SAS2 Integrated RAID Configuration Utility

User's Guide

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Note: Before using this information and the product it supports, read the information in Appendix B, “Notices,” on page 23.

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Chapter 1. Introduction

The SAS2 integrated RAID configuration utility is a command-line utility that you can use to configure the integrated RAID functions of SAS2 controllers. The configuration utility is a minimally interactive program that you can run from a command prompt or a shell script. When you use a SAS2IRCU command, the program returns a status value to the operating system when it exits.

Hardware and software requirements

SAS2IRCU runs on the following platforms:

- X86 or X64-compatible
- EM64T / AMD64

SAS2IRCU works with storage devices that are compliant with existing SCSI standards.

Controller support

SAS2IRCU supports the following SAS2 controllers and the host bus adapters based on these controllers:

- LSISAS2004
- LSISAS2008

Operating system and software support

SAS2IRCU requires PCI 2.x or PCI 3.0 firmware and MPI v2.0. SAS2IRCU supports the following operating systems:

- Microsoft Windows Preinstallation Environment (Windows PE) 2.1 or later, Microsoft Windows 2003 (all versions), and Microsoft Windows 2008 (all versions)

  Requires Windows driver v2.00.00.17 or later.
- Red Hat Enterprise Linux (RHEL) 4, Red Hat Enterprise Linux (RHEL) 5, and Red Hat Enterprise Linux (RHEL) 6
- SUSE Linux Enterprise Server (SLES) 10 and SUSE Linux Enterprise Server (SLES) 11

Notices in this document

The following notices are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.

Chapter 2. Using the SAS2 Integrated RAID Configuration Utility

This chapter describes the configuration utility interface and commands.

Interface description

Each command has the following format:

`sas2ircu` *`controller_number command parameters`*

Use a space to separate the program name, the controller number, the command, and the parameters fields. The format of *parameter* is command specific.

Information passes between the user environment and the SAS2IRCU through the command line, the standard output and standard error interfaces, and the program return value. You can redirect the output streams as permitted by the operating system. When the program exits, it returns a value of 0 if the command is successful. Otherwise, it returns a value of 1.

If a RAID command fails, the SAS2IRCU prints the IOCStatus and IOCLogInfo on the console. You can use this information to analyze the cause of the failure.

Operating-system support for commands

The following table shows which utility commands are supported on each operating system and controller type. Check your BIOS revision level to be sure that you have an IR or IT controller.

Table 1. Utility commands and operating system support

Command	DOS	Linux	EFI	WinPE
Create	x	x	x	x
Delete	x	x	x	x
Display	x	x	x	x
Hotspare	x	x	x	x
List	x	x	x	x
Status	x	x	x	x
Mfgpage	x	-	-	-
Constchk	x	x	x	x
Activate	x	x	x	x
Locate	x	x	x	x
Logir	x	x	x	x

Command syntax

Read the following guidelines before you use the utility command-line interface:

- Each command has the following format:

  `sas2ircu` *`controller_number command parameters`*

- Each command starts with sas2ircu.
- *controller_number* is the unique controller number that the program assigns to each PCI function on supported controller chips in the system, starting with controller 0. For example, in a system that contains two LSISAS2008 controllers, controller 0 refers to the first controller, and controller 1 refers to the other controller.

  Valid controller number values are 0 to 255 (decimal).
- The *enclosure:bay* parameter specifies the enclosure and slot of a peripheral device that is attached to the bus. The argument must use a colon (:) as a separator and must follow the enclosure:bay format. *Enclosure* is a 16-bit EnclosureHandle value set by the I/O controller (IOC). A value of 0 is invalid. *Bay/Slot* is a 16-bit slot value set by the IOC. Use the **display** command to get the enclosure and slot numbers of a drive.
- Variables are shown in italics.
- Optional parameters are enclosed in brackets ([ ]).
- Enter parameters that are enclosed in braces ({ }) one or more times, as required for the command.
- Do not enter the command-line definition characters <>, [ ] and { } on the command line.

Activate command

Use the **activate** command to activate an inactive integrated RAID volume.

Syntax

The syntax of the **activate** command is

```
sas2ircu controller_number activate volumeID
```

where:

controller_number
is the index of the controller with the volume that you want to activate.

volumeID is the volume ID of an integrated RAID volume that is currently in the Inactive state.

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

Constchk command

Use the **constchk** command to send requests to the integrated RAID firmware to start a consistency check operation on the specified volume.

