HP Smart Array B110i SATA RAID Controller User Guide

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Intended audience

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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Enabling and configuring the controller

Enabling the controller and setting the boot order

The HP Smart Array B110i SATA RAID Controller is not enabled by default and must be enabled in RBSU.

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/smartstart/documentation).

HP ProLiant 100 Series servers

To enable the controller and set boot order:

1. Power up the server.
2. When prompted during the start-up sequence, access RBSU by pressing the **F10** key.
3. Select **Advanced** or **Advanced Settings**.
4. Select **SATA Configuration** or **Hard Drive Configuration**.
5. Change **SATA #1** to **RAID**.
6. Return to the previous screen by pressing the **Escape** key.
7. Select the **Boot Menu** by pressing the **right arrow** key.
8. Select **Hard Disk Drives**.
9. To assign the HP Smart Array B110i SATA RAID Controller as the boot controller, set **Ctrl 1** to **HP Smart Array B110i SATA RAID Controller**.
10. Press the **F10** key to save the setting and to exit RBSU.

HP ProLiant 300 Series servers

To enable the controller and set boot order:

1. Power up the server.
2. When prompted during the start-up sequence, access RBSU by pressing the **F9** key.
3. Select **Advanced Settings**.
4. Select **Embedded SATA RAID**.
5. Select Enabled.
6. Return to the previous screen by pressing the **Escape** key.
7. Select **Boot Controller Order**.
8. To assign the HP Smart Array B110i SATA RAID Controller as the boot controller, set **Ctrl 1** to **HP Smart Array B110i SATA RAID Controller**.
9. Press the **F10** key to save the settings and to exit RBSU.

Configuring an array

The HP Smart Array B110i SATA RAID Controller supports SATA drives only.

For the most efficient use of drive space, all drives within an array should have approximately the same capacity. Each configuration utility treats every physical drive in an array as if it has the same capacity as the smallest drive in the array. Any excess capacity of a particular drive cannot be used in the array. Therefore, the capacity is unavailable for data storage.

The more physical drives that are in an array, the greater the probability that the array will experience a drive failure during any given period. To reduce the risk of data loss that might occur when a drive fails, configure all logical drives in an array with a suitable fault-tolerance (RAID) method.

The HP Smart Array B110i SATA RAID Controller supports up to two logical drives.

Newly created logical drives are invisible to the operating system. To make the new logical drives available for data storage, format them using the instructions given in the operating system documentation.

Option ROM Configuration for Arrays

Before installing an operating system, you can use the ORCA utility to create the first logical drive, assign RAID levels, and establish online spare configurations.

The utility also provides support for the following functions:

- Reconfiguring one or more logical drives
- Viewing the current logical drive configuration
- Deleting a logical drive configuration
- Setting the controller to be the boot controller

If you do not use the utility, ORCA will default to the standard configuration.

For more information regarding array controller configuration, refer to the controller user guide.

For more information regarding the default configurations that ORCA uses, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD.

The HP Smart Array B110i SATA RAID Controller does not support ORCA CLI.

To create a logical drive using ORCA:

1. Power up the server.
2. When prompted during the start-up sequence, access ORCA by pressing the **F8** key.
3. Select **Create Logical Drive.**

   The screen displays a list of all unconfigured physical drives and the valid RAID options for the system.
4. Use the **Arrow** keys, **Spacebar,** and **Tab** key to navigate around the screen and set up the logical drive, including an online spare drive, if one is required.

   NOTE: You cannot use ORCA to configure one spare drive to be shared among several arrays. Only ACU enables you to configure shared spare drives.
5. Press the **Enter** key to accept the settings.

6. Press the **F8** key to confirm the settings and save the new configuration.

   After several seconds, the **Configuration Saved** screen appears.

7. Press the **Enter** key to continue.

Repeat this procedure to create additional logical drives.

Array Configuration Utility

ACU is a browser-based utility with the following features:

- Runs as a local application or remote service
- Supports assignment of online spares
- Suggests the optimum configuration for an unconfigured system
- Provides different operating modes, enabling faster configuration or greater control over the configuration options
- Remains available any time that the server is on
- Displays on-screen tips for individual steps of a configuration procedure
- Beginning with ACU version 8.28.13.0, provides diagnostic functionality on the Diagnostics tab (formerly known as Array Diagnostics Utility)

For optimum performance, the minimum display settings are 1024 × 768 resolution and 16-bit color. Servers running Microsoft® operating systems require one of the following supported browsers:

- Internet Explorer 6.0 or later
- Mozilla Firefox 2.0 or later

For Linux servers, see the README.TXT file for additional browser and support information.

