Managing Storage Using RAID

Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

This chapter includes the following sections:

RAID Options

Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

You can choose to store the E-Series Server data files on local Redundant Array of Inexpensive Disks (RAID). The following RAID levels are supported:

- The single-wide E-Series Server supports RAID 0 and RAID 1 levels.

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

1

• The double-wide E-Series Server supports RAID 0, RAID 1, and RAID 5 levels.

• The double-wide E-Series Server with the PCIe option supports RAID 0 and RAID 1 levels.

RAID 0

With RAID 0, the data is stored evenly in stripe blocks across one or more disk drives without redundancy (mirroring). The data in all of the disk drives is different.

Figure 1: RAID 0
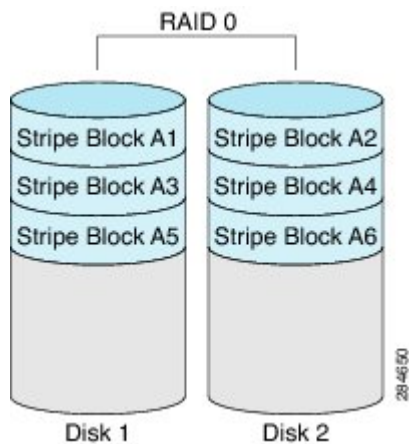
Compared to RAID 1, RAID 0 provides additional storage because both disk drives are used to store data. The performance is improved because the read and write operation occurs in parallel within the two disk drives.

However, there is no fault tolerance, error checking, hot spare, or hot-swapping. If one disk drive fails, the data in the entire array is destroyed. Because there is no error checking or hot-swapping, the array is susceptible to unrecoverable errors.

RAID 1

RAID 1 creates a mirrored set of disk drives, where the data in both the disk drives is identical, providing redundancy and high availability. If one disk drive fails, the other disk drive takes over, preserving the data.

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

2

RAID 1 also allows you to use a hot spare disk drive. The hot spare drive is always active and is held in readiness as a hot standby drive during a failover.

Figure 2: RAID 1
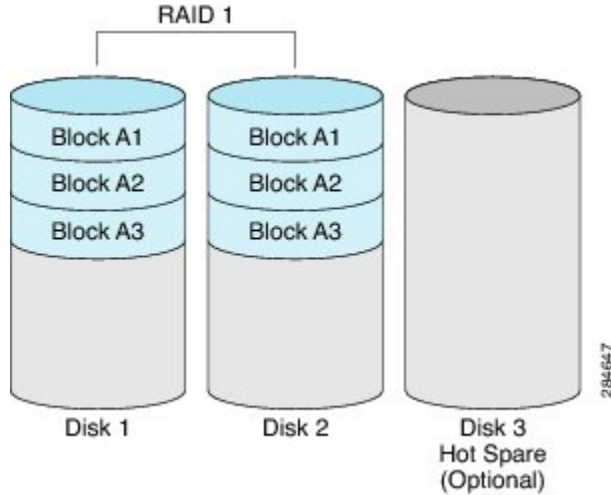
RAID 1 supports fault tolerance and hot-swapping. When one disk drive fails, you can remove the faulty disk drive and replace it with a new disk drive.

However, compared to RAID 0, there is less storage space because only half of the total potential disk space is available for storage and there is an impact on performance.

RAID 5

With RAID 5, the data is stored in stripe blocks with parity data staggered across all disk drives, providing redundancy at a low cost.

Figure 3: RAID 5
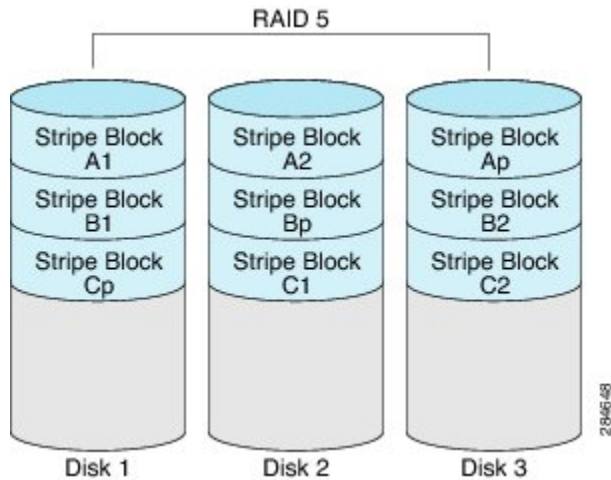
RAID 5 provides more data storage capacity than RAID 1 and better data protection than RAID 0. It also supports hot swapping; however, RAID 1 offers better performance.

