Dell Acceleration Appliance for Databases 2.0

GUI Guide

Contents

About this guide

This guide contains information about using the graphical user interface (GUI) to configure the Dell Acceleration Appliance for Databases (DAAD). This guide is intended for administrators responsible for server and storage systems. It is assumed the reader is familiar with basic server administration.

Typographical conventions

This document follows these conventions:

Convention	Usage	Examples
NOTE:	Important additional information or further explanation of a topic.	**NOTE:** A weekly backup is recommended.
CAUTION!	The task or operation might have serious consequences if conducted incorrectly or without appropriate safeguards. If you are not an expert in the use of this product, consult support for assistance.	**CAUTION!** Do not change configuration parameters.
Bold	A command or system input that you type, or text or a button you click on a graphical user interface (GUI).	Click **Help** for details about disaster recovery.
Italic	Italic font indicates any of the following: • A term with a specific meaning in the context of this document. • Emphasis on specific information. • Reference to another document. • Variables in a syntax statement for which values are substituted.	Detailed information about disaster recovery methods is available in the Administrator Guide. `network:ping `*`hostname`*
`Courier`	System output, file names or path names. Bold Courier for commands typed by user.	`> Recovery in progress` **`network:ping 10.1.100.14`**
`< >` Angle Brackets	A required entry or variable parameter	`installer-<version#>.run`
Square `[ ]` Brackets	An optional entry or variable parameter.	**`tar [zxvf] file.tgz`**
Curly `{ }` Brackets	A list of options separated by a the pipe symbol "|" from which any one must be selected.	Click { **OK** | **Cancel** }.

Overview

The *Dell Acceleration Appliance for Databases GUI Guide* helps you use the Dell Acceleration Appliance for Databases (DAAD) software in a graphical user interface (GUI) environment, including setting up a storage profile and pools, creating volumes, adding initiators, and managing Fusion ioMemory.

DAAD documentation matrix

The following documentation is available for the Dell Acceleration Appliance for Databases:

- *Dell Acceleration Appliance for Databases Release Notes* — a summary of new features, changes, and bugs fixes in this release of the product. The Release Notes document also identifies known issues with the current product.

- *Dell Acceleration Appliance for Databases Configuration Guide* — an introduction to the Dell Acceleration Appliance for Databases software. The guide also outlines information on features such as first boot setup, host multipathing, and application tuning.

- *Dell Acceleration Appliance for Databases CLI Reference* — a description of the command line interface for the Dell Acceleration Appliance for Databases. This guide provides procedures for setting up a storage profile and pools, creating volumes, adding initiators, and managing Fusion ioMemory from the DAAD console.

- *Dell Acceleration Appliance for Databases Monitoring Guide* — a description of how to monitor the status and performance of DAAD systems using the built-in web-based interface, Oracle Enterprise Manager (OEM), or Ganglia.

Basic tasks and the overview tab

NOTE: It is a best practice to save and back up configurations of your DAAD system on a regular basis. As you set up storage pools, create volumes, and manage initiator groups, be sure to back up your current configuration. For information about backing up and restoring configurations, see the *config* commands in the *Dell Acceleration Appliance for Databases CLI Reference Guide*.

Basic task flow

The following table lists the basic DAAD tasks and the sections in this guide that explains each one.

Table 2-1. Task location

GUI Guide Section	Tasks
Basic Tasks and the Overview Tab (this section)	• Getting Help, logging out • Changing the admin password • Viewing summary and slot information • Viewing real-time performance metrics • Updating software • Performing and saving basic or extended searches for DAAD elements
Setting up storage on page 25	• Choosing a storage profile to balance performance and reliability • Creating and removing storage pools for volumes • Performing basic or enhanced searches (applies to all configuration screens)
Configuring volumes on page 35	• Creating or removing volumes • Expanding volume capacity
Managing initiators on page 41	• Setting up and managing initiator groups and access • Assigning initiator groups to volumes • Adding, editing, or removing initiators
Viewing targets on page 49	• Viewing target information • Creating a target alias

Table 2-1. Task location (continued)

GUI Guide Section	Tasks
Managing Fusion ioMemory on page 53	• Getting information about the Fusion ioMemory modules currently deployed in your Dell Acceleration Appliance for Databases • Saving searches for Fusion ioMemory attributes
Getting host information on page 59	• Viewing information about the configured hosts • Collecting system logs • Shutting down the Dell Acceleration Appliance for Databases • Restarting the appliance (`system:restart` in CLI) • Using the chassis monitor URL (`node:list` in CLI)
Managing clusters in HA configurations on page 65	• Understanding HA concepts and configurations • Selecting and configuring HA hardware components for Fibre Channel, InfiniBand/SRP, and iSCSI • Managing information in a configured HA cluster
Monitoring DAAD performance on page 67	• Viewing and analyzing real-time performance statistics, with Performance Overview graphs and Live Meter • Creating custom reports for performance attributes, including IOPS, bandwidth, temperature, and endurance
Handling DAAD alerts on page 77	• Understanding and managing alerts: error, warning, and informational • Displaying or archiving system alerts for errors, warnings, and informational conditions
Configuring DAAD settings on page 81	• Viewing network information for ports • Setting up remote access, user accounts, and alert rules and subscribers • Configuring SMTP Server and SNMP notifications
Appendixes	• Errors on page 106 • Warnings on page 110 • Alert parameter attributes on page 116 • SNMP MIB information on page 117