For more information, refer to the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the Documentation CD or the HP website (http://www.hp.com).

Installing the HP Smart Array Hot Plug Advanced Pack for B110i license key

When installed and activated, the HP Hot Plug Advanced Pack license key enables the user to remove and install hard drives without powering down the server.

For proper hot-plug operation, the following items are required:

- The HP Hot Plug Advanced Pack license key
- A drive cage backplane configured for the B110i SATA RAID controller
- A supported hard drive installed in the server
- One of the following drivers, depending on the operating system:
  - Microsoft® Windows® driver version 6.10.x or later
  - Red Hat Enterprise Linux driver version 1.2.4-x or later
  - Novell SUSE SLES driver version 1.2.4-x or later

IMPORTANT: The license key is stored on the hard drive. If no hard drives are installed, the license key cannot be installed.

Before installing the license key, be sure that hard drives are installed. For more information on installing hard drives, see the server user guide.

To obtain the license key, see the entitlement certificate included with the HP Hot Plug Advanced Pack. Depending on the method of delivery, the certificate is provided either in a sealed envelope or in an email message.

To install the license key, use one of the following methods:

- Installing a license key with ORCA (on page 8)
- Installing a license key with ACU (on page 9)

Installing a license key with ORCA

To install a license key:

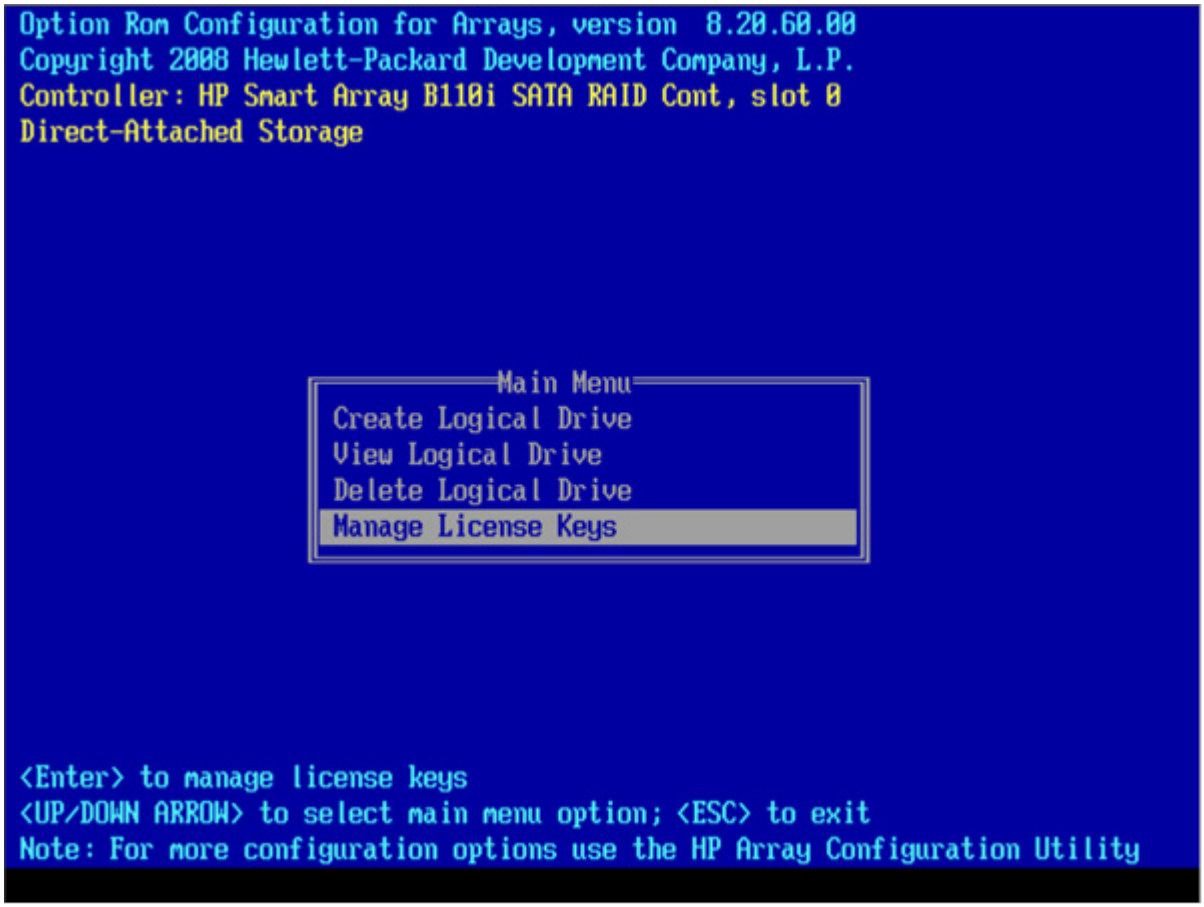
1. Power down the server, if necessary.
2. Power up the server.