Syntax

The syntax of the **constchk** command is

```
sas2ircu controller_number constchk volumeID [noprompt]
```

where:

controller_number
: is the index of the controller on which you want to run the consistency check operation.

volumeID
: is the volume ID of an integrated RAID volume, as listed in the **display** command, on which you want to start the consistency check operation.

The optional **noprompt** parameter prevents warnings and prompts from being displayed while the command is running

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

Create command

Use the **create** command to create integrated RAID volumes on SAS2 controllers.

When you add a disk to an integrated RAID volume, the volume might not use all of the storage capacity of the disk. For example, if you add a 300 GB disk drive to a volume that uses only 200 GB of capacity on each disk drive, the volume does not use the remaining 100 GB of capacity on the disk drive.

The disk that is identified by the first *enclosure:bay* on the command line becomes the primary disk drive when you create an integrated mirroring (RAID 1) volume. If the controller resynchronizes the disk drives, the data on the primary disk drive becomes available when you access the newly created volume.

When the integrated RAID firmware creates a RAID1 volume, it starts a background initialization of the volume. You can use the **status** command to monitor the status of the initialization.

Observe the following rules when you create integrated RAID volumes and hot spare disks:

- All disks that are part of a volume, including hot spares for that volume, must be on the same SAS2 controller.
- You can create RAID0, RAID1, RAID1E, and RAID10 integrated RAID volumes.
- You can create a maximum of two integrated RAID volumes per controller.
- The configuration of the integrated RAID firmware determines the maximum and minimum number of drives that you can use in integrated RAID volumes. The configuration is specified in the following fields of the I/O controller:

  MaxDrivesRAID0, MaxDrivesRAID1, MaxDrivesRAID10, MaxDrivesRAID1E MinDrivesRAID0, MinDrivesRAID1, MinDrivesRAID10, MinDrivesRAID1E, MaxVolumes, MaxPhysDisks, MaxGlobalHotSpares, MaxPhysDisks (maximum number of physical drives combined in all volumes on the controller)
- You cannot create an integrated RAID volume that combines SAS and SATA hard disk drives.
- You cannot create an integrated RAID volume that combines solid state drives and hard disk drives.
- You cannot use both SATA and SAS solid state drives in a single integrated RAID volume, if the integrated RAID firmware supports it. Support for such a mixing is specified by values in static fields in the MPI2 specification and is specific for solid state drives only.

Syntax

The syntax of the **create** command is

```
sas2ircu controller_number create volume_type size
{enclosure:bay} [volume_name] [noprompt]
```

where:

controller_number
: is the index of the controller for the newly created volume.

volume_type
: is the volume type of the new volume. Valid values are RAID0, RAID1, RAID10, and RAID1E.

size
: is the size of the RAID volume in MB, or `max` for the maximum available size.

enclosure:bay is the enclosure and slot values of the disk drive for the new RAID volume. You can get these values from the output of the **display** command.

Note: DOS does not support addressing by enclosure:bay.

volume_name is a user-specified string to identify the volume.

The optional **noprompt** parameter prevents warnings and prompts from being displayed while the command is running

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

Delete command

Use the **delete** command to delete all integrated RAID volumes and hot spare drives from the specified SAS2 controller. No other controller configuration parameters are changed.

Syntax

The syntax of the **delete** command is

```
sas2ircu controller_number delete [noprompt]
```

where:

controller_number
is the index of the controller with the volumes that you want to delete.

The optional **noprompt** parameter prevents warnings and prompts from being displayed while the command is running

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

Display command

Use the **display** command to display information about the SAS2 controller configurations, including controller type, firmware version, BIOS version, volume information, physical drive information, and enclosure (see “Sample output”). The physical device information section displays the duplicate device of a dual-port SAS drive.

Note: One MB is 1048576 bytes. The **display** command rounds down to the nearest MB all amounts stated in MB.

Syntax

The syntax of the **display** command is

```
sas2ircu controller_number display [filename]
```

where:

controller_number
: is the index of the controller for which you want to display information.

filename
: is an optional file name to which you want to store the command output.