Logging in to the GUI

After completing the first boot configuration as described in the *Dell Acceleration Appliance for Databases Configuration Guide*, a URL is displayed on the DAAD console. Type the URL in the address bar of your browser to display the login screen for the web interface for DAAD.
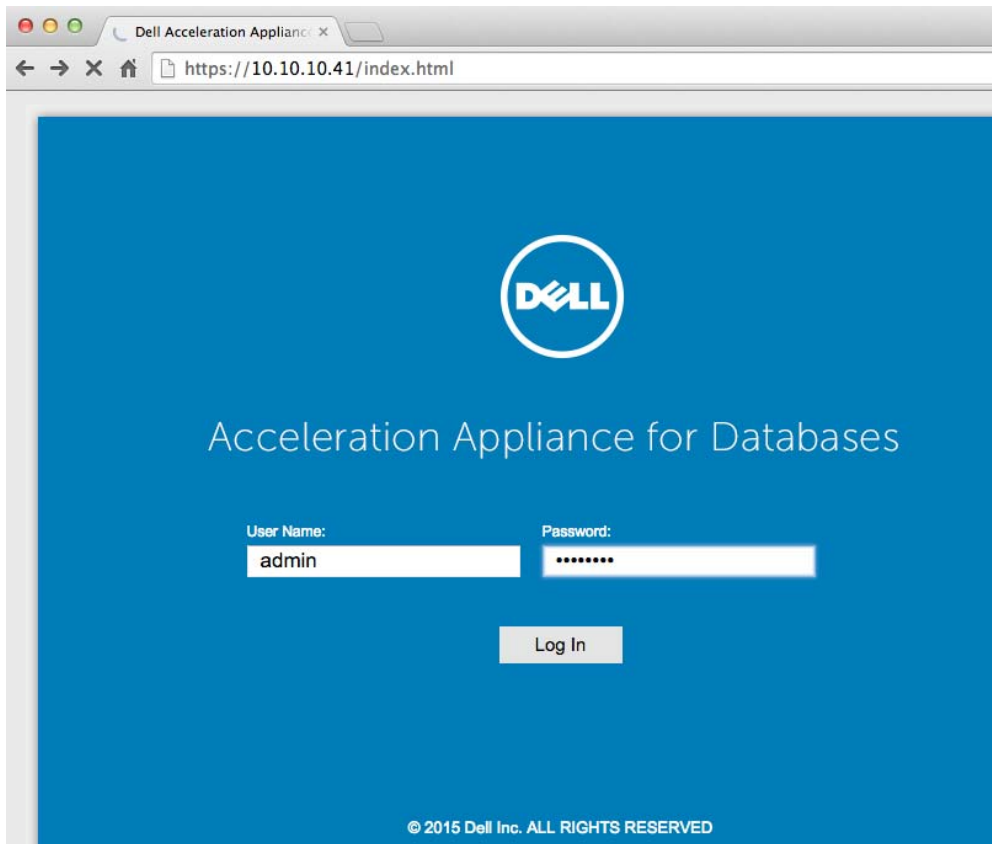
To log in to the DAAD GUI:

> **CAUTION!** Using multiple browser windows for the same DAAD is not supported.

1. In the User Name field, type **admin**
2. In the Password field, type the password you set during the DAAD configuration process.
3. Click **Log In**.

You are logged in to the DAAD web interface, and the Overview screen is displayed. More specifically, the Tab bar at the top of the screen displays the Overview screen.
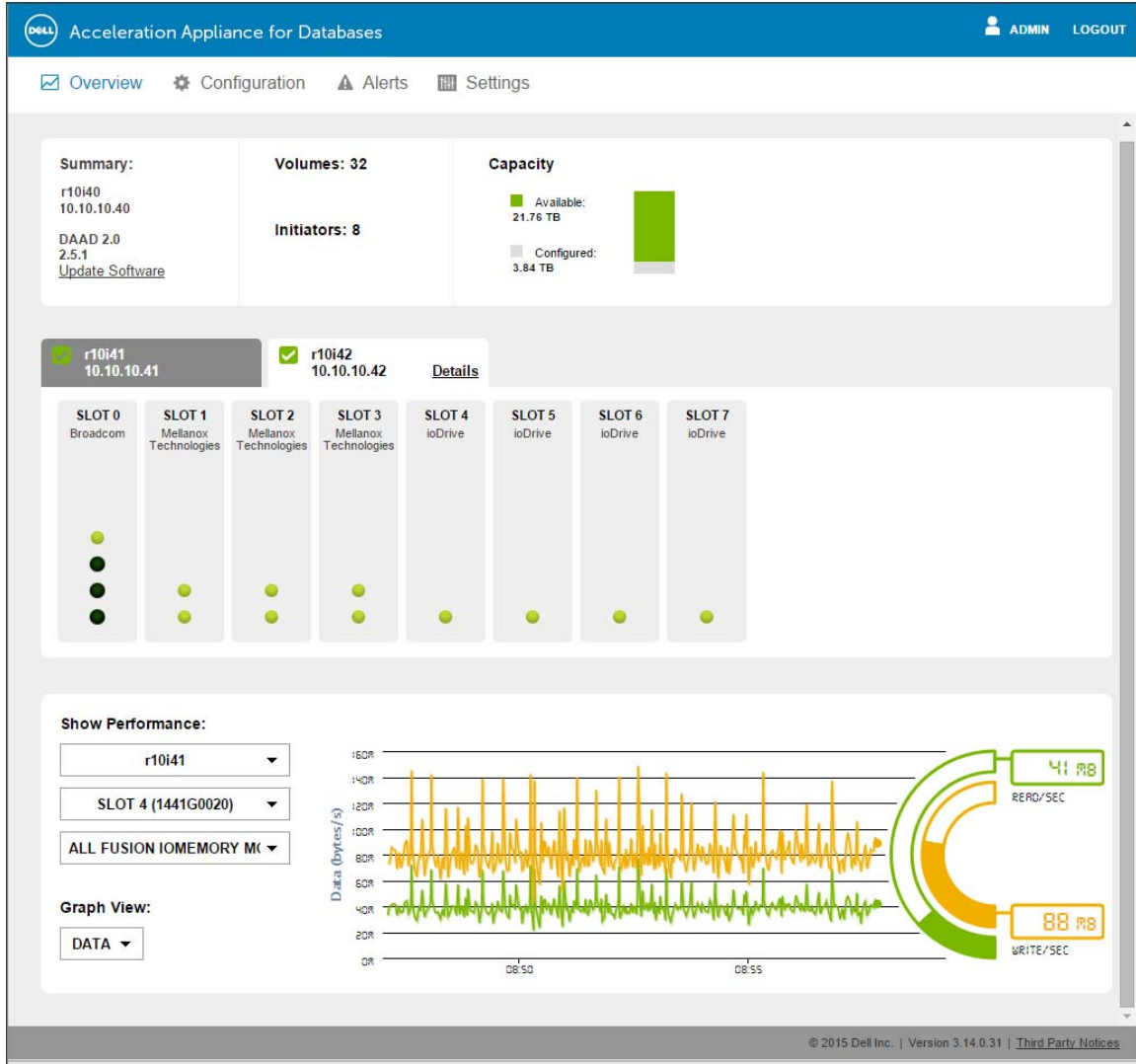
Tabs bar

