



## Configuring Boot Order and RAID Levels

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This chapter includes the following sections:

- [About Configuring Boot Order and RAID Levels, page 1](#)
- [Configuring Boot Order, page 1](#)
- [RAID Configuration, page 2](#)

## About Configuring Boot Order and RAID Levels

You can configure the server BIOS boot order settings and perform RAID configuration using the Server Configuration function.

This section contains the following topics:

- [Configuring Boot Order, on page 1](#)
- [About RAID Configuration, on page 2](#)

## Configuring Boot Order

UCS-SCU displays a list of all bootable devices on the server.

To set the BIOS boot order of your server, follow these steps:

### Procedure

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- Step 1** Click **Server Configuration** in the left navigation pane, and then click **Boot order Configuration**. You can choose the devices that you want to participate in the boot order configuration, using the arrow keys between the Device Types and Boot Order column.
- Step 2** Highlight a device in the Device Types column (choose from either HDD, CD/DVD, Internal EFI Shell, Network Device, or FDD), click the left-to-right arrow key to arrange the server boot order that you prefer, and click **Apply**.
- Step 3** Click **Apply**.  
The Boot Order is saved on this server.

**Step 4** Reset the boot order by clicking **Reset**.

**Note** If the system has multiple boot devices under each component, for example, if the system has multiple bootable hard disks under the same controller or CD drives, SCU will not display this information. You will have to enter the BIOS and configure the order of these sub-components manually.

# RAID Configuration

## About RAID Configuration

RAID (Redundant Array of Independent Disks) is a technology for managing how data is stored on the physical disks that reside in your system or are attached to it . You can use the RAID Configuration functionality in the UCS-SCU to configure the on-board or PCIe supported RAID controller cards.

If your system has multiple RAID controllers, UCS-SCU displays a list of all available RAID cards, and physical and logical disks on the RAID Configuration page. The following RAID configuration options are available:

- Automatic setup with redundancy
- Automatic setup without redundancy
- Single RAID levels—RAID 0, RAID 1, RAID 5 and RAID 6
- Nested RAID levels—RAID 10, RAID 50 and RAID 60

## RAID Configuration Page Components

### About Physical Disks Table

The Physical Disks table in the RAID Configuration page lists the following:

- ID—The identifying number of the physical disk.
- Slot—The slot in which the physical disk belongs.
- State—The status of the disk. For more information about the various disk states, see the following table.

**Table 1: Disk Status Conditions**

Status Condition	Description
Online	The drive is already used in another array.
Global Hotspare	The drive will be used to repair any array in the system that had a drive failure, if the failed drive is equal to, or smaller than the hot spare drive.
Unconfigured Good	The drive is unused or available.

Status Condition	Description
Ready	The drive is online and operating correctly.
Offline	The drive is offline or absent. No actions can be performed on the drive until it is back online.
Unconfigured Bad	The drive is not operational and needs to be replaced.  Disks with a status of "Unconfigured bad" cannot be used for RAID configurations.
Foreign	The drive is part of an array created on a different controller, or created within one enclosure and moved to another on the same controller. It can be used to create a new array after clearing the configuration

- Size—The size of the physical disk
- Device Speed—The disk access speed of the controller.
- Link Speed—The link speed of the controller
- Logical Disk—The logical disk to which the physical disk belongs to.

### About Logical Disks Table

The logical disks pane in the RAID Configuration page displays the information about the logical disks. The following table explains the RAID array attributes.

**Table 2: RAID Array Attributes**

Option	Description
ID	Unique ID to the logical disk.
Size	Logical drive size. The maximum value depends on RAID level selected and the physical disks size involved.
Primary RAID level	RAID 0 (Data striping), 1 (Disk Mirroring), 5 (Data Striping with Striped Parity), 6 (Distributed Parity and Disk Striping).
Secondary RAID Level	Applicable only for nested RAID levels.
Stripe size	Size of the data stripe across all disks. Each physical disk has a smaller stripe of data. The sum of all the stripes equals the stripe size.

