NETAŞ Server

RAID User Guide (AMD Turin)

Version: R1.2

LEGAL INFORMATION

Revision History

Revision No.	Revision Date	Revision Reason
R1.2	2025-11-28	Updated "1.3 Applicable Server Models".
R1.1	2025-10-16	Full revision.
R1.0	2025-08-04	First edition.

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Contents

About This Manual

Purpose

This manual describes the features of various RAID cards installed on servers, and the operations involved in initial configuration, common configuration and disk replacement.

Intended Audience

This manual is intended for:

- Network planning engineers
- Network management engineers
- Maintenance engineers

What Is in This Manual

This manual contains the following chapters and appendixes.

Chapter 1, RAID Overview	Describes basic RAID concepts, mapping relationships of RAID card names, and applicable server models.
Chapter 2, NETAŞ PMC RAID Card	Describes the capability features, initial configurations, and common configurations.
Chapter 3, Appendixes	Describes the CLI tool ARCCONF for RAID cards and the boot mode.

Conventions

This manual uses the following conventions.

①	Notice: indicates equipment or environment safety information. Failure to comply can result in equipment damage, data loss, equipment performance degradation, environmental contamination, or other unpredictable results. Failure to comply will not result in personal injury.
📚	Note: provides additional information about a topic.

Chapter 1
RAID Overview

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1.1 Basic RAID Concepts

1.1.1 RAID Levels

RAID refers to a disk array that combines multiple physical disks for the purpose of data redundancy.

It can provide higher storage performance, I/O performance and reliability than a single disk. Commonly used RAID levels include RAID 0, RAID 1, RAID 1E, RAID 5, RAID 6, RAID 10, RAID 50, and RAID 60.

⚙ RAID 0

RAID 0 is also called stripe or striping. Figure 1-1 shows its data storage principle.

Figure 1-1 RAID 0 Data Storage Diagram
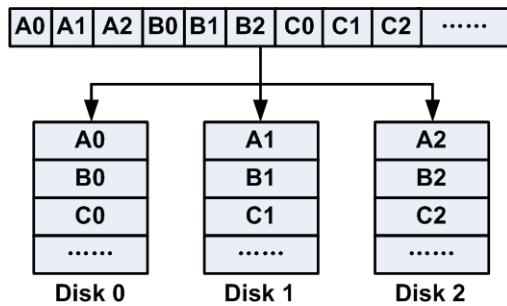
The storage principle of RAID 0 is to distribute sequential data (A0–A2, B0–B2, C0–C2,.....) to several member disks.

RAID 0 provides the highest storage performance among all RAID levels, because when the system receives a data request, multiple member disks in the RAID 0 array can concurrently execute the data request. This type of concurrent data operation can make full use of the bus bandwidth, remarkably boosting the overall disk read/write performance.

Because RAID 0 provides no data redundancy, data security cannot be guaranteed. Therefore, RAID 0 can only be used in scenarios where the requirements for I/O are high, but the requirements for data security are low.

RAID 0 requires at least one disk, and the data will be lost if the disk fails.

1.1.2   RAID 1

RAID 1 is also called mirror or mirroring, see Figure 1-2.

Figure 1-2 RAID 1 Data Storage Diagram
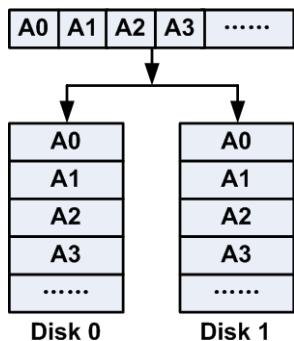
Each working disk of the RAID 1 array has a corresponding mirrored disk, and a piece of sequential data (A0, A1, A2, ...) needs to be written into the working disk and the mirrored disk respectively, which is equivalent to automatic backup.

When the working disk of the RAID 1 array is faulty, the system automatically reads data from the mirrored disk.

RAID 1 requires at least two disks, and data is not lost if one disk fails.

RAID 1 provides high reliability but only a half of the total capacity. The disk usage is low.

Therefore, RAID 1 is applicable to the scenarios where high fault tolerance is required, such as finance.

1.1.3   RAID 1E

RAID 1E is an enhanced version of RAID 1, which integrates data mirroring and data striping, see Figure 1-3.

Figure 1-3 RAID 1E Data Storage Diagram
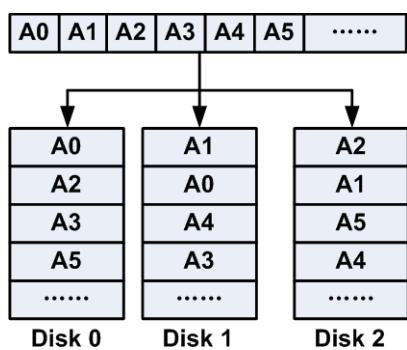
Data striping and data backup of RAID 1E spread across all the member disks. Take two stripe groups (for example, A0, A1, A2 and A2, A1 and A0) as one unit. In each unit, the data in the previous stripe group is arranged continuously, and the next stripe group is the striped mirror of the previous stripe group. That is, the data in each member disk of the previous stripe group is moved rightwards one disk and written into each member disk of the next stripe group. The data of the last member disk is written into the first member disk.

RAID 1E requires at least three disks, and data is not lost if one disk fails. When a member disk of the RAID 1E array fails, the system transfers the read/write requests to other normal member disks for processing.

Compared with RAID 1, RAID 1E also uses the mirroring mode to store data, so its effective capacity is half of the total hard disk capacity. Because RAID 1E allows access to more member disks, it has stronger data recovery capability. However, each piece of data must be written at least twice, which reduces the disk write capability.

1.1.4 RAID 5

RAID 5 is a solution that balances storage performance, data security and storage costs, see Figure 1-4.

Figure 1-4 RAID 5 Data Storage Diagram
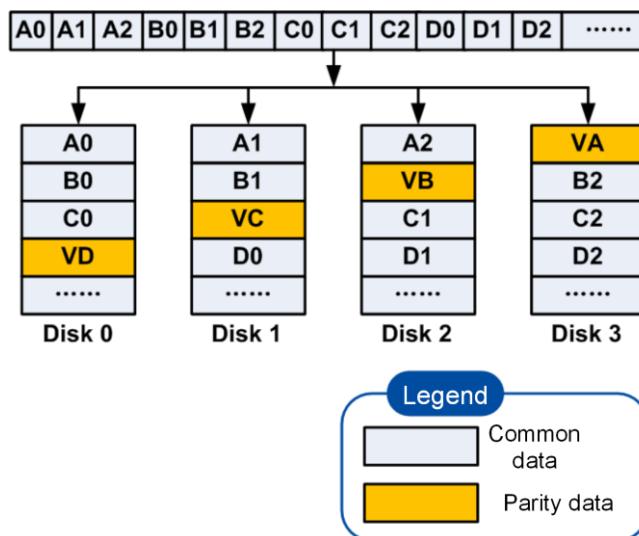
RAID 5 uses the CRC mode to distribute sequential data (A0–A2, B0–B2, C0–C2, D0–D2, ...) and the corresponding parity data (VA, VD, ...) to different member disks respectively.

RAID 5 requires at least three disks, and data is not lost if one disk fails. If a member disk in the RAID 5 array is faulty, the data on the faulty member disk can be rebuilt from the data on other member disks in the array through the XOR operation.

> **📚 Note**
>
> For example, when the data block A0 is damaged, the recovery can be calculated with the following formula:
>
> $$A0 = A1 \oplus A2 \oplus VA$$

RAID 5 can be used to process both a large or small amount of data. It features high speed, large capacity, and fault tolerance distribution. It is often used in various private NAS servers. RAID 5 can be regarded as a trade-off between RAID 0 and RAID 1.

1.5   RAID 6

On the basis of RAID, RAID 6 is formed to further enhance data protection, see Figure 1-5.

Figure 1-5 RAID 6 Data Storage Diagram
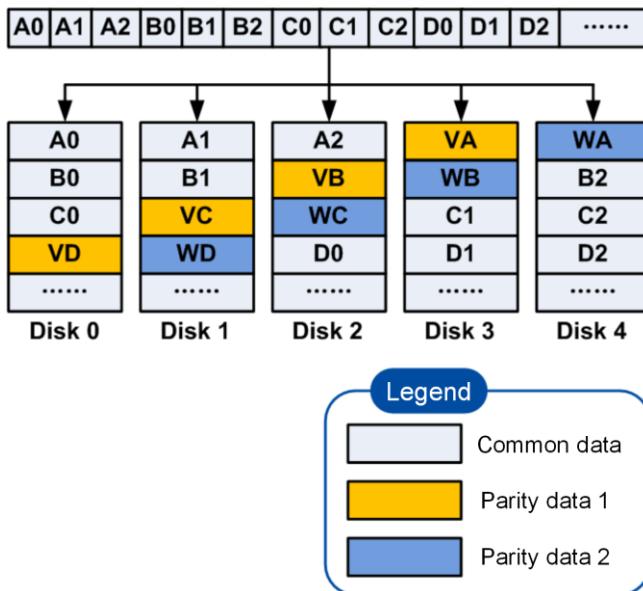
Like RAID 5, RAID 6 distributes sequential data (A0–A2, B0–B2, C0–C2, D0–D2, ...) and the corresponding parity data (VA, VD, ...) to different member disks respectively.

The difference is that on the basis of RAID 5, RAID 6 adds a second parity block (WA, WB, WC and WD, ...). The two independent check systems use different algorithms to implement double check and enhance fault tolerance. Therefore, when two member disks of the RAID 6 array are faulty, data security can also be guaranteed, achieving high reliability.

RAID 6 requires at least four disks, and data is not lost if two disks fail. If two member disks in a RAID 6 array is faulty, the data on the faulty member disks can be rebuilt from the data on other member disks in the array through the XOR (#) operation and the coefficient and XOR operation.

Note

For example, when two data blocks A0 and A1 are damaged at the same time, you can recover them by using the following formula:

$$A0 = A1 \oplus A2 \oplus VA$$
$$A1 = (A0 \times K0 \oplus A2 \times K2 \oplus WA) / K1$$

In the above formula, K0, K1 and K2 are polynomial values in the Galois domain, and are known coefficients.

The read performance and fault tolerance performance of RAID 6 are higher, but more disk space is allocated for parity data. Therefore, compared with RAID 5, it has greater write performance loss and higher implementation costs.

1.1.6 RAID 10

RAID 10 is a combination of RAID 1 and RAID 0, see Figure 1-6.

Figure 1-6 RAID 10 Data Storage Diagram
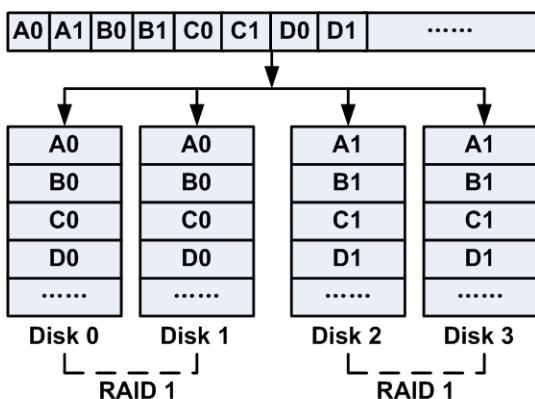
RAID 10 can be regarded as: Two member disks in a pair (Disk 0 and Disk 1, Disk 2 and Disk 3, ...) form a multiple RAID 1 volume. Multiple RAID 1 volumes form a RAID 0 array, and data is distributed on each RAID 1 volume in the form of RAID 0.

After receiving the I/O data requests, the system distributes the sequential data (A0, A1, B0, B1, C0, C1, ...) to two RAID 1 volumes for concurrent processing in accordance with the working mode of RAID 0. That is, the data is stored in the working disks Disk 0 and Disk 2. At the same time, in the manner of RAID 1, the system automatically copies data to mirrored disk Disk 1 when writing data into Disk 0, and copies data to the mirrored disk Disk 3 when writing data into Disk 2.

RAID 10 requires at least four disks, and data is not lost if two disks fail.

RAID 10 balances storage performance and data security. It not only provides data security (same as RAID 1) but storage performance (similar to RAID 0).

1.1.7   RAID 50

RAID 50 is a combination of RAID 5 and RAID 0, see Figure 1-7.

Figure 1-7 RAID 50 Data Storage Diagram
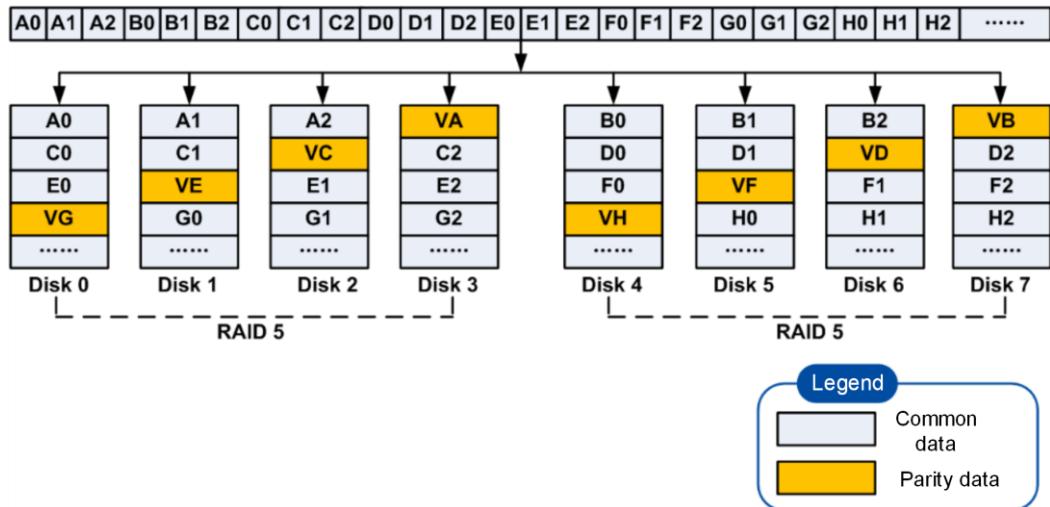
One RAID 50 array consists of multiple RAID 5 volumes. At least six hard disks are required for RAID 50. Data is distributed on each RAID 5 volume in RAID 0 mode.

RAID 50 supports the features of both RAID 0 and RAID 5:

- Like RAID 0, data is partitioned into stripes and written into all the member disks at the same time.
- Like RAID 5, data security is guaranteed through parity bits that are evenly distributed on all the member disks.

With the redundancy function provided by RAID 5, if any disk in a RAID 5 volume is faulty, the array can operate properly and restore the data from the faulty disk. The replacement of the faulty disk does not affect services. Therefore, RAID 50 allows a single disk failure in multiple RAID 5 volumes at the same time, greatly improving the fault tolerance capability.

At the same time, RAID 50 inherits the high storage performance of RAID 0, and stores the data distributed in multiple RAID 5 volumes. It can process data concurrently, thus providing better read/write performance.

1.1.8   RAID 60

RAID 60 is a combination of RAID 6 and RAID 0, see Figure 1-8.

Figure 1-8 RAID 60 Data Storage Diagram
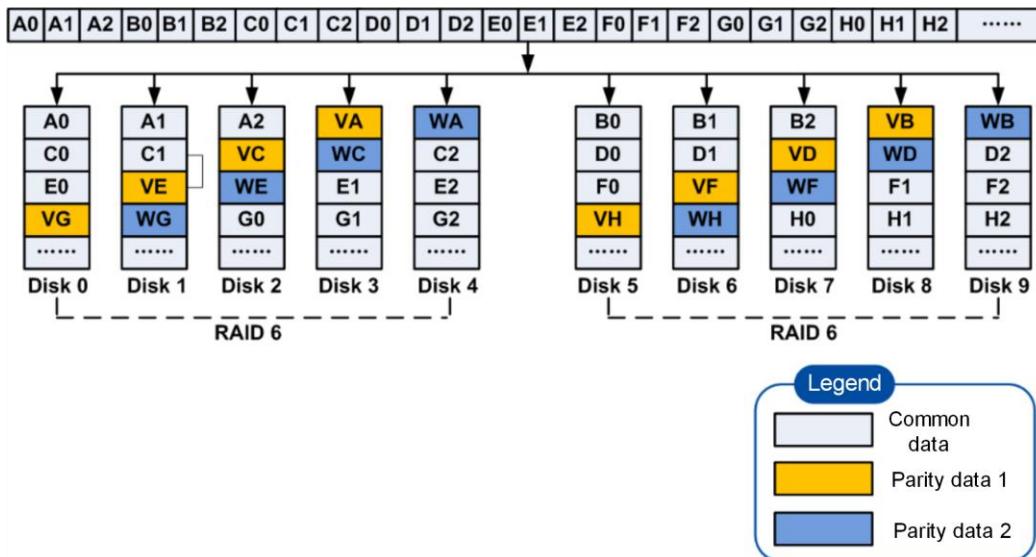
One RAID 60 array consists of multiple RAID 6 volumes. At least eight hard disks are required for RAID 60. Data is distributed on each RAID 6 volume in RAID 0 mode.

RAID 60 supports the features of both RAID 0 and RAID 6:

- Like RAID 0, data is partitioned into stripes and written into all the member disks at the same time.
- Like RAID 6, RAID 60 ensures data security by using two parity blocks that are evenly distributed on all the member disks.

If two member disks of the RAID 6 array are faulty, with the redundancy provided by RAID 6, the array can operate properly and rebuild data of the faulty disk. The replacement of faulty disks does not affect services. Therefore, RAID 60 can maintain the security of data in the faulty disks when dual disks are faulty in multiple RAID 6 volumes at the same time.

In addition, RAID 60 inherits the high storage performance of RAID 0, and stores the data distributed in multiple RAID 6 volumes. It can process data concurrently, thus providing better read/write performance.

1.1.2 RAID Performance Comparison

Fault Tolerance Capabilities

For a description of the fault tolerance capability comparison between the commonly used RAID levels, refer to Table 1-1. For the RAID containing multiple subgroups, RAID 10 and RAID 50 allow the number of faulty disks to be the same as the number of subgroups, but each subgroup must contain only one faulty disk. RAID 60 allows the number of faulty disks to be twice that of subgroups. Each subgroup can contain a maximum of two faulty disks.

Table 1-1 Fault Tolerance Capability Comparison Between Commonly Used RAID Levels

RAID Level	Fault Tolerance Capacity Description
RAID 0	It does not support fault tolerance. A fault in any member disk will affect data security.
RAID 1	It supports fault tolerance through data redundancy. When a member disk is faulty, the data on the corresponding mirrored disk can be used to run the system and rebuild the faulty disk.
RAID 1E	It supports fault tolerance through data redundancy. When a member disk is faulty, normal disks can be used to run the system and rebuild the faulty disk. If there are more than four member disks, two member disks are allowed to be faulty. However, the prerequisites are that the two faulty disks cannot be adjacent to each other, and the two faulty disks cannot be the first member disk and the last member disk.
RAID 5	It supports fault tolerance through the distributed parity data. When a member disk is faulty, the RAID card uses parity data to rebuild all the lost data.
RAID 6	It supports fault tolerance through the distributed parity data. When two member disks are faulty, the data on the normal member disks and the corresponding two sets of parity data can be used to calculate and rebuild the faulty disk.
RAID 10	It supports fault tolerance through data redundancy. Each RAID 1 volume allows one member disk to be faulty. The data in the corresponding mirrored disk in the group can be used to run the system and rebuild the faulty disk.
RAID 50	It supports fault tolerance through the distributed parity data. Each RAID 5 volume allows one member disk to be faulty. The data on normal disks and the corresponding one set of parity data can be used to calculate and rebuild the faulty disk.
RAID 60	It supports fault tolerance through the distributed parity data. Each RAID 6 volume allows two member disks to be faulty. The data on normal disks and the corresponding two sets of parity data can be used to calculate and rebuild the faulty disks.

I/O Performance

A RAID array can be used as an independent storage unit or multiple virtual units by the system. Because multiple disks can be accessed at the same time, the I/O performance for a RAID array is higher than that for a common disk. For a description of the I/O performance comparison between the commonly used RAID levels, refer to Table 1-2.

Table 1-2 I/O Performance Comparison Between Commonly Used RAID Levels

RAID Level	I/O Performance Description
RAID 0	RAID 0 divides data into smaller data blocks and writes them into different disks. Because multiple disks can be read and written at the same time, RAID 0 improves the I/O performance.

RAID Level	I/O Performance Description
RAID 1	Because the disks in a RAID group exist in pairs, data must be written in two copies at the same time, occupying longer time and resources. As a result, the performance deteriorates.
RAID 1E	Each piece of data must be written at least twice, which reduces the disk write capability.
RAID 5	Because both common data and parity data is kept on member disks, each member disk can be read and written separately. Therefore, RAID 5 provides high data throughput.
RAID 6	RAID 6 needs to write two sets of parity data across member disks, which causes performance deterioration during write operations. RAID 6 is ideal in scenarios where high reliability, high response rate and high transmission rate are required to provide high data throughput, high data redundancy and high I/O performance.
RAID 10	With the high data transmission rate provided by the RAID 0 subgroup, RAID 10 performs well in data storage. The I/O performance is improved as the number of subgroups increases.
RAID 50	RAID 50 outperforms other RAID levels in the scenarios that require high reliability, high response rate and high transmission rate. The I/O performance is improved as the number of subgroups increases.
RAID 60	Its application scenarios are similar to those of RAID 50. However, because two sets of parity data need to be written into each member disk, its performance is deteriorated during write operations. Therefore, RAID 60 is not applicable to tasks that require writing massive data.

Available Capacity

For a description of the storage capacity comparison between the commonly used RAID levels, refer to Table 1-3.

Table 1-3 Storage Capacity Comparison Between Commonly Used RAID Levels

RAID Level	Storage Capacity Description
RAID 0	In all RAID levels, RAID 0 provides the maximum storage capacity. Available capacity = minimum capacity of a member disk x number of member disks
RAID 1	Data must be written in two copies, causing high storage space consumption. Available capacity = minimum capacity of a member disk x number of member disks ÷ 2
RAID 1E	Two stripe groups are used as one unit, and the next stripe group is the striped mirror of the last stripe group, causing high storage space consumption. Available capacity = minimum capacity of a member disk x number of member disks ÷ 2

RAID Level	Storage Capacity Description
RAID 5	Parity data blocks are isolated from common data blocks. In general, parity data occupies the capacity of one member disk. Available capacity = minimum capacity of a member disk x (number of member disks - 1)
RAID 6	Two independent parity data blocks are isolated from common data blocks. In general, the parity data occupies the capacity of two member disks. Available capacity = minimum capacity of a member disk x (number of member disks - 2)
RAID 10	It consists of multiple RAID 1 volumes and has the same capacity as RAID 1. Available capacity = minimum capacity of a member disk x number of member disks ÷ 2
RAID 50	It consists of multiple RAID 5 volumes. Its capacity is related to the number of RAID 5 volumes. Available capacity = total capacity of all the RAID 5 volumes
RAID 60	It consists of multiple RAID 6 volumes. Its capacity is related to the number of RAID 6 volumes. Available capacity = total capacity of all the RAID 6 volumes

Performance Comparison Summary

Each RAID level has its advantages and disadvantages in terms of fault tolerance, I/O performance and available capacity. For the overall comparison of the performance indicators, refer to Table 1-4.

Table 1-4 Performance Comparison Summary

RAID Level	Fault Tolerance Capability	I/O Performance		Number of Required Disks	Disk Usage
		Read Performance	Write Performance		
RAID 0	Low	High	High	N≥2	100%
RAID 1	High	High	Medium	2N (N≥1)	50%
RAID 1E	High	High	Medium	N≥3	50%
RAID 5	Medium	High	Medium	N≥3	(N-1)/N
RAID 6	High	High	Medium	N≥4	(N-2)/N
RAID 10	High	Medium	Medium	2N (N≥2)	50%
RAID 50	High	High	High	N≥n×M (n≥3, M≥2)	(N-M)/N
RAID 60	High	High	High	N≥n×M (n≥4, M≥2)	(N-2M)/N

1. N is the total number of RAID member disks.

2. M is the number of RAID volumes.

3. n is the number of member disks in each volume.

1.1.3 RAID-Related Features

1.1.3.1 Disk Group and Virtual Disk

With the explosive growth of modern data centers, data service traffic is increasing day by day, resulting in higher requirements for data storage capacity and read/write speed of servers. As a result, common disks cannot meet these requirements. In this case, it is necessary to form multiple independent disks into a super-large disk group in a specific way to provide better storage performance, I/O performance and security.

A virtual disk is a continuous data storage unit divided based on an overall disk group. Virtual disks can be configured to have larger capacity, higher security, and more data redundancy than a single physical disk.

A virtual disk can be:

- A complete disk group
- Multiple complete disk groups
- Part of a disk group
- Parts of multiple disk groups (a part is divided from each disk group and they constitute a virtual disk)

Related conventions:

- A disk group (DG for short) is also called a drive group or array.
- A virtual disk is also called virtual drive (VD for short), volume or logical disk (LD for short).

1.1.3.2 Fault Tolerance

Fault tolerance means that data integrity and data processing capabilities are not affected when a disk error or disk fault occurs in a disk group.

Fault tolerance improves the disk system availability, guaranteeing system operation.

Therefore, fault tolerance is a very important feature in the fault recovery procedure.

RAID can use redundant data to restore the data errors occurring during the calculation or transmission to achieve fault tolerance. RAID 1, RAID 1E, RAID 5, RAID 6, RAID 10, RAID 50 and RAID 60 provide the fault tolerance capability. For the fault tolerance description at each level, refer to "Fault Tolerance Capabilities".

Note

RAID 0 does not provide fault tolerance. Once a disk fails, its data is lost.

1.3.3   Consistency Check

For RAID 1, RAID 5, RAID 6, RAID 10, RAID 50 and RAID 60 with the redundancy function, the RAID card calculates the data stored on the disks, and compares these data with the corresponding redundant data. If any inconsistency is found, an attempt is made to automatically fix the inconsistency and save the error information. It is recommended that a consistency check be performed at least once a month.

Note

Because RAID 0 does not provide the redundancy function, it does not support the consistency check.

1.3.4   Hot Spare

Hot Spare

Hot spare refers to the backup performed when the system is operating properly. The hot spare feature of the RAID controller card is implemented by hot spare and emergency spare.

Hot Spare Disk

A hot spare disk is an independent disk in the disk system. When a disk in a RAID group is faulty, the hot spare disk is automatically added to the RAID group to replace the faulty disk for rebuilding data and providing fault tolerance.

On RAID card management screens or CLI, an idle disk whose capacity is greater than or equal to that of a member disk in a RAID group and whose media type and interface are the same as those of the member disk can be specified as the hot spare disk of the RAID group.

The RAID card supports the following two types of hot spare disks:

- Global hot spare disk, which is shared by all the configured RAID groups of a RAID card. One RAID card can be configured with one or more global hot spare disks. If a member disk in any RAID group fails, the global hot spare disk can automatically replace the faulty disk.
- Dedicated hot spare disk, which is exclusive to a specific RAID group of a RAID card. Each RAID group can be configured with one or more dedicated hot spare disks. If a member disk in the specified RAID group fails, the dedicated hot spare disk can automatically replace the faulty disk.

A hot spare disk has the following features:

- The hot spare disk is only used for the RAID groups with redundancy, including RAID 1, RAID 1E, RAID 5, RAID 6, RAID 10, RAID 50 and RAID 60.
- The hot spare disk is only used to replace a faulty disk managed by the same RAID card.

Emergency Spare

The emergency spare function means that if a member disk in any RAID group with the redundancy function is faulty and no hot spare disk is specified, an idle disk managed by the RAID card automatically replaces the faulty member disk and rebuilds the data to avoid data loss.

Emergency spare requires that the capacity of the idle disk must be greater than or equal to that of the member disk, and the media type and interface of the idle disk must be the same as that of the member disk.

1.5 Data Rebuild

Description

If a faulty disk exists in a RAID group, you can use the data rebuild function of the RAID card to rebuild data in the faulty disk for a new disk. The data rebuild function is only used for the RAID arrays with redundancy, including RAID 1, RAID 5, RAID 6, RAID 10, RAID 50 and RAID 60. The RAID card supports automatic data rebuild:

- If an available hot spare disk is specified for a RAID group, when a member disk is faulty, the hot spare disk automatically replaces the faulty disk and rebuilds the data.
- If no available hot spare disk is specified for a RAID group, when a member disk is faulty, an idle disk in the RAID group automatically replaces the faulty disk and rebuilds the data.

Note

The hot spare disk and idle disk used for data rebuild must meet the following requirements:
- The capacity is larger than or equal to the RAID member disk.
- The media type and interface are the same as those of the member disk.

If no hot spare disk is specified for a RAID group and no idle disk meets requirements, data can be rebuilt only after the faulty disk is replaced with a new one.

After the hot spare disk begins data rebuild, the faulty member disk is marked as removable.

If the system is powered off during the data rebuild process, the RAID card continues the data rebuild task after the system is restarted.

Rebuild Rate

The rebuild rate is the proportion of CPU resources occupied by a data rebuild task to the overall CPU resources during the system operation. It can be set to 0%–100%.

- The value **0%** indicates that the data rebuild task is started only when there is no other task running in the system.
- The value **100%** indicates that the data rebuild task occupies all CPU resources.

> **📚 Note**
>
> The rebuild rate can be set as required. It is recommended that you set a proper value based on the actual system conditions.

1.1.6 Disk Status

Physical Disk Status

For a description of the possible status of a physical disk managed by a RAID controller card, refer to Table 1-5.

Table 1-5 Physical Disk Status

Status	Description
Online	Indicates that the disk is a member disk of a virtual disk and is online and can be used properly.
Unconfigured Good	Indicates that the disk is in normal status, but is not a member disk or a hot spare disk of a virtual disk.
Hot Spare	Indicates that the disk is set as a hot spare disk.
Failed	This status appears when an unrecoverable error occurs on a disk in **Online** or **Hot Spare** status.
Rebuild/Rebuilding	Indicates that the disk is rebuilding data to ensure the data redundancy and integrity of the virtual disk. In this case, the performance of the virtual disk is affected.
Unconfigured Bad	This status appears when an uninitialized disk or a disk in **Unconfigured Good** status has an unrecoverable error.
Missing	This status appears after the disk in the **Online** status is removed.
Offline	Indicates that the disk is a member disk of a virtual disk and is offline and can be used properly.
Shield State	Indicates the temporary status in which the physical disk is performing a diagnosis operation.
Copyback	Indicates that a new disk is replacing the hot spare disk.
Unsupport	Indicates that the specification of the disk exceeds the current specification of the RAID card.
Raw (Pass Through)	Indicates that the disk is a pass-through disk in HBA mode. For the concept of pass-through, refer to "1.1.3.13 Disk Pass-Through".
Ready	Indicates that the disk in this status can be used to configure a RAID volume, which is applicable to the **RAID** mode and **Mixed** mode of the RAID card.

Status	Description
	● In **RAID** mode, the connected disks can be used in the system only after they form a RAID volume, and the disks in **Ready** status are not reported to the OS. ● In **Mixed** mode, the connected disks can be used directly or form a RAID volume, and the disks in **Ready** status are reported to the OS.
Predictive Failure	Indicates that the disk is about to change to the **Failed** status. The data on the disk needs to be backed up and the disk needs to be replaced.

Virtual Disk Status

For a description of the possible status of a virtual disk created under a RAID card, refer to Table 1-6.

Table 1-6 Virtual Disk Status

Status	Description
Optimal	Indicates that the virtual disk is in good condition and all member disks are online.
Degraded	Indicates that the virtual disk is available but abnormal, and some member disks are faulty or offline.
Failed	Indicates that the virtual disk is faulty.
Partial Degraded	This status appears when the number of faulty or offline disks in the RAID group does not exceed the maximum number of faulty disks supported by the RAID array.
Offline	This status appears when the number of faulty or offline disks in the RAID group exceeds the maximum number of faulty disks supported by the RAID array.

1.7 Read/Write Policy for Virtual Disks

Overview

When creating a virtual disk, you need to define the data read/write policies to standardize subsequent data read and write operations on it.

Data Read Policy

"**Read Policy**" is generally displayed on the configuration screen. The RAID controller card supports the following two types of data read policies:

● Read-ahead mode: When a RAID card reads the required data from the virtual disk, it simultaneously reads the subsequent data and writes it into the cache. If a user needs to

access the data, the data can be directly read from the cache to reduce the track seeking operation, save the response time, and improve the data read speed.

 Notice

To use this policy, the RAID card must support data protection against a power supply failure. However, if the super capacitor is abnormal at this time, the data may be lost.

● Non-read-ahead mode: The RAID card reads data from the virtual disk only after receiving a data read command. It does not perform the read-ahead operation.

Data Write Policy

"**Write Policy**" is generally displayed on the configuration screen. The RAID card supports the following three types of data write policies:

● Write back: If this policy is used, when data needs to be written to a virtual disk, it is directly written into the cache. The RAID card refreshes the data to the virtual disk only when the written data is accumulated to a certain extent, achieving batch data write and improving the data write speed. After receiving all the transmitted data, the cache returns the data transmission completion signal to the host.

 Notice

To use this policy, the RAID card must support data protection against a power supply failure. However, if the super capacitor is abnormal at this time, the data may be lost.

● Direct write: The RAID card directly writes data to the virtual disk without being cached. However, the write speed is low. After the virtual receives all the transmitted data, the RAID card returns the data transmission completion signal to the host.

 Note

This policy does not require the RAID card to support data protection against a power supply failure. Even if the super capacitor fails, there is no impact.

● BBU-related write-back:
  ➔ When the BBU of the RAID card is present and operates properly, the write operation from the RAID card to the virtual disk is transited through the cache (write-back mode).
  ➔ When the BBU of the RAID card is not present or the BBU is faulty, the write operation from the RAID card to the virtual disk is automatically switched to the direct write mode without being cached.

1.8 Data Protection Against a Power Supply Failure

Protection Principle

The speed of writing data into the high-speed cache of a RAID controller card is greater than that of writing data into a disk. When the server writes a large amount of data, the high-speed cache of the RAID card can be used to improve system performance.

After the high-speed cache is enabled, the advantages and disadvantages are as follows:

- The write performance of the server is improved. When the write pressure on the server is reduced or the high-speed cache of the RAID card is to be full, data is written into a disk from the high-speed cache.
- The risk of data loss increases. When the server is powered off accidentally, the data in the high-speed cache of the RAID card will be lost.

To improve the high read/write performance of the server and ensure the data security in the high-speed cache of the RAID card, you can configure a super capacitor for the RAID card. In case of unexpected power failure of the server, the super capacitor is used to supply power to the RAID card, and data in the high-speed cache is written into the NAND flash in the super capacitor for storage.

Super Capacitor Power Calibration

Because protection against a power supply failure requires a super capacitor, the RAID card needs to record the discharge curve and the maximum power of the super capacitor to learn about the status of the super capacitor. In addition, to extend the lifespan of the super capacitor, the automatic calibration mode of the super capacitor is enabled on the RAID card by default.

The RAID card needs to keep the battery level of the super capacitor at a relatively stable value. Therefore, the battery level of the super capacitor is calibrated through the three-phase charging/discharging operations. The three-phase charging/discharging operations are as follows:

1. Charges the super capacitor with maximum power.
2. Automatically starts the calibration process to completely discharge the super capacitor.
3. Recharges the super capacitor to the maximum power.

The super capacitor has the following characteristics during the calibration process:

- The write policy of the RAID card is automatically adjusted to direct write mode to ensure data security.
- The write performance of the RAID card is low.
- The power calibration period depends on the charging and discharging speeds of the super capacitor.

1.3 Disk Striping

Basic Concepts

Disk striping means that the disk space is divided into multiple stripes in accordance with the specified size and data blocks are also divided in accordance with the stripe size when data is written. The specific concepts include the following:

- Stripe width: number of disks used in a disk group for striping.
- Stripe size of a disk group: total amount of data written at the same time on all member disks in the disk group by the RAID card.
- Stripe size of a disk: amount of data written into a single disk.

For example, a RAID 0 group composed of four member disks divides the sequential data into 12 data blocks and writes them to each member disk in the way shown in Figure 1-9.

Figure 1-9 Disk Striping Example

Segment 1	Segment 2	Segment 3	Segment 4
Segment 5	Segment 6	Segment 7	Segment 8
Segment 9	Segment 10	Segment 11	Segment 12
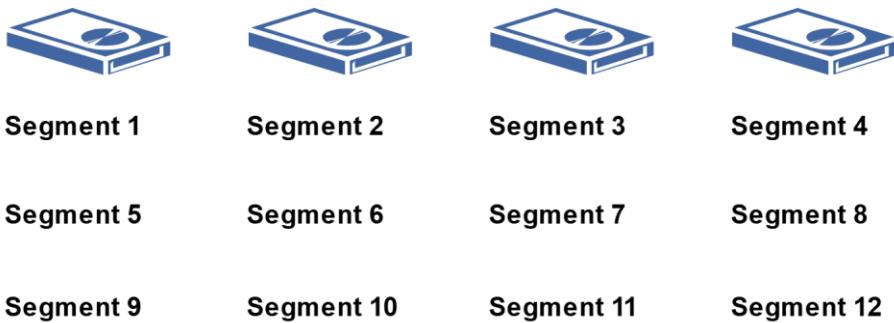
In the example RAID 0, suppose the size of each data block is 2 KB:

- The stripe width is the number of member disks, that is, 4.
- The stripe size of the disk group is the sum of 12 data blocks, that is, 24 KB.
- The stripe size of each disk is the sum of three data blocks, that is, 6 KB.

Feature

Because most disks have restrictions on the number of accesses (I/O operation per second) and data transmission rate (data volume per second), when multiple processes access a disk at the same time, the disk restriction may be triggered. Subsequent processes are suspended. Striping is a technology used to automatically balance the I/O load across multiple physical disks. By dividing a piece of sequential data into multiple data blocks and writing them into different disks, multiple processes can access different parts of the data at the same time. In addition, when a disk needs sequential access to data, it can obtain the maximum I/O parallel capability.

Note

This feature does not ensure data redundancy.

1.3.10 Disk Mirroring

Disk mirroring means that the same data is written into two disks at the same time when a data write task is executed, thus achieving 100% data redundancy. Because the data on the two disks is exactly the same, when one disk is faulty, the data will not be lost, and the system automatically switches from the faulty disk to the mirrored disk for data read and write.

Disk mirroring is applicable to RAID 1 and RAID 10. It brings a complete redundancy of 100%, but it is costly and the actual disk usage is only 50%, because each disk needs a backup disk during the mirroring process, see Figure 1-10.

Figure 1-10 Disk Mirroring Example

Segment 1	Segment 1 Duplicated
Segment 2	Segment 2 Duplicated
Segment 3	Segment 3 Duplicated
Segment 4	Segment 4 Duplicated
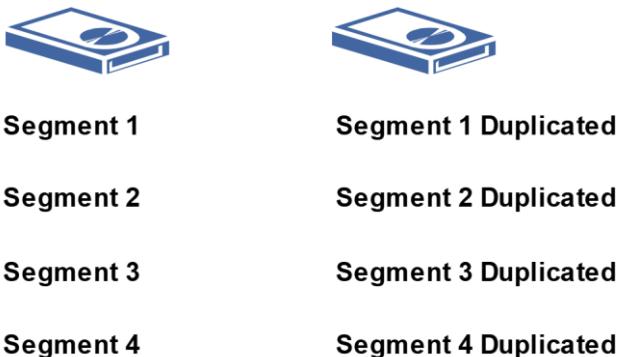
1.3.11 Foreign Configuration

The foreign configuration is different from the configuration of the current **RAID card**, and is usually displayed as **Foreign Configuration** on the configuration screen.

In the following cases, the foreign configuration exists:

- The RAID configuration information exists in a physical disk newly installed on a server, and the RAID card identifies such information as a foreign configuration.
- After the RAID card of a server is replaced, the new RAID card identifies the existing RAID information as foreign configuration.
- After a member disk of a RAID group is hot swapped, the member disk is marked as carrying foreign configuration.

The detected foreign configuration can be processed in accordance with the actual server conditions:

- If the RAID information carried by the newly inserted disk does not meet the requirements of the current scenario, the configuration can be deleted.
- After the RAID card is replaced, if you want to use the previous configuration, you can import that configuration to apply it on the new RAID card.

1.1.2 Disk Energy Saving

A RAID controller card has the disk energy saving function, and can control disk rotation in accordance with the disk configurations and I/O activities. All rotary SAS and SATA disks support this function.

When the disk energy saving function is enabled, both idle disks and idle hot spare disks mounted under the RAID card are in energy saving status. When related operations (for example, creating a RAID volume, creating a hot spare disk, expanding a disk dynamically, and rebuilding a hot spare disk) are performed, the disk in energy saving status can be woken up.

1.1.3 Disk Pass-Through

Disk pass-through, namely, the JBOD function, also called transparent command transmission, is a data transmission mode that only ensures transmission quality without processing the command by the transmission device.

After the disk pass-through function is enabled, the RAID controller card can transparently transmit commands to the connected disk. If no RAID group is configured, user commands can be transparently transmitted to a disk, so that upper-layer service software or management software can access the disk.

For example, during the installation of the server operating system:

- For a RAID card that supports the disk pass-through function, you can use a disk mounted under the RAID card as the installation disk.
- For a RAID card that does not support the disk pass-through function, you can use only the virtual disk configured under the RAID card as the installation disk.

1.2 Mapping Relationships of RAID Card Names

RAID cards of different models have different names displayed on the BMC and BIOS. For the corresponding relationships, refer to Table 1-7.

Table 1-7 Mapping Relationships of RAID Card Names

RAID Card Model	Name on the BMC	Name on the BIOS
NETAŞ SmartROC3100	SDPSA	NETAŞ SmartROC3100 SDPSx V2.52
NETAŞ SmartROC3100	SDPSA_L	NETAŞ SmartROC3100 SDPSx V2.52
NETAŞ SmartIOC2100	SDPSA_I	NETAŞ SmartIOC2100 SDPSx V2.52
NETAŞ SmartROC3100	SDPSB	NETAŞ SmartROC3100 SDPSx V2.52
NETAŞ SmartROC3100	SDPSB_L	NETAŞ SmartROC3100 SDPSx V2.52
NETAŞ SmartIOC2100	SDPSB_I	NETAŞ SmartIOC2100 SDPSx V2.0

| NETAŞ SmartROC3100 | RM241 | NETAŞ SmartROC3100 RM24x V2.52 |

RAID Card Model	Name on the BMC	Name on the BIOS
NETAŞ SmartROC3100	RM242	NETAŞ SmartROC3100 RM24x V2.52
NETAŞ SmartIOC2100	RM243	NETAŞ SmartIOC2100 RM24x V2.52

1.3 Applicable Server Models

This document is applicable to rack servers based on the **Turin** platform, including but not limited to the following models:

- NCS6721A N6

-

- ……

Chapter 2
NETAŞ PMC RAID Card

Table of Contents

A NETAŞ PMC RAID controller card is integrated with the BIOS configuration utility. By using the program, you can configure the disks that are supported by the RAID card to a RAID volume of a specific level.

Note

This chapter uses the PMC RS241-18i as an example. The operation screens of the BIOS configuration utility displayed in this chapter are for reference only, and may not be the same as the actual ones.

2.1 Capability Features

For a description of the capabilities of a NETAŞ PMC RAID controller card, refer to Table 2-1.

Table 2-1 Descriptions of the Capabilities of a PMC Controller Card

Capability Item	Capability Parameter
Product form	Mezz card
Controller chip	PMC PM8238
Host interface	PCIe 3.0×8
SAS interface	12 Gb SAS
Number of ports	16+2
Drive interface	SAS and SATA
Drive type	HDD and SSD
Whether drives are hot swappable	Supported

Capability Item	Capability Parameter
Maximum number of RAID groups	8
Number of drives	238
RAID level	RAID 0, RAID 1, RAID 10, RAID 5, RAID 6, RAID 50, RAID 60
JBOD mode	Supported
Cache	2048 MiB
Cache protection	None
Out-of-band management	Supported
Consistency check/verification and fix	Supported
Online capacity expansion	Supported
Online RAID level migration	Supported
Automatic rebuild	Supported
Manufacturer tool support	ARCCONF

2.2 Initial Configuration (Legacy Mode)

Figure 2-1 shows the initial configuration flow of a NETAŞ PMC RAID controller card.

Figure 2-1 Initial Configuration Flow of a NETAŞ PMC RAID Card
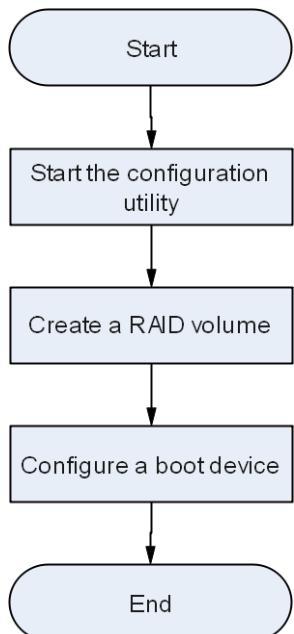
2.2.1 Starting the Configuration Utility

Abstract

This procedure describes how to start the BIOS configuration utility of a NETAŞ PMC RAID controller card to log in to the management screen and complete the subsequent initial and common configurations.

Prerequisite

The boot mode is already set to **Legacy** in BIOS. For details, refer to "3.2.1 Setting the Boot Mode to Legacy".

Steps

1. Start the server system.
2. During the POST process, when the prompt message is displayed (as shown in Figure 2-2), press **Ctrl+A** to start the BIOS configuration utility of the NETAŞ PMC card. The screen as shown in Figure 2-3 is displayed.