The Tabs bar is displayed at the top of the Overview screen:

The Overview, Configuration, Alerts, and Settings tabs help you manage the DAAD. The tabs are described in detail in the following sections:

- Overview screen details on page 16
- Configuration Tab
  - Volume information on page 35
  - About storage pools for DAAD on page 25
  - Managing initiators on page 41
  - Viewing targets on page 49
  - Managing Fusion ioMemory on page 53
  - Getting host information on page 59
  - Managing clusters in HA configurations on page 65
- Handling DAAD alerts on page 77
- Configuring DAAD settings on page 81

On the far right of the Overview screen, there are **ADMIN** and **LOGOUT** buttons that allow you to perform the following tasks:

- Change the admin password on page 15
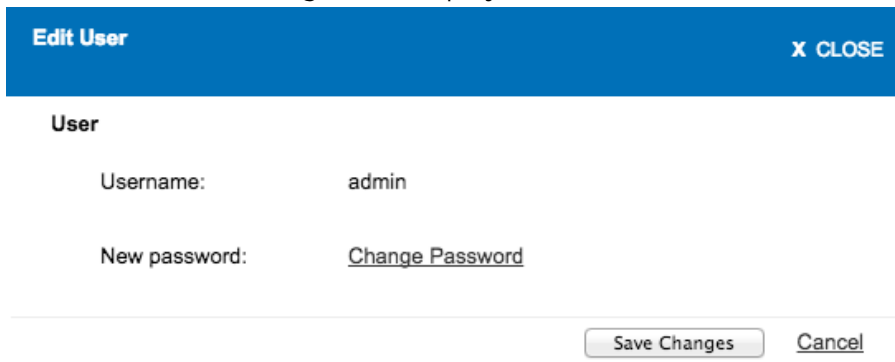- Log out of the GUI on page 16

Change the admin password

> **NOTE:** In HA environments, change the admin password on both nodes. Log into the first node and change the password, and then log into the second node and change the password.
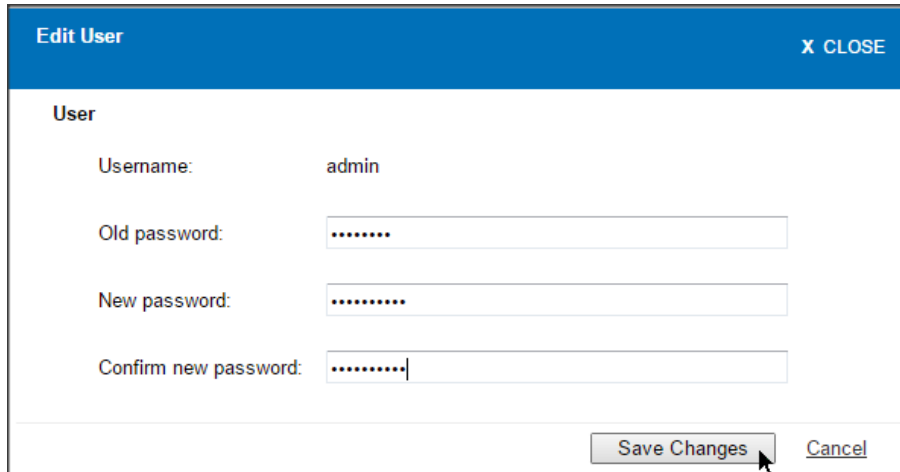
To change the admin password:

1 Click **ADMIN** ( )

The Edit User dialog box is displayed.

2   Click **Change Password**. The Edit User dialog box shows password and
    confirmation fields.

Edit User   **X CLOSE**

User

    Username: admin

    Old password: [••••••••]

    New password: [•••••••••]

    Confirm new password: [•••••••••]

        [Save Changes]   Cancel

3   Enter the **Old password**, **New password**, and then **Confirm new password**.

4   Click **Save Changes** to update the admin password.

Log out of the GUI

To log out from the Dell Acceleration Appliance for Databases, click **Logout** on the
upper-right corner of the menu bar.