Option	Description
Read policy	No Read Ahead, Read Ahead, Adaptive. Read Ahead will read additional consecutive stripes. Adaptive will turn on Read Ahead for sequential reads and turn it off for random reads.
Write policy	Write Through or Write Back. With Write Through, I/O completion for write operations is signaled when the data is written to the disk. With Write Back, I/O completion is signaled when the data is transferred to cache.
Cache policy	Direct I/O or Cached I/O. Choose Direct I/O for unchecked read and write operations. Choose Cached I/O to cache all write operations and check the cache first for read operations

## Configuring RAID Arrays

Only unconfigured good disks can be used for RAID configuration. Disks that are already part of RAID are not available for RAID configuration.

To create custom or multiple RAID arrays, follow these steps:

### Procedure

**Step 1** Click **Server Configuration** in the left navigation pane and then click RAID configuration. The RAID Configuration page displays with the list of physical disks and logical disks.

**Step 2** Click the **Configure RAID** icon on the top-right of the page. The RAID Configuration page appears.

**Step 3** From the RAID level drop-down list, select one of the following RAID levels:

- Automatic Setup without Redundancy
- Automatic Setup with Redundancy

**Note** The automatic setup with or without redundancy overrides all the existing RAID arrays.

- Single-level RAID Configuration
- Nested RAID Configuration

**Step 4** Click **Create Array**.

**Note** The Create Array button is enabled only if the minimum required number of drive groups are created.

A progress bar is displayed and then a RAID Configuration dialog box appears depicting the completion of a RAID configuration.

**Step 5** Click **OK**.

The RAID Configuration page appears. You can view the following:

- The drive group information is displayed in the Logical Disks table.
- The physical disks information is displayed in the Physical Disks table.
- The status of the physical disks that are part of the drive group changes to Online and the status of the backup physical disk changes to Hot spare.

**Automatic Setup without Redundancy**

Automatic setup without redundancy requires one or more hard drives. UCS-SCU creates RAID 0 with this option.

The following table shows the default values that are displayed for automatic setup without redundancy

**Table 3: Default Values for Automatic Setup without Redundancy**

Parameter	Value
Controller	MegaRAID SAS <family>
RAID Level	0
Stripe Size	64
Read Policy	No Read Ahead
Write Policy	Write Back
Cache Policy	Direct IO
Size (MB)	Depends on the physical disk size

**Note**

The common parameters, except for total size, are the default values for the controller.

**Automatic Setup with Redundancy**

Automatic setup with redundancy is the default RAID configuration option. This configuration requires at least two physical drives to be available. If two physical disks are not available, the default RAID configuration would be automatic setup without redundancy.

The following table shows the default values that are displayed for automatic setup with redundancy

**Table 4: Default Values for Automatic Setup with Redundancy**

Parameter	Value
Controller	MegaRAID SAS <family>
RAID Level	1
Stripe Size	64
Read Policy	No Read Ahead
Write Policy	Write Back
Cache Policy	Direct IO
Size (MB)	Depends on the physical disk size

**Note**

The common parameters, except for total size, are the default values for the controller.

## Single-Level RAID Configuration

To configure single level RAID, follow these steps:

### Procedure

- Step 1** From the RAID drop-down list, select a RAID level (**0** or **1** or **5** or **6**).  
The Drive Groups pane appears with a list of physical disks and drive groups. For more information about a physical disk, hover the cursor over the physical disk until the tooltip is displayed
- Step 2** From the Physical Disks list, select the physical disks that you want to include in the Drive Groups list.  
The following table displays the minimum number of physical disks required for each of the RAID levels.

**Table 5: Minimum Number of Required Physical Drives**

RAID Level	Number of Physical Disks Required
RAID 0	1
RAID 1	2
RAID 5	3
RAID 6	4

**Step 3** Click **Create Drive Group**.

**Note** The Create Drive Group button remains disabled until the minimum number of physical disks for a RAID level is selected.

The selected physical disks are included in the Drive Groups list.

**Note** The Delete Drive Group button remains disabled until a drive group is created.

**Step 4** From the Physical Disks list, choose a drive to be a hot spare drive or a standby drive.

**Step 5** From the Stripe Size list, choose a stripe size for the RAID level.

**Step 6** From the Read Policy list, choose a read policy for the RAID level.

**Step 7** From the Write Policy list, choose a write policy for the RAID level.

**Step 8** From the Cache Policy list, choose a cache policy for the RAID level.

**Step 9** In the Size (MB) text field, enter the size of the logical disk in MB.

### Nested RAID Configuration

Nested RAID levels have primary and secondary RAID levels. You need to create a minimum of two drive groups in nested RAID levels and the drive groups should have the same number of physical disks

To configure nested RAID levels, follow these steps:

#### Procedure

**Step 1** From the RAID drop-down list, select a RAID level (**10** or **50** or **60**).

The Drive Groups pane appears with a list of physical disks and drive groups. For more information about a physical disk, hover the cursor over the physical disk until the tooltip is displayed

**Step 2** From the Physical Disks list, select the physical disks that you want to include in the Drive Groups list. The following table displays the minimum number of physical disks and data groups required for each of the RAID levels.

