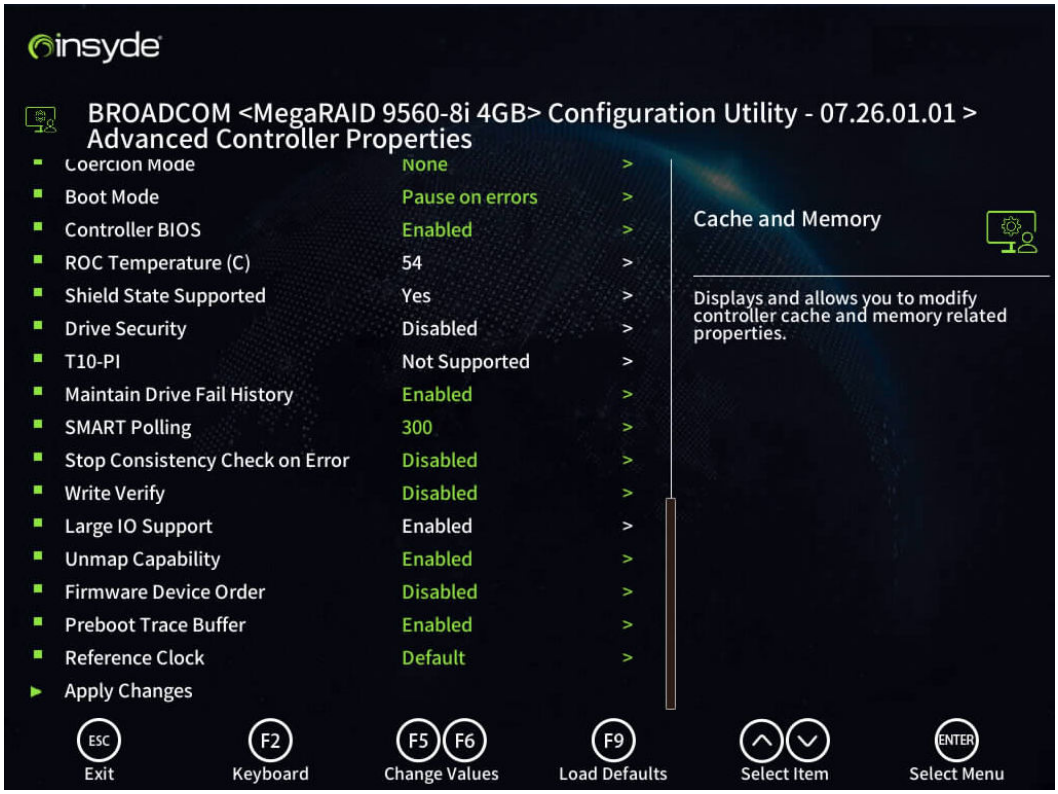


Table 7-8 Parameter description

Parameter	Description
Cache and Memory	Displays cache and memory information about a controller.
Patrol Read	Specifies the patrol read feature.
Power Save Settings	Sets the drive sleep mode.
Spare	Sets the hot spare state.
Task Rates	Sets the handling speed of various tasks.
External Key Management	Specifies the external key management.
Apply Changes	Saves the settings.
Alarm Control	This parameter does not take effect because the 9560-8i RAID controller card is not configured with a buzzer.
Auto Import Foreign Configuration	Specifies whether to automatically import foreign configurations.
Coercion Mode	Specifies the drive capacity compression mode.
Boot Mode	Specifies the action to be taken when the BIOS detects an exception. The value options are as follows: ● **Stop on Errors**: The controller BIOS stops the startup when detecting an exception and continues the startup only with your confirmation. ● **Pause on Errors**: – In the Preserved Cache scenario, the controller BIOS stops startup when detecting an exception. You need to confirm whether to continue the startup. – In other scenarios, the controller BIOS pauses startup when detecting an exception. After a period of time, the controller BIOS continues the startup if you do not confirm. ● **Ignore Errors**: The controller BIOS continues the startup when detecting an exception. This option is usually used for system diagnosis. ● **Safe Mode on Errors**: The controller BIOS enters the safe startup mode when detecting an exception. It is **Pause on Errors** by default.
Controller BIOS	Specifies the BIOS enablement state.

Parameter	Description
ROC Temperature (C)	Specifies the controller temperature.
Shield State Supported	Specifies whether I/O interruption is supported for drive diagnosis. It is **Yes** by default.
Drive Security	Specifies the state of drive encryption.
T10-PI	Specifies the state of information protection technology.
Maintain Drive Fail History	Specifies the state of the fault recording function for drives. The default value is **Enabled**. **NOTE** ● When this parameter is set to **Disabled**: – When a new drive is inserted no matter whether the drive has RAID configurations or when a drive in the redundant RAID array is hot-swapped, the failed drive automatically rebuilds data. ● When this parameter is set to **Enabled**: – When a new drive without RAID configurations is inserted, the failed drive automatically rebuilds data. – When a new drive with RAID configurations is inserted or when a drive in the redundant RAID array is hot-swapped, the drive state is marked as **Unconfigured Bad (Foreign)** and the rebuild operation is not automatically performed. If the RAID array needs to be rebuilt for the drive, set the drive to **Unconfigured Good**. For details, see **5.9 Importing or Deleting a Foreign Configuration**. – After a JBOD drive controlled by a RAID controller card is removed and then inserted, the drive state is marked as **Unconfigured Bad**. If the JBOD drive needs to be enabled again, set the drive to **Unconfigured Good**. Then set the drive as a JBOD drive.
SMART Polling	Specifies the SMART polling interval. The default value is **300**.
Stop Consistency Check on Error	Specifies whether consistency check is stopped in case of errors.
Write Verify	Verifies data write.

Parameter	Description
Drive Detection Type	Media errors often occur on drives over time, which may degrade the performance of drives and the entire system. The firmware attempts to detect drives with poor performance. You can set the controller attributes based on site requirements. The options are as follows: ● Disabled ● High Latency ● Aggressive ● Default It is **Disabled** by default.
Drive Corrective Action	Media errors often occur on drives over time, which may degrade the performance of drives and the entire system. If the I/O latency continuously decreases due to a certain number of affected media on the drive, the firmware fails the drive. As a result, the drive starts rebuild or copyback. The firmware also records some events to generate alarms for users. ● **Disabled**: This function is disabled. ● **Enabled**: This function is enabled. It is **Disabled** by default.
Drive Error Threshold	Sets the appropriate controller properties. ● Every 8 hours ● Every 1 hours ● Every 15 mins ● Every 5 mins It is **Every 8 hours** by default.
Large IO Support	Enables or disables large I/O support. ● **Disabled**: This function is disabled. ● **Enabled**: This function is enabled. It is **Enabled** by default.
Unmap Capability	Specifies the unmapping capability. If this function is enabled, SAS drives that support the Unmap function are marked as **Unmap**. ● **Disabled**: This function is disabled. ● **Enabled**: This function is enabled. It is **Enabled** by default.
Apply Changes	Saves the settings.

Step 2 Modify advanced controller properties by referring to **Table 7-8**.

Step 3 Select **Apply Changes** and press **Enter**.

The message "The operation has been performed successfully" is displayed.

Step 4 Select **OK** and press **Enter**.

----End

7.2.3 Virtual Drive Management

This screen allows you to view and manage virtual drives.

Screen Overview

Figure 7-14 shows the **Virtual Drive Management** screen that lists the virtual drives.

Figure 7-14 Virtual Drive List screen

Select a virtual drive and press **Enter**. The drive detail screen is displayed, as shown in **Figure 7-15**. **Table 7-9** describes the parameters on the screen.

Figure 7-15 Virtual Drive Management screen

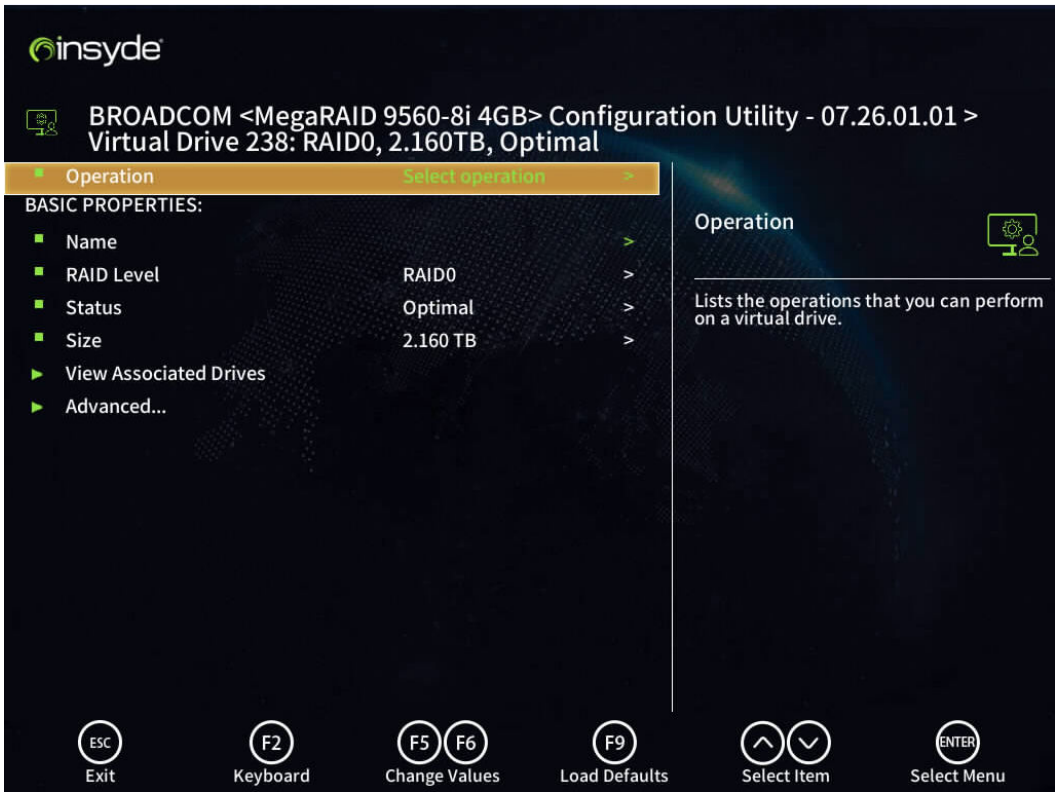


Table 7-9 Parameter description

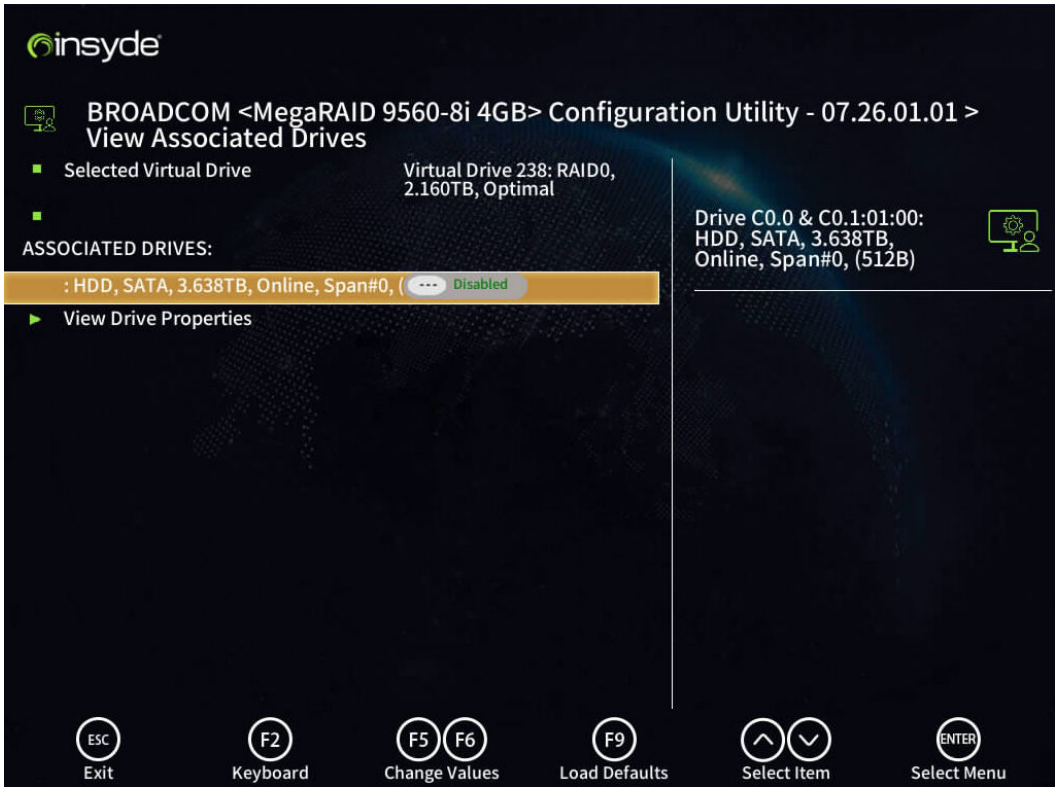
Parameter	Description
Operation	Specifies the operation that can be performed. The options are as follows: ● **Start Locate**: locates all member drives of the virtual drive. ● **Stop Locate**: stops locating the member drives of the virtual drive. ● **Delete Virtual Drive**: deletes the virtual drive. ● **Expand Virtual Drive**: expands the virtual drive capacity. ● **Reconfigure Virtual Drives**: reconfigures the virtual drive. A RAID controller card does not support reconfiguration of two or more virtual drives at the same time. ● **Hide/Unhide Virtual Drive**: hides or shows the virtual drive. ● **Hide/Unhide Drive Group**: hides or shows the drive group. ● **Fast Initialization**: performs fast initialization of the virtual drive. ● **Slow Initialization**: performs slow initialization of the virtual drive. ● **Check Consistency**: performs consistency check. ● **Virtual Drive Erase**: formats the virtual drive.
Progress	Displays the current operation progress. **NOTE** This parameter is displayed only when the virtual drive is being initialized, expanded, reconfigured, or formatted.
Stop	Stops the operation in progress. **NOTE** This parameter is displayed only when the virtual drive is initialized, expanded, or formatted.
Name	Specifies the name of a virtual drive.
RAID Level	Specifies the RAID level of a virtual drive.
Status	Specifies the current running state of a virtual drive.
Size	Specifies the capacity of a virtual drive.
View Associated Drives	Views member drive properties.
Advanced...	Displays advanced properties of a virtual drive.

Viewing Member Drive Properties

Step 1 On the screen shown in **Figure 7-15**, select **View Associated Drives** and press **Enter**.

The member drive list is displayed, as shown in **Figure 7-16**.

Figure 7-16 View Associated Drives screen



Step 2 Select the member drive to be viewed and press **Enter**.

Step 3 Select **View Drive Properties** and press **Enter**.

The drive properties screen is displayed, as shown in **Figure 7-17**. **Table 7-10** describes the parameters on the screen.

Figure 7-17 View Drive Properties screen

Table 7-10 Parameter description

Parameter	Description
Operation	Specifies the operations that can be performed on a member drive. The options are as follows: ● **Start Locate**: locates the drive. ● **Stop Locate**: stops locating the drive. ● **Place Drive Offline/Online**: makes the drive online/ offline.
Device ID	Specifies the ID of a member drive.
Connection	Specifies the port of a member drive.
Enclosure Position	Specifies the location of an enclosure.
Slot Number	Specifies the slot number of a member drive.
Status	Specifies the current operating state of a member drive.
Size	Specifies the capacity of a member drive.
Type	Specifies the type of a member drive.
Model	Specifies the model of a member drive.
Serial Number	Specifies the serial number of a member drive.

Parameter	Description
Associated Virtual Drive	Virtual drive to which a member drive belongs.
Advanced...	Views and modifies advanced properties of a virtual drive.

----End

Viewing and Modifying Advanced Properties of a Virtual Drive

Step 1 On the screen shown in **Figure 7-15**, select **Advanced** and press **Enter**.

The screen shown in **Figure 7-18** and **Figure 7-19** is displayed. **Table 7-11** describes the parameters on the screen.

Figure 7-18 Advanced screen (1)

Figure 7-19 Advanced screen (2)

Table 7-11 Parameter description

Parameter	Description
Logical Sector Size	Specifies the size of a logical sector.
Strip Size	Specifies the size of a strip.
Starting Logical Block Addressing (LBA)	Specifies the start address of logical units.
Emulation Type	Sets the sector size reported to the OS. • **Default**: If there are any 512e drives in member drives, the physical sector size is 512e (4k). If there are no 512e drives, the physical sector size is 512n. • **Disable**: If there are no 512e drives in member drives, the physical sector size is 512n. • **Force**: Even though there are no 512e drives in member drives, the physical sector size is still 512e (4k).
Secured	Specifies whether the encryption function of a RAID array is supported.
Bad Blocks	Specifies that the virtual drive has bad blocks.
Access	Specifies whether Access is supported.

Parameter	Description
Current Write Cache Policy	Specifies the current cache write policy. The options are as follows: ● **Write Through**: Once the drive subsystem receives all data, the controller card notifies the host that data transmission is complete. ● **Write Back**: The controller card goes into the **Write Through** mode when supercapacitor is absent or faulty. ● **Always Write Back**: Once all data in the cache is received, the controller card notifies the host that data transmission is complete. **NOTICE** In **Always Write Back** mode, DDR (Cache) write data of the RAID controller card will be lost when the server is powered off and the supercapacitor is faulty, uninstalled or charging. This mode is not recommended. This mode is not recommended.
Default Write Cache Policy	Specifies the default write cache policy.
Disable Background Initialization	Specifies whether background initialization is disabled.
Read Cache Policy	Specifies the current cache read policy. The options are as follows: ● **No Read Ahead**: disables the Read Ahead function. ● **Read Ahead**: enables the Read Ahead function. The RAID controller card prefetches sequential data or data to be used and stores it in the cache.
Drive Cache	Specifies whether cache is supported.
Input/Output (I/O)	Specifies the I/O read policy. The options are as follows: ● **Direct**: Data is read directly from drives instead of from cache. ● Cached: Data is read from cache.
Unmap Capability	Specifies the unmapping capability.
Apply Changes	Saves the settings.

Step 2 Set the **Advanced** parameters described in **Table 7-11**.

Step 3 Select **Apply Changes** and press **Enter**.

The message "The operation has been performed successfully." is displayed.

Step 4 Select **OK** and press **Enter**.

----End

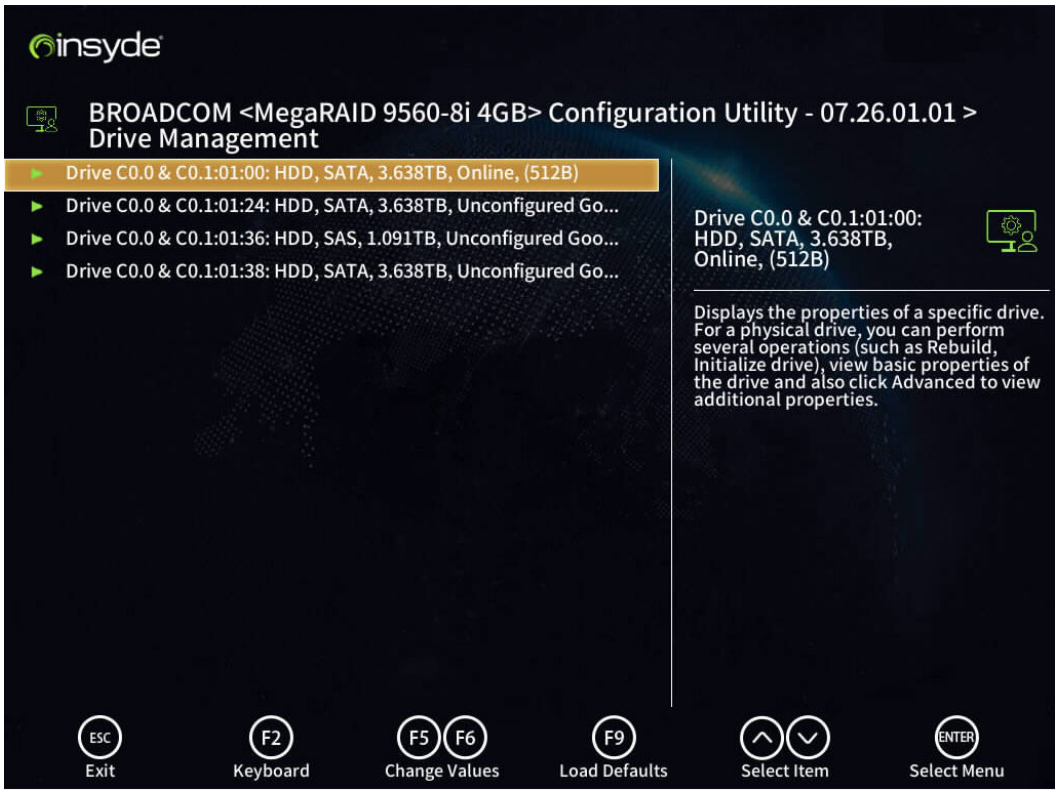
7.2.4 Drive Management

This screen allows you to view the basic properties of a drive and perform operations on the drive.

Screen Overview

Figure 7-20 shows the **Drive Management** screen, which lists the drives.

Figure 7-20 Drive List screen



Select a drive and press **Enter**. The drive detail screen is displayed, as shown in **Figure 7-21**. **Table 7-12** describes the parameters on the screen.

Figure 7-21 Drive Management screen

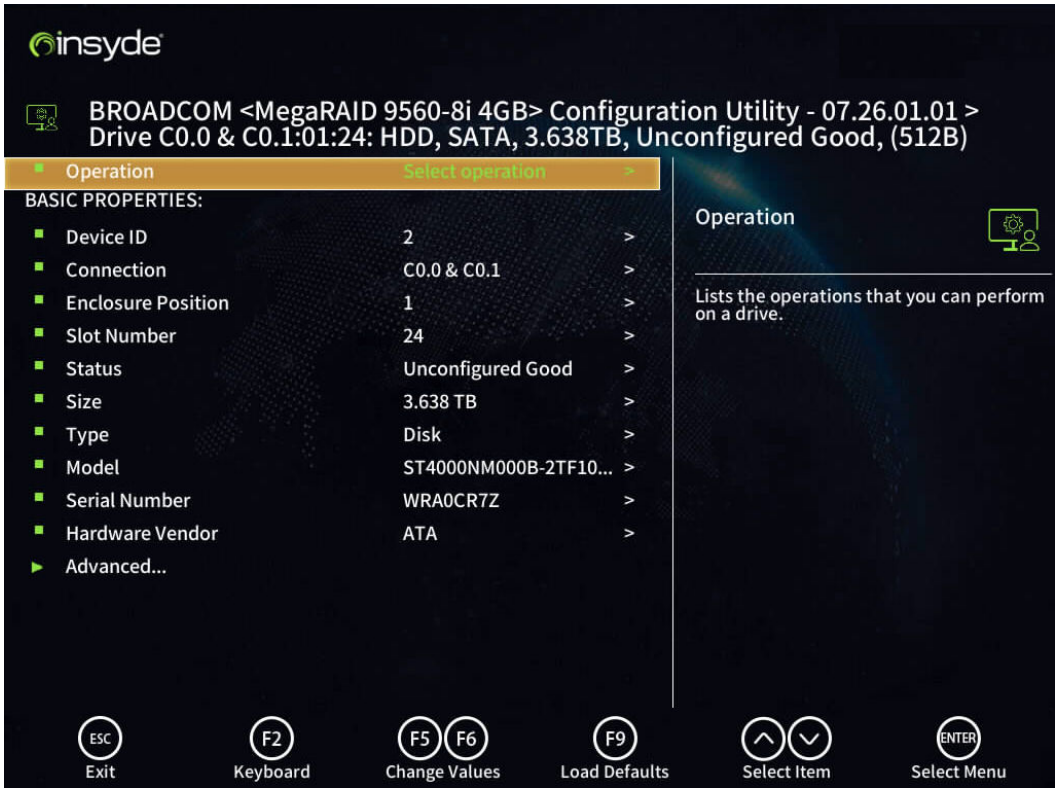


Table 7-12 Parameter description

Parameter	Description
Operation	Operations that can be performed. The options are as follows: ● **Start Locate**: locates the drive. ● **Stop Locate**: stops locating the drive. ● **Initialize Drive**: initializes the drive. ● **Drive Erase**: erases data on the drive. To erase data on a member drive in a RAID array, delete the RAID array in advance. To erase data on a hot spare drive, cancel settings of the hot spare drive. To erase data on a JBOD drive, set the drive to the **Unconfigured Good** state. – **Simple**: erases data on the drive one round. – **Normal**: erases data on the drive three rounds. – **Thorough**: erases data on the drive nine rounds. – **Stop Erase**: stops erasing data on the drive. ● **Make Unconfigured Good/Bad**: changes the drive state. ● **Make JBOD**: enables the pass-through function, which makes drives be used without being added to the RAID array. ● **Assign Global Hot Spare Drive**: sets a drive as a global hot spare drive. ● **Assign Dedicated Hot Spare Drive**: sets a drive as a dedicated hot spare drive. ● **Unassign Hot Spare Drive**: deletes a hot spare drive. ● **Cryptographic Erase**: erases data on an encrypted drive. ● **Place Drive Online**: changes the drive state from **Offline** to **Online**. **NOTE** ● The **Place Drive Online** operation does not change drive data. After this operation, drives in a RAID array have inconsistent data. To prevent data inconsistency, do not directly place an offline drive online. Choose **Rebuild** and add the offline drive to the RAID array. ● If all drives are set to the JBOD mode, the **Make JBOD** option is unavailable. If all drives are set to **Unconfigured Good**, the **Make Unconfigured Good** option is unavailable. ● After initialization or erasure is complete, data is deleted from the drive. Exercise caution when performing this operation.