Legal information

To view information about Dell trademarks and related items, click **Third Party Notices**
on the lower-right corner of the screen.

© 2015 Dell Inc. | Version 3.14.0.20 | Third Party Notices
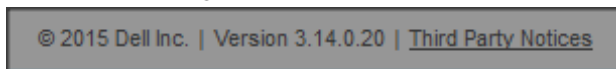
Overview screen details

The Overview screen is divided into the following sections:

- Summary
- Slot
- Performance

Summary section

The summary section provides the following information:

- Summary — Displays the host name of the appliance (or cluster name, if in HA
  mode), the IP address of the server hosting the Dell Acceleration Appliance for
  Databases (or the cluster IP address, if in HA mode), the version of software
  currently running, and the Update Software link (see Updating software on

page 21). In a single-server configuration, clicking the host name displays the Fusion ioMemory Configuration screen. In HA configurations, the details are available in the Host tab (see) for each cluster node.

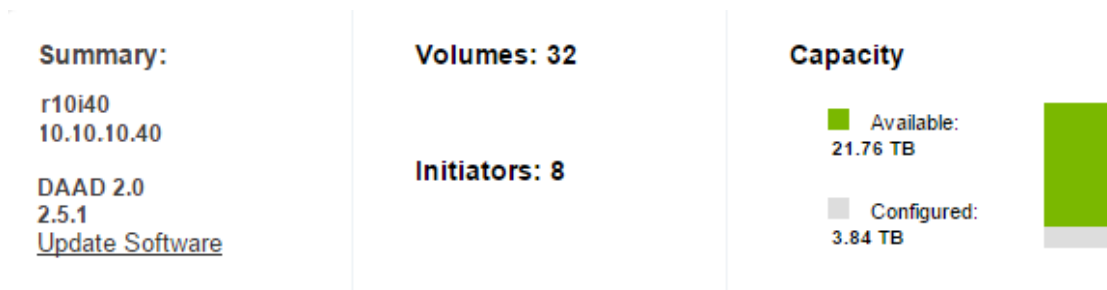- Volumes and Initiators — Displays the number of volumes and initiators that have been configured
- Capacity — Displays the available space (green) on the storage pool for creating volumes; and configured space (gray) on the entire appliance.

| Summary:	Volumes: 32	Capacity
r10i40 10.10.10.40 DAAD 2.0 2.5.1 Update Software	Initiators: 8	Available: 21.76 TB Configured: 3.84 TB

Slot section

The slots graphic shows the following information:

- Host tabs (HA only) — Click a tab to view the slot configuration for the selected host. (Standalone appliances have one tab.) On a tab, you can click **Details** to view the Host Configuration screen.)
- Slot Usage — Fusion ioMemory devices or network fabric cards are indicated for each slot. The status light in the slot icon indicates functioning (green), or a problem (red), or an offline condition (red). Unused slots are indicated by dashed outlines.

  NOTE: Slot numbers listed here are intended to match the physical locations of the slots in the server.

- Details — For HA, click the Details link to view the Configure access tab for the selected host. (For standalone, click the Host screen for the server to get similar information.) See Fusion ioMemory configuration on page 54 for details.
- Port numbering and adapter information — To view port numbering information, place the cursor over the desired port icon at the bottom of any CNA slot diagram. To see adapter information, place the cursor over the desired title description at the top of any CNA slot diagram.
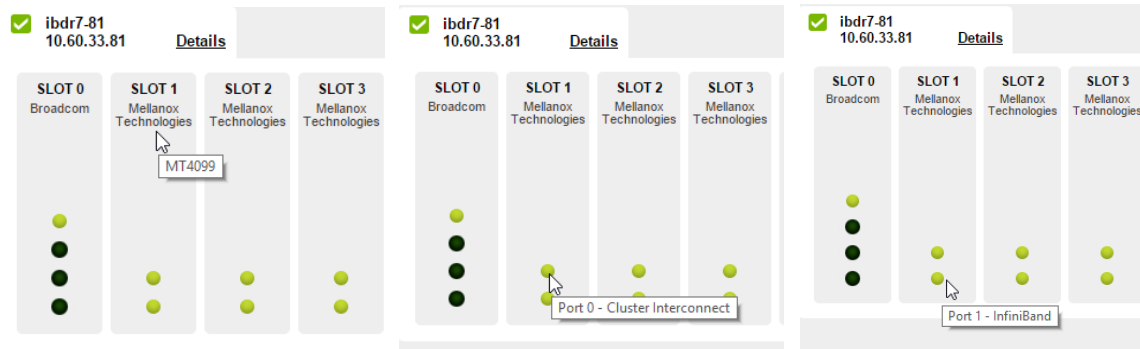
Performance section

You can see a graphical view of the performance of the current Dell Acceleration Appliance for Databases in the Show Performance section at the bottom of the Overview tab.
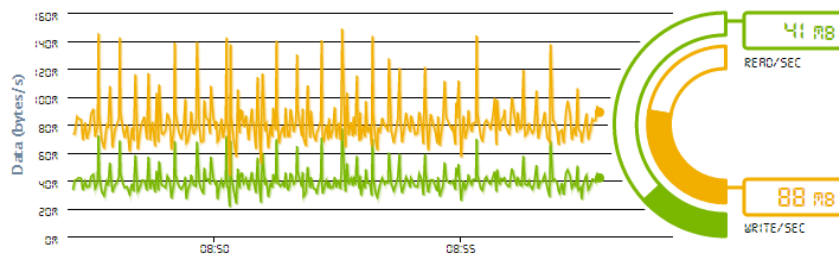
For details on the graphical elements, see Performance graphs (Overview tab) on page 67.