Non-RAID

When the disk drives of a computer are not configured as RAID, the computer is in non-RAID mode. Non-RAID mode is also referred to as Just a Bunch of Disks or Just a Bunch of Drives (JBOD). Non-RAID mode does not support fault tolerance, error checking, hot-swapping, hot spare, or redundancy.

Summary of RAID Options

RAID Option	Description	Advantages	Disadvantages
RAID 0	Data stored evenly in stripe blocks without redundancy	• Better storage • Improved performance	• No error checking • No fault tolerance • No hot-swapping • No redundancy • No hot spare
RAID 1	Mirrored set of disk drives and an optional hot spare disk drive	• High availability • Fault tolerance • Hot spare • Hot-swapping	• Less storage • Performance impact
RAID 5	Data stored in stripe blocks with parity data staggered across all disk drives	• Better storage efficiency than RAID 1 • Better fault tolerance than RAID 0 • Low cost of redundancy • Hot-swapping	• Slow performance
Non-RAID	Disk drives not configured for RAID Also referred to as JBOD	• Portable	• No error checking • No fault tolerance • No hot-swapping • No redundancy • No hot spare

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

4

Configuring RAID

Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to configure the RAID level, strip size, host access privileges, drive caching, and initialization parameters on a virtual drive.

Procedure

	Command or Action	Purpose
Step 1	Server# **scope chassis**	Enters the chassis command mode.
Step 2	Server /chassis # **show storageadapter**	Displays information about installed storage cards. This information allows you to determine the slot in which the storage card is installed.
Step 3	Server /chassis # **scope storageadapter SLOT-5**	Enters command mode for an installed storage card.
Step 4	Server /chassis/storageadapter # **show physical-drive**	Displays physical disk drives. This information allows you to determine the status of the physical drives. **Note** To configure RAID, the status of the physical drives must be **unconfigured good**. To change the state of the physical drive, see Changing the Physical Drive State.
Step 5	Server /chassis/storageadapter # **create-virtualdrive {-r0 | -r1 | -r5}** *physical-drive-numbers* **[QuickInit | FullInit | NoInit] [RW | RO | Blocked] [DiskCacheUnchanged | DiskCacheEnable | DiskCacheDisable] [-strpsz64 | -strpsz32 | -strpsz16 | -strpsz8]**	Creates a virtual drive with the specified RAID level on the physical drive. You can also specify the following options: **Note** The options are *not* case sensitive. • (Optional) Initialization options: ◦ **QuickInit**—Controller initialization the drive quickly. You can start writing data into the virtual drive in a few seconds. This is the default option. ◦ **FullInit**—Controller does a complete initialization of the new configuration. You cannot write data into the virtual drive until initialization is complete. If the drive is large, this can take a long time. ◦ **NoInit**—Controller does not initialize the drives. • (Optional) Access policy options: ◦ **RW**—The host has full access to the drive. This is the default option.

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

5

	Command or Action	Purpose
		◦ **RO**—The host can only read data from the drive.
		◦ **Blocked**—The host cannot access the drive.
		• (Optional) Drive cache options:
		◦ **DriveCacheDisable**—Caching is disabled on the physical drives.
		Note This is the default and recommended option.
		◦ **DriveCacheUnchanged**—The controller uses the caching policy specified on the physical drive. This is the default option.
		◦ **DriveCacheEnable**—Caching is enabled on the physical drives.
		• (Optional) Strip size options:
		◦ **-strpsz64**—This is the default option.
		◦ **-strpsz32**
		◦ **-strpsz16**
		◦ **-strpsz8**
		Caution The smaller strip sizes have a known problem with VMware vSphere Hypervisor™ installation; therefore, if you are installing the vSphere platform, we recommend that you use the **strpsz64** option.
Step 6	Server /chassis/storageadapter # **show virtual-drive**	(Optional) Displays virtual drive information for the storage card. This information allows you to verify RAID configuration.