   POST runs.

   During POST, all controllers in the server are initialized one at a time in the current boot order sequence. If a controller is connected to one or more hard drives, a message appears during the initialization process for that controller, prompting you to start ORCA.
3. At the ORCA prompt for the controller that you want to configure, press the **F8** key.

IMPORTANT: If no hard drives are installed, then this option does not appear.

The ORCA main menu appears.



4. Select **Manage License Keys**.

IMPORTANT: If no hard drives are installed, then this option does not appear.

5. Under the License Key menu, select **Add License Key**.
6. Enter the license key in the space provided.

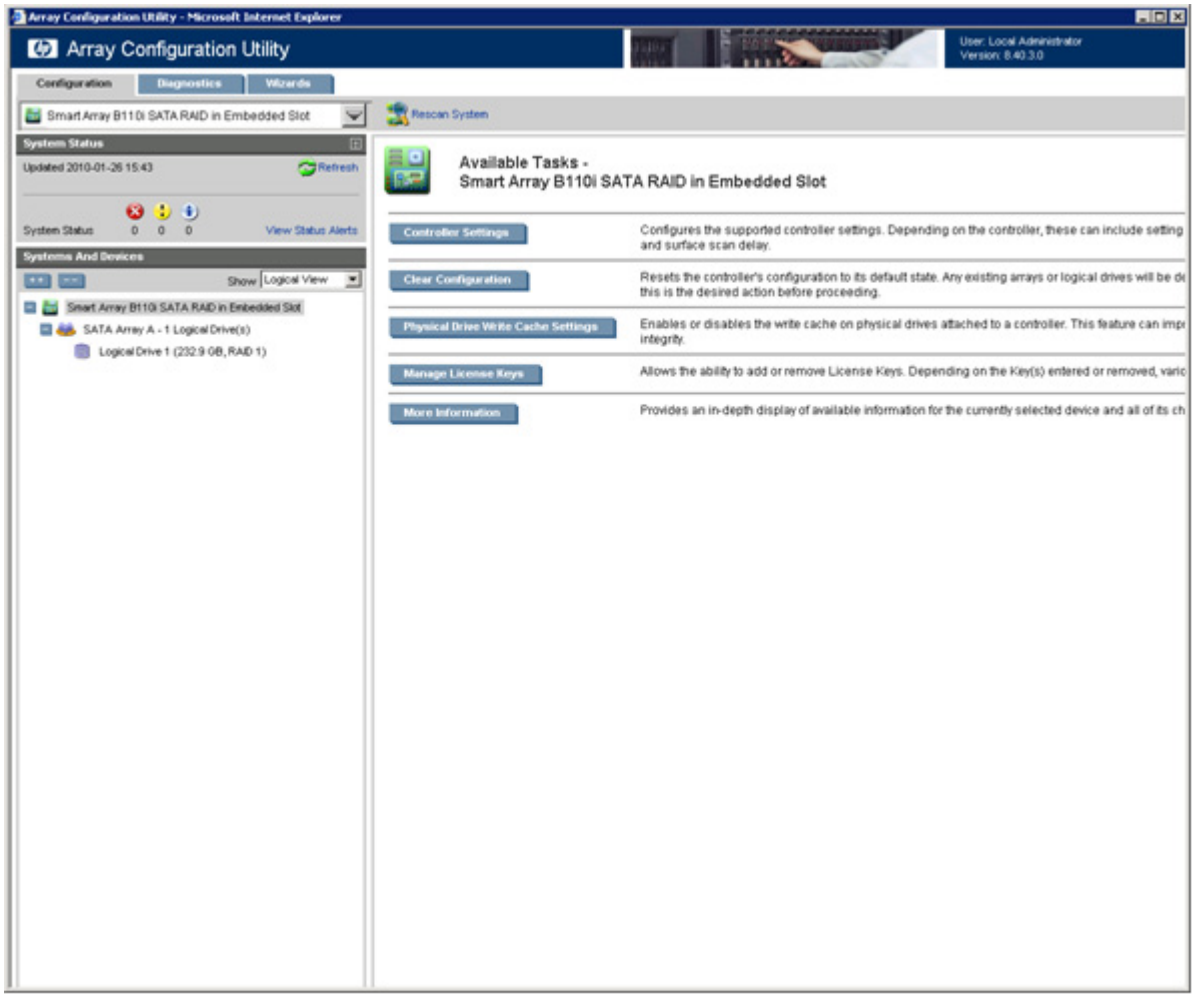
   ORCA issues a notification after the license key activates successfully.