1 From the Show Performance drop-down menu, select the node you want to monitor (multiple nodes are shown for HA). If a cluster exists, you can select it.

Show Performance:

r10i40

- r10i40
- r10i41
- r10i42
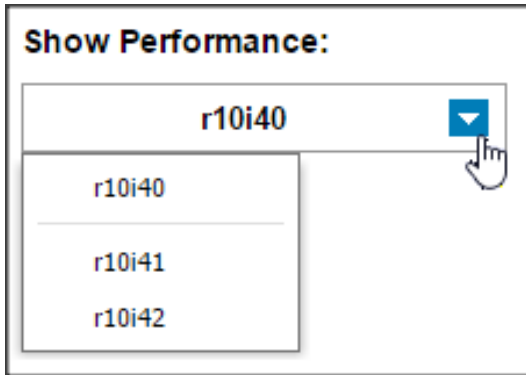
> **NOTE:** By default, the statistics for the Data (bandwidth or Gbps) are displayed. The examples in this section display information about data performance. To switch to IOPS performance statistics, select **Operations**.

Graph View:

DATA

OPERATIONS
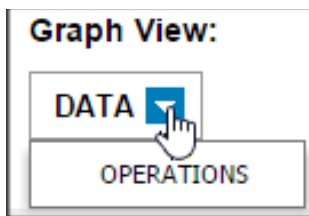
2 To view the read or write statistics for a given point in time, mouse over the yellow or green performance line. A popup with the statistics for the particular point in time is displayed.
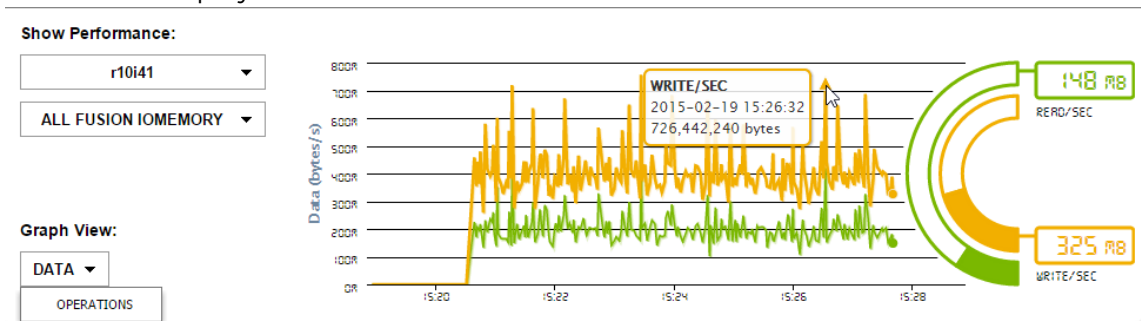
Selecting a performance view

To view performance statistics for all Fusion ioMemory devices or network devices in the DAAD system:

1   From the Show Performance drop-down menu, select the node whose performance you want to monitor (multiple nodes are shown for HA). If a cluster exists, you can select it

Show Performance:

```
r10i40        ▼

  r10i40

  r10i41

  r10i42
```
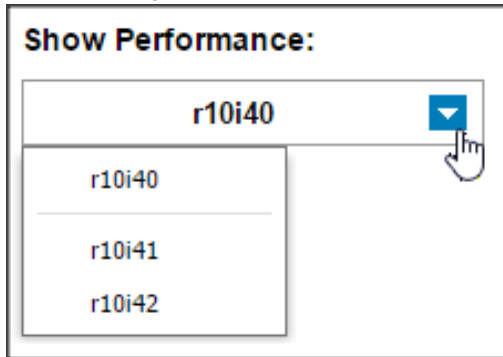
2   Click **ALL Fusion ioMemory** or select the device from the drop-down menu whose performance you want to display.

```
ALL FUSION IOMEMORY

SLOT 4 (1441G0020)

SLOT 5 (1441G0345)

SLOT 6 (1441G0160)

SLOT 7 (1441G0054)

ALL CNA

SLOT 0 - Broadcom

SLOT 1 - Mellanox Technologies

SLOT 2 - Mellanox Technologies

SLOT 3 - Mellanox Technologies

ALL FUSION IOMEMORY    ▼
```
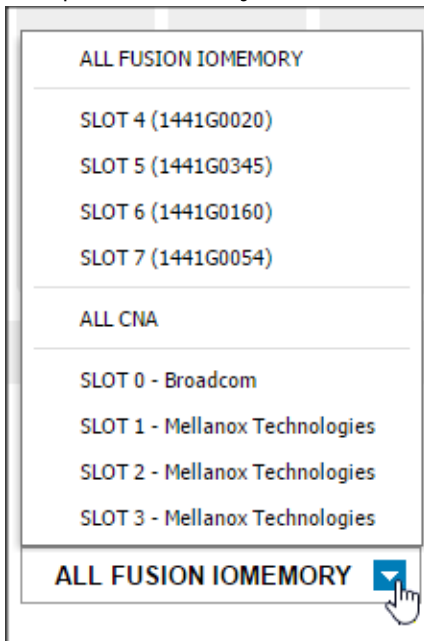
- **All Fusion ioMemory** — This option displays combined performance for all the Fusion ioMemory devices in the DAAD
  - **Slot *n*** — This option displays the performance of the Fusion ioMemory device in the specified slot.
- **All CNA** — This option displays combined performance for all network devices in the DAAD.
  - **Slot *n*** — This option displays the performance of the network device in the specified slot.