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

Sample output

The **display** command returns information as shown in the following sample output.

```
Read configuration has been initiated for controller 0
------------------------------------------------------------
Controller information
------------------------------------------------------------
   Controller type                         : SAS2008
   BIOS version                            : 7.00.02.00
   Firmware version                        : 00.250.19.0
   Channel description                     : 1 Serial Attached SCSI
   Initiator ID                            : 112
   Maximum physical devices                : 62
   Concurrent commands supported           : 266
   Slot                                    : 3
   Segment                                 : 0
   Bus                                     : 64
   Device                                  : 1
   Function                                : 0
   RAID Support                            : Yes
------------------------------------------------------------
IR Volume information
------------------------------------------------------------
------------------------------------------------------------
Physical device information
------------------------------------------------------------
Initiator at ID #112
Device at ID #335524
   Device is a Hard disk
   Enclosure #                             : 2
```

```
   Slot #                                  : 2
   Connector ID                            : 4
   State                                   : Ready (RDY)
   Size (in MB)/(in sectors)               : 70007/143374738
   Manufacturer                            : HP
   Model Number                            : DG072A9BB7
   Firmware Revision                       : HPD0
   Serial No                               : B365P720H7330709
   Protocol                                : SAS
   Drive Type                              : SAS
Device at ID #335525
   Device is a Hard disk
   Enclosure #                             : 2
   Slot #                                  : 1
   Connector ID                            : 4
   State                                   : Ready (RDY)
   Size (in MB)/(in sectors)               : 70007/143374738
   Manufacturer                            : HP
   Model Number                            : DG072A9BB7
   Firmware Revision                       : HPD0
   Serial No                               : B365P720H7L70709
   Protocol                                : SAS
   Drive Type                              : SAS
------------------------------------------------------------
Enclosure information
------------------------------------------------------------
Enclosure#                                 : 1
Logical ID                                 : 51234567:89012345
Numslots                                   : 8
StartSlot                                  : 0
```

Logical drive status values are described in the following list:

Okay (OKY)
The volume is in the active state and drives are functioning properly. User data is protected if the current RAID level provides data protection.

Degraded (DGD)
The volume is in the active state. User data is not fully protected because of a configuration change or drive failure.

Failed (FLD)
The volume has failed.

Missing (MIS)
The volume is missing.

Initializing (INIT)
The volume is initializing.

Online (ONL)
The volume is online.

Physical device status values are described in the following list:

Online (ONL)
The drive is operational and is part of a logical drive.

Hot Spare (HSP)
The drive is a hot spare that is available to replace a failed drive in an array.

Ready (RDY)
The drive is ready for use as a normal disk drive, or it is ready to be assigned to a disk array or a hot spare pool.

Available (AVL)
The drive might or might not be ready, and it is not suitable for use in an array or a hot spare pool.

Failed (FLD)
The drive was part of a logical drive or was a hot spare drive, and it failed. The drive is now offline.

Missing (MIS)
The drive was part of a logical drive or was a hot spare drive, and it is missing. It has been removed or is not responding.

Standby (SBY)
The device is not a hard disk drive device.

Out of Sync (OSY)
The drive, which is part of a logical drive, is not synchronized with other drives that are part of the logical drive.

Degraded (DGD)
The drive is part of a logical drive and is in a Degraded state.

Rebuilding (RBLD)
The drive is part of a logical drive and is currently rebuilding.

Optimal (OPT)
The drive is optimal and is part of a logical drive.

Physical device drive type values are described in the following list:

SAS_HDD
The drive is a SAS hard disk drive (HDD).

SATA_HDD
The drive is a SATA hard disk drive (HDD).

SAS_SSD
The drive is a SAS solid state drive (SSD).

SATA_SSD
The drive is a SATA solid state drive (SSD).

Physical device protocol values are described in the following list:

SAS The drive supports the SAS protocol.

SATA The drive supports the SATA protocol.

Hotspare command

Use the **hotspare** command to add a hot spare drive to spare pool 0 or delete a hot spare drive. The capacity of the hot spare drive must be greater than or equal to the capacity of the smallest drive in the RAID volume. To check the hot spare drive capacity, issue the **display** command on the drive.

Observe the following rules when you create hot spare drives:

- You cannot create a hot spare drive unless at least one RAID1, RAID10, or RAID1E volume already exists.
- You cannot create a hot spare and add it to an inactive integrated RAID volume.
- You cannot add a SAS hot spare hard disk drive if the existing volumes on the controller use SATA drives. You cannot add a SATA hot spare hard disk drive if the existing volumes on the controller use SAS drives.
- You can add a SAS hot spare solid state drive to a volume that has SATA solid state drives, and you can add a SATA hot spare solid state drive to a volume that has SAS solid state drives, if the integrated RAID firmware allows it. This depends on the values in the static fields.
- The maximum allowable number of hot spare drives depends on the value of the **MaxGlobalHotSpares** field. (Normally, the maximum is two global hot spares per controller.)
- You cannot add a hot spare solid state drive to a volume that has hard disk drives, and you cannot add hard disk drives to a volume that has solid state drives.