Figure 2-2 POST Screen
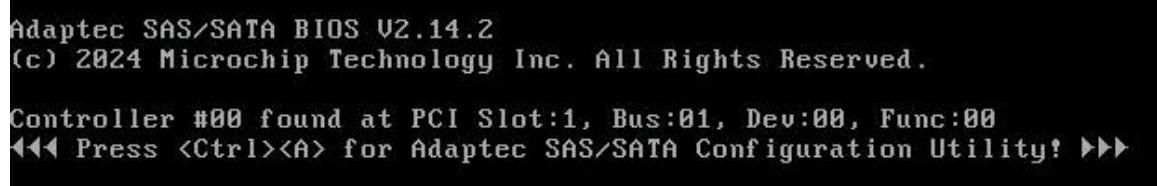

```
Adaptec SAS/SATA BIOS V2.14.2
(c) 2024 Microchip Technology Inc. All Rights Reserved.

Controller #00 found at PCI Slot:1, Bus:01, Dev:00, Func:00
◀◀◀ Press <Ctrl><A> for Adaptec SAS/SATA Configuration Utility! ▶▶▶
```

Figure 2-3 BIOS Configuration Utility Screen


```
◀◀◀ Adaptec SAS/SATA Configuration Utility [Build    0 ]▶▶▶




                    ZTE SmartROC3100 Family Controller #0


                          ┌─── Options ───┐
                          │ Controller Details        │
                          │ Configure Controller Settings │
                          │ Array Configuration       │
                          │ Disk Utilities            │
                          └───────────────┘




Arrow keys to move cursor, <Enter> to select option, <Esc> to exit (*=default)
```

3. In the **Options** area, use the arrow keys to select **Array Configuration**, and then press **Enter**. The **Configuration Menu** screen is displayed, see Figure 2-4.

Figure 2-4 Configuration Menu Screen
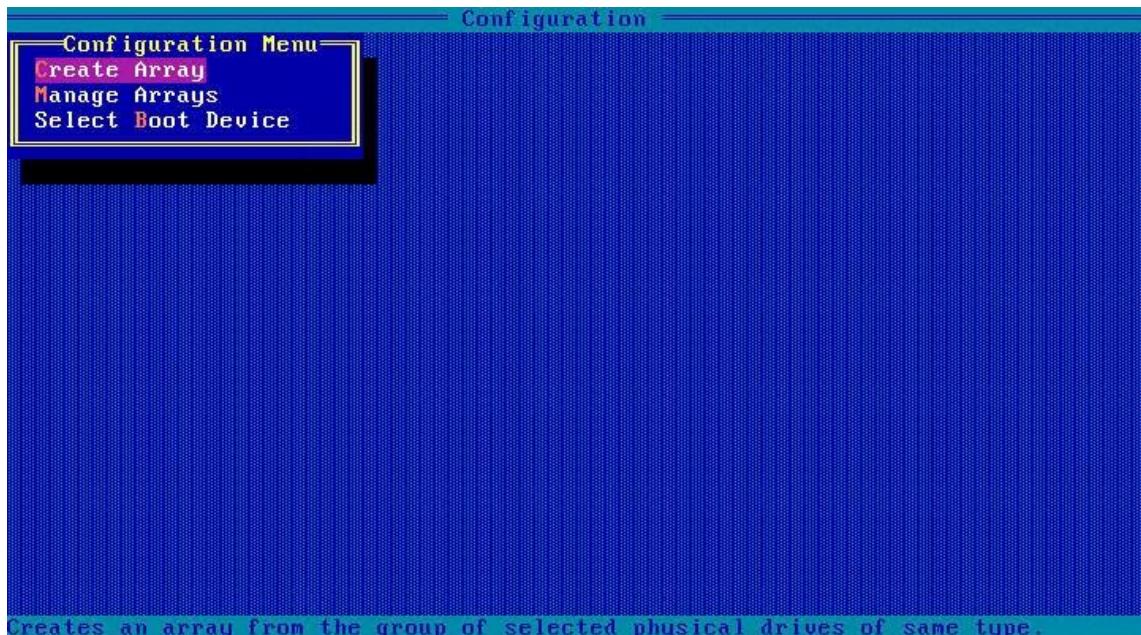
2.2.2 Creating a RAID Volume

Abstract

You can create RAID volumes at different levels as required.

The procedures for creating RAID volumes at different levels are similar. This procedure uses a RAID 0 volume in legacy mode as an example.

Prerequisite

Sufficient SATA and SAS disks are installed on the server.

Context

For a description of the number of disks required to create a RAID volume, refer to Table 2-2.

Table 2-2 Number of Disks Required for Creating a RAID Volume

RAID Level	Description
RAID 0	RAID 0 requires at least one disks.
RAID1	RAID 1 requires at least two disks. Disks with different capacities can be used in a RAID 1 volume, but the logical capacity of each member disk depends on the space of the disk with the smallest capacity.

RAID Level	Description
RAID 5	RAID 5 requires at least three disks.
RAID 6	RAID 6 requires at least four disks.
RAID 10	RAID 10 requires at least four disks. A RAID 10 volume consists of at least two RAID 1 volumes. For example, if there are four disks to be used in RAID 10 mode, you need to add them to two drive groups, each of which is mounted with two disks in RAID 1 mode.
RAID 50	RAID 50 requires at least six disks. A RAID 50 volume consists of at least two RAID 5 volumes. For example, if there are six disks to be used in RAID 50 mode, you need to add them to two drive groups, each of which is mounted with three disks in RAID 5 mode.
RAID 60	RAID 60 requires at least eight disks. A RAID 60 volume consists of at least two RAID 6 volumes. For example, if there are eight disks to be used in RAID 60 mode, you need to add them to two drive groups, each of which is mounted with four disks in RAID 6 mode.

Steps

1. On the **Configuration Menu** screen, use the arrow keys to select **Create Array**, and then press **Enter**. On the displayed **Select drives to create Array** screen, all the disks that can be used to create a RAID volume are displayed, see Figure 2-5.

Figure 2-5 Select Drives to Create Array Screen
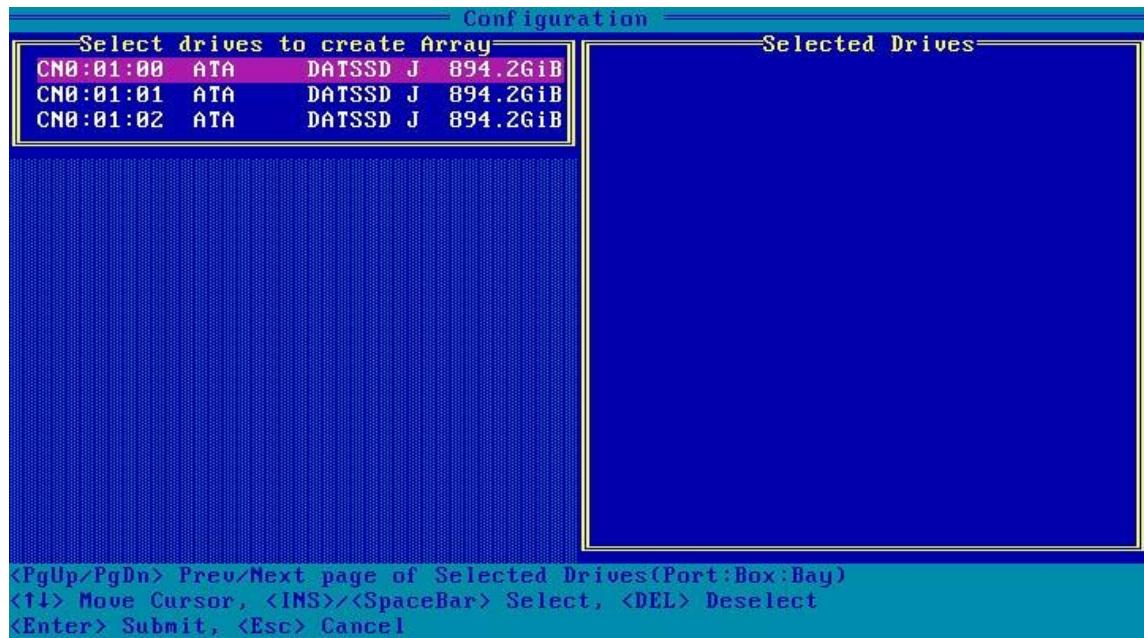
2. Use the arrow keys to select the disks to be used to create the RAID volume, and then press **Insert** to add these disks to the **Selected Drives** list, see Figure 2-6.

Figure 2-6 Selected Drives List
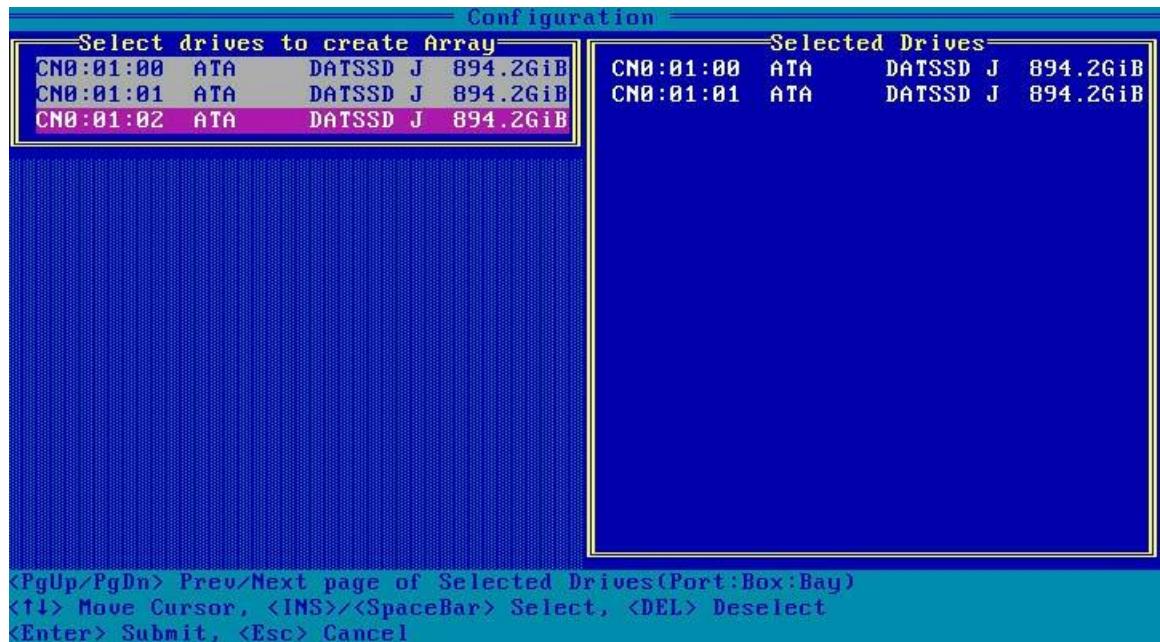

```
═══════════════════════════ Configuration ═══════════════════════════
┌Select drives to create Array┐        ┌Selected Drives┐
│CN0:01:00  ATA     DATSSD J  894.2GiB│ │CN0:01:00  ATA     DATSSD J  894.2GiB│
│CN0:01:01  ATA     DATSSD J  894.2GiB│ │CN0:01:01  ATA     DATSSD J  894.2GiB│
│CN0:01:02  ATA     DATSSD J  894.2GiB│ │                                     │
│                                     │ │                                     │
│                                     │ │                                     │


<PgUp/PgDn> Prev/Next page of Selected Drives(Port:Box:Bay)
<↑↓> Move Cursor, <INS>/<SpaceBar> Select, <DEL> Deselect
<Enter> Submit, <Esc> Cancel
```

📚 **Note**

- The disks for creating a RAID volume must be of the same type. It is forbidden to select disks with interface types such as SATA and SAS at the same time.
- Press the **Delete** key to delete the selected disk from the **Selected Drives** list.

3. Press **Enter**. The **Create Logical Drive** screen is displayed, see Figure 2-7.

Figure 2-7 Create Logical Drive Screen
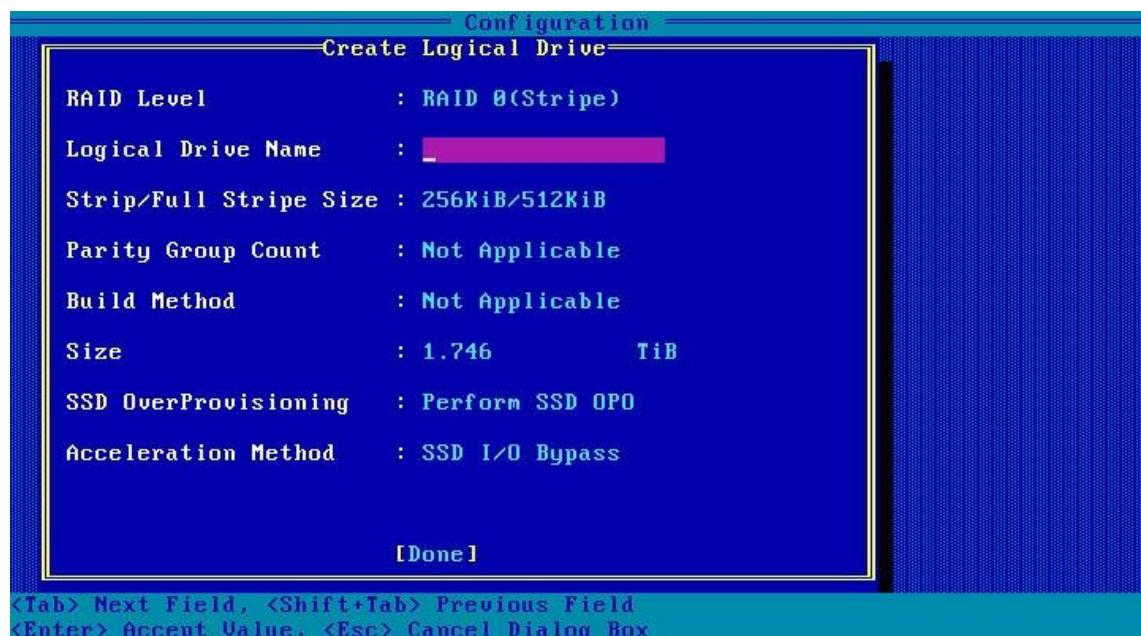
4. Use **Tab**/**Tab+Shift** to select the parameters that you want to modify. In the displayed operation box, use the arrow keys to select the related parameters, and then press **Enter** for confirmation. For a description of the parameters on the **Create Logical Drive** screen, refer to Table 2-3.

Table 2-3 Descriptions of the Parameters on the Create Logical Drive Screen

Parameter	Description
RAID Level	Sets a RAID level, for example, **RAID 0(Stripe)**.
Logical Drive Name	Sets the RAID name, for example, "0".
Strip/Full Stripe Size	The stripe size should be equal to the size of average disk IO requests generated by server applications. In the optimum status, only one IO operation is executed for each IO request. The recommended stripe size configurations are as follows: ● For a Web server, 8 KB is recommended. ● For a groupware server (such as an email server), 16 KB is recommended. ● For a database server, 16 KB or 32 KB is recommended. ● For a file server, 32 KB or 64 KB is recommended ● For a video file server, 64 KB, 128 KB, or 256 KB is recommended.
Parity Group Count	Configures logical-device parity groups in accordance with the number of physical devices in the array. It is not applicable to all RAID levels.
Build Method	Sets the RAID initialization method, which is used to determine how the logical devices prepare for read and write, and how long the initialization takes.

Parameter	Description
	● default: When the logical devices can be accessed by the operating system, parity blocks are initialized at the back end. A lower RAID level can achieve faster parity initialization. ● RPI: The data and parity blocks at the front end are overwritten. Before the parity initialization procedure is completed, logical devices remain invisible and unavailable to the operating system. All parity groups are initialized in parallel, but the initialization of a single parity group (RAID 5) is faster. The RAID level does not affect the performance during the RAID initialization. ● Not Applicable: unavailable. Keep the default configuration unless otherwise specified.
Size	Displays the storage size of the disk array in accordance with the total storage space of the disks added to the disk array. By default, the RAID created uses all the available disk space.
Acceleration Method	Sets the caching mode for the RAID volume. ● IO Bypass: This option is valid only when the RAID logical volume is formed by SSDs. ● Controller Cache: enables controller cache optimization. The read cache and write cache are used at the same time. ● None: disables the controller cache. Neither **IO Bypass** nor **Controller Cache** is used. Keep the default configuration unless otherwise specified.

5. Use **Tab** to select **Done**, and then press **Enter** to create the RAID volume, see Figure 2-8.

Figure 2-8 Creating a RAID Volume

6. The RAID volume is created successfully, see Figure 2-9. Press any key to return to the **Configuration Menu** screen.

Figure 2-9 RAID Volume Created Successfully
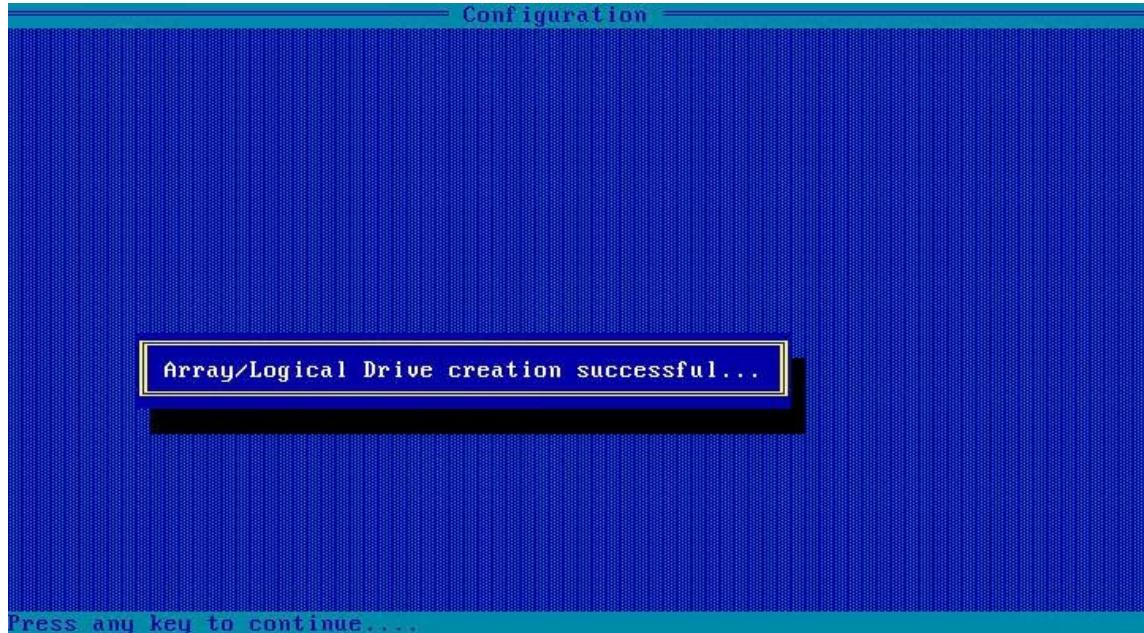
2.2.3 Configuring a Boot Device

Abstract

After a RAID volume is created, if you need to install an operating system on the RAID volume, and there are multiple RAID volumes on the RAID card, you must set the RAID volume as a boot device.

Prerequisite

A RAID volume is created successfully. For details, refer to "2.2.2 Creating a RAID Volume".

Steps

1. On the **Configuration Menu** screen, use the arrow keys to select **Manage Arrays**, and then press **Enter**. The **List of Arrays** page is displayed, see Figure 2-10.

Figure 2-10 List of Arrays Screen

```
================================ Configuration ===============================

         ===========List of Arrays (Page 1 of 1)===========
         ARRAY-A - 002-PD(s), 01-LD(s)
         ARRAY-B - 002-PD(s), 01-LD(s)



<ENTER>List Logical Drives, <CTRL+C>Create Logical Drives, <CTRL+D>Delete Array
<Ctrl+S>Add Spare drives, <DEL>Delete Spare Drive, <ESC>Cancel.
<CTRL+E>Enable/Disable SSD I/O Bypass,<CTRL+F>Identify Device.
```
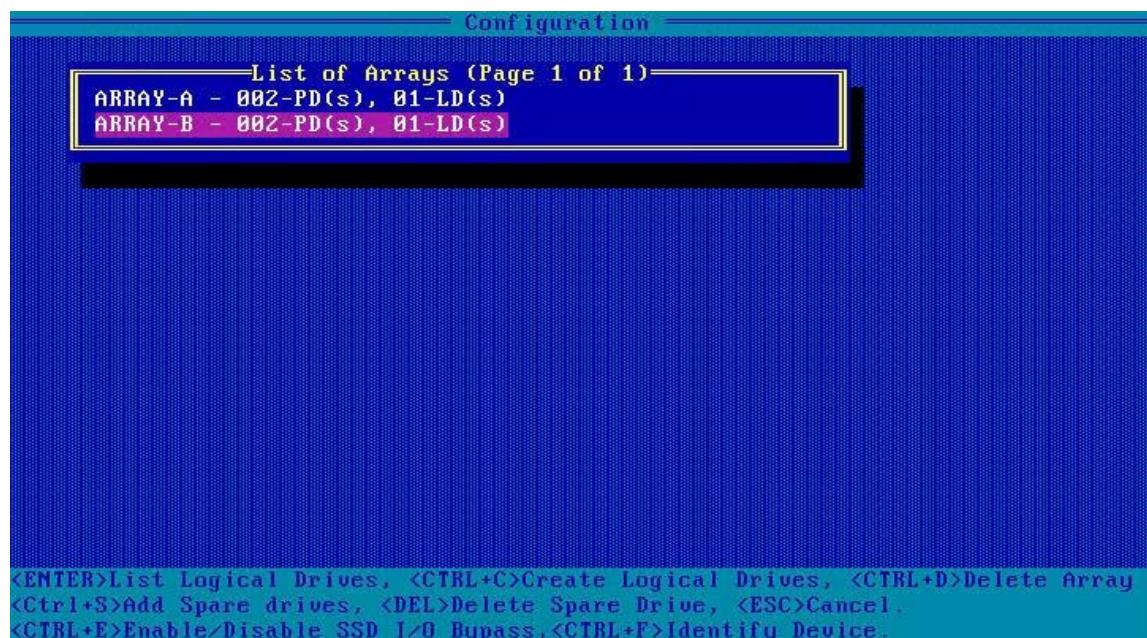
2. Use the arrow keys to select the array where the RAID volume to be set as a boot device is located, and then press **Enter**. The **List of Logical Drives** screen is displayed, see Figure 2-11.

Figure 2-11 List of Logical Drives Screen

```
================================ Configuration ===============================

      ===========List of Logical Drives (Page 1 of 1)===========
      01 0                          RAID0   14.5TiB



<Enter> Display Logical Drive Details, <Del> Delete Logical Device
<Ctrl+P> Set as Primary Boot LD,<Ctrl+S> Set as Secondary Boot LD
<CTRL+D> Delete Bootable Logical Drive , <CTRL+F>Force Online LD
<↑↓> Moves Cursor
```
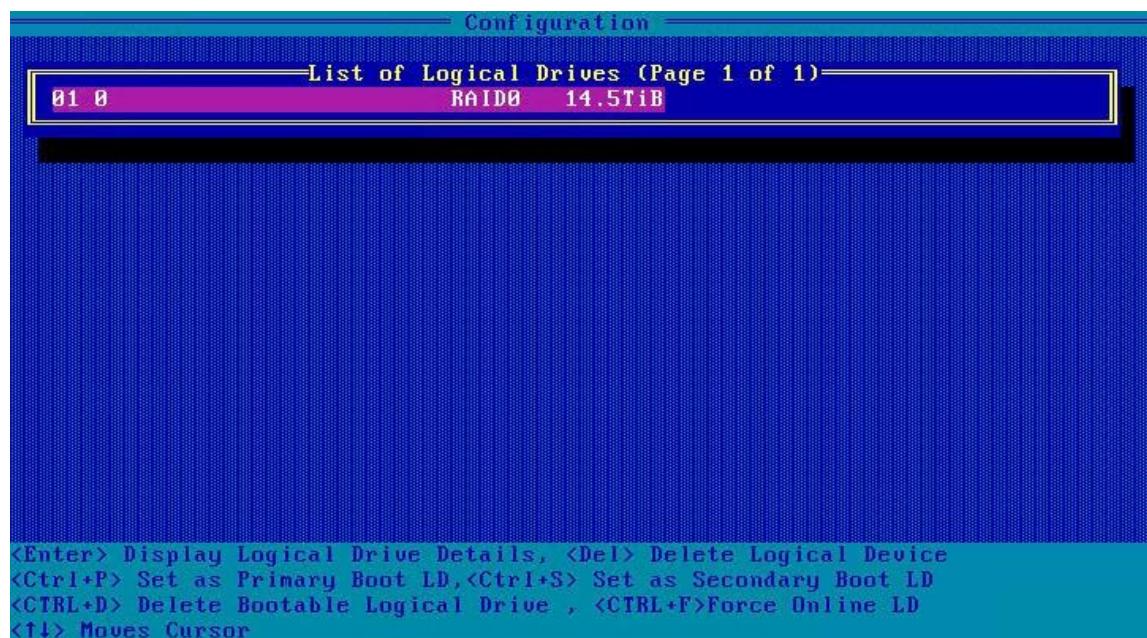
3. Select the RAID volume to be booted first, and then press **Ctrl+P** to configure it as the first boot device, see Figure 2-12.

Figure 2-12 Configuring a Boot Device
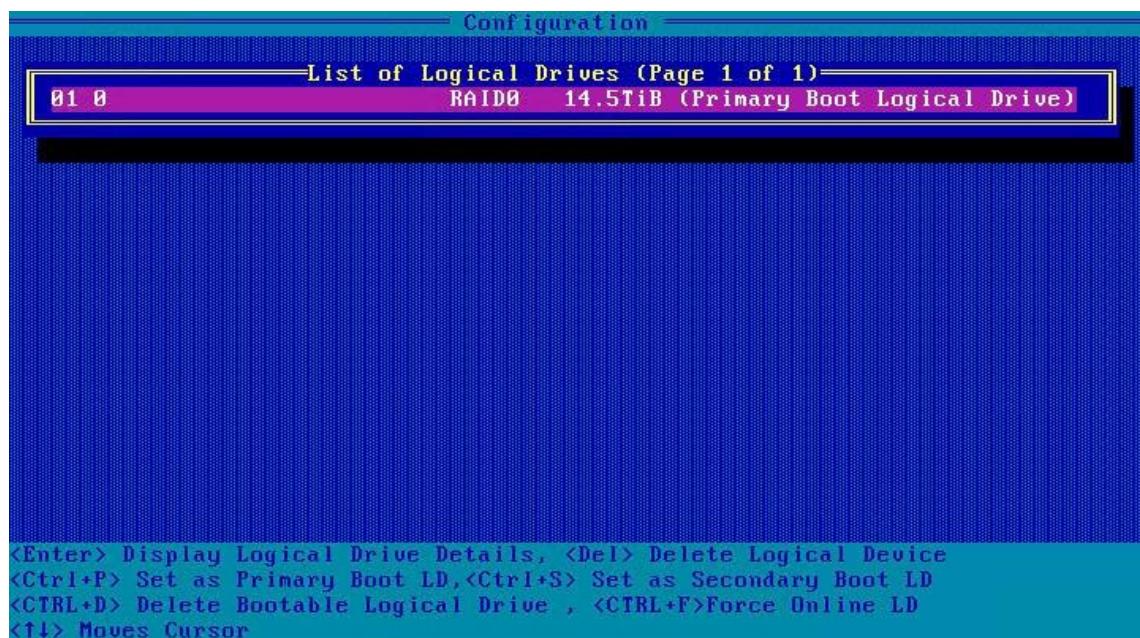
2.3 Initial Configuration (UEFI Mode)

Figure 2-13 shows the initial configuration flow of a NETAŞ PMC RAID controller card.

Figure 2-13 Initial Configuration Flow of a NETAŞ PMC RAID Card
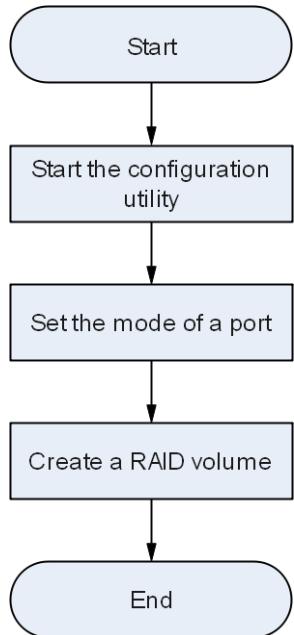
Note

- The PMC RAID card is in UEFI mode, and it currently does not support the boot disk settings.

● The PMC RAID card does not support the co-existence of configurations in both UEFI and legacy modes. If the mode is switched from UEFI to legacy, the configuration in UEFI mode must be cleared. Otherwise, the normal operation of the RAID card is affected.

2.3.1 Starting the Configuration Utility

Abstract

This procedure describes how to start the BIOS configuration utility of a NETAŞ PMC RAID controller card to log in to the management screen and complete the subsequent initial and common configurations.

Prerequisite

The boot mode is already set to UEFI in BIOS. For details, refer to "3.2.2 Setting the Boot Mode to UEFI".

Steps

1. Start the server system.
2. During the POST process, press **F2/DEL**. The **Aptio Setup** screen is displayed, see Figure 2-14.

Figure 2-14 Aptio Setup Screen
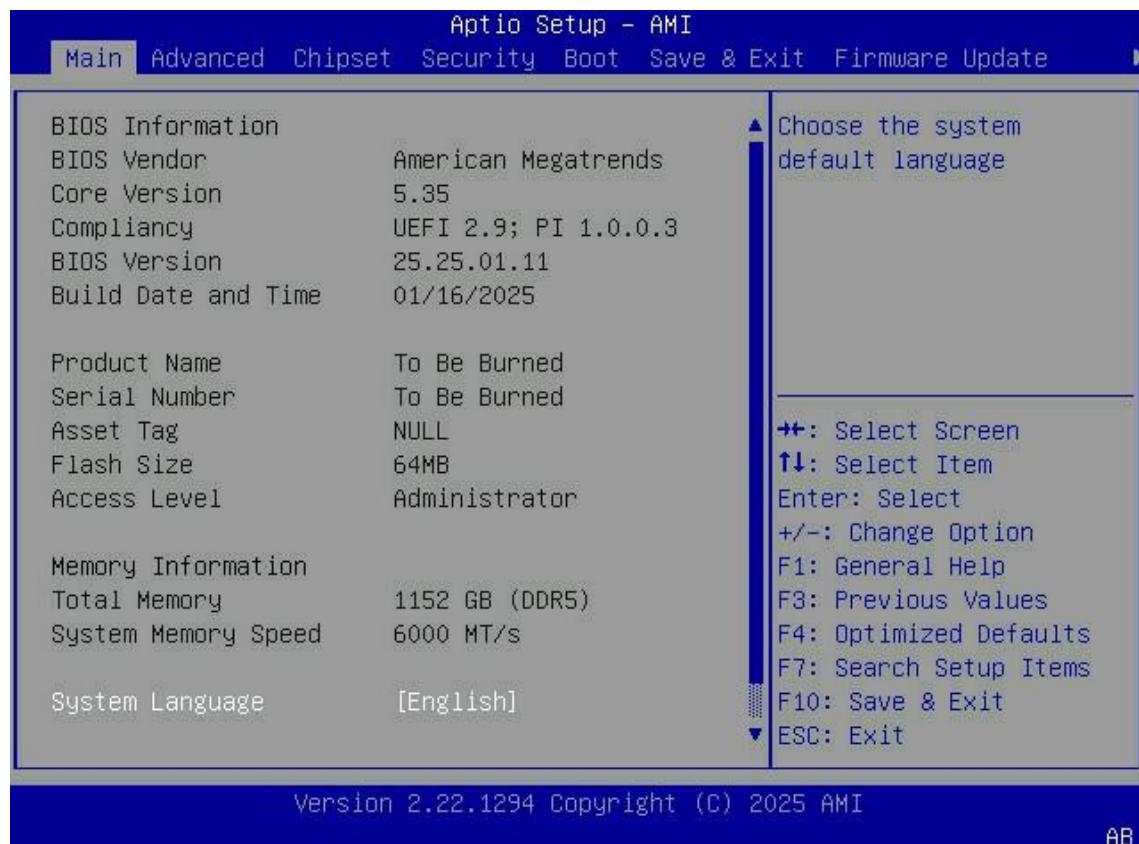
3. Use the arrow keys to select **Advanced**, and then press **Enter**. The **Advanced** screen is displayed, see Figure 2-15.

Figure 2-15 Advanced Screen

```
                        Aptio Setup – AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit  Firmware Update    ▶

  ▶ Network Stack Configuration           ▲  Configuration Utility
  ▶ CSM Configuration                        for ZTE SmartROC3100
  ▶ NVMe Configuration                       RS241-18i 2G
  ▶ SATA Configuration
  ▶ CPU Configuration
  ▶ PXE/iPXE Configuration
  ▶ PCIe Device Info

  ▶ AMD Mem Configuration Status
  ▶ Tls Auth Configuration                   ↔: Select Screen
  ▶ RAM Disk Configuration                   ↑↓: Select Item
  ▶ AMD PBS                                   Enter: Select
  ▶ VLAN Configuration (MAC:00E04C682B58)     +/-: Change Option
  ▶ MAC:00E04C682B58-IPv6 Network Configuration   F1: General Help
  ▶ MAC:00E04C682B58-IPv4 Network Configuration   F3: Previous Values
  ▶ VLAN Configuration (MAC:AE3855598C26)     F4: Optimized Defaults
  ▶ MAC:AE3855598C26-IPv4 Network Configuration   F7: Search Setup Items
  ▶ ZTE SmartROC3100 RS241-18i 2G             F10: Save & Exit
  ▶ Driver Health ZTE SmartROC3100 RS241-18i 2G ▼ ESC: Exit

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                                                                        AB
```

4. Use the arrow keys to select **NETAŞ SmartROC3100 RM242-18i 4G**, and press **Enter**. The controller management screen is displayed, see Figure 2-16.

Figure 2-16 Controller Management Screen
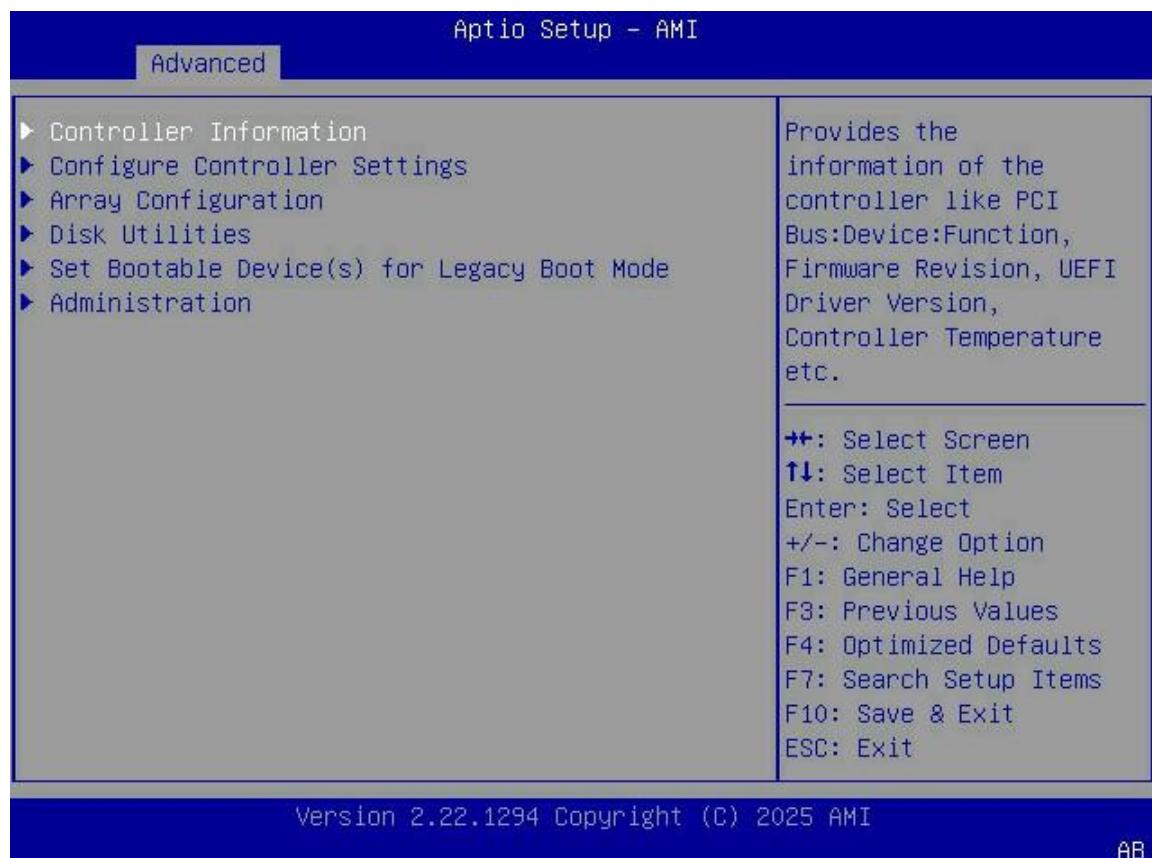
For a description of the functions of the menus on the controller management screen, refer to Table 2-4.

Table 2-4 Functions of Menus on the Controller Management Screen

Menu	Function Description
Controller Information	Displays the basic information, firmware, current temperature, and port configuration of the controller.
Configure Controller Settings	Provides advanced configuration options for the controller.
Array Configuration	Creates an array or RAID.
Disk Utilities	Displays the list of disk devices mounted under the controller as well as the basic disk information. It allows you to turn on the disk location indicator, erase disk data and upgrade the firmware.
Set Bootable Device(s) for Legacy Boot Mode	Configures, or clears the primary and secondary boot disks.
Administration	Allows the controller administrator to perform operations, such as upgrading the firmware and restoring factory defaults.

2.3.2 Setting the Mode of a Port

Abstract

The ports of a PMC RAID controller card, namely, the ports connected with a disk backplane and disk cables, support three modes: RAID, HBA and Mixed. Before adding the disk corresponding to a port to a RAID logical volume, you must check the port mode.
The PMC card supports setting the port mode in the following two ways:

- Setting the mode of all ports in batches
- Setting the mode of a port separately

Context

Port modes include RAID, HBA and Mixed, which are described as follows:

- In RAID mode, the connected disks can be used only after they form a RAID volume.
- In HBA mode, the connected disks are pass-through disks and cannot be used to create a RAID volume. Instead, they can only be used directly.
- In Mixed mode, the connected disks support both RAID and HBA mode.
    → The RAID mode is applicable to the disks that have been used to create a RAID volume.
    → The HBA mode (pass-through) is applicable to the disks that are not used to create a RAID volume.

Steps

- Setting the Mode of All Ports in Batches
    1. On the controller management screen, use the arrow keys to select **Configure Controller Settings**, and then press **Enter**. The **Configure Controller Settings** screen is displayed, see Figure 2-17.

Figure 2-17 Configure Controller Settings Screen

```
                          Aptio Setup - AMI
         Advanced

  ▶ Modify Controller Settings              Configures the         ▲
  ▶ Modify Cache Settings                   supported controller
  ▶ Advanced Controller Settings            settings. Depending on
  ▶ Modify Spare Activation Mode            the controller, these
  ▶ Clear Configuration                     can include setting the
  ▶ Backup Power Source                     cache ratio,
  ▶ Manage Power Settings                   transformation and
  ▶ Out of Band Messaging Settings          rebuild priorities and ▼
  ▶ Self-Encryption Drive (SED) Based Encryption
    Setup                                   ➦+: Select Screen
  ▶ Configure Controller Port Mode          ↑↓: Select Item
  ▶ Modify Expander Minimum Scan Duration   Enter: Select
  ▶ Configure Persistent Event Log Policy   +/-: Change Option
  ▶ Configure Controller UEFI Driver Health F1: General Help
    Reporting                               F3: Previous Values
  ▶ Configure Spindown Spares Policy        F4: Optimized Defaults
                                            F7: Search Setup Items
                                            F10: Save & Exit
                                            ESC: Exit


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                                                              AB
```

2. Use the arrow keys to select **Configure Controller Port Mode**, and then press **Enter**.

The **Configure Controller Port Mode** screen is displayed, see Figure 2-18.

Figure 2-18 Configure Controller Port Mode Screen
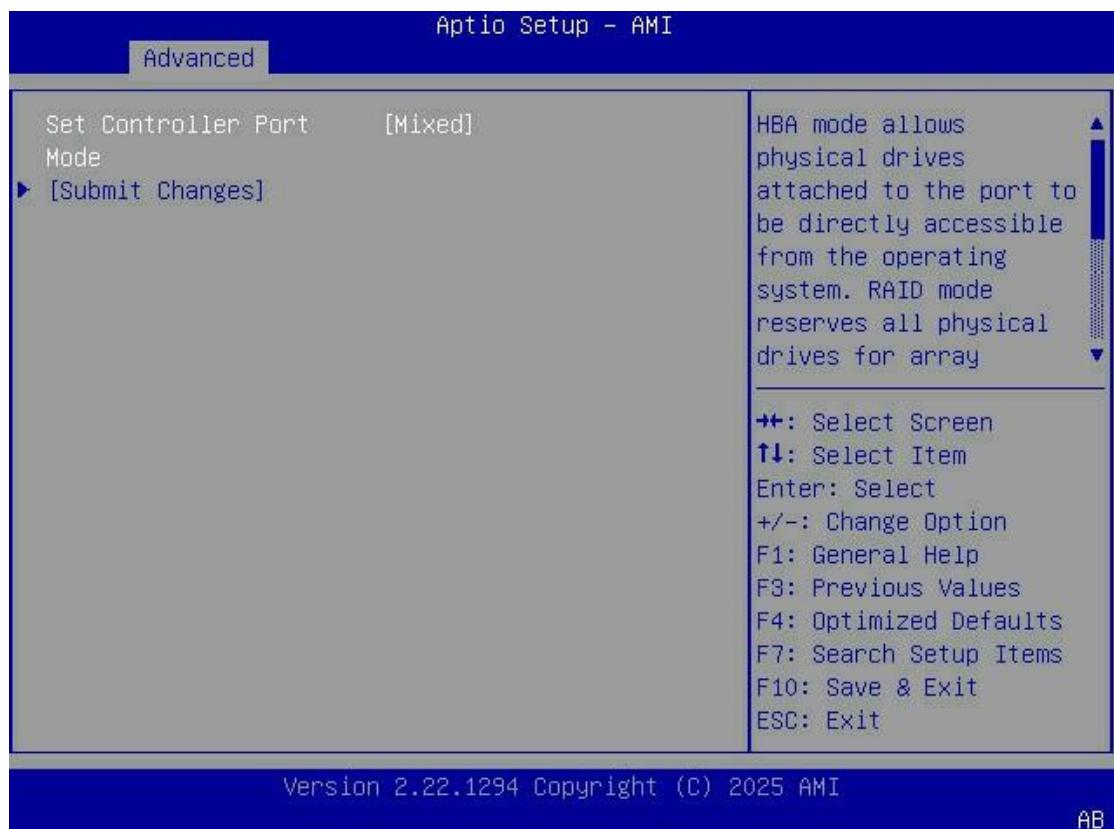
```
                        Aptio Setup – AMI
        Advanced

    Set Controller Port      [Mixed]           HBA mode allows
    Mode                                       physical drives
  ▶ [Submit Changes]                           attached to the port to
                                               be directly accessible
                                               from the operating
                                               system. RAID mode
                                               reserves all physical
                                               drives for array

                                               ↔: Select Screen
                                               ↑↓: Select Item
                                               Enter: Select
                                               +/-: Change Option
                                               F1: General Help
                                               F3: Previous Values
                                               F4: Optimized Defaults
                                               F7: Search Setup Items
                                               F10: Save & Exit
                                               ESC: Exit

                Version 2.22.1294 Copyright (C) 2025 AMI
                                                              AB
```

3. Use the arrow keys to select **Set Controller Port Mode**, and then press **Enter**. The **Set Controller Port Mode** dialog box is displayed, see Figure 2-19.

Figure 2-19 Set Controller Port Mode Dialog Box
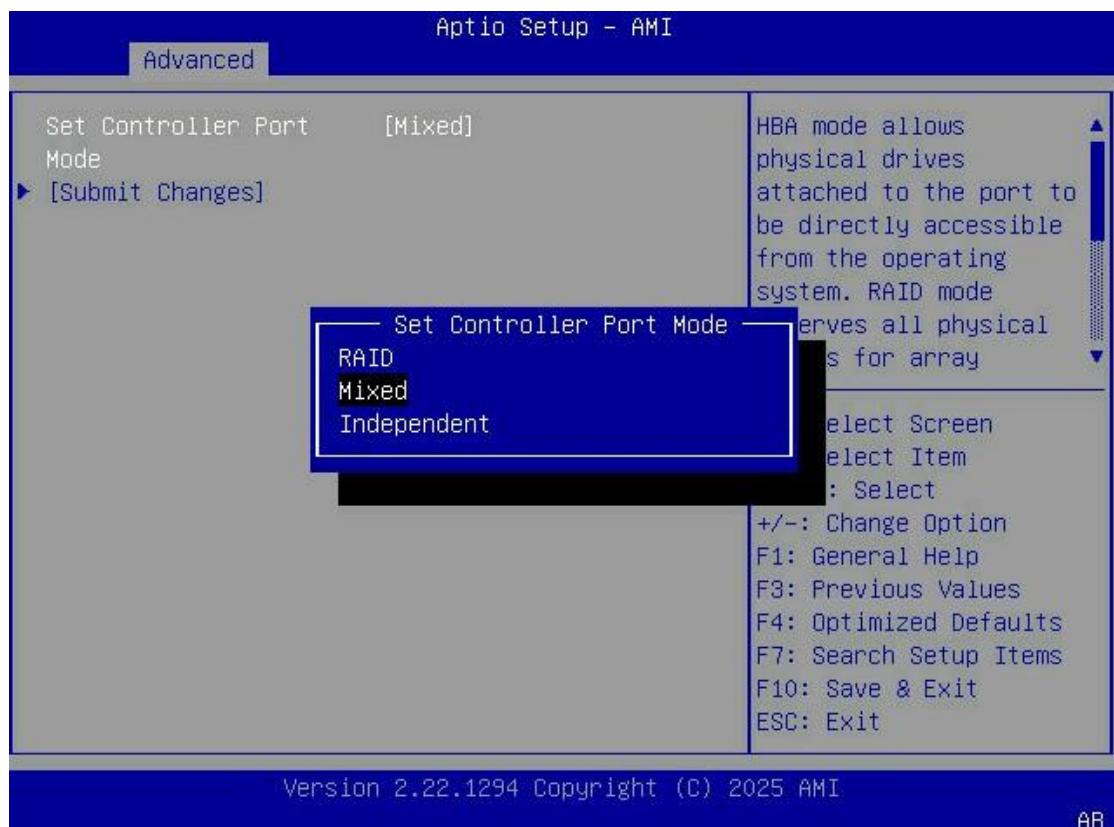
4. Use the arrow keys to select the port mode to be set, and then press **Enter**, see Figure 2-20.