For more information on interpreting Dell Acceleration Appliance for Databases performance statistics, see Monitoring DAAD performance on page 67.

Updating software

> **NOTE:** Software updates can also be done using the Command-Line Interface (CLI). For details, see "Quick Start Tasks: Software Update" in the *Dell Acceleration Appliance for Databases CLI Reference*.

When a new version of the Dell Acceleration Appliance for Databases software is available, you can install it using the software update package (without using the ISO image on the installation DVD). Refer to the current *Dell Acceleration Appliance for Databases Release Notes* for any specific update restrictions or special instructions.

If you are updating the software for all nodes in an HA cluster, a *rolling* update is automatically done. When one node is being updated, the HA complement of the node being updated goes into the failback mode until the update finishes. This process continues until all nodes in the cluster are updated.

> **CAUTION!** Do not make changes to HA configuration when the system is in a degraded state. For example, do not make configuration changes when one node is down.

To update the software (firmware) on the appliance:

1 Visit the support website dell.com/support/home for the latest software update package (`.IOP` file).
2 Save the `.IOP` file to the local computer (`/tmp` directory is recommended) from where you intend to perform the software update.

3   Click **Update Software** in the Summary box. The Update Software dialog box is displayed:
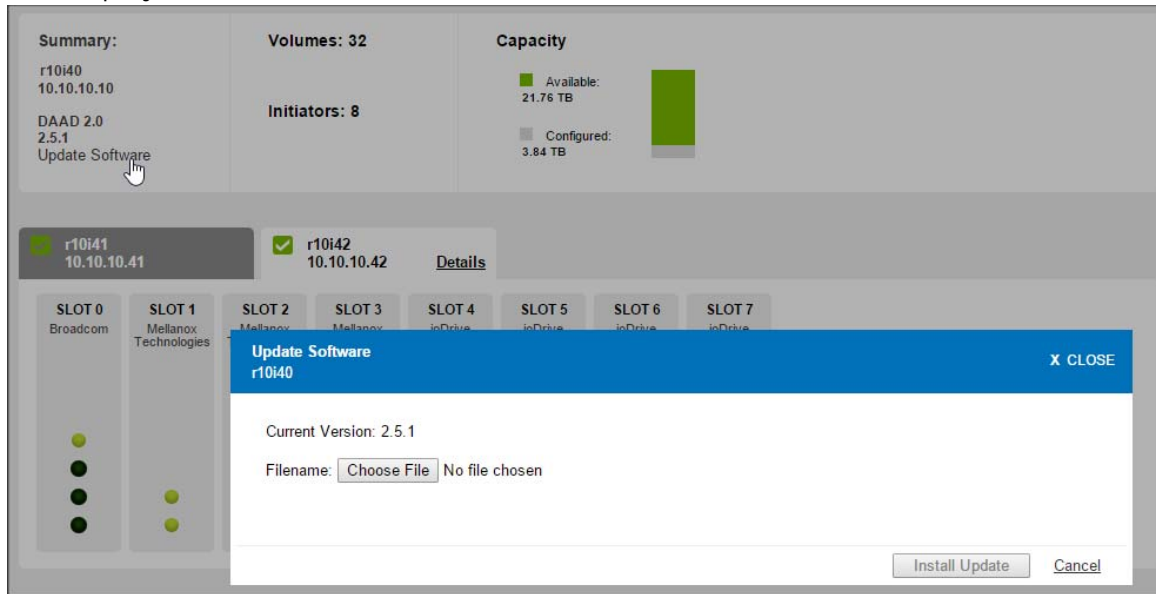
4   Click **Choose File** and navigate to the update file (.IOP) you want to install.

5   Click **Open** in the File Upload dialog box.

Data about the .IOP file is included in the dialog box, such as file version number, release date, build number, description, hotfix ID, reboot-required indicator, and estimated update time.

6   Click **Install Update** to update the software.

A notification message is displayed regarding the success of the update. A restart may occur without prompting.

The browser loses its connection to the DAAD. If you are updating cluster nodes, the browser reconnects to the other (primary) node. Once the update is completed, the browser connection is also lost.

Reverting to a previous software version

If it is necessary to revert to the previous version of the software, you must revert using the CLI and not the GUI. For instructions on reverting, see `soft:revert` in Software Commands in the *Dell Acceleration Appliance for Databases CLI Reference Guide*.

Handling connection loss

If the network connection to the Dell Acceleration Appliance for Databases host server is lost, the software automatically attempts to reconnect to it, as shown in the following dialog box.

CONNECTION LOST   X CLOSE

Connection lost from:
https://10.60.31.46

Attempting to reconnect...   Cancel

3
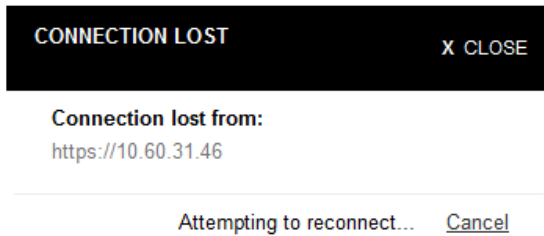
Setting up storage

You must set up storage before you create volumes for data. You can do this either through the GUI or with the CLI (see Quick Start Tasks: Management in the About the Command-Line Interface (CLI) section of the *Dell Acceleration Appliance for Databases CLI Reference Guide*. However, be aware of the following limitations:

- Commands for adjusting RAID configurations are found in the CLI but not in the GUI.

