C H A P T E R **8**

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 chapter contains the following sections:

- Boot Order Configuration, page 8-1
- RAID Configuration, page 8-1

Boot Order Configuration

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

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

Step 1 Click **Server Configuration** in the left navigation pane, and then click **Boot order Configuration**. You will be able to choose the devices 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 you prefer, and click **Apply**.

Step 3 Click **Apply**.

The Boot Order is saved on this server.

Step 4 To reset the boot order click **Reset**.

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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 subcomponents manually.

RAID Configuration

You can use the RAID Configuration functionality 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, physical and logical disks on the RAID Configuration page.

UCS-SCU supports the following RAID levels:

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

This section includes the following sections:

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. To know more about the various disk states, go to Table 8-1.
- 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.

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Table 8-1   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.
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 configuration.

Logical Disks Table

The logical disks pane in the RAID Configuration page displays the information about the logical disks.

Table 8-2 explains the RAID array attributes.

Table 8-2   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.
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 will not be available for RAID configuration.

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

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, page 8-4

- Automatic Setup With Redundancy, page 8-4

Note   The automatic setup with or without redundancy will override all the existing RAID arrays.

- Single Level RAID Configuration, page 8-5

- Nested RAID Configuration, page 8-6

Step 4 Click **Create Array**.

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

A progress bar displays 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.

Table 8-3 shows the default values that are displayed for automatic setup without redundancy.

Table 8-3   Default Values for Automatic Setup Without Redundancy

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

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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.

Table 8-4 shows the default values that are displays.

Table 8-4   Default Values for Automatic Setup With Redundancy

Parameters	Values
Controller	MegaRAID SAS *<family>*
RAID Level	1
Stripe Size	64
Read Policy	No Read Ahead
Writer Policy	Write Back
Cache Policy	Direct IO
Size (MB)	Depends on the size of the logical disk

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:

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. To know more about a physical disk, hover the cursor over the physical disk until the tooltip displays.

Step 2   From the Physical Disks list, select the physical disks that you want to include in the Drive Groups list.

Table 8-5 displays the minimum number of physical disks required for each of the RAID levels.

Table 8-5   Minimum number of physical drives required

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 lev and the drive groups should have the same number of physical disks.

To configure nested RAID levels, follow these steps:

Step 1 From the RAID drop-down list, select a nested RAID level.

The Drive Groups pane appears with a list of physical disks and drive groups. To know more about a physical disk, hover the cursor over the physical disk until the tooltip displays.

Step 2 From the Physical Disks list, select the physical disks that you want to include in the Drive Groups list.

Table 8-6 displays the minimum number of physical disks and data groups required.

Table 8-6   Minimum number of physical drives and data groups required

RAID Level	Minimum number of Physical Disks	Minimum number of Data Groups
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.

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:

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 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**.

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