Installing a license key with ACU

To install a license key:

1. Power down the server, if necessary.
2. Power up the server.

3. Open ACU.



4. Select a controller from the Controller/Device menu.

   The System Status, Systems And Devices, and Available Tasks panels appear.

5. In the Available Tasks panel, click **Manage License Keys**.

   IMPORTANT: If no hard drives are installed, then this option does not appear.

   Specific license key tasks appear. A complete list of existing license keys also appears.

6. Click **Add License Key**.
7. Enter the license key number.
8. Click **Save**.

Installing device drivers and Management Agents

Installing device drivers

IMPORTANT: Enable the HP Smart Array B110i SATA RAID Controller before installing device drivers. For more information see "Enabling the controller and setting the boot order (on page 5)."

A device driver is required for the operating system to communicate with the disk drive controller. For more information on supported operating systems, see the HP Smart Array B110i SATA RAID Controller product page on the HP website (http://www.hp.com/go/sataraid).

The controller drivers are located on the Easy Set-up CD. For more information on using the Easy Set-up CD to install drivers, see the HP Smart Array B110i SATA RAID Controller product page on the HP website (http://www.hp.com/go/sataraid).

Driver Updates are posted to the HP website (http://www.hp.com/support). When prompted for product information, enter the appropriate server model name.

Windows operating systems

For Windows operating systems, the device drivers install automatically with the assisted installation option on the Easy Set-up CD or SmartStart CD.

For manual installation of Microsoft® Windows Server® 2003, the driver must be added using the virtual install disk or the F6 option at the beginning of the installation process.

If the server model supports the virtual install disk feature, the driver installs automatically. Updates can be applied after the OS installation is complete.

Linux operating systems

For Linux operating systems, use the driver update diskette (DUD) images located on the Easy Set-up CD or SmartStart CD.

The readme file provided on the DUD image provides detailed instructions for installing device drivers on specific versions of the Linux operating system.

Installing Management Agents

If you use the Assisted Installation path feature of SmartStart to install the operating system on a new server, the Management Agents are automatically installed at the same time.

You can update the Management Agents by using the latest versions of the agents provided on the SmartStart CD or the Easy Set-up CD. The procedure is provided with the agents. To download the latest versions of the CDs, see the HP website:

- SmartStart CD (http://h18013.www1.hp.com/products/servers/management/smartstart/documentation.html?jumpid=hpr_R1002_USEN).
- Easy Set-up CD (http://h18013.www1.hp.com/products/servers/management/remotemgmt/easy_setup_cd/index.html?jumpid=reg_R1002_USEN).

Replacing, moving, or adding hard drives

Recognizing hard drive failure

△ **CAUTION:** Sometimes, a drive that has previously been failed by the controller may seem to be operational after the system is power-cycled or (for a hot-pluggable drive) after the drive has been removed and reinserted. However, continued use of such marginal drives may eventually result in data loss. Replace the marginal drive as soon as possible.

The HP Smart Array B110i SATA RAID Controller supports drive LED illumination only on systems with backplane support for drive LEDs.