This example shows how to configure RAID.

```
Server# scope chassis
Server /chassis # show storageadapter

PCI Slot Product       Name    Serial Number  Firmware Package Build   Product ID Cache
Memory Size
-------- ----------------------------- -------------- ----------------------- --------------
 ---
SLOT-5   LSI MegaRAID SAS   2004 ROMB     20.10.1-0092             LSI Logic   0 MB

Server /chassis # scope storageadapter SLOT-5

Server /chassis /storageadapter# show physical-drive

Slot Number  Controller Status                Manufacturer   Model        Drive  Firmware
Coerced Size   Type
----------- ---------- ----------------------------------- -------------- --------------
```

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

6

```
-------------- ---
1          SLOT-5     unconfigured good    TOSHIBA        MBF2600RC     5704    571250 MB
           HDD
2          SLOT-5     unconfigured good    ATA            ST9500620NS  SN01    475883 MB
           HDD

Server /chassis /storageadapter # create-virtualdrive -r0 1 FullInit RW DiskCacheEnable
-strpsz32
---
status: ok
---------------------
Server /chassis /storageadapter # show virtual-drive
Virtual Drive  Status                Name                    Size       RAID Level
-------------  --------------------  ----------------------- ---------- ----------
0              Optimal                                       571250 MB  RAID 0
```

What to Do Next

Make the disk drive bootable. See Making the Disk Drive Bootable

Deleting the RAID Configuration

> **Note** The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to clear all RAID configuration.

Procedure

	Command or Action	Purpose
Step 1	Server# **scope chassis**	Enters the chassis command mode.
Step 2	Server /chassis # **show storageadapter**	Displays information about installed storage cards. This information allows you to determine the slot in which the storage card is installed.
Step 3	Server /chassis # **scope storageadapter SLOT-5**	Enters command mode for an installed storage card.
Step 4	Server /chassis /storageadapter # **clear-all-raid-config**	Clears all RAID configuration. At the confirmation prompts answer Yes.
		Note When RAID configuration is cleared, all existing data on th disk drive is lost.

This example shows how to delete RAID configuration.

```
Server# scope chassis
Server /chassis # show storageadapter

PCI Slot Product      Name    Serial Number  Firmware Package Build   Product ID Cache
Memory Size
-------- ------------------------------ -------------- ------------------------ --------------
```

```
      ---
SLOT-5   LSI MegaRAID SAS     2004 ROMB     20.10.1-0092            LSI Logic   0 MB

Server /chassis # scope storageadapter SLOT-5
Server /chassis /storageadapter # clear-all-raid-config
This operation will clear all RAID configuration.
Warning: All data in the disks would be lost!!!
Are you sure you want to proceed? [Yes|No] Yes
Are you really sure you want to clear all RAID configuration and lose all data? [Yes|No]
Yes
```

Changing the Physical Drive State

> **Note** The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to change the state of the physical drive. Options are: hotspare, jbod, or unconfigured good.

Procedure

	Command or Action	Purpose
Step 1	Server# **scope chassis**	Enters the chassis command mode.
Step 2	Server /chassis # **show storageadapter**	Displays information about installed storage cards. This information allows you to determine the slot in which the storage card is installed.
Step 3	Server /chassis # **scope storageadapter SLOT-5**	Enters command mode for an installed storage card.
Step 4	Server /chassis/storageadapter # **show physical-drive**	Displays physical disk drives.
Step 5	Server /chassis/storageadapter # **scope physical-drive** *slot-number*	Enters command mode for the specified physical drive.
Step 6	Server /chassis/storageadapter /physical-drive # **show detail**	Displays information about the specified physical drive.
Step 7	Server /chassis/storageadapter /physical-drive # **set state {unconfiguredgood	jbod	hotspare}**	Changes the state of the physical drive. Options are: hotspare, jbod, or unconfigured good.
Step 8	Server /chassis/storageadapter /physical-drive* # **commit**	Commits the changes.
Step 9	Server /chassis/storageadapter /physical-drive # **show detail**	Displays information about the specified physical drive.