Parameter	Description
Progress	Displays the current operation progress. **NOTE** This parameter is displayed only when the drive is being initialized or erased.
Stop	Stops the operation in progress. **NOTE** This parameter is displayed only when the drive is being initialized or erased.
Device ID	Specifies the ID of a drive.
Connection	Specifies the port of a drive.
Enclosure Position	Specifies the location of an enclosure.
Slot Number	Specifies the slot number of a drive.
Status	Specifies the current operating state of a drive.
Size	Specifies the capacity of a drive.
Type	Specifies the type of a drive.
Model	Specifies the model of a drive.
Serial Number	Specifies the serial number of a drive.
Hardware Vendor	Specifies the vendor of a drive.
Advanced...	Specifies the advanced properties of a drive.

Safely Erasing Data from a Drive

NOTE

This operation will delete data on the drive. Exercise caution when performing this operation.

Step 1 Set **Operation** to **Drive Erase**.

Step 2 Select **Erase Mode** and press **Enter**.

Step 3 Select the erase type and press **Enter**.

Step 4 Select **OK** and press **Enter**.

A confirmation screen is displayed.

Step 5 Select **Confirm** and press **Enter**.

Step 6 Select **Yes** and press **Enter**.

A message is displayed, indicating that the operation is successful.

----End

Viewing Drive Properties

Select **Advanced** and press **Enter**.

The **Drive Properties** screen is displayed, as shown in **Figure 7-22** and **Figure 7-23**. **Table 7-13** describes the parameters on the screen.

Figure 7-22 Drive Properties screen (1)

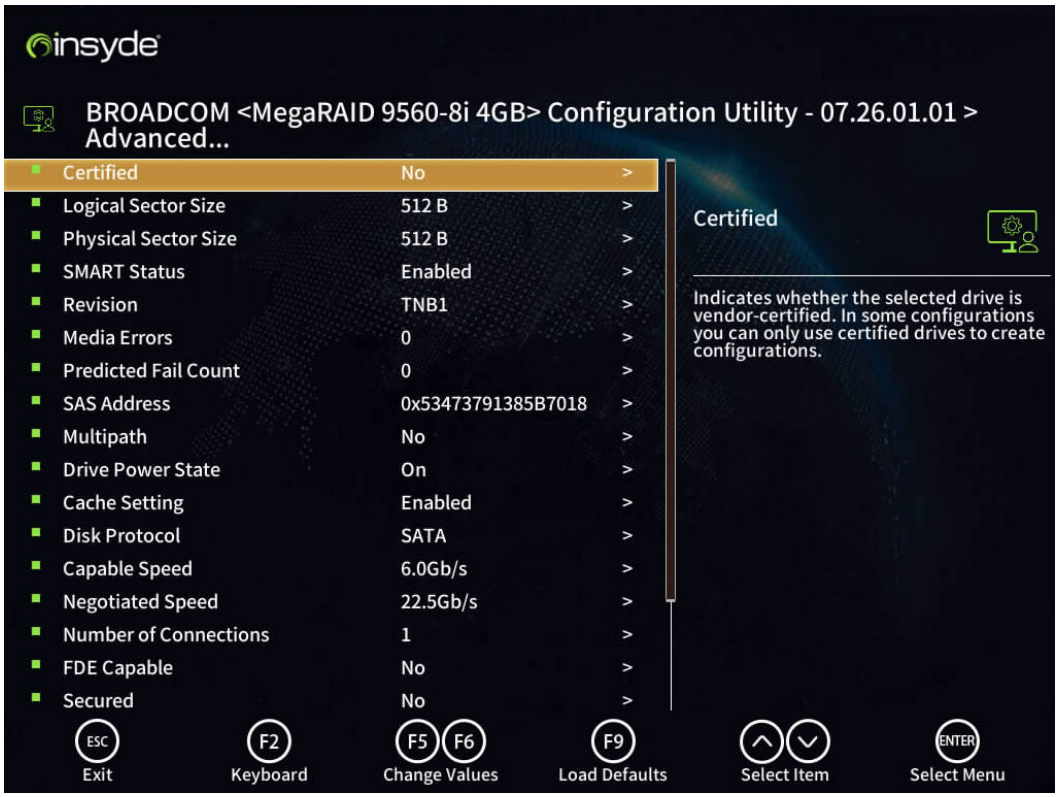


Figure 7-23 Drive Properties screen (2)

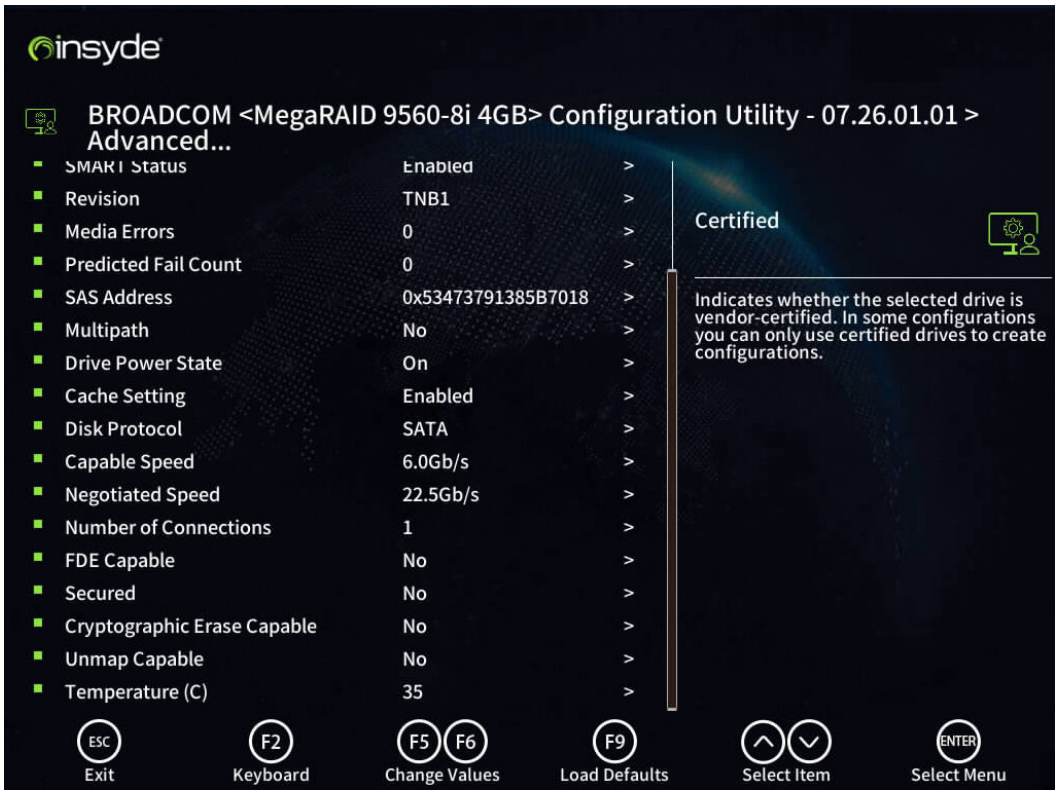


Table 7-13 Parameter description

Parameter	Description
Certified	Specifies whether a drive passes the supplier certification.
Logical Sector Size	Specifies the size of a logical sector.
Physical Sector Size	Specifies the size of a physical sector.
SMART Status	Specifies whether the SMART function is enabled.
Revision	Specifies the firmware version of a drive.
Media Errors	Specifies the number of media errors.
Predicted Fail Count	Specifies the number of predictive failures.
SAS Address	Specifies the SAS drive address.
Drive Power State	Specifies the power state of a drive.
Cache Setting	Specifies whether cache setting is supported.
Disk Protocol	Specifies the protocol supported by a drive.
Device Speed	Specifies the rate of a device.
Negotiated Drive Transfer Speed	Specifies the data transmission rate of a drive.

Parameter	Description
Number of Connections	Specifies the number of connectors.
FDE Capable	Specifies whether a drive supports the Full Disk Encryption (FDE) technology.
Secured	Specifies whether the encryption function of a RAID array is supported.
Cryptographic Erase Capable	Specifies the encrypted erasure capability of a drive.
Unmap Capable	Specifies the unmapping capability.
Temperature (C)	Specifies the temperature of a drive.

7.2.5 Hardware Components

This screen provides sensor information about the RAID controller card.

Screen Overview

Figure 7-24 shows the **Hardware Components** screen. Table 7-14 describes the parameters on the screen.

Figure 7-24 Hardware Components screen

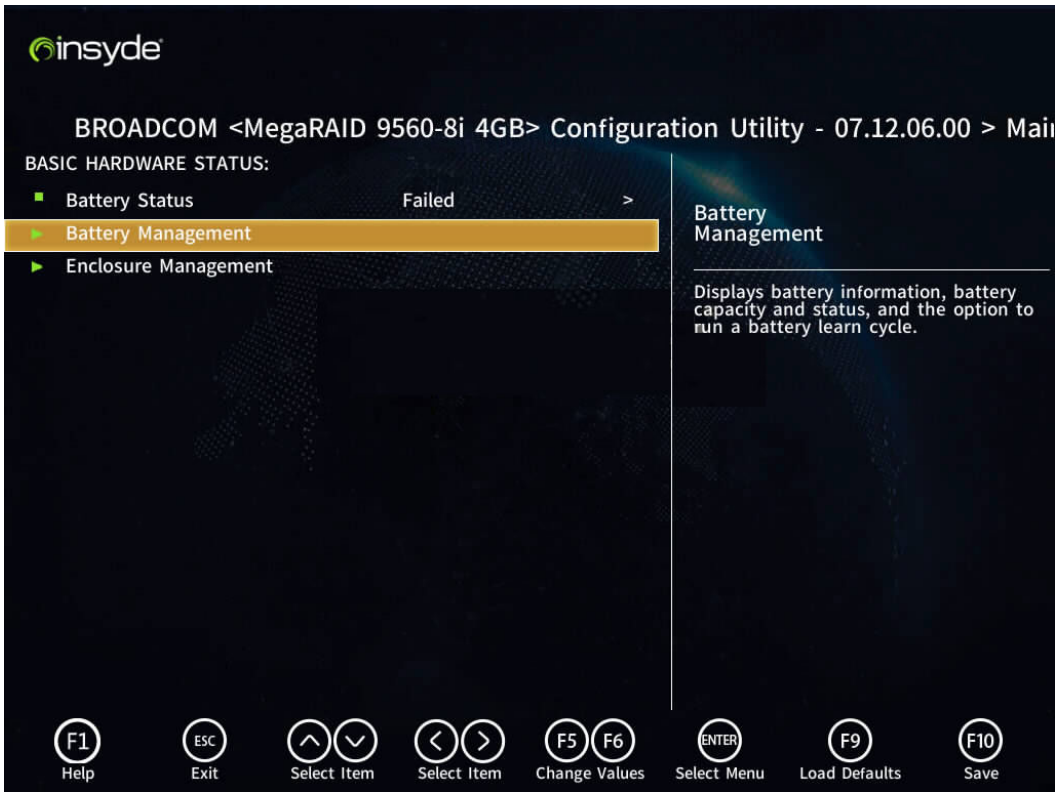


Table 7-14 Parameter description

Parameter	Description
Battery Status	Specifies the capacitor state.
Battery Management	Specifies the capacitor management.
Enclosure Management	Advanced information about sensors.

Viewing Advanced Sensor Information

Step 1 Select **Enclosure Management** and press **Enter**.

The component selection screen is displayed, as shown in **Figure 7-25**.

Figure 7-25 Selecting a component

Step 2 Select **Select Enclosure** and press **Enter**.

Step 3 Select a component and press **Enter**.

Step 4 Select **View Enclosure Status** and press **Enter**.

The sensor details are displayed.

----End

7.3 View Server Profile

This screen allows you to perform management operations of the RAID controller card.

Screen Overview

Figure 7-26 shows the **Viewing Server Profile** screen. **Table 7-15** describes the parameters on the screen.

Figure 7-26 View Server Profile screen

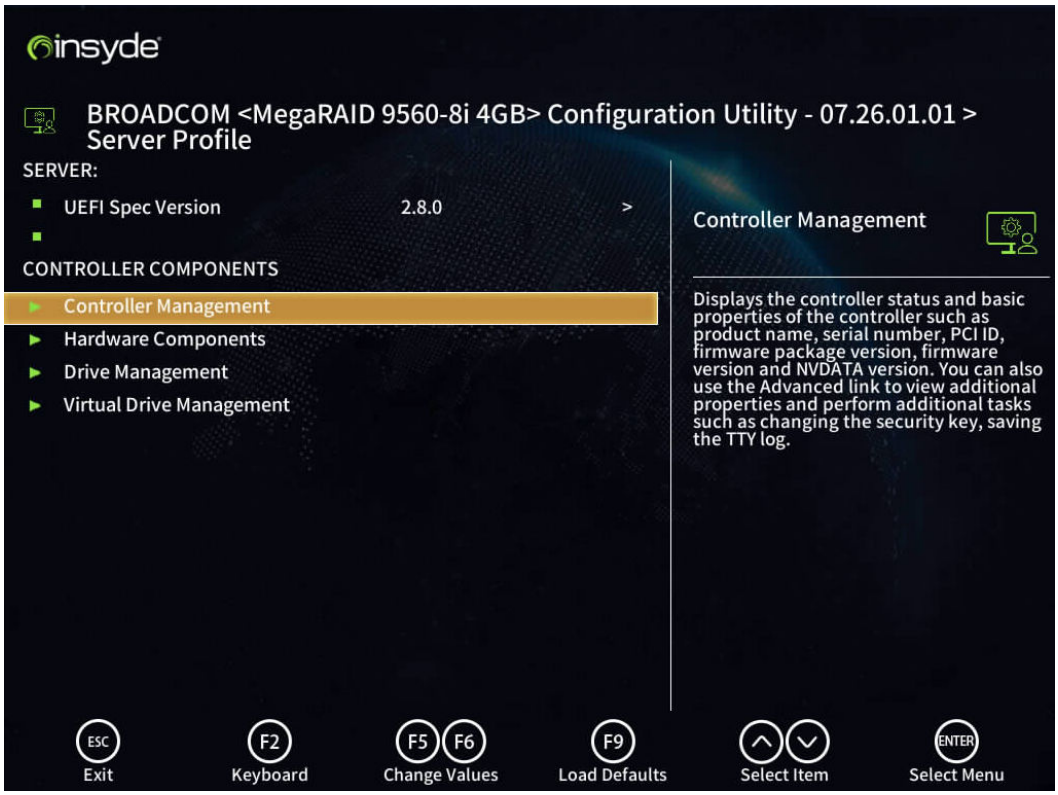


Table 7-15 Parameter description

Parameter	Description
UEFI Spec Version	Specifies the UEFI specification version supported by the server.
Controller Management	Manages controllers. For details, see **7.2.2 Controller Management**.
Hardware Components	Manages controller components. For details, see **7.2.5 Hardware Components**.
Drive Management	Manages drives. For details, see **7.2.4 Drive Management**.

Parameter	Description
Virtual Drive Management	Manages virtual drives. For details, see **7.2.3 Virtual Drive Management**.

7.4 View Foreign Configuration

Screen Overview

Figure 7-27 shows the **Viewing Foreign Configuration** screen. On this screen, you can view, import, and clear foreign configurations. This operation is displayed only when the RAID controller card has foreign configurations.

Figure 7-27 View Foreign Configuration screen

Viewing and Importing a Foreign Configuration

Step 1 Select **Preview Foreign Configuration** and press **Enter**.

The **Preview Foreign Configuration** screen displays existing foreign configurations.

Step 2 Select **Import Foreign Configuration** and press **Enter**.

A confirmation screen is displayed.

Step 3 Select **Confirm** and press **Enter**.

Step 4 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed.

Step 5 Select **OK** and press **Enter**.

----End

Deleting a Foreign Configuration

Step 1 Select **Clear Foreign Configuration** and press **Enter**.

A confirmation screen is displayed.

Step 2 Select **Confirm** and press **Enter**.

Step 3 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed.

Step 4 Select **OK** and press **Enter**.

----End

7.5 Configure

This screen allows you to configure and manage virtual drives, drive groups, and foreign configurations, as well as delete configurations.

Screen Overview

Figure 7-28 shows the **Configure** screen. **Table 7-16** describes the parameters on the screen.

Figure 7-28 Configure screen

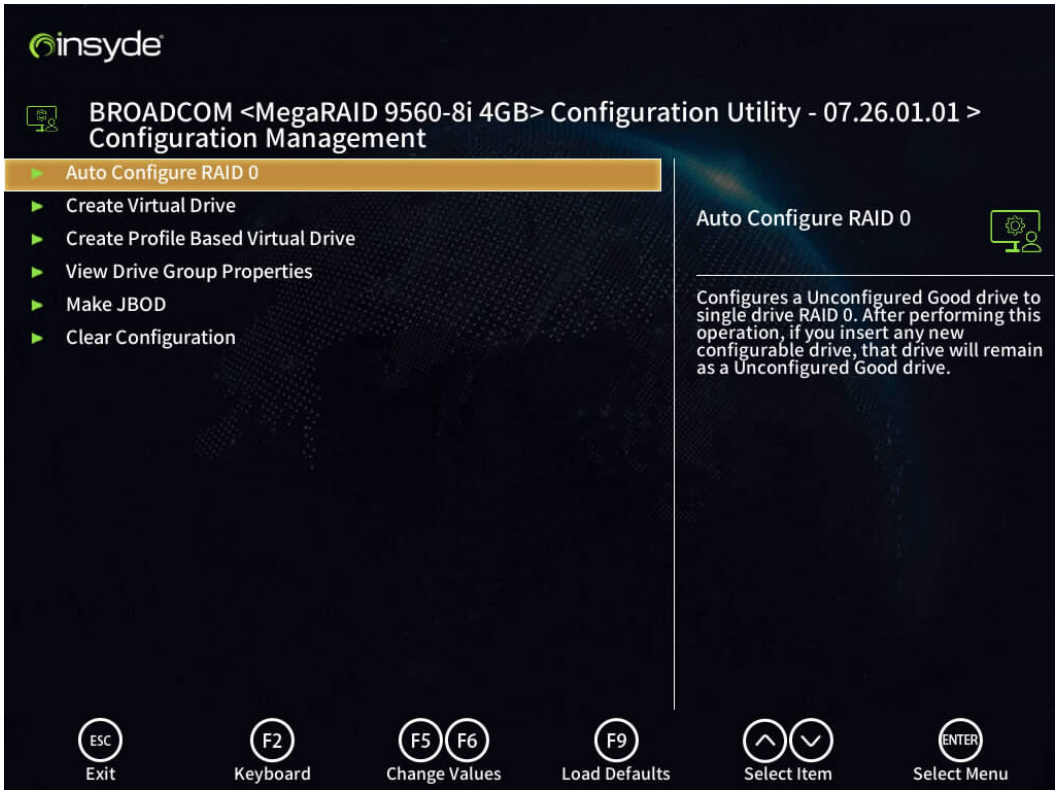


Table 7-16 Parameter description

Parameter	Description
Auto Configure RAID 0	Automatically creates a single-drive RAID 0 for all drives in the **Unconfigured Good** state.
Create Virtual Drive	Creates a RAID array.
Create Profile Based Virtual Drive	Creates a RAID array of a certain level for all drives in the **Unconfigured Good** state.
View Drive Group Properties	Displays drive group properties.
Make JBOD	Enables the pass-through function, which makes drives be used without being added to the RAID array.
Clear Configuration	Clears all RAID configurations.
Manage Foreign Configuration	Manages foreign configurations. This operation is displayed only when the RAID controller card has foreign configurations.

Clearing the Current Configuration

Step 1 Select **Clear Configuration** and press **Enter**.

A confirmation screen is displayed.

Step 2 Select **Confirm** and press **Enter**.

Step 3 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed.

Step 4 Select **OK** and press **Enter**.

----End

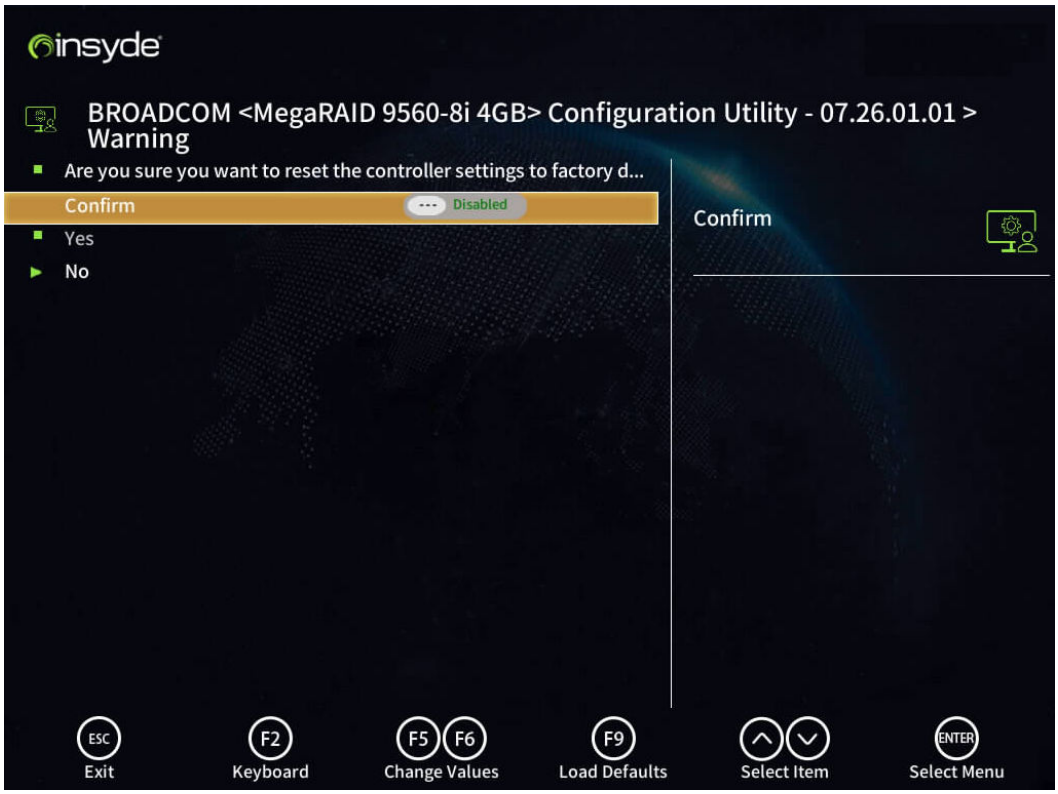
7.6 Set Factory Defaults

Restoring Factory Settings

Step 1 On the main screen, select **Set Factory Defaults** and press **Enter**.

The confirmation screen is displayed, as shown in **Figure 7-29**.

Figure 7-29 Confirming operation



Step 2 Select **Confirm** and press **Enter**.

Step 3 Select **Yes** and press **Enter**.

The message "The operation has been performed successfully" is displayed.

Step 4 Select **OK** and press **Enter**.

----End

7.7 Manage MegaRAID Advanced Software Options

This screen allows you to view and import advanced software properties of the RAID controller cards.

Screen Overview

Figure 7-30 shows the **Managing MegaRAID Advanced Software Options** screen. Table 7-17 describes parameters on the screen.