The following items indicate a hard drive failure:

- The following messages appear in ORCA:
  - 1784: Drive Array Failure

    This indicates a drive failure in a logical volume.
  - 1784: Drive Array Logical Drive Failure

    This indicates that the entire logical volume has failed. This may mean that multiple drives have failed.
- The following POST messages appear when the system is restarted, as long as the controller detects at least one functional drive:
  - 1784: Drive Array Failure
  - 1786: Drive Array Recovery Needed
- ACU represents failed drives with a distinctive icon.
- HP Systems Insight Manager (SIM) can detect failed drives remotely across a network. For more information about HP SIM, see the documentation on the Management CD.
- The HP System Management Homepage (SMHP) indicates that a drive has failed.
- In Windows operating systems, the Event Notification Service posts an event to the Microsoft® Windows® system event log and the IML.
- In Linux operating systems, systems events are logged to /var/log/messages.
- ADU lists all failed drives (on systems supported by SmartStart v8.25 or earlier).
- ACU lists all failed drives (on systems supported by ACU v8.28.13.0 or later).

For additional information about diagnosing hard drive problems, see the *HP ProLiant Servers Troubleshooting Guide* on the HP website (http://www.hp.com/go/bizsupport).

Effects of a hard drive failure

When a hard drive fails, all logical drives that are in the same array are affected. Each logical drive in an array might be using a different fault-tolerance method. Therefore, each logical drive can be affected differently.

- RAID 0 configurations cannot tolerate drive failure. If any physical drive in the array fails, all RAID 0 logical drives in the same array also fail.
- RAID 1 configurations can tolerate one drive failure. If one physical drive in a RAID 1 configuration fails, the RAID volume is still intact as a degraded RAID 1.
- RAID 1+0 configurations can tolerate up to two drive failures as long as no failed drives are mirrored to one another.

  A RAID 1+0 configuration of four drives consists of two RAID 1 volumes of two drives each. One drive from each RAID 1 volume can fail for a total of two failed drives. If both drives in one RAID 1 volume fail, the entire RAID 1+0 volume fails.

Compromised fault tolerance

△ **CAUTION:** When fault tolerance is compromised, data loss can occur. However, it may be possible to recover the data. For more information, see "Recovering from compromised fault tolerance (on page 14)."

If more drives fail than the fault-tolerance method can manage, fault tolerance is compromised, and the logical drive fails. If this failure occurs, the operating system rejects all requests and indicates unrecoverable errors.

For example, fault tolerance might occur when a drive in an array fails while another drive in the array is being rebuilt.

Compromised fault tolerance can also be caused by problems unrelated to drives. In such cases, replacing the physical drives is not required.

Recovering from compromised fault tolerance

If fault tolerance is compromised, inserting replacement drives does not improve the condition of the logical volume. Instead, if the screen displays unrecoverable error messages, perform the following procedure to recover data:

1. Power down the entire system, and then power it back up. In some cases, a marginal drive will work again for long enough to enable you to make copies of important files.

   If a 1779 POST message is displayed, press the **F2** key to re-enable the logical volumes. Remember that data loss has probably occurred and any data on the logical volume is suspect.
2. Make copies of important data, if possible.
3. Replace any failed drives.
4. After you have replaced the failed drives, fault tolerance may again be compromised. If so, cycle the power again. If the 1779 POST message is displayed:
   a. Press the **F2** key to re-enable the logical drives.
   b. Recreate the partitions.
   c. Restore all data from backup.

To minimize the risk of data loss that is caused by compromised fault tolerance, make frequent backups of all logical volumes.

Replacing hard drives

If you are replacing a drive in a fault-tolerant configuration while the system is powered down, a POST message appears when the system is powered up. When this message appears, press the **F1** key to enable automatic data recovery. If you do not enable automatic data recovery, the logical volume remains in a ready-to-recover condition, and the same POST message appears when the system is restarted.

In RAID 1 configurations, you can replace one failed drive.

In RAID 1+0 configurations, drives are mirrored in pairs. If drives are not mirrored to removed or failed drives, you can replace them simultaneously.

Guidelines

Before replacing hard drives, observe the following guidelines:

- Be sure that the array has a current, valid backup.
- Confirm that the replacement drive is a SATA drive.
- Use replacement drives that have a capacity equal to or greater than the smallest drive in the array. The controller immediately fails drives that have insufficient capacity.

To replace more drives in an array than the fault tolerance method can support, follow the previous guidelines for replacing several drives simultaneously. Wait until rebuild is complete, as indicated by ACU/ACU-CLI, before replacing additional drives.

If you need to replace more drives than the fault tolerance method can support because fault tolerance has been compromised, recover the data before replacing any drives. For more information, see "Recovering from compromised fault tolerance (on page 14)."