Figure 2-20 Selecting a Port Mode
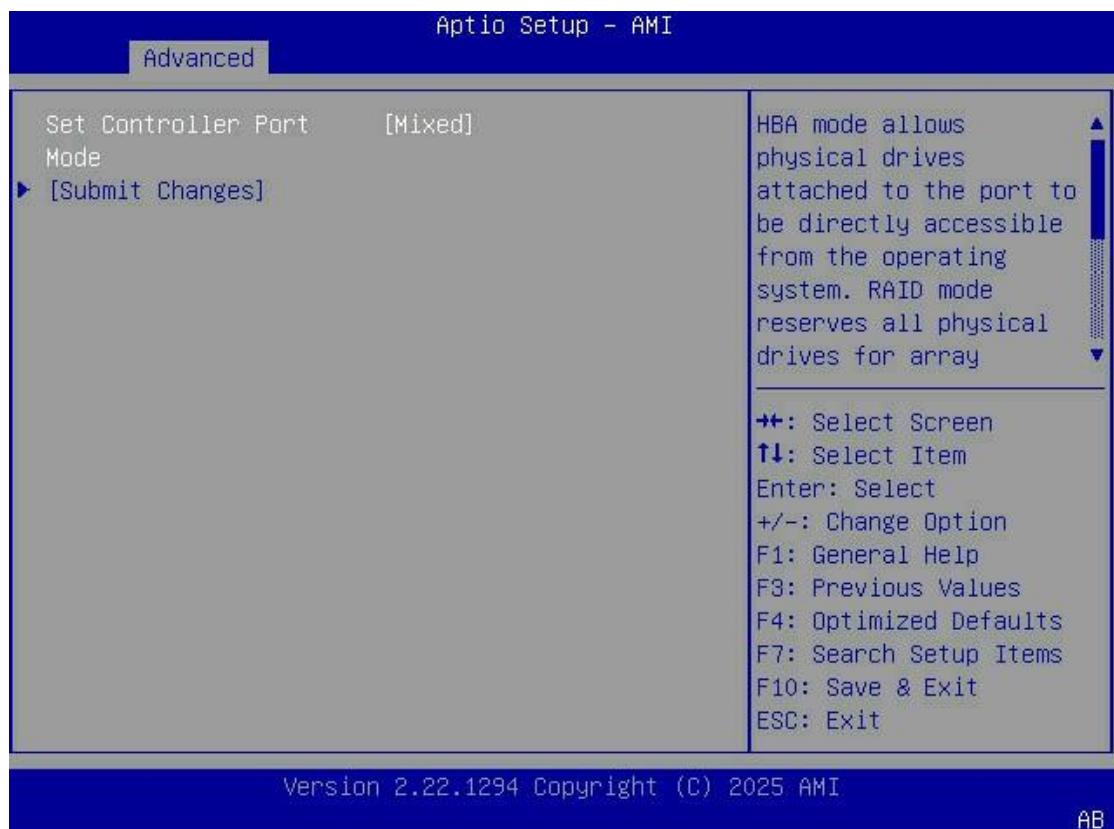
5. Use the arrow keys to select **Submit Changes**, and press **Enter**. The port mode is set successfully, see Figure 2-21.

Figure 2-21 Successful Setting

```
                          Aptio Setup - AMI
       Advanced

   Controller Port Mode changes applied       Navigate back to Main
   successfully                                Menu

  ▶ [Back to Main Menu]




                                              ⭢⭠: Select Screen
                                              ↑↓: Select Item
                                              Enter: Select
                                              +/-: Change Option
                                              F1: General Help
                                              F3: Previous Values
                                              F4: Optimized Defaults
                                              F7: Search Setup Items
                                              F10: Save & Exit
                                              ESC: Exit

                 Version 2.22.1294 Copyright (C) 2025 AMI
                                                                   AB
```
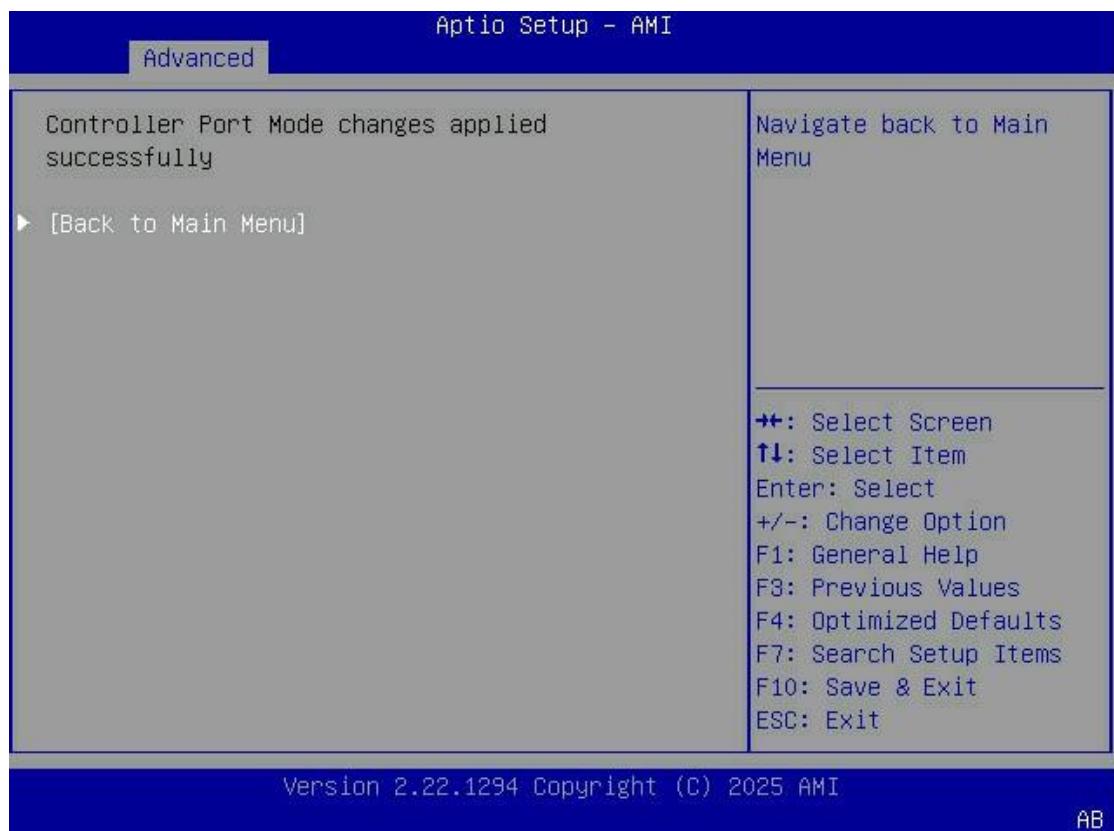
6. Select **Back to Main Menu**, and then press **Enter** to return to the controller management screen.

- Setting the Mode of a Port Separately

  1. On the controller management screen, use the arrow keys to select **Configure Controller Settings**, and then press **Enter**. The **Configure Controller Settings** screen is displayed, see Figure 2-22.

Figure 2-22 Configure Controller Settings Screen


```
                        Aptio Setup – AMI
          Advanced

 ▶ Modify Controller Settings            Configures the        ▲
 ▶ Modify Cache Settings                 supported controller
 ▶ Advanced Controller Settings          settings. Depending on
 ▶ Modify Spare Activation Mode          the controller, these
 ▶ Clear Configuration                   can include setting the
 ▶ Backup Power Source                   cache ratio,
 ▶ Manage Power Settings                 transformation and
 ▶ Out of Band Messaging Settings        rebuild priorities and ▼
 ▶ Self-Encryption Drive (SED) Based Encryption
   Setup                                 ↔: Select Screen
 ▶ Configure Controller Port Mode        ↑↓: Select Item
 ▶ Modify Expander Minimum Scan Duration Enter: Select
 ▶ Configure Persistent Event Log Policy +/-: Change Option
 ▶ Configure Controller UEFI Driver Health F1: General Help
   Reporting                             F3: Previous Values
 ▶ Configure Spindown Spares Policy      F4: Optimized Defaults
                                         F7: Search Setup Items
                                         F10: Save & Exit
                                         ESC: Exit

            Version 2.22.1294 Copyright (C) 2025 AMI
                                                            AB
```

2. Use the arrow keys to select **Configure Controller Port Mode**, and then press **Enter**.

   The **Configure Controller Port Mode** screen is displayed, see Figure 2-23.

Figure 2-23 Configure Controller Port Mode Screen
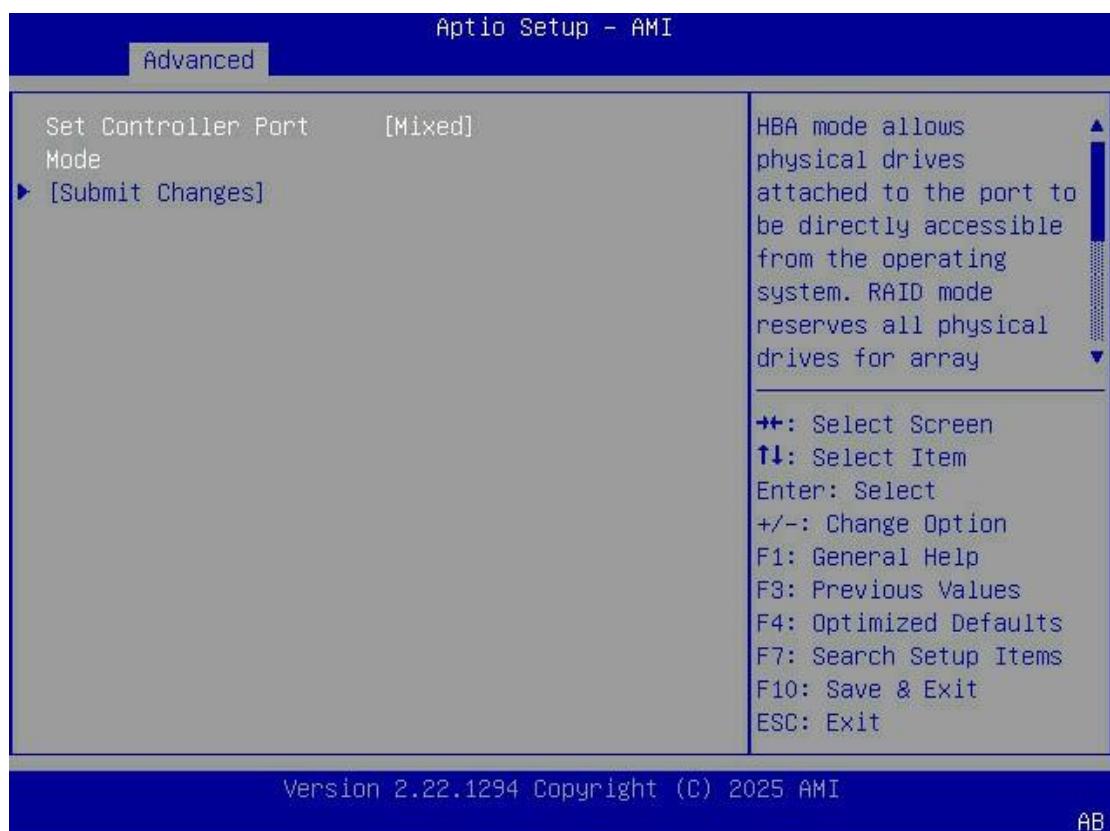
3. Use the arrow keys to select **Set Controller Port Mode**, and then press **Enter**. The **Set Controller Port Mode** screen is displayed, see Figure 2-24.

Figure 2-24 Set Controller Port Mode Screen

4. Use the arrow keys to select **Independent**, and then press **Enter** to set the port mode to **Independent**, see Figure 2-25.

Figure 2-25 Setting the Port Mode to Independent


```
                        Aptio Setup - AMI
        Advanced

    Set Controller Port      [Independent]        HBA mode allows
    Mode                                          physical drives
  ▶ [Submit Changes]                              attached to the port to
                                                  be directly accessible
                                                  from the operating
                                                  system. RAID mode
                                                  reserves all physical
                                                  drives for array


                                                  ←→: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Option
                                                  F1: General Help
                                                  F3: Previous Values
                                                  F4: Optimized Defaults
                                                  F7: Search Setup Items
                                                  F10: Save & Exit
                                                  ESC: Exit

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                                                              AB
```

5. Use the arrow keys to select **Submit Changes**, and press **Enter** to set the port mode, see Figure 2-26.

Figure 2-26 Setting the Port Mode

```
                         Aptio Setup - AMI
       Advanced

     Port CN0 Mode            [Mixed]              Connector Mode: For
     Port CN1 Mode            [Mixed]              Multiple domain
     Port CN2 Mode            [Mixed]              connections, Connector
     Port CN3 Mode            [Mixed]              mode has to be changed
     Port CN4 Mode            [Mixed]              to the same mode for
  ▶  [Submit Changes]                              all connectors
                                                   connected to the Multi
                        ┌──── Port CN3 Mode ────┐  domain device.
                        │ RAID                   │
                        │ HBA                    │
                        │ Mixed                  │  ↔: Select Screen
                        └────────────────────────┘  ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Option
                                                   F1: General Help
                                                   F3: Previous Values
                                                   F4: Optimized Defaults
                                                   F7: Search Setup Items
                                                   F10: Save & Exit
                                                   ESC: Exit

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                                                               AB
```

6. Use the arrow keys to select **Port CN3 Mode**, and then press **Enter**. In the displayed dialog box, set the port mode, see Figure 2-27.

Figure 2-27 Port CN3 Mode Dialog Box

```
                          Aptio Setup - AMI
          Advanced

    Port CN0 Mode            [Mixed]              Connector Mode: For
    Port CN1 Mode            [Mixed]              Multiple domain
    Port CN2 Mode            [Mixed]              connections, Connector
    Port CN3 Mode            [Mixed]              mode has to be changed
    Port CN4 Mode            [Mixed]              to the same mode for
  ▶ [Submit Changes]                             all connectors
                                                 connected to the Multi
                         ┌── Port CN3 Mode ──┐   domain device.
                         │ RAID              │
                         │ HBA               │
                         │ Mixed             │   ↔: Select Screen
                         │                   │   ↑↓: Select Item
                         └───────────────────┘   Enter: Select
                                                 +/-: Change Option
                                                 F1: General Help
                                                 F3: Previous Values
                                                 F4: Optimized Defaults
                                                 F7: Search Setup Items
                                                 F10: Save & Exit
                                                 ESC: Exit

               Version 2.22.1294 Copyright (C) 2025 AMI
                                                                      AB
```

7. Repeat Step 6 to set the mode of another port.

8. Use the arrow keys to select **Submit Changes**, and press **Enter**. The port mode is set successfully, see Figure 2-28.

Figure 2-28 Port Mode Set Successfully
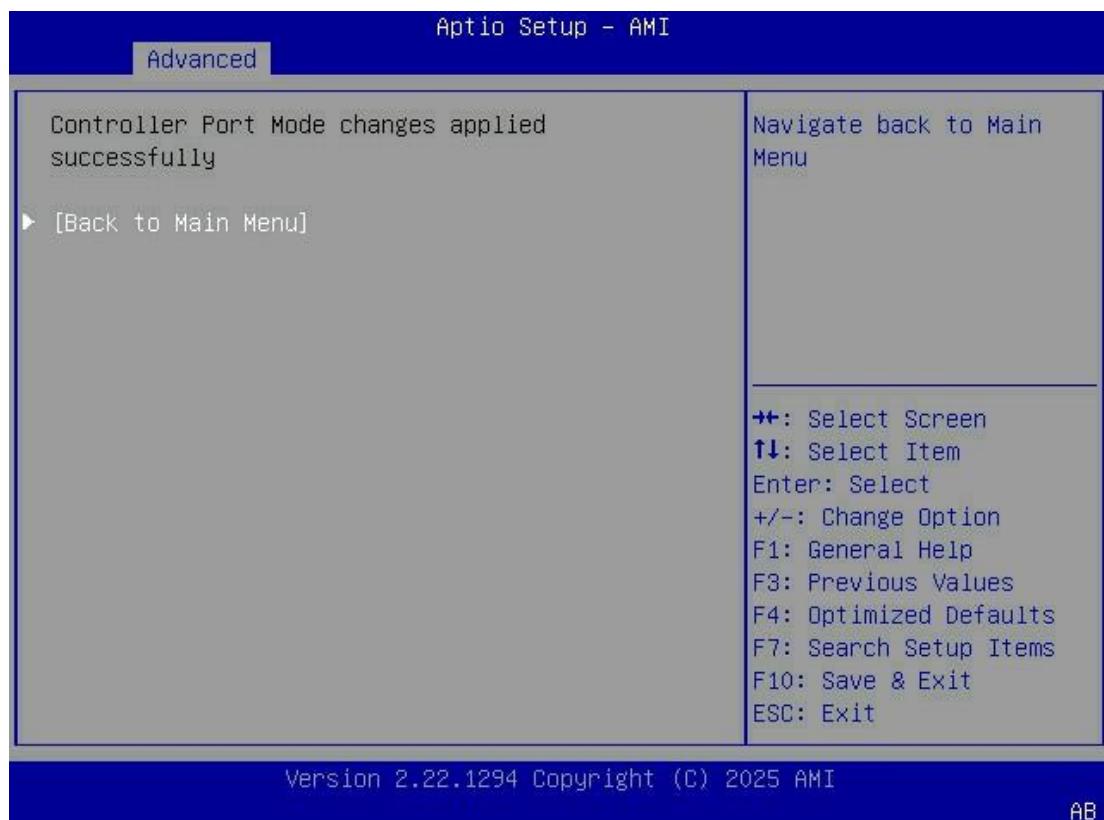
9. Select **Back to Main Menu**, and then press **Enter** to return to the controller management screen.

2.3.3 Creating a RAID Volume

Abstract

You can create RAID volumes at different levels as required.

The operations for creating RAID volumes at different levels are similar. This procedure uses creating a RAID 1 volume in UEFI mode as an example.

Prerequisite

● Sufficient SATA and SAS disks are installed on the server.

● The port mode for the disks to be connected is already set. For details, refer to "2.3.2 Setting the Mode of a Port".

Context

For a description of the number of disks required to create a RAID volume, refer to Table 2-5.

Table 2-5 Number of Disks Required for Creating a RAID Volume

RAID Level	Description
RAID 0	RAID 0 requires at least one disks.
RAID 1	RAID 1 requires at least two disks. Disks with different capacities can be used in a RAID 1 volume, but the logical capacity of each member disk depends on the space of the disk with the smallest capacity.
RAID 5	RAID 5 requires at least three disks.
RAID 6	RAID 6 requires at least four disks.
RAID 1+0	RAID 1+0 requires at least four disks. A RAID 1+0 volume consists of at least two RAID 1 volumes. For example, if there are four hard disks to be stored in the RAID 1+0 mode, you need to add them to two "Drive Group," and each "Drive Group" mounts two hard disks. The storage mode is RAID 1.
RAID 50	RAID 50 requires at least six disks. A RAID 50 volume consists of at least two RAID 5 volumes. For example, if six hard disks need to be stored in the RAID 50 mode, it is necessary to add six hard disks to two "Drive Group," each of which is mounted with three hard disks, and the storage mode is RAID 5.
RAID 60	RAID 60 requires at least eight disks. A RAID 60 volume consists of at least two RAID 6 volumes. For example, if there are eight disks to be used in RAID 60 mode, you need to add them to two drive groups, each of which is mounted with four disks in RAID 6 mode.

Steps

1. On the controller management screen, use the arrow keys to select **Array Configuration**, and then press **Enter**. The **Array Configuration** screen is displayed, see Figure 2-29.

Figure 2-29 Array Configuration Screen
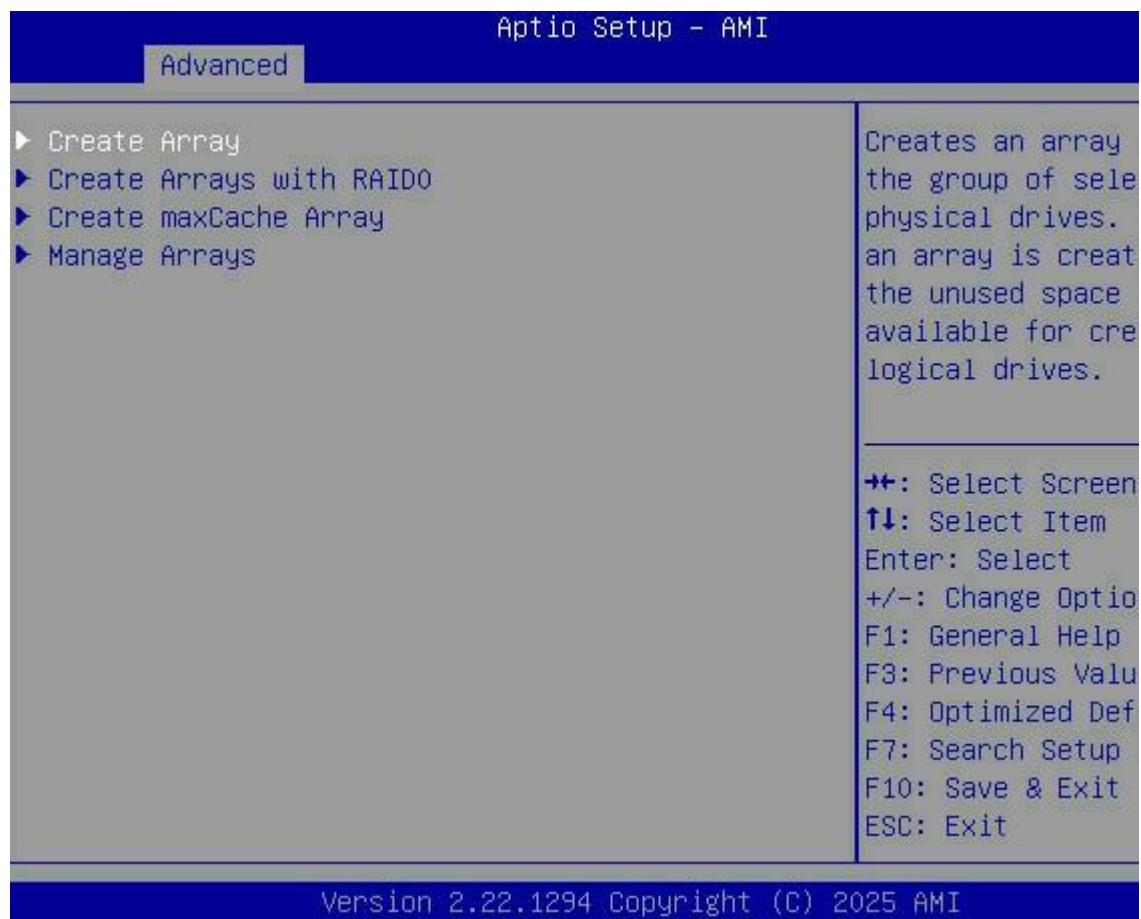
2. Use the arrow keys to select **Create Array**, and then press **Enter**. In the displayed disk list, all the disks that can be used to create a RAID volume are displayed, see Figure 2-30.

Figure 2-30 Viewing the Disk List

```
                        Aptio Setup - AMI
     Advanced

 Port:CN0 Box:1 Bay:0    [Disabled]       Size:894.253
  Size:960.197 GB                         GiB(960.197 GB)
 SATA-SSD ATA                             Port:CN0 Box:1 Bay:0
 DATSSD                                   Logical Sector Size:512
 J960GSBLYAC8CDED90                       Model:ATA      DATSSD
 Port:CN0 Box:1 Bay:1    [Disabled]       J960GSBLYAC8CDED90
  Size:960.197 GB                         Serial
 SATA-SSD ATA                             Number:D230814033KA00010▼
 DATSSD
 J960GSBLYAC8CDED90
 Port:CN0 Box:1 Bay:2    [Disabled]       ←→: Select Screen
  Size:960.197 GB                         ↑↓: Select Item
 SATA-SSD ATA                             Enter: Select
 DATSSD                                   +/-: Change Option
 J960GSBLYAC8CDED90                       F1: General Help
 ▶ [Proceed to next Form]                 F3: Previous Values
                                          F4: Optimized Defaults
                                          F7: Search Setup Items
                                          F10: Save & Exit
                                          ESC: Exit

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                                                              AB
```

3. Select the disk to be added to the array, and then press **Enter** to set the disk port to **Enabled** status, see Figure 2-31.

Figure 2-31 Confirming the Configuration

> **Note**
>
> The disks for creating a RAID volume must be of the same type. It is forbidden to select disks with interface types such as SATA and SAS at the same time.

4. Use the arrow keys to select **Proceed to Next Form**, and then press **Enter**. The screen for creating RAID is displayed, see Figure 2-32.

Figure 2-32 Creating RAID

```
                    Aptio Setup - AMI
      Advanced

  Warning: Self Encrypting Drive-SED devices    RAID Level
  present in the selection. If SED security is
  enabled using any external tool other than the
  controller managed options, the SED may become
  locked after the drive is power cycled. This
  may lead to denial of service or loss of data.
  Proceed with caution..

  RAID Level              [RAID0]
▶ [Proceed to next Form]                         ++: Select Screen
                                                 ↑↓: Select Item
                                                 Enter: Select
                                                 +/-: Change Option
                                                 F1: General Help
                                                 F3: Previous Values
                                                 F4: Optimized Defaults
                                                 F7: Search Setup Items
                                                 F10: Save & Exit
                                                 ESC: Exit

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                                                              AB
```

5. Use the arrow keys to select **RAID Level**, and then press **Enter**. From the displayed shortcut menu, select the desired RAID level, see Figure 2-33.

Figure 2-33 Selecting a RAID Level

```
                        Aptio Setup - AMI
    Advanced

 Warning: Self Encrypting Drive-SED devices      RAID Level
 present in the selection. If SED security is
 enabled using any external tool other than the
 controller managed options, the SED may become
 locked after the drive is power cycled. This
 may lead to denial of service or loss of data.
 Proceed with caution..

                              ┌─ RAID Level ─┐
 RAID Level          [R│ RAIDO             │   ─────────────────
 ▶ [Proceed to next Form]  │ RAID1          │   ++: Select Screen
                              └──────────────┘   ↑↓: Select Item
                                                 Enter: Select
                                                 +/-: Change Option
                                                 F1: General Help
                                                 F3: Previous Values
                                                 F4: Optimized Defaults
                                                 F7: Search Setup Items
                                                 F10: Save & Exit
                                                 ESC: Exit

            Version 2.22.1294 Copyright (C) 2025 AMI
                                                              AB
```

6. Use the arrow keys to select **Proceed to Next Form**, and press **Enter**. The screen for setting RAID logical volumes is displayed, see Figure 2-34.

Figure 2-34 Setting RAID Logical Volumes

```
                          Aptio Setup - AMI
        Advanced

  Logical Drive Label      Logical Drive 1          Enter a label for this
  Strip Size / Full        [256 KiB / 256 KiB]      logical drive. The
  Stripe Size                                       label is displayed in
  Size                     894.221                  the Logical Drive
  Unit Size                [GiB]                     Details section
  SSD Over                 [Disable]
  Provisioning
  Optimization
  Acceleration Method      [IO Bypass]
 ▶ [Submit Changes]                                 ↔: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Option
                                                    F1: General Help
                                                    F3: Previous Values
                                                    F4: Optimized Defaults
                                                    F7: Search Setup Items
                                                    F10: Save & Exit
                                                    ESC: Exit

                  Version 2.22.1294 Copyright (C) 2025 AMI
                                                                       AB
```

7. Use the arrow keys to select the parameters that you want to modify. In the displayed operation boxes, configure the related parameters. For a description of the parameters for setting a logical volume, refer to Table 2-6.

Table 2-6 Parameter Descriptions for Logical Volume Configuration

Parameter	Description
Logical Drive Label	Sets the name of the RAID logical volume, for example, "Logical Drive 1".
Strip Size/Full Stripe Size	● Strip Size indicates the size of the current stripe. The stripe size should be equal to the size of average disk IO requests generated by server applications. In the optimum status, only one IO operation is executed for each IO request. The size can be 16 KiB, 32 KiB, 64 KiB, 128KiB, 512 KiB, or 1024 KiB. The default value is 256 KiB. The recommended stripe size configurations are as follows: ➔ For a Web server, 8 KiB is recommended. ➔ For a groupware server (such as an email server), 16 KiB is recommended. ➔ For a database server, 16 KiB or 32 KiB is recommended. ➔ For a file server, 32 KiB or 64 KiB is recommended. ➔ For a video file server, 64 KiB, 128 KiB, or 256 KiB is recommended.

Parameter	Description
	● Full Stripe Size indicates the total size of all stripes. When you set **Strip Size**, the system automatically calculates **Full Stripe Size**.
Size	Displays the storage size of the RAID volume in accordance with the total storage space of the disks added to the RAID volume. By default, all available space is used to create a RAID logical volume. To create multiple RAID logical volumes, you can define the size of the volumes.
Unit Size	Select the unit (MiB/GiB/TiB) of the logical drive.
Acceleration Method	Sets the caching mode for the RAID volume. ● IO Bypass: This option is valid only when the RAID logical volume is formed by SSDs. ● Controller Cache: enables controller cache optimization. The read cache and write cache are used at the same time. ● None: disables the controller cache. Neither **IO Bypass** nor **Controller Cache** is used. Keep the default configuration unless otherwise specified.

8. Use the arrow keys to select **Submit Changes**, and press **Enter**. The RAID volume is created successfully, see Figure 2-35.

Figure 2-35 RAID Volume Created Successfully
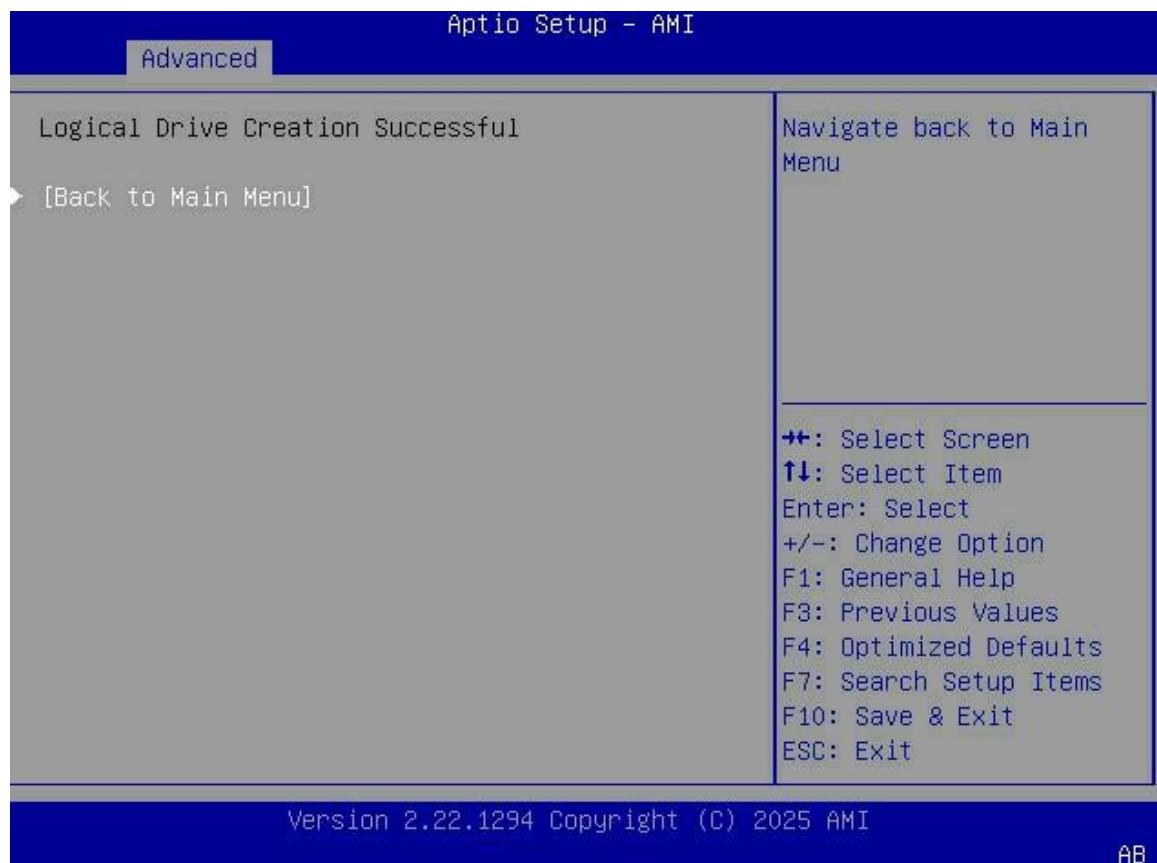
9. Select **Back to Main Menu**, and then press **Enter** to return to the controller management screen.

2.4 Common Configurations (Legacy Mode)

By using the BIOS configuration utility, you can configure and maintain a created RAID volume. For a description of the common operations on a PMC RAID card in legacy mode, refer to Table 2-7.

Table 2-7 Common Operations on a PMC Card

Common Operation	Description
Querying RAID volume information	Refer to "2.4.1 Querying RAID Volume Information".
Creating a hot spare disk	Refer to "2.4.2 Creating a Hot Spare Disk".
Deleting a RAID volume	Refer to "2.4.3 Deleting a RAID Volume".
Deleting a hot spare disk	Refer to "2.4.4 Deleting a Hot Spare Disk".
Locating a disk	Refer to "2.4.5 Locating a Disk".

Common Operation	Description
Configuring a pass-through disk	Refer to "2.4.6 Configuring a Pass-Through Disk".

2.4.1 Querying RAID Volume Information

Abstract

This procedure describes how to query the RAID information created on a PMC RAID card, such as the RAID volume status and member disk status.

Prerequisite

A RAID volume is created successfully. For details, refer to "2.2.2 Creating a RAID Volume".

Steps

1. On the **Configuration Menu** screen, use the arrow keys to select **Manage Arrays**, and then press **Enter**. The **List of Arrays** screen is displayed, see Figure 2-36.

   Figure 2-36 List of Arrays Screen
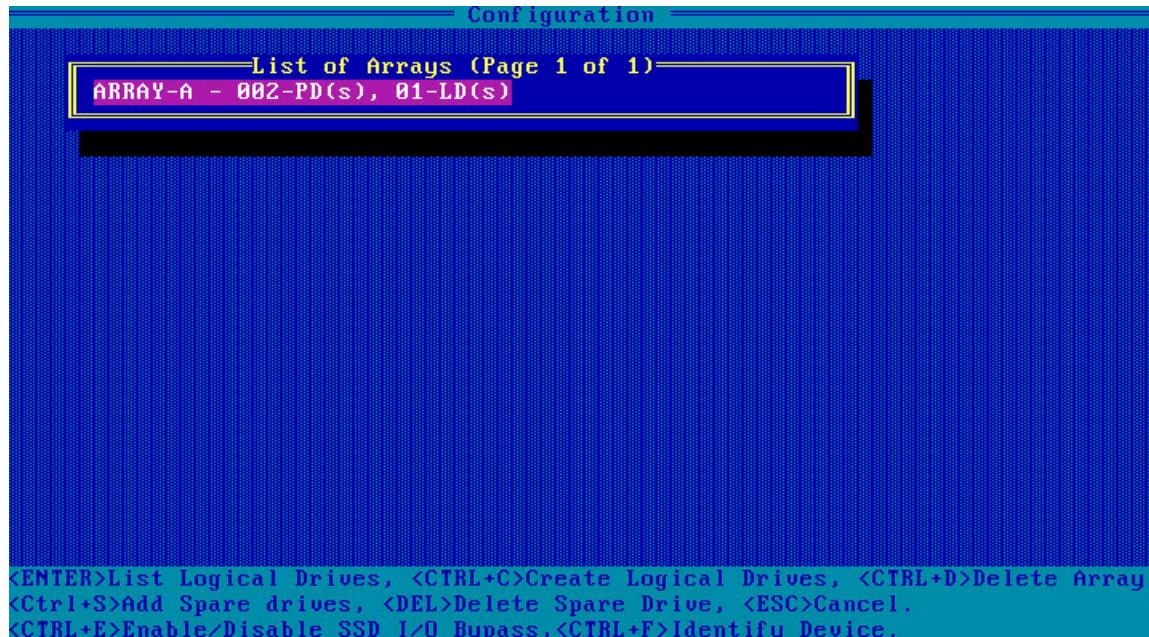
2. Select the RAID volume whose properties you want to view, and then press **Enter**. The **List of Logical Drives** screen is displayed, see Figure 2-37.

Figure 2-37 List of Logical Drives Screen

```
══════════════════════════ Configuration ══════════════════════════

          ┌══════════List of Logical Drives (Page 1 of 1)═══════════┐
          │ 01 0                          RAID1  894.2GiB            │
          └──────────────────────────────────────────────────────────┘





<Enter> Display Logical Drive Details, <Del> Delete Logical Device
<Ctrl+P> Set as Primary Boot LD,<Ctrl+S> Set as Secondary Boot LD
<CTRL+D> Delete Bootable Logical Drive , <CTRL+F>Force Online LD
<↑↓> Moves Cursor
```

3. Press **Enter**. In the displayed **Logical Drive Details** dialog box, view the property information about the RAID volume, see Figure 2-38.

Figure 2-38 Logical Drive Details Dialog Box

```
══════════════════════════ Configuration ══════════════════════════

          ┌══════════List of Logical Drives (Page 1 of 1)═══════════┐
          │ 01 0                          RAID1  894.2GiB            │
          └──────────────────────────────────────────────────────────┘

          ┌═══════════════════Logical Drive Details══════════════════┐
          │ Array Name                    : Array-A                  │
          │ Status                        : Ok                       │
          │ Drive Type                    : Data                     │
          │ Size                          :  894.2GiB                │
          │ RAID Level                    : RAID1                    │
          │ Legacy Disk Geometry(C/H/S)   :  65535/255/32            │
          │ Strip Size/Full Stripe size   : 128KiB/128KiB            │
          │ Drive Unique ID               : 600508b1001c73f794025aec997c1ef3 │
          │ Logical Drive Label           : 0                        │
          │ Acceleration Method           : SSD I/O Bypass           │
          └──────────────────────────────────────────────────────────┘

<ESC> Back to previous menu <CTRL+D> Display Array Members
<CTRL+S> Display Spare Drives
```

4. (Optional) To view the member disk information, press **Ctrl+D**. The **Array Member Drives** dialog box is displayed, see Figure 2-39.

Figure 2-39 Array Member Drives Dialog Box
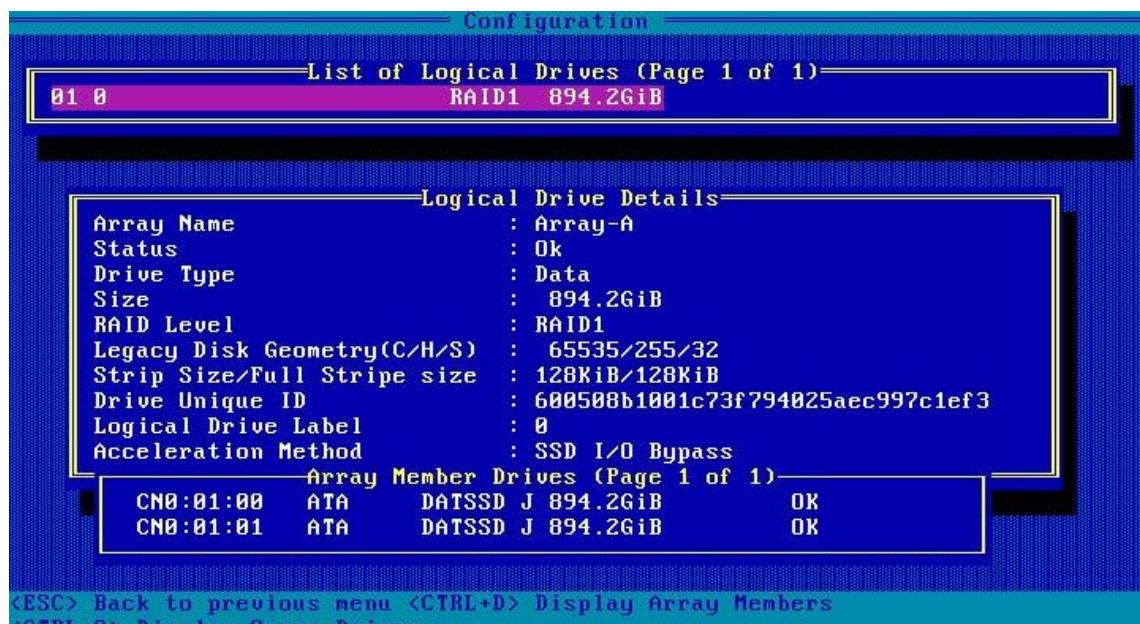
2.4.2 Creating a Hot Spare Disk

Abstract

A hot spare disk improves the data security of a RAID array. For a description of the hot spare disk types supported by a PMC RAID controller card, refer to Table 2-8.

Table 2-8 Hot Spare Disk Types

Type	Description
Dedicated	● This type of hot spare disks is exclusive to the specified one or more disk groups of a RAID card. One or more hot spare disks can be created for each disk group. ● When a disk in a disk group is faulty, a dedicated hot spare disk temporarily takes over the faulty disk. ● After a new disk is added, it will be recreated in the disk group to restore the disk group status. The hot spare disk in the disk group is restored to the Dedicated Hot Spare Drive status, and can be manually associated with all disk groups as a global hot spare disk.
Auto Replace	● This type of hot spare disks provides the hot standby function for a disk group of a RAID card. One or more hot spare disks can be created for each disk group. ● When a disk in a disk group is faulty, a hot spare disk of this type automatically replaces the faulty disk. ● After a new disk is installed, the hot spare disk is still in the disk group, and the newly added disk is automatically converted into an Auto Replace hot spare

Type	Description
	disk, which can be associated with only one disk group as a dedicated hot spare disk.

Prerequisite

There are sufficient idle disks on the server.

Context

When creating a hot spare disk, pay attention to the following points:

● Multiple hot spare disks can be created for a disk group, but only one type of hot spare disk can be set at a time. That is, either **Dedicated** or **Auto Replace** is specified.

● An idle disk can be set as a hot spare disk. The disk that has been used to create a RAID volume cannot be set as a hot spare disk.

● The hot spare disk must be of the same type as that of any member disk in the corresponding disk group. That is, all of them are SATA disks or SAS disks, and the hot spare disk's capacity must not be less than the maximum capacity of the member disks.

● Disk groups at all levels except RAID 0 support hot spare disks.

Steps

1. On the **Configuration Menu** screen, use the arrow keys to select **Manage Arrays**, and then press **Enter**. The **List of Arrays** screen is displayed, see Figure 2-40.

Figure 2-40 List of Arrays Screen
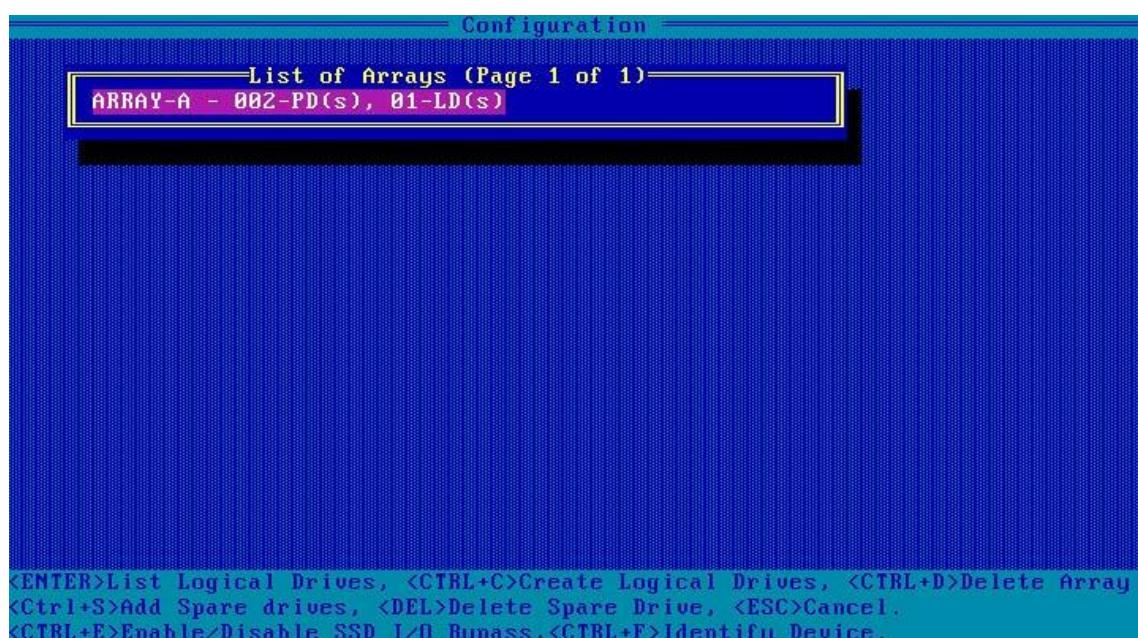
2. Use the arrow keys to select the RAID volume for which you want to configure a hot spare disk, and press **Ctrl+S**. The **Select Hotspare Drives** screen is displayed, see Figure 2-41.