Figure 7-30 Manage MegaRAID Advanced Software Options screen

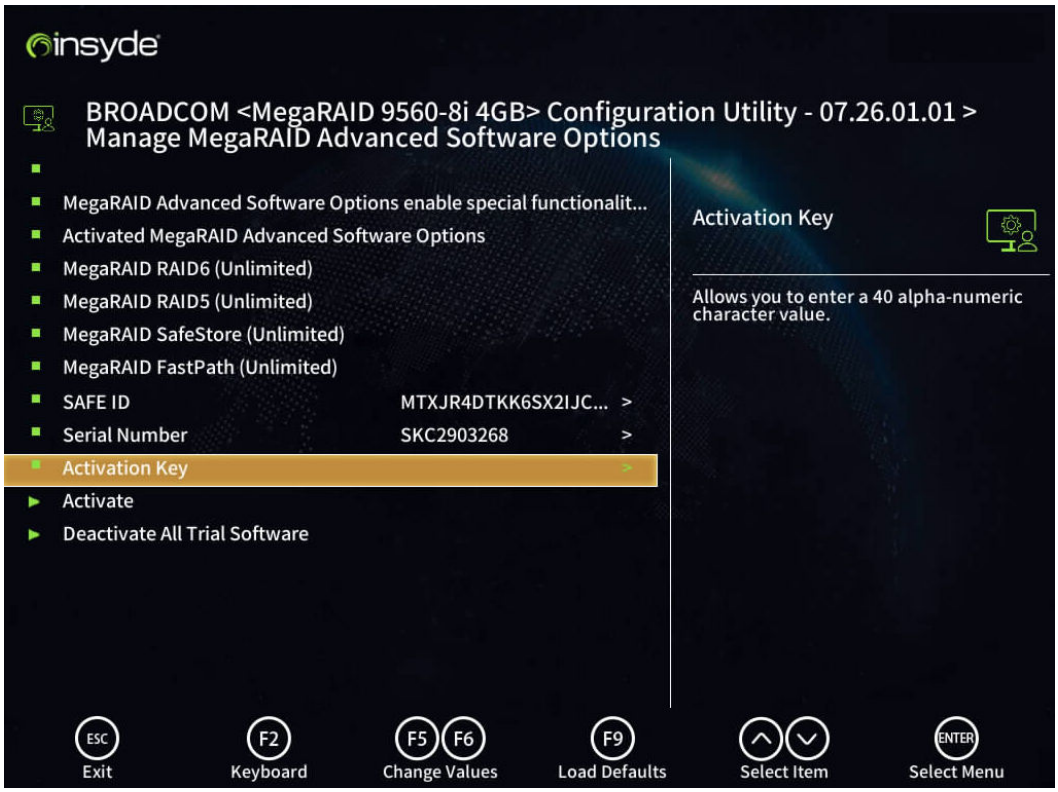


Table 7-17 Parameter description

Parameter	Description
SAFE ID	Specifies the security code of a RAID controller card.
Serial Number	Specifies the serial number of a RAID controller card.
Activation Key	Specifies the key for activating advanced features.
Activate	Activates advanced features. The 9560-8i does not support activation of advanced features.
Deactive All Trail Software	Deactivates all advanced features.

7.8 Exit

This screen allows you to exit the configuration screen.

Exiting the Configuration Screen

Step 1 On the 9560-8i main screen, press **Esc**. The screen shown in **Figure 7-31** is displayed.

Figure 7-31 Device Manager screen

Step 2 Press **F10** to exit the BIOS.

A confirmation screen is displayed.

Step 3 Select **OK** and press **Enter**.

The BIOS is closed, and the message "Press Control+Alt+Delete to reboot" is displayed.

----End

8 OS Command-Line Tool

The OS command-line tool can be used to manage RAID controller cards while the server is running.

8.1 Downloading and Installing StorCLI

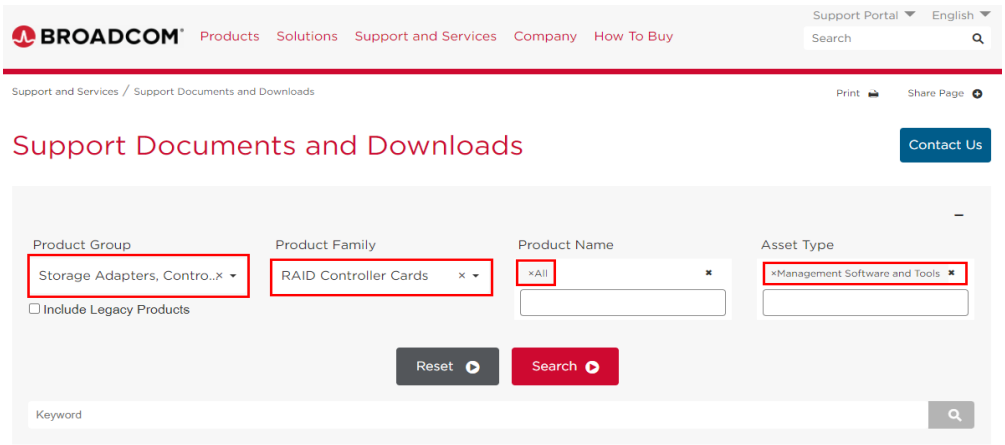
Downloading StorCLI

Step 1 Log in to the **Support Documents and Downloads** page on the BROADCOM website.

Step 2 Search for the management software and tools.

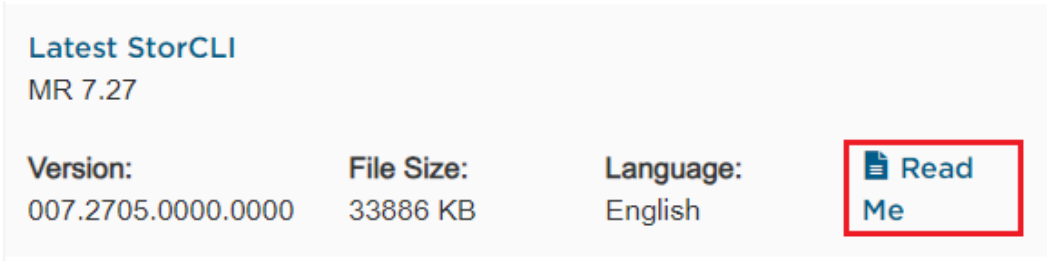
1. Select **Storage Adapters, Controllers, and ICs** in the **Product Group** drop-down list box.
2. Select **RAID Controller Cards** in the **Product Family** drop-down list box.
3. Select **All** in the **Product Name** drop-down list box.
4. Select **Management Software and Tools** in the **Asset Type** drop-down list box.
5. Click **Search**. The detailed operation is shown in **Figure 8-1**.

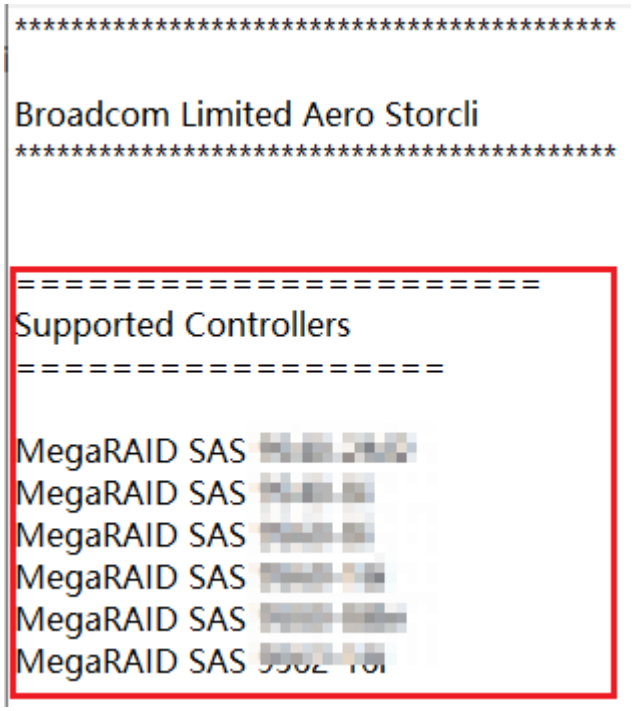
Figure 8-1 Support Documents and Downloads screen



Step 3 Click **Management Software and Tools** and find **Latest StorCLI**.

Step 4 Check whether the Latest StorCLI version supports the RAID controller card listed in **Supported Controllers** in the *Read Me* of Latest StorCLI and download the latest version of Latest StorCLI that supports the RAID controller card.





Step 5 Decompress the downloaded compressed file to obtain the target tool package for your OS.

----End

Installing StorCLI

The StorCLI installation method varies depending on the OS type. The following takes Windows, Linux, and VMware as examples to describe the StorCLI installation procedure. For the installation procedures for other OSs, see the **Readme** file in the software package.

The RAID controller card supports storcli64.

- Installing StorCLI in Windows
  a. Upload the tool package applicable to the Windows to a directory (such as **C:\tmp**) on the server.

b. In the **Run** box, enter **cmd** and press **Enter** to open the **Command Prompt**.

c. Run the **cd *directory where the tool package is stored*** in the command line, such as **cd C:\tmp**.

For Windows, StorCLI does not require installation. You can directly run RAID controller card management commands.

- Installing StorCLI in Linux

a. Use a file transfer tool (such as WinSCP) to upload the package applicable to Linux to a directory (such as the **/tmp** directory) on the server OS.

b. On the Linux CLI, run the **rpm -ivh /tmp/storclixxx.rpm** command to install the StorCLI.

NOTE

The StorCLI installation directory is **/opt/MegaRAID/storcli/**. You need to access the directory and run the RAID controller card commands.

When the installation is complete, you can run the RAID controller card management commands.

- Installing StorCLI in VMware

a. Use a file transfer tool (such as WinSCP) to upload the package applicable to VMware to a directory (such as the **/tmp** directory) on the server OS.

b. On the VMware CLI, run the **esxcli software vib install -v=/tmp/vmware-xxx-storcli.vib --no-sig-check** command to install the StorCL. **/tmp/vmware-xxx-storcli.vib** is the complete path of the StorCLI file.

NOTE

The StorCLI installation directory is **/opt/lsi/storcli/**. You need to access the directory and run the RAID controller card commands.

8.2 Common Commands

NOTE

The storcli64 applies to 64-bit OSs, and the storcli tool applies to 32-bit OSs. This section uses a 64-bit OS as an example to describe the CLI operations.

8.2.1 Querying RAID Controller Card Configuration

Function

Used to query the basic configuration about the 9560-8i.

Format

storcli64 /c*controller_id* **show**

Parameter Description

Parameter	Description	Value
controller_id	Controller ID	If this parameter is set to **all**, the ID information about all controllers managed by this tool is queried.

Usage Guidelines

Default settings are recommended.

Example

Query the basic configuration of the RAID controller card.

```
[root@localhost ~]# ./storcli64 /c0 show
Generating detailed summary of the adapter, it may take a while to complete.

CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None

Product Name = MegaRAID 9560-8i 4GB
Serial Number = SKB3073438
SAS Address =  500062b208239900
PCI Address = 00:65:00:00
System Time = 07/18/2022 17:36:52
Mfg. Date = 08/02/21
Controller Time = 07/18/2022 09:36:51
FW Package Build = 52.20.0-4433
BIOS Version = 7.20.01.0_0x07140000
FW Version = 5.200.02-3664
Driver Name = megaraid_sas
Driver Version = 07.720.04.00
Current Personality = RAID-Mode
Vendor Id = 0x1000
Device Id = 0x10E2
SubVendor Id = 0x1000
SubDevice Id = 0x4010
Host Interface = PCI-E
Device Interface = SAS-12G
Bus Number = 101
Device Number = 0
Function Number = 0
Domain ID = 0
Security Protocol = None
Drive Groups = 2

TOPOLOGY :
========


-----------------------------------------------------------------------------
DG Arr Row EID:Slot DID Type  State BT       Size PDC  PI SED DS3  FSpace TR
-----------------------------------------------------------------------------
 0 -   -  -       -   RAID0 Optl  N    1.090 TB dflt N  N   none N      N
 0 0   -  -       -   RAID0 Optl  N    1.090 TB dflt N  N   none N      N
 0 0   0  252:0    44  DRIVE Onln  N    1.090 TB dflt N  N   none -      N
 1 -   -  -       -   RAID1 Optl  N  893.750 GB dflt N  N   none N      N
```

```
 1 0   -   -        -  RAID1 Optl  N  893.750 GB dflt N  N   none N      N
 1 0   0   252:2    55  DRIVE Onln  N  893.750 GB dflt N  N   none -      N
 1 0   1   252:3    56  DRIVE Onln  N  893.750 GB dflt N  N   none -      N
-------------------------------------------------------------------------

DG=Disk Group Index|Arr=Array Index|Row=Row Index|EID=Enclosure Device ID
DID=Device ID|Type=Drive Type|Onln=Online|Rbld=Rebuild|Optl=Optimal|Dgrd=Degraded
Pdgd=Partially degraded|Offln=Offline|BT=Background Task Active
PDC=PD Cache|PI=Protection Info|SED=Self Encrypting Drive|Frgn=Foreign
DS3=Dimmer Switch 3|dflt=Default|Msng=Missing|FSpace=Free Space Present
TR=Transport Ready

Virtual Drives = 2

VD LIST :
=======

---------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
---------------------------------------------------------------
1/236 RAID1 Optl  RW     No      RWTD  -   OFF 893.750 GB
0/237 RAID0 Optl  RW     Yes     RWTD  -   OFF   1.090 TB
---------------------------------------------------------------

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency

JBOD Drives = 2

JBOD LIST :
=========

-----------------------------------------------------------------------------------------
ID EID:Slt DID State Intf Med     Size SeSz Model                  Vendor   Port
-----------------------------------------------------------------------------------------
 4 252:4    57 Onln  SATA SSD 1.746 TB 512B SAMSUNG MZ7L31T9HBLT-00B7C ATA      C0.1 x1
 5 252:5    58 Onln  SATA SSD 1.746 TB 512B SAMSUNG MZ7L31T9HBLT-00B7C ATA      C0.1 x1
-----------------------------------------------------------------------------------------

ID=JBOD Target ID|EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|Onln=Online
Offln=Offline|Intf=Interface|Med=Media Type|SeSz=Sector Size
SED=Self Encryptive Drive|PI=Protection Info|Sp=Spun|U=Up|D=Down

Physical Drives = 5

PD LIST :
=======

-----------------------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model                  Sp Type
-----------------------------------------------------------------------------------------
252:0    44 Onln   0   1.090 TB SAS  HDD N   N  512B AL15SEB120N             U  -
252:2    55 Onln   1 893.750 GB SATA SSD Y   N  512B SAMSUNG MZ7L3960HCJR-00B7C U  -
252:3    56 Onln   1 893.750 GB SATA SSD Y   N  512B SAMSUNG MZ7L3960HCJR-00B7C U  -
252:4    57 Onln   -   1.746 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  JBOD
252:5    58 Onln   -   1.746 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  JBOD
-----------------------------------------------------------------------------------------

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
```



```
UBUnsp=UBad Unsupported|Rbld=Rebuild

Enclosures = 1

Enclosure LIST :
==============

---------------------------------------------------------------------------
EID State Slots PD PS Fans TSs Alms SIM Port# ProdID     VendorSpecific
---------------------------------------------------------------------------
252 OK       8  5  0    0  0    0   0  0 -    VirtualSES
---------------------------------------------------------------------------

EID=Enclosure Device ID | PD=Physical drive count | PS=Power Supply count
TSs=Temperature sensor count | Alms=Alarm count | SIM=SIM Count | ProdID=Product ID
```

8.2.2 Querying and Setting Spinup Parameters

Function

Used to query and set the spinup interval between drives and the number of drives that spin up simultaneously upon power-on.

Format

storcli64 /c*controller_id* **show spinupdelay**

storcli64 /c*controller_id* **show spinupdrivecount**

storcli64 /c*controller_id* **set spinupdelay=***time*

storcli64 /c*controller_id* **set spinupdrivecount=***count*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
time	Specifies the spinup interval between drives.	The default value is **2** and the unit is second.
count	Specifies the number of drives that spin up simultaneously upon power-on.	The default value is **4**.

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

Default settings are recommended.

Example

Query spinup parameters of a RAID controller card.

```
[root@localhost ~]# storcli64 /c0 show spinupdelay
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

-------------------------
Ctrl_Prop     Value
-------------------------
Spin Up Delay 2 second(s)
-------------------------


[root@localhost ~]# storcli64 /c0 show spinupdrivecount
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

-------------------------
Ctrl_Prop          Value
-------------------------
Spin Up Drive Count 2
-------------------------
```

Set **spinupdelay** to **20s** and **spinupdrivecount** to **5** for the RAID controller card.

```
[root@localhost ~]# storcli64 /c0 set spinupdelay=20
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

-------------------------
Ctrl_Prop     Value
-------------------------
Spin Up Delay 20 second(s)
-------------------------


[root@localhost ~]# storcli64 /c0 set spinupdrivecount=5
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================
```



```
--------------------------
Ctrl_Prop          Value
--------------------------
Spin Up Drive Count 5
--------------------------
```

8.2.3 Querying and Setting Spindown Parameters

Function

Used to set the **spindown** parameter to enable idle HDDs to enter the energy-saving mode. After entering the energy-saving mode, the HDDs are marked as removed by the firmware. You need to manually set the **spindown** parameter before creating or deleting a RAID array or upgrading the drive firmware.

Format

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **spindown**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	–
slot_id	Specifies the slot number of a physical drive.	–

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None

Example

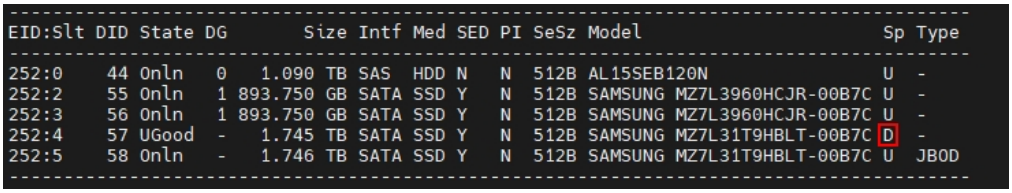
Set the spindown function.

```
[root@localhost ~]# storcli64 /c0 /e252/s4 spindown
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Spin Down Drive Succeeded.
```


NOTE

The drive in the energy-saving mode is in the **D** state, as shown in **Figure 8-2**.

Figure 8-2 State information



EID:Slt	DID	State	DG	Size	Intf	Med	SED	PI	SeSz	Model	Sp	Type
252:0	44	Onln	0	1.090 TB	SAS	HDD	N	N	512B	AL15SEB120N	U	-
252:2	55	Onln	1	893.750 GB	SATA	SSD	Y	N	512B	SAMSUNG MZ7L3960HCJR-00B7C	U	-
252:3	56	Onln	1	893.750 GB	SATA	SSD	Y	N	512B	SAMSUNG MZ7L3960HCJR-00B7C	U	-
252:4	57	UGood	-	1.745 TB	SATA	SSD	Y	N	512B	SAMSUNG MZ7L31T9HBLT-00B7C	D	-
252:5	58	Onln	-	1.746 TB	SATA	SSD	Y	N	512B	SAMSUNG MZ7L31T9HBLT-00B7C	U	JBOD

8.2.4 Setting the Drive PowerSave Parameters

Function

Used to set the **PowerSave** parameters for idle drives and hot spare drives.

Format

storcli64 /c*controller_id* **set ds=** *state* **type=** *disktype* **spindowntime=** *time*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
state	Specifies whether to enable the power saving mode.	• **on**: enable • **off**: disable
disktype	Specifies the drive type.	• **1**: idle drive • **2**: hot spare drive
time	Specifies the standby time. If there is no drive I/O within the standby time, the drive enters the spindown mode.	• The **spindowntime** parameter is not available when **ds** is set to **off**. • When **ds** is set to **on** and the value is set to a number ranging from 30 to 1440 (in minutes), if the value is beyond this range, an error is reported. However, the status of **ds** can also be set, and the default value is **30** minutes.

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Enable the power saving mode for an idle drive.

```
[root@localhost ~]# storcli64 /c0 set ds=on type=1 spindowntime=30
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================


------------------------
Ctrl_Prop    Value
------------------------
SpnDwnUncDrv Enabled
SpnDwnTm     30 minutes
------------------------
```

8.2.5 Setting the Initialization Function for a Physical Drive and Viewing the Initialization Progress

Function

Used to set the initialization function for a physical drive and view the initialization progress.

Format

storcli64 /c*controller_id***e***enclosure_id***s***slot_id action* **initialization**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	–

Parameter	Description	Value
slot_id	Specifies the slot number of a physical drive.	–
action	Specifies the operation to be performed.	• **show**: shows initialization progress. • **start**: starts initialization. • **stop**: stops initialization.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

The drive status must be Unconfigured Good.

Example

Initialize the drive in slot 3 and view the initialization progress.

```
[root@localhost ~]# storcli64 /c0/e252/s3 start initialization
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Start Drive Initialization Succeeded.


[root@localhost ~]# storcli64 /c0/e252/s3 show initialization
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Show Drive Initialization Status Succeeded.


------------------------------------------------------------
Drive-ID    Progress% Status         Estimated Time Left
------------------------------------------------------------
/c0/e252/s3 -         Not in progress -
------------------------------------------------------------
```

8.2.6 Setting the Data Erasing Mode for a Drive and Viewing the Erasing Progress

Function

Used to set the data erase mode for a drive and view the erasing progress.

Format

storcli64 ***/c****controller_id****/e****enclosure_id****/s****slot_id*** **show erase**

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **stop erase**

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **start erase** *mode*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	–
slot_id	Specifies the slot number of a drive.	–
mode	Specifies the data erase mode.	• **simple**: erases data one round. • **normal**: erases data three rounds. • **thorough**: erases data nine rounds.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

The drive status must be Unconfigured Good.

Example

Erase the data in simple mode from the drive in slot 3 and view the erasing progress.

```
[root@localhost ~]# storcli64 /c0/e252/s3 start erase simple
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Start Drive Erase Succeeded.


[root@localhost ~]# storcli64 /c0/e252/s3 show erase
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Show Drive Erse Status Succeeded.
-------------------------------------------------------
Drive-ID Progress% Status Estimated Time Left
-------------------------------------------------------
/c0/e252/s3 0 In progress 0 Seconds
-------------------------------------------------------
```



```
[root@localhost ~]# storcli64 /c0/e252/s3 stop erase
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Stop Drive Erase Succeeded.
```

8.2.7 Setting Background Task Resource Usage

Function

Used to set the background initialization rate, consistency check rate, drive patrol rate, RAID rebuild rate, and RAID capacity expansion and migration rate.

Format

storcli64 /c*controller_id* **set** *action*=*value*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
action	Specifies the background task whose resource usage is to be set.	• **bgirate**: background initialization rate • **ccrate**: consistency check rate • **prrate**: drive patrol rate • **rebuildrate**: RAID rebuild rate • **reconrate**: RAID capacity expansion and migration rate
value	Specifies the resource usage of a background task.	0 to 100: The lower the value, the lower the priority. When the value is set to **0%** and the RAID controller card is busy, no resource is reserved for background tasks. When the resources are idle, the operation is performed.

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Set the drive patrol rate to **30%**.

```
[root@localhost ~]# storcli64 /c0 set prrate=30
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================


-----------------------
Ctrl_Prop       Value
-----------------------
Patrol Read Rate 30%
-----------------------
```

8.2.8 Configuring the BIOS Function: Stop on Error

Function

Used to enable the Stop on Error function so that the controller BIOS stops startup when it detects an error.

Format

storcli64 /c*controller_id* **set bios mode=***action*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
action	Specifies the operation to be performed.	• **soe**: The controller BIOS stops startup when it detects an error. • **ie**: The controller BIOS ignores errors during startup.

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Enable the Stop on Error function.

```
[root@localhost ~]# storcli64 /c0 set bios mode=soe
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

----------------
Ctrl_Prop Value
----------------
BIOS Mode SOE
----------------
```

8.2.9 Creating and Deleting a RAID Array

Function

Used to create and delete a RAID array.

Format

Command	Description
storcli64 /c*controller_id* **add vd r***level*[0|1|5|6|10|50|60] **[size=**<VD1_Sz>,<VD2_Sz>,..|*all] [**name**=<*VDNAME1*>,..] **drives=**enclosure_id**:**slot_id| enclosure_id**:**startid**-**endid**,**enclosure_id**:**slot_id| enclosure_id**:**startid**-**endid [**pdperarray=***pdperarray*] [**pdcache**=on|off|*default] [wt|*wb|awb] [nora|*ra] [*direct|cached] [**Strip**=<8|16|32|64|128|256|1024>] [**EmulationType**=0|1|2] [**Spares**=[enclosure_id**:**slot_id| enclosure_id**:**startid**-**endid**,**enclosure_id**:**slot_id| enclosure_id**:**startid**-**endid]	Creates a RAID array.
storcli64 /c*controller_id***/v***raid_id* **del**	Deletes a RAID array.

NOTE

* indicates a default value.

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card.	-
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	-
r*level*	Specifies the target RAID array level.	The value can be **0**, **1**, **5**, **6**, **10**, **50**, or **60**.
size	Specifies the target RAID array capacity.	The default value is **all**, that is, the total capacity of all member drives.
name	Specifies the name of the target RAID array.	-
drives	Specifies the drives to be added to the target RAID array.	-
startid-*endid*	Specifies the start ID and end ID of the drives to be added to the RAID array.	-
slot_id	Specifies the drive ID.	-
pdperarray	Specifies the number of drives in a span. Sets this parameter only when you create a RAID 10, RAID 50, or RAID 60 array.	-
pdcache	Sets the cache state of a member drive in a RAID array.	● on ● off ● default

Parameter	Description	Value
wrcache	Specifies the write cache attribute of the RAID array. **wrcache=wt|wb|awb** is the complete command and **wrcache=** can be omitted.	● **wt**: When the drive subsystem receives all data, the controller notifies the host that data transmission is complete. ● **wb**: When all data is stored in the cache, the controller notifies the host that data transmission is complete. ● **awb**: The RAID controller card is forced into the **wb** mode when no capacitor exists or the capacitor fails.
rdcache	Specifies the read cache attribute of the RAID array. **rdcache=ra|nora** is the complete command and **rdcache=** can be omitted.	● **ra**: When the required data is read from the virtual drives, the subsequent data is read and stored in the cache. When users access the data, the data can be hit in the cache, which reduces the drive seek operations, saves the response time, and improves the data read speed. ● **nora**: The RAID controller card reads data from the virtual drives only after receiving a data read command.