Automatic data recovery (rebuild)

When you replace a hard drive in an array, the controller uses the fault-tolerance information on the remaining drives in the array to reconstruct the data from the original drive and write it to the replacement drive. This process is called automatic data recovery or rebuild. If fault tolerance is compromised, this data cannot be reconstructed and, likely, is lost permanently.

If another drive in the array fails while fault tolerance is unavailable during rebuild, a fatal system error can occur, and all data on the array is then lost. In exceptional cases, however, failure of another drive does not always cause a fatal system error. These exceptions include the following:

- Failure after activation of a spare drive
- Failure of a drive that is not mirrored to any other failed drives (in a RAID 1+0 configuration)

Time required for a rebuild

The time required for a rebuild varies, depending on several factors:

- The priority that the rebuild is given over normal I/O operations

  Change the priority setting with ACU ("Array Configuration Utility" on page 7).
- The amount of I/O activity during the rebuild operation
- The rotational speed of the hard drives

- The brand, model, and age of the drives
- The amount of unused capacity on the drives

Allow approximately 15 minutes per gigabyte for the rebuild process to complete.

System performance is affected during the rebuild, and the system is unprotected against further drive failure until the rebuild has finished. Therefore, replace drives during periods of low activity, when possible.

When automatic data recovery has finished, the state of the logical volume is updated in ACU/ACU-CLI /agents, and an event is posted to the system event log indicating that the rebuild is complete.

If the ACU/ACU-CLI/agents or the posted event indicate that the rebuild has terminated abnormally, determine the appropriate course of action. See "Abnormal termination of a rebuild (on page 16)."

Abnormal termination of a rebuild

If the rebuild process has been terminated abnormally, an event is reported in the system event log and the array remains in interim recovery mode.

Three possible causes exist for abnormal termination of a rebuild:

Posted event	Cause of rebuild termination
None of the drives in the array are marked as failed in ACU/ACU-CLI.	One of the drives in the array has experienced an uncorrectable read error.
The replacement drive is marked as failed in ACU/ACU-CLI.	The replacement drive has failed.
One of the other drives in the array is marked as failed.	The drive with the illuminated Fault LED has now failed.

Each of these situations requires a different remedial action.

One of the drives in the array has experienced an uncorrectable read error.

To resolve this issue:

1. Back up as much data as possible from the logical drive.

CAUTION: Do not remove the drive that has the media error. Doing so causes the logical drive to fail.

2. Restore data from the backup. Writing data to the location of the unreadable sector often eliminates the error.
3. Remove and reinsert the replacement drive. This action restarts the rebuild process.

If the rebuild process still terminates abnormally, do the following:

1. Delete and recreate the logical drive.
2. Restore data from the backup.

The replacement drive has failed.

Verify that the replacement drive has the correct capacity and is a supported model. If these factors are not the cause of the failure, use a different drive as the replacement.

Another drive in the array has failed.

You might be able to enable a recently failed drive temporarily by cycling the server power. To cycle the server power:

1. Power down the server.
2. Remove the replacement physical drive (the one undergoing a rebuild), and then reinstall the drive that it is replacing.
3. Power up the server.

If the newly failed drive is operational, do the following:

1. Back up any unsaved data.
2. Remove the original drive that was being replaced, and then reinsert the replacement physical drive. The rebuild process restarts automatically.
3. When the rebuild process has finished, replace the newly failed drive.

If the newly failed drive has not recovered, do the following:

1. Remove the original drive that was being replaced, and then reinsert the replacement physical drive.
2. Replace the newly failed drive.
3. Restore data from the backup.

Moving hard drives and arrays

You can move drives to other ID positions on the same array controller. You can also move a complete array from one controller to another.

Observe the following conditions for moving drives:

- Power down the server.
- If moving the drives to a different server, confirm that the new server has empty bays to accommodate all the drives simultaneously.
- Confirm that the array has no failed or missing drives.
- Confirm that no spare drive in the array is acting as a replacement for a failed drive.
- If moving the drives to a different server, confirm that the new server has the latest system ROM and drivers. For more information, see the HP website (http://www.hp.com/go/support).