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

8

This example shows how to change the state of the physical drive.

```
Server# scope chassis
Server /chassis # show storageadapter

PCI Slot Product       Name    Serial Number  Firmware Package Build   Product ID Cache
Memory Size
-------- ------------------------------ -------------- ----------------------- --------------
 ---
SLOT-5   LSI MegaRAID SAS    2004 ROMB      20.10.1-0092             LSI Logic   0 MB

Server /chassis# scope storageadapter SLOT-5
Server /chassis /storageadapter# show physical-drive

Slot Number  Controller Status                     Manufacturer   Model         Drive  Firmware
Coerced Size   Type
----------- --------- ------------------------------------ -------------- --------------
-------------- -----
1           SLOT-5    system               TOSHIBA       MBF2600RC    5704    571250 MB
        HDD
2           SLOT-5    unconfigured good   ATA           ST9500620NS  SN01    475883 MB
        HDD

Server /chassis /storageadapter# scope physical-drive 1
Server /chassis /storageadapter/physical-drive# show detail

Slot Number 1:
    Controller: SLOT-5
    Status: system
    Manufacturer: TOSHIBA
    Model: MBF2600RC
    Drive Firmware: 5704
    Coerced Size: 571250 MB
    Type: HDD

Server /chassis /storageadapter/physical-drive# set state hotspare
Server /chassis /storageadapter/physical-drive*# commit
Server /chassis /storageadapter/physical-drive# show detail

Slot Number 1:
    Controller: SLOT-5
    Status: hotspare
    Manufacturer: TOSHIBA
    Model: MBF2600RC
    Drive Firmware: 5704
    Coerced Size: 571250 MB
    Type: HDD
```

Rebuilding the Physical Drive

Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to manually start the rebuild process on the physical drive.

Procedure

	Command or Action	**Purpose**
Step 1	Server# **scope chassis**	Enters the chassis command mode.

	Command or Action	Purpose
Step 2	Server /chassis # **show storageadapter**	Displays information about installed storage cards. This information allows you to determine the slot in which the storage card is installed.
Step 3	Server /chassis # **scope storageadapter SLOT-5**	Enters command mode for an installed storage card.
Step 4	Server /chassis/storageadapter # **show physical-drive**	Displays physical disk drives.
Step 5	Server /chassis/storageadapter # **scope physical-drive** *slot-number*	Enters command mode for the specified physical drive.
Step 6	Server /chassis/storageadapter /physical-drive # **rebuild**	Rebuilds the physical drive.
Step 7	Server /chassis/storageadapter /physical-drive # **rebuild abort**	(Optional) Stops the rebuild process.

This example shows how to change the state of the physical drive.

```
Server# scope chassis
Server /chassis # show storageadapter

PCI Slot Product       Name    Serial Number  Firmware Package Build   Product ID Cache
Memory Size
-------- ------------------------------ -------------- ------------------------ --------------
 ---
SLOT-5   LSI MegaRAID SAS    2004 ROMB      20.10.1-0092             LSI Logic   0 MB

Server /chassis# scope storageadapter SLOT-5
Server /chassis /storageadapter# show physical-drive

Slot Number   Controller Status                  Manufacturer   Model         Drive  Firmware
Coerced Size   Type
----------- ---------- ------------------------------------ -------------- --------------
-------------- -----
1          SLOT-5    system                   TOSHIBA        MBF2600RC   5704   571250 MB
        HDD
2          SLOT-5    unconfigured good    ATA            ST9500620NS  SN01   475883 MB
        HDD

Server /chassis /storageadapter# scope physical-drive 1
Server /chassis /storageadapter/physical-drive# rebuild
Server /chassis /storageadapter/physical-drive# rebuild abort
```

Erasing the Contents of a Physical Drive

✎

Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to erase all of the contents of a physical drive and set it to zero.

■ **CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x**

10

Procedure

	Command or Action	**Purpose**
Step 1	Server# **scope chassis**	Enters the chassis command mode.
Step 2	Server /chassis # **show storageadapter**	Displays information about installed storage cards. This information allows you to determine the slot in which the storage card is installed.
Step 3	Server /chassis # **scope storageadapter SLOT-5**	Enters command mode for an installed storage card.
Step 4	Server /chassis/storageadapter # **show physical-drive**	Displays physical disk drives.
Step 5	Server /chassis/storageadapter # **scope physical-drive** *slot-number*	Enters command mode for the specified physical drive.
Step 6	Server /chassis/storageadapter /physical-drive # **erase**	Erases all of the contents of a physical drive and sets it to zero. **Note** The erase process takes a few hours to complete.
Step 7	Server /chassis/storageadapter /physical-drive # **erase abort**	(Optional) Stops the erase process.