Figure 2-41 Select Hotspare Drives Screen
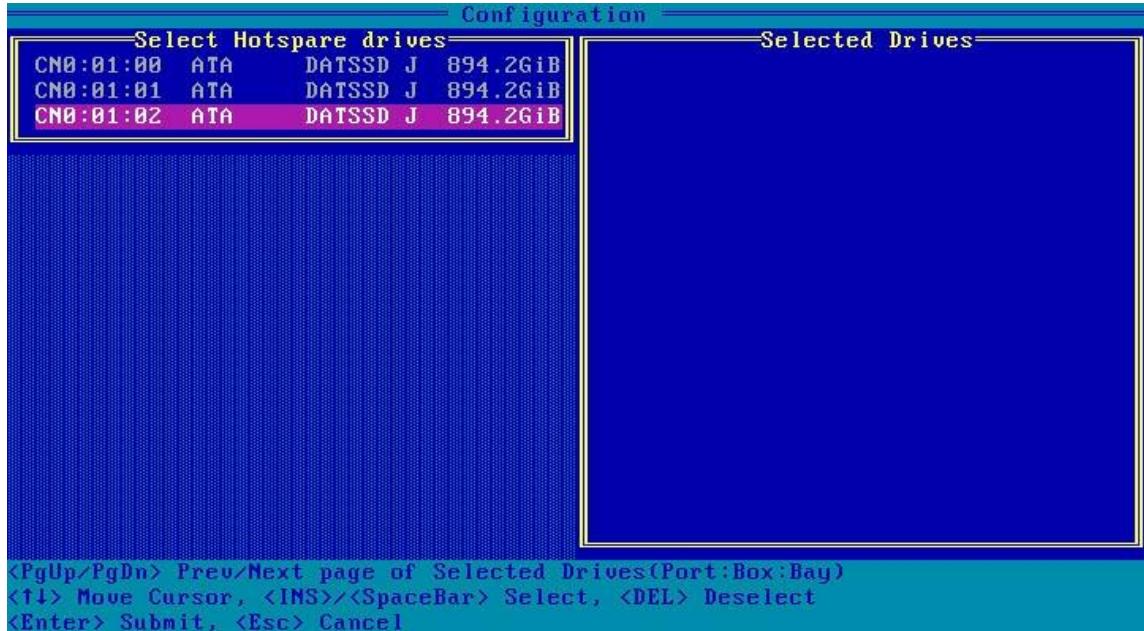
3. Use the arrow keys to select the idle disk to be set as a hot spare disk, and then press **Insert** to add the disk to the **Selected Drives** list, see Figure 2-42.

Figure 2-42 Selected Drives Screen
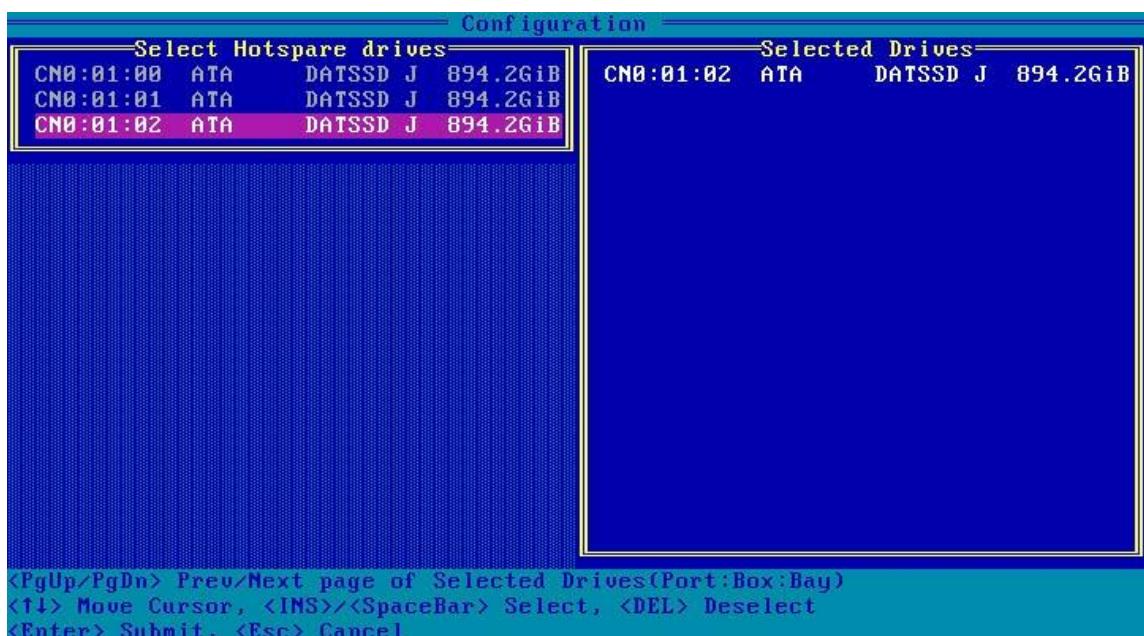
Note

Press the **Delete** key to delete the selected disk from the **Selected Drives** list.

4. Press **Enter**. A confirmation dialog box is displayed, see Figure 2-43.

Figure 2-43 Confirmation Dialog Box
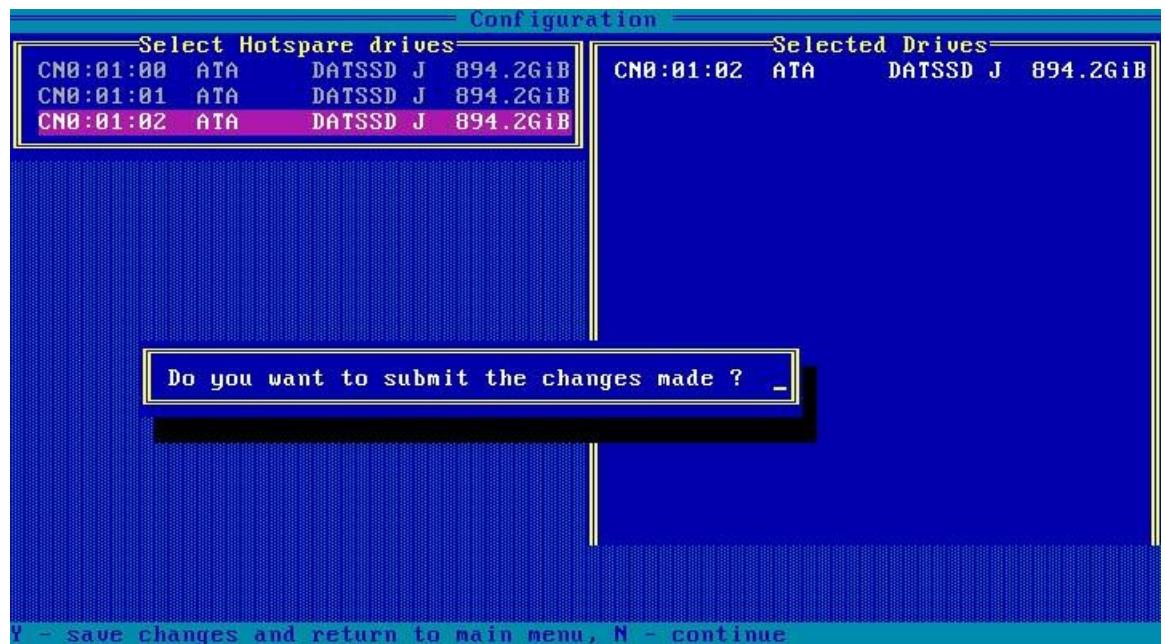
5. At the cursor in the confirmation dialog box, enter **Y**. The **Select Spare Type** screen is displayed, see Figure 2-44.

Figure 2-44 Select Spare Type Screen
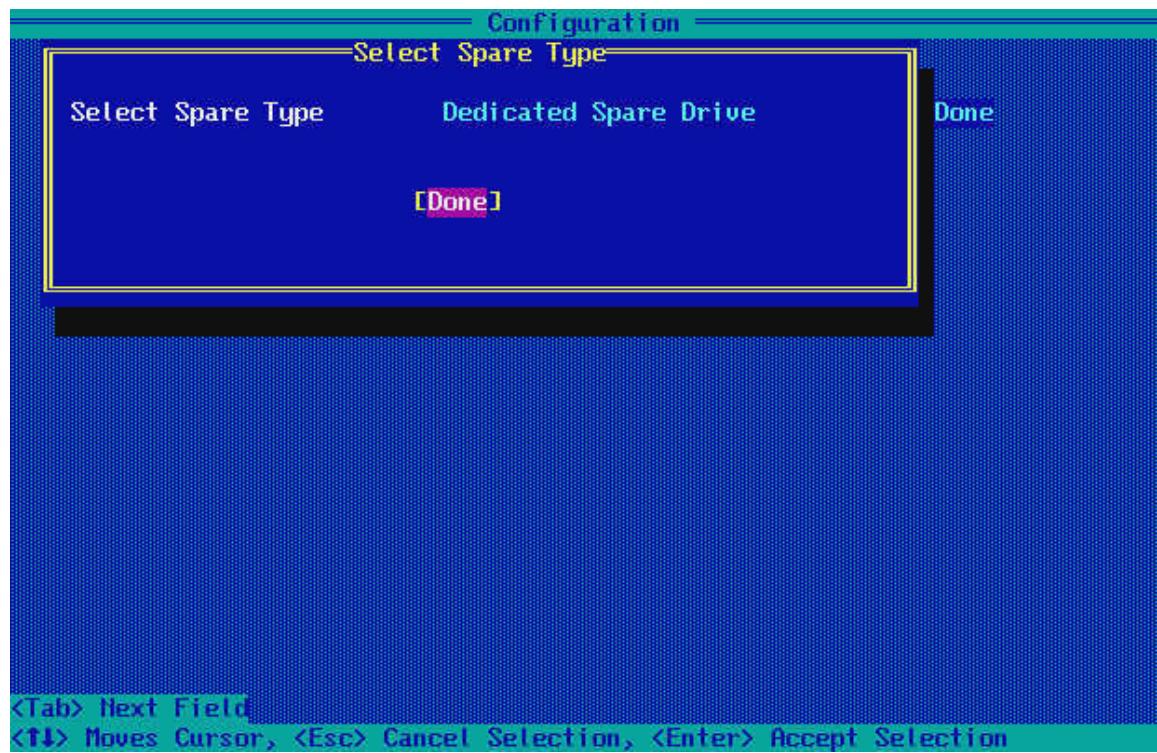
6. Use the arrow keys to select the type of hot spare disk to be created, and then press **Enter** for confirmation, see Figure 2-45.

Figure 2-45 Select Spare Type Screen
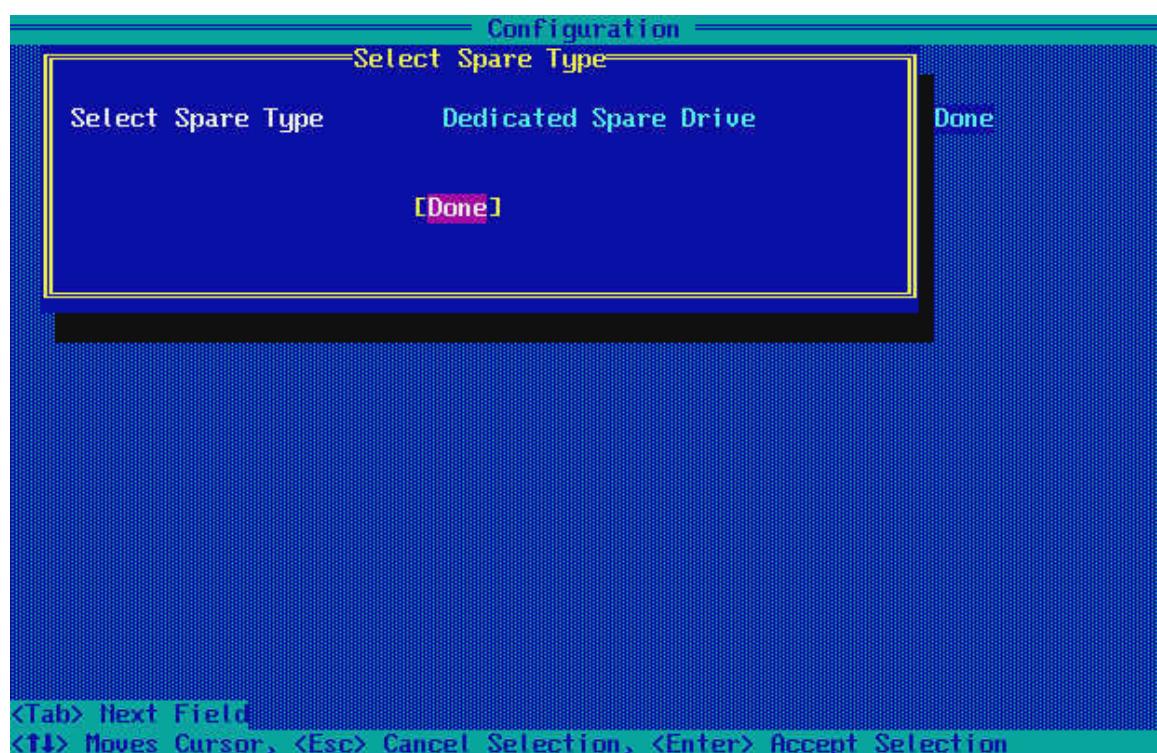
7. Use **Tab** to select **Done**, and then press **Enter** to create the hot spare disk, see Figure 2-46.

Figure 2-46 Creating a Hot Spare Disk
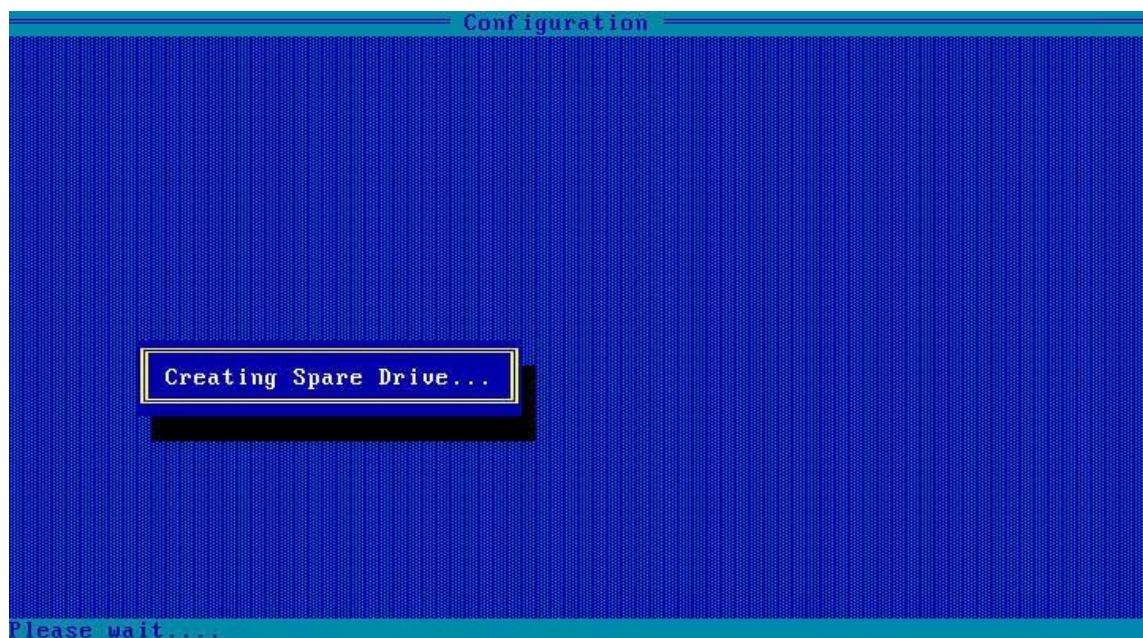
2.4.3 Deleting a RAID Volume

Abstract

When a server no longer needs a RAID volume, you can delete the RAID volume to release the disk space.

🛈 **Notice**

The data that is lost during deletion of the RAID volume cannot be restored. Therefore, you must make sure that you have backed up important data before deleting the volume.

Prerequisite

A RAID volume is created successfully. For details, refer to "2.2.2 Creating a RAID Volume".

Steps

1. On the **Configuration Menu** screen, use the arrow keys to select **Manage Arrays**, and then press **Enter**. The **List of Arrays** screen is displayed, see Figure 2-47.

Figure 2-47 List of Arrays Screen

2. Use the arrow keys to select the array where the RAID volume to be deleted is located, and then press **Enter**. The **List of Logical Drives** screen is displayed, see Figure 2-48.

Figure 2-48 List of Logical Drives Screen
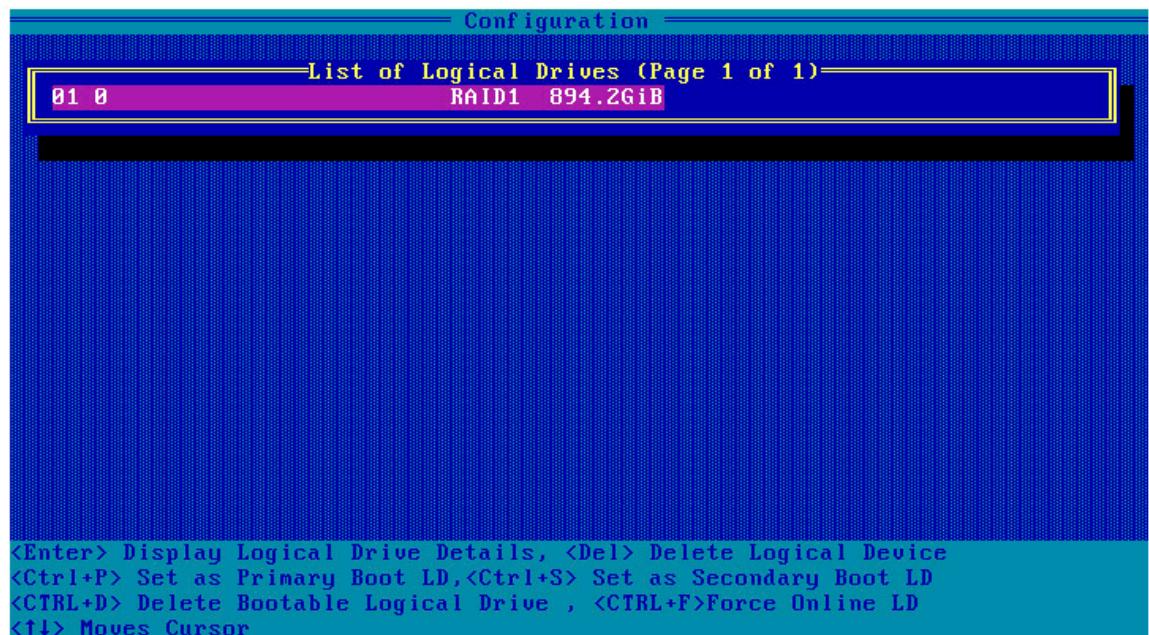
3. Use the arrow keys to select the RAID volume to be deleted, and press **Delete**. A warning dialog box is displayed, see Figure 2-49.

Figure 2-49 Warning Dialog Box

4. At the cursor in the warning dialog box, enter **Y** to delete the selected hot spare disk.

2.4.4 Deleting a Hot Spare Disk

Abstract

When the number of disks of a server cannot meet the requirements, you can delete an existing hot spare disk and restore it to a common disk.

Prerequisite

A hot spare disk is already created. For details, refer to "2.4.2 Creating a Hot Spare Disk".
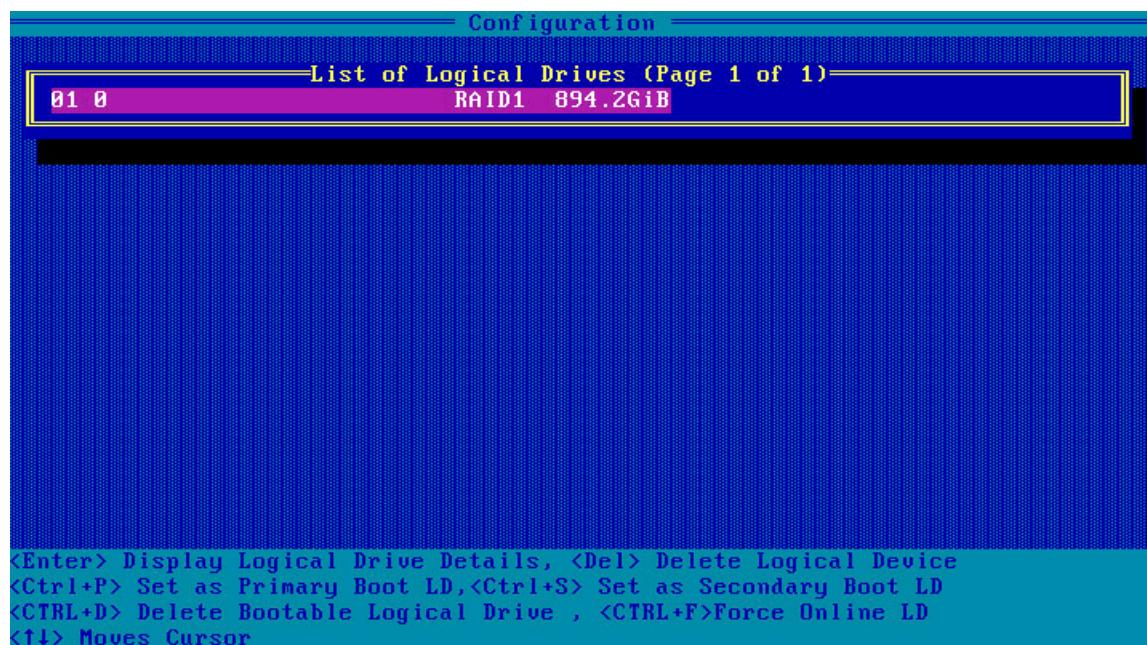
Steps

1. On the **Configuration Menu** screen, use the arrow keys to select **Manage Arrays**, and then press **Enter**. The **List of Arrays** screen is displayed, see Figure 2-50.

Figure 2-50 List of Arrays Screen
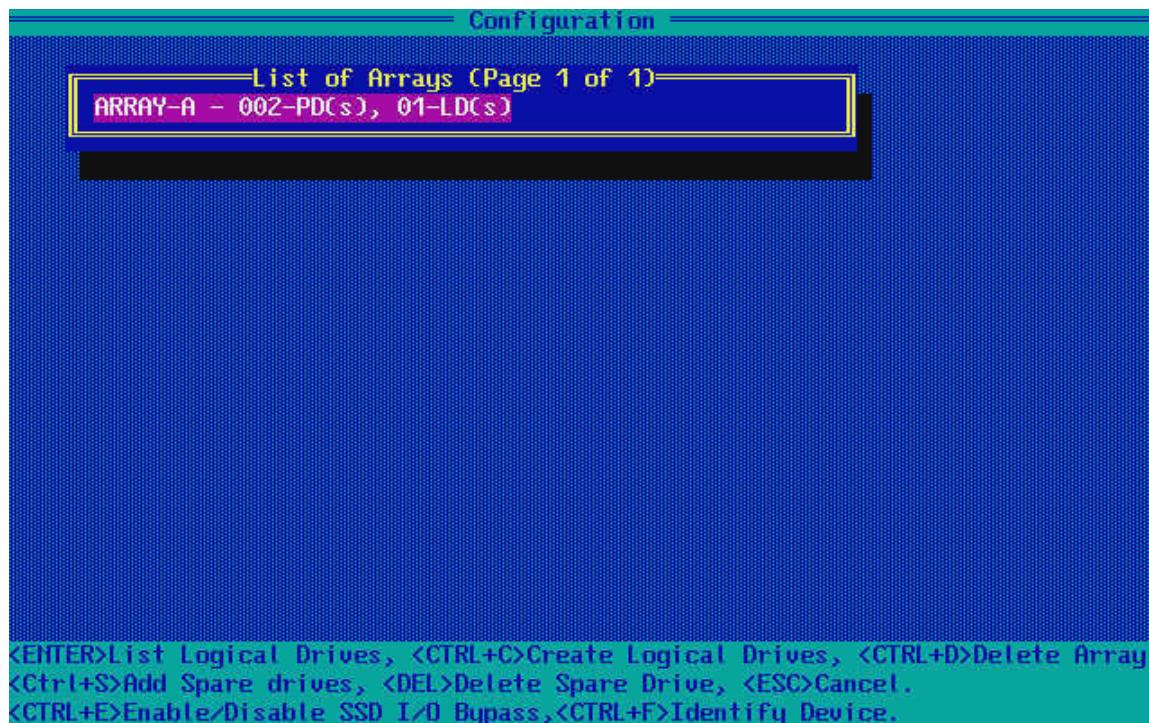
2. Use the arrow keys to select the array where the hot spare disk to be deleted is located, and press **Delete**. The **Select Hotspare drives** screen is displayed, see Figure 2-51.

Figure 2-51 Select Hotspare Drives Screen
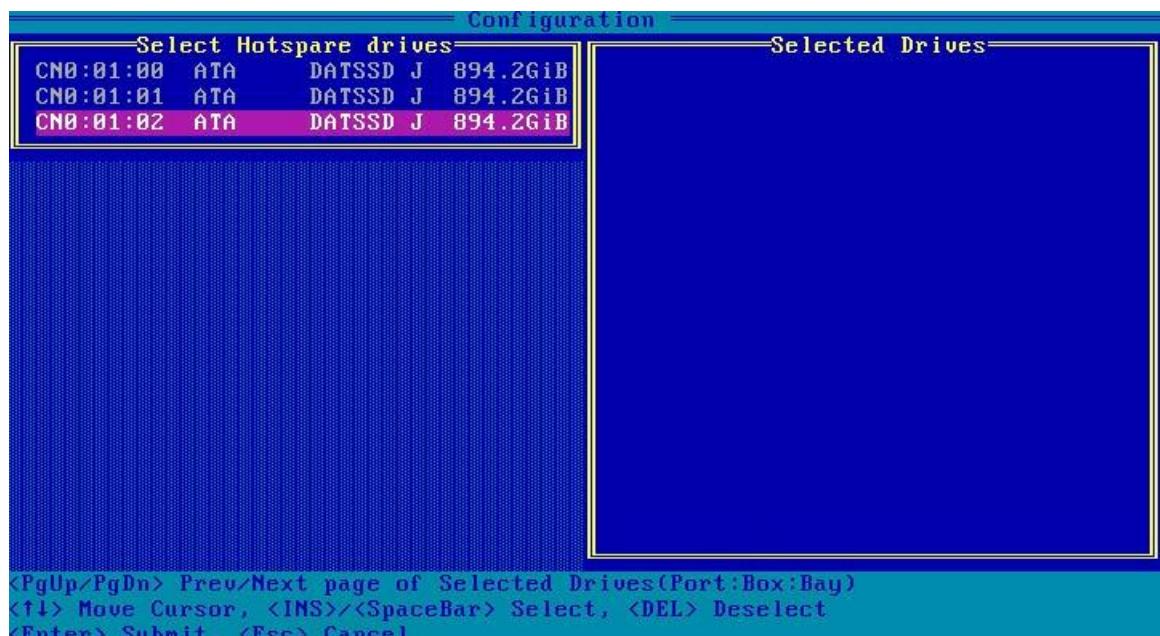
3. Use the arrow keys to select the hot spare disk to be deleted, and then press **Insert** to add the disk to the **Selected Drives** list, see Figure 2-52.

Figure 2-52 Selected Drives List
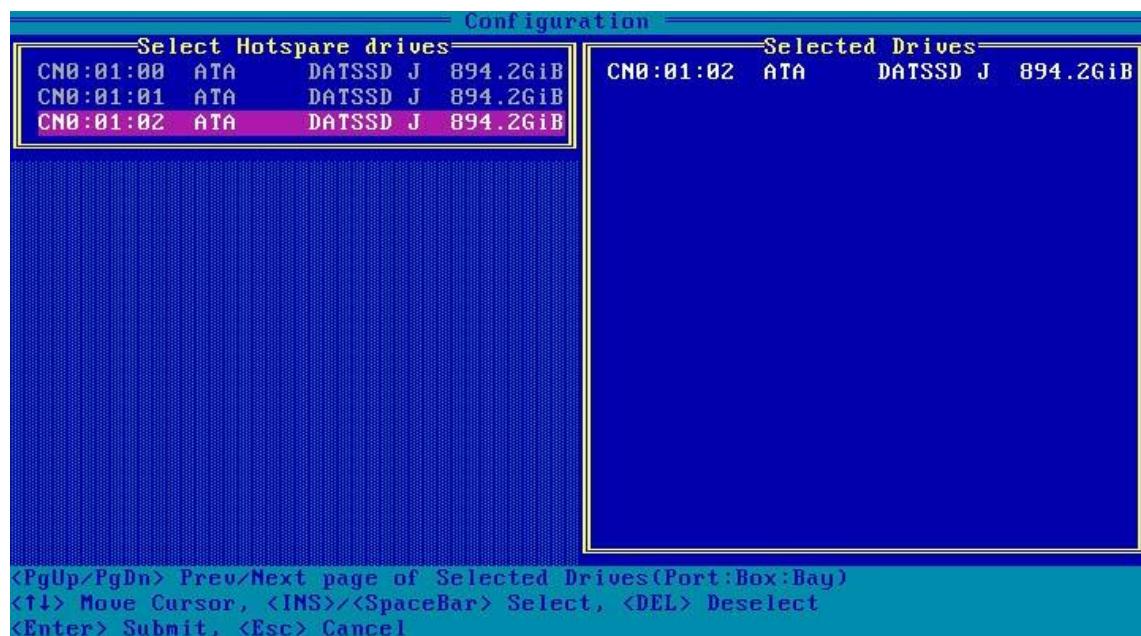
Note

Press the **Delete** key to delete the selected disk from the **Selected Drives** list.

4. Press **Enter**. A confirmation dialog box is displayed, see Figure 2-53.

Figure 2-53 Confirmation Dialog Box
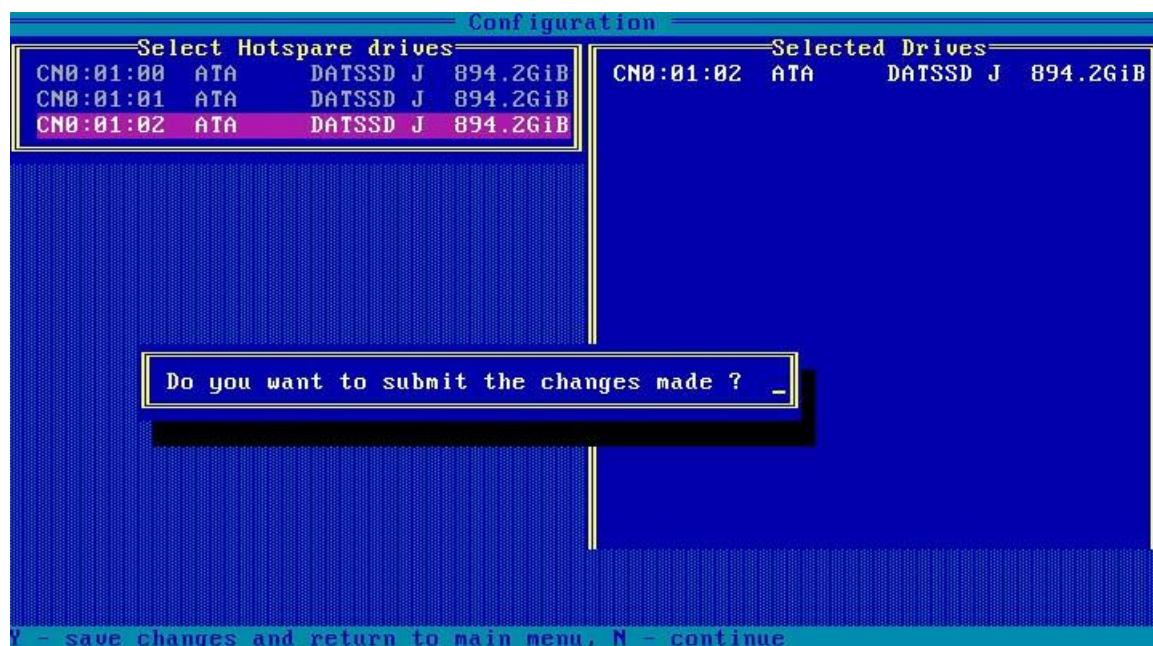
5. At the cursor in the confirmation dialog box, enter **Y** to delete the selected hot spare disk, see Figure 2-54.

Figure 2-54 Deleting a Hot Spare Disk
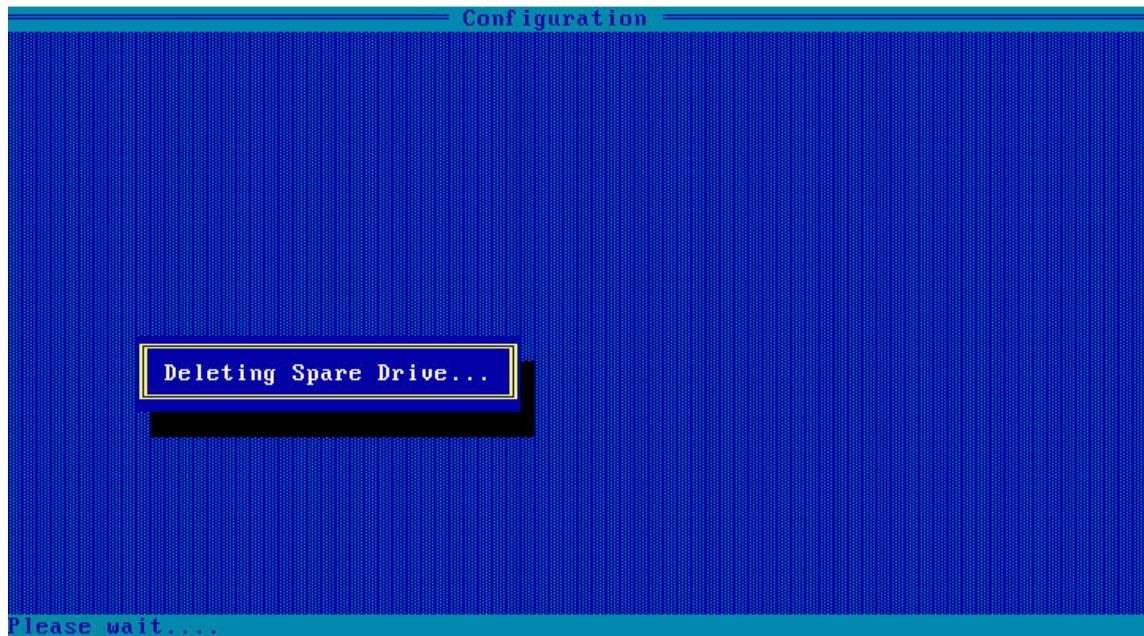
2.4.5 Locating a Disk

Abstract

After the indicator of a disk is lit, you can locate the disk so that you can easily replace or maintain it.

Steps

1. In the Options area on the BIOS configuration utility screen, use the arrow keys to select **Disk Utilities**, and then press **Enter**. The **Select Disks and press <Enter>** screen is displayed, see Figure 2-55.

Figure 2-55 Select Disks and Press <Enter> Screen
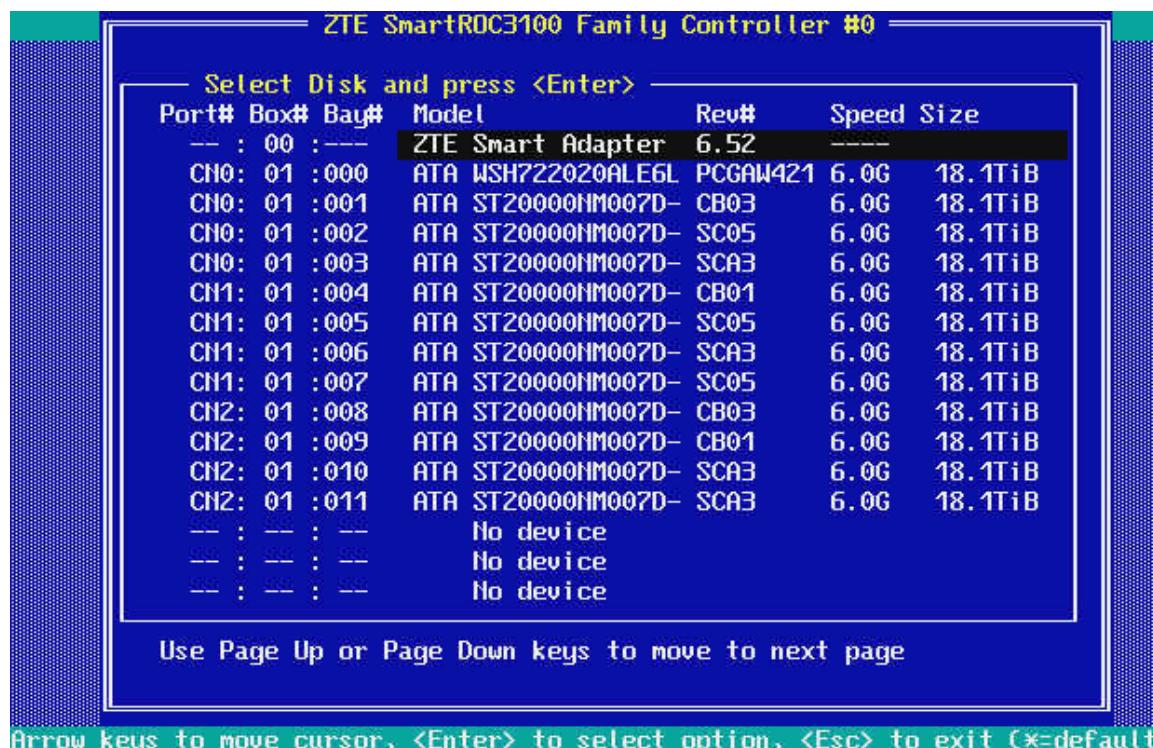
2. Use the arrow keys to select the disk to be located, and then press **Enter**. A function menu is displayed, see Figure 2-56.

Figure 2-56 Function Menu
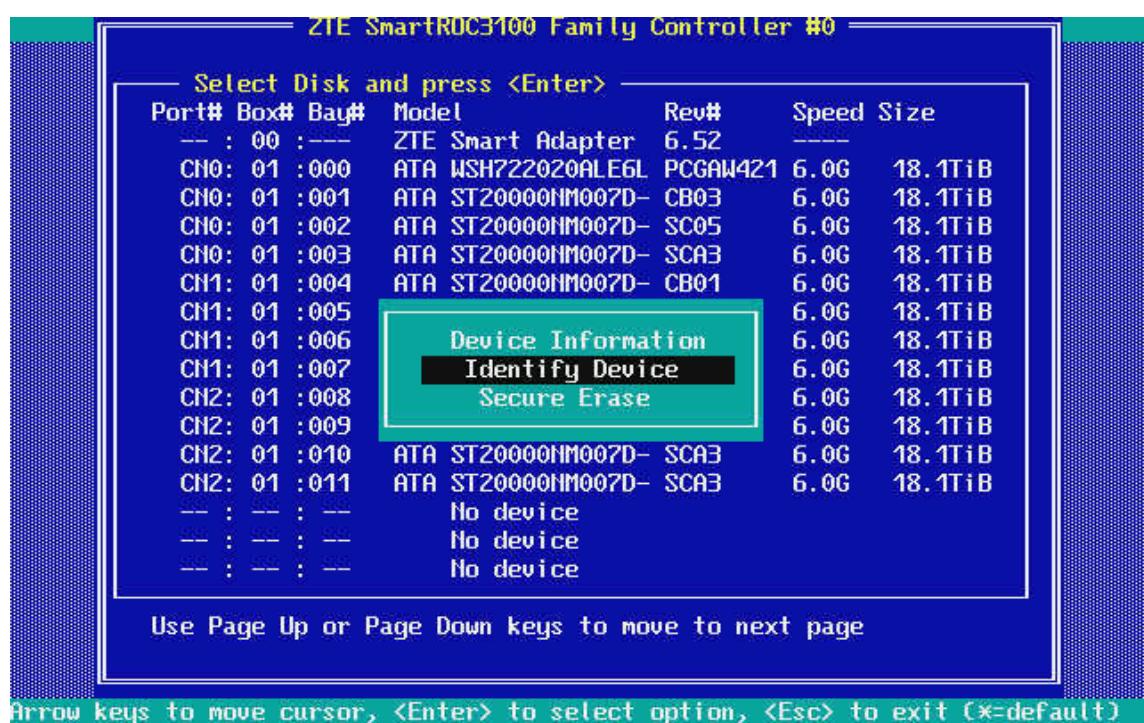
3. Use the arrow keys to select **Identify Device**, and then press **Enter**. A prompt message is displayed, see Figure 2-57. At this time, the red indicator of the corresponding disk is lit and flashes continuously.

Figure 2-57 Disk Indicator Lit
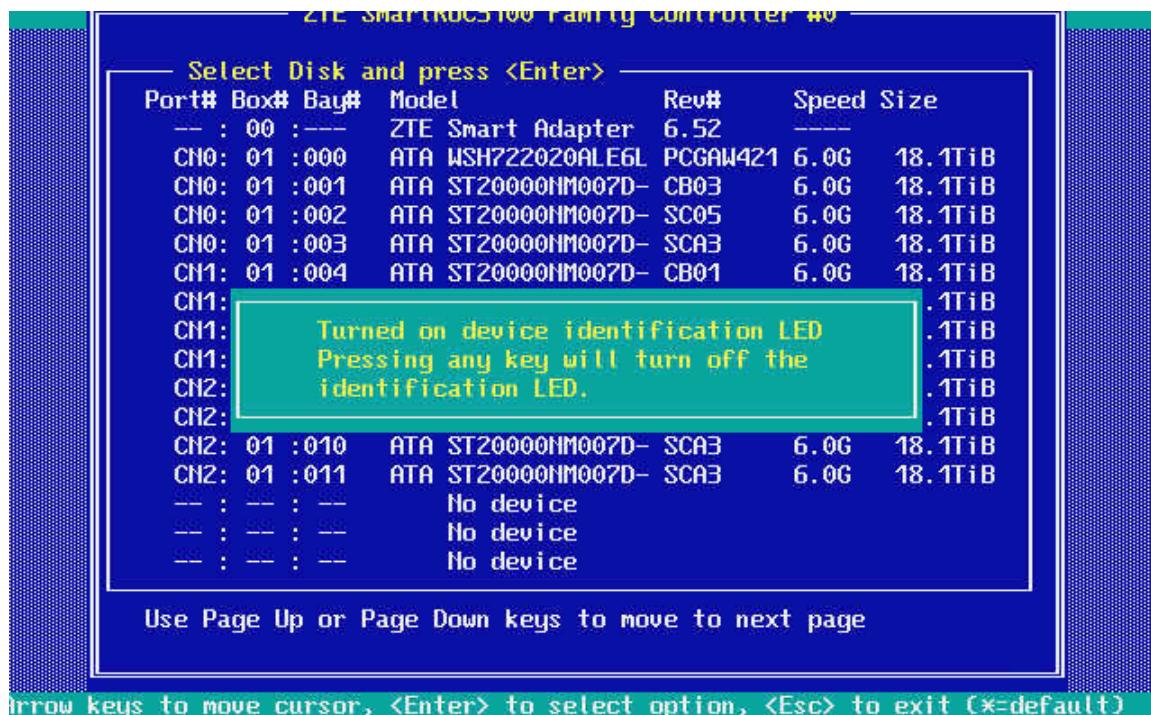
4. Press any key to go out the disk indicator. The disk locating ends.

2.4.6 Configuring a Pass-Through Disk

Abstract

In accordance with the actual RAID configuration, you can configure a pass-through disk in either of the following ways:

- Setting the mode of all ports in batches:
  If the disks connected to all ports are not used to create a RAID volume, the mode of these ports can be set to HBA in a unified manner.
- Setting the mode of ports separately:
  If the disks connected to some ports have been used to create a RAID volume, the mode of these ports can be set to Mixed and that of other ports can be set to HBA.

Context

Port modes include RAID, HBA and Mixed, which are described as follows:

- In RAID mode, the connected disks can be used only after they form a RAID volume.

- In HBA mode, the connected disks are pass-through disks and cannot be used to create a RAID volume. Instead, they can only be used directly.
- In Mixed mode, the connected disks support both RAID and HBA mode.
  - → The RAID mode is applicable to the disks that have been used to create a RAID volume.
  - → The HBA mode (pass-through) is applicable to the disks that are not used to create a RAID volume.

Steps

1. In the Options area on the BIOS configuration utility screen, use the arrow keys to select **Controller Details**, and then press **Enter**. The controller details are displayed. The value of **Controller Mode** is **MIXED**, see Figure 2-58.

   Figure 2-58 Controller Details

2. Press **ESC** to return to the BIOS configuration screen. Use the arrow keys to select **Configure Controller Settings** and press **Enter**. The **Configure Controller Settings** screen is displayed, see Figure 2-59.

Figure 2-59 Configure Controller Settings Screen

3. Use the arrow keys to select **Configure Controller Port Mode**, and then press **Enter**. The **Configure Controller Port Mode** screen is displayed, see Figure 2-60.

Figure 2-60 Configure Controller Port Mode Screen
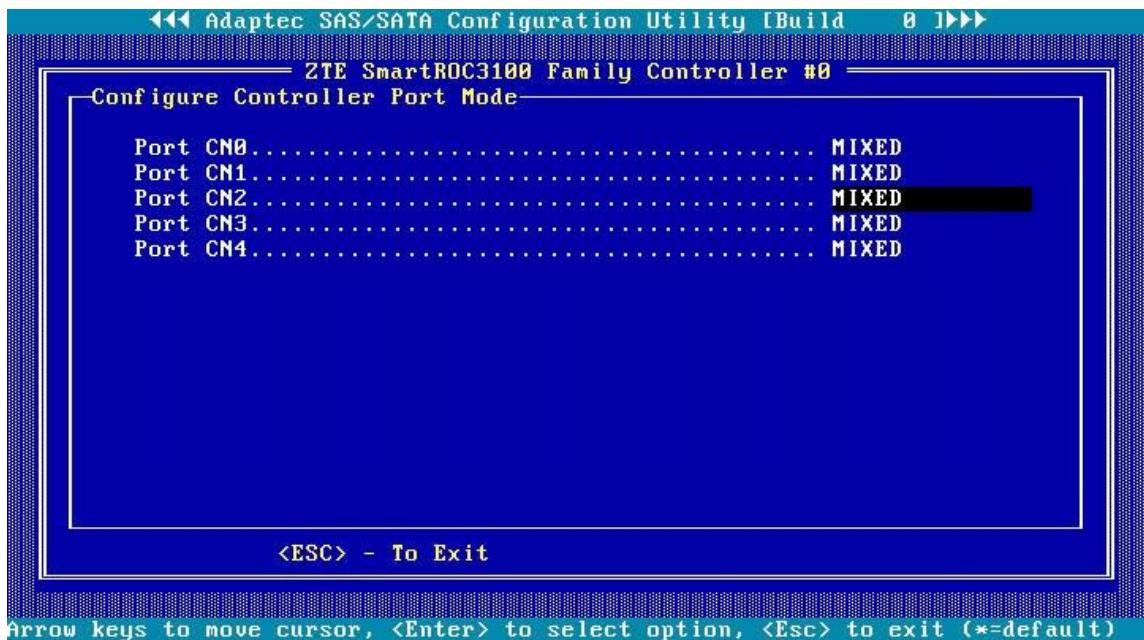
4. Use the arrow keys to select the port whose connected disk is not used to create a RAID volume, and press **Enter**. In the displayed dialog box, set the port mode to **HBA**, see Figure 2-61.