Observe the following conditions for moving an array to another controller:

- If the other controller is connected to one or more arrays of configured logical drives, the total number of logical drives on the controller after the drives have been moved must not exceed the number of logical drives that the controller supports. This number depends on the controller model and on the controller firmware version.
- If moving the logical volume to a hardware-based Smart Array controller that is connected to one or more logical drives, confirm that the total number of logical drives does not exceed the number of logical drives that the controller supports.
- If moving the logical volume to an HP Smart Array B110i SATA RAID Controller in another server, remove all physical drives from the other server.

When all the conditions have been met, move the drives:

1. Back up all data before removing any drives or changing configuration. This step is **required** if you are moving data-containing drives from a controller that does not have a cache module.

2. Power down the system.
3. Move the drives.
4. Power up the system.
5. Observe the POST messages:
   - If a 1785 POST message appears, the drive array did not configure properly. Continue with step 6.
   - If a 1724 or 1727 POST message appears, drive positions were changed successfully and the configuration was updated. Continue with step 7.
6. If the array did not configure properly, do the following:
   a. Power down the system immediately to prevent data loss.
   b. Return the drives to their original locations.
   c. Restore the data from backup, if necessary.
7. Verify the new drive configuration by running ORCA or ACU.

After the drives have been moved, confirm that the total number of hard drives on the new controller does not exceed the maximum number of supported hard drives for that controller model and firmware version.

Adding drives

You can add hard drives to a system at any time, if you do not exceed the maximum number of drives that the controller supports. You can then build a new array from the added drives.

If the hard drives that you intend to add to the system are configured into logical drives, you must meet certain conditions before adding the hard drives to the system. For more information, see "Moving hard drives and arrays (on page 17)."

If the HP Hot Plug Advanced Pack is not installed, you must reset the server after the hard drives are added successfully so that the controller can recognize the logical drives. For more information, see "Installing the HP Smart Array Hot Plug Advanced Pack for B110i license key (on page 7)."

Migrating hard drives to an optional Smart Array controller

Installing an optional Smart Array controller

To install the component:

1. Power down the server.
2. Remove the access panel.
3. Remove components and cables as needed.
4. Install the Smart Array controller.

   For more information, see the server user guide or the documentation that ships with the option.
5. Install components and cables removed previously.
6. Install the access panel.
7. Power up the server.
8. Migrate hard drives to the Smart Array controller:
   - Migrating hard drives to an optional Smart Array controller—Microsoft® Windows® (on page 19)
   - Migrating hard drives to an optional Smart Array controller—Linux (on page 20)

Migrating hard drives to an optional Smart Array controller—Microsoft® Windows®

This section provides instructions to migrate hard drives from the embedded HP Smart Array B110i SATA RAID controller to an optional Smart Array controller in a server with a Microsoft® Windows® operating system.

Installing the Smart Array driver—Microsoft® Windows®

To install the driver from the HP website (http://www.hp.com/go/support):

1. When prompted for product information, enter the Smart Array controller model number in the product field.
2. Select **Download drivers and software**.
3. Select the appropriate operating system.
4. Download the HP ProLiant Smart Array SAS/SATA Controller Driver package.
5. To install the driver, run the Smart Array Controller Driver package.

To install the driver from the Easy Set-up CD:

1. From the System Support Software menu, select the current operating system.
2. Select **Driver – storage controller**.
3. Download the HP ProLiant Smart Array SAS/SATA Controller Driver package.
4. To install the driver, run the Smart Array Controller package.

When the driver is installed, complete the migration procedure.

Completing the migration to an optional Smart Array controller—Microsoft® Windows®

To complete the migration to the Smart Array controller:

1. Back up all data.
2. Access the **Device Manager** menu:
   a. Right-click **My Computer.**
   b. Select **Manage**.
3. In the Storage Controller section, verify that the system recognizes the Smart Array controller.
4. Power down the server.
5. Remove the access panel.
6. Remove components and cables as needed.
7. Disconnect the existing data cable from the hard drive backplane.
8. Connect the SAS cable to the controller and hard drive backplane.

   This action replaces the SATA connection.
9. Install components and cables removed previously.
10. Install the access panel.
11. Power up the server.

Migrating hard drives to an optional Smart Array controller—Linux

This section provides instructions to migrate hard drives from the embedded HP Smart Array B110i SATA RAID controller to an optional Smart Array controller in a server with the Red Hat Enterprise Linux operating system or the SuSE Linux Enterprise Server operating system.

Before migrating hard drives, be sure that you have installed the operating system *by label*, using the latest hpahcisr driver from the HP website (http://www.hp.com/go/support).