Syntax

The syntax of the **hotspare** command is

```
sas2ircu controller_number hotspare [delete] enclosure:bay
```

where:

controller_number
is the index of the controller on which you want to create the hot spare disk.

enclosure:bay is the enclosure and slot values of the hot spare disk drive. You can get these values from the output of the **display** command.

Note: DOS does not support addressing by enclosure:bay.

The optional **delete** parameter deletes the hot spare disk at *enclosure:bay*.

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

List command

Use the **list** command to display a listing of all controllers that are present in the system, along with each corresponding controller index. Use the controller index as an input parameter for other SAS2IRCU commands.

Syntax

The syntax of the **list** command is

```
sas2ircu list
```

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

Sample output

The following example shows the output of the **list** command. The format and fields in the output might vary depending on the types of installed controllers.

```
      Adapter    Vendor Device                 SubSys SubSys
Index  Type        ID    ID     Pci Address     Ven ID Dev ID
----- --------- ------ ------ ---------------- ------- ------
0      SAS2008    1000h 72h    00h:01h:00h:00h  1000h   00dah
1      SAS2008    1000h 72h    00h:05h:00h:00h  1000h   00dah
```

Locate command

Use the **locate** command to locate specific drives in a volume by turning on their location indicators.

Syntax

The syntax of the **locate** command is

```
sas2ircu controller_number locate enclosure:bay action
```

where:

controller_number
is the index of the controller that is associated with the drives that you want to locate.

enclosure:bay is the enclosure and slot number of the drive.

action is the following possible actions:

On: Turns on the location indicator of the drive.

Off: Turns off the location indicator of the drive.

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

Logir command

Use the **logir** command to upload or clear the integrated RAID log information.

Syntax

The syntax of the **logir** command is

```
sas2ircu controller_number logir action [filename] [noprompt]
```

where:

controller_number
: is the index of the controller that is associated with the logs that you want to upload or clear.

action
: is the following possible actions:

  Upload: Upload the controller logs to a file.

  Clear: – Clear the controller logs.

filename
: is an optional file name to which you want to upload the logs. The default file name is `logir.log`.

The optional **noprompt** parameter prevents warnings and prompts from being displayed while the command is running

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

Mfgpage command

Use the **mfgpage** command to update information on manufacturing pages. Only DOS and EFI support this command.

Syntax

The syntax of the **mfgpage** command is

```
sas2ircu controller_number mfgpage passcode mfgpage_number
offset value
```

where:

controller_number
: is the index of the controller that is associated with the manufacturing pages that you want to update.

passcode
: is the passcode that is required for DOS access, which is restricted.

mfgpage_number
: is the manufacturing page (4 or 10) that you want to update.

offset
: is the dword offset (offset of a value) in the specified manufacturing page that you want to update, in hexadecimal format.

value
: is the value of the offset that is being modified, in hexadecimal format.

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

Status command

Use the **status** command to display the current status of any existing integrated RAID volumes and the status of any operation that is currently in progress on the selected controller. If no operation is in progress, the utility displays a message indicating this before it exits.

Syntax

The syntax of the **status** command is

```
sas2ircu controller_number status
```

where:

controller_number
is the index of the controller that is associated with the volumes whose status you want to display.

Return values

0x00 Success: Command completed successfully.

0x01 Failure: Bad command-line arguments or operational failure.

0x02 Adapter_not_found: Cannot find the specified adapter.

Sample output

The following example shows the information that the **status** command returns when a volume resynchronization is in progress.

```
Background command progress status for controller 0...
IR Volume 1
   Volume ID                               : 6
   Current operation                       : Synchronize
   Volume status                           : Enabled
   Volume state                            : Degraded
   Physical disk I/Os                      : Not quiesced
   Volume size (in sectors)                : 70311936
   Number of remaining sectors             : 68250624
   Percentage complete                     : 2.93%
```

The following example shows the information that the **status** command returns if a background volume operation is not in progress.

```
IR Volume 1
   Current operation                       : None
   Volume ID                               : 6
   Volume status                           : Enabled
   Volume state                            : Optimal
   Physical disk I/Os                      : Not quiesced
```

The status data fields can have the following values:

Current operation
Synchronize, Consistency Check, OCE, Background Init, or None

Volume status
Enabled or Disabled

Volume state:
[Inactive] Optimal, Degraded, Missing, or Failed

Physical disk I/Os:
Quiesced or Not quiesced

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM® products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support website at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

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Getting help and information from the World Wide Web

On the World Wide Web, the IBM website has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x® and xSeries® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter® information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/systems/intellistation/.

You can find service information for IBM systems and optional devices at http://www.ibm.com/supportportal/.

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For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:
IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

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