Parameter	Description	Value
iopolicy	Specifies the I/O policy of the RAID array. **iopolicy=direct|cached** is the complete command and **iopolicy=** can be omitted. **NOTE** **Direct IO** is set by default. **Cache IO** is not supported. For details, see the firmware release notes of the RAID controller card.	● **Direct**: The value has different definitions in read and write scenarios. – In a read scenario, data is directly read from drives. (If **Read Policy** is set to **Read Ahead**, data is read from the RAID cache.) – In a write scenario, data is written into the RAID cache. (If **Write Policy** is set to **Write Through**, data is directly written into drives.) ● **Cached**: Data is read from or written into the RAID cache. Selects this value only when CacheCade 1.1 is configured.
Strip	Specifies the strip size of a RAID array.	MR card: The value can be **64**, **128**, **256**, **512**, or **1024**. iMR card: The value can only be **64**. The unit is KB.

Parameter	Description	Value
EmulationType	Sets the sector size reported to the OS.	• **0**: default value. If there are any 512e drives in member drives, the physical sector size is 512e (4k). If there are no 512e drives, the physical sector size is 512n. • **1**: disable. If there are no 512e drives in member drives, the physical sector size is 512n. • **2**: force. Even though there are no 512e drives in member drives, the physical sector size is still 512e (4k).
Spares	Specifies a hot spare drive for the RAID array.	-
raid_id	Specifies the ID of the RAID array to be deleted. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	-

NOTE

- For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.
- Use commas (,) to separate multiple drives to be added to a RAID array. The format of a single drive is *enclosure_id:slot_id*. The format of drives in consecutive slots is *enclosure_id:startid-endid*.

Usage Guidelines

None.

Example

Create a RAID 0 array.

```
[root@localhost ~]# storcli64 /c0 add vd r0 size=100GB drives=252:2
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
```



```
Controller = 0
Status = Success
Description = Add VD Succeeded.
```

Delete a RAID array.

```
[root@localhost ~]# storcli64 /c0/v236 del
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Delete VD succeeded.
```

8.2.10 Setting the Cache Read and Write Properties for a RAID Array

Function

Used to set the cache read and write properties for a RAID array.

Format

Command	Description
storcli64 /c*controller_id***/v***raid_id* **set wrcache=***wrmode*	Sets the cache write policy.
storcli64 /c*controller_id***/v***raid_id* **set rdcache=***rdmode*	Sets the cache read policy.

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card.	-
raid_id	Specifies the RAID array ID. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	-

Parameter	Description	Value
wrmode	Sets the cache write policy.	• **wt**: When the drive subsystem receives all data, the controller notifies the host that data transmission is complete. • **wb**: When all data is stored in the cache, the controller notifies the host that data transmission is complete. • **awb**: The RAID controller card is forced into the **wb** mode when no capacitor exists or the capacitor fails.
rdmode	Sets the cache read policy.	• **ra**: When the required data is read from the virtual drives, the subsequent data is read and stored in the cache. When users access the data, the data can be hit in the cache, which reduces the drive seek operations, saves the response time, and improves the data read speed. • **nora**: The RAID controller card reads data from the virtual drives only after receiving a data read command.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Set the cache write mode to **wt**.

```
[root@localhost ~]# storcli64 /c0/v238 set wrcache=wt
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None

Detailed Status :
===============

-----------------------------------------
 VD Property Value Status  ErrCd ErrMsg
-----------------------------------------
238 wrCache  WT    Success     0 -
-----------------------------------------
```

8.2.11 Setting a RAID Access Policy

Function

Used to set an access policy for a RAID array.

Format

storcli64 /c*controller_id***/v***raid_id* **set accesspolicy=***mode*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card.	–
raid_id	Specifies the ID of the target RAID. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	–
mode	Specifies a RAID access policy.	• **rw**: The RAID array is readable and writable. • **blocked**: The RAID array cannot be accessed. • **ro**: The RAID array can only be read.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Set the RAID access policy to **rw**.

```
[root@localhost ~]# storcli64 /c0/v238 set accesspolicy=rw
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None

Detailed Status :
===============

-----------------------------------------
 VD Property  Value Status  ErrCd ErrMsg
-----------------------------------------
238 AccPolicy RW    Success     0 -
-----------------------------------------
```

8.2.12 Setting RAID Foreground Initialization

Function

Used to set a RAID foreground initialization mode.

Format

storcli64 /c*controller_id***/v***raid_id* **start** *mode*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card.	–
raid_id	Specifies the ID of the target RAID. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	–

Parameter	Description	Value
mode	Specifies a foreground initialization mode.	• **init**: writes zeros to the first 100 MB space of a RAID array. The RAID array changes to the **Optimal** state after initialization. • **init full**: writes zeros to the entire RAID array. During the initialization, the RAID array is in the **Initialization** state.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Quickly initialize a RAID array.

```
[root@localhost ~]# storcli64 /c0/v238 start init
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Start INIT Operation Success.
```

8.2.13 Setting RAID Background Initialization and Viewing the Initialization Progress

Function

Used to pause, resume, and stop RAID background initialization and view the initialization progress.

Format

Parameter	Description
storcli64 /c*controller_id***/v***raid_id action* **bgi**	Queries, pauses, resumes, and stops RAID array background initialization.
storcli64 /c*controller_id***/v***raid_id* **set autobgi=**<on|off>	Enables or disables the automatic background initialization.

Parameter	Description
storcli64 /c*controller_id***/v***raid_id* **show autobgi**	Queries the automatic background initialization progress.

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card.	–
raid_id	Specifies the ID of the target RAID. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	–
action	Specifies the operation of background initialization to be performed.	• **show**: shows the background initialization progress. • **pause**: pauses the background initialization progress. • **resume**: resumes the background initialization progress. • **stop**: stops the background initialization progress.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

Disable automatic background initialization before stopping background initialization. Otherwise, background initialization starts automatically after the command execution is stopped.

Example

View the background initialization progress.

```
[root@localhost ~]# storcli64 /c0/v238 show bgi
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
```



```
Description = None


VD Operation Status :
=====================

-------------------------------------------------------------
 VD Operation Progress% Status          Estimated Time Left
-------------------------------------------------------------
238 BGI      -        Not in progress -
-------------------------------------------------------------
```

8.2.14 Setting a Boot Drive

Function

Used to set a virtual drive or physical drive as a boot drive.

Format

storcli64 /c*controller_id***/v***vd_id* **set bootdrive=on**

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **set bootdrive=on**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card.	–
vd_id	Specifies the ID of the target virtual drive. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	–
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	–
slot_id	Specifies the slot number of a physical drive.	–

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Set VD 238 as a boot drive.


```
[root@localhost ~]# storcli64 /c0/v238 set bootdrive=on
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None

Detailed Status :
===============


-----------------------------------------
 VD Property   Value Status  ErrCd ErrMsg
-----------------------------------------
238 Boot Drive On    Success     0 -
-----------------------------------------
```

Set the drive in slot 0 as a boot drive.

```
[root@localhost ~]# storcli64 /c0/e252/s0 set bootdrive=on
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Set Drive Boot Drive Succeeded.
```

8.2.15 Setting the Emergency Hot Spare Function

Function

Used to enable the emergency hot spare function and allow the emergency hot spare function to be used when a SMART error occurs.

Format

storcli64 /c*controller_id* **set eghs eug=***state*

storcli64 /c*controller_id* **set eghs smarter=***state*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card.	–
state	Specifies whether to enable the emergency hot spare function.	• **on**: enable • **off**: disable

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Enable the emergency hot spare function and allow the emergency hot spare function to be used when a SMART error occurs.

```
[root@localhost ~]# storcli64 /c0 set eghs eug=on
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

------------------
Ctrl_Prop   Value
------------------
EmergencyUG ON
------------------


[root@localhost ~]# storcli64 /c0 set eghs smarter=on
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

------------------------
Ctrl_Prop       Value
------------------------
EmergencySmarter ON
------------------------
```

8.2.16 Setting the Hot Spare Drive State

Function

Used to set the hot spare drive state to global or dedicated.

Format

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **add hotsparedrive** [**dgs=***dg_id*]

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	–

Parameter	Description	Value
slot_id	Specifies the slot number of a physical drive.	–
dg_id	Specifies the ID of the drive group to which the dedicated hot spare drive belongs.	–

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Set the drive in slot 2 to a global hot spare drive.

```
[root@localhost ~]# storcli64 /c0/e252/s2 add hotsparedrive
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Add Hot Spare Succeeded.
```

Set the drive in slot 3 to a dedicated hot spare drive of dg 0.

```
[root@localhost ~]# storcli64 /c0/e252/s3 add hotsparedrive dgs=0
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Add Hot Spare Succeeded.
```

8.2.17 Querying and Setting RAID Rebuild

Function

Start, pause, resume, and stop RAID rebuild, and query the progress.

Syntax

Syntax	Description
storcli64 /c*controller_id* **e***enclosure_id***s***slot_id action* **rebuild**	Starts, queries, pauses, resumes, and stops RAID rebuild.
storcli64 /ccontroller_id **set autorebuild=**<on|off>	Enables/Disables automatic rebuild.

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
enclosure_id	Specifies the ID of the enclosure where the drives are installed.	–
slot_id	Specifies a slot number of the hard drive.	–
action	Specifies the operation to be performed.	• **start**: starts rebuild. • **show**: shows the rebuild progress. • **pause**: pauses rebuild. • **resume**: resumes rebuild. • **stop**: stops rebuild.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

Disable automatic rebuild before stopping rebuild. Otherwise, stopping rebuild of a drive may cause rebuilt to be exceptionally performed on another idle drive.

Examples

Manually start rebuild.

```
[root@localhost ~]# ./storcli64 /c0/e70/s7 start rebuild
Controller = 0
Status = Success
Description = Start
Drive Rebuild Succeeded.
```

Show the current rebuild status of a drive.

```
[root@localhost ~]# ./storcli64 /c0/e70/s7 show rebuild
Controller = 0
Status = Success
Description = Show
Drive Rebuild Status Succeeded.
------------------------------------------------------
Drive-ID   Progress% Status      Estimated Time Left
------------------------------------------------------
/c0/e70/s7        5 In progress 26 Minutes
------------------------------------------------------
```

Suspend the drive rebuild process.


```
[root@localhost ~]# ./storcli64 /c0/e70/s7 pause rebuild
Controller = 0
Status = Success
Description = Pause
Drive Rebuild Succeeded.
```

Resume the rebuild.

```
[root@localhost ~]# ./storcli64 /c0/e70/s7 resume rebuild
Controller = 0
Status = Success
Description = Resume
Drive Rebuild Succeeded.
```

Stop the rebuild.

```
[root@localhost ~]# ./storcli64 /c0/e70/s7 stop rebuild
Controller = 0
Status = Success
Description = Stop
Drive Rebuild Succeeded.
```

8.2.18 Querying and Setting Copyback

Function

Start, pause, resume, and stop copyback, and view the progress.

Syntax

Command	Description
storcli64 /c*controller_id* **e***enclosure_id***s***slot_id* ***start*** **copyback target**=target_enclosure_id:target_slot_id	Copys data from the hot spare drive back to the target data drive.
storcli64 /c*controller_id* **e***enclosure_id***s***target_slot_id action* **copyback**	Pauses, resumes, views, and stops copyback.

Parameters

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	-
enclosure_id	Specifies the ID of the enclosure where the drives are installed.	-
slot_id	Specifies the slot number of a hard drive.	-

Parameter	Description	Value
target_enclosure_id	Specifies the ID of the enclosure where the target drive is installed.	-
target_slot_id	Specifies the slot number of the target physical drive for which the copyback is performed.	-
action	Specifies the operation to be performed.	• **show**: shows the progress. • **pause**: pauses the process. • **resume**: resumes the check. • **stop**: stops the process.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Manually start copyback.

```
[root@localhost ~]# ./storcli64 /c0/e65/s2 start copyback target=65:8
CLI Version = 007.2309.0000.0000 Sep 16, 2022
Operating system = Linux 5.14.0-70.13.1.el9_0.x86_64
Controller = 0
Status = Success
Description = Start Drive Copyback Succeeded.
```

Show the current copyback status of the drive.

```
[root@localhost ~]# ./storcli64 /c0/e65/s8 show copyback
CLI Version = 007.2309.0000.0000 Sep 16, 2022
Operating system = Linux 5.14.0-70.13.1.el9_0.x86_64
Controller = 0
Status = Success
Description = Show Drive Copyback Status Succeeded.


-------------------------------------------------------
Drive-ID   Progress% Status      Estimated Time Left
-------------------------------------------------------
/c0/e65/s8        11 In progress 2 Hours 10 Minutes
-------------------------------------------------------
```

Pause the drive copyback process.

```
[root@localhost ~]# ./storcli64 /c0/e65/s8 pause copyback
CLI Version = 007.2309.0000.0000 Sep 16, 2022
```



```
Operating system = Linux 5.14.0-70.13.1.el9_0.x86_64
Controller = 0
Status = Success
Description = Pause Drive Copyback Succeeded.
```

Resume copyback.

```
[root@localhost ~]# ./storcli64 /c0/e65/s8 resume copyback
CLI Version = 007.2309.0000.0000 Sep 16, 2022
Operating system = Linux 5.14.0-70.13.1.el9_0.x86_64
Controller = 0
Status = Success
Description = Resume Drive Copyback Succeeded.
```

Stop copyback.

```
[root@localhost ~]# ./storcli64 /c0/e65/s8 stop copyback
CLI Version = 007.2309.0000.0000 Sep 16, 2022
Operating system = Linux 5.14.0-70.13.1.el9_0.x86_64
Controller = 0
Status = Success
Description = Stop Drive Copyback Succeeded.
```

8.2.19 Setting a SMART Scan Interval

Function

Used to set a SMART scan interval.

Format

storcli64 /c*controller_id* **set smartpollinterval=***value*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
value	Specifies a SMART scan interval.	0~65535, the unit is second.

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Set the SMART scan interval to **60 seconds**.

```
[root@localhost ~]# storcli64 /c0 set smartpollinterval=60
CLI Version = 007.1907.0000.0000 Sep 13, 2021
```



```
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

--------------------------------
Ctrl_Prop         Value
--------------------------------
SmartPollInterval 60 second(s)
--------------------------------
```

8.2.20 Expanding RAID Array Capacity by Increasing Member Drive Available Space

Function

There are two RAID capacity expansion methods:

- Increase the available capacity of member drives.
- Add drives.

Format

storcli64 /c*controller_id***/v***vd_id* **expand size=***capacity* [expandarray]

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
vd_id	Specifies the ID of the target RAID array. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	–
capacity	Specifies the capacity after the expansion.	–

Parameter	Description	Value
expandarray	Specifies the parameter when the available capacity of the drive group is increased by replacing member drives and the capacity to be expanded exceeds the original available capacity of the drive group.	–

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Query the VD capacity that can be used for expansion.

```
[root@localhost ~]# storcli64 /c0/v239 show expansion
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


EXPANSION INFORMATION :
======================

-----------------------------------------------
 VD     Size OCE NoArrExp   WithArrExp Status
-----------------------------------------------
239 1.162 TB Y   597.056 GB -         -
-----------------------------------------------

OCE - Online Capacity Expansion | WithArrExp - With Array Expansion
 VD=Virtual Drive | NoArrExp - Without Array Expansion
```

NOTE

In the example, if the expansion capacity is less than 3.627 TB, the **expandarray** parameter is not required; but if the expansion capacity is greater than 3.627 TB and less than 5.446 TB, the **expandarray** parameter is required.

Expand the capacity of VD 239 by **200 GB**.

```
[root@localhost ~]# storcli64 /c0/v239 expand size=200GB
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = expansion operation succeeded


EXPANSION RESULT :
```



```
================

-------------------------------------------------------------------------------
 VD    Size FreSpc     ReqSize    AbsUsrSz   %FreSpc NewSize  Status NoArrExp
-------------------------------------------------------------------------------
239 1.162 TB 597.056 GB 200.000 GB 202.999 GB      34 1.360 TB -      597.056 GB
-------------------------------------------------------------------------------

VD=Virtual Drive/Logical Drive | Size - Current VD size | FreSpc - Freespace available before expansion
ReqSize - Requested Size | %FreSpc - Requested expansion size in % of available free space
AbsUsrSz - User size rounded to nearest % | NoArrExp - Without Array Expansion
```

8.2.21 Expanding RAID Capacity by Adding New Drives and Changing the RAID Level

Function

There are two RAID capacity expansion methods:

- Increase the available capacity of member drives.
- Add drives.

After adding a new drive, you can change the RAID level.

NOTE

Plan the hard drive capacity in advance to prevent data loss after RAID array level migration.

Format

storcli64 /c*controller_id***/v***vd_id* **start migrate type=r***level* **option=add drives=***enclosure_id***:***slot_id*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	–
vd_id	Specifies the ID of the target RAID array. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	–
slot_id	Specifies the slot number of a new drive to be added.	–

Parameter	Description	Value
level	Specifies the target RAID level after adding a new drive.	• If the target RAID level is the same as the original RAID level, the command expands the RAID capacity. • If the target RAID level is different from the original RAID level, the command changes the RAID level.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Add the drive in slot 5 to the RAID 1 array for capacity expansion.

```
[root@localhost ~]# storcli64 /c0/v239 start migrate type=r1 option=add drives=252:5
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Start VD Operation Success


[root@localhost ~]# storcli64 /c0/v239 show migrate
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


VD Operation Status :
=====================

-------------------------------------------------------------
 VD Operation Progress% Status      Estimated Time Left
-------------------------------------------------------------
239 Migrate          1 In progress 5 Hours 1 Minutes
-------------------------------------------------------------
```

Add the drive to a single-drive RAID 0 array and change the RAID level to RAID 1.

```
[root@localhost ~]# storcli64 /c0/v238 start migrate type=r1 option=add drives=252:5
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Start VD Operation Success


[root@localhost ~]# storcli64 /c0/v238 show migrate
```



```
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


VD Operation Status :
=====================

-------------------------------------------------------
 VD Operation Progress% Status      Estimated Time Left
-------------------------------------------------------
238 Migrate          3 In progress 19 Minutes
-------------------------------------------------------
```

8.2.22 Querying and Clearing PreservedCache Data

Function

Used to query and clear PreservedCache data.

Format

storcli64 /c*controller_id* **show preservedcache**

storcli64 /c*controller_id***/v***vd_id* **delete preservedcache force**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
vd_id	Specifies the ID of the target RAID array. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	–

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Query PreservedCache data.

```
[root@localhost ~]# storcli64 /c0 show preservedcache
CLI Version = 007.1907.0000.0000 Sep 13, 2021
```



```
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = No Virtual Drive has Preserved Cache Data.
```

8.2.23 Setting Consistency Check Parameters

Function

Used to set consistency check parameters.

Format

storcli64 /c*controller_id*[**/v***vd_id*]**show cc**

storcli64 /c*controller_id***/v***vd_id* **start cc force**

storcli64 /c*controller_id***/v***vd_id action* **cc**

storcli64 /c*controller_id* **set cc=conc delay=***value* **starttime=***time* **excludevd=***evd_id*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
vd_id	Specifies the ID of the target RAID array. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	–
action	Specifies the operation to be performed.	● **pause**: pauses the check. ● **resume**: resumes the check. ● **stop**: stops the check.
cc	Sets the consistency check to the sequential mode or parallel mode, or disables the consistency check.	● **off**: disables the consistency check. ● **seq**: enables the sequential mode. ● **conc**: enables the parallel mode.
value	Specifies the frequency of performing consistency checks.	Any integer value. **NOTE** The unit of the frequency is hour.

Parameter	Description	Value
time	Specifies the consistency check start time.	Example: 2022/07/19 10 **NOTE** The unit of the start time is hour.
evd_id	Specifies the ID of a virtual drive on which no consistency check is performed.	–

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

If the **show** command does not contain **/v***vd_id* the consistency check parameters are queried.

If the **show** command contains **/v***vd_id* the consistency check progress is queried.

Example

Set automatic consistency check parameters.

```
[root@localhost ~]# storcli64 /c0 set cc=conc delay=1 starttime=2022/07/19 10 excludevd=0
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================


-------------------------------------
Ctrl_Prop       Value
-------------------------------------
CC Mode         CONC
CC delay        1
CC Starttime    2022/07/19 10:00:00
CC ExcludeVD(0) Success
-------------------------------------
```

Query the consistency check progress.

```
[root@localhost ~]# storcli64 /c0/v238 show cc
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


VD Operation Status :
===================


-------------------------------------------------------------
```



```
VD Operation Progress% Status         Estimated Time Left
-----------------------------------------------------------
238 CC       -       Not in progress -
-----------------------------------------------------------
```

8.2.24 Querying and Setting Patrol Read Parameters

Function

Query and set patrol read parameters.

Syntax

Syntax	Description
storcli64 /c*controller_id* **set patrolread starttime=***time* **maxconcurrentpd=***number*	Sets the patrol read start time and the number of drives to be checked concurrently.
storcli64 /c*controller_id* **set patrolread delay=***delaytime*	Sets the controller patrol read period.
storcli64 /cx set supportssdpatrol-read=[on|off]	Enables the patrol read of SSDs. The default status is **Disabled**. If the function is not enabled, an error is reported when the virtual drive patrol read of SSD member drives is started.
storcli64 /c*controller_id* **set patrolread=**{on **mode=**<auto|manual>}|{off}	Enables the patrol read, sets the automatic or manual mode, or disables the patrol read.
storcli64 /c*controller_id action* **patrolread**	Queries the patrol read information of the current controller.

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	-
time	Specifies the start time of the patrol read.	Example: 2022/07/20 08 **NOTE** The unit of the start time is hour.
number	Specifies the number of drives to be checked concurrently.	-
delaytime	Specifies the patrol read interval.	The unit is hour.

Parameter	Description	Value
action	Specifies the patrol read action to be performed.	**show**: queries the patrol read progress. **start**: starts the patrol read. **stop**: stops the patrol read. **pause**: pauses the patrol read. **resume**: resumes the patrol read.

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

Table 8-1 Command output description

Syntax	Parameter	Description	Example Value
storcli64 /c*controller_id* **show patrolread**	PR Mode	Patrol read mode	Disabled
	PR Execution Delay	Patrol read period	168 hours
	PR iterations completed	Number of completed patrol read iterations	1
	PR Next Start time	Start time of the next patrol read	12/11/2022, 12:00:00
	PR on SSD	Whether to enable the patrol read on SSDs	Disabled
	PR Current State	Current state of the patrol read	Stopped
	PR Excluded VDs	IDs of virtual drives on which the patrol read is not performed	0
	PR MaxConcurrentPd	Number of drives to be checked concurrently	2

Example

Set the patrol read start time to **2022/07/20 08** and the number of drives to be checked concurrently to **1**.

```
[root@localhost ~]# ./storcli64 /c0 set patrolread starttime=2022/07/20 08 maxconcurrentpd=1
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

----------------------------------------
Ctrl_Prop          Value
----------------------------------------
PR Starttime       2022/07/20 08:00:00
PR MaxConcurrentPd 1
----------------------------------------
```

Enable the patrol read and set to the automatic mode.

```
[root@localhost ~]# ./storcli64 /c0 set patrolread=on mode=auto
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================
 ----------------------------------------
 Ctrl_Prop        Value
 ----------------------------------------
 Patrol Read Mode auto
 ----------------------------------------
```

Query the patrol read information.

```
[root@localhost ~]# ./storcli64 /c0 show patrolread
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

-----------------------------------------------
Ctrl_Prop               Value
-----------------------------------------------
PR Mode                 Disable
PR Execution Delay      168 hours
PR iterations completed 0
PR Next Start time      07/20/2022, 08:00:00
PR on SSD               Disabled
PR Current State        Stopped
PR Excluded VDs         0
PR MaxConcurrentPd      1
-----------------------------------------------
```

8.2.25 Querying and Setting CacheFlush Parameters

Function

Used to query and set cache flush interval.

Syntax

Syntax	Description
storcli64 /c*controller_id* **show cacheflushint**	Queries the cache flush interval.
storcli64 /c*controller_id* **set cacheflushint=**<*value*>	Sets the cache refresh interval.

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	-
value	Specifies the cache flush interval.	The value ranges from **0** to **255**, in seconds. The default value is **4**.

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Set the cache flush interval to **10**.

```
[root@localhost ~]# storcli64 /c0 set cacheflushint=10
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

-------------------------
Ctrl_Prop          Value
-------------------------
```



```
Cache Flush Interval 10
----------------------------
```

Query the cache flush interval.

```
[root@localhost ~]# storcli64 /c0 show cacheflushint
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================


-----------------------------
Ctrl_Prop           Value
-----------------------------
Cache Flush Interval 10 sec
-----------------------------
```

8.2.26 Setting Drive State

Function

Used to set the drive state.

Format

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **set** *state* [force]

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **delete jbod**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	–
slot_id	Specifies the slot number of a physical drive.	–

Parameter	Description	Value
state	Specifies the target drive state.	● **online**: sets a drive online. When a member drive in a RAID array in the **Degraded** state is offline, you can use this parameter to add the offline member drive to the RAID array to enable this drive online. ● **offline**: enables a drive offline. If the RAID array features redundancy, the drive offline will degrade the RAID array. If the number of offline drives exceeds the maximum failed drives in the array, the RAID array will be offline. If the RAID array does not feature redundancy, the drive offline will cause the RAID array to turn into the **Failed** state. ● **jbod**: enables the drive to work in JBOD mode. ● **good**: sets the drive to the idle state. – Enables a drive in the **Unconfigured Bad** state to turn into the **Unconfigured Good (foreign)** state. Then, you can import a foreign configuration to this drive or clear foreign configurations from this drive. – Enables a drive in the **JBOD** state to

Parameter	Description	Value
		turn into the **Unconfigured Good** state. The drive in the **Unconfigured Good** state can be used to create a RAID or a hot spare drive.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

Run any of the following commands to set the drive status from **JBOD** to **Ugood**.