IMPORTANT: Migrating drives on a SLES system installed with the default method is not supported. By default, a SLES installation uses a device or controller ID to partition and format hard drives. In order to migrate drives to a Smart Array controller, you must manually change the installation configuration to install by label.

For more information about installing Red Hat Enterprise Linux by label, see the OS documentation for Red Hat Enterprise Linux.

For more information about installing SLES by label, see the OS documentation for SLES.

Installing the Smart Array driver—Linux

To install the Smart Array driver:

1. Using the software RAID controller, boot the operating system.
2. Download the latest Smart Array hpahcisr driver from the HP website (http://www.hp.com/go/support):
   a. When prompted for product information, enter the Smart Array controller model number in the product field.
   b. Select **Download drivers and software**.
   c. Select the appropriate operating system.
   d. Download the Smart Array hpahcisr driver rpm.
3. Install the Smart Array hpahcisr driver rpm.

   For more information, see the text file that is downloaded with the driver.

When the driver is installed and the system is configured, complete the migration procedure.

Completing the migration to the Smart Array controller—Linux

To complete the migration to the Smart Array controller:

1. Power down the server.
2. Remove the access panel.
3. Remove components and cables as needed.
4. Disconnect the existing data cable from the hard drive backplane.
5. Connect the SAS cable to the controller and hard drive backplane.

   This action replaces the SATA connection.
6. Install components and cables removed previously.
7. Install the access panel.
8. Power up the server.

Diagnosing array problems

Diagnostic tools

To troubleshoot array problems and generate feedback about arrays, use the following diagnostic tools:

- **ACU**

  For more recent products, array diagnostics is available with ACU v8.28.13.0 and later. This utility is available on the SmartStart CD in the controller kit and also on the HP website (http://www.hp.com/support). For more information about ACU, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the Documentation CD that ships with the controller. For more information about error messages, see the *HP ProLiant Servers Troubleshooting Guide*.

- **ADU**

  For products that support SmartStart v8.25 and earlier, this utility is available on the SmartStart CD in the controller kit and also on the HP website (http://www.hp.com/support). When prompted for product information, enter the server model name. For more information about the meanings of the various ADU error messages, see the *HP ProLiant Servers Troubleshooting Guide*.

- **Event Notification Service**

  This utility reports array events to the Microsoft® Windows® system event log and IML. You can obtain the utility from the SmartStart CD or the HP website (http://www.hp.com/support). When prompted for product information, enter the server model name.

- **HP Insight Diagnostics**

  HP Insight Diagnostics is a tool that displays information about the system hardware configuration and performs tests on the system and its components, including drives if they are connected to Smart Array controllers. This utility is available on the SmartStart CD and also on the HP website (http://www.hp.com/servers/diags).

- **POST messages**

  Smart Array controllers produce diagnostic error messages (POST messages) at reboot. Many POST messages suggest corrective actions. For more information about POST messages, see the *HP ProLiant Servers Troubleshooting Guide*.

Electrostatic discharge

Preventing electrostatic discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding methods to prevent electrostatic discharge

Several methods are used for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.

Regulatory compliance notices

Battery replacement notice

This component uses a nickel metal hydride (NiMH) battery pack.

⚠ **WARNING:** There is a risk of explosion, fire, or personal injury if a battery pack is mishandled. To reduce this risk:

- Do not attempt to recharge the batteries if they are disconnected from the controller.
- Do not expose the battery pack to water, or to temperatures higher than 60°C (140°F).
- Do not abuse, disassemble, crush, or puncture the battery pack.
- Do not short the external contacts.
- Replace the battery pack only with the designated HP spare.
- Battery disposal should comply with local regulations.

Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. To forward them to recycling or proper disposal, use the public collection system or return them to HP, an authorized HP Partner, or their agents.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

Taiwan battery recycling notice

The Taiwan EPA requires dry battery manufacturing or importing firms in accordance with Article 15 of the Waste Disposal Act to indicate the recovery marks on the batteries used in sales, giveaway or promotion. Contact a qualified Taiwanese recycler for proper battery disposal.

Acronyms and abbreviations

ACU

Array Configuration Utility

ADU

Array Diagnostics Utility

IML

Integrated Management Log

ORCA

Option ROM Configuration for Arrays

POST

Power-On Self Test

RBSU

ROM-Based Setup Utility

SIM

Systems Insight Manager

SMHP

HP System Management Homepage

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