This example shows how to erase the contents of a physical drive.

```
Server# scope chassis
Server /chassis # show storageadapter

PCI Slot Product       Name    Serial Number  Firmware Package Build   Product ID Cache
Memory Size
-------- ------------------------------ -------------- ------------------------ --------------
 ---
SLOT-5   LSI MegaRAID SAS    2004 ROMB      20.10.1-0092             LSI Logic   0 MB

Server /chassis# scope storageadapter SLOT-5
Server /chassis /storageadapter# show physical-drive

Slot Number   Controller Status                        Manufacturer   Model         Drive  Firmware
Coerced Size   Type
----------- ---------- ------------------------------------- -------------- --------------
-------------- -----
1           SLOT-5     system                TOSHIBA       MBF2600RC   5704    571250 MB
        HDD
2           SLOT-5     unconfigured good     ATA           ST9500620NS SN01    475883 MB
        HDD

Server /chassis /storageadapter# scope physical-drive 1
Server /chassis /storageadapter/physical-drive# erase
Server /chassis /storageadapter/physical-drive# erase abort
```

Enabling Auto Rebuild on the Storage Controller

Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to rebuild a disk drive automatically. If one of the disk drives that is configured with RAID gets degraded, and a new drive is plugged it, the rebuild process on the new drive starts automatically.

Procedure

	Command or Action	**Purpose**
Step 1	Server# **scope chassis**	Enters the chassis command mode.
Step 2	Server /chassis # **show storageadapter**	Displays information about installed storage cards. This information allows you to determine the slot in which the storage card is installed.
Step 3	Server /chassis # **scope storageadapter SLOT-5**	Enters command mode for an installed storage card.
Step 4	Server /chassis/storageadapter # **set global-hotspare-for-newdrives true**	Enables auto rebuild on the storage controller.
Step 5	Server /chassis/storageadapter* # **commit**	Commits the changes.

This example shows how to enable auto rebuild on the storage controller.

```
Server# scope chassis
Server /chassis # show storageadapter
PCI Slot Product      Name    Serial Number  Firmware Package Build   Product ID Cache
Memory Size
-------- ------------------------------ -------------- ----------------------- --------------
 ---
SLOT-5   LSI MegaRAID SAS    2004 ROMB      20.10.1-0092             LSI Logic   0 MB

Server /chassis# scope storageadapter SLOT-5
Server /chassis /storageadapter# set global-hotspare-for-newdrives true
Server /chassis /storageadapter*# commit
```

Deleting a Virtual Drive

Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

12

Procedure

	Command or Action	Purpose
Step 1	Server# **scope chassis**	Enters the chassis command mode.
Step 2	Server /chassis # **show storageadapter**	Displays information about installed storage cards. This information allows you to determine the slot in which the storage card is installed.
Step 3	Server /chassis # **scope storageadapter SLOT-5**	Enters command mode for an installed storage card.
Step 4	Server /chassis/storageadapter # **show virtual-drive**	Displays virtual drive information that includes the virtual drive number, which you is required to delete the virtual drive.
Step 5	Server /chassis/storageadapter # **delete virtual-drive** *drive-number*	Deletes the specified virtual drive.
Step 6	Server /chassis/storageadapter* # **commit**	Commits the changes.

This example shows how to delete a virtual drive.

```
Server# scope chassis
Server /chassis # show storageadapter
PCI Slot Product     Name    Serial Number  Firmware Package Build   Product ID Cache
Memory Size
-------- ------------------------------ -------------- ----------------------- --------------
 ---
SLOT-5   LSI MegaRAID SAS    2004 ROMB      20.10.1-0092             LSI Logic   0 MB

Server /chassis# scope storageadapter SLOT-5
Server /chassis /storageadapter # show virtual-drive
Virtual Drive  Status               Name                    Size       RAID Level
-------------- -------------------- ----------------------- ---------- ----------
0              Optimal                                      571250 MB  RAID 0

Server /chassis /storageadapter # delete virtual-drive 0
Server /chassis /storageadapter *# commit
```

Performing a Consistency Check on a Virtual Drive

Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to verify the drives for consistency.