- **storcli64 /c***controller_id***e***enclosure_id***s***slot_id* **delete jbod**
- **storcli64 /c***controller_id***e***enclosure_id***s***slot_id* **set good force**

Example

Change the state of the drive in slot 3 from **Unconfigured Good** to **JBOD**.

```
[root@localhost ~]# storcli64 /c0/e252/s3 set jbod
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Set Drive JBOD Succeeded.
```

8.2.27 Setting the State of a Drive UID Indicator

Function

Used to turn on/off the UID indicator of a specified drive.

Format

storcli64 /c*controller_id***e***enclosure_id***s***slot_id action* **locate**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–

Parameter	Description	Value
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	The value can be **all**, which indicates that the UID indicators of all the drives in the enclosure are turned on.
slot_id	Specifies the slot number of a physical drive.	The value can be **all**, which indicates that the UID indicators of all the drives in the enclosure are turned on.
action	Specifies the operation to be performed.	• **start**: turns on the UID indicator of a specified drive. • **stop**: turns off the UID indicator of a specified drive.

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Turn on the UID indicator of the drive in slot 3.

```
[root@localhost ~]# storcli64 /c0/e252/s3 start locate
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Start Drive Locate Succeeded.
```

8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives

Function

Used to query detailed information about RAID controller cards, physical drives, and physical drives.

Format

storcli64 /c*controller_id* **show**

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **show all**

storcli64 /c*controller_id***/v***vd_id* **show all**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	If this parameter is set to **all**, the ID information about all controllers managed by this tool is queried.
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	If this parameter is set to **all**, the ID information about all drive enclosures connected to the managed controllers is queried.
slot_id	Specifies the slot number of a physical drive.	If this parameter is set to **all**, the ID information about all drives is queried.
vd_id	Specifies the ID of a virtual drive. **NOTE** The new VD IDs start from 239 and decrease according to the creation sequence.	If this parameter is set to **all**, the information about all virtual drives is queried.

Usage Guidelines

Table 8-2 describes the fields in the command output.

Table 8-2 Command output description

Format	Field	Meaning	Example
storcli64 /c*controller_id* **show**	Product Name	Specifies the model of a RAID controller card.	MegaRAID 9560-8i 4GB
	FW Version	Specifies the firmware version of a RAID controller card.	5.200.02-3664
	Driver Name	Specifies the driver name of a RAID controller card.	megaraid_sas

Format	Field	Meaning	Example
	Driver Version	Specifies the driver version of a RAID controller card.	07.720.04.00
	Current Personality	Specifies the operating mode of a RAID controller card.	RAID-Mode
storcli64 / **c***controller_id***/** **e***enclosure_id***/s***slot_id* **show all**	Manufacturer Id	Specifies the vendor ID of a physical drive.	ATA
	Model Number	Specifies the module number of a physical drive.	SAMSUNG MZ7L3960HCJR-00B7C
	Firmware Revision	Specifies the firmware version of a physical drive.	JXTC104Q
	Raw size	Specifies the capacity of a physical drive.	894.252 GB [0x6fc81ab0 Sectors]
	Logical Sector Size	Specifies the logical sector size of a physical drive.	512 B
	Physical Sector Size	Specifies the size of a physical sector.	4 KB
storcli64 / **c***controller_id***/v***vd_id* **show all**	TYPE	Specifies the level of a RAID array.	RAID 1
	State	Specifies the state of a RAID array.	Optl
	Access	Specifies the data access policy applied on a RAID array.	RW

Format	Field	Meaning	Example
	Cache	Specifies the current read/ write policy and I/O policy of a RAID array.	RWTD
	Size	Specifies the size of a RAID array.	100.0 GB
	PDs for VD 238	Specifies the physical drives in a RAID array.	-
	Strip Size	Specifies the strip size of a RAID array.	256 KB
	Write Cache(initial setting)	Specifies the cache write policy of a RAID array.	WriteBack
	Disk Cache Policy	Specifies the cache policy of member drives in a RAID array.	Disk's Default

Example

Query detailed information about the RAID controller card.

```
[root@localhost ~]# storcli64 /c0 show
Generating detailed summary of the adapter, it may take a while to complete.

CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None

Product Name = MegaRAID 9560-8i 4GB
Serial Number = SKB3073438
SAS Address =  500062b208239900
PCI Address = 00:65:00:00
System Time = 07/20/2022 10:08:18
Mfg. Date = 08/02/21
Controller Time = 07/20/2022 02:08:18
FW Package Build = 52.20.0-4433
BIOS Version = 7.20.01.0_0x07140000
FW Version = 5.200.02-3664
Driver Name = megaraid_sas
Driver Version = 07.720.04.00
Current Personality = RAID-Mode
Vendor Id = 0x1000
Device Id = 0x10E2
SubVendor Id = 0x1000
```



```
SubDevice Id = 0x4010
Host Interface = PCI-E
Device Interface = SAS-12G
Bus Number = 101
Device Number = 0
Function Number = 0
Domain ID = 0
Security Protocol = None
Drive Groups = 1

TOPOLOGY :
========

-----------------------------------------------------------------------------
DG Arr Row EID:Slot DID Type  State BT       Size PDC  PI SED DS3  FSpace TR
-----------------------------------------------------------------------------
 0 -   -   -       -   RAID1 Optl  N  893.750 GB dflt N  N   dflt Y      N
 0 0   -   -       -   RAID1 Optl  N  893.750 GB dflt N  N   dflt Y      N
 0 0   0   252:2    55  DRIVE Onln  N  893.750 GB dflt N  N   dflt -      N
 0 0   1   252:5    58  DRIVE Onln  N    1.745 TB dflt N  N   dflt -      N
-----------------------------------------------------------------------------

DG=Disk Group Index|Arr=Array Index|Row=Row Index|EID=Enclosure Device ID
DID=Device ID|Type=Drive Type|Onln=Online|Rbld=Rebuild|Optl=Optimal|Dgrd=Degraded
Pdgd=Partially degraded|Offln=Offline|BT=Background Task Active
PDC=PD Cache|PI=Protection Info|SED=Self Encrypting Drive|Frgn=Foreign
DS3=Dimmer Switch 3|dflt=Default|Msng=Missing|FSpace=Free Space Present
TR=Transport Ready

Virtual Drives = 1

VD LIST :
=======

-----------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
-----------------------------------------------------------------
0/238 RAID1 Optl  RW     Yes     RWTD  -   ON  100.000 GB
-----------------------------------------------------------------

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency

JBOD Drives = 2

JBOD LIST :
=========

---------------------------------------------------------------------------------------
ID EID:Slt DID State Intf Med       Size SeSz Model                  Vendor   Port
---------------------------------------------------------------------------------------
 0 252:0    44 Onln  SAS  HDD   1.090 TB 512B AL15SEB120N              TOSHIBA  C0.0 x1
 3 252:3    56 Onln  SATA SSD 894.252 GB 512B SAMSUNG MZ7L3960HCJR-00B7C ATA      C0.0 x1
---------------------------------------------------------------------------------------

ID=JBOD Target ID|EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|Onln=Online
Offln=Offline|Intf=Interface|Med=Media Type|SeSz=Sector Size
SED=Self Encryptive Drive|PI=Protection Info|Sp=Spun|U=Up|D=Down

Physical Drives = 5

PD LIST :
=======

---------------------------------------------------------------------------------------
```

```
EID:Slt DID State DG      Size Intf Med SED PI SeSz Model                Sp Type
-------------------------------------------------------------------------------------
252:0    44 Onln  -    1.090 TB SAS  HDD N   N  512B AL15SEB120N             U  JBOD
252:2    55 Onln  0  893.750 GB SATA SSD Y   N  512B SAMSUNG MZ7L3960HCJR-00B7C U  -
252:3    56 Onln  -  894.252 GB SATA SSD Y   N  512B SAMSUNG MZ7L3960HCJR-00B7C U  JBOD
252:4    57 UGood -    1.745 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  -
252:5    58 Onln  0    1.745 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  -
-------------------------------------------------------------------------------------

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
UBUnsp=UBad Unsupported|Rbld=Rebuild

Enclosures = 1

Enclosure LIST :
==============

-------------------------------------------------------------------------
EID State Slots PD PS Fans TSs Alms SIM Port# ProdID     VendorSpecific
-------------------------------------------------------------------------
252 OK       8  5  0    0  0    0   0  0 -    VirtualSES
-------------------------------------------------------------------------

EID=Enclosure Device ID | PD=Physical drive count | PS=Power Supply count
TSs=Temperature sensor count | Alms=Alarm count | SIM=SIM Count | ProdID=Product ID
```

Query information about the physical drive in slot 3.

```
[root@localhost ~]# storcli64 /c0/e252/s3 show all
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Show Drive Information Succeeded.


Drive /c0/e252/s3 :
=================

-------------------------------------------------------------------------------------
EID:Slt DID State DG      Size Intf Med SED PI SeSz Model                Sp Type
-------------------------------------------------------------------------------------
252:3    56 Onln  -  894.252 GB SATA SSD Y   N  512B SAMSUNG MZ7L3960HCJR-00B7C U  JBOD
-------------------------------------------------------------------------------------

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
UBUnsp=UBad Unsupported|Rbld=Rebuild


Drive /c0/e252/s3 - Detailed Information :
========================================

Drive /c0/e252/s3 State :
=======================
Shield Counter = 0
Media Error Count = 0
Other Error Count = 0
Drive Temperature =  37C (98.60 F)
```



```
Predictive Failure Count = 0
S.M.A.R.T alert flagged by drive = No


Drive /c0/e252/s3 Device attributes :
====================================
SN = S6KNNE0R900684
Manufacturer Id = ATA
Model Number = SAMSUNG MZ7L3960HCJR-00B7C
NAND Vendor = NA
WWN = 5002538F01909089
Firmware Revision = JXTC104Q
Raw size = 894.252 GB [0x6fc81ab0 Sectors]
Coerced size = 893.750 GB [0x6fb80000 Sectors]
Non Coerced size = 893.752 GB [0x6fb81ab0 Sectors]
Device Speed = 6.0Gb/s
Link Speed = 6.0Gb/s
NCQ setting = Enabled
Write Cache = Enabled
Logical Sector Size = 512B
Physical Sector Size = 4 KB
Connector Name = C0.0 x1


Drive /c0/e252/s3 Policies/Settings :
====================================
Enclosure position = 1
Connected Port Number = 1(path0)
Sequence Number = 8
Commissioned Spare = No
Emergency Spare = No
Last Predictive Failure Event Sequence Number = 0
Successful diagnostics completion on = N/A
FDE Type = TCG Opal
SED Capable = Yes
SED Enabled = No
Secured = No
Cryptographic Erase Capable = Yes
Sanitize Support = CryptoErase, BlockErase
Locked = No
Needs EKM Attention = No
PI Eligible = No
Certified = No
Wide Port Capable = No
Unmap capable = Yes
Unmap capable for LDs = No
Multipath = No

Port Information :
=================


-----------------------------------------
Port Status Linkspeed SAS address
-----------------------------------------
  0 Active 6.0Gb/s   0x300062b208239903
-----------------------------------------


Inquiry Data =
40 00 ff 3f 37 c8 10 00 00 00 00 00 3f 00 00 00
00 00 00 00 36 53 4e 4b 45 4e 52 30 30 39 36 30
34 38 20 20 20 20 20 20 00 00 00 00 00 00 58 4a
43 54 30 31 51 34 41 53 53 4d 4e 55 20 47 5a 4d
4c 37 39 33 30 36 43 48 52 4a 30 2d 42 30 43 37
20 20 20 20 20 20 20 20 20 20 20 20 20 20 10 80
01 40 00 2f 00 40 00 02 00 02 07 00 ff 3f 10 00
3f 00 10 fc fb 00 10 bd ff ff ff 0f 00 00 07 00
```

Query information about VD 238.

```
[root@localhost ~]# storcli64 /c0/v238 show all
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


/c0/v238 :
========

-----------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
-----------------------------------------------------------------
0/238 RAID1 Optl  RW     Yes     RWTD  -   ON  100.000 GB
-----------------------------------------------------------------

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency


PDs for VD 238 :
==============

-------------------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model                  Sp Type
-------------------------------------------------------------------------------------
252:2    55 Onln   0 893.750 GB SATA SSD Y   N  512B SAMSUNG MZ7L3960HCJR-00B7C U  -
252:5    58 Onln   0   1.745 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  -
-------------------------------------------------------------------------------------

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
UBUnsp=UBad Unsupported|Rbld=Rebuild


VD238 Properties :
================
Strip Size = 256 KB
Number of Blocks = 209715200
VD has Emulated PD = Yes
Span Depth = 1
Number of Drives Per Span = 2
Write Cache(initial setting) = WriteBack
Disk Cache Policy = Disk's Default
Encryption = None
Data Protection = None
Active Operations = None
Exposed to OS = Yes
OS Drive Name = /dev/sdb
Creation Date = 19-07-2022
Creation Time = 09:03:11 AM
Emulation type = default
Cachebypass size = Cachebypass-64k
Cachebypass Mode = Cachebypass Intelligent
Is LD Ready for OS Requests = Yes
SCSI NAA Id = 600062b2082399002a692fcfb6bb2606
Unmap Enabled = No
```

8.2.29 Querying Supercapacitor Information

Function

Used to query supercapacitor information, such as the supercapacitor name and the cache capacity of the TFM Flash card.

Format

storcli64 /c*controller_id***/cv show all**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	The value can be **all**, indicating all controllers.

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Query supercapacitor information.

```
[root@localhost ~]# ./storcli64 /c0/cv show all
CLI Version = 007.0409.0000.0000 Nov 06, 2017
Operating system = Linux3.10.0-514.el7.x86_64
Controller = 0
Status = Success
Description = None


Cachevault_Info :
================

-------------------
Property    Value
-------------------
Type        CVPM02
Temperature 28 C
State       Optimal
-------------------


Firmware_Status :
=================

----------------------------------------
Property                    Value
----------------------------------------
Replacement required        No
No space to cache offload   No
```



```
Module microcode update required No
---------------------------------------


GasGaugeStatus :
===============

------------------------------
Property               Value
------------------------------
Pack Energy            294 J
Capacitance            108 %
Remaining Reserve Space 0
------------------------------


Design_Info :
============

-------------------------------------
Property               Value
-------------------------------------
Date of Manufacture      04/11/2016
Serial Number            22417
Manufacture Name         LSI
Design Capacity          288 J
Device Name              CVPM02
tmmFru                   N/A
CacheVault Flash Size    8.0 GB
tmmBatversionNo          0x05
tmmSerialNo              0xee7d
tmm Date of Manufacture  09/12/2016
tmmPcbAssmNo             022544412A
tmmPCBversionNo          0x03
tmmBatPackAssmNo         49571-13A
scapBatversionNo         0x00
scapSerialNo             0x5791
scap Date of Manufacture 04/11/2016
scapPcbAssmNo            1700134483
scapPCBversionNo         A
scapBatPackAssmNo        49571-13A
Module Version           6635-02A
-------------------------------------


Properties :
==========

-----------------------------------------------------------------
Property             Value
-----------------------------------------------------------------
Auto Learn Period    27d (2412000 seconds)
Next Learn time      2018/08/03  17:48:38 (586633718 seconds)
Learn Delay Interval 0 hour(s)
Auto-Learn Mode      Transparent
-----------------------------------------------------------------
```

NOTE

- In the command output, **Device Name CVPM02** indicates that the supercapacitor name is **CVPM02** and **CacheVault Flash Size 8.0GB** indicates that the cache capacity of the TFM Flash card is **8.0 GB**.
- If **State** is **FAILED**, replace the supercapacitor.

8.2.30 Upgrading the Drive Firmware

Function

Used to upgrade the drive firmware.

Format

./storcli64 /c*controller_id* **/e***enclosure_id***/s***slot_id* **download src=***FW_name*.**bin**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	–
slot_id	Specifies the slot number of a physical drive.	–
FW_name	Specifies the drive firmware name.	–

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Upgrade the drive firmware.

```
[root@localhost ~]# ./storcli64 /c0/e64/s5 download src=5200_D1MU004_Releasefullconcatenatedbinary.bin
Starting microcode update  .....please wait...
Flashing PD image  ..... please wait...
CLI Version = 007.0504.0000.0000 Nov 22,2017
Operation system = Linux 3.10.0-514.el7.x86_64
Controller = 0
Status = Success
Description = Firmware Download succeeded.

Drive Firmware Download :
=========================
--------------------------------------------------------------------------------
Drive     Status  ErrCd    ErrMsg
--------------------------------------------------------------------------------
/c0/e64/s5 Success   0       -
--------------------------------------------------------------------------------
```


8.2.31 Rebuilding the RAID Array Manually

Function

Used to rebuild the RAID array manually.

Format

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **insert dg=***DG* **array=***Arr* **row=***Row*

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **start rebuild**

Parameter Description

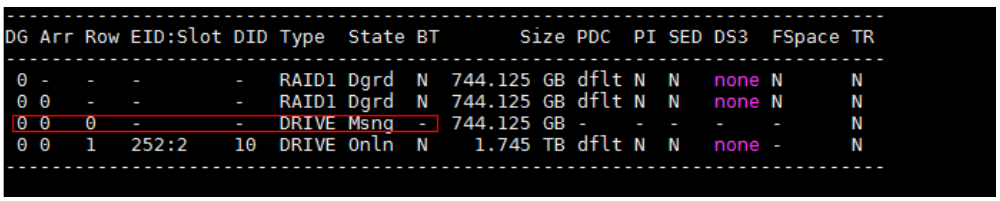
Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	–
slot_id	Specifies the slot number of the physical drive to be added to the RAID array.	–
DG	Specifies the ID of the DG where the drive fails.	–
Arr	Specifies the ID of the RAID array where the drive fails.	–
Row	Specifies the row number of the RAID array where the drive fails.	–

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

To rebuild a RAID array, perform the following steps:

1. Run the **storcli64 /c***controller_id* **show** command to query the **DG**, **Arr**, and **Row** information of the faulty drive.



2. Run the **storcli64 /c***controller_id***e***enclosure_id***s***slot_id* **insert dg=***DG* **array=***Arr* **row=***Row* command to add the drive to the RAID array.
3. Run the **storcli64 /c***controller_id***e***enclosure_id***s***slot_id* **start rebuild** command to manually rebuild the RAID array.

Example

Add the drive to the RAID array.

```
[root@localhost ~]# storcli64 /c0/e252/s1 insert dg=0 array=0 row=0
CLI Version = 007.0504.0000.0000 Nov 22, 2017
Operating system = Linux 3.10.0-693.el7.x86_64
Controller = 0
Status = Success
Description = Insert Drive Succeeded.
```

Rebuild the RAID array manually.

```
[root@localhost ~]# storcli64 /c0/e252/s1 start rebuild
CLI Version = 007.0504.0000.0000 Nov 22, 2017
Operating system = Linux 3.10.0-693.el7.x86_64
Controller = 0
Status = Success
Description = Start Drive Rebuild Succeeded.
```

8.2.32 Querying or Clearing the RAID Controller Card Logs

Function

Used to query and clear logs of the RAID controller cards.

Format

Syntax	Description
storcli64 /c*controller_id* **show termlog**	Queries logs of the RAID controller card after the power-on.
storcli64 /c*controller_id* **show alilog**	Queries historical logs of the RAID controller card (including termlog).
storcli64 /c*controller_id* **delete termlog**	Deletes RAID controller card logs.

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Queries logs of the RAID controller card.

```
[root@localhost idriver]# ./storcli64 /c0 show termlog
Firmware Term Log Information on controller 0:
05/27/19  6:48:11: C0:TTY History buffer cleared

CLI Version = 007.0504.0000.0000 Nov 22, 2017
Operating system = Linux 3.10.0-514.el7.x86_64
Controller = 0
Status = Success
Description = None
```

Queries historical logs of the RAID controller card (including termlog).

```
[root@localhost idriver]# ./storcli64 /c0 show alilog

    SAS RAID Management Tool Command Line Utilities
    ==================================================


Adapter #0

Date/Time:          Mon Sep 18 05:45:02 PM
Operating System:   Linux version 4.18.0-193.28.1.el7.aarch64 (mockbuild@aarch64-01.bsys.centos.org) (gcc version
8.3.1
Physical Memory:          267260800 KB
Operating Version:  Linux version 4.18.0-193.28.1.el7.aarch64 (mockbuild@aarch64-01.bsys.centos.org) (gcc version
8.3.1
Driver Name:        megaraid_sas
Driver Version:     07.722.02.00
Processor:

    RAID Controller XXX Information
    ============================================================


RAID Type:          XXX

Host Intr:          PCIE
Device Intr:        SAS-12G
Port Count:         8
Serial #            02Y193X2NC000012
NVDT Version:       5.2200.00-0631
CBB  Version:       23.25.01.00
BIOS Version:       7.22.00.0_0x07160300
HIIM Version:       07.22.03.00
HIIA Version:       07.22.03.00
APP  Version:       5.220.02-3757
NVRAM Size:         128 KB
RAID Level:         0 1 5 6 00 10 50 60 PRL 11 PRL 11 with spanning SRL 3 supported
Cache Size:         4096 MB
Flash Size:         32 MB
RCV Error:          0
Un-RCV Error:       0
              High Availability Properties
              ================
Topology Type:      None
Support Cluster:    No
Cluster Mode:       Inactive

Controller Properties
---------------------
Rebuild Rate                          : 30
Patrol Read Rate                      : 30
```

```
Back Ground Initialization(BGI) Rate         : 30
Consistency Check(CC) Rate                   : 30
Reconstruction Rate                          : 30
Maximum # of drives to spin up at one time   : 2
# of seconds to delay among spinup groups    : 2
Cluster Enable                               : FALSE
Drive capacity coercion mode                 : None
Alarm Enable                                 : FALSE
Disable AutoRebuild                          : FALSE
Disable Battery Warning                      : FALSE
Restore Hotspare on Insertion                : NO
Expose Enclosure Devices                     : YES

BBU Properties
--------------
BBU Battery Type:                            CVPM05
BBU Voltage:                                 5144 mV
BBU Current:                                 0 mA
BBU Temperature:                             22 C
IBBU Relative State Of Charge:               0
IBBU Charging Current:                       0 mA
IBBU Absolute State Of Charge:               0

BBU Firmware Status
-------------------
voltageLow:                                  OK
temperatureHigh                              OK
learnCycleRequested:                         No
learnCycleActive:                            No
learnCycleFailed                             OK
learnCycleTimeout:                           No


                    Device Information
                    ==================

Device Name:       ATA                 Product Id:         SAMSUNG MZ7L3960
Rev:               304Q                Vendor Specific:    S6KNNE0T511373
Device Type:       DISK                Device ID:          12
SAS Address 0:     0x558aea8fb7357017  SAS Address 1:      0x0
Media Error:       0                   Other Error:        0
PredictiveFail:    0                   Firmware State:     Online
Speed:             6.0Gb/s             DDF State:          SATA
Primary Defect:    ---                 Grown Defect:       ---
Raw size:          915715 MB           Non-coerced size:   915203 MB
Coerced size:      915200 MB           Enclosure index:    1
Path Count:        1                   Slot Number         23

# of Logical Drives :12

Logical Drive# 0
================
      Target ID          : 235
      Sequence Number    : 3
      Size               : 457344 MB

Detail Logical Drive Information
--------------------------------

Target ID                  : 235
Sequence Number            : 3
Logical Drive name         :
Total Redundant space(MB)  : 0

Default Read Policy        : Read Ahead
Default Write Policy       : WriteBack
Default Cache Policy       : Direct IO
Current Read Policy        : Read Ahead
Current Write Policy       : Write Back
```

```
Current Cache Policy          : Direct IO
PD Cache Policy               : UNCHANGED
Access Policy                 : Read/Write
Background Initialization     : Enabled
Primary RAID Level            : 0
RAID Level Qualifier          : 0
Secondary RAID Level          : 0
Strip Size per DDF            : 9 (256K)
# of drivers per span         : 1
# of spans                    : 1
Init Progress State           : No init in progress
State                         : OPTIMAL
Consistentcy                  : Consistent
Span# 0                       :
 Start Block     : 0MB
 # blocks        : 457344MB
 Array Index     : 0

Total size of the logical drive: 457344MB
Logical Drive owner's Device ID: 65535
Number of Physical Devices  : 1
Device IDs:     46


                    NVRAM Event History
                    ===================

EVENT SEQUENCE INFORMATION
--------------------------
Sequence # of newest event in the log    : 294740
Sequence # of oldest event in the log    : 233700
Sequence # of last log clear             : 233700
Sequence # of last clean shutdown        : 233700
Sequence # of this session boot          : 294376
EVENT DETAILS
------------
233700: 0-days 0:1:7Info:PD 16(e0xfb/s14) Inquiry info: Info- ATA  SAMSUNG MZ7L3960 NE0T512179 960 GB
233701: 0-days 0:1:7Info:Inserted: PD 17(e0xfb/s11)
233702: 0-days 0:1:7Info:Inserted: PD 17(e0xfb/s11) Info: enclPd=fb, scsiType=0, portMap=00,
sasAddr=558aea8fb735700b,0000000000000000
233703: 0-days 0:1:7Info:PD 17(e0xfb/s11) Inquiry info: Info- ATA  SAMSUNG MZ7L3960 NE0T511384 960 GB
233704: 0-days 0:1:7Info:Inserted: PD 18(e0xfb/s33)
233705: 0-days 0:1:7Info:Inserted: PD 18(e0xfb/s33) Info: enclPd=fb, scsiType=0, portMap=00,
sasAddr=558aea8fb7357021,0000000000000000
233706: 0-days 0:1:7Info:PD 18(e0xfb/s33) Inquiry info: Info- ATA  SAMSUNG MZ7L3960 NE0T512178 960 GB


                     Online History
                     ==============

Firmware Term Log Information on controller 0:

09/18/23  8:08:22.518: C0:TTY History buffer cleared holdPtr=6 gTtyHoldBufferIdx=0
09/18/23  8:08:23.262: C0:DRecV lm=2968 tbio=1 totTD=0 ignC=ffff rC=0 ts=b6 mytc=b6 timOc=0 retCigc=0 rs 2 cs 2
09/18/23  8:08:23.273: C0:DRecV lm=2a76 tbio=1 totTD=0 ignC=ffff rC=0 ts=b6 mytc=b6 timOc=0 retCigc=0 rs 2 cs 2

Date/Time:          Mon Sep 18 05:45:14 PM


CLI Version = 007.2203.0000.0000 May 11, 2022
Operating system = Linux 4.18.0-193.28.1.el7.aarch64
Controller = 0
Status = Success
Description = None
```

Delete logs of the RAID controller card.

```
[root@localhost idriver]# ./storcli64 /c0 delete termlog
CLI Version = 007.0504.0000.0000 Nov 22, 2017
Operating system = Linux 3.10.0-514.el7.x86_64
Controller = 0
```

```
Status = Success
Description = None


Controller Properties :
=====================


----------------------------
Ctrl Method Result
----------------------------
  0 Delete Termlog deleted
----------------------------
```

8.2.33 Querying and Setting bootwithpinnedcache Parameters

Function

Used to query the boot of the RAID controller card with dirty data.