Figure 2-61 Setting the Port Mode to HBA

```
◄◄◄ Adaptec SAS/SATA Configuration Utility [Build    0 ]►►►
┌──────────── ZTE SmartROC3100 Family Controller #0 ════════┐
┌─Configure Controller Port Mode─┐
    Port CN0....................................... MIXED
    Port CN1....................................... MIXED
    Port CN2....................................... MIXED
    Port CN3....................................... MIXED
    Port CN4....................................... MIXED
                        ┌─────────────────┐
                        │ RAID            │
                        │ MIXED           │
                        │ HBA             │
                        └─────────────────┘



        <ESC> - To Exit
Arrow keys to move cursor, <Enter> to select option, <Esc> to exit (*=default)
```

5. (Optional) If the connected disk is already used to create a RAID volume, set the port mode to **MIXED**, see Figure 2-62.

Figure 2-62 Setting the Port Mode to MIXED
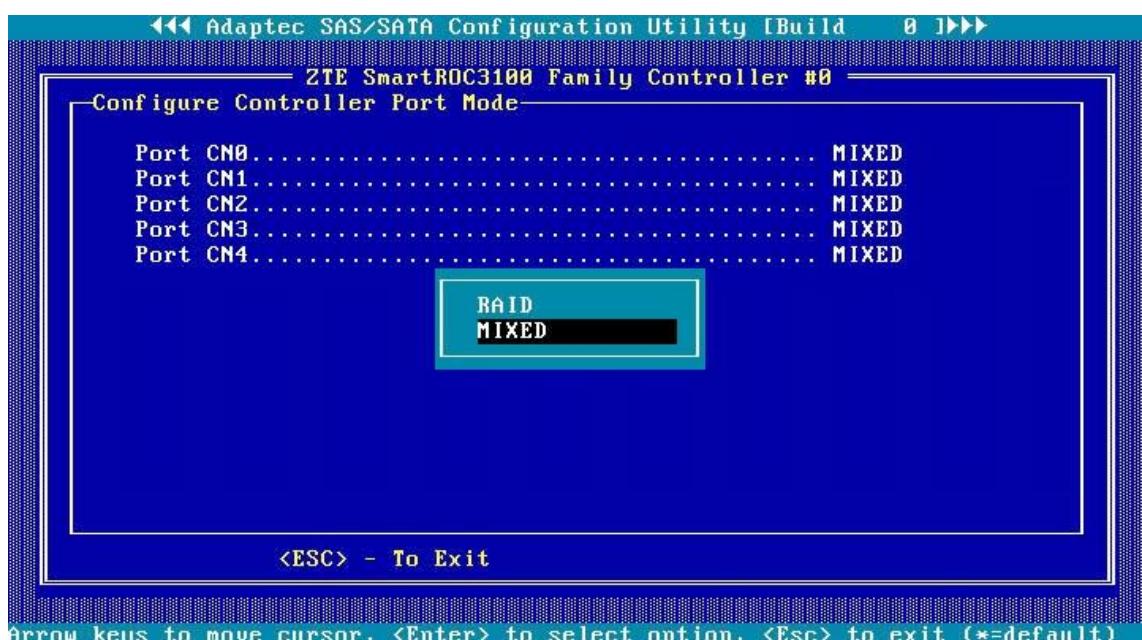
```
◄◄◄ Adaptec SAS/SATA Configuration Utility [Build    0 ]►►►
┌──────────── ZTE SmartROC3100 Family Controller #0 ════════┐
┌─Configure Controller Port Mode─┐
    Port CN0....................................... MIXED
    Port CN1....................................... MIXED
    Port CN2....................................... MIXED
    Port CN3....................................... MIXED
    Port CN4....................................... MIXED
                        ┌─────────────────┐
                        │ RAID            │
                        │ MIXED           │
                        └─────────────────┘




        <ESC> - To Exit
Arrow keys to move cursor, <Enter> to select option, <Esc> to exit (*=default)
```

Note

Note

The mode of the ports whose connected disks are already used to create a RAID volume cannot be set to HBA.

6. Set the port mode as required, and then press **Esc** to exit. In the displayed dialog box, select **Yes** to save the configuration, see Figure 2-63.

Figure 2-63 Saving the Configuration

7. Wait until a configuration success message is displayed, see Figure 2-64.

Figure 2-64 Successful Configuration
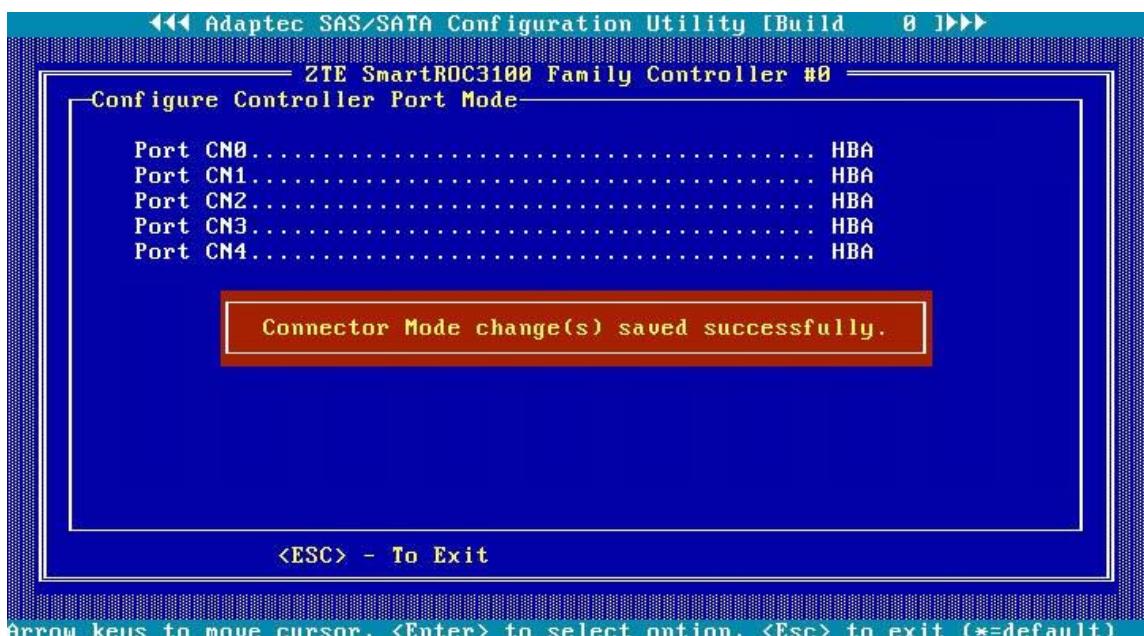
8. Press **Esc** multiple times until the **Exit Utility** dialog box is displayed, see Figure 2-65.

Figure 2-65 Exit Utility Dialog Box
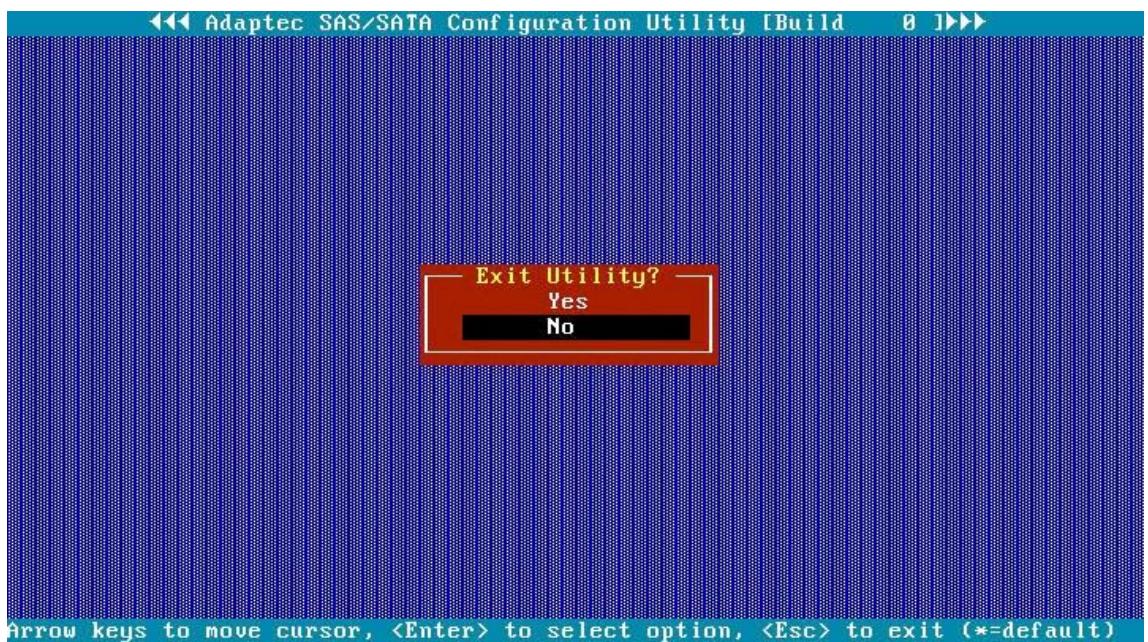
9. In the **Exit Utility** dialog box, select **NO**, and then press **Enter**. The BIOS configuration utility screen is displayed, see Figure 2-66.

Figure 2-66 BIOS Configuration Utility Screen

10. Use the arrow keys to select **Controller Details**, and then press **Enter**. The controller details are displayed, see Figure 2-67. The value of **Controller Mode** is **HBA**.

Figure 2-67 Controller Details
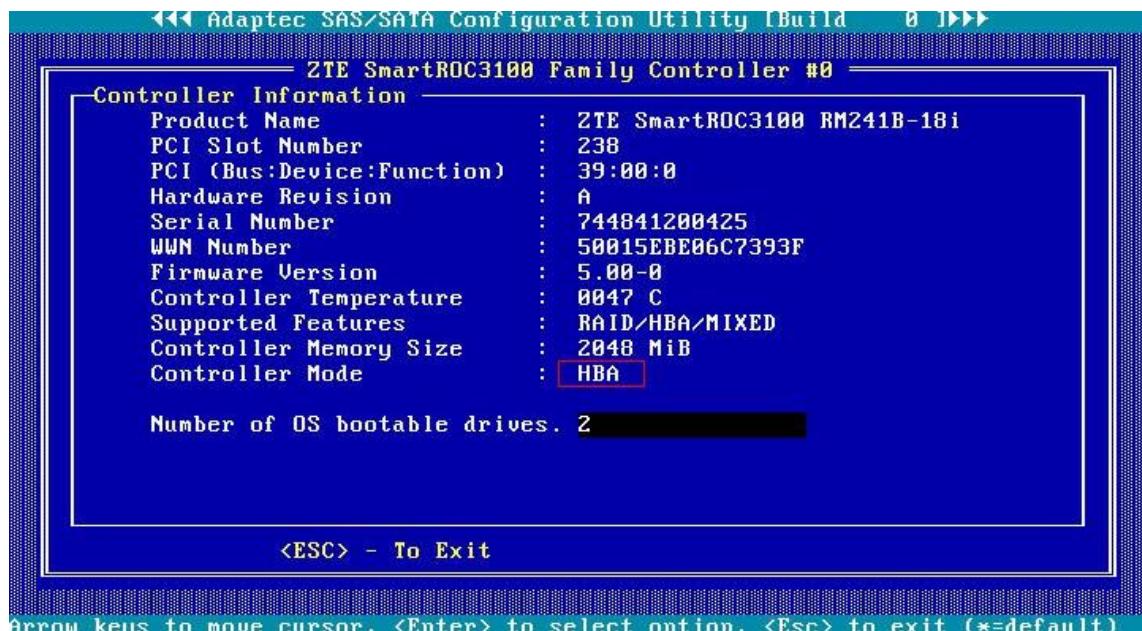
2.5 Common Configurations (UEFI Mode)

By using the BIOS configuration utility, you can configure and maintain a created RAID volume. For a description of the common operations on a PMC RAID card in UEFI mode, refer to Table 2-9.

Table 2-9 Common Operations on a PMC RAID Card

Common Operation	Description
Querying RAID volume information	Refer to "2.5.1 Querying RAID Volume Information".
Locating a disk	Refer to "2.5.2 Locating a Disk".
Creating a hot spare disk	Refer to "2.5.3 Creating a Hot Spare Disk".
Deleting a hot spare disk	Refer to "2.5.4 Deleting a Hot Spare Disk".
Deleting a RAID volume	Refer to "2.5.5 Deleting a RAID Volume".
Clearing RAID configuration information	Refer to "2.5.6 Clearing RAID Configuration Information".

2.5.1 Querying RAID Volume Information

Abstract

This procedure describes how to query RAID volume information, such as the RAID volume status and member disk status.

Prerequisite

A RAID volume is created successfully. For details, refer to "2.3.3 Creating a RAID Volume".

Steps

1. On the controller management screen, use the arrow keys to select **Array Configuration**, and then press **Enter**. The screen for configuring an array or RAID is displayed, as shown in Figure 2-68.

Figure 2-68 Configuring an Array or RAID
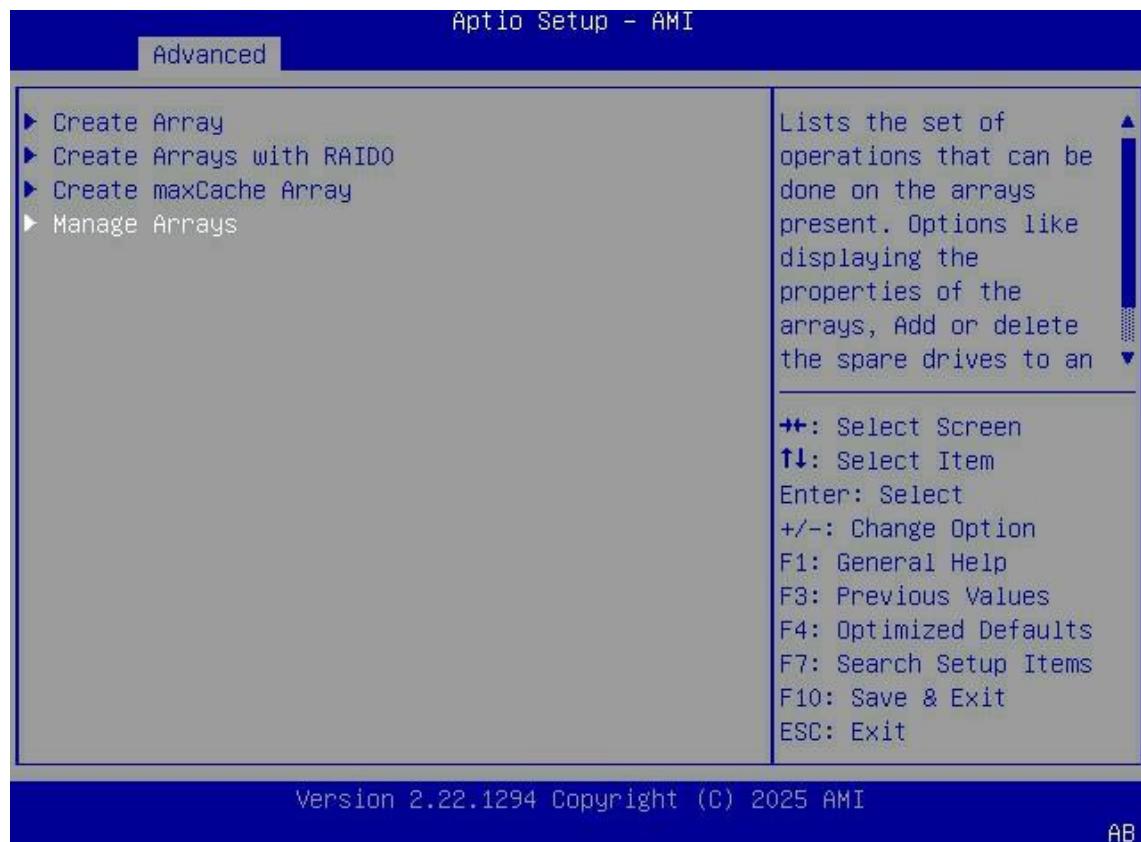
2. Use the arrow keys to select **Manage Arrays**, and then press **Enter**. The screen for managing arrays is displayed, as shown in Figure 2-69.

Figure 2-69 Managing Arrays
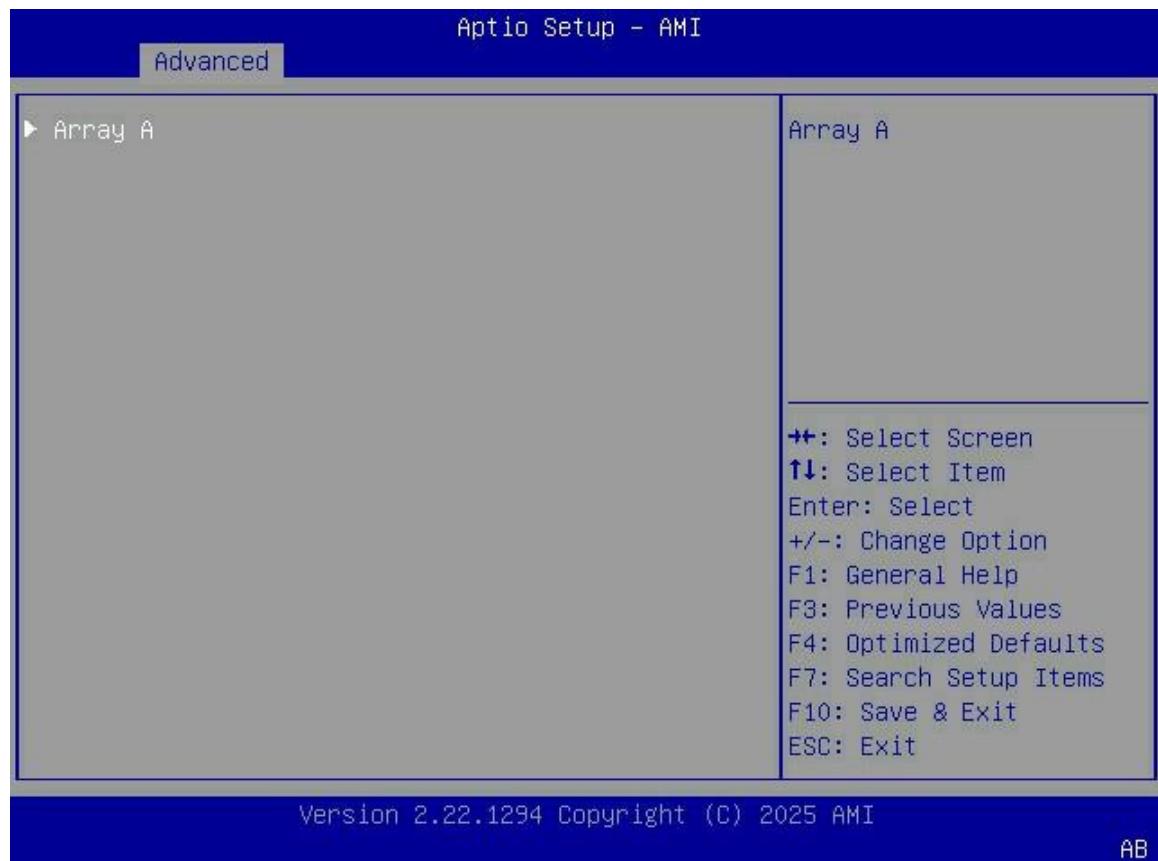
3. Use the arrow keys to select the array where the RAID volume to be viewed is located, and then press **Enter**. The screen for managing the selected array is displayed, as shown in Figure 2-70.

Figure 2-70 Managing the Selected Array

```
                          Aptio Setup - AMI
         Advanced

   Array Type            Data              ▲ Displays the list the
   ID                    0                   logical drives
   Interface Type        SATA-SSD            contained in the array.
   Total Space           1.746 TiB(1.92 TB)
   Unused Space          NA(NA)
   Used Space            1.746 TiB(1.92 TB)
   Block Size            512 Bytes
   Array Status          Ok
   SSD I/O Bypass        Enabled
   Member Logical        1                 ➡: Select Screen
   Drive(s)                                ↑↓: Select Item
   Member Physical       2                 Enter: Select
   Drive(s)                                +/-: Change Option
 ▶ List Logical Drives                     F1: General Help
 ▶ Create Logical Drive                    F3: Previous Values
 ▶ IO Bypass Settings                      F4: Optimized Defaults
 ▶ Create Split Mirror Backup              F7: Search Setup Items
 ▶ Manage Spare Drives                     F10: Save & Exit
 ▶ Manage Data Drives                    ▼ ESC: Exit

              Version 2.22.1294 Copyright (C) 2025 AMI
                                                            AB
```

4. Use the arrow keys to select **List Logical Drives**, and then press **Enter**. The screen for managing RAID volumes is displayed, as shown in Figure 2-71.

Figure 2-71 Managing RAID Volumes

```
                        Aptio Setup - AMI
        Advanced

  ▶ Logical Drive 1 (Logical Drive 1)        Logical Drive 1
                                             (Logical Drive 1)




                                             _____
                                             ↔: Select Screen
                                             ↑↓: Select Item
                                             Enter: Select
                                             +/-: Change Option
                                             F1: General Help
                                             F3: Previous Values
                                             F4: Optimized Defaults
                                             F7: Search Setup Items
                                             F10: Save & Exit
                                             ESC: Exit

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                                                          AB
```

5. Use the arrow keys to select the RAID volume that you want to view, and then press **Enter**.

   The screen for managing the selected RAID volume is displayed, as shown in Figure 2-72.

Figure 2-72 Managing the Selected RAID Volume
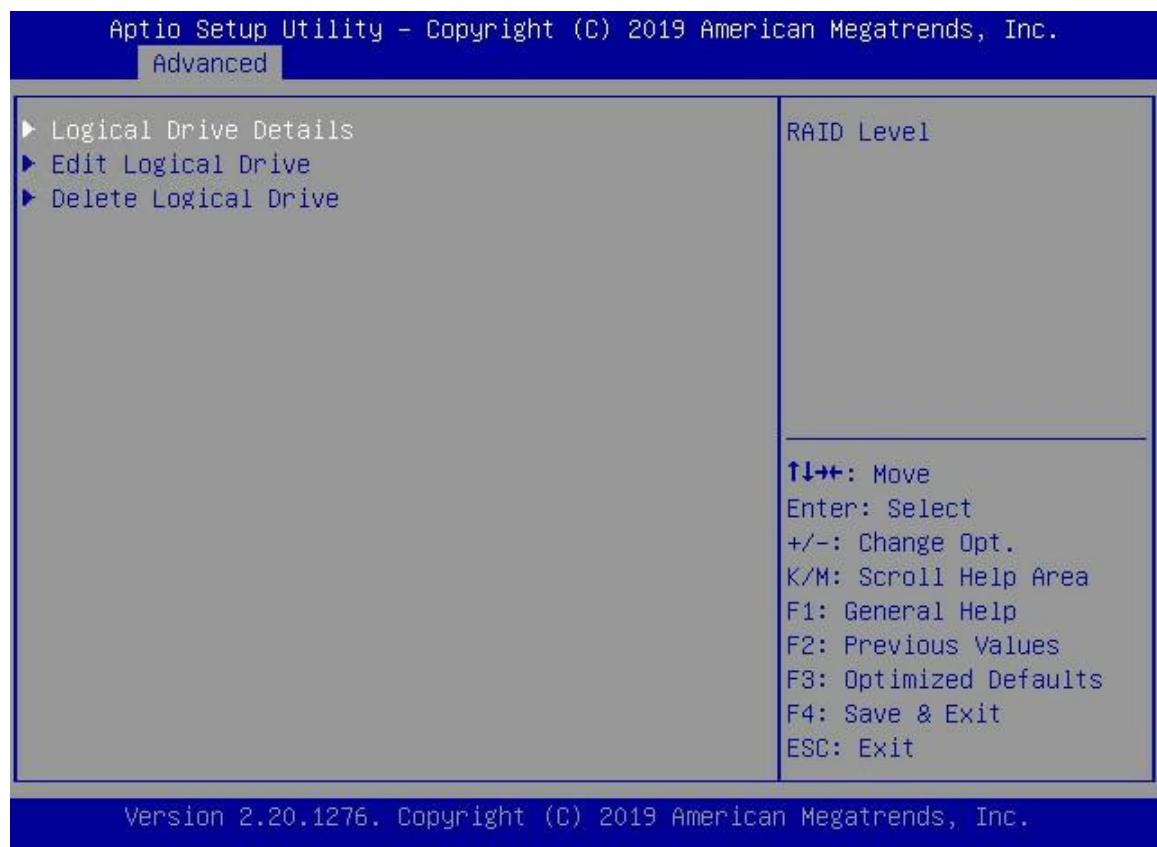
6. Use the arrow keys to select **Logical Drive Details**, and then press **Enter**. The **Logical Drive Details** screen is displayed. View the RAID volume attribute information, as shown in Figure 2-73.

Figure 2-73 Viewing RAID Volume Information

```
                        Aptio Setup - AMI
        Advanced

Status                 Ok                              ▲
Size                   894.222 GiB(960.163 GB)
RAID Level             RAID1
Legacy Disk            65535/255/32
Geometry(C/H/S)
Strip Size             256 KiB
Full Stripe Size       256 KiB
Logical Drive Label    Logical Drive 1
Volume Unique          600508B1001C2DD57CCBD527
Identifier             B3D1A509                    →←: Select Screen
Acceleration Method    IO Bypass                   ↑↓: Select Item
Logical Drive Members:                             Enter: Select
Port:CN0 Box:1 Bay:0 Size:894.253 GiB(960.197     +/-: Change Option
GB) SATA-SSD ATA    DATSSD J960GSBLYAC8CDED90      F1: General Help
Status:Ok                                          F3: Previous Values
                                                   F4: Optimized Defaults
                                                   F7: Search Setup Items
Port:CN0 Box:1 Bay:1 Size:894.253 GiB(960.197     F10: Save & Exit
GB) SATA-SSD ATA    DATSSD J960GSBLYAC8CDED90   ▼ ESC: Exit
Status:Ok

            Version 2.22.1294 Copyright (C) 2025 AMI
                                                                   AB
```

2.5.2 Locating a Disk

Abstract

After the indicator of a disk is lit, you can locate the disk so that you can easily replace or maintain it. You can locate a physical disk or multiple disks in a disk group.

Steps

● Locating a Single Physical Disk

  1. On the controller management screen, use the arrow keys to select **Disk Utilities**, and then press **Enter**. The screen for the list of physical disks mounted on the RAID controller card is displayed, see Figure 2-74.

Figure 2-74 Screen for the List of Disks Mounted on the RAID Card

2. Use the arrow keys to select the disk to be located, and then press **Enter**. The screen for setting a disk is displayed, see Figure 2-75.

Figure 2-75 Setting a Disk

```
                          Aptio Setup - AMI
        Advanced

                                                       Provides the
    Port:CN0 Box:1 Bay:2  Size:960.197 GB SATA-SSD     information related to
    ATA     DATSSD J960GSBLYAC8CDED90                   the particular device

  ▶ Device Information
  ▶ Identify Device
  ▶ Erase Disk
  ▶ Revert to Original Factory State using PSID
  ▶ Update Device Firmware
                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Option
                                                       F1: General Help
                                                       F3: Previous Values
                                                       F4: Optimized Defaults
                                                       F7: Search Setup Items
                                                       F10: Save & Exit
                                                       ESC: Exit

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                                                                           AB
```

3. Use the arrow keys to select **Identify Device**, and then press **Enter**. The **Identify Device** screen is displayed, see Figure 2-76.

Figure 2-76 Identify Device Screen

```
                    Aptio Setup - AMI
         Advanced

 Port:CN0 Box:1 Bay:2  Size:960.197 GB SATA-SSD   Start
 ATA    DATSSD J960GSBLYAC8CDED90

 Turn On/Off the device identification LED.

 Note: Identification LED will be operational
 only if the hardware on which the device is
 connected supports turning on/off
 identification LED.
                                                  ++: Select Screen
                                                  ↑↓: Select Item
 Identification            86400                  Enter: Select
 Duration (seconds)                               +/-: Change Option
 ► Start                                          F1: General Help
 ► Stop                                           F3: Previous Values
                                                  F4: Optimized Defaults
                                                  F7: Search Setup Items
                                                  F10: Save & Exit
                                                  ESC: Exit

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                                                             AB
```

4. Next to **Identification Duration (seconds)**, enter the time of the lighting delay (unit: seconds), select **Yes**, and press **Enter** for confirmation, see Figure 2-77.

Figure 2-77 Lighting Delay

```
                        Aptio Setup - AMI
          Advanced

  Port:CN0 Box:1 Bay:2  Size:960.197 GB SATA-SSD      Device LED
  ATA     DATSSD J960GSBLYAC8CDED90                    Identification Duration
                                                       in seconds: 1-86400:
  Turn On/Off the device identification LED.           Input range. 86400:
                                                       Default
  Note: Identification LED will be operational
  only if the hardware on which the device is
  connected supports turning on/off
  identification LED.                                 ---------------------------

                                                       ↔: Select Screen
  Identification                 10                    ↑↓: Select Item
  Duration (seconds)                                   Enter: Select
  ▶ Start                                              +/-: Change Option
  ▶ Stop                                               F1: General Help
                                                       F3: Previous Values
                                                       F4: Optimized Defaults
                                                       F7: Search Setup Items
                                                       F10: Save & Exit
                                                       ESC: Exit

                 Version 2.22.1294 Copyright (C) 2025 AMI
                                                                        AB
```

5. Use the arrow keys to select **Start**, and then press **Enter**. The red indicator of the corresponding disk is lit and continuously flashes, see Figure 2-78.

Figure 2-78 Starting Locating a Disk

```
                          Aptio Setup - AMI
        Advanced

   Port:CN0 Box:1 Bay:2  Size:960.197 GB SATA-SSD    Navigate back to Main
   ATA     DATSSD J960GSBLYAC8CDED90                  Menu

   Turned on device identification LED

 ▶ [Back to Main Menu]

                                                      �→ : Select Screen
                                                      ↑↓ : Select Item
                                                      Enter: Select
                                                      +/-: Change Option
                                                      F1: General Help
                                                      F3: Previous Values
                                                      F4: Optimized Defaults
                                                      F7: Search Setup Items
                                                      F10: Save & Exit
                                                      ESC: Exit

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                                                                       AB
```

Note

The indicator flashing duration is the configured lighting delay. After the lighting delay is reached, the default value 86400 s (24 hours) is restored, and the indicator goes out.

6. (Optional) To go out the disk indicator and end the locating, press **Esc** to return to the locating screen, use the arrow keys to select **Stop**, and press **Enter**, see Figure 2-79.

Figure 2-79 Ending Disk Locating

7. Select **Back to Main Menu**, and then press **Enter** to return to the controller management screen.

● Locating Multiple Disks in a Disk Group

1. On the controller management screen, use the arrow keys to select **Array Configuration**, and then press **Enter**. The **Array Configuration** screen is displayed, see .

Figure 2-80 Array Configuration Screen

```
                          Aptio Setup - AMI
       Advanced

 ▶ Create Array                          Creates an array from
 ▶ Create Arrays with RAID0              the group of selected
 ▶ Create maxCache Array                 physical drives. Once
 ▶ Manage Arrays                         an array is created,
                                         the unused space is
                                         available for creating
                                         logical drives.


                                         ↔: Select Screen
                                         ↑↓: Select Item
                                         Enter: Select
                                         +/-: Change Option
                                         F1: General Help
                                         F3: Previous Values
                                         F4: Optimized Defaults
                                         F7: Search Setup Items
                                         F10: Save & Exit
                                         ESC: Exit

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                                                              AB
```

2. Use the arrow keys to select **Manage Arrays**, and then press **Enter**. The **Manage Arrays** screen is displayed, see Figure 2-81.

Figure 2-81 Managing Arrays Screen
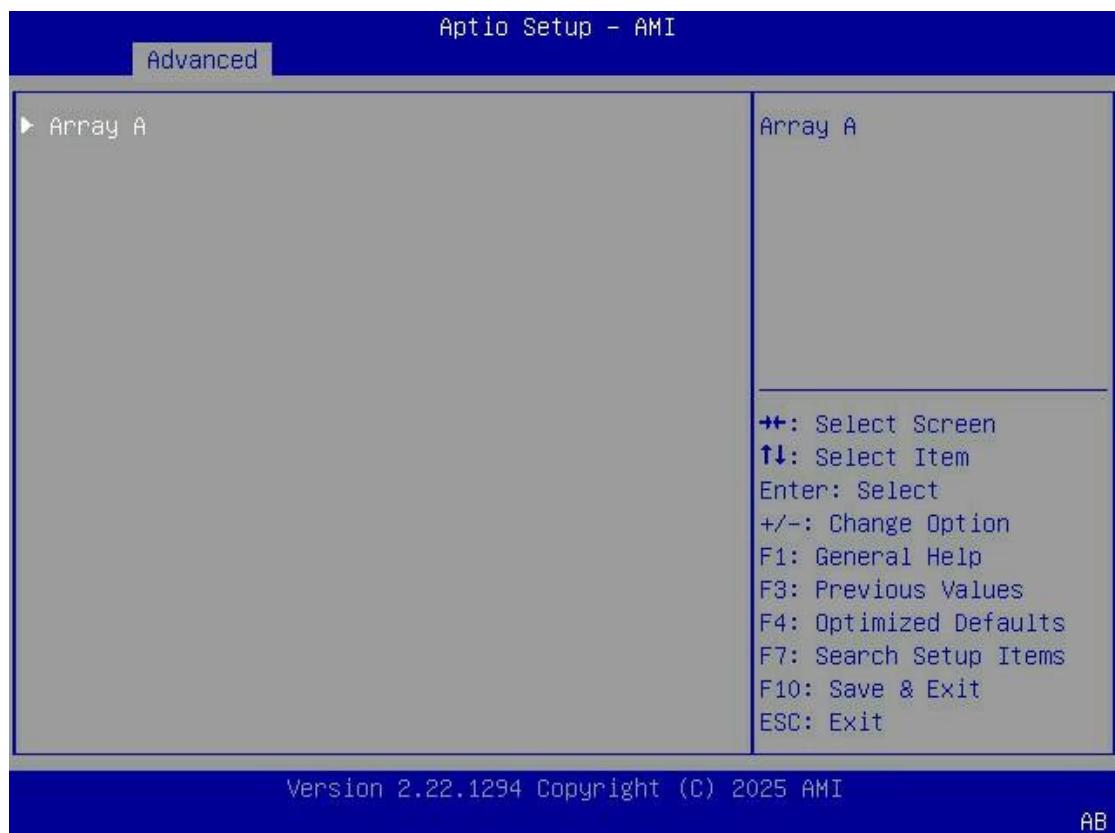
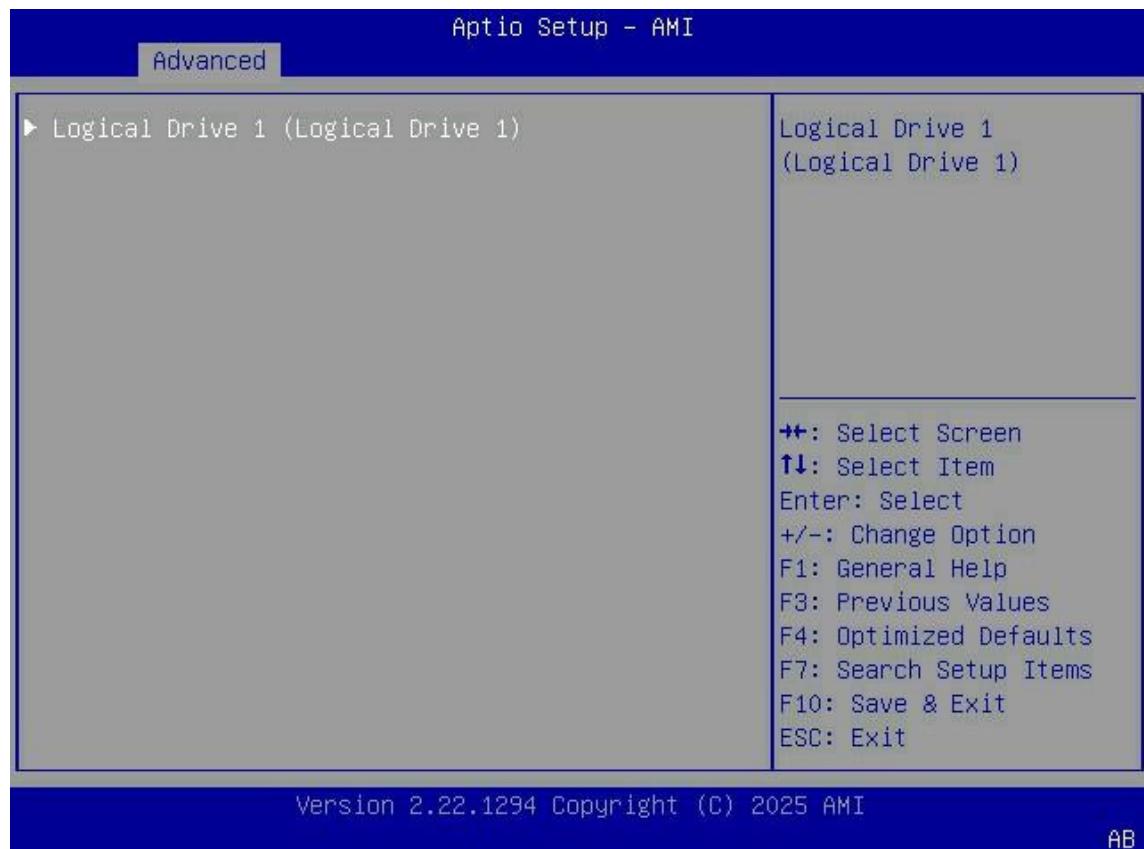3. Use the arrow keys to select the array in which the disk to be located is placed, and then press **Enter**. The screen for managing the selected array is displayed, see Figure 2-82.

Figure 2-82 Managing the Selected Array

```
                        Aptio Setup - AMI
        Advanced

    ID                     0                    ▲ Turn On/Off the device
    Interface Type         SATA-SSD               identification LED.
    Total Space            1.746 TiB(1.92 TB)
    Unused Space           NA(NA)
    Used Space             1.746 TiB(1.92 TB)
    Block Size             512 Bytes
    Array Status           Ok
    SSD I/O Bypass         Enabled
    Member Logical         1
    Drive(s)                                      ┌────────────────────────
    Member Physical        2                      ▶◀: Select Screen
    Drive(s)                                       ↑↓: Select Item
  ▶ List Logical Drives                           Enter: Select
  ▶ Create Logical Drive                          +/-: Change Option
  ▶ IO Bypass Settings                            F1: General Help
  ▶ Create Split Mirror Backup                    F3: Previous Values
  ▶ Manage Spare Drives                           F4: Optimized Defaults
  ▶ Manage Data Drives                         ▒ F7: Search Setup Items
  ▶ Identify Device                            ▼ F10: Save & Exit
                                                  ESC: Exit

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                                                              AB
```

4. Use the arrow keys to select **Identify Device**, and then press **Enter**. The **Identify Device** screen is displayed, see Figure 2-83.

Figure 2-83 Identify Device Screen

```
                        Aptio Setup – AMI
         Advanced

 ┌─────────────────────────────────────────┬──────────────────────────┐
 │ Array A                                  │ Device LED               │
 │                                          │ Identification Duration  │
 │ Turn On/Off the device identification LED.│ in seconds: 1-86400:     │
 │                                          │ Input range. 86400:      │
 │ Note: Identification LED will be operational│ Default               │
 │ only if the hardware on which the device is│                        │
 │ connected supports turning on/off        │                          │
 │ identification LED.                      │                          │
 │                                          │                          │
 │ Identification          86400            │ ➧➧: Select Screen        │
 │ Duration (seconds)                       │ ↑↓: Select Item          │
 │ Identify by Drive       [Data Drive(s) only]│ Enter: Select         │
 │ Configuration type                       │ +/-: Change Option       │
 │ ▶ Start                                  │ F1: General Help         │
 │ ▶ Stop                                   │ F3: Previous Values      │
 │                                          │ F4: Optimized Defaults   │
 │                                          │ F7: Search Setup Items   │
 │                                          │ F10: Save & Exit         │
 │                                          │ ESC: Exit                │
 └─────────────────────────────────────────┴──────────────────────────┘

              Version 2.22.1294 Copyright (C) 2025 AMI
                                                              AB
```

5. Next to **Identification Duration (seconds)**, enter the time of the lighting delay (unit: seconds), and then press **Enter** for confirmation, see Figure 2-84.

Figure 2-84 Lighting Delay

```
                          Aptio Setup - AMI
        Advanced

   Array A                                      Device LED
                                                Identification Duration
   Turn On/Off the device identification LED.   in seconds: 1-86400:
                                                Input range. 86400:
   Note: Identification LED will be operational Default
   only if the hardware on which the device is
   connected supports turning on/off
   identification LED.

   Identification          200                  ↔: Select Screen
   Duration (seconds)                           ↑↓: Select Item
   Identify by Drive       [Data Drive(s) only] Enter: Select
   Configuration type                           +/-: Change Option
   ▶ Start                                       F1: General Help
   ▶ Stop                                        F3: Previous Values
                                                F4: Optimized Defaults
                                                F7: Search Setup Items
                                                F10: Save & Exit
                                                ESC: Exit

                  Version 2.22.1294 Copyright (C) 2025 AMI
                                                                AB
```
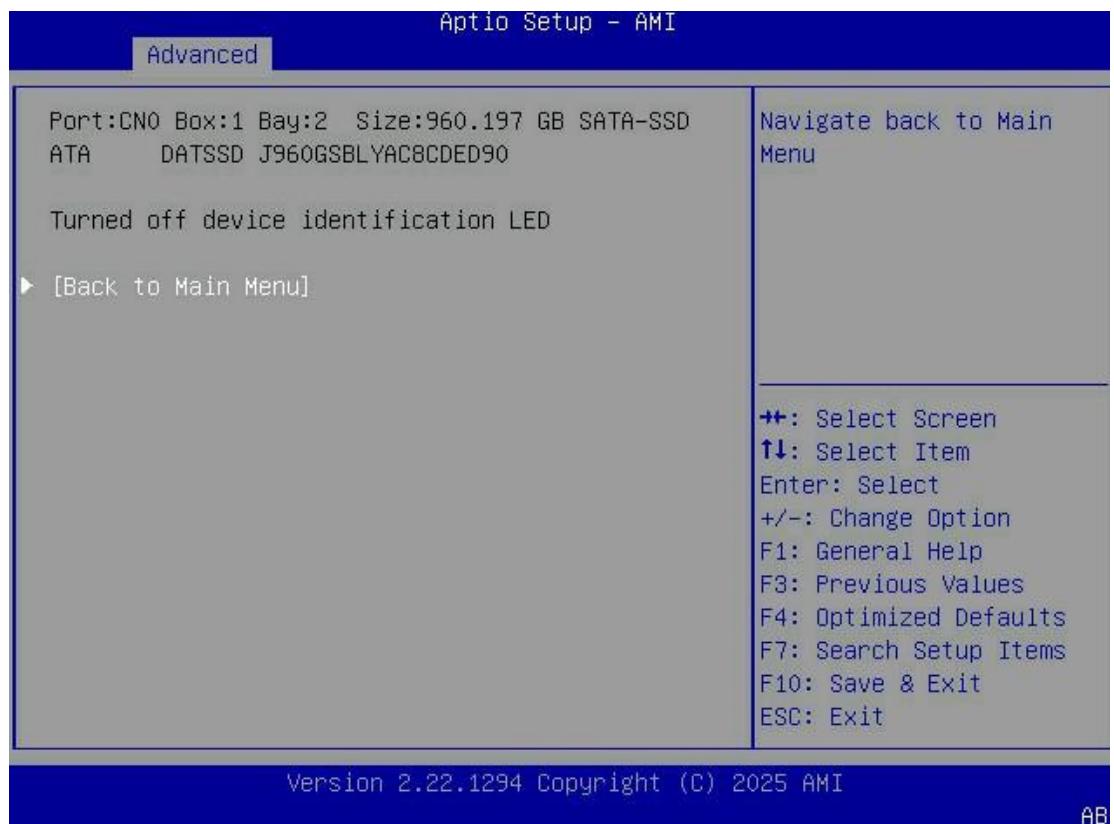
6. Use the arrow keys to select **Start**, and then press **Enter**. The red indicators of all the disks that belong to the array are lit and continuously flash, see Figure 2-85.