- **For RAID 5**—This procedure checks if the data in all of the parity stripe blocks is correct.

- **For RAID 1**—This procedure checks if the data in both disk drives is identical.

Procedure

	Command or Action	Purpose
Step 1	Server# **scope chassis**	Enters the chassis command mode.
Step 2	Server /chassis # **show storageadapter**	Displays information about installed storage cards. This information allows you to determine the slot in which the storage card is installed.
Step 3	Server /chassis # **scope storageadapter SLOT-5**	Enters command mode for an installed storage card.
Step 4	Server /chassis/storageadapter # **scope virtual-drive** *drive-number*	Enters command mode for the specified virtual drive.
Step 5	Server /chassis/storageadapter /virtual-drive # **verify**	Verifies the drive for consistency. • **For RAID 5**—Checks if the data in all of the parity stripe blocks is correct. • **For RAID 1**—Checks if the data in both disk drives is identical.
Step 6	Server /chassis/storageadapter /virtual-drive # **verify abort**	(Optional) Stops the verify process.
Step 7	Server /chassis/storageadapter /virtual-drive # **show detail**	Displays information about the specified virtual drive.

This example shows how to perform a consistency check on a virtual drive.

```
Server# scope chassis
Server /chassis # show storageadapter

PCI Slot Product       Name    Serial Number  Firmware Package Build   Product ID Cache
Memory Size
-------- ------------------------------ -------------- ------------------------ --------------
 ---
SLOT-5   LSI MegaRAID SAS    2004 ROMB       20.10.1-0092             LSI Logic   0 MB

Server /chassis# scope storageadapter SLOT-5
Server /chassis /storageadapter# scope virtual-drive 0
Server /chassis /storageadapter/virtual-drive# verify
---
status: ok
...
Server /chassis /storageadapter/virtual-drive# show detail
Status: Optimal
    Name:
    Size: 475883 MB
    RAID Level: RAID 1
    Target ID: 0
    Stripe Size: 64 KB
    Drives Per Span: 2
    Span Depth: 1
    Access Policy: Read-Write
    Disk Cache Policy: Unchanged
    Write Cache Policy: Write Through
    Cache Policy: Direct
```

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

14

```
          Read Ahead Policy: None
          Auto Snapshot: false
          Auto Delete Oldest: true
          Allow Background Init: true
          Consistency Check Progress: 0 %
          Consistency Check Elapsed Seconds: 0 s
```

Reconstructing the Virtual Drive Options

Note   The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

To migrate (reconstruct) the virtual drive to a new RAID level, you might need to add or remove physical drives. When you add or remove physical drives, the size of the virtual drive is either retained or increased.

You can retain or increase the size of the virtual drive, but you cannot decrease its size. For example, if you have two physical drives with RAID 0, you cannot migrate to RAID 1 with the same number of drives. Because with RAID 1, a mirrored set of disk drives are created, which reduces the size of the virtual drive to half of what it was before, which is not supported.

Note   The virtual drive reconstruction process might take several hours to complete. You can continue to use the system during the reconstruction process.

Options for Retaining the Size of the Virtual Drive

See the following figure and the table that follows for options that retain the size of the virtual drive when you migrate the virtual drive to a new RAID level.

Figure 4: Retaining the Virtual Drive Size Options
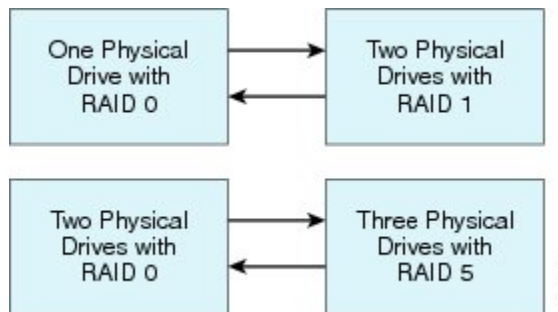
The following table lists the options that retain the size of the virtual drive and provides information about how many physical drives you must add or remove to migrate the virtual drive to a specific RAID level.