Format

storcli64 /c*controller_id* **set bootwithspinnedcache=***action*

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	–
action	Specifies the operation to be performed.	• on • off

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

None.

Example

Query the bootwithpinnedcache function.

```
[root@localhost ~]# storcli64 /c0 show bootwithpinnedcache
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================


----------------------------
```



```
Ctrl_Prop             Value
------------------------------
Boot With Pinned Cache ON
------------------------------
```

Enable the bootwithpinnedcache function.

```
[root@localhost ~]# storcli64 /c0 set bootwithpinnedcache=on
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================


------------------------------
Ctrl_Prop             Value
------------------------------
Boot With Pinned Cache ON
------------------------------
```

8.2.34 SnapDump Operations

Function

Used to describe operations related to SnapDump.

Format

Format	Description
storcli64 /c*controller_id* **show snapdump**	Checks whether the SnapDump function is enabled and whether the **SnapDump** files are automatically generated.
storcli64 /c*controller_id* **get snapdump id=all**	Obtains the historical **SnapDump** files.
storcli64 /c*controller_id* **get snapdump**	Obtains the historical **SnapDump** files and generates a new **SnapDump** file.
storcli64 /c*controller_id* **set snapdump state=on|off**	Enables or disables the SnapDump function.
storcli64 /c*controller_id* **delete snapdump force**	Deletes the historical SnapDump logs.

Parameter Description

Parameter	Description	Value
controller_id	Controller ID	If this parameter is set to **all**, the ID information about all controllers managed by this tool is queried.
state=on|off	SnapDump state	**on** indicates that the function is enabled, and **off** indicates that the function is disabled.

Usage Guidelines

- The SnapDump files are logs that can be automatically generated when the RAID controller card is abnormal. You can also manually obtain it.
- Before collecting the SnapDump information, check whether the SnapDump function is enabled and whether the SnapDump files are automatically generated.
- Obtaining the historical SnapDump files and generating a new SnapDump file affect services. Therefore, you are advised to use this command offline.
- If the SnapDump function cannot be enabled, check whether the current firmware version of the RAID controller card supports the function.
- The SnapDump file collected **snapdump_******************.zip** is saved in the current directory where the command is executed.

  NOTE

  Collecting SnapDump logs may cause the I2C link to be busy, and the CloudBMC may report an alarm about communication failure of a RAID controller card for a short time. After the SnapDump logs are collected, the alarm is cleared.

Example

Check whether the SnapDump function is enabled and whether the SnapDump files are automatically generated.

```
[root@localhost ~]# storcli64 /c0 show snapdump
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


SnapDump Properties :
=====================


-----------------------------------------
Ctrl_Prop                 Value
-----------------------------------------
Snapdump                  ON
Snapdump Save Count       N/A
```

```
Snapdump Delay OCR            15
Snapdump properties           Read-Write
Snapdump Preboot Trace Buffer ON
Snapdump Current Count        11
-----------------------------------------


SnapDump Details :
==================


-------------------------------------------------
ID Snapdump Size Snapdump time       OnDemand
-------------------------------------------------
 5       3742387 06-05-2022 16:41:06 Yes
 6       3662769 06-05-2022 21:01:08 Yes
 7       3604239 06-06-2022 05:25:01 Yes
 8       3466428 06-06-2022 13:49:18 Yes
 9       3409534 06-06-2022 13:58:34 Yes
10       2850463 06-08-2022 19:15:59 Yes
11       3224364 06-10-2022 13:27:15 Yes
12       3288895 06-10-2022 16:33:03 Yes
13       3123763 04-16-2020 16:39:16 Yes
14       3105144 04-16-2020 23:48:36 Yes
15       3023683 05-06-2020 17:19:38 Yes
-------------------------------------------------
```

Obtain the historical **SnapDump** files.

```
[root@localhost ~]# storcli64 /c0 get snapdump id=all
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Snapdump :
========


----------------------------------------
Ctrl Status  Ctrl_Prop    ErrCd ErrMsg
----------------------------------------
   0 Success Get Snapdump     0 -
----------------------------------------
```

Obtain the historical **SnapDump** files and generate a new **SnapDump** file.

```
[root@localhost ~]# storcli64 /c0 get snapdump
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Download Support Log


Snapdump :
========


----------------------------------------
Ctrl Status  Ctrl_Prop    ErrCd ErrMsg
----------------------------------------
   0 Success Get Snapdump     0 -
----------------------------------------
```

Enable or disable the SnapDump function.

Enable:

```
[root@localhost ~]# storcli64 /c0 set snapdump state=on
CLI Version = 007.1907.0000.0000 Sep 13, 2021
```

```
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

-------------------
Ctrl_Prop    Value
-------------------
Set Snapdump on
-------------------
```

Disable:

```
[root@localhost ~]# storcli64 /c0 set snapdump state=off
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


Controller Properties :
=====================

-------------------
Ctrl_Prop    Value
-------------------
Set Snapdump off
-------------------
```

Delete the historical SnapDump logs.

```
[root@localhost ~]# storcli64 /c0 delete snapdump force
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Snapdump delete
```

8.2.35 Querying and Setting deviceorderbyfirmware Parameters

Function

Used to change the allocation sequence of RAID array (VD) IDs and drive letters.

Format

storcli64 /c*controller_id* **set deviceorderbyfirmware=on/off**

storcli64 /c*controller_id* **show deviceorderbyfirmware**

Parameter Description

Parameter	Description	Value
controller_id	Controller ID	If this parameter is set to **all**, the ID information about all controllers managed by this tool is queried.

For details about how to query the RAID controller card ID, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

Usage Guidelines

VD ID	Drive Letter			
	deviceorderbyfirmware=off		deviceorderbyfirmware=on	
	Creating a RAID array (before the reset)	After the reset	Creating a RAID array (before the reset)	After the reset
239	sda	sdc	sda	sda
238	sdb	sdb	sdb	sdb
237	sdc	sda	sdc	sdc

NOTE

- The **driveorderbyfirmware** feature requires the cooperation between the driver and firmware. If the version of firmware or driver is earlier than MR720 and the **driveorderbyfirmware** is enabled, the RAID controller card may not report the drive letters to the host, and the OS cannot be booted. Only the firmware or driver of MR720 version or later supports the **driveorderbyfirmware** feature.
- The default value of **driveorderbyfirmware** is **off**.
- When **driveorderbyfirmware** is **on**, the VD drive letters are arranged in descending order of VD IDs. The VD drive letters rank in the front, and the JBOD drive letters are behind them. When **driveorderbyfirmware** is **off**, the VD drive letters are arranged in ascending order of VD IDs. The JBOD drive letters are in front of the VD drive letters.

Example

Query the **deviceorderbyfirmware** parameters.

```
[root@localhost ~]# storcli64 /c0 show deviceorderbyfirmware
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None
```



```
Controller Properties :
=====================

---------------------------------------
Ctrl_Prop                 Value
---------------------------------------
Firmware based device ordering ON
---------------------------------------
```

Set **deviceorderbyfirmware** to **on**.

```
[root@localhost ~]# storcli64 /c0 set deviceorderbyfirmware=on
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Please reboot the system for the changes to take effect

Controller Properties :
=====================

---------------------------------------
Ctrl_Prop                 Value
---------------------------------------
Firmware based device ordering ON
---------------------------------------
```

According to the command prompt, when **deviceorderbyfirmware** is **on**, the device needs to be reset to take effect. Check the allocation sequence of RAID array (VD) IDs and drive letters after the reset.

```
[root@localhost ~]# storcli64 /c0/vall show all
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None

/c0/v237 :
========

-----------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
-----------------------------------------------------------------
2/237 RAID0 Optl  RW     Yes     RWTD  -   OFF 100.000 GB
-----------------------------------------------------------------

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency


PDs for VD 237 :
==============

-------------------------------------------------------------------------------
EID:Slt DID State DG     Size Intf Med SED PI SeSz Model                Sp Type
-------------------------------------------------------------------------------
252:5    58 Onln   2 1.745 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  -
-------------------------------------------------------------------------------

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
```

```
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
UBUnsp=UBad Unsupported|Rbld=Rebuild


VD237 Properties :
==================
Strip Size = 256 KB
Number of Blocks = 209715200
VD has Emulated PD = Yes
Span Depth = 1
Number of Drives Per Span = 1
Write Cache(initial setting) = WriteBack
Disk Cache Policy = Disk's Default
Encryption = None
Data Protection = None
Active Operations = None
Exposed to OS = Yes
OS Drive Name = /dev/sdc
Creation Date = 19-07-2022
Creation Time = 03:05:36 AM
Emulation type = default
Cachebypass size = Cachebypass-64k
Cachebypass Mode = Cachebypass Intelligent
Is LD Ready for OS Requests = Yes
SCSI NAA Id = 600062b2082399002a68dc00cc38fe01
Unmap Enabled = No


/c0/v238 :
========

------------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
------------------------------------------------------------------
1/238 RAID0 Optl  RW     Yes     RWTD  -   OFF 100.000 GB
------------------------------------------------------------------

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency


PDs for VD 238 :
==============

-----------------------------------------------------------------------------------
EID:Slt DID State DG     Size Intf Med SED PI SeSz Model                  Sp Type
-----------------------------------------------------------------------------------
252:4    57 Onln   1 1.745 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  -
-----------------------------------------------------------------------------------

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
UBUnsp=UBad Unsupported|Rbld=Rebuild
```


VD238 Properties :
==========
Strip Size = 256 KB
Number of Blocks = 209715200
VD has Emulated PD = Yes
Span Depth = 1
Number of Drives Per Span = 1
Write Cache(initial setting) = WriteBack
Disk Cache Policy = Disk's Default
Encryption = None
Data Protection = None
Active Operations = None
Exposed to OS = Yes
OS Drive Name = /dev/sdb
Creation Date = 19-07-2022
Creation Time = 03:05:26 AM
Emulation type = default
Cachebypass size = Cachebypass-64k
Cachebypass Mode = Cachebypass Intelligent
Is LD Ready for OS Requests = Yes
SCSI NAA Id = 600062b2082399002a68dbf6bcbd83c7
Unmap Enabled = No

/c0/v239 :
========

DG/VD TYPE State Access Consist Cache Cac sCC Size Name

0/239 RAID0 Optl RW Yes RWTD - OFF 100.000 GB

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency

PDs for VD 239 :
==========

EID:Slt DID State DG Size Intf Med SED PI SeSz Model Sp Type

252:2 55 Onln 0 893.750 GB SATA SSD Y N 512B SAMSUNG MZ7L3960HCJR-00B7C U -
---

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
UBUnsp=UBad Unsupported|Rbld=Rebuild

VD239 Properties :
==========
Strip Size = 256 KB
Number of Blocks = 209715200
VD has Emulated PD = Yes
Span Depth = 1
Number of Drives Per Span = 1
Write Cache(initial setting) = WriteBack
Disk Cache Policy = Disk's Default


```
Encryption = None
Data Protection = None
Active Operations = None
Exposed to OS = Yes
OS Drive Name = /dev/sda
Creation Date = 18-07-2022
Creation Time = 10:57:39 AM
Emulation type = default
Cachebypass size = Cachebypass-64k
Cachebypass Mode = Cachebypass Intelligent
Is LD Ready for OS Requests = Yes
SCSI NAA Id = 600062b2082399002a67f923be855ac3
Unmap Enabled = No
```

Set **deviceorderbyfirmware** to **off**.

```
[root@localhost ~]# storcli64 /c0 set deviceorderbyfirmware=off
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Please reboot the system for the changes to take effect


Controller Properties :
=====================

-------------------------------------
Ctrl_Prop                 Value
-------------------------------------
Firmware based device ordering OFF
-------------------------------------
```

According to the command prompt, when **deviceorderbyfirmware** is **off**, the device needs to be reset to take effect. Check the allocation sequence of RAID array (VD) IDs and drive letters after the reset.

```
[root@localhost ~]# storcli64 /c0/vall show all
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None


/c0/v237 :
========

-----------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
-----------------------------------------------------------------
2/237 RAID0 Optl  RW     Yes     RWTD  -   OFF 100.000 GB
-----------------------------------------------------------------

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency


PDs for VD 237 :
==============

-------------------------------------------------------------------------------
EID:Slt DID State DG     Size Intf Med SED PI SeSz Model                Sp Type
-------------------------------------------------------------------------------
252:5    58 Onln   2 1.745 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  -
```

```
--------------------------------------------------------------------------------

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
UBUnsp=UBad Unsupported|Rbld=Rebuild


VD237 Properties :
==================
Strip Size = 256 KB
Number of Blocks = 209715200
VD has Emulated PD = Yes
Span Depth = 1
Number of Drives Per Span = 1
Write Cache(initial setting) = WriteBack
Disk Cache Policy = Disk's Default
Encryption = None
Data Protection = None
Active Operations = None
Exposed to OS = Yes
When OS Drive Name = /dev/sdc # Deviceorderbyfirmware is off, there are two JBOD drives, so the VD drive letters start from sdc.#
Creation Date = 19-07-2022
Creation Time = 03:05:36 AM
Emulation type = default
Cachebypass size = Cachebypass-64k
Cachebypass Mode = Cachebypass Intelligent
Is LD Ready for OS Requests = Yes
SCSI NAA Id = 600062b2082399002a68dc00cc38fe01
Unmap Enabled = No


/c0/v238 :
========

------------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
------------------------------------------------------------------
1/238 RAID0 Optl  RW     Yes     RWTD  -   OFF 100.000 GB
------------------------------------------------------------------

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency


PDs for VD 238 :
==============

------------------------------------------------------------------------------
EID:Slt DID State DG     Size Intf Med SED PI SeSz Model                Sp Type
------------------------------------------------------------------------------
252:4    57 Onln   1 1.745 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  -
------------------------------------------------------------------------------

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
```

```
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
UBUnsp=UBad Unsupported|Rbld=Rebuild


VD238 Properties :
==================
Strip Size = 256 KB
Number of Blocks = 209715200
VD has Emulated PD = Yes
Span Depth = 1
Number of Drives Per Span = 1
Write Cache(initial setting) = WriteBack
Disk Cache Policy = Disk's Default
Encryption = None
Data Protection = None
Active Operations = None
Exposed to OS = Yes
OS Drive Name = /dev/sdd
Creation Date = 19-07-2022
Creation Time = 03:05:26 AM
Emulation type = default
Cachebypass size = Cachebypass-64k
Cachebypass Mode = Cachebypass Intelligent
Is LD Ready for OS Requests = Yes
SCSI NAA Id = 600062b2082399002a68dbf6bcbd83c7
Unmap Enabled = No


/c0/v239 :
========

------------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
------------------------------------------------------------------
0/239 RAID0 Optl  RW     Yes     RWTD  -   OFF 100.000 GB
------------------------------------------------------------------

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency


PDs for VD 239 :
==============

-------------------------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model                  Sp Type
-------------------------------------------------------------------------------------------
252:2    55 Onln   0 893.750 GB SATA SSD Y   N  512B SAMSUNG MZ7L3960HCJR-00B7C U  -
-------------------------------------------------------------------------------------------

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
UBUnsp=UBad Unsupported|Rbld=Rebuild


VD239 Properties :
==================
Strip Size = 256 KB
Number of Blocks = 209715200
VD has Emulated PD = Yes
```

```
Span Depth = 1
Number of Drives Per Span = 1
Write Cache(initial setting) = WriteBack
Disk Cache Policy = Disk's Default
Encryption = None
Data Protection = None
Active Operations = None
Exposed to OS = Yes
OS Drive Name = /dev/sde
Creation Date = 18-07-2022
Creation Time = 10:57:39 AM
Emulation type = default
Cachebypass size = Cachebypass-64k
Cachebypass Mode = Cachebypass Intelligent
Is LD Ready for OS Requests = Yes
SCSI NAA Id = 600062b2082399002a67f923be855ac3
Unmap Enabled = No
```

8.2.36 Setting and Querying Pass-Through Drive Information

Function

Used to set a drive as a pass-through drive and query the configuration information of the 9560-8i pass-through drive.

Format

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **set jbod**

storcli64 /c*controller_id* **show**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	If this parameter is set to **all**, the ID information about all controllers managed by this tool is queried.
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	–
slot_id	Specifies the slot number of a physical drive.	–

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

NOTE

When the drive is set as a JBOD drive, and the information about the JBOD drive is queried, **JBOD** is displayed in **Type**, and **State** is **Onln**.

Usage Guidelines

Enable the pass-through function before setting a drive as a pass-through drive.

Example

Set the drive in slot 2 as a pass-through drive.

```
[root@localhost ~]# storcli64 /c0/e252/s2 set jbod
CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = Set Drive JBOD Succeeded.
```

Query the information about the pass-through drive.

```
[root@localhost ~]# storcli64 /c0 show
Generating detailed summary of the adapter, it may take a while to complete.

CLI Version = 007.1907.0000.0000 Sep 13, 2021
Operating system = Linux 3.10.0-1127.el7.x86_64
Controller = 0
Status = Success
Description = None

Product Name = MegaRAID 9560-8i 4GB
Serial Number = SKB3073438
SAS Address =  500062b208239900
PCI Address = 00:65:00:00
System Time = 07/18/2022 15:11:53
Mfg. Date = 08/02/21
Controller Time = 07/18/2022 07:11:52
FW Package Build = 52.20.0-4433
BIOS Version = 7.20.01.0_0x07140000
FW Version = 5.200.02-3664
Driver Name = megaraid_sas
Driver Version = 07.720.04.00
Current Personality = RAID-Mode
Vendor Id = 0x1000
Device Id = 0x10E2
SubVendor Id = 0x1000
SubDevice Id = 0x4010
Host Interface = PCI-E
Device Interface = SAS-12G
Bus Number = 101
Device Number = 0
Function Number = 0
Domain ID = 0
Security Protocol = None
JBOD Drives = 3

JBOD LIST :
=========

---------------------------------------------------------------------------------------
ID EID:Slt DID State Intf Med       Size SeSz Model                    Vendor   Port
---------------------------------------------------------------------------------------
 0 252:0    44 Onln  SAS  HDD   1.090 TB 512B AL15SEB120N              TOSHIBA  C0.0 x1
 2 252:2    55 Onln  SATA SSD 894.252 GB 512B SAMSUNG MZ7L3960HCJR-00B7C ATA      C0.0 x1
 5 252:5    58 Onln  SATA SSD   1.746 TB 512B SAMSUNG MZ7L31T9HBLT-00B7C ATA      C0.1 x1
---------------------------------------------------------------------------------------

ID=JBOD Target ID|EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|Onln=Online
Offln=Offline|Intf=Interface|Med=Media Type|SeSz=Sector Size
SED=Self Encryptive Drive|PI=Protection Info|Sp=Spun|U=Up|D=Down

Physical Drives = 5
```



```
PD LIST :
========

-------------------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model                  Sp Type
-------------------------------------------------------------------------------------
252:0    44 Onln  -    1.090 TB SAS  HDD N   N  512B AL15SEB120N              U  JBOD
252:2    55 Onln  -  894.252 GB SATA SSD Y   N  512B SAMSUNG MZ7L3960HCJR-00B7C U  JBOD
252:3    56 UGood -  893.750 GB SATA SSD Y   N  512B SAMSUNG MZ7L3960HCJR-00B7C U  -
252:4    57 UGood -    1.745 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  -
252:5    58 Onln  -    1.746 TB SATA SSD Y   N  512B SAMSUNG MZ7L31T9HBLT-00B7C U  JBOD
-------------------------------------------------------------------------------------

EID=Enclosure Device ID|Slt=Slot No|DID=Device ID|DG=DriveGroup
DHS=Dedicated Hot Spare|UGood=Unconfigured Good|GHS=Global Hotspare
UBad=Unconfigured Bad|Sntze=Sanitize|Onln=Online|Offln=Offline|Intf=Interface
Med=Media Type|SED=Self Encryptive Drive|PI=Protection Info
SeSz=Sector Size|Sp=Spun|U=Up|D=Down|T=Transition|F=Foreign
UGUnsp=UGood Unsupported|UGShld=UGood shielded|HSPShld=Hotspare shielded
CFShld=Configured shielded|Cpybck=CopyBack|CBShld=Copyback Shielded
UBUnsp=UBad Unsupported|Rbld=Rebuild

Enclosures = 1

Enclosure LIST :
==============

-------------------------------------------------------------------------
EID State Slots PD PS Fans TSs Alms SIM Port# ProdID     VendorSpecific
-------------------------------------------------------------------------
252 OK       8  5  0    0  0    0  0 -     VirtualSES
-------------------------------------------------------------------------

EID=Enclosure Device ID | PD=Physical drive count | PS=Power Supply count
TSs=Temperature sensor count | Alms=Alarm count | SIM=SIM Count | ProdID=Product ID
```

8.2.37 Viewing, Importing, and Clearing Foreign Configurations

Function

Used to describe how to view, import, and clear foreign configurations of a RAID controller card.

Format

storcli64 /c*controller_id***/fall show all**

storcli64 /c*controller_id***/fall import preview**

storcli64 /c*controller_id***/fall delete**

Parameter Description

Parameter	Description	Value
controller_id	Specifies the ID of a RAID controller card.	–

Usage Guidelines

None.

Example

Import foreign configurations of the RAID controller card.

```
[root@localhost ~]# ./storcli64 /c0/fall import preview
CLI Version = 007.0504.0000.0000 Nov 22, 2017
Operating system = Linux 3.10.0-957.el7.x86_64
Controller = 0
Status = Success
Description = Operation on foreign configuration Succeeded


FOREIGN PREVIEW :
================

DG=Disk Group Index|Arr=Array Index|Row=Row Index|EID=Enclosure Device ID
DID=Device ID|Type=Drive Type|Onln=Online|Rbld=Rebuild|Dgrd=Degraded
Pdgd=Partially degraded|Offln=Offline|BT=Background Task Active
PDC=PD Cache|PI=Protection Info|SED=Self Encrypting Drive|Frgn=Foreign
DS3=Dimmer Switch 3|dflt=Default|Msng=Missing|FSpace=Free Space Present
TR=Transport Ready

Total foreign drive groups = 0
```

Delete external configurations of the RAID controller card.

```
[root@localhost ~]# ./storcli64 /c0/fall delete
CLI Version = 007.0504.0000.0000 Nov 22, 2017
Operating system = Linux 3.10.0-957.el7.x86_64
Controller = 0
Status = Success
Description = Successfully deleted foreign configuration
```

8.2.38 Querying and Setting the Drive Security Function

Command Function

Used to query the Drive Security state, enable and disable the Drive Security function, and modify the Drive Security parameter.