  NOTE: See Naming conventions for storage pools on page 26 for rules on choosing names for storage pools, volumes, initiators, initiator groups, aliases, and targets in Dell Acceleration Appliance for Databases.

About storage pools for DAAD

Four types of storage pools can be created, each with its own storage profile. In each case you can click **More Details** in the GUI next to the profile description to get additional information.

- *Reliable Performance* (default) — Reliability and performance are emphasized over capacity, using a RAID 10 configuration. Storage is divided into two equal segments that are mirrored to each other, so that an unlikely failure of a Fusion ioMemory module does not result in data loss. This configuration requires a minimum of four ioDrives or additional increments of two ioDrives, which must all be of the same type and capacity.
- *Maximum Performance* — Performance is emphasized, using a RAID 0 configuration. This does *not* provide redundant storage. With this configuration, the storage capacity is striped across the available ioDrives (minimum 2) installed in the server. All ioDrives in this profile must be of the same capacity.
- Reliable Capacity — Capacity is emphasized over performance and fault tolerance, employing a RAID 5 configuration. A single Fusion ioMemory failure can be sustained without loss of data, and read performance is better than write performance. At least three ioDrive devices are required, and they must all be of the same type and capacity.

  NOTE: The Reliable Capacity option is supported only in standalone mode, not HA.

CAUTION! Operating a RAID 5 array in degraded mode (with one failed drive) could cause a total loss of data, if the system is exposed to a power failure or any other unclean shutdown. If a RAID 5 drive failure occurs, schedule a drive replacement as soon as possible.

- *Direct Access* — Maximum capacity is emphasized, similar to a JBOD storage configuration, without redundant storage or striping. In Direct Access mode, each Fusion ioMemory module is presented as an individual storage pool. This option uses host/appliance/application-based logical volume management instead of using the logical volume management of the appliance.

    NOTE: The available capacity is affected by the storage profile you select. For each profile, the RAID configuration and overhead is factored into the available capacity displayed.

Naming conventions for storage pools

The default storage pool name is `storagepool-#` where `#` is 1 or the next unused number. You can change any storage pool name according to the following rules:

- Only alphanumeric characters (letters and numbers), dashes, and underscores should be used.
- A maximum of 16 characters can be used.
- Any combination of lowercase or uppercase letters should be used.
- Names must begin with a letter (not a digit, dash, or underscore).
- Names may not be duplicated within the Dell Acceleration Appliance for Databases.

HA considerations

With two-node HA clusters, identical pools are created on each node, and the pool name is the same for each.

Creating a storage pool

In the Storage Pools screen, one or more storage pools can be set up from the raw Fusion ioMemory devices.

NOTE: You can adjust the width of any column by dragging the divider bar of the adjacent column.

1 To create a new storage pool, click **Add Storage Pool**. The Add Storage Pool dialog box is displayed, allowing you to select the storage profile that best suits your needs.

2 Enter the name for the storage pool. (For Direct Access, the name defaults to `storagepool-n`, depending on the number of existing pools.)

3 Click a storage profile type:
   – Maximum Performance
   – Reliable Performance
   – Reliable Capacity
   – Direct Access

4   Click **More Details** if you need more information on the profile type.

> **NOTE:** For all storage profile types except Direct Access, a star-rating chart is displayed that shows how the selected type favors performance, reliability, or capacity. For example:

Storage Profile

○ Maximum Performance

◉ Reliable Performance

Require fault tolerance and favor performance over capacity. (More Details)

Performance:	★ ★ ★ ☆
Reliability:	★ ★ ★ ★
Capacity:	★ ☆ ☆ ☆

Reliability and performance are emphasized over capacity, employing a RAID 10 configuration. Storage is divided into two equal segments that are mirrored to each other so that an unlikely failure of an ioDrive will not result in data loss. An even number of at least four Fusion ioMemory modules (four ioDrives or two ioDrive Duos) of the same type (ioDrive or ioDrive Duo) and capacity is required.

○ Reliable Capacity

○ Direct Access

Fusion ioMemory Selection

Capacity: [25.6 TB (12.8 TB available) ▼]   Required: 4 x ioD[...]

Close

Change Selection

5   If you select any Storage Profile type besides Direct Access, a drop-down menu is displayed. You can specify the capacity of the Fusion ioMemory device to use in the storage pool. Fulfill any requirements listed next to the drop-down menu.

Fusion ioMemory Selection

Capacity: [12.8 TB (12.8 TB available) ▼]   Required: 2 x ioDrive (6.4 TB) per host

Change Selection

r10i41 | r10i42

SLOT 4	SLOT 5	SLOT 6	SLOT 7
ioDrive	ioDrive	ioDrive	ioDrive
6.4 TB	6.4 TB	6.4 TB	6.4 TB
✔	✔		

Add   Cancel

6 If you want the new storage pool to use the Fusion ioMemory devices that are currently pictured in the slot diagrams, click **Add** to complete creating the pool and proceed to Storage pool information on page 31.

Or

In the Fusion ioMemory Selection section, click **Change Selection** to specify the ioDrives for the new pool. The slot icons for any available (not in use) ioDrives now appear with selection boxes

7 Click the ioDrives you want to include in the new storage pool. (To return to the original drive selection, click the **Use Default Selection** link that has replaced the **Change Selection** link.)