**Table 6: Minimum Number of Required Physical Drives**

RAID Level	Minimum Number of Physical Disks Required	Minimum Number of Data Groups Required
RAID 10	4	2
RAID 50	6	2
RAID 60	8	2

**Step 3** Click **Create Drive Group**.

**Note** The Create Drive Group button remains disabled until the minimum number of physical disks for a RAID level is selected.

The selected physical disks are included in the Drive Groups list.

**Note** The Delete Drive Group button remains disabled until a drive group is created.

- Step 4** From the Stripe Size list, choose a stripe size for the RAID level.
  - Step 5** From the Read Policy list, choose a read policy for the RAID level.
  - Step 6** From the Write Policy list, choose a write policy for the RAID level.
  - Step 7** From the Cache Policy list, choose a cache policy for the RAID level.
  - Step 8** In the Size (MB) text field, enter the size of the logical disk in MB.
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## Clearing RAID Arrays

### Deleting All Virtual Disks

To clear up all the disks, follow these steps:

#### Procedure

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- Step 1** Click **Server Configuration** in the left navigation pane and then click RAID configuration. The RAID Configuration page displays with the list of physical disks and logical disks.
  - Step 2** Click the **Clear Configuration** icon on the top-right of the page. The RAID Configuration dialog box appears.
  - Step 3** Click **Yes** to confirm the operation. All the virtual disks under Logical Disks are cleared and the state of the hard disks change to Unconfigured Good.
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### Deleting Multiple or Single Virtual Disks

In single RAID levels and nested RAID levels, if the number of unconfigured good physical disks is less than the minimum disks required for the selected RAID level, a RAID Configuration dialog box appears specifying that logical disks need to be deleted to free up the physical disks.

To clear up the logical disks, follow these steps:

#### Procedure

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- Step 1** Click **Yes** in the RAID Configuration dialog box that appears. A Delete Logical Disks dialog box appears.
  - Step 2** Select the logical disk or disks to be deleted. The physical disks that are part of the logical disk is displayed at the bottom of the dialog box.
- Note** If you delete a logical disk, all the information stored in the disk will be inaccessible.



**Step 3** Click **Delete**.

## UCS-SCU Supported RAID Controllers

### LSI Embedded MegaRAID

#### Supported Platforms

The LSI Embedded MegaRAID is supported on the following platforms:

- UCS-C220 M3
- UCS-C240 M3 (in the 16 HDD configuration)

#### Supported RAID Options

When you are using the LSI Embedded MegaRAID controller, you can use the following RAID options:

- Automatic setup without redundancy
- RAID 0
- RAID 1
- RAID 5 —To enable this level, you need to install a key, like the LSI TSOC Raid key.
- RAID 10

The following table shows the default values that are displayed for automatic setup without redundancy for LSI Embedded MegaRAID.

**Table 7: Default Values for Automatic Setup without Redundancy**

Parameter	Values
Controller	LSI Embedded MegaRAID
RAID Level	0
Stripe Size	64
Read Policy	Read Ahead
Write Policy	Write Through
Cache Policy	Direct IO

Parameter	Values
Size (MB)	Depends on the physical disk size

To learn about configuring the RAID levels, go to the [Configuring RAID Arrays, on page 4](#) section.

## Enabling LSI MegaRAID Controller



**Note** The support for the LSI Embedded MegaRAID controller is disabled by default in the BIOS.

To enable the controller in the BIOS, follow these steps:

### Procedure

- Step 1** Reboot the server and press **F2** when prompted to enter the BIOS Setup utility.
- Step 2** Select the **Advanced** tab, then **South Bridge**.
- Step 3** Set Onboard SCU Storage Support to **Enabled**.
- Step 4** Press **F10** to save your changes and exit the utility.