Syntax

storcli64 /c*controller_id* **show securitykey keyid**

storcli64 /c*controller_id* **set securitykey=***encryption key* **passphrase=***password* **keyid=***name*

storcli64 /c*controller_id* **set securitykey=***encryption key* **oldsecuritykey=***old encryption key* **passphrase=***xxx* **keyid=***xxx*

storcli64 /c*controller_id* **delete securitykey**

Parameter Description

Parameter	Parameter Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	If this parameter is set to **all**, the ID information about all controllers managed by this tool is queried.
encryption key	Sets the encryption key.	-
password	Sets the password/new password for starting the RAID controller card.	-
name	Sets the encryption key name.	-
old encryption key	Specifies the old password for starting the RAID controller card.	-

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

User Guide

The hard drive must be an SED encrypted drive.

Example

Query the Drive Security state.

```
[root@localhost~]#./storcli64 /c0 show securitykey keyid
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Failure
Description = None
Detailed Status :
===============
-------------------------------------------------------------------------------
Ctrl Status Ctrl_Prop Value ErrMsg                                    ErrCd
-------------------------------------------------------------------------------
 0 Failed KeyID     -   device state doesn't support requested command   50
-------------------------------------------------------------------------------
```

Enable the Drive Security function and query the Drive Security state.

```
[root@localhost~]#./storcli64 /c0 set securitykey=Xfusion12#$ passphrase=Xfusion@123 keyid=MR9560
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160..e17.x86_64
Controller = 0
Status = Success
Description = None

Controller Properties :
=====================
```



```
----------------------
Ctrl Method Result
----------------------
 0set Key Success
----------------------


[root@localhost~]#./storcli64 /c0 show securitykey keyid
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = None

Controller Properties :
=====================
----------------
Ctrl_Prop Value
----------------
KeyID    MR9560
----------------
```

Disable the Drive Security function.

```
[root@localhost~]#./storcli64 /c0 delete securitykey
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = None

Controller Properties :
========================
-----------------------
Ctrl Method   Result
-----------------------
 0 delete Key Success
-----------------------
```

Modify the Drive Security parameter.

```
[root@localhost~]#./storcli64 /c0 set securitykey=xFUSION12#$ oldsecuritykey=Xfusion12#$
passphrase=xFUSION@123 keyid=9560XYZ
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = None

Controller Properties :
========================
-----------------------
Ctrl Method   Result
-----------------------
 0 update Key Success
-----------------------
```

8.2.39 Creating a Secured VD

Command Function

Used to create a secured VD.

Syntax

storcli64 /c*controller_id* **add vd r***level*[0|1|5|6|10|50|60] [**size=**<VD1_Sz>,<VD2_Sz>,..|*all] **drives=**enclosure_id:slot_id|enclosure_id:startid-endid,enclosure_id:slot_id|enclosure_id:startid-endid **sed**

storcli64 /c*controller_id* **/d***dg_id* **set security=on**

Parameter Description

Parameter	Parameter Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	If this parameter is set to **all**, the ID information about all controllers managed by this tool is queried.
r*level*	Specifies the target RAID array level.	The value can be **0**, **1**, **5**, **6**, **10**, **50**, or **60**.
size	Specifies the target RAID array capacity.	The default value is **all**, that is, the total capacity of all member hard drives.
drives	Specifies the hard drives to be added to the target RAID array.	-
enclosure_id	Specifies the ID of the enclosure where the hard drive is installed.	-
slot_id	Specifies the hard drive ID.	-
dg_id	Specifies the DG where the RAID array is located.	-

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

User Guide

There are two ways to create a secured VD:

- Enable the Drive Security function to create an encrypted RAID array. The command syntax is:

  storcli64 /c*controller_id* **add vd r***level*[0|1|5|6|10|50|60] [**size=**<VD1_Sz>,<VD2_Sz>,..|*all] **drives=**enclosure_id:slot_id|enclosure_id:startid-endid,enclosure_id:slot_id|enclosure_id:startid-endid **sed**
- Enable the Drive Security function, create a RAID array, and enable the encryption function for the RAID array. The command syntax is: **storcli64 /c***controller_id* **/d***dg_id* **set security=on**.

The hard drive must be an SED encrypted drive.

Example

Create an encrypted RAID 5 array.

```
[root@localhost~]#./storcli64 /c0 add vd r5 drives=252:2-4 sed
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = Add VD Succeeded.
```

Create a RAID 0 array and enable encryption for the RAID 0 array.

```
[root@localhost~]#./storcli64 /c0 add vd r0 drives=252:5
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = Add VD Succeeded.


[root@localhost~]#./storcli64 /c0/d2 set security=on
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = Success
```

8.2.40 Creating and Deleting the Secured JBOD Drives

Command Function

Used to create a secured JBOD drive.

Syntax

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **set jbod**

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **set security=on**

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **set good (force)**

storcli64 /c*controller_id***/e***enclosure_id***/s***slot_id* **del jbod**

Parameter Description

Parameter	Parameter Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	-
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	-
slot_id	Specifies the slot number of the physical drive.	-

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

User Guide

- The hard drive must be an SED secured drive.
- To restore a pass-through drive to an idle drive, run the **storcli64 /c***controller_id***e***enclosure_id***s***slot_id* **set good (force)** command, or the **storcli64 /c***controller_id***e***enclosure_id***s***slot_id* **del jbod** command.

Example

Set the hard drive in slot 2 as a pass-through drive.

```
[root@localhost~]#./storcli64 /c0/e252/s2 set jbod
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = Set Drive JBOD Succeeded.
```

Enable encryption for a pass-through drive.

```
[root@localhost~]#./storcli64 /c0/e252/s2 set security=on
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = Set JBOD Security On Succeeded.
```

Restore the pass-through drive to an idle drive.

```
[root@localhost~]#./storcli64 /c0/e252/s2 del jbod
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = Delete JBOD Drive Succeeded.
```

8.2.41 Erasing Data from the Encrypted Drives

Command Function

Used to quickly erase data from the SED encrypted drives.

Syntax

storcli64 /c*controller_id***e***enclosure_id***s***slot_id* **secureerase force**

Parameter Description

Parameter	Parameter Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	-

Parameter	Parameter Description	Value
enclosure_id	Specifies the ID of the enclosure where the drive is installed.	-
slot_id	Specifies the slot number of the physical drive.	-

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

User Guide

The hard drive must be an SED encrypted drive.

Example

Erase data from the SED encryption drives.

```
[root@localhost~]#./storcli64 /c0/e252/s2 secureerase force
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = Drive Secure Erase Succeeded.
```

8.2.42 Querying, Importing, and Deleting the Secured Foreign Configuration Information

Command Function

Used to query, import, and delete the secured foreign configuration information.

Syntax

storcli64 /c*controller_id***fall show** [all] **securitykey=***encryption key*

storcli64 /c*controller_id***fall import securitykey=***encryption key*

storcli64 /c*controller_id***fall del securitykey=***encryption key*

Parameter Description

Parameter	Parameter Description	Value
controller_id	Specifies the ID of a RAID controller card for drives.	If this parameter is set to **all**, the ID information about all controllers managed by this tool is queried.

Parameter	Parameter Description	Value
encryption key	Specifies the encryption key set before entering.	–

For details about how to query the IDs, see **8.2.28 Querying the Information About RAID Controller Cards, RAID Arrays, and Physical Drives**.

User Guide

The hard drive must be an SED encrypted drive.

Example

Query the foreign information about the current RAID controller card.

```
[root@localhost~]#./storcli64 /c1/fa11 show all securitykey=Xfusion12#$
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 0
Status = Success
Description = Operation on foreign configuration Succeeded

Foreign Topology:
=================
-------------------------------------------------------------------------
DG Arr Row EID:Slot DID Type State BT      Size PDC  PI SED DS3  FSpace TR
-------------------------------------------------------------------------
0  -   -   -       -   RAID0 Frgn N 893.750 GB dflt N  Y   dflt N      N
0  0   -   -       -   RAID0 Frgn N 893.750 GB dflt N  Y   dflt N      N
0  0   0   252:0    31  DRIVE Frgn N 893.750 GB dflt N  Y   dflt -      N
-------------------------------------------------------------------------

Foreig VD List:
===============
-----------------------------
DG  VD      Size Type Name
-----------------------------
 0 238 893.750 GB RAID0
-----------------------------
NoVDs - Number of VD in Drive Group
DG=Disk Group Index|Arr=Array Index|Row=Row Index|EID=Enclosure Device ID
DID=Device ID|Type=Drive Type|Onln=On1ine|Rb1d Rebui1d|Opt1=Optima1|Dgrd=Degraded
Pdgd=Partia11y degraded|Offln=offline|BT—Background Task Active
PDC=PD Cache|PI=Protection Info|SED=SeIf Encrypting Drive|Frgn=Foreign
DS3=Dimmer Switch 3|df1t=Defau1t|Msng=Missing|FSpace=Free Space Present
TR=Transport Ready

Total foreign Drive Groups = 1
```

Import the foreign information.

```
[root@localhost~]#./storcli64 /c1/fa11 import securitykey=Xfusion12#$
CLI Version = 007.1416.0000.0000 July 24,2020
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 1
Status = Success
Description = Successfully imported foreign configuration
```

Delete the foreign information.

```
[root@localhost~]#./storcli64 /c1/fa11 del securitykey=Xfusion12#$
CLI Version = 007.1416.0000.0000 July 24,2020
```



```
Operating system = Linux 3.10.0-1160.e17.x86_64
Controller = 1
Status = Success
Description = Successfully deleted foreign configuration
```

8.2.43 Querying the S.M.A.R.T Information of Drives on MegaRAID Controller Cards in RAID Mode

For details, see Log Collection in the FwUpgrade System > Collecting S.M.A.R.T Information" in the *FusionServer Servers FwUpgrade System Drive Log Collection Guide*.

9 Installing Drivers and Upgrading Firmware

9.1 Downloading and Installing the RAID Controller Card Driver

Before installing the drivers, you need to download the *Driver Version Mapping* and the driver software packages. The RAID controller card must be used with the driver version that is listed in the *Driver Version Mapping*.

Procedure

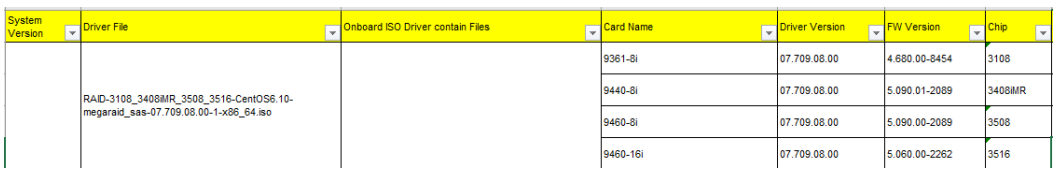
Step 1 Log in to the technical support website, choose **Software Download** > **FusionServer iDriver**.

The FusionServer iDriver version list is displayed.

Step 2 Click the target version on the **Software** tab. The **Version and Patch Software** screen is displayed.

Step 3 In the **Documentation** list, download the *FusionServer iDriver XXX Driver Version Mapping*. *XXX* indicates the version number.

The *FusionServer iDriver XXX Driver Version Mapping* provides the driver names for various OSs. Open the downloaded file, select the sheet for your OS. Then click the filter arrow of the **Card Name** column and select the name of your RAID controller card only to view the information in the **System Version**, **Driver File**, and **Onboard ISO Driver contain Files** columns.



System Version	Driver File	Onboard ISO Driver contain Files	Card Name	Driver Version	FW Version	Chip
	RAID-3108_3408iMR_3508_3516-CentOS6.10-megaraid_sas-07.709.08.00-1-x86_64.iso		9361-8i	07.709.08.00	4.680.00-8454	3108
			9440-8i	07.709.08.00	5.090.01-2089	3408iMR
			9460-8i	07.709.08.00	5.090.00-2089	3508
			9460-16i	07.709.08.00	5.060.00-2262	3516

- **System Version**: OS version.
- **Driver File**: the ISO file that contains the target driver file. (If the **Driver File** is **inbox driver (use the driver provided by the OS)**, the driver provided by the OS is used.)
- **Onboard ISO Driver contain Files**: the driver file list contained in the ISO file.

NOTE

The *FusionServer iDriver XXX Driver Version Mapping* records all components for which drivers can be installed in an OS and corresponding driver information. If you cannot find driver information about a component in the sheet, no driver can be installed for the component in the OS.

For example, if you select **9460-8i** in the **Card Name** column in the **RHEL** sheet of the file, you can find that the corresponding value of **Driver File** is **onboard_driver_RHEL9.0.iso** and that of **Onboard ISO Driver contain Files** is **RAID-3408iMR_3416iMR_3508_3516-RHEL9.0-megaraid_sas-07.723.02.00-1-x86_64.rpm**.

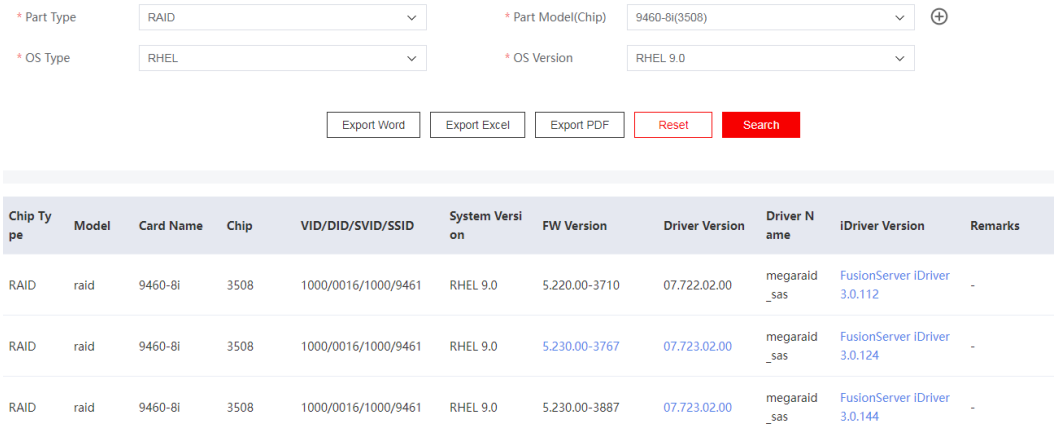
Step 4 Download the driver file.

Based on **System Version** obtained in **Step 3**, choose the OS type in **Driver** in the **Version and Patch Software** list, select the required OS version, and download the software package of the required OS version.

For example, select **RHEL** in the **Version and Patch Software** list, select **RHEL9.0**, and download the software package **FusionServer iDriver-RHEL9.0-Driver-V115.zip**, the driver file for RHEL 9.0.

NOTE

You can also access the **Firmware and Driver Mapping Guide** from the technical support website to obtain the target version of the driver software package for **Step 2**.



Chip Type	Model	Card Name	Chip	VID/DID/SVID/SSID	System Version	FW Version	Driver Version	Driver Name	iDriver Version	Remarks
RAID	raid	9460-8i	3508	1000/0016/1000/9461	RHEL 9.0	5.220.00-3710	07.722.02.00	megaraid_sas	FusionServer iDriver 3.0.112	-
RAID	raid	9460-8i	3508	1000/0016/1000/9461	RHEL 9.0	5.230.00-3767	07.723.02.00	megaraid_sas	FusionServer iDriver 3.0.124	-
RAID	raid	9460-8i	3508	1000/0016/1000/9461	RHEL 9.0	5.230.00-3887	07.723.02.00	megaraid_sas	FusionServer iDriver 3.0.144	-

Step 5 Install the driver for the RAID controller card. For details about how to install the RAID controller card driver:

- Read the **readme.txt** file contained in the driver package downloaded in **Step 4**. The file introduces how to install drivers of server boards, including the RAID controller cards.
- See the "Installing Drivers" section in the *Server OS Installation Guide*.

----End

9.2 Upgrading Firmware

For firmware upgrades of the RAID controller card, see the "Upgrading the RAID Controller Card or NIC Firmware" section in the *Server Upgrade Guide*.

A Appendix

A.1 Common Tasks

A.1.1 Setting the BIOS to Legacy Mode

Scenarios

Set the server boot mode to the Legacy mode when required.

Impact on the System

The server needs to be restarted, which will interrupt services.

Procedure

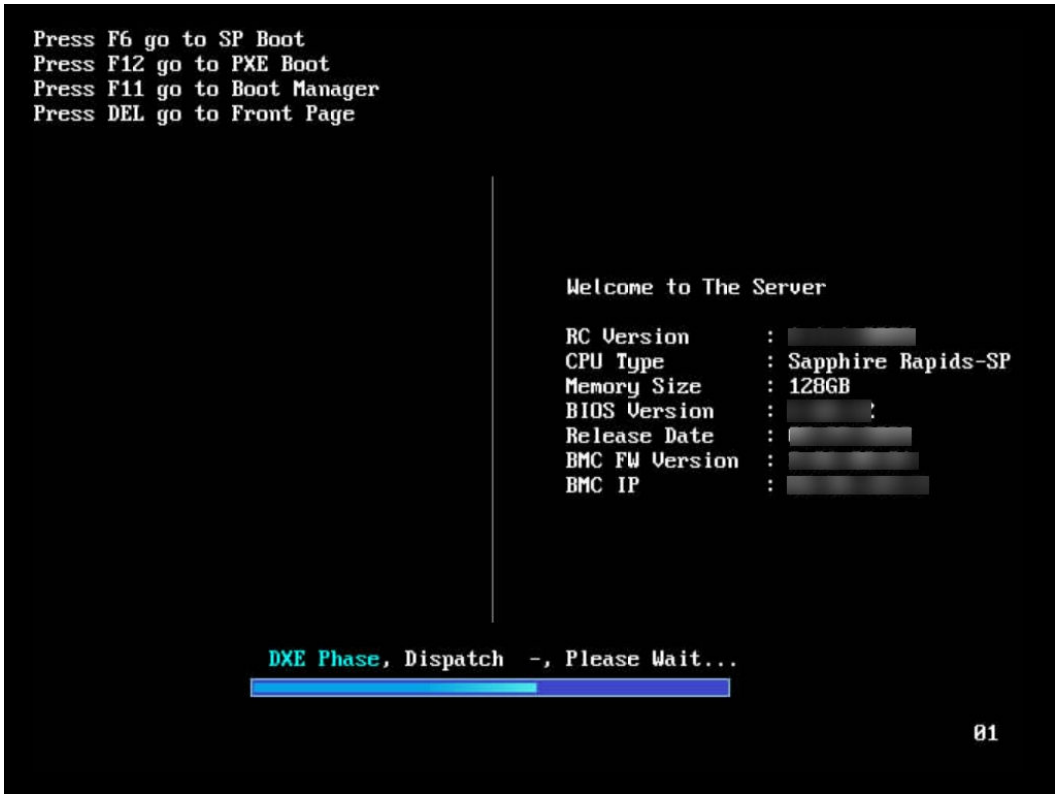
Step 1 Access the server desktop using the Remote Virtual Console.

Step 2 Restart the server.

During the restart process, press **Delete** when information shown in **Figure A-1** is displayed.

The screen for entering the password is displayed.

Figure A-1 BIOS boot screen



Step 3 Type the password and press **Enter**.

NOTE

The default BIOS password is **Admin@9000**.

The screen shown in **Figure A-2** is displayed.

Figure A-2 Front page

Step 4 Select **Setup Utility** and press **Enter**.

Step 5 Click  .

Step 6 Set **Boot Type** to **Legacy Boot**, as shown in **Figure A-3**.

Figure A-3 Boot screen

Step 7 Press **F10** to save the configuration.

A confirmation dialog box is displayed.

Step 8 Select **Yes** and press **Enter**.

The server automatically restarts.

----End

A.1.2 Setting the BIOS to UEFI Mode

Scenarios

Set the server boot mode to the UEFI mode when required.

Impact on the System

The server needs to be restarted, which will interrupt services.

Procedure

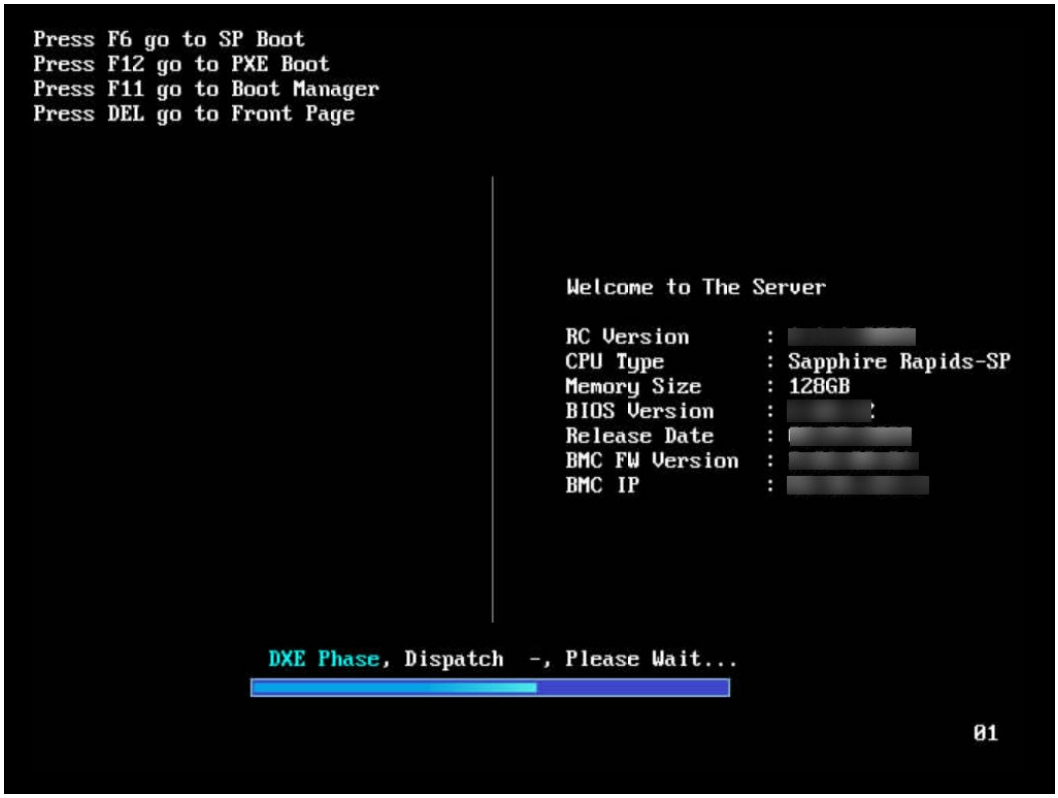
Step 1 Access the server desktop using the Remote Virtual Console.

Step 2 Restart the server.

During the restart process, press **Delete** when information shown in **Figure A-4** is displayed.

The screen for entering the password is displayed.

Figure A-4 BIOS boot screen



Step 3 Type the password and press **Enter**.

NOTE

The default BIOS password is **Admin@9000**.

The screen shown in **Figure A-5** is displayed.

Figure A-5 Front page

Step 4 Select **Setup Utility** and press **Enter**.

Step 5 Click  .

Step 6 Set **Boot Type** to **UEFI Boot Type**, as shown in **Figure A-6**.

Figure A-6 Boot screen

Step 7 Press **F10** to save the configuration.

A confirmation dialog box is displayed.

Step 8 Select **Yes** and press **Enter**.

The server automatically restarts.

----End

A.1.3 Managing RAID Controller Cards using the iBMC

The iBMC allows you to perform the out-of-band management of the RAID controller card. You can use the iBMC WebUI or CLI to perform basic query and configuration operations on the RAID controller cards that support out-of-band management. For details, see *iBMC User Guide*.

NOTE

You can check whether a RAID controller card supports out-of-band management according to the section "Technical Specifications".

A.2 Common Errors and Troubleshooting Methods During the RAID Controller Card Boot

Table A-1 describes the boot error messages present in the MegaRAID firmware.

Table A-1 Boot error messages

No.	Boot Message Description	Troubleshooting Action
1	Memory or battery problems were detected. The adapter has recovered, but cached data was lost. Press any key to continue, or press C to load the configuration utility.	**Cause:** The cached data is lost and cannot be retrieved. **Action:** Perform memory and battery tests. If needed, replace the RAID controller card or the battery.
2	This is a test message. You can press a key to ignore it, or you can wait five seconds. No further action is required. Press any key to continue, or press C to load the configuration utility.	This is a test message. You can press any key to ignore it or wait five seconds. No further action is required.
3	Firmware version inconsistency was detected. The adapter has recovered, but cached data was lost. Press any key to continue, or press C to load the configuration utility.	**Cause:** Firmware versions are inconsistent. The adapter has recovered, but cached data was lost. **Action:** Ensure that the other controller also has the same firmware version.
4	Foreign configuration(s) found on adapter. Press any key to continue or press C to load the configuration utility or press F to import foreign configuration(s) and continue.	**Cause:** A storage device was inserted with the metadata that does not belong to any RAID arrays recognized by the controller. **Action:** Either import the configuration settings of the inserted storage device or delete the RAID array.
5	Previous configuration cleared or missing. Importing configuration created on %02d/%02d%2d:%02d. Press any key to continue, or press C to load the configuration utility.	**Cause:** The controller is not able to recognize the current RAID array configuration. **Action:** Either import the configuration settings or delete the foreign configuration found on the storage device.
6	Firmware package: %s	None.
7	Firmware version: %s	None.
8	This firmware is a TEST version. It has not completed any validation.	**Cause:** The controller is not able to recognize the current RAID array configuration. **Action:** Update the firmware to the correct version.