Figure 2-85 Starting Locating a Disk

```
                         Aptio Setup - AMI
        Advanced

 Turned on device identification LED              Navigate back to Main
                                                  Menu
 ▶ [Back to Main Menu]



                                                  →←: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Option
                                                  F1: General Help
                                                  F3: Previous Values
                                                  F4: Optimized Defaults
                                                  F7: Search Setup Items
                                                  F10: Save & Exit
                                                  ESC: Exit


              Version 2.22.1294 Copyright (C) 2025 AMI
                                                                      AB
```

📚 **Note**

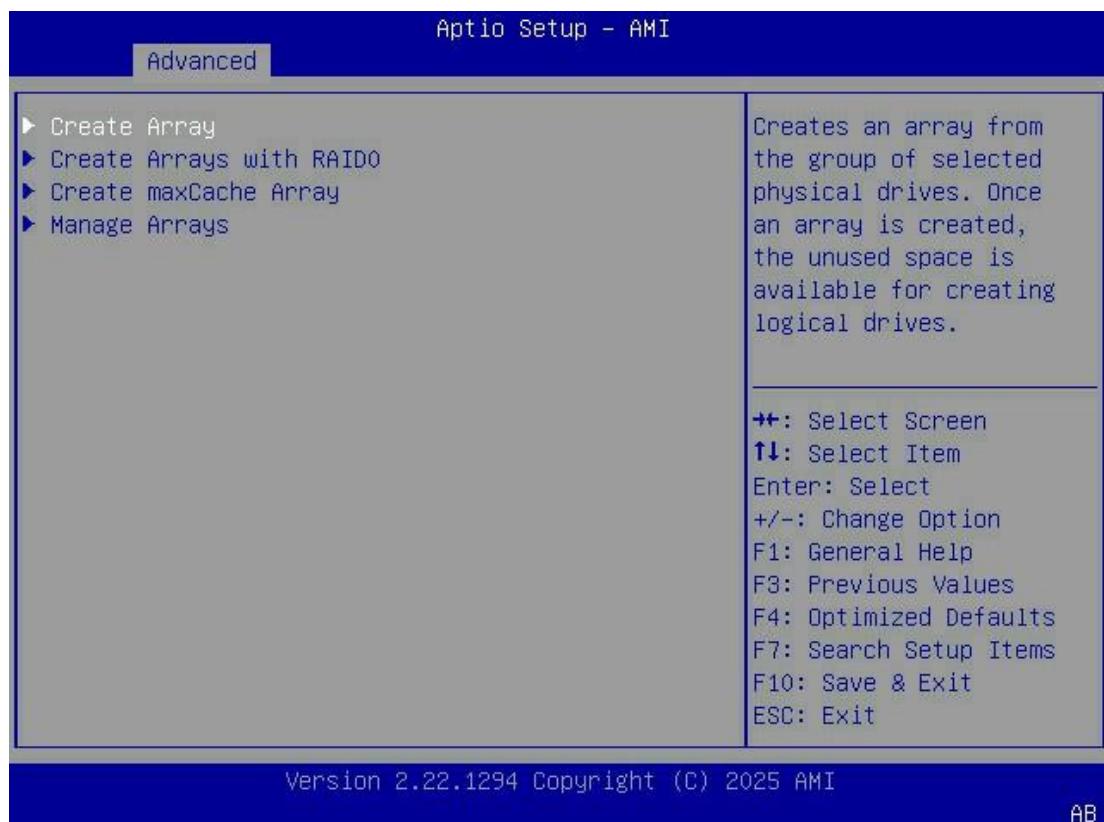The indicators of the hot spare disks belonging to the array are also lit and flash continuously at the same time. The indicator flashing duration is the configured lighting delay. After the lighting delay is reached, the default value 86400 s (24 hours) is restored, and the indicator goes out.

7. (Optional) To go out the disk indicator and end the locating, press **Esc** to return to the locating screen, and use the arrow keys to select **Stop**. The disk indicator goes out and the disk locating ends, see Figure 2-86.

**Figure 2-86 Ending Disk Locating**

8. Select **Back to Main Menu**, and then press **Enter** to return to the controller management screen.

2.5.3 Creating a Hot Spare Disk

Abstract

A hot spare disk improves the data security of a RAID array. For a description of the hot spare disk types supported by a PMC RAID controller card, refer to Table 2-10.

Table 2-10 Hot Spare Disk Types

Type	Description
Dedicated	● This type of hot spare disks is exclusive to the specified one or more disk groups of a RAID card. One or more hot spare disks can be created for each disk group. ● When a disk in a disk group is faulty, a dedicated hot spare disk temporarily takes over the faulty disk.
Auto Replace	● This type of hot spare disks provides the hot standby function for a disk group of a RAID card. One or more hot spare disks can be created for each disk group. ● When a disk in a disk group is faulty, a hot spare disk of this type automatically replaces the faulty disk.

Prerequisite

There are sufficient idle disks on the server.

Context

When creating a hot spare disk, pay attention to the following points:

- Multiple hot spare disks can be created for a disk group, but only one type of hot spare disk can be set at a time. That is, either **Dedicated** or **Auto Replace** is specified.
- An idle disk can be set as a hot spare disk. The disk that has been used to create a RAID volume cannot be set as a hot spare disk.
- The hot spare disk must be of the same type as that of any member disk in the corresponding disk group. That is, all of them are SATA disks or SAS disks, and the hot spare disk's capacity must not be less than the maximum capacity of the member disks.
- Disk groups at all levels except RAID 0 support hot spare disks.

Steps

1. On the controller management screen, use the arrow keys to select **Array Configuration**, and then press **Enter**. The **Array Configuration** screen is displayed, see Figure 2-87.

Figure 2-87 Array Configuration Screen
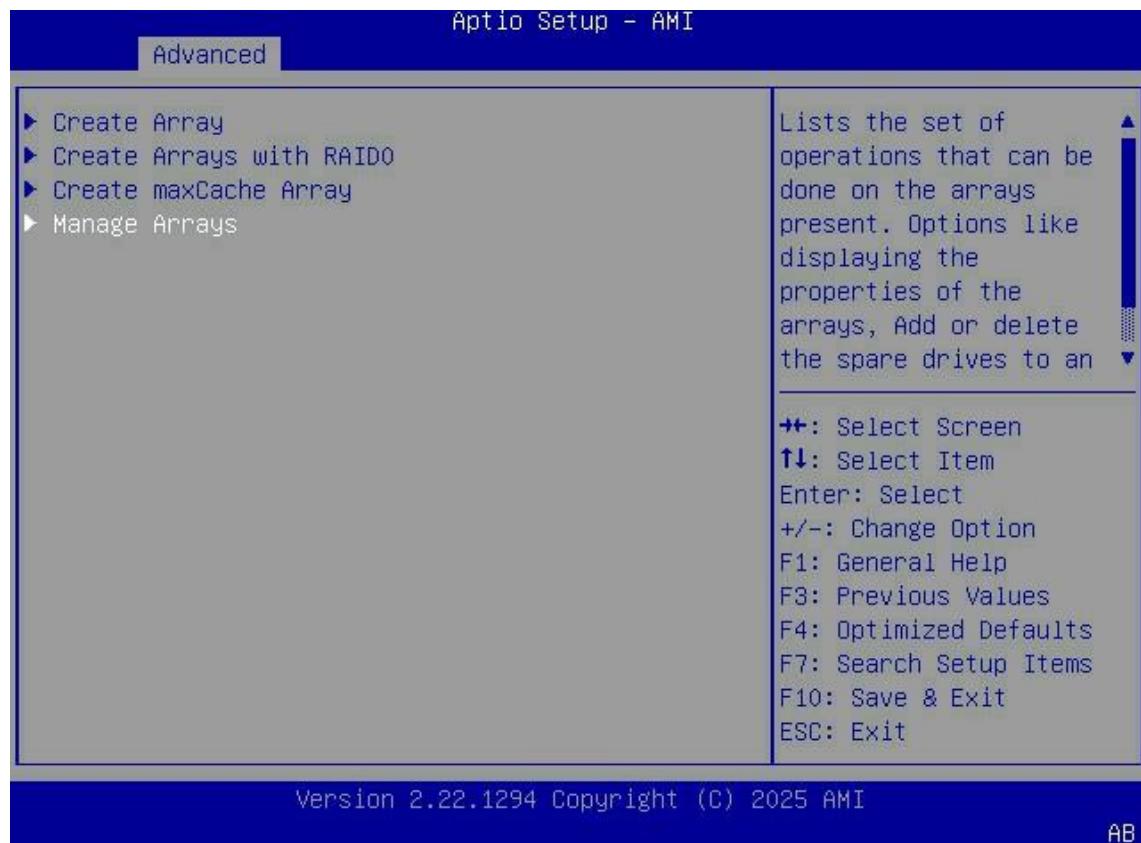
2. Use the arrow keys to select **Manage Arrays**, and then press **Enter**. The **Manage Arrays** screen is displayed, see Figure 2-88.

Figure 2-88 Managing Arrays Screen
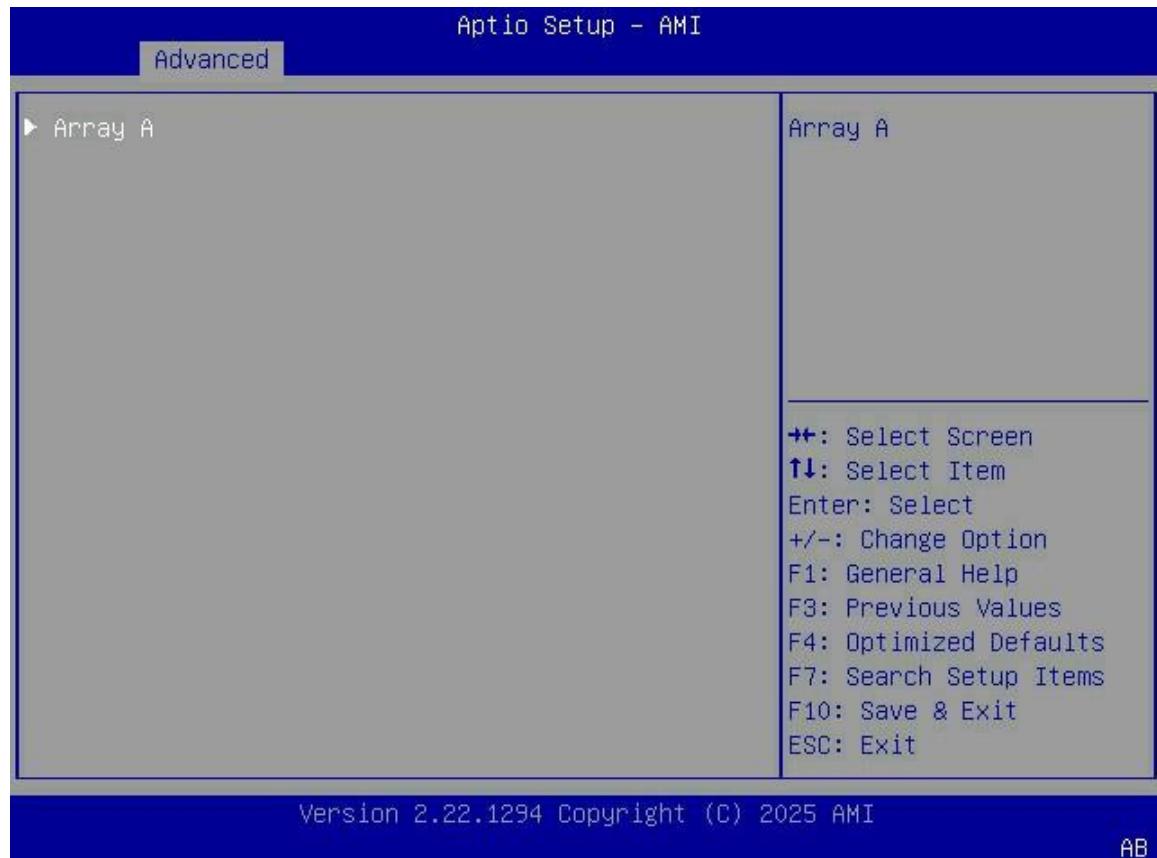
3. Use the arrow keys to select the array for which you need to create the hot spare disk, and then press **Enter**. The screen for managing the selected array is displayed, see Figure 2-89.
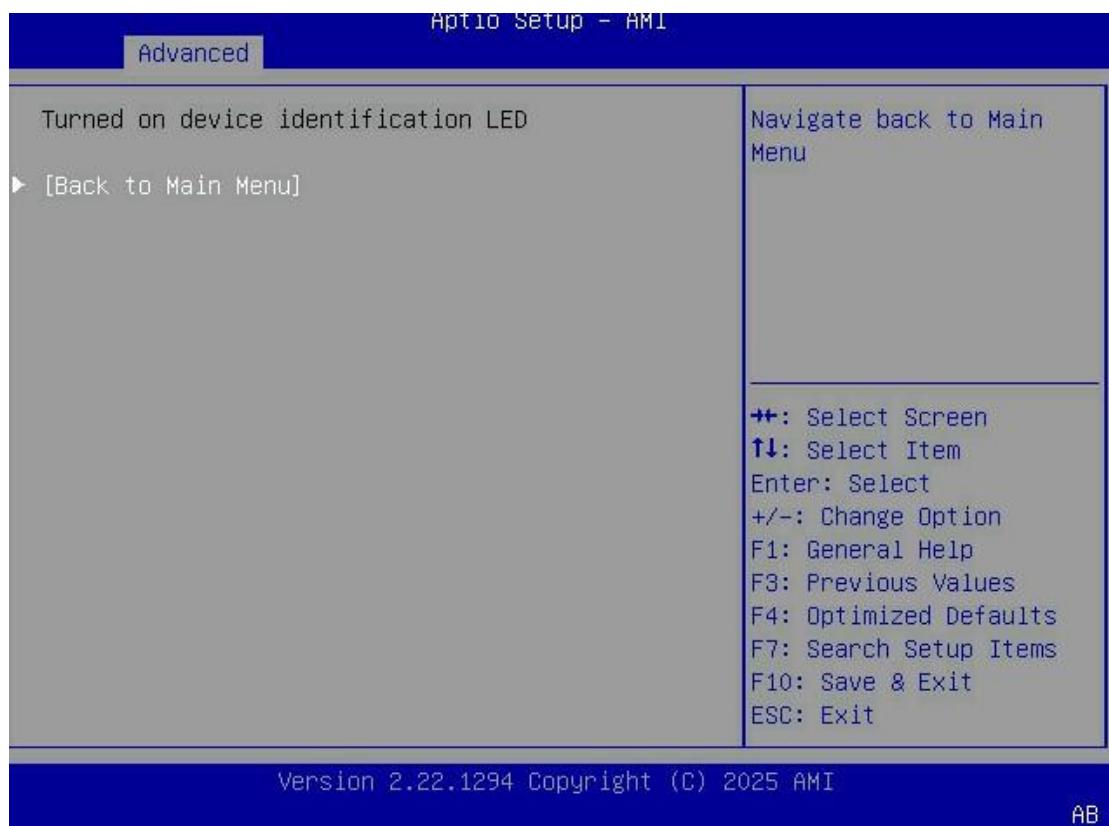
Figure 2-89 Managing the Selected Array


```
                          Aptio Setup - AMI
        Advanced

  Array Type              Data              ▲│Displays the list the
  ID                      0                  │logical drives
  Interface Type          SATA-SSD           │contained in the array.
  Total Space             1.746 TiB(1.92 TB) │
  Unused Space            NA(NA)             │
  Used Space              1.746 TiB(1.92 TB) │
  Block Size              512 Bytes          │
  Array Status            Ok                 │
  SSD I/O Bypass          Enabled            │
  Member Logical          1                  │→←: Select Screen
  Drive(s)                                   │↑↓: Select Item
  Member Physical         2                  │Enter: Select
  Drive(s)                                   │+/-: Change Option
▶ List Logical Drives                        │F1: General Help
▶ Create Logical Drive                       │F3: Previous Values
▶ IO Bypass Settings                         │F4: Optimized Defaults
▶ Create Split Mirror Backup                 │F7: Search Setup Items
▶ Manage Spare Drives                       ▓│F10: Save & Exit
▶ Manage Data Drives                        ▼│ESC: Exit

            Version 2.22.1294 Copyright (C) 2025 AMI
                                                              AB
```

4. Use the arrow keys to select **Manage Spare Drives**, and then press **Enter**. The **Manage Spare Drives** screen is displayed, see Figure 2-90.

Figure 2-90 Manage Spare Drives Screen

```
                          Aptio Setup - AMI
        Advanced

   Warning: Self Encrypting Drive-SED devices      Drives assigned as
   present in the selection. If SED security is    dedicated spares can
   enabled using any external tool other than the  only be used as spare
   controller managed options, the SED may become  drives.
   locked after the drive is power cycled. This
   may lead to denial of service or loss of data.
   Proceed with caution..

 ▶ Assign Dedicated Spare
 ▶ Assign Auto Replace Spare
                                                   ↔: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Option
                                                   F1: General Help
                                                   F3: Previous Values
                                                   F4: Optimized Defaults
                                                   F7: Search Setup Items
                                                   F10: Save & Exit
                                                   ESC: Exit

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                                                              AB
```

5. In accordance with your actual conditions, use the arrow keys to select the type of the hot spare disk to be created, and then press **Enter**. The screen for selecting a hot spare disk is displayed, see Figure 2-91.

Figure 2-91 Selecting a Hot Spare Disk

6. Use the arrow keys to select the disk to be set as a hot spare disk, press **Enter**, and then set the status of the disk to **Enabled**, see Figure 2-92.

Figure 2-92 Setting Disk Status

7. Use the arrow keys to select **Assign Dedicated Spare**, and then press **Enter**. The hot spare disk is successfully created, see Figure 2-93.

Figure 2-93 Hot Spare Disk Created Successfully
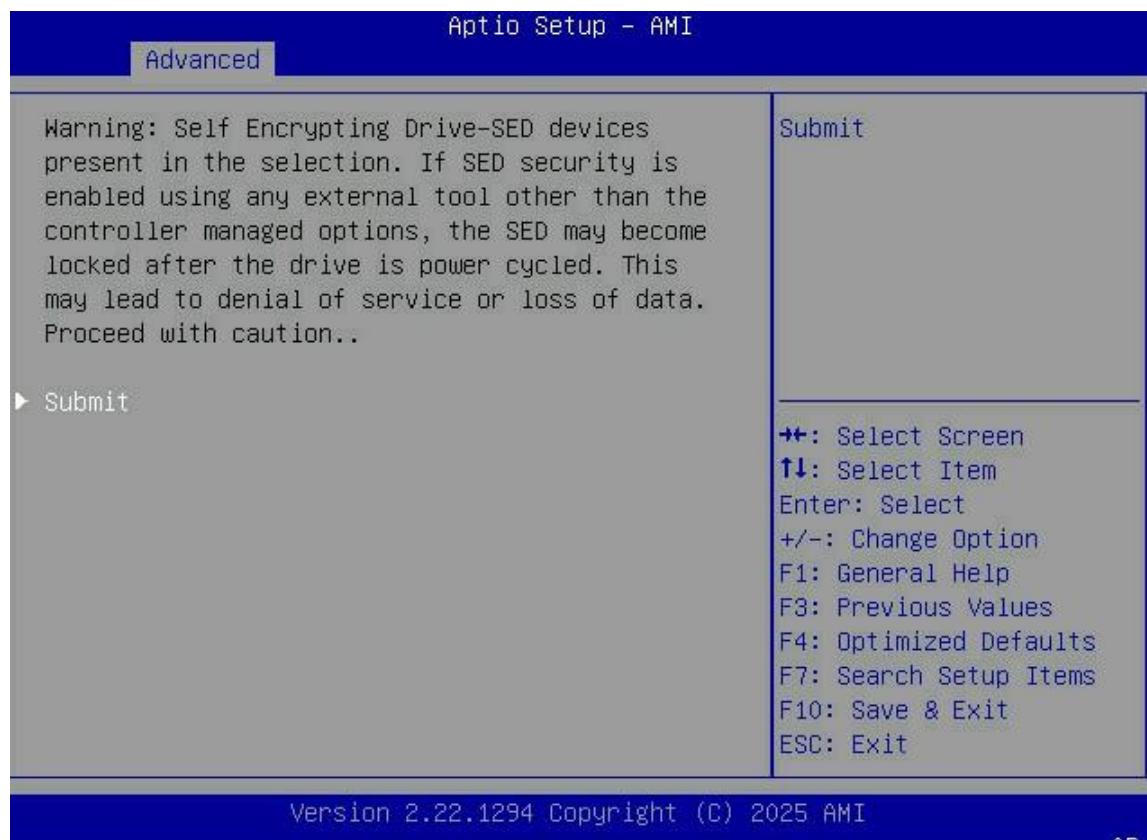
8. Select **Back to Main Menu**, and then press **Enter** to return to the controller management screen.

2.5.4 Deleting a Hot Spare Disk

Abstract

When the number of disks of a server cannot meet the requirements, you can delete an existing hot spare disk and restore it to a common disk.

Prerequisite

A hot spare disk is created successfully. For details, refer to "2.5.3 Creating a Hot Spare Disk".

Steps

1. On the controller management screen, use the arrow keys to select **Array Configuration**, and then press **Enter**. The **Array Configuration** screen is displayed, see Figure 2-94.

Figure 2-94 Array Configuration Screen
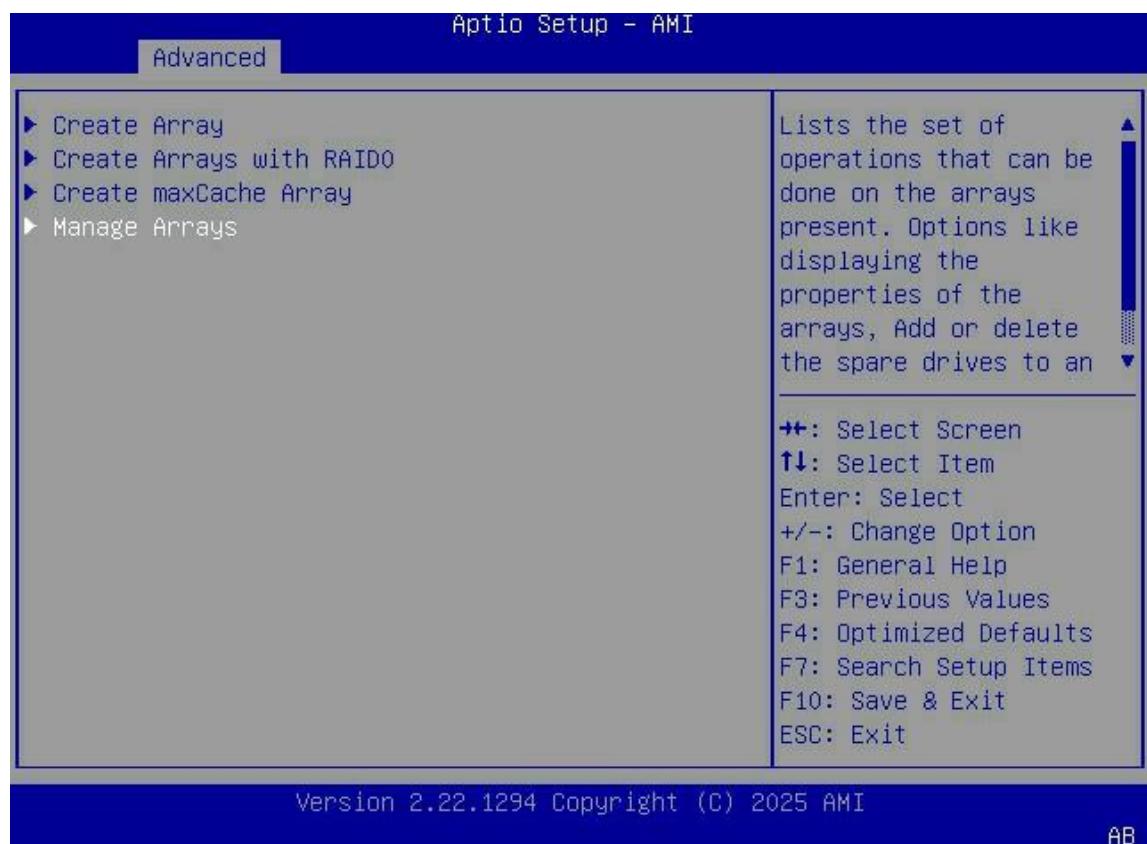
2. Use the arrow keys to select **Manage Arrays**, and then press **Enter**. The **Manage Arrays** screen is displayed, see Figure 2-95.
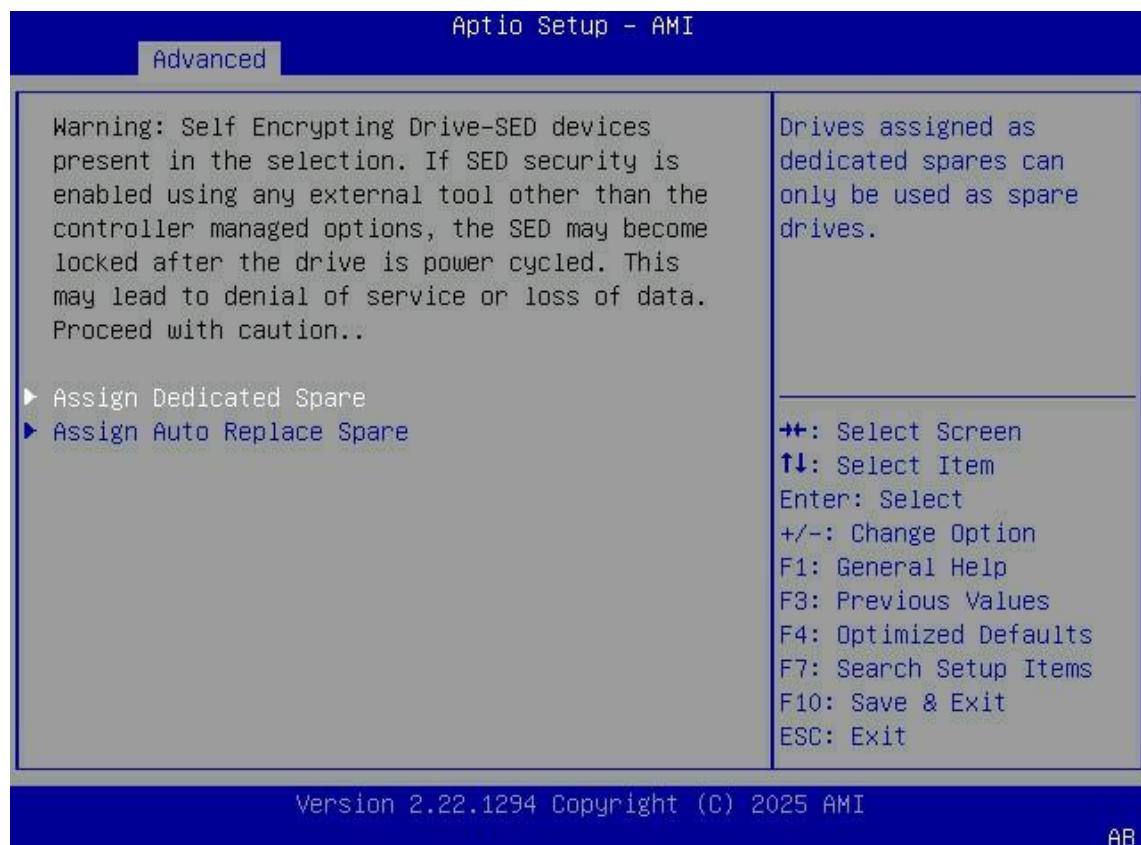
Figure 2-95 Managing Arrays Screen
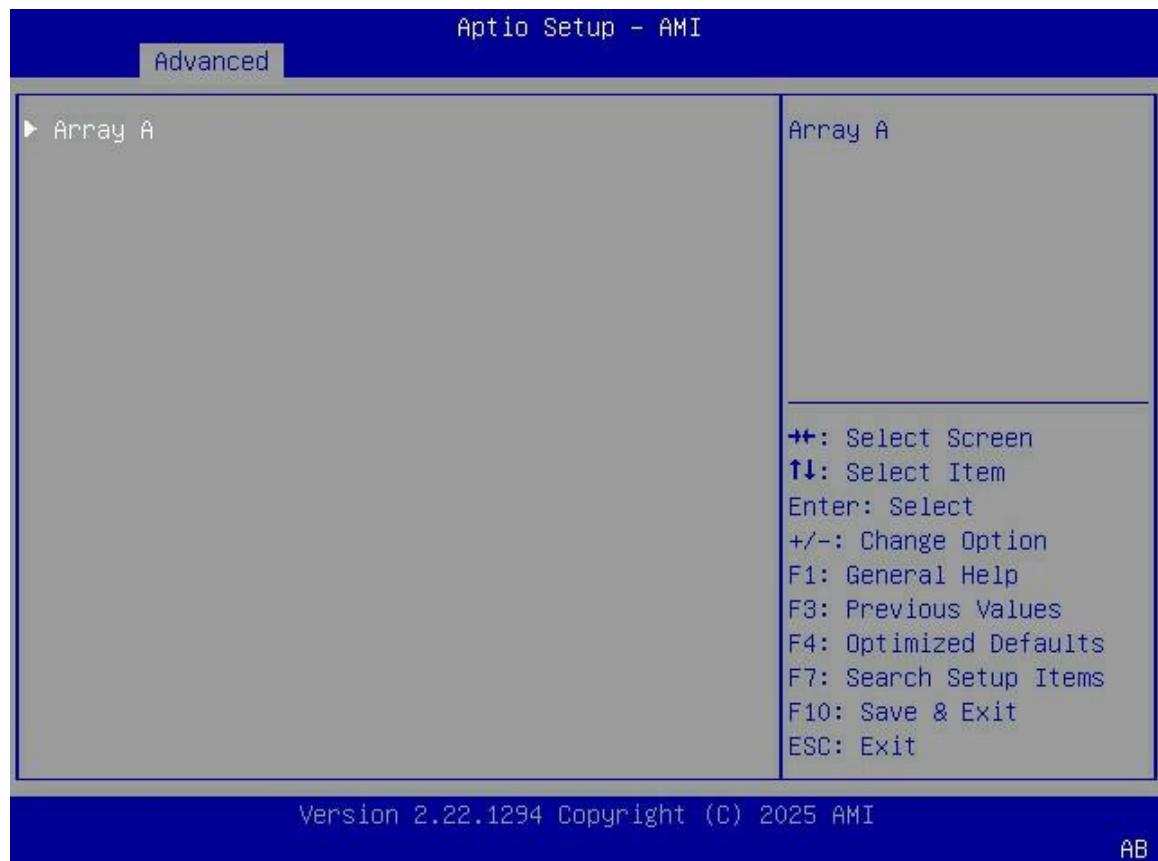
3. Use the arrow keys to select the array for which you need to delete the hot spare disk, and then press **Enter**. The screen for managing the selected array is displayed, see .

Figure 2-96 Managing the Selected Array

```
                          Aptio Setup - AMI
           Advanced

     Array Type             Data              ▲  Displays the list the
     ID                     0                    logical drives
     Interface Type         SATA-SSD             contained in the array.
     Total Space            1.746 TiB(1.92 TB)
     Unused Space           NA(NA)
     Used Space             1.746 TiB(1.92 TB)
     Block Size             512 Bytes
     Array Status           Ok
     SSD I/O Bypass         Enabled
     Member Logical         1                 ►◄: Select Screen
     Drive(s)                                 ↑↓: Select Item
     Member Physical        2                 Enter: Select
     Drive(s)                                 +/-: Change Option
   ► List Logical Drives                      F1: General Help
   ► Create Logical Drive                     F3: Previous Values
   ► IO Bypass Settings                       F4: Optimized Defaults
   ► Create Split Mirror Backup               F7: Search Setup Items
   ► Manage Spare Drives                      F10: Save & Exit
   ► Manage Data Drives                    ▼  ESC: Exit

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                                                                    AB
```

4. Use the arrow keys to select **Manage Spare Drives**, and then press **Enter**. The **Manage Spare Drives** screen is displayed, see Figure 2-97.

Figure 2-97 Manage Spare Drives Screen

```
                        Aptio Setup – AMI
        Advanced

    Warning: Self Encrypting Drive-SED devices      Drives assigned as
    present in the selection. If SED security is     dedicated spares can
    enabled using any external tool other than the   only be used as spare
    controller managed options, the SED may become   drives.
    locked after the drive is power cycled. This
    may lead to denial of service or loss of data.
    Proceed with caution..

  ▶ Assign Dedicated Spare
  ▶ Change Spare type to AutoReplace               ➜←: Select Screen
  ▶ Delete Spare Drives                            ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Option
                                                   F1: General Help
                                                   F3: Previous Values
                                                   F4: Optimized Defaults
                                                   F7: Search Setup Items
                                                   F10: Save & Exit
                                                   ESC: Exit

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                                                                    AB
```

5. Use the arrow keys to select **Delete Spare Drives**, and then press **Enter**. The screen for selecting a hot spare disk is displayed, see Figure 2-98.

Figure 2-98 Selecting a Hot Spare Disk

```
                        Aptio Setup - AMI
        Advanced

   Port:CN0 Box:1 Bay:2    [Disabled]         Size:894.253            ▲
    Size:960.197 GB                           GiB(960.197 GB)
   SATA-SSD ATA                               Port:CN0 Box:1 Bay:2
   DATSSD                                     Logical Sector Size:512
   J960GSBLYAC8CDED90                         Model:ATA     DATSSD
 ▶ Delete Spare Drives                        J960GSBLYAC8CDED90
                                              Serial
                                              Number:D240219023KA00005▼

                                              ←→: Select Screen
                                              ↑↓: Select Item
                                              Enter: Select
                                              +/-: Change Option
                                              F1: General Help
                                              F3: Previous Values
                                              F4: Optimized Defaults
                                              F7: Search Setup Items
                                              F10: Save & Exit
                                              ESC: Exit


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                                                                      AB
```

6. Use the arrow keys to select the hot spare disk to be deleted, press **Enter**, and then set the status of the disk to **Enabled**, see Figure 2-99.

Figure 2-99 Setting Disk Status


```
                          Aptio Setup - AMI
      Advanced

  Port:CN0 Box:1 Bay:2     [Enabled]            Size:894.253
   Size:960.197 GB                              GiB(960.197 GB)
  SATA-SSD ATA                                  Port:CN0 Box:1 Bay:2
  DATSSD                                        Logical Sector Size:512
  J960GSBLYAC8CDED90                            Model:ATA       DATSSD
 ▶ Delete Spare Drives                          J960GSBLYAC8CDED90
                                                Serial
                                                Number:D240219023KA00005▼

                                                →←: Select Screen
                                                ↑↓: Select Item
                                                Enter: Select
                                                +/-: Change Option
                                                F1: General Help
                                                F3: Previous Values
                                                F4: Optimized Defaults
                                                F7: Search Setup Items
                                                F10: Save & Exit
                                                ESC: Exit

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                                                                      AB
```

7. Use the arrow keys to select **Delete Spare Drives** and press **Enter**. The hot spare disk is deleted successfully, see Figure 2-100.

Figure 2-100 Hot Spare Disk Deleted Successfully

```
                          Aptio Setup - AMI
        Advanced

 Delete Spare Successful                      Navigate back to Main
                                              Menu
 ▶ [Back to Main Menu]




                                              →←: Select Screen
                                              ↑↓: Select Item
                                              Enter: Select
                                              +/-: Change Opt.
                                              K/M: Scroll Help Area
                                              F1: General Help
                                              F2: Previous Values
                                              F3: Optimized Defaults
                                              F4: Save & Exit

              Version 2.22.1294 Copyright (C) 2025 AMI
```

8. Select **Back to Main Menu**, and then press **Enter** to return to the controller management screen.

2.5.5 Deleting a RAID Volume

Abstract

When a server no longer needs a RAID volume, you can delete the RAID volume to release the disk space.

 Notice

● The data that is lost during deletion of the RAID volume cannot be restored. Therefore, you must make sure that you have backed up important data before deleting the volume.
● If the RAID logical volume to be deleted is the only logical volume on the current array, the array is also deleted after the RAID logical volume is deleted.

Prerequisite

The RAID volume is created successfully. For details, refer to "2.3.3 Creating a RAID Volume".

Steps

1. On the controller management screen, use the arrow keys to select **Array Configuration**, and then press **Enter**. The **Array Configuration** screen is displayed, see Figure 2-101.

Figure 2-101 Array Configuration Screen
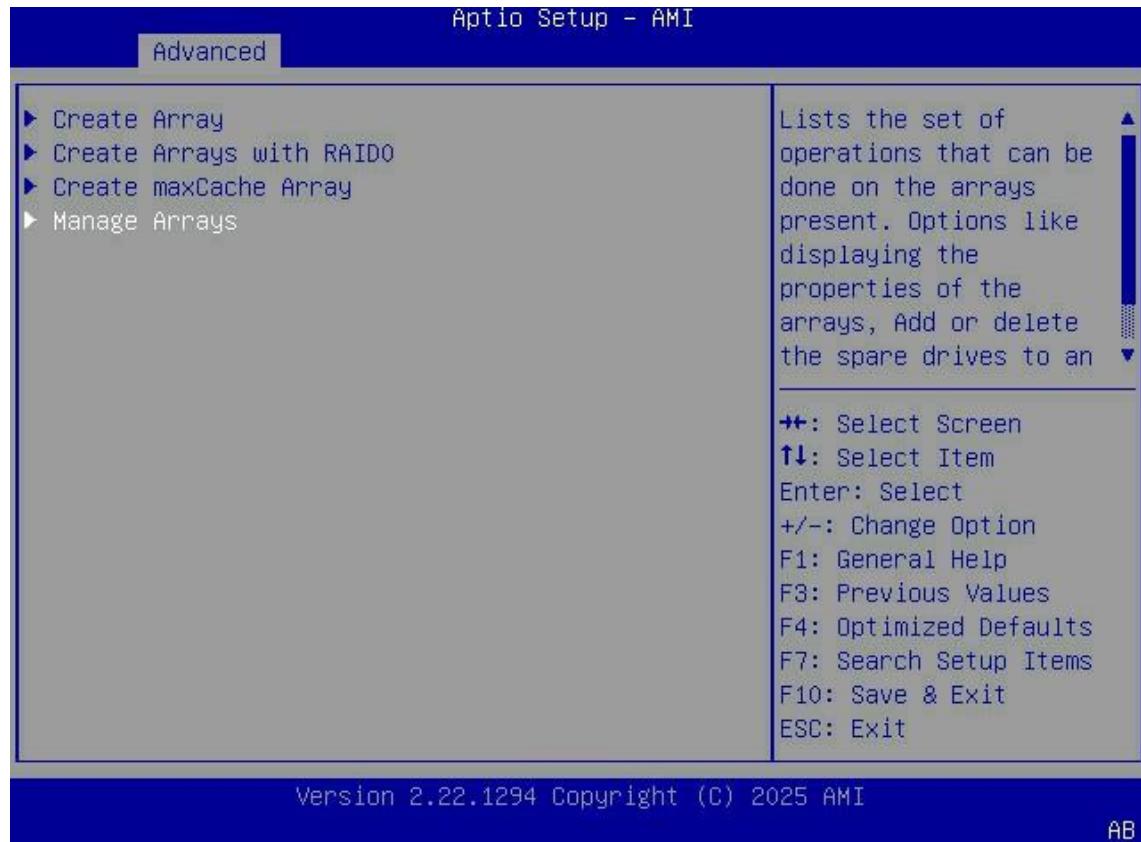
2. Use the arrow keys to select **Manage Arrays**, and then press **Enter**. The **Manage Arrays** screen is displayed, see Figure 2-102.

Figure 2-102 Managing Arrays Screen

```
                        Aptio Setup - AMI
      Advanced

 ▶ Array A                                    │ Array A
                                              │
                                              │
                                              │
                                              │
                                              │
                                              │
                                              │
                                              │
                                              │ ←→: Select Screen
                                              │ ↑↓: Select Item
                                              │ Enter: Select
                                              │ +/-: Change Option
                                              │ F1: General Help
                                              │ F3: Previous Values
                                              │ F4: Optimized Defaults
                                              │ F7: Search Setup Items
                                              │ F10: Save & Exit
                                              │ ESC: Exit

              Version 2.22.1294 Copyright (C) 2025 AMI
                                                              AB
```
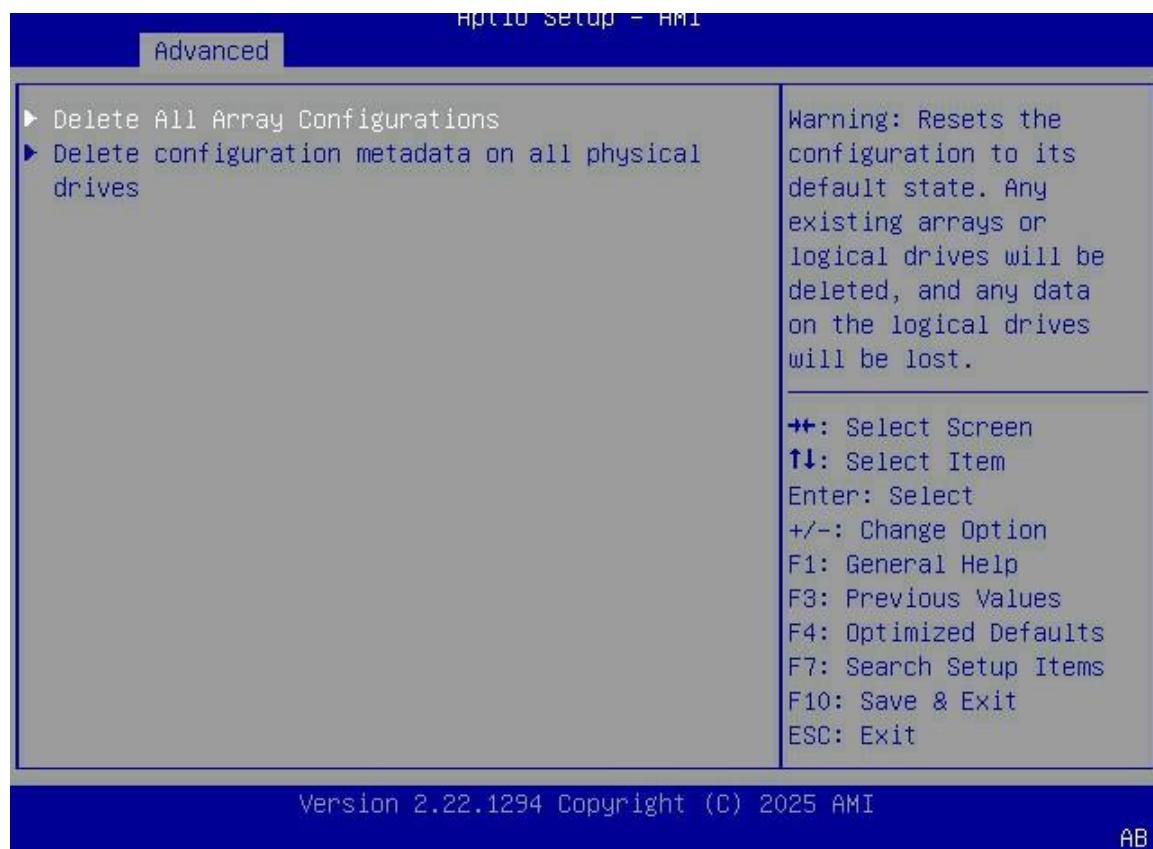
3. Use the arrow keys to select the array for which you need to delete a logical volume, and then press **Enter**. The screen for managing the selected array is displayed, see Figure 2-103.

Figure 2-103 Managing the Selected Array

```
                          Aptio Setup - AMI
          Advanced

   Array Type            Data              ▲  Displays the list the
   ID                    0                    logical drives
   Interface Type        SATA-SSD             contained in the array.
   Total Space           1.746 TiB(1.92 TB)
   Unused Space          NA(NA)
   Used Space            1.746 TiB(1.92 TB)
   Block Size            512 Bytes
   Array Status          Ok
   SSD I/O Bypass        Enabled
   Member Logical        1                    →←: Select Screen
   Drive(s)                                   ↑↓: Select Item
   Member Physical       2                    Enter: Select
   Drive(s)                                   +/-: Change Option
 ▶ List Logical Drives                        F1: General Help
 ▶ Create Logical Drive                       F3: Previous Values
 ▶ IO Bypass Settings                         F4: Optimized Defaults
 ▶ Create Split Mirror Backup                 F7: Search Setup Items
 ▶ Manage Spare Drives                     ▒  F10: Save & Exit
 ▶ Manage Data Drives                      ▼  ESC: Exit

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                                                                    AB
```

4. Use the arrow keys to select **List Logical Drives**, and then press **Enter**. The **List Logical Drives** screen is displayed, see Figure 2-104.

Figure 2-104 List Logical Drives Screen

```
                         Aptio Setup - AMI
      Advanced

  ▶ Logical Drive 1 (Logical Drive 1)        Logical Drive 1
                                             (Logical Drive 1)



                                             ➡➡: Select Screen
                                             ↑↓: Select Item
                                             Enter: Select
                                             +/-: Change Option
                                             F1: General Help
                                             F3: Previous Values
                                             F4: Optimized Defaults
                                             F7: Search Setup Items
                                             F10: Save & Exit
                                             ESC: Exit

               Version 2.22.1294 Copyright (C) 2025 AMI
                                                              AB
```
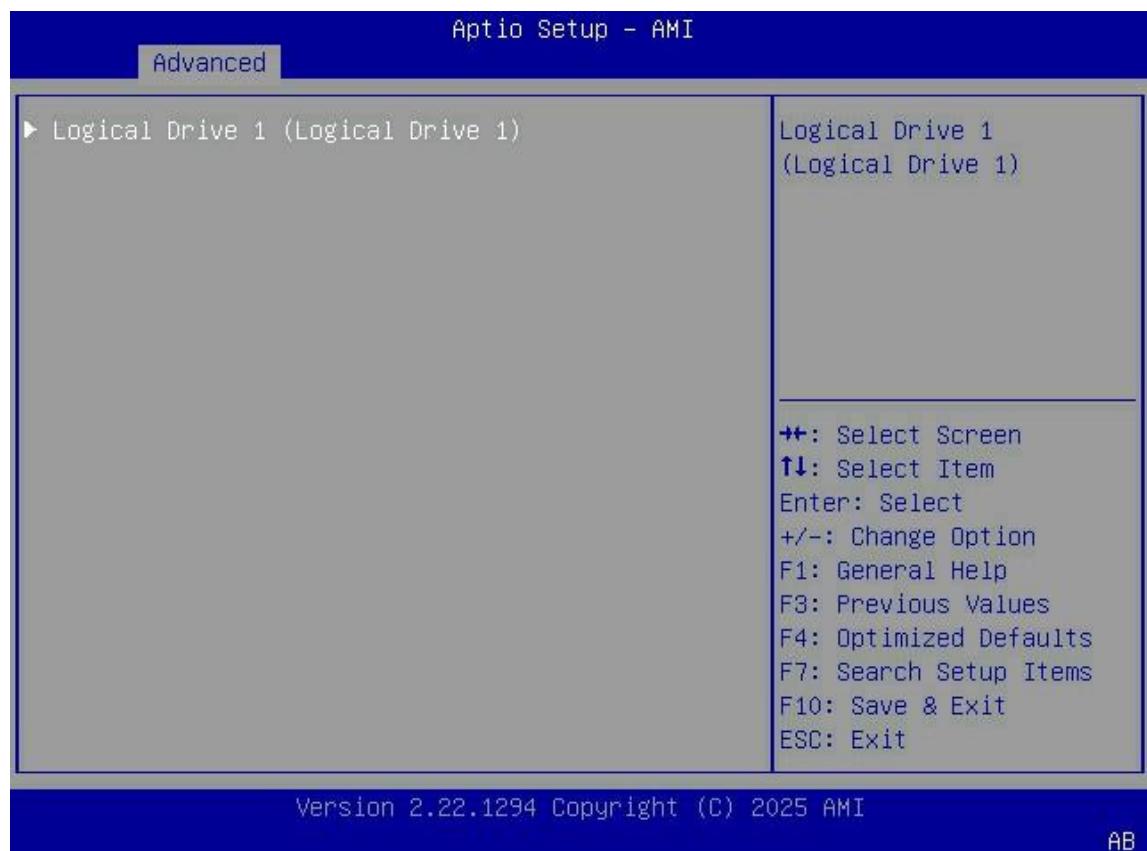
5. Use the arrow keys to select the logical volume to be deleted, and then press **Enter**. The screen for managing the selected logical volume is displayed, see Figure 2-105.