Table 1: Retaining the Virtual Drive Size

From:	Migrate to:	Add or Remove Disks
One physical drive with RAID 0	Two physical drives with RAID 1	Add one disk.
Two physical drives with RAID 1	One physical drive with RAID 0	Remove one disk.
Two physical drives with RAID 0	Three physical drives with RAID 5	Add one disk.
Three physical drives with RAID 5	Two physical drives with RAID 0	Remove one disk.

Options for Increasing the Size of the Virtual Drive

See the following figure and the table that follows for options that increase the size of the virtual drive when you migrate the virtual drive to a new RAID level.

Figure 5: Increasing the Virtual Drive Size Options

The following table lists the options that increase the size of the virtual drive and provides information about how many physical drives you must add or remove to migrate the virtual drive to a specific RAID level.
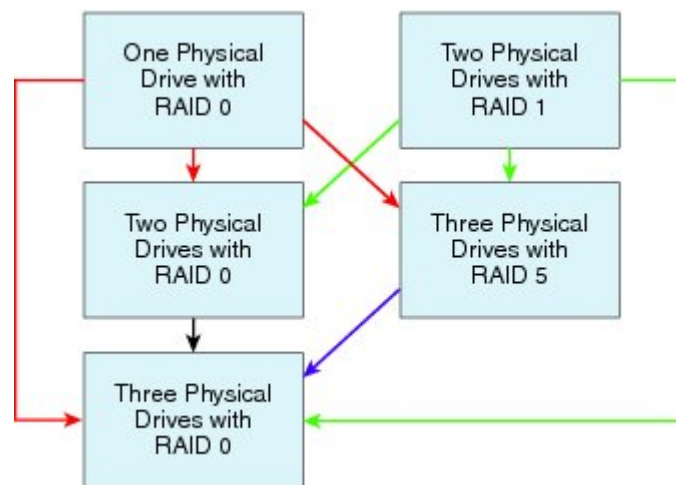
Table 2: Increasing the Virtual Drive Size

From:	Migrate to:	Add or Remove Disks
One physical drive with RAID 0 See the **red** arrows in the figure.	Two physical drives with RAID 0	Add one disk.
	Three physical drives with RAID 5	Add two disks.
	Three physical drives with RAID 0	Add two disks.

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

16

From:	Migrate to:	Add or Remove Disks
Two physical drives with RAID 1 See the **green** arrows in the figure.	Two physical drives with RAID 0	—
	Three physical drives with RAID 5	Add one disk.
	Three physical drives with RAID 0	Add one disk.
Two physical drives with RAID 0 See the **black** arrow in the figure.	Three physical drives with RAID 0	Add one disk.
Three physical drives with RAID 5 See the **purple** arrow in the figure.	Three physical drives with RAID 0	—

Reconstructing a Virtual Drive

Note   The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to add or remove the physical drive in order to migrate the virtual drive to the specified RAID level.

Before You Begin

See Reconstructing the Virtual Drive Options, on page 15.

Procedure

	Command or Action	Purpose
Step 1	Server# **scope chassis**	Enters the chassis command mode.
Step 2	Server /chassis # **show storageadapter**	Displays information about installed storage cards. This information allows you to determine the slot in which the storage card is installed.
Step 3	Server /chassis # **scope storageadapter SLOT-5**	Enters command mode for an installed storage card.
Step 4	Server /chassis/storageadapter # **scope virtual-drive** *drive-number*	Enters command mode for the specified virtual drive.
Step 5	Server /chassis/storageadapter /virtual-drive # **reconstruct** {**-r0**	**-r1**	**-r5**} [**-add**	**-rmv**] *new-physical-drive-slot-number(s)*	Adds or removes the physical drive to migrate the virtual drive to the new specified RAID level. • **-r0**	**-r1**	**-r5**—Available RAID levels are: RAID 0, RAID 1, or RAID 5.

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine
Integrated Management Controller, Release 3.x

17

	Command or Action	Purpose
		• **-add	-rmv** —Adds or removes the physical drive.
Step 6	Server /chassis/storageadapter /virtual-drive # **show detail**	Displays information about the specified virtual drive.