No.	Boot Message Description	Troubleshooting Action
9	This firmware is an ALPHA version – It has not completed all validation. The validation stamp is: %s"""	**Cause:** The controller is not able to recognize the current RAID array configuration. **Action:** Update the firmware to the correct version.
10	This firmware is BETA version – It has not completed all validation. The validation stamp is: %s"""	**Cause:** The controller is not able to recognize the current RAID array configuration. **Action:** Update the firmware to the correct version.
11	An enclosure was found that contains both SAS and SATA drives, but this controller does not allow mixed drive types in a single enclosure. Correct the problem then restart your system. Press any key to continue, or press C to load the configuration utility.	**Cause:** A single enclosure that has both SAS and SATA drives cannot be used because the controller does not support mixed drive types in a single enclosure. **Actions:** ● Use only one type of drive, either SAS or SATA drive. ● Replace the controller with a controller that supports mixed drive types in a single enclosure. ● Contact technical support to enable this feature.
12	SAS drives were detected, but this controller does not support SAS drives. Remove the SAS drives then restart your system. Press any key to continue, or press C to load the configuration utility.	**Cause:** This controller does not support SAS drives. **Action:** Replace the SAS drives with SATA drives and restart the system.
13	SATA drives were detected, but this controller does not support SATA drives. Remove the SATA drives then restart your system. Press any key to continue, or press C to load the configuration utility.	**Cause:** This controller does not support SATA drives. **Action:** Replace the SATA drives with SAS drives and restart the system.

No.	Boot Message Description	Troubleshooting Action
14	There are %d enclosures connected to connector %s, but only maximum of %d enclosures can be connected to a single SAS connector. Remove the extra enclosures then restart your system.	**Cause:** This controller supports only a particular number of enclosures. **Action:** Remove extra enclosures or insert a controller that supports your enclosure requirements.
15	Invalid SAS topology detected. Check your cable configurations, repair the problem, and restart your system.	**Cause:** The controller has detected an invalid SAS topology. **Action:** Check the cables or reconfigure the attached devices to create a valid SAS topology.
16	The battery is currently discharged or disconnected. Verify the connection and allow 30 minutes for charging. If the battery is properly connected and it has not returned to operational state after 30 minutes of charging then contact technical support for additional assistance.	**Cause:** The battery is currently discharged or disconnected. **Actions:** ● Check the battery cable to ensure that it is connected properly. ● Ensure that the battery is charging properly. ● Contact technical support to replace the battery if the battery is draining out.
17	The battery hardware is missing or malfunctioning, or the battery is unconnected, or the battery could be fully discharged. If you continue to boot the system, the battery-backed cache will not function. If battery is connected and has been allowed to charge for 30 minutes and this message continues to appear, contact technical support for assistance. Press D to disable this warning (if your controller does not have a battery)	**Cause:** The battery hardware is missing or malfunctioning, or the battery is unconnected, or the battery could be fully discharged. **Actions:** ● Check the battery cable to ensure that it is connected properly. ● Ensure that the battery is charging properly. ● Contact technical support to replace the battery if the battery is draining out.
18	Invalid SAS Address present in MFC data. Program a valid SAS Address and restart your system.	**Cause:** An invalid SAS address is in the MFC data. **Actions:** 1. Power off the system and remove the controller. 2. Contact technical support to re-program the SAS address.

No.	Boot Message Description	Troubleshooting Action
19	Some configured disks have been removed from your system, or are no longer accessible. Check your cables and also make sure all disks are present. Press any key to continue, or press C to load the configuration utility.	**Cause:** The controller is unable to find the configured drives. **Actions:** ● Check if the configured drives are present and they are properly connected. ● Access the BIOS and check if the devices are displayed. ● Ensure that the drives are spun-up and have power supplied to them. ● If there is a backplane, check the connector to ensure that power is being supplied to the drive.
20	The following VDs have missing disks: %s. If you proceed (or load the configuration utility), these VDs will be marked OFFLINE and will be inaccessible. Check your cables and make sure all disks are present. Press any key to continue, or press C to load the configuration utility.	**Cause:** The controller is unable to find the configured drives. **Actions:** ● Check if the configured drives are present and they are properly connected. ● Access the BIOS and check if the devices are displayed. ● Ensure that the drives are spun-up and have power supplied to them. ● If there is a backplane, check the connector to ensure that power is being supplied to the drive.
21	The following VDs are missing: %s. If you proceed (or load the configuration utility), these VDs will be removed from your configuration. If you wish to use them at a later time, they will have to be imported. If you believe these VDs should be present, power off your system and check your cables to make sure all disks are present. Press any key to continue, or press C to load the configuration utility.	**Cause:** The controller is unable to find the configured drives. **Actions:** ● Check if the configured drives are present and they are properly connected. ● Access the BIOS and check if the devices are displayed. ● Ensure that the drives are spun-up and have power supplied to them. ● If there is a backplane, check the connector to ensure that power is being supplied to the drive.

No.	Boot Message Description	Troubleshooting Action
22	The following VDs are missing complete spans: %s. If you proceed (or load the configuration utility), these VDs will be removed from your configuration and the remaining drives marked as foreign. If you wish to use them at a later time, restore the missing span(s) and use a foreign import to recover the VDs. If you believe these VDs should be present, please power off your system and check your cables to make sure all disks are present. Press any key to continue, or press C to load the configuration utility.	**Cause:** The controller is unable to find the configured drives. **Actions:** ● Check if the configured drives are present and they are properly connected. ● Access the BIOS and check if the devices are displayed. ● Ensure that the drives are spun-up and have power supplied to them. ● If there is a backplane, check the connector to ensure that power is being supplied to the drive.
23	All of the disks from your previous configuration are gone. If this is an unexpected message, power off your system and check your cables to make sure all disks are present. Press any key to continue, or press C to load the configuration utility.	**Cause:** The controller is unable to find the configured drives. **Actions:** ● Check if the configured drives are present and they are properly connected. ● Access the BIOS and check if the devices are displayed. ● Ensure that the drives are spun-up and have power supplied to them. ● If there is a backplane, check the connector to ensure that power is being supplied to the drive.
24	The cache contains dirty data, but some VDs are missing or will go offline, so the cached data can not be written to disk. If this is an unexpected error, power off your system and check your cables to make sure all disks are present. If you continue, the data in cache will be permanently discarded. Press X to acknowledge and permanently destroy the cached data.	**Cause:** The controller is unable to find the configured drives. **Actions:** ● Check if the configured drives are present and they are properly connected. ● Access the BIOS and check if the devices are displayed. ● Ensure that the drives are spun-up and have power supplied to them. ● If there is a backplane, check the connector to ensure that power is being supplied to the drive.

No.	Boot Message Description	Troubleshooting Action
25	Your VDs that are configured for Write-Back are temporarily running in Write-Through mode. This is caused by the battery being charged, missing, or bad. Allow the battery to charge for 24 hours before evaluating the battery for replacement. The following VDs are affected: %s Press any key to continue.	**Cause:** Your VDs that are configured for Write-Back are temporarily running in Write-Through mode. This is caused by the battery being charged, missing, or bad. **Actions:** ● Check the battery cable to ensure that it is connected properly. ● Ensure that the battery is charging properly. ● Contact technical support to replace the battery if the battery is draining out.
26	Invalid memory configuration detected. Contact your system support. System has halted.	**Cause:** The memory configuration is invalid. **Action:** Replace the RAID controller card.
27	Cache data was lost due to an unexpected power-off or reboot during a write operation, but the adapter has recovered. This could be because of memory problems, bad battery, or you might not have a battery installed. Press any key to continue or C to load the configuration utility.	**Cause:** Cache data was lost due to an unexpected power-off or reboot during a write operation, but the adapter has recovered. This could be because of memory problems, bad battery, or you might not have a battery installed. **Actions:** ● Check the battery cable to ensure that it is connected properly. ● Ensure that the battery is charging properly. ● Contact technical support to replace the battery if the battery is draining out.

No.	Boot Message Description	Troubleshooting Action
28	Controller cache was discarded due to an unexpected power-off or reboot during a write operation, but the adapter has recovered. This could be due to memory problems, bad battery, or you may not have a battery installed. Press any key to continue or 'C' to load the configuration utility.	**Cause:** Cache data was lost due to an unexpected power-off or reboot during a write operation, but the adapter has recovered. This could be because of memory problems, bad battery, or you might not have a battery installed. **Actions:** ● Check the battery cable to ensure that it is connected properly. ● Ensure that the battery is charging properly. ● Contact technical support to replace the battery if the battery is draining out.
29	Entering the configuration utility in this state will result in drive configuration changes. Press Y to continue loading the configuration utility or power off your system and check your cables to make sure all disks are present and reboot the system.	**Cause:** The controller is unable to find the configured drives. **Actions:** ● Check if the configured drives are present and they are properly connected. ● Access the BIOS and check if the devices are displayed. ● Ensure that the drives are spun-up and have power supplied to them. ● If there is a backplane, check the connector to ensure that power is being supplied to the drive. ● If the controller is being used to create new configurations by reusing the drives, clear the existing data and continue.
30	Multibit ECC errors were detected on the RAID controller. If you continue, data corruption can occur. Contact technical support to resolve this issue. Press X to continue, otherwise power off the system, replace the controller, and reboot.	**Cause:** Multibit ECC errors were detected on the RAID controller. If you continue, data corruption can occur. **Actions:** 1. Replace a RAID controller card. 2. If the fault persists, contact technical support.

No.	Boot Message Description	Troubleshooting Action
31	Single-bit ECC errors were detected on the RAID controller. Contact technical support to resolve this issue. Press X to continue or else power off the system, replace the controller, and reboot.	**Cause:** Single-bit ECC errors were detected on the RAID controller. **Actions:** 1. Replace a RAID controller card. 2. Restart the system. 3. If the fault persists, contact technical support.
32	Single-bit overflow ECC errors were detected on the RAID controller. If you continue, data corruption can occur. Contact technical support to resolve this issue. Press X to continue or else power off the system, replace the controller, and reboot.	**Cause:** Single-bit overflow ECC errors were detected on the RAID controller. If you continue, data corruption can occur. **Actions:** 1. Replace a RAID controller card. 2. Restart the system. 3. If the fault persists, contact technical support.
33	Multibit ECC errors were detected on the RAID controller. The DIMM on the controller needs replacement. Contact technical support to resolve this issue. If you continue, data corruption can occur. Press X to continue, otherwise power off the system and replace the DIMM module and reboot. If you have replaced the DIMM press X to continue.	**Cause:** Multibit ECC errors were detected on the RAID controller. **Actions:** 1. Replace a RAID controller card. 2. Restart the system. 3. If the fault persists, contact technical support.
34	Single-bit ECC errors were detected during the previous boot of the RAID controller. The DIMM on the controller needs replacement. Contact technical support to resolve this issue. Press X to continue, otherwise power off the system and replace the DIMM module and reboot. If you have replaced the DIMM press X to continue.	**Cause:** Single-bit ECC errors were detected during the previous boot of the RAID controller. **Actions:** 1. Replace a RAID controller card. 2. Restart the system. 3. If the fault persists, contact technical support.

No.	Boot Message Description	Troubleshooting Action
35	Single-bit overflow ECC errors were detected during the previous boot of the RAID controller. The DIMM on the controller needs replacement. Contact technical support to resolve this issue. If you continue, data corruption can occur. Press X to continue, otherwise power off the system and replace the DIMM module and reboot. If you have replaced the DIMM press X to continue.	**Cause:** Single-bit overflow ECC errors were detected during the previous boot of the RAID controller. **Actions:** 1. Replace a RAID controller card. 2. Restart the system. 3. If the fault persists, contact technical support.
36	The attached enclosure does not support in controller's Direct mapping mode. Contact your system support. The system has halted because of an unsupported configuration.	**Cause:** Too many chained enclosures may be present. This message may also be related to a security feature in the drive. **Actions:** ● Remove the drives that are not supported. ● Reduce the number of drives. ● Replace the enclosure with another one. ● Ensure that the firmware version is updated. ● If the fault persists, contact technical support.
37	Expander detected in controller with direct mapping mode. Reconfiguring automatically to persistent mapping mode. Automatic reboot would happen in 10 seconds.	**Cause:** An expander is detected on the controller in the direct mapping mode. **Actions:** No action is required. The controller will configure itself to a persistent mapping mode and reboot. If the fault persists, contact technical support.
38	Your controller's I/O processor has a fault that can potentially cause data corruption. Your controller needs replacement. Contact your system support. To continue, press Y to acknowledge.	**Cause:** Your controller's I/O processor has a fault that can potentially cause data corruption. **Action:** Contact technical support to replace the controller.

No.	Boot Message Description	Troubleshooting Action
39	The number of disks exceeded the maximum supported count of %d disks. Remove the extra drives and reboot system to avoid losing data. Press Y to continue with extra drives.	**Cause:** The number of disks exceeds the upper limit. **Actions:** ● Power off the system and remove the controller. ● Remove the extra drives to reduce the size of the topology. ● Replace the controller with a controller that supports a larger topology.
40	The number of devices exceeded the maximum limit of devices per quad. Remove the extra drives and reboot the system to avoid losing data. System has halted due to unsupported configuration.	**Cause:** The number of disks exceeds the upper limit. **Actions:** ● Power off the system and remove the controller. ● Remove the extra drives to reduce the size of the topology. ● Replace the controller with a controller that supports a larger topology.
41	A discovery error has occurred, power cycle the system and all the enclosures attached to this system.	**Cause:** A discovery error has occurred, power cycle the system and all the enclosures attached to this system. **Actions:** ● Shutdown and restart the system as well as all the enclosures attached to the system. ● Ensure that all cables are correctly connected. Reduce the topology in case of a bad drive. ● If the fault persists, collect the logs of the system, driver, and firmware and contact technical support.
42	Drive security is enabled on this controller and a pass phrase is required. Enter the pass phrase.	**Cause:** Drive security is enabled on this controller and a password is required. **Action:** Enter the password.
43	Invalid pass phrase. Enter the pass phrase.	**Cause:** The password is invalid. **Action:** Enter a valid password.

No.	Boot Message Description	Troubleshooting Action
44	There was a drive security key error. All secure drives will be marked as foreign. Press any key to continue, or C to load the configuration utility.	**Cause:** There was a drive security key error. All secure drives will be marked as foreign. **Action:** Check if the controller supports self-encrypting drives.
45	Invalid pass phrase. If you continue, a drive security key error will occur and all secure configurations will be marked as foreign. Reboot the machine to retry the pass phrase or press any key to continue.	**Cause:** The password is invalid. **Action:** Restart the system to retry the password or press any key to continue.
46	Unable to communicate to EKMS. If you continue, there will be a drive security key error and all secure configurations will be marked as foreign. Check the connection with the EKMS, reboot the machine to retry the EKMS or press any key to continue.	**Cause:** The communication with the EKMS failed. **Action:** Check the connection of the EKMS and restart the system to re-establish the connection to the EKMS.
47	Unable to change security to EKMS as not able to communicate to EKMS. If you continue, the drive security will remain to existing security mode. Check the connection with the EKMS, reboot the machine to retry the EKMS or press any key to continue.	**Cause:** Communication with the EKMS failed and the security mode cannot be modified to EKMS. **Action:** Check the connection of the EKMS and restart the system to re-establish the connection to the EKMS.
48	DKM existing key request failed; existing secure configurations will be labeled foreign and will not be accessible. Reboot the server to retry.	**Cause:** DKM existing key request failed. Existing secure configurations will be labeled foreign and will not be accessible. **Action:** Check the connection of the EKMS and restart the system to re-establish the connection to the EKMS.
49	DKM new key request failed; controller security mode transition was not successful. Reboot the server to retry request, or press any key to continue.	**Cause:** DKM new key request failed. Controller security mode transition was not successful. **Action:** Check the connection of the EKMS and restart the system to re-establish the connection to the EKMS.

No.	Boot Message Description	Troubleshooting Action
50	Firmware did not find valid NVDATA image. Program a valid NVDATA image and restart your system. Press any key to continue.	**Cause:** Firmware did not find valid NVDATA image. **Actions:** ● Update the correct firmware package that has a proper NV data image. ● Check the current firmware version, and if needed, update to the latest firmware version. Updating to the latest firmware version may require importing foreign volumes.
51	IR to MR Migration failed. Press any key to continue with MR defined NVDATA values	**Cause:** IR to MR migration failed. Press any key to continue with MR defined NVDATA values. **Action:** None.
52	Two BBUs are connected to the adapter. This is not a supported configuration. Battery and caching operations are disabled. Remove one BBU and reboot to restore battery and caching operations. If dirty cache is lost in this boot, that could have been because of dual battery presence.	**Cause:** Two BBUs are connected to the adapter. This is not a supported configuration. Battery and caching operations are disabled. **Action:** Remove one BBU and reboot to restore battery and caching operations. If dirty cache is lost in this boot, that could have been because of dual battery presence.
53	Offline or missing virtual drives with preserved cache exist. Check the cables and make sure that all drives are present. Press any key to continue, or C to load the configuration utility.	**Cause:** The controller is unable to find the configured drives. **Actions:** ● Check if the configured drives are present and they are properly connected. ● Access the BIOS and check if the devices are displayed. ● Ensure that the drives are spun-up and have power supplied to them. ● If there is a backplane, check the connector to ensure that power is being supplied to the drive. ● Cache offload occurs if the missing drive is restored.

No.	Boot Message Description	Troubleshooting Action
54	Offline or missing virtual drives with preserved cache exist. Check the cables and make sure that all drives are present. Press any key to enter the configuration utility.	**Cause:** The controller is unable to find the configured drives. **Actions:** ● Check if the configured drives are present and they are properly connected. ● Access the BIOS and check if the devices are displayed. ● Ensure that the drives are spun-up and have power supplied to them. ● If there is a backplane, check the connector to ensure that power is being supplied to the drive. ● Cache offload occurs if the missing drive is restored.
55	Invalid SAS Address present in SBR. Contact your system support. Press any key to continue with Default SAS Address.	**Cause:** An invalid SAS address is in the SBR. **Action:** Contact technical support to restore to factory default values.
56	Incompatible secondary iButton present! Insert the correct iButton and restart the system. Press any key to continue but OEM specific features will not be upgraded!	**Cause:** Incompatible RAID keys exist. **Actions:** Insert the correct RAID keys and restart the system. If the fault persists, contact technical support engineers to replace the RAID key.
57	Upgrade Key Missing! An upgrade key was present on a previous power cycle, but it is not connected. This can result in inaccessible data unless it is addressed. Re-attach the upgrade key and reboot.	**Cause:** An upgrade key that was present on a previous power cycle may not be connected. **Actions:** Reattach the upgrade key and restart the system. If the fault persists, contact technical support to replace the upgrade key.
58	The native configuration is not supported by the controller. Check the controller, iButton or key-vault. If you continue the configuration will be marked foreign. Press any key to continue.	**Cause:** The native configuration is not supported by the controller. **Actions:** Insert the correct RAID keys and restart the system. If the fault persists, contact technical support engineers to replace the RAID key.

No.	Boot Message Description	Troubleshooting Action
59	The battery is currently discharged or disconnected. Verify the connection and allow 30 minutes for charging. If the battery is properly connected and it has not returned to operational state after 30 minutes of charging, contact technical support for additional assistance. Press D to disable this warning (if your controller does not have a battery).	**Cause:** The battery is currently discharged or disconnected. **Actions:** ● Check the battery cable to ensure that it is connected properly. ● Ensure that the battery is charging properly. ● Contact technical support to replace the battery if the battery is draining out.
60	The battery is currently discharged or disconnected. VDs configured in Write-Back mode will run in Write-Through mode to protect your data and will return to the Write-Back policy when the battery is operational. If VDs have not returned to Write-Back mode after 30 minutes of charging then contact technical support for additional assistance. The following VDs are affected: %s. Press any key to continue.	**Cause:** The battery is currently discharged or disconnected. VDs configured in Write-Back mode will run in Write-Through mode to protect your data and will return to the Write-Back policy when the battery is operational. **Actions:** ● Check the battery cable to ensure that it is connected properly. ● Ensure that the battery is charging properly. ● Contact technical support to replace the battery if the battery is draining out.
61	Cache data was lost, but the controller has recovered. This could be because your controller had protected cache after an unexpected power loss and your system was without power longer than the battery backup time. Press any key to continue or C to load the configuration utility.	**Cause:** Cache data was lost, but the controller has recovered. This could be because your controller had protected cache after an unexpected power loss and your system was without power longer than the battery backup time. **Actions:** ● Check the memory and battery. ● Check the voltage levels and cache offload timing in case of power loss. ● If necessary, replace the memory or battery.

No.	Boot Message Description	Troubleshooting Action
62	A snapshot rollback is in progress on VDs %s, the controller cannot boot until the rollback operation completes. Press any key to enter the configuration utility.	**Cause:** A snapshot rollback is in progress on VDs. The controller cannot boot until the rollback operation completes. **Action:** Wait for some time until the rollback is complete.
63	The following VDs: %s have Rollback active and the corresponding Repository is missing. If you continue to boot the system or enter the configuration utility, these VDs will become unusable. Press any key to Continue.	**Cause:** This may be related to the snapshot feature, which is not supported on MegaRAID 12Gb/s SAS RAID controllers. **Action:** Wait for some time until the rollback is complete.
64	Snapshot Repository VDs %s have been removed from your system, or are no longer accessible. Check the cables and make sure all disks are present. If you continue to boot the system, the snapshot related data will be lost. Press any key to continue, or C to load the configuration utility.	**Cause:** The controller is unable to find the configured drives. **Actions:** ● Check if the configured drives are present and they are properly connected. ● Access the BIOS and check if the devices are displayed. ● Ensure that the drives are spun-up and have power supplied to them. ● If there is a backplane, check the connector to ensure that power is being supplied to the drive.
65	The most recent configuration command could not be committed and must be retried. Press any key to continue, or C to load the configuration utility.	**Cause:** The most recent configuration command could not be committed and must be retried. **Action:** None.
66	Firmware could not synchronize the configuration or property changes for some of the VD's/PD's. Press any key to continue, or C to load the configuration utility.	**Cause:** Firmware could not synchronize the configuration or property changes for some of the VD's/PD's. **Actions:** Press any key to continue or press C to load the Configuration Utility. If the fault persists, contact technical support.

No.	Boot Message Description	Troubleshooting Action
67	On-board expander firmware or manufacturing image is corrupted. The flash expander firmware and manufacturing image use the recovery tools.	**Cause:** The expander has a software failure. **Action:** Contact technical support.
68	The native configuration is not supported by the current firmware. Make sure that the correct controller firmware is being used. If you continue, the configuration will be marked as foreign. Press any key to continue.	**Cause:** The native configuration is not supported by the current firmware. **Actions:** ● Collect the logs of the system, driver, and firmware. ● Ensure that the firmware version is correct and updated to the latest version. ● If the fault persists, contact technical support.
69	Foreign configuration import did not import any drives. Press any key to continue.	**Cause:** The foreign configuration import function did not import any drives. **Actions:** ● Check the firmware version of the controller. ● Replace the controller and try again. ● If the fault persists, contact technical support.
70	Valid memory detected. Firmware is upgraded from iMR to MR. Reboot the system for the MR firmware to run.	**Cause:** The memory is detected. The firmware is upgraded from iMR to MR. **Action:** Reboot the system for the MR firmware to run.
71	Advanced software options keys were detected, features activated – %s.	**Cause:** Advanced software options keys were detected and the feature is being activated. **Action:** None.

No.	Boot Message Description	Troubleshooting Action
72	Advanced software options keys were missing, features deactivated – %s.	**Cause:** Advanced software options keys were missing and the feature is being disabled. **Actions:** ● Verifying Cable Connections ● Check for the Advanced Software Options key. ● If the fault persists, contact technical support.
73	Cannot communicate with iButton to retrieve premium features. This is probably because of extreme temperatures. The system has halted!	**Cause:** Communicate with RAID keys to retrieve premium features failed. This is probably because of extreme temperatures. **Actions:** ● Verifying Cable Connections ● Ensure that the RAID keys are present. ● Check the ambient temperature near the RAID keys. ● If the fault persists, contact technical support.
74	Consecutive power loss detected during I/O transactions on non-optimal write-back volumes. This might have resulted in data integrity issues. Press 'X' to proceed.	**Cause:** Consecutive power loss was detected during I/O transactions on non-optimal write-back volumes. This might have resulted in data integrity issues. **Actions:** ● Check if the controller is securely locked in the PCI slot. ● Check the power supply, battery, and supercapacitor. ● If you find any hardware defect, contact technical support.

No.	Boot Message Description	Troubleshooting Action
75	USB cache device is not responding. Power down the system for 2 minutes to attempt recovery and avoid cache data loss, and then power-on.	**Cause:** The USB cache device is not responding. **Actions:** ● The LSI SAS2208 controller supports USB cache offload. Ensure that USB cache is present and secure. ● Reset and replace the USB cache. ● Power off the system for 2 minutes to attempt recovery and avoid cache data loss, then power on the system.
76	Bad or missing RAID controller memory module detected. Press D to downgrade the RAID controller to iMR mode. **Warning!** Downgrading to iMR mode, might result in incompatible Logical drives. Press any other key to continue, controller shall boot to safe mode.	**Cause:** The memory module of the RAID controller is damaged or lost. **Action:** Replace the RAID controller card.