Figure 2-105 Managing the Selected Logical Volume
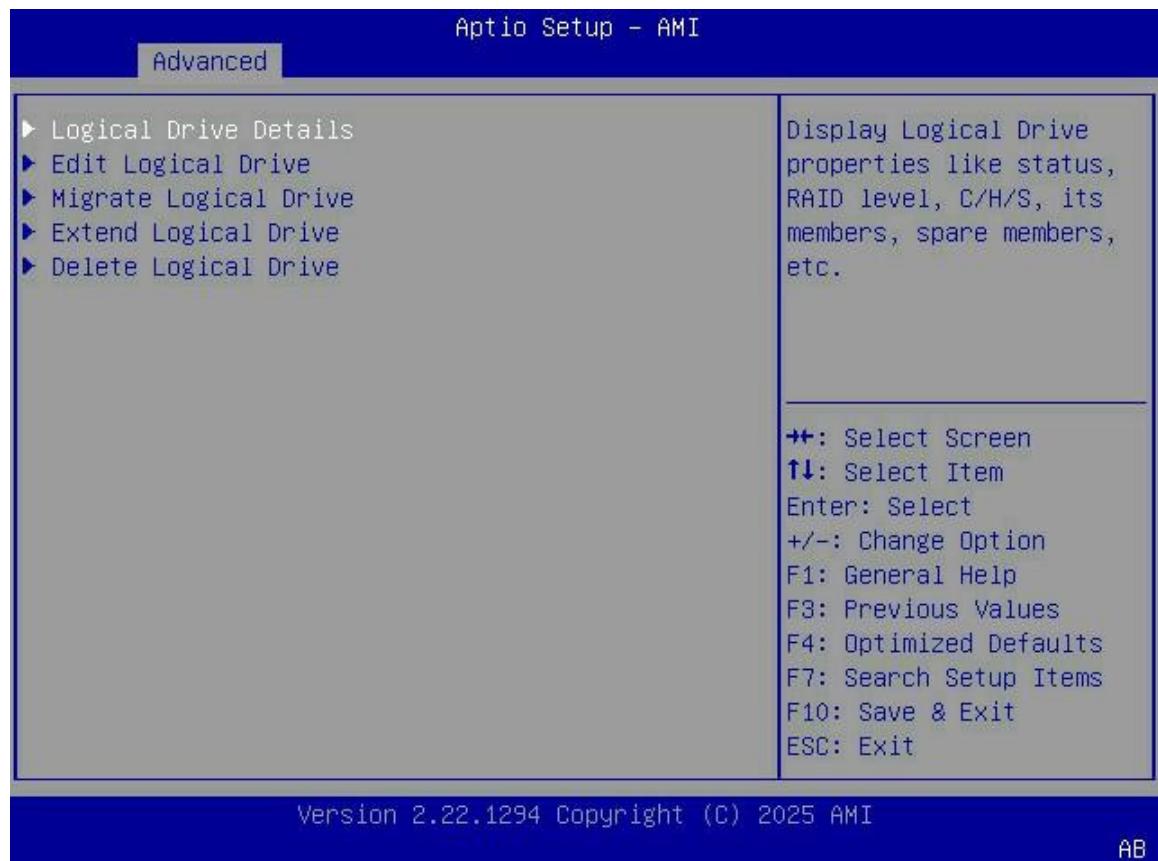
6. (Optional) To view the details of the logical volume, use the arrow keys to select **Logical Drive Details**, and then press **Enter**, see Figure 2-106.

Figure 2-106 Logical Volume Details


```
                        Aptio Setup - AMI
        Advanced

Status                  Ok                          ▲
Size                    894.222 GiB(960.163 GB)
RAID Level              RAID1
Legacy Disk             65535/255/32
Geometry(C/H/S)
Strip Size              256 KiB
Full Stripe Size        256 KiB
Logical Drive Label     Logical Drive 1
Volume Unique           600508B1001C2DD57CCBD527
Identifier              B3D1A509                    ▶←: Select Screen
Acceleration Method     IO Bypass                   ↑↓: Select Item
Logical Drive Members:                              Enter: Select
Port:CN0 Box:1 Bay:0 Size:894.253 GiB(960.197       +/-: Change Option
GB) SATA-SSD ATA     DATSSD J960GSBLYAC8CDED90       F1: General Help
Status:Ok                                           F3: Previous Values
                                                    F4: Optimized Defaults
Port:CN0 Box:1 Bay:1 Size:894.253 GiB(960.197       F7: Search Setup Items
GB) SATA-SSD ATA     DATSSD J960GSBLYAC8CDED90       F10: Save & Exit
Status:Ok                                   ▼        ESC: Exit


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                                                                    AB
```

7. On the logical volume management screen, use the arrow keys to select **Delete Logical Drive**, and then press **Enter**. The confirmation screen for RAID volume deletion is displayed, see Figure 2-107.

Figure 2-107 Confirmation Screen for RAID Volume Deletion

```
                        Aptio Setup - AMI
     Advanced

  Deletes the Logical Drive. Any data contained      Configuration changes
  in the Logical Drive will be lost. If the          will be applied
  Logical Drive being deleted is the only            immediately
  Logical Drive of the Array, the Array will be
  deleted as well.
  Warning: Self Encrypting Drive-SED devices
  present in the selection. If SED security is
  enabled using any external tool other than the
  controller managed options, the SED may become
  locked after the drive is power cycled. This       ++: Select Screen
  may lead to denial of service or loss of data.     ↑↓: Select Item
  Proceed with caution..                             Enter: Select
                                                     +/-: Change Option
                                                     F1: General Help
                                                     F3: Previous Values
                                                     F4: Optimized Defaults
  ▶ [Submit Changes]                                 F7: Search Setup Items
                                                     F10: Save & Exit
                                                     ESC: Exit

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                                                                    AB
```

8. Select **Submit Changes**, and then press **Enter**. The logical volume is deleted successfully, see Figure 2-108.

Figure 2-108 Logical Volume Deleted Successfully
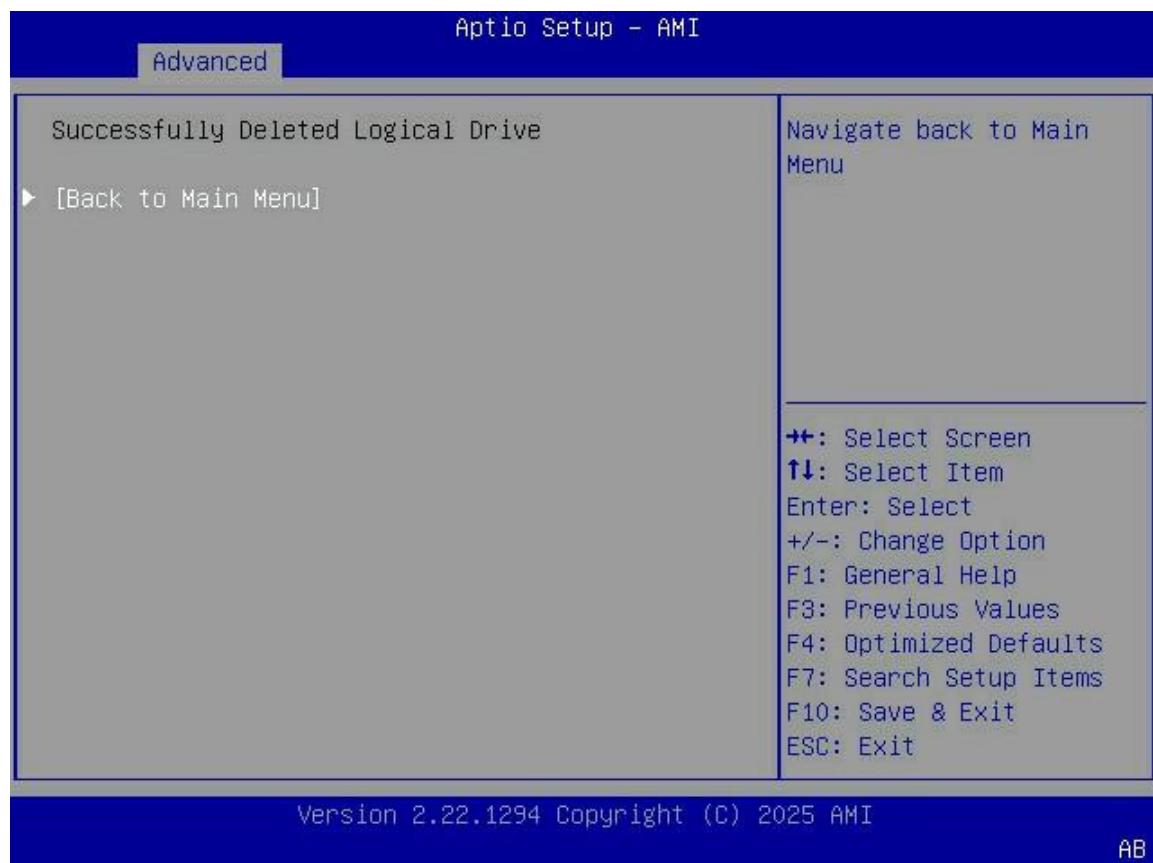
```
                        Aptio Setup — AMI
        Advanced

  Successfully Deleted Logical Drive        Navigate back to Main
                                            Menu
  ▶ [Back to Main Menu]




                                            ↔: Select Screen
                                            ↑↓: Select Item
                                            Enter: Select
                                            +/-: Change Option
                                            F1: General Help
                                            F3: Previous Values
                                            F4: Optimized Defaults
                                            F7: Search Setup Items
                                            F10: Save & Exit
                                            ESC: Exit

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                                                              AB
```

9. Select **Back to Main Menu**, and then press **Enter** to return to the controller management screen.

2.5.6 Clearing RAID Configuration Information

Abstract

This procedure describes how to clear all configuration information that is already created on a PMC RAID controller card.

🛈 **Notice**

The data that is lost during clearing of the configuration information on the RAID card cannot be restored. Therefore, it is required to make sure that you have backed up important data before the clearing operation.

Prerequisite

A RAID volume is created successfully and it has the corresponding RAID configuration information. For details, refer to "2.3.3 Creating a RAID Volume".

Steps

1. On the controller management screen, use the arrow keys to select **Configure Controller Settings**, and then press **Enter**. The **Configure Controller Settings** screen is displayed, see Figure 2-109.

   Figure 2-109 Configure Controller Settings Screen
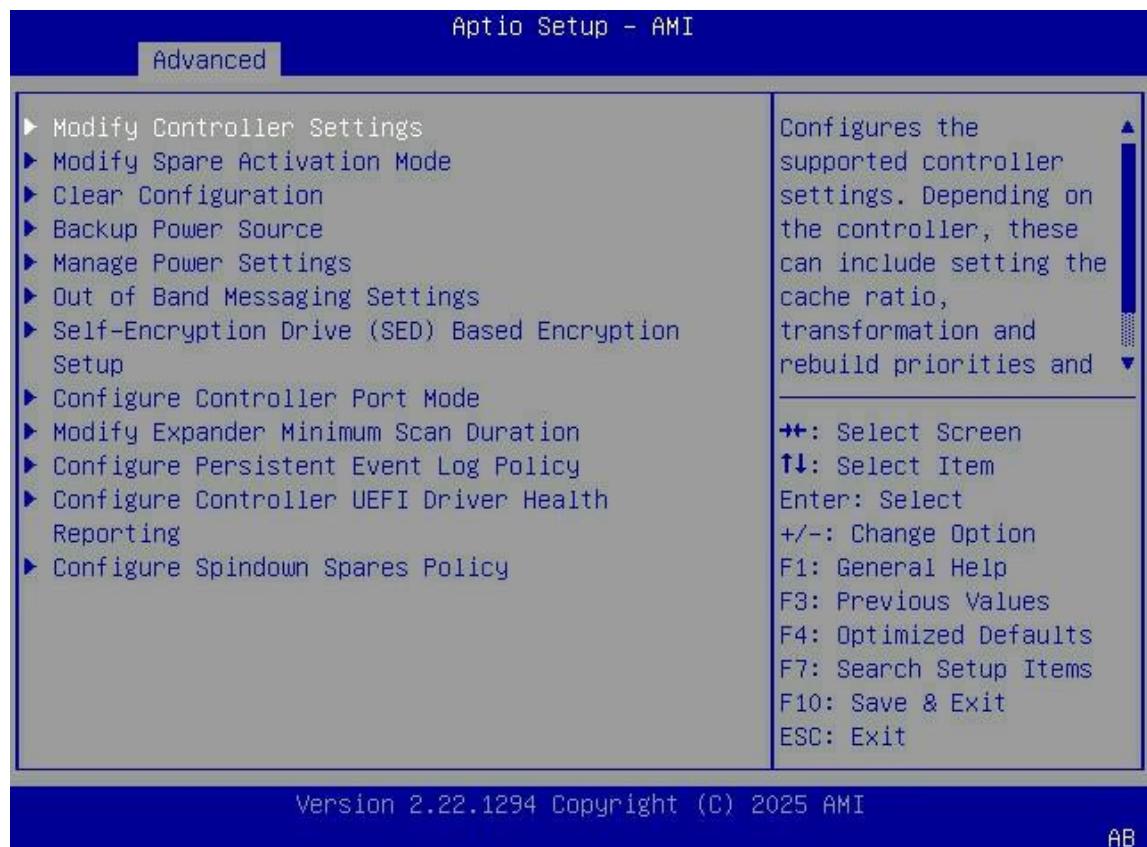
2. Use the arrow keys to select **Clear Configuration**, and then press **Enter**. The screen for clearing the configurations is displayed, see Figure 2-110.

Figure 2-110 Clearing the Configurations

```
                        Aptio Setup - AMI
        Advanced

  ▶ Delete All Array Configurations          Warning: Resets the
  ▶ Delete configuration metadata on all physical    configuration to its
    drives                                   default state. Any
                                            existing arrays or
                                            logical drives will be
                                            deleted, and any data
                                            on the logical drives
                                            will be lost.

                                            ↔: Select Screen
                                            ↑↓: Select Item
                                            Enter: Select
                                            +/-: Change Option
                                            F1: General Help
                                            F3: Previous Values
                                            F4: Optimized Defaults
                                            F7: Search Setup Items
                                            F10: Save & Exit
                                            ESC: Exit

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                                                              AB
```

3. Use the arrow keys to select **Delete All Array Configuration**, and then press **Enter**. The screen for clearing the array configurations is displayed, see Figure 2-111.

Figure 2-111 Clearing the Array Configurations
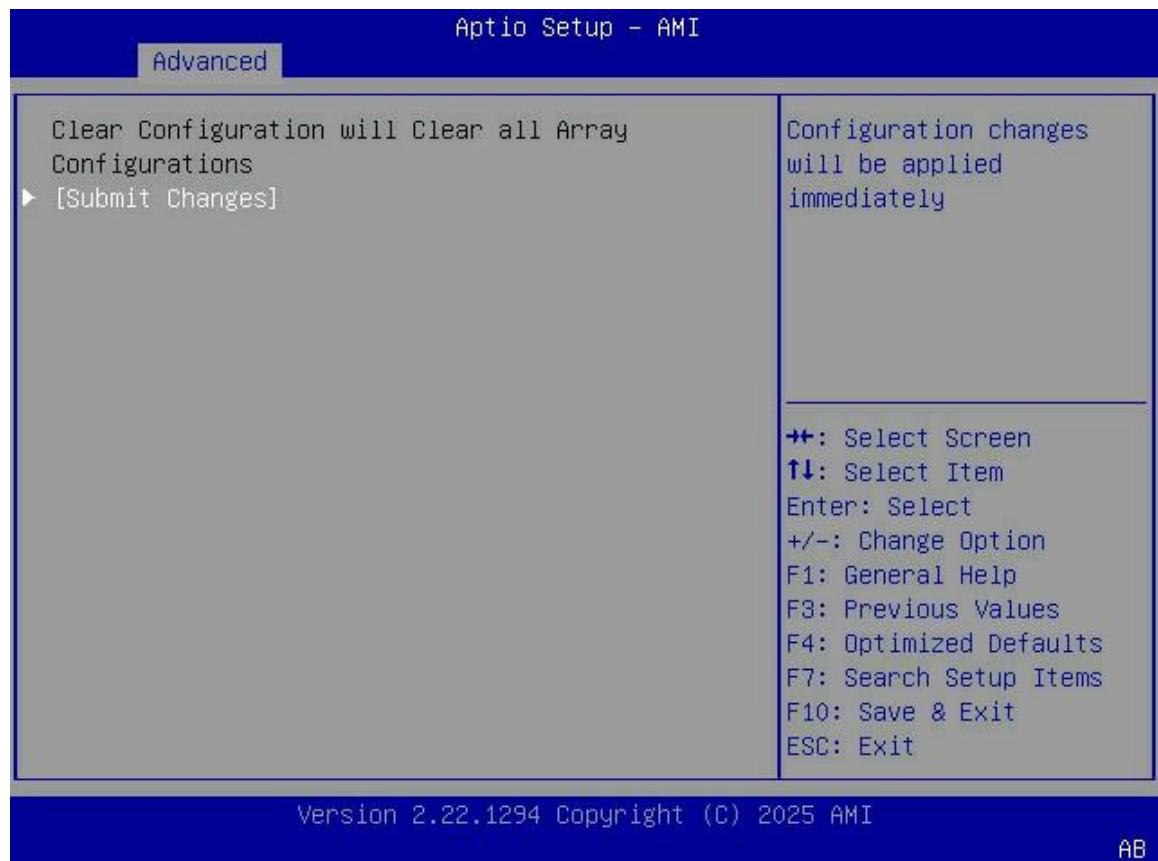
4. Use the arrow keys to select **Submit Changes**, and press **Enter**. The configuration information is cleared successfully, see Figure 2-112.

Figure 2-112 Configuration Cleared Successfully


```
                          Aptio Setup – AMI
    Advanced

 Clear Configuration of Logical Drives        Navigate back to Main
 Successful                                    Menu

 ▶ [Back to Main Menu]





                                               ←→: Select Screen
                                               ↑↓: Select Item
                                               Enter: Select
                                               +/-: Change Opt.
                                               K/M: Scroll Help Area
                                               F1: General Help
                                               F2: Previous Values
                                               F3: Optimized Defaults
                                               F4: Save & Exit

              Version 2.22.1294 Copyright (C) 2025 AMI
```
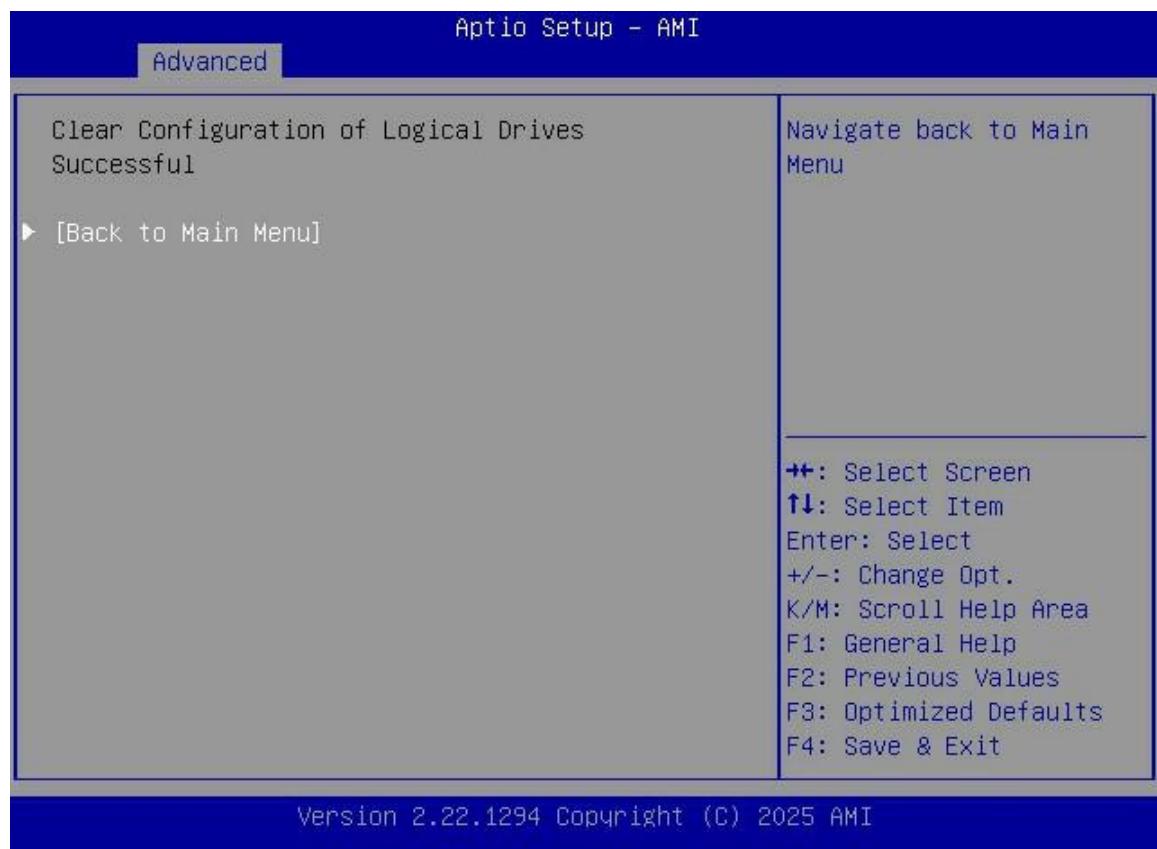
5. Select **Back to Main Menu**, and then press **Enter** to return to the controller management screen.

Chapter 3
Appendixes

Table of Contents

3.1 ARCCONF CLI Tool

During the proper operation of a server, the ARCCONF CLI tool allows you to configure a RAID controller card without restarting the server.

3.1.1 Downloading and Installing the ARCCONF Tool

Abstract

Before using the ARCCONF tool to operate a RAID controller card, you must download and install the ARCCONF tool.

Steps

Downloading the ARCCONF Tool

1. On the address bar of the browser on the maintenance PC, enter

   https://enterprise.NETAŞ. com.cn/tools-detail.html?id=9, and then press **Enter**. The page

   for downloading the tool is displayed.

2. Click the latest version. The page for downloading it is displayed.

Note

For example, the filename of the downloaded tool is "*LogTool_V01.20.01.02.zip*," where "
V01.20.01.02" is the tool version number and vary with the update of the tool version.
This manual uses the tool of the *LogTool_V01.20.01.02.zip* version as an example to describe
how to download and install the ARCCONF tool.

3.
Click . The latest version of the tool is downloaded to the maintenance PC.

Installing the ARCCONF Tool

4. Decompress the *LogTool_V01.20.01.02.zip* tool package to the *LogTool_ V01.20.01.02* folder, and then enter this folder.

5. Depending on the server operating system, perform the following operations:

If...	Then...
The OS is Linux	a. Decompress the *LogCollect_linux.tar.gz* package in the *LogTool_V01.20.01.02* folder to the *LogCollect_linux* folder. Access the *LogCollect_linux\components\raid\tools* directory. *Arcconf-linux* in the *tools* folder is the ARCCONF tool. b. Connect the maintenance PC to the server directly through a network cable, and upload the *arcconf-linux* file to any directory of the server OS through the SSH tool on the maintenance PC. c. Rename the *arcconf-linux* file as *arcconf*. d. Grant the executable permission to the *arcconf* files.
The OS is Windows	a. Decompress the *LogCollect_windows.7z* package in the *LogTool_V01.20.01.02* folder to the *LogCollect_windows* folder. Access the *LogCollect_windows\components\raid\tools \x86_64* directory. *Arcconf64.exe* in the *x86_64* folder is the ARCCONF tool. b. On the maintenance PC, upload the *arcconf64.exe* file to the *C:\ Windows\System32* directory of the server OS through the SSH tool. c. Rename the *arcconf64.exe* file as *arcconf.exe*.
The OS is VMware	a. Use a file transfer tool (for example, Putty) to upload the tool package applicable to VMware to any directory of the server OS. The following uses */tmp* as an example. b. Run the following command to install the ARCCONF tool: **esxcli software vib install -v=***/tmp/vmware-esx-provider- arcconf.vib --no-sig-check* In the above command, */tmp/vmware-esx-provider-arcconf. vib* must be the complete path of the ARCCONF tool file. c. Enter the */opt/pmc* (installation path of the ARCCONF tool) directory and execute the commands related to the RAID card.

📚 Note

If the OS is Linux, the ARCCONF tool can be used only after the executable permission is granted to it. The following command is used to grant the highest permission. You must exercise caution when executing the following command:
 # chmod 777 *arcconf*

3.1.2 Common Commands

When you configure a RAID card by using the ARCCONF CLI tool, it is recommended that you comply with the initial configuration flow shown in Figure 3-1.

Figure 3-1 Initial Configuration Flow
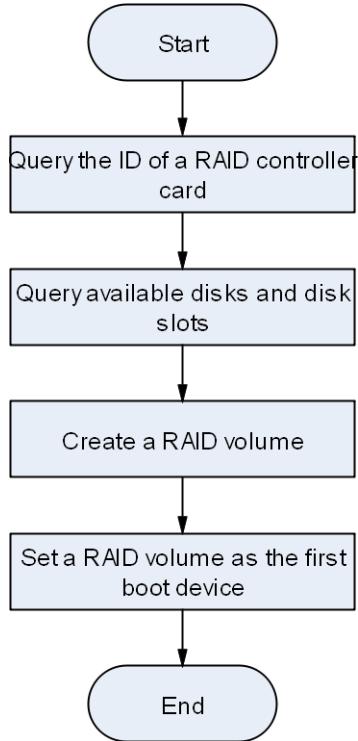
Note

- The ID of a queried RAID card is used as a parameter for executing other common commands. For the commands, refer to "3.1.2.1 Querying the Basic Information About a RAID Card".
- The queried available disks and disk slots are used as the parameters of the RAID creation command. For the command, refer to "3.1.2.6 Creating and Deleting a RAID Array".
- A RAID volume is set as the first boot device. For the command, refer to "3.1.2.7 Setting a Boot Device".

3.1.2.1 Querying the Basic Information About a RAID Card

Command Function

This command displays all the RAID cards identified by the ARCCONF tool or the basic information about the specified RAID card.

Syntax

- arcconf list
- arcconf list [Controller#]

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID controller card	-

Usage Guidelines

None

Example

- The following example shows how to query the IDs of all RAID cards identified by the ARCCONF tool:

arcconf list

For a description of the fields in the command output, refer to Table 3-1.

Table 3-1 Descriptions of the Fields in the Command Output

Field	Description
Controller ID	ID of a RAID card
Status	Status of a RAID card
Slot	Slot number of a RAID card
Mode	Work mode of a RAID card

- The following example shows how to query information about RAID card 1:

arcconf list 1

For a description of the fields in the command output, refer to Table 3-2.

Table 3-2 Descriptions of the Fields in the Command Output

Field	Description
Array ID	ID of the disk array
Logical ID	ID of the virtual disk
Physical ID	ID of the physical disk

3.1.2.2 Querying the Detailed Information About a RAID Card

Command Function

This command displays detailed information about a RAID controller card, disk array, virtual disk, and physical disk.

Syntax

arcconf getconfig <Controller#> [AD | LD [LD#] | AR [AR#] | PD [Channel# ID# Channel# ID#...]| MC | CN | [AL]] [nologs]

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-
AD	Specifies that RAID card attributes are queried	-
LD	Specifies that virtual disk attributes are queried	-
[LD#]	ID of a virtual disk	-
[AR#]	ID of a disk array	-
PD	Specifies that physical disk attributes are queried	-
<Channel# ID#>	Device ID of a physical disk	-
MC	Specifies that the maximum cache information is queried	-
CN	Specifies that the RAID card information is queried	-
[AL]	Specifies that all device information is queried	-

Usage Guidelines

None

Example

- The following example shows how to query the information about a RAID card:

  # arcconf getconfig 1 ad

```
Controllers found: 1
--------------------------------------------------------------
Controller information
--------------------------------------------------------------
    Controller Status                        : Optimal
    Controller Mode                          : RAID (Hide RAW)
    Channel description                      : SCSI
    Controller Model                         : ZTE Adaptec SmartIOC2100 SDPSx V2.0
    Controller Serial Number                 : 719343
    Controller World Wide Name               : 50123456789ABC00
    Physical Slot                            : 0
    Temperature                              : 46 C/ 114 F (Normal)
    Host bus type                            : PCIe 3.0
    Host bus speed                           : 7880 MBps
    Host bus link width                      : 8 bit(s)/link(s)
    PCI Address (Bus:Device:Function)        : 0:3c:0:0
    Number of Ports                          : 5
    Internal Port Count                      : 5
    External Port Count                      : 0
    Defunct disk drive count                 : 0
    NCQ status                               : Enabled
    Queue Depth                              : Automatic
    Monitor and Performance Delay            : 60 minutes
    Elevator Sort                            : Enabled
    Degraded Mode Performance Optimization   : Disabled
    Latency                                  : Disabled
    Statistics data collection mode          : Disabled
    Post Prompt Timeout                      : 15 seconds
    Boot Controller                          : False
    Primary Boot Volume                      : None
    Secondary Boot Volume                    : None
    Driver Name                              : smartpqi
    Driver Supports SSD I/O Bypass           : Yes
    Manufacturing Part Number                : Not Applicable
    Manufacturing Spare Part Number          : Not Applicable
    Manufacturing Wellness Log               : Not Applicable
    NVRAM Checksum Status                    : Passed
    Sanitize Lock Setting                    : None
    --------------------------------------------------------
    Power Settings
    --------------------------------------------------------
    Power Consumption                        : Not Available
    Current Power Mode                       : Maximum Performance
    Pending Power Mode                       : Not Applicable
    Survival Mode                            : Enabled
    --------------------------------------------------------
    I2C Settings
    --------------------------------------------------------
    I2C Address                              : 0x0
    --------------------------------------------------------
    Cache Properties
    --------------------------------------------------------
```

```
--------------------------------------------------------
Physical Drive Write Cache Policy Information
--------------------------------------------------------
Configured Drives                        : Default
Unconfigured Drives                      : Default
HBA Drives                               : Default
--------------------------------------------------------
RAID Properties
--------------------------------------------------------
Logical devices/Failed/Degraded          : 2/0/0
Automatic Failover                       : Disabled
Background consistency check             : High
Consistency Check Delay                  : 0 seconds
Parallel Consistency Check Supported     : Enabled
Parallel Consistency Check Count         : 1
Inconsistency Repair Policy              : Disabled
Consistency Check Inconsistency Notify   : Disabled
Rebuild Priority                         : Medium
Expand Priority                          : Medium
--------------------------------------------------------
Controller Version Information
--------------------------------------------------------
Firmware                                 : 2.66[0]
Driver                                   : Linux 1.1.4-115
Hardware Revision                        : A
--------------------------------------------------------
Temperature Sensors Information
--------------------------------------------------------
Sensor ID                                : 0
Current Value                            : 37 deg C
Max Value Since Powered On               : 46 deg C
Location                                 : Inlet Ambient

Sensor ID                                : 1
Current Value                            : 46 deg C
Max Value Since Powered On               : 56 deg C
Location                                 : ASIC

--------------------------------------------------------
```

For a description of the fields in the command output, refer to Table 3-3.

Table 3-3 Descriptions of the Fields in the Command Output

Field	Description
Controller Status	Status of the RAID card
Controller Mode	Work mode of the RAID card
Controller Model	Model of the RAID card
Firmware	Firmware version of the RAID card
Driver	Driver version of the RAID card

● The following example shows how to query the information about array 1:

arcconf getconfig 1 ar 1

```
Controllers found: 1
----------------------------------------------------------------
Array Information
----------------------------------------------------------------
Array Number 1
   Name                          : B
   Status                        : Ok
   Interface                     : SATA SSD
   Total Size                    : 3662336 MB
   Unused Size                   : 0 MB
   Block Size                    : 512 Bytes
   Array Utilization             : 100.00% Used, 0.00% Unused
   Type                          : Data
   Transformation Status         : Not Applicable
   Spare Rebuild Mode            : Dedicated
   SSD I/O Bypass                : Enabled
   ----------------------------------------------------------
   Array Logical Device Information
   ----------------------------------------------------------
   Logical 1                     : Optimal (1, Data, 1831388 MB) test
   ----------------------------------------------------------
   Array Physical Device Information
   ----------------------------------------------------------
```

- The following example shows how to query the information about virtual disk 1:

arcconf getconfig 1 ld

```
Controllers found: 1
----------------------------------------------------------------
Logical device information
----------------------------------------------------------------
Logical Device number 0
   Logical Device name           : system
   Disk Name                     : /dev/sdd
   Block Size of member drives   : 512 Bytes
   Array                         : 0
   RAID level                    : 1
   Status of Logical Device      : Optimal
   Size                          : 457830 MB
   Stripe-unit size              : 256 KB
   Full Stripe Size              : 256 KB
   Interface Type                : SATA SSD
   Device Type                   : Data
   Boot Type                     : None
   Heads                         : 255
   Sectors Per Track             : 32
   Cylinders                     : 65535
   Caching                       : Enabled
   Mount Points                  : /boot/efi 200 MB  Partition Number 1 /boot 1024 MB  Partition Number 2
   LD Acceleration Method        : Controller Cache
   Volume Unique Identifier      : 600508B1001C1FF69AB000FC028B878C
   ----------------------------------------------------------
   Array Physical Device Information
   ----------------------------------------------------------
   Device 16                     : Present (457862MB, SATA, SSD, Channel:0, Device:16) PHYS7295
   Device 17                     : Present (457862MB, SATA, SSD, Channel:0, Device:17) BTHC450
```

For a description of the fields in the output displayed after the command for querying virtual disk 1 is executed, refer to .

Table 3-4 Description of the Fields in the Command Output

Parameter	Description
Logical Device name	Name of the virtual disk
Disk Name	Drive letter of the virtual disk
Array	ID of the virtual disk
RAID level	RAID level

Parameter	Description
Status of Logical Device	RAID status
Boot Type	Boot type of the virtual disk
Caching	Whether cache is enabled

● The following example shows how to query the information about the disk in slot 5:

arcconf getconfig 1 pd 0 5

```
Controllers found: 1
----------------------------------------------------------------
Physical Device information
----------------------------------------------------------------
      Device #0
         Device is a Hard drive
         State                        : Online
         Drive has stale RIS data     : False
         Block Size                   : 512 Bytes
         Physical Block Size          : 4K Bytes
         Transfer Speed               : SATA 6.0 Gb/s
         Reported Channel,Device(T:L) : 0,5(5:0)
         Reported Location            : Enclosure Direct Attached, Slot 5(Connector 1:CN1)
         Array                        : 1
         Vendor                       : ATA
```

3.1.2.3 Querying Virtual Disk Information

Command Function

This command displays virtual disk information.

Syntax

arcconf getconfig <Controller#> LD [LD#]

Syntax Description

Parameter	Description	Range
<Controller#>	ID of the RAID card that the disks are connected to	-
LD	Specifies that virtual disk attributes are queried	-
[LD#]	ID of a virtual disk	-

Usage Guidelines

None

Example

The following example shows how to display the information about all virtual disks in RAID card 1:

arcconf getconfig 1 ld

```
Controllers found: 1
----------------------------------------------------------
Logical device information
----------------------------------------------------------
Logical Device number 0
   Logical Device name              : system
   Disk Name                        : /dev/sdd
   Block Size of member drives      : 512 Bytes
   Array                            : 0
   RAID level                       : 1
   Status of Logical Device         : Optimal
   Size                             : 457830 MB
   Stripe-unit size                 : 256 KB
   Full Stripe Size                 : 256 KB
   Interface Type                   : SATA SSD
   Device Type                      : Data
   Boot Type                        : None
   Heads                            : 255
   Sectors Per Track                : 32
   Cylinders                        : 65535
   Caching                          : Enabled
   Mount Points                     : /boot/efi 200 MB  Partition Number 1 /boot 1024 MB  Partition Number 2
   LD Acceleration Method           : Controller Cache
   Volume Unique Identifier         : 600508B1001C1FF69AB000FC028B878C
   --------------------------------------------------------
   Array Physical Device Information
   --------------------------------------------------------
   Device 16                        : Present (457862MB, SATA, SSD, Channel:0, Device:16) PHYS7295
   Device 17                        : Present (457862MB, SATA, SSD, Channel:0, Device:17) BTHC450
```

For a description of the fields in the command output, refer to Table 3-5.

Table 3-5 Descriptions of the Fields in the Command Output

Field	Description
Logical Device name	Name of the virtual disk
Disk Name	Drive letter of the virtual disk
Array	ID of the virtual disk
RAID level	RAID level of the virtual disk
Status of Logical Device	RAID status
Boot Type	Boot type of the virtual disk
Caching	Whether the caching function is enabled

3.1.2.4 Querying Physical Disk Information

Command Function

This command displays physical disk information.

Syntax

arcconf getconfig <Controller#> PD [Channel# ID# Channel# ID#...]

Syntax Description

Parameter	Description	Range
<Controller#>	ID of the RAID card that the disks are connected to	-

Parameter	Description	Range
PD	Specifies that physical disk attributes are queried	-
<Channel# ID#>	Device ID of a physical disk	-

Usage Guidelines

None

Example

The following example shows how to display the information about the physical disk in slot 5:

arcconf getconfig 1 pd 0 5

```
Controllers found: 1
------------------------------------------------------------------------
Physical Device information
------------------------------------------------------------------------
      Device #0
          Device is a Hard drive
          State                         : Online
          Drive has stale RIS data      : False
          Block Size                    : 512 Bytes
          Physical Block Size           : 4K Bytes
          Transfer Speed                : SATA 6.0 Gb/s
          Reported Channel,Device(T:L)  : 0,5(5:0)
          Reported Location             : Enclosure Direct Attached, Slot 5(Connector 1:CN1)
          Array                         : 1
          Vendor                        : ATA
```

3.1.2.5 Querying the Firmware/Driver Version of a RAID Card

Command Function

This command displays the firmware/driver version of a RAID controller card.

Syntax

arcconf getversion [Controller#]

Syntax Description

Parameter	Description	Setting
[Controller#]	ID of a RAID card	-

Usage Guidelines

None

Example

The following example shows how to query the firmware/driver version of the RAID card whose ID is 1:

arcconf getversion 1

```
Controllers found: 1
Controller #1
==============
Firmware                              : 2.66[0] (0)
Driver                                : Linux 1.1.4-115 (0)


Command completed successfully.
```

For a description of the fields in the command output, refer to Table 3-6.

Table 3-6 Descriptions of the Fields in the Command Output

Field	Description
Firmware	Firmware version of the RAID card
Driver	Driver version of the RAID card

3.1.2.6 Creating and Deleting a RAID Array

Command Function

The following commands create and delete a RAID array.

Syntax

- arcconf create <Controller#> logicaldrive [Options] <Size> <RAID#> <Channel# ID#> [Channel# ID#] ... [noprompt] [nologs]
- arcconf delete <Controller#> logicaldrive <ld#> [noprompt] [nologs]

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-
[Options]	Options for creating a RAID array	- stripesize: optional, specifying the stripe size in KB, range: 16, 32, 64, 128*, 256, 512, 1024. - legs: optional parameter, specifying the number of sub-logical devices. - name: optional, used to specify the name of the logical disk. - method: initialization method of the logical device. Valid options include BUILD and DEFAULT. - wcache: write cache setting of the logical device. Valid options include WT and WB. - ldcache: sets the cache of the logical device. Valid options include LON and LOFF.

Parameter	Description	Setting
		• ssdoverprovisioningoptimization <enable | disable>: specifies the initialization to support the fast parity check function. • cachelinesize: specifies the size of the maximum cache. The default value is 64.
<Size>	Logical device size (MB). You can set it to all available space by using the MAX keyword.	-
<RAID#>	RAID level	RAID 0, RAID 1, RAID 1ADM, RAID 10, RAID 10ADM, RAID 5, RAID 6, RAID 50, RAID 60
<Channel# ID#>	Device ID of a physical disk	-
<Id#>	ID of a virtual disk	-

Usage Guidelines

By default, the disks without data are used to create a RAID array.

Example

- The following example shows how to query available disks. In the command output, the disk whose **State** is **Ready** can be used to create a RAID array, and the disk whose **State** is **Online** has been used to create a RAID array.
  # arcconf getconfig 1 pd

```
Controllers found: 1
-----------------------------------------------------------------------
Physical Device information
-----------------------------------------------------------------------
   Channel #0:
      Device #0
         Device is a Hard drive
         State                                : Online
         Drive has stale RIS data             : False
         Block Size                           : 512 Bytes
         Physical Block Size                  : 4K Bytes
         Transfer Speed                       : SATA 6.0 Gb/s
         Reported Channel,Device(T:L)         : 0,0(0:0)
         Reported Location                    : Direct Attached, Slot 0(Connector 0:CN0)
         Array                                : 0
         Vendor                               : ATA
         Model                                : Micron_5300_MTFD
         Firmware                             : D3MU001
         Serial number                        : 21022CAFD844
         World-wide name                      : 30015EBE03850E41
         Reserved Size                        : 32768 KB
         Used Size                            : 457830 MB
         Unused Size                          : 0 MB
         Total Size                           : 457862 MB
         Write Cache                          : Disabled (write-through)
         S.M.A.R.T.                           : No
         S.M.A.R.T. warnings                  : 0
         SSD                                  : Yes
         Device On Boot Connector             : No
         NCQ supported                        : Supported
         NCQ status                           : Enabled
         Boot Type                            : None
         Current Temperature                  : 28 deg C
         Maximum Temperature                  : 47 deg C
         Threshold Temperature                : 70 deg C
         PHY Count                            : 1
         Drive Configuration Type             : Data
         Drive Exposed to OS                  : False
         Sanitize Erase Support               : True
         Sanitize Lock Freeze Support         : True
         Sanitize Lock Anti-Freeze Support    : True
         Sanitize Lock Setting                : None
         Usage Remaining                      : 100 percent
         Estimated Life Remaining             : Not Applicable
         SSD Smart Trip Wearout               : False
         56 Day Warning Present               : False
         Drive Unique ID                      : 6C0D214B7B889236EEB49804E39D9427
         Drive SKU Number                     : Not Applicable
```

- The following example shows how to create RAID 1:

  # arcconf create 1 logicaldrive stripesize 64 name test max 1 0 4 0 5

```
Controllers found: 1

Do you want to add a logical device to the configuration?
Press y, then ENTER to continue or press ENTER to abort: y

Creating logical device: test

Command completed successfully.
```

- The following example shows how to delete the virtual disk whose ID is 1:

  # arcconf delete 1 logicaldrive 1

```
Controllers found: 1

WARNING: Deleting this logical device will automatically delete array 1 because it is the only logical device present on that array.
All data in logical device 1 will be lost.
Delete the logical device?
Press y, then ENTER to continue or press ENTER to abort: y

Deleting: logical device 1 ("test")

Command completed successfully.
```

3.1.2.7 Setting a Boot Device

Command Function

The following two commands set a RAID volume or physical disk as a boot device.

- The configuration takes effect when the work mode of a RAID volume on a RAID card is mixed or RAID.
- The configuration takes effect when the work mode of a physical disk on a RAID controller card is HBA or mixed.

Syntax

- arcconf setboot <Controller#> logicaldrive <LogicalDrive#> type <Boot Type>
- arcconf setboot <Controller#> device <Channel# ID#> type <Boot Type>

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-
<LogicalDrive#>	ID of a virtual disk	-
<Boot Type>	Boot order	- Primary: sets the virtual disk or physical disk as the primary boot device. - Secondary: sets the virtual disk or physical disk as the secondary boot device.
<Channel# ID#>	Device ID of a physical disk	-

Usage Guidelines

None

Example

- The following example shows how to set virtual disk 0 as the primary boot device:

  # arcconf setboot 1 logicaldrive 0 type Primary

  ```
  Controllers found: 1
  Do you wish to change the boot type of the selected device.
  Press y, then ENTER to continue or press ENTER to abort: y


  Command completed successfully.
  ```

- The following example shows how to set the disk in slot 6 as the secondary boot device:

  # arcconf setboot 1 device 0 6 type Secondary

```
Controllers found: 1
Do you wish to change the boot type of the selected device.
Press y, then ENTER to continue or press ENTER to abort: y


Command completed successfully.
```

3.1.2.8 Setting a Hot Spare Disk

Command Function

This command sets a global or dedicated hot spare disk.

Syntax

arcconf setstate <Controller#> device <Channel# ID#> <State> [ARRAY <AR#> [AR#] ...] [SPARETYPE <TYPE>] [noprompt] [nologs]

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-
<Channel# ID#>	Device ID of a physical disk	-
<State>	Adds or deletes a hot spare disk	● HSP: adds a hot spare disk for one or more arrays ● RDY: deletes a hot spare disk
[ARRAY <AR#> [AR#] ...]	ID of a virtual disk	-
[SPARETYPE <TYPE>]	Sets the replacement mode of the hot spare disk	● 1: dedicated spare, which can be shared between arrays ● 2: automatically replaced but cannot be shared between arrays

Usage Guidelines

None

Example

● The following example shows how to set the disk in slot 6 as a dedicated hot spare disk:

arcconf setstate 1 device 0 6 hsp array 1 sparetype 2

```
Controllers found: 1

Any existing hot-spare drives of a different sparetype will be removed.

Command completed successfully.
```

- The following example shows how to cancel the disk in slot 6 as a dedicated hot spare disk:

  # arcconf setstate 1 device 0 6 rdy

```
Controllers found: 1

Command completed successfully.
```

3.1.2.9 Setting the Work Mode of a RAID Card

Command Function

This command sets the work mode of a RAID card.