This example shows how to migrate one of two discs that was initially configured as RAID 1 to RAID 0.

```
Server# scope chassis
Server /chassis # show storageadapter

PCI Slot Product       Name    Serial Number  Firmware Package Build   Product ID Cache
Memory Size
-------- ------------------------------ -------------- ----------------------- --------------
 ---
SLOT-5   LSI MegaRAID SAS    2004 ROMB      20.10.1-0092             LSI Logic   0 MB

Server /chassis# scope storageadapter SLOT-5
Server /chassis /storageadapter# scope virtual-drive 0
Server /chassis /storageadapter/virtual-drive# reconstruct -r0 -rmv 1
---
status: ok
...
Server /chassis /storageadapter/virtual-drive# show detail
Status: Optimal
    Status: Optimal
    Name:
    Size: 475883 MB
    RAID Level: RAID 1
    Target ID: 0
    Stripe Size: 64 KB
    Drives Per Span: 2
    Span Depth: 1
    Access Policy: Read-Write
    Disk Cache Policy: Unchanged
    Write Cache Policy: Write Through
    Cache Policy: Direct
    Read Ahead Policy: None
    Auto Snapshot: false
    Auto Delete Oldest: true
    Allow Background Init: true
    ReConstruct Progress: 0 %
    ReConstruct Elapsed Seconds: 3 s
```

Making the Disk Drive Bootable

Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

After you configure RAID, you must make the disk drive bootable. Use this procedure to make the disk drive bootable.

Before You Begin

Configure RAID on the disk drive.

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

18

Procedure

	Command or Action	**Purpose**
Step 1	Server# **scope chassis**	Enters the chassis command mode.
Step 2	Server /chassis # **show storageadapter**	Displays information about installed storage cards. This information allows you to determine the slot in which the storage card is installed.
Step 3	Server /chassis # **scope storageadapter SLOT-5**	Enters command mode for an installed storage card.
Step 4	Server /chassis/storageadapter # **show physical-drive**	Displays physical disk drives. **Note** The physical drive status could be one of the following: • **system**—JBOD mode. The drive is not configured as RAID. • **online**—RAID mode. • **unconfigured good**—The drive is ready to be assigned to a drive group or hot spare pool. No mode is configured on the drive. • **hotspare**—The drive is designated as a spare drive. No mode is configured on the drive.
Step 5	Server /chassis/storageadapter # **set boot-drive {pd1 | pd2 | pd3 | vd0}**	Makes the disk drive bootable. **Note** To make the disk drive bootable, the status of the drive must be **system**. The status **system** indicates that the drive is in JBOD (non-RAID) mode.
Step 6	Server /chassis/storageadapter # **commit**	Commits the changes.
Step 7	Server /chassis/storageadapter # **show settings**	Displays settings.

This example shows how to make the disk drive bootable using the CIMC CLI.

```
Server# scope chassis
Server /chassis# show storageadapter

PCI Slot Product      Name    Serial Number  Firmware Package Build   Product ID Cache
Memory Size
-------- ----------------------------- -------------- ----------------------- --------------
 ---
SLOT-5   LSI MegaRAID SAS    2004 ROMB     20.10.1-0092             LSI Logic   0 MB

Server /chassis# scope storageadapter SLOT-5
Server /chassis /storageadapter# show physical-drive

Slot Number  Controller Status              Manufacturer   Model      Drive  Firmware
Coerced Size   Type
```

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine Integrated Management Controller, Release 3.x

19

```
          ----------- ---------- ------------------------------------ -------------- --------------
          -------------- -----
          1          SLOT-5     system                  TOSHIBA        MBF2600RC    5704    571250 MB
                     HDD
          2          SLOT-5     unconfigured good       ATA            ST9500620NS  SN01    475883 MB
                     HDD

             Server /chassis /storageadapter# set boot-drive pd1
          Server /chassis /storageadapter*# commit
          Server /chassis /storageadapter# show settings
          Boot Drive: pd1
```

CLI Configuration Guide for Cisco UCS E-Series Servers and the Cisco UCS E-Series Network Compute Engine
Integrated Management Controller, Release 3.x

20