Syntax

arcconf setcontrollermode <Controller#> <Controller Mode>

Syntax Descriptions

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-
<Controller Mode>	Work mode of the RAID card	• 2: indicates HBA mode. This mode does not allow RAID array creation. All hard disks are reported to the OS as raw disks. • 3: indicates RAID mode. The RAID card only reports the disks that form a RAID array to the OS. • 5: indicates Mixed mode. The RAID card reports that the RAID disks that form a RAID array. If a disk has no RAID configuration information, the RAID card reports to the OS as a raw disk. The OS can directly operate the disk.

Usage Guidelines

None

Example

- The following example shows how to set the work mode of a RAID card to RAID:

  # arcconf setcontrollermode 1 3

```
Controllers found: 1

Command completed successfully.
```

- The following example shows how to query the work mode of a RAID card:

arcconf getconfig 1

```
Controllers found: 1
--------------------------------------------------------------
Controller information
--------------------------------------------------------------
   Controller Status              : Optimal
   Controller Mode                : RAID (Hide RAW)
   Channel description            : SCSI
   Controller Model               : ZTE Adaptec SmartIOC2100 SDPSx V2.0
```

3.1.2.10 Setting the Read/Write Cache Ratio of a RAID Card

Command Function

This command sets the respective percentage of the read cache and write cache of a RAID controller card.

Syntax

arcconf setcache <Controller#> cacheratio read write

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-
read	Percentage of the read cache	0–100
write	Percentage of the write cache	0–100

Usage Guidelines

- The sum of the percentage of the read cache and that of the write cache is 100%.
- When this command is executed for a RAID card that does not support Cache, an error is reported.

Example

The following example shows how to set the percentage of the read cache to 50% and that of the write cache to 50%:

arcconf setcache 1 cacheratio 50 50

```
Controllers found: 1
Command completed successfully.
```

3.1.2.11 Setting the Caching Policy

Command Function

This command enables or disables the caching function for a virtual disk.

Syntax

- arcconf setcache <Controller#> logicaldrive <LogicalDrive#> con
- arcconf setcache <Controller#> logicaldrive <LogicalDrive#> coff

Syntax Description

Parameter	Description	Range
<Controller#>	ID of a RAID card	-
<LogicalDrive#>	ID of a virtual disk	-

Usage Guidelines

None

Example

- The following example shows how to enable the caching function for virtual disk 0:

  # arcconf setcache 1 logicaldrive 0 con

  ```
  Controllers found: 1
  Cache mode is already set to Enabled.
  Command aborted.
  ```

- The following example shows how to disable the caching function for virtual disk 0:

  # arcconf setcache 1 logicaldrive 0 coff

  ```
  Controllers found: 1
  Command completed successfully.
  ```

3.1.2.12 Using Cache Without a Capacitor

Command Function

This command enables the use of the cache of a RAID card without a capacitor.

 Notice

If the cache of the RAID card is used when there is no capacitor, data may be lost if the RAID card is powered off. Therefore, you must use this command with caution.

Syntax

arcconf setcache <Controller#> nobatterywritecache enable

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-

Usage Guidelines

- The sum of the percentage of the read cache and that of the write cache is 100%.
- When this command is executed for a RAID card that does not support Cache, an error is reported.

Example

The following example shows how to enable the use of the cache of a RAID card without a capacitor:

arcconf setcache 1 nobatterywritecache enable

```
Controllers found: 1

WARNING : Enabling write caching on a cache module without a fully charged battery or

capacitor could cause data loss in the event of a power failure.

Are you sure you want to continue?

Press y, then ENTER to continue or press ENTER to abort: y

Command completed successfully.
```

3.1.2.13 Setting a Disk as a Pass-Through Disk

Command Function

After a disk is set as a pass-through disk, the OS can directly manage it.

Syntax

arcconf uninit <Controller#> [Channel# ID#] ... [nologs]

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-
[Channel# ID#]	Device ID of a physical disk	-

Usage Guidelines

None

Example

The following example shows how to set the disk in slot 5 as a pass-through disk:

arcconf uninit 1 0 5

```
Controllers found: 1
Uninitializing Channel 0, Device 5.

Command completed successfully.
```

3.1.2.14 Querying and Setting the Write Cache Policy for Disks

Command Function

The following commands query and set the write cache policy for disks.

Syntax

- arcconf getconfig <Controller#> logicaldrive ad
- arcconf setcache <Controller#> drivewritecachepolicy <drivetype> <cachepolicy> < drivetype> <cachepolicy>...

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-
<drivetype>	Type of disk for which you want to set the write cache policy	- Configured: sets the write cache policy for RAID member disks in RAID or mixed mode. - Unconfigured: sets the write cache policy for non-RAID member disks in RAID or mixed mode. - HBA: set the write cache policy for disks in HBA mode.
<cachepolicy>	Write cache policy	0: Default (keeps the default status) 1: Enabled (enables write caching) 2: Disabled (disables write caching)

Usage Guidelines

When this command is executed for a RAID card that does not support Cache, an error is reported.

Example

- The following example shows how to set the write cache policy for disks in **Configured** status to **Enabled** and set the write cache policy for disks in **Unconfigured** status to **Disabled**:
  # arcconf setcache 1 drivewritecachepolicy Configured 1 Unconfigured 2

```
Controllers found: 1

Enabling controller drive write cache can increase write performance but risks losing

the data in the cache on sudden loss.

Command completed successfully.
```

- The following example shows how to query the write cache policy for disks:

  # arcconf getconfig 1 ad

```
Controllers found: 1

-------------------------------------------------------------------------------------------------------

Controller information

-------------------------------------------------------------------------------------------------------

   Controller Statue              : Optimal

   Controller Mode                :Mixed

   Channel description            :SCSI

...

-------------------------------------------------------------------------------------------------------

Physical Drive Write Cache Policy Information

-------------------------------------------------------------------------------------------------------

Configured Drives               :Enabled

Unconfigured Drives             :Disabled

HBA Drives                      :Default

-------------------------------------------------------------------------------------------------------

...
```

3.1.2.15 Setting the Status of a Disk Locating Indicator

Command Function

This command turns on or off a disk locating indicator.

Syntax

- arcconf identify <Controller#> all [TIME <BlinkTime>] [STOP] [nologs]
- arcconf identify <Controller#> logicaldrive <logicaldrive#> [TIME <BlinkTime>] [nologs]
- arcconf identify <Controller#> device <Channel# ID#> [TIME <BlinkTime>] [nologs]

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-
[TIME <BlinkTime>]	Time period (in seconds) that the locating indicator is lit for	-

Parameter	Description	Setting
[STOP]	Specifies that the locating indicator is off	-
<LogicalDrive#>	ID of a virtual disk	-
<Channel# ID#>	Device ID of a physical disk	-

Usage Guidelines

None

Example

- The following example shows how to light the locating indicators of disks in RAID group 1 for 5 seconds:

  # arcconf identify 1 logicaldrive 1 time 5

```
Controllers found: 1
Only devices managed by an enclosure processor may be identified

Command completed successfully.
```

- The following example shows how to light the locating indicators of disks in slot 7 for 30 seconds:

  # arcconf identify 1 device 0 7 time 30

```
Controllers found: 1
Only devices managed by an enclosure processor may be identified

Command completed successfully.
```

- The following example shows how to turn off the locating indicators of disks in all slots:

  # arcconf identify 1 all stop

```
Controllers found: 1
No devices are blinking.

Command aborted.
```

3.1.2.16 Modifying the RAID Stripe Size

Command Function

This command modifies the RAID stripe size.

Syntax

arcconf modify <Controller#> from <LogicalDrive#> to stripesize <STRIPE> <Size> <RAID#> < Channel# ID#> [Channel# ID#] ... [noprompt] [nologs]

Syntax Description

Parameter	Description	Range
<Controller#>	ID of a RAID card	-
<LogicalDrive#>	ID of the virtual disk to be set	-
<STRIPE>	Stripe size to be set	16, 32, 64, 128, 256, 512, and 1024. Unit: KB.
<Size>	Size of the virtual disk. The **max** parameter can be used to specify all the available space of the virtual disk	Unit: MB.
<RAID#>	RAID level of the virtual disk	-
<Channel# ID#>	Device ID of a physical disk	-

Usage Guidelines

- The **noprompt** parameter is used in the command to indicate forcible execution.
- If the **nologs** parameter is specified, this command is not executed when data is stored in the virtual disk.
- The stripe size and RAID capacity cannot be modified at the same time.
- When the RAID capacity is set to the maximum value and the stripe size needs to be modified, the **max** parameter cannot be used in the command to represent a number.

Note

For example, the **Changing the size and the stripe size simultaneously is not allowed** message is displayed if the following command is executed to modify the stripe size:
arcconf modify 1 from 1 to stripesize 256 max 0 0 3
The following command can be executed to modify the stripe size:
arcconf modify 1 from 1 to stripesize 256 915683 0 0 3

Example

The following example shows how to modify the stripe size to 128 KB without adding any hard disk:

arcconf modify 1 from1 to stripesize 128 1831388 1 0 4 0 5

```
Controllers found: 1
Reconfiguration of a logical device is a long process.  Are you sure you want to continue?
Press y, then ENTER to continue or press ENTER to abort: y

Reconfiguring logical device: test

Command completed successfully.
```

3.1.2.17 Setting the Initialization Function for a Physical Disk

Command Function

The following two commands set the initialization function for a physical disk and query the task status of the physical disk.

Syntax

- arcconf task start <Controller#> device <Channel# ID#> <task> [PATTERN <erasePattern>] [noprompt]
- arcconf task stop <Controller#> device <Channel# ID#>

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID controller card	-
<Channel# ID#>	Device ID of a physical disk	-
<task>	Task type	secureerase: securely erases disk data.
[PATTERN < erasePattern>]	Initialization type	1: zero initialization, which initializes all blocks as zero. 2: random zero initialization, which randomly initializes blocks as zero. 2: random zero initialization, which randomly initializes blocks as zero. 4: enables the physical devices (HDDs and SSDs) to change the encryption key to prevent correct decryption of previously stored information. 5: block erasing and clearing method, applicable to SSDs only. 6: overwrites user data with specific pattern data, applicable to HDDs only.

Usage Guidelines

Because the command uses the **noprompt** parameter to indicate forcible execution, which omits the reconfirmation operation during the setting process. Therefore, the **noprompt** parameter is not recommended.

Example

- The following example shows how to initialize the disk in slot 5:

  # arcconf task start 1 device 0 5 secureerase

- The following example shows how to query task status:

  # arcconf getstatus 1

3.1.2.18 Setting the Deinitialization Function for a Physical Disk

Command Function

Delete the information in the metadata area of a physical disk.

Syntax

- arcconf uninit <Controller#> <CHANNEL# DRIVE#> [Channel# ID#] ... [nologs]
- arcconf uninit <Controller#> ALL

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID controller card	-
<CHANNEL# DRIVE#> [Channel# ID#]	Device ID of a physical disk	-

Usage Guidelines

None

Example

- The following example shows how to deinitialize the disk in RAID1:

  # arcconf uninit 1 0 0

  ```
  Controllers found: 1
  One or more drives specified does not have any smart firmware configuration data on it.

  Command aborted.
  ```

- The following example shows how to deinitialize all disks in RAID card 1:

  # arcconf 1 All

3.1.2.19 Setting the Priority of a Background Task

Command Function

This command sets and applies the priority of a background task.

Syntax

- arcconf setpriority <Controller#> priority [current]
- arcconf setpriority <Controller#> [Task ID#] <New Priority> [current]

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID controller card	-
[Task ID#]	Task type	- rebuild: rebuild - expand: expansion
<New Priority>	Task priority	- high: high priority - medium: medium priority - low: low priority

Usage Guidelines

None

Example

The following example shows how to set and apply the priority of a background rebuild task to medium:

arcconf setpriority 1 rebuild medium

```
Controllers found: 1

Command completed successfully.
[root@localhost home]#
```

3.1.2.20 Querying Disk Array Rebuild Status

Command Function

 This command queries the rebuild status of disk arrays on a RAID controller card.

Syntax

arcconf getstatus [Controller#]

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-

Usage Guidelines

None

Example

The following example shows how to query the rebuild status of disk arrays on RAID card 1:

arcconf getstatus 1

```
Controllers found: 1
Logical Device Task:
    Logical Device            : 1
    Task ID                   : 100
    Current operation         : Rebuild
    Status                    : In Progress
    Priority                  : Medium
    Percentage complete       : 94


Command completed successfully.
```

For a description of the fields in the command output, refer to Table 3-7.

Table 3-7 Description of the Fields in the Command Output

Field	Description
Logical Device	ID of the virtual disk
Current operation	Current operation
Status	Status
Priority	Priority
Percentage complete	Completion percentage

3.1.2.21 Setting Consistency Check Status

Command Function

This command enables the consistency check function.

Syntax

arcconf consistencycheck <Controller#> <On [Delay]|Off> [noprompt] [nologs]

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID card	-
<On [Delay]|Off>	Consistency check status	● on: enabled ● off: disabled

Usage Guidelines

None

Example

The following example shows how to enable the automatic consistency check function:

arcconf consistencycheck 1 on

```
Controllers found: 1

Command completed successfully.
```

3.1.2.22 Upgrading Firmware

Command Function

This command upgrades the firmware of a RAID controller card.

Syntax

arcconf romupdate controller_id fwfile

Syntax Description

Parameter	Description	Setting
controller_id	ID of a RAID card	-
fwfile	Name of the .bin file required for firmware upgrade	-

Usage Guidelines

None

Example

The following example shows how to upgrade the firmware of a RAID card:

arcconf romupdate 1 SmartFWx100.bin

```
Controllers found: 1
Are you sure you want to continue?
Press y, then ENTER to continue or press ENTER to abort: y
Updating controller 1 firmware...
Succeeded
You must restart the system for firmware updates to take effect.
Command completed successfully.
```

3.1.2.23 Collecting Firmware Logs

Command Function

This command collects firmware logs of a RAID controller card.

Syntax

arcconf savesupportarchive

Syntax Description

None

Usage Guidelines

None

Example

The following example shows how to collect firmware logs of a RAID card:

arcconf savesupportarchive

```
Controllers found: 1
Usage: SAVESUPPORTARCHIVE [Path] [Firmware|GUI|Arcconf|Storlib|Basecode|Redfish]
Example: SAVESUPPORTARCHIVE C:\Adaptec\maxView Firmware
Example: SAVESUPPORTARCHIVE /var/log/maxView Storlib
Example: SAVESUPPORTARCHIVE
Example: SAVESUPPORTARCHIVE .
```

```
================================================================================


Saves  all the logs

    Path          : directory other than default

    Firmware      : saves Firmware logs

    GUI           : saves GUI logs

    Arcconf       : saves Arcconf logs

    StorLib       : saves StorLib logs

    Basecode      : saves Basecode logs

    Redfish       : saves Redfish logs
The path is not specified, Using the default.
The logs are saved in relevant folders in /var/log/Support
Command completed successfully.
```

3.1.2.24 Collecting Support Logs of a RAID Card

Command Function

Collect the support logs for the RAID card, which mainly include event logs, log files, hard drive SMART logs, abnormal lockup logs, RAID card configuration, and topology information.

Syntax

arcconf savesupportarchive #FileDir

Syntax Description

Parameter	Description	Range
#FileDir	Directory address	-

Usage Guidelines

None

Example

Collect logs to the/home/pmc directory.

arcconf savesupportarchive /home/pmc

The log topology is as follows:

Support /*All files are stored in the Support directory.*/

├—— Agent

├—— Arcconf

│   ├—— UcliErr.log

```
│  └── UcliEvt.log /*Operation records of the RAID card using the ARCCONF in the current
system*/
├── Basecode
│  ├── LockupDetails_slot_0_controller_1.bin /*Abnormal log after server lockup*/
│  └── PALSHIM_slot_0_controller_1.bin /*Detailed logs from the RAID card, which can be
reviewed in case of failure.*/
├── CIM
├── Firmware
│  ├── Controller_1_Config.txt /*RAID card configuration file, which can obtain the status
and anomaly statistics of related devices when a failure occurs.*/
│  ├── Controller_1_Debug_Log.txt
│  ├── Controller_1_Event_Log.txt /*Abnormal logs such as disk plugging and unplugging
and RAID volume degradation*/
│  ├── Controller_1_Log.txt /*RAID Card Log*/
│  ├── Controller_1_SmartStats.xml /*Hard drive SMART logs*/
│  └── Controller_1_Stats.txt
├── GUI
└── Storlib
├── arcconfig.xml
└── arcerror.txt
```

3.1.2.25 Collecting Statistics on PHY Bit Errors

Command Function

Obtain the bit error information about the RAID card, Expander, and hard disk.

Syntax

- arcconf phyerrorl<Controller#> [noprompt]
- arcconf phyerrorlog <Controller#> DEVICE <Channel# ID#> [noprompt]
- arcconf phyerrorlog <Controller#> DEVICE ALL [noprompt]
- arcconf phyerrorlog <Controller#> ENCLOSURE <Connector# Channel# ID#> EXPANDER <ExpanderID#> PHY <PHY#> [noprompt]
- arcconf phyerrorlog <Controller#> ENCLOSURE <Connector# Channel# ID#> EXPANDER <ExpanderID#> PHY ALL [noprompt]

Syntax Description

Parameter	Description	Setting
<Controller#>	ID of a RAID controller card	-

Parameter	Description	Setting
<Channel# ID#>	Device ID of a physical disk	-
<ExpanderID#>	ID of a Expander	-
<PHY#>	ID of the Logical Physical Layer	-

Usage Guidelines

None

Example

- Obtain the bit error information of RAID card 1.

  # arcconf phyerrorlog 1

  ```
  Controllers found: 1

  Controller PHY Error Log:
  =========================

  Controller ID    : 1
  Controller Model : ZTE SmartROC3100 SDPSA_L-18i 2G

     PHY Identifier                              : 0
        Invalid DWORD Count                      : 0
        Running Disparity Error Count            : 0
        Loss of DWORD Synchronization Count      : 0
        PHY Reset Problem Count                  : 0
  ```

- Obtain the bit error information of RAID card 1 Expander.

  # arcconf phyerrorlog 1 enclosure 3 2 0 expander 0 phy all nodiskinfo

  ```
  Controllers found: 1

  Expander List for Controller 1:

  Expander# 1
     Expander ID                : 0
     Reported Channel,Device    : 2,0
     Reported Location          : Connector 3, Enclosure 1
     Vendor ID                  : PMCSIERASXP 36x12G
     Product Revision Level     : RevB
     Expander SAS Address       : 50015EBE0614813F
     Negotiated Link Rate       : 12 Gbps
     Maximum Link Rate          : 12 Gbps
  ```

- Obtain the bit error information about the hard disk in RAID card 1.

  # arcconf phyerrorlog 1 device all

3.2 Common Operations

3.2.1 Setting the Boot Mode to Legacy

Abstract

You can set the boot mode of BIOS to **Legacy** in accordance with the actual operation requirements.

Prerequisite

The operation terminal is already connected to the real-time desktop of the server through the remote console of the management software.
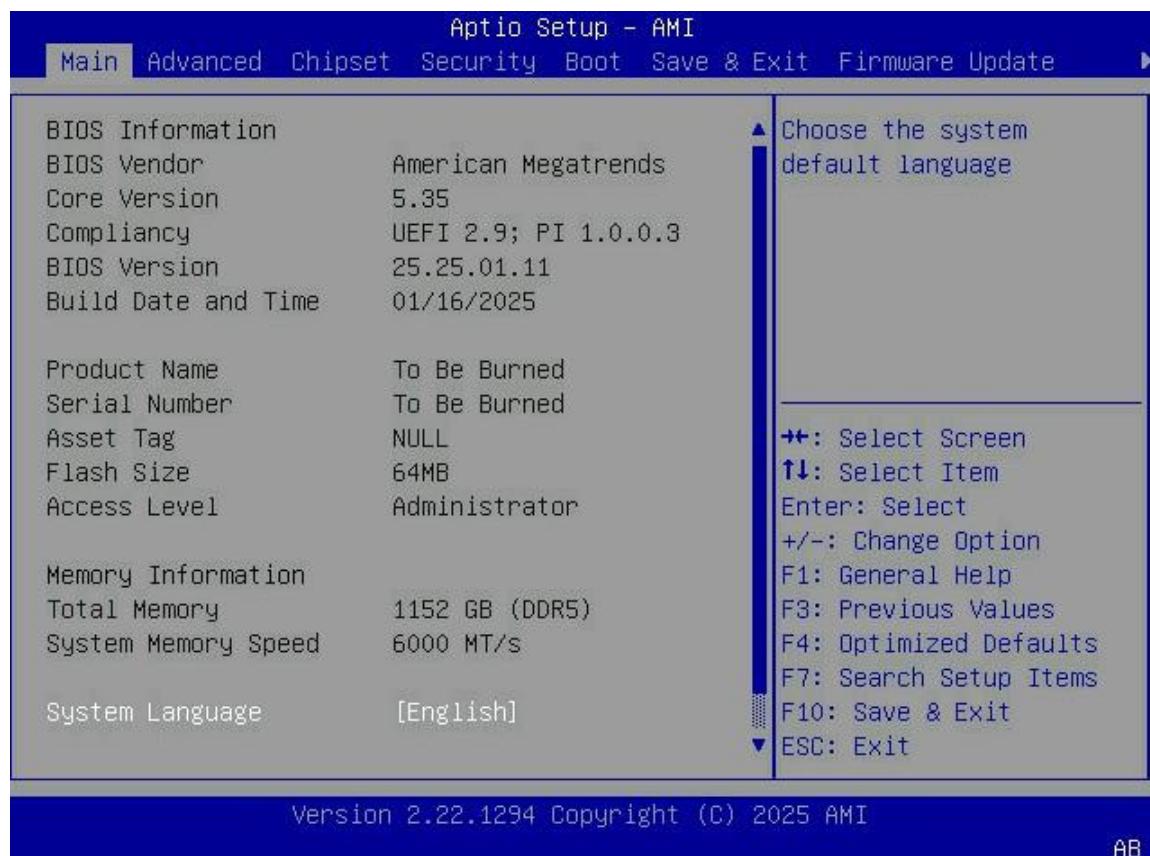
Steps

> ⓘ **Notice**
>
> Restarting the server may cause system service interruption.

1. Restart the server. The screen as shown in Figure 3-2 is displayed.
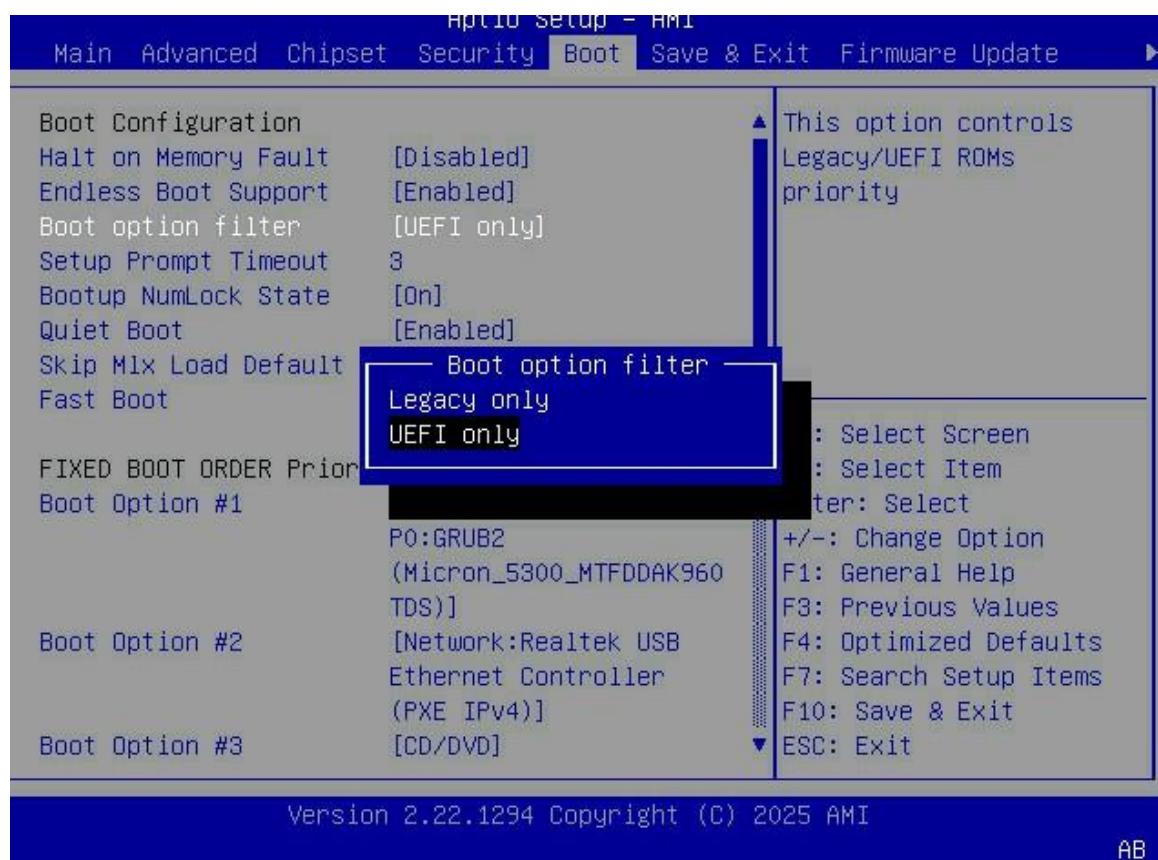
Figure 3-2 BIOS Restart Screen

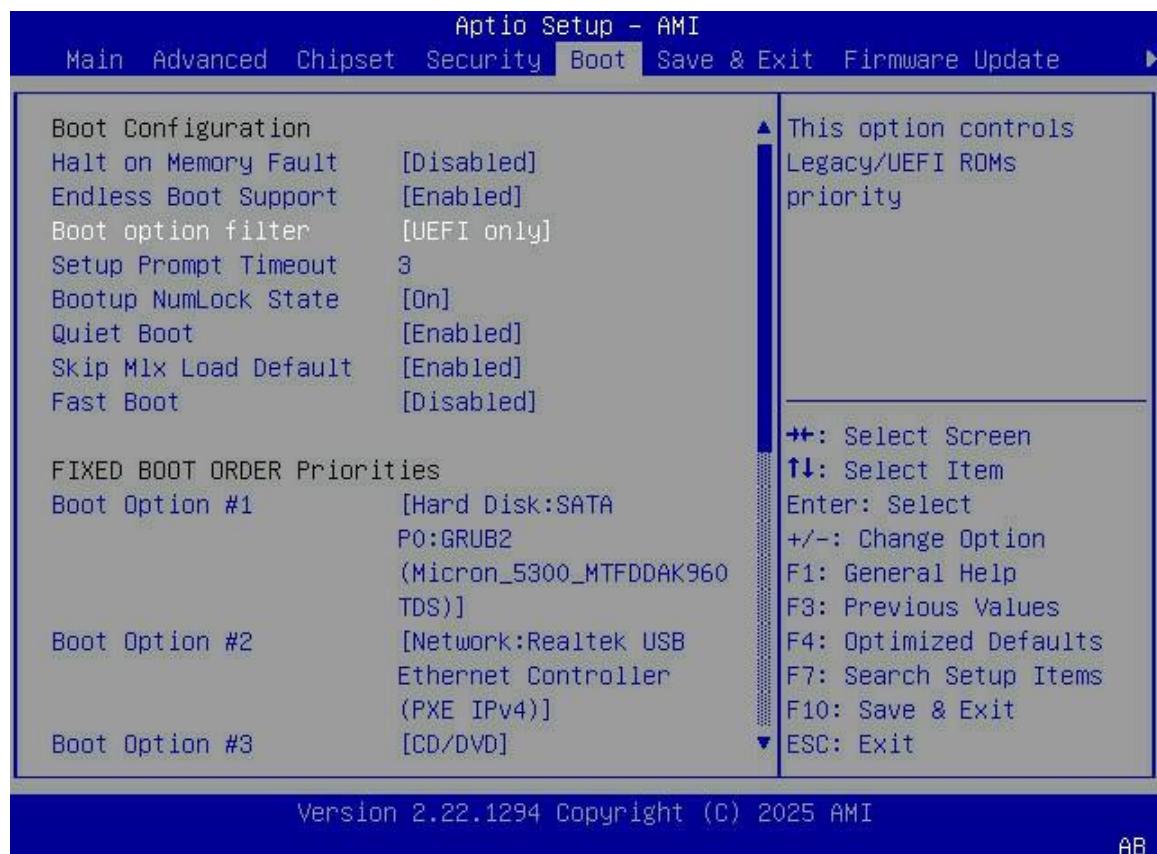2. During the POST process, press **F2/DEL** as prompted. The BIOS configuration utility is started, see Figure 3-3.

Figure 3-3 BIOS Configuration Utility Screen

```
                          Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit  Firmware Update    ▶

    BIOS Information                              ▲  Choose the system
    BIOS Vendor            American Megatrends       default language
    Core Version           5.35
    Compliancy             UEFI 2.9; PI 1.0.0.3
    BIOS Version           25.25.01.11
    Build Date and Time    01/16/2025

    Product Name           To Be Burned
    Serial Number          To Be Burned
    Asset Tag              NULL                      →←: Select Screen
    Flash Size             64MB                      ↑↓: Select Item
    Access Level           Administrator             Enter: Select
                                                     +/-: Change Option
    Memory Information                               F1: General Help
    Total Memory           1152 GB (DDR5)            F3: Previous Values
    System Memory Speed    6000 MT/s                 F4: Optimized Defaults
                                                     F7: Search Setup Items
    System Language        [English]                 F10: Save & Exit
                                              ▼      ESC: Exit

              Version 2.22.1294 Copyright (C) 2025 AMI
                                                                        AB
```

3. Use arrow keys to select **Boot > Boot option filter**, and then press **Enter**. The **Boot option filter** dialog box is displayed, see Figure 3-4.
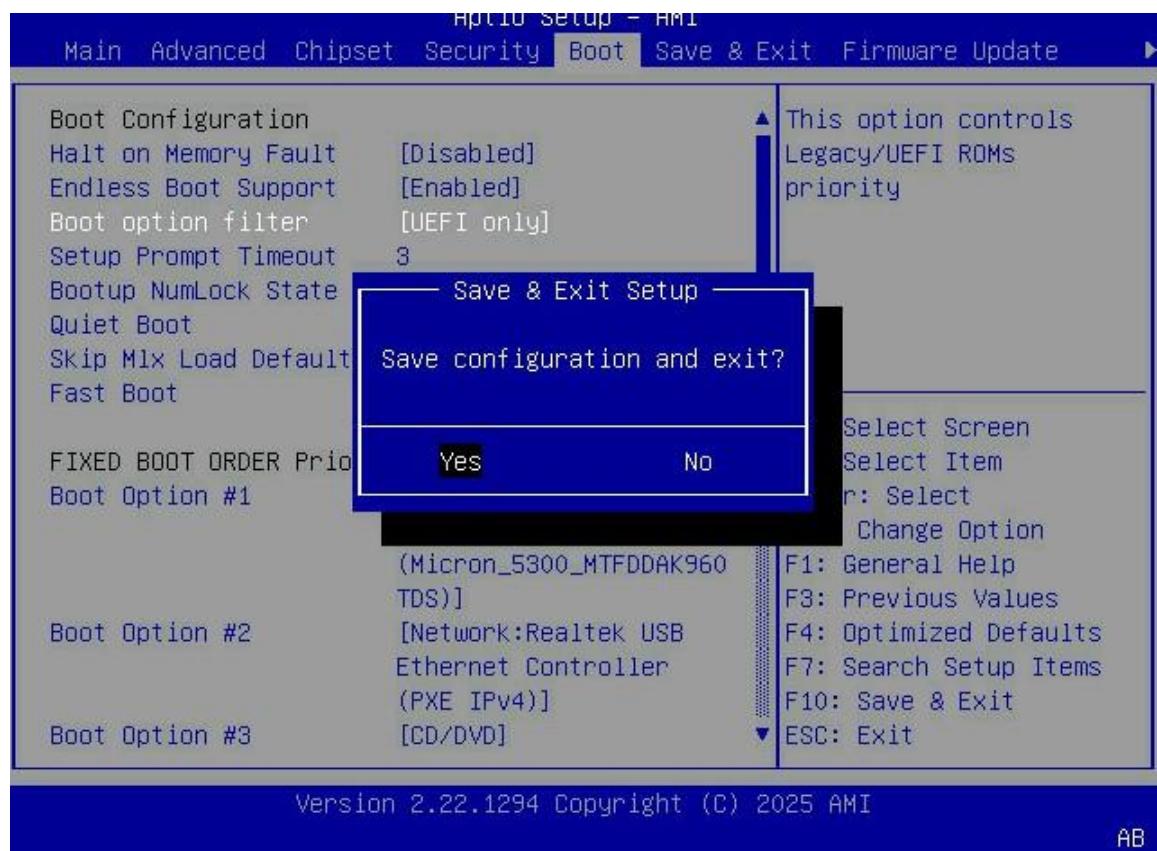
Figure 3-4 Boot Option Filter Dialog Box
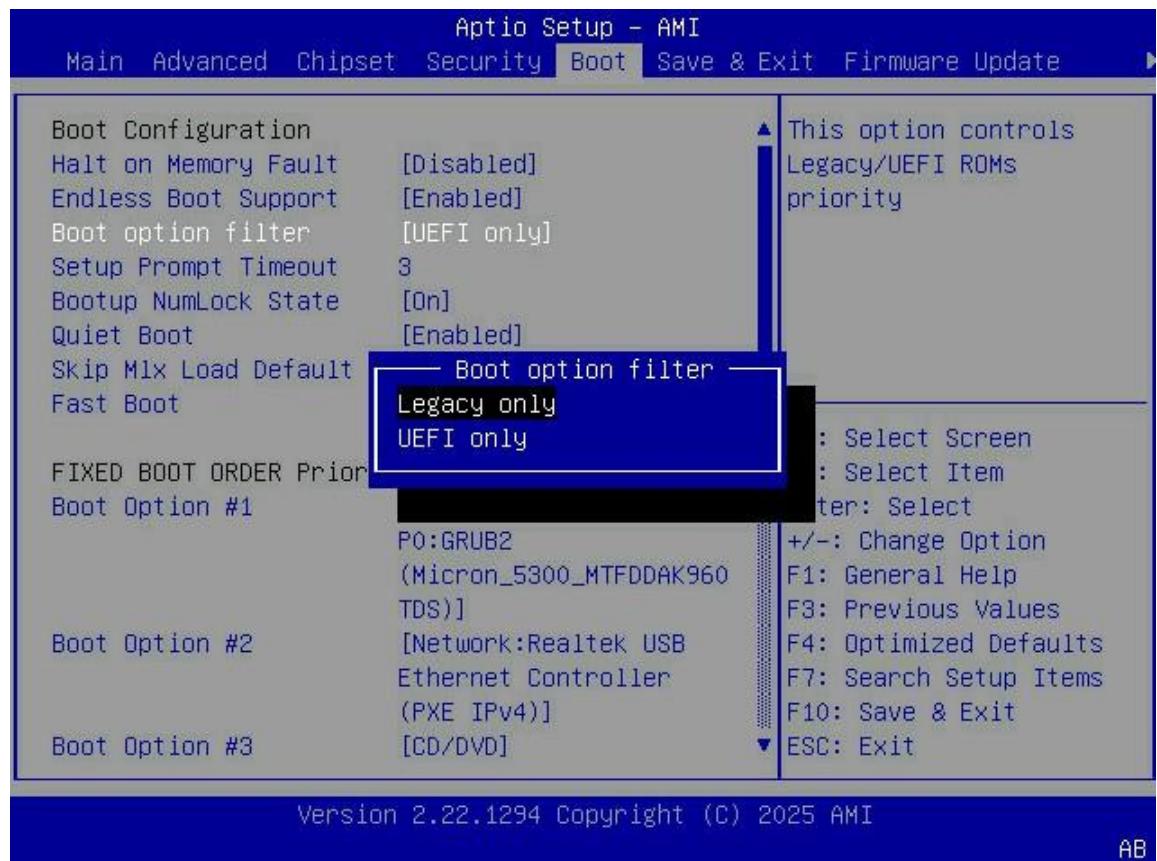
4. Use the arrow keys to select **Legacy only**, and then press **Enter** to set the boot mode of the BIOS to **Legacy**, see Figure 3-5.

Figure 3-5 Setting the Boot Mode to Legacy

```
                        Aptio Setup - AMI
      Main  Advanced  Chipset  Security  Boot  Save & Exit  Firmware Update      ▶

   Boot Configuration                          ▲  This option controls
   Halt on Memory Fault        [Disabled]         Legacy/UEFI ROMs
   Endless Boot Support        [Enabled]          priority
   Boot option filter          [Legacy only]
   Setup Prompt Timeout        3
   Bootup NumLock State        [On]
   Quiet Boot                  [Enabled]
   Skip Mlx Load Default       [Enabled]
   Fast Boot                   [Disabled]
                                               ─────────────────────
                                                ←→: Select Screen
   FIXED BOOT ORDER Priorities                  ↑↓: Select Item
   Boot Option #1              [Hard Disk]      Enter: Select
   Boot Option #2              [Network]        +/-: Change Option
   Boot Option #3              [CD/DVD]         F1: General Help
   Boot Option #4              [Other Device]   F3: Previous Values
   Boot Option #5              [USB]            F4: Optimized Defaults
                                                F7: Search Setup Items
                                                F10: Save & Exit
                                             ▼  ESC: Exit


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                                                                          AB
```

5. Press **F10** or use the arrow keys to select **Save & Exit > Save Changes and Exit**, and then press **Enter**. The **Save & Exit Setup** dialog box is displayed, see Figure 3-6.

Figure 3-6 Save & Exit Setup Dialog

```
                        Aptio Setup - AMI
    Main  Advanced  Chipset  Security   Boot   Save & Exit  Firmware Update    ▶

  Boot Configuration                            ▲  This option controls
  Halt on Memory Fault      [Disabled]             Legacy/UEFI ROMs
  Endless Boot Support      [Enabled]              priority
  Boot option filter        [Legacy only]
  Setup Prompt Timeout      3
  Bootup NumLock State      ── Save & Exit Setup ──
  Quiet Boot
  Skip Mlx Load Default     Save configuration and exit?
  Fast Boot
                                                      Select Screen
  FIXED BOOT ORDER Prio                         Yes            No        Select Item
  Boot Option #1                                                         r: Select
  Boot Option #2                                                          Change Option
  Boot Option #3            [CD/DVD]                F1: General Help
  Boot Option #4            [Other Device]          F3: Previous Values
  Boot Option #5            [USB]                   F4: Optimized Defaults
                                                    F7: Search Setup Items
                                                    F10: Save & Exit
                                                 ▼  ESC: Exit

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                                                                               AB
```

6. Use the arrow keys to select **Yes**, and press **Enter**. The boot mode is set to **Legacy**, and the server is restarted automatically.

3.2.2 Setting the Boot Mode to UEFI

Abstract

You can set the boot mode of BIOS to UEFI in accordance with the actual operation requirements.

Prerequisite

The operation terminal is already connected to the real-time desktop of the server through the remote console of the management software.

Steps

🛈 **Notice**

Restarting the server may cause system service interruption.

1. Restart the server. The screen as shown in Figure 3-7 is displayed.

Figure 3-7 BIOS Restart Screen

2. During the POST process, press **F2/DEL** as prompted. The BIOS configuration utility is started, see Figure 3-8.

Figure 3-8 BIOS Configuration Utility Screen

```
                         Aptio Setup - AMI
  Main  Advanced  Chipset  Security  Boot  Save & Exit  Firmware Update    ▶

 BIOS Information                              ▲ Choose the system
 BIOS Vendor            American Megatrends    │ default language
 Core Version           5.35
 Compliancy             UEFI 2.9; PI 1.0.0.3
 BIOS Version           25.25.01.11
 Build Date and Time    01/16/2025

 Product Name           To Be Burned
 Serial Number          To Be Burned
 Asset Tag              NULL                     →←: Select Screen
 Flash Size             64MB                     ↑↓: Select Item
 Access Level           Administrator            Enter: Select
                                                 +/-: Change Option
 Memory Information                              F1: General Help
 Total Memory           1152 GB (DDR5)           F3: Previous Values
 System Memory Speed    6000 MT/s                F4: Optimized Defaults
                                                 F7: Search Setup Items
 System Language        [English]                F10: Save & Exit
                                              ▼ ESC: Exit

                Version 2.22.1294 Copyright (C) 2025 AMI
                                                                        AB
```

3. Use arrow keys to select **Boot > Boot option filter**, and then press **Enter**. The **Boot option filter** dialog box is displayed, see Figure 3-9.

Figure 3-9 Boot Option Filter Dialog Box

```
                        Aptio Setup - AMI
   Main   Advanced   Chipset   Security   Boot   Save & Exit   Firmware Update        ▶

   Boot Configuration                              ▲  This option controls
   Halt on Memory Fault      [Disabled]               Legacy/UEFI ROMs
   Endless Boot Support      [Enabled]                priority
   Boot option filter        [UEFI only]
   Setup Prompt Timeout      3
   Bootup NumLock State      [On]
   Quiet Boot                [Enabled]
   Skip Mlx Load Default   ┌──── Boot option filter ────┐
   Fast Boot               │ Legacy only                │
                           │ UEFI only                  │ : Select Screen
   FIXED BOOT ORDER Prior  └────────────────────────────┘ : Select Item
   Boot Option #1                                          ter: Select
                             P0:GRUB2                      +/-: Change Option
                             (Micron_5300_MTFDDAK960       F1: General Help
                             TDS)]                         F3: Previous Values
   Boot Option #2            [Network:Realtek USB          F4: Optimized Defaults
                             Ethernet Controller           F7: Search Setup Items
                             (PXE IPv4)]                    F10: Save & Exit
   Boot Option #3            [CD/DVD]                    ▼ ESC: Exit

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                                                                              AB
```

4. Use the arrow keys to select **UEFI only**, and then press **Enter** to set the boot mode of the BIOS to **UEFI**, see Figure 3-10.

Figure 3-10 Setting the Boot Mode to UEFI

```
                        Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit  Firmware Update      ▶

   Boot Configuration                         ▲ This option controls
   Halt on Memory Fault       [Disabled]        Legacy/UEFI ROMs
   Endless Boot Support       [Enabled]          priority
   Boot option filter         [UEFI only]
   Setup Prompt Timeout       3
   Bootup NumLock State       [On]
   Quiet Boot                 [Enabled]
   Skip Mlx Load Default      [Enabled]
   Fast Boot                  [Disabled]
                                                ↔: Select Screen
   FIXED BOOT ORDER Priorities                  ↑↓: Select Item
   Boot Option #1         [Hard Disk:SATA       Enter: Select
                          P0:GRUB2              +/-: Change Option
                          (Micron_5300_MTFDDAK960  F1: General Help
                          TDS)]                 F3: Previous Values
   Boot Option #2         [Network:Realtek USB  F4: Optimized Defaults
                          Ethernet Controller   F7: Search Setup Items
                          (PXE IPv4)]           F10: Save & Exit
   Boot Option #3         [CD/DVD]             ▼ ESC: Exit

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                                                                       AB
```

5. Press **F10** or use the arrow keys to select **Save & Exit > Save Changes and Exit**, and then press **Enter**. The **Save & Exit Setup** dialog box is displayed, see .

Figure 3-11 Save & Exit Setup Dialog

```
                          Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit  Firmware Update      ▶

  Boot Configuration                              ▲  This option controls
  Halt on Memory Fault      [Disabled]               Legacy/UEFI ROMs
  Endless Boot Support      [Enabled]                priority
  Boot option filter        [UEFI only]
  Setup Prompt Timeout      3
  Bootup NumLock State  ┌──── Save & Exit Setup ─────┐
  Quiet Boot            │                            │
  Skip Mlx Load Default │   Save configuration and exit?  │
  Fast Boot             │                            │
                        │                            │  Select Screen
  FIXED BOOT ORDER Prio │    Yes            No        │  Select Item
  Boot Option #1        └────────────────────────────┘  r: Select
                                                         Change Option
                            (Micron_5300_MTFDDAK960   F1: General Help
                            TDS)]                     F3: Previous Values
  Boot Option #2            [Network:Realtek USB      F4: Optimized Defaults
                            Ethernet Controller       F7: Search Setup Items
                            (PXE IPv4)]               F10: Save & Exit
  Boot Option #3            [CD/DVD]                ▼ ESC: Exit

            Version 2.22.1294 Copyright (C) 2025 AMI
                                                                          AB
```

6. Use the arrow keys to select **Yes**, and press **Enter**. The boot mode is set to **UEFI**, and the server is restarted automatically.

Figures

Tables

Glossary

BBU

- Battery Backup Unit

BIOS

- Basic Input/Output System

BMC

- Baseboard Management Controller

CLI

- Command Line Interface

CPU

- Central Processing Unit

CRC

- Cyclic Redundancy Check

DG

- Disk Group

HBA

- Host Bus Adapter

HDD

- Hard Disk Drive

I/O

- Input/Output

ID

- Identification

IO

- Input & Output

JBOD

- Just a Bunch of Disk

LD

- Logical Disk

NAS

- Network Attached Storage

OS

- Operating System

PC

- Personal Computer

PCIe

- Peripheral Component Interconnect Express

PMC

- PCI Mezzanine Card

POST

- Power-On Self-Test

RAID

- Redundant Array of Independent Disks

SAS

- Serial Attached SCSI

SATA

- Serial ATA

SSD

- Solid State Drive

SSH

- Secure Shell

UEFI

- Unified Extensible Firmware Interface

VD

- Virtual Drive