8 Click **Add** to create the storage pool.

9 After you have decided on the type of storage profile you want to use, and configured as desired, click **Add**.

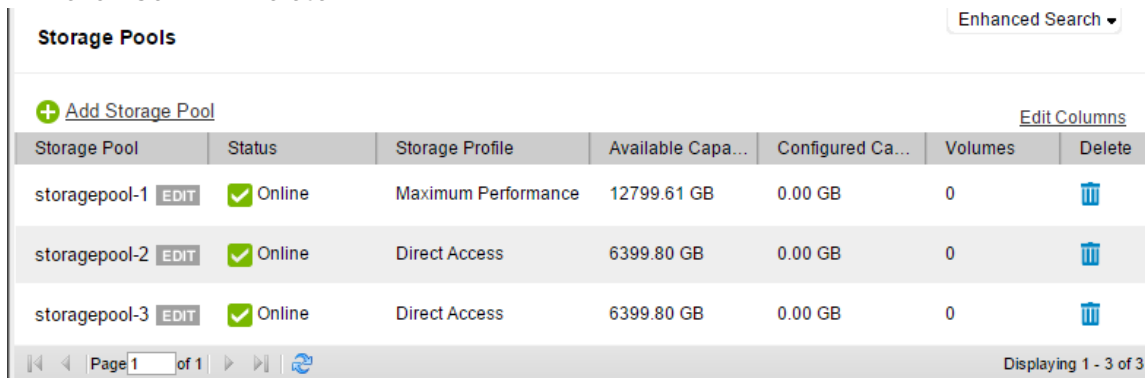The Storage Pools screen is displayed, displaying the newly created pool.

You can continue to add more storage pools until there is no more available capacity. A single Fusion ioMemory device can only belong to one pool.

Storage pool information

The Storage Pools screen provides the following information columns:

- Storage Pool — Name of the storage pool. Click **Edit** to change the name of an existing pool.
- Status — Online or offline status of the the storage pool. This also indicates whether there are any warning or error conditions.
- Storage Profile — Type of profile: Reliable Performance, Maximum Performance, Reliable Capacity, or Direct Access.
- Available Capacity — Total usable capacity for adding new volumes to the storage pool.
- Configured Capacity — Total capacity configured into volumes.
- Volumes — Number of volumes currently belonging to this storage pool. To view the volume(s), click the link in this column. See Configuring volumes on page 35 for details.
- Delete — You can delete a storage pool only when all volumes have first been deleted from it. Click the 🗑 icon to mark the storage pool for deletion, and then click Confirm Delete.

Storage Pools   Enhanced Search ▾

➕ Add Storage Pool   Edit Columns

Storage Pool	Status	Storage Profile	Available Capa...	Configured Ca...	Volumes	Delete
storagepool-1 EDIT	✓ Online	Maximum Performance	12799.61 GB	0.00 GB	0	🗑
storagepool-2 EDIT	✓ Online	Direct Access	6399.80 GB	0.00 GB	0	🗑
storagepool-3 EDIT	✓ Online	Direct Access	6399.80 GB	0.00 GB	0	🗑

◁◁ ◁ Page 1 of 1 ▷ ▷▷ ⟳   Displaying 1 - 3 of 3

Columns (storage pools)

To change the columns that are displayed on the Storage Pools screen, click **Columns** and clear or check the boxes as desired. Then click **Update Columns** to save the changes.

Edit Columns   X CLOSE

☑ Status
☑ Storage Profile
☑ Available Capacity
☑ Configured Capacity
☑ Volumes

You can also use the basic Search feature and the Enhanced Search tab to find attributes in your Dell Acceleration Appliance for Databases that correspond to the column entries. See Basic search on page 32.

Basic search

The basic search feature is available in the Tabs bar, on the main Configuration and Alerts screens. To perform a basic search:

1 Click the "Search <item>" box at the right of the Tabs bar.

2 Type the term you want to search for and press **Enter**. The results list on the screen is filtered to contain only entries with the search item you specified.

3 To clear the search results and return to the unfiltered list, click **clear search**.
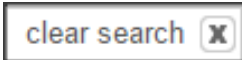
Enhanced search

The Enhanced Search feature, available on each Configuration screen, enables you to find Dell Acceleration Appliance for Databases elements (for example, initiators, devices, volumes, and targets) that match the attributes that you specify.

To use Enhanced Search:

1 Click the Enhanced Search tab at the upper-right corner of the Configuration screen section. The Choose Attribute button is displayed:
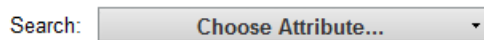
2 Click the Choose Attribute drop-down menu and select an attribute to search for.

3 From the condition drop-down menu that is displayed, select the condition for your search.
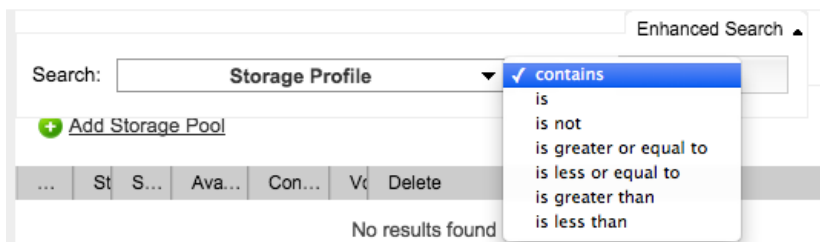
4 In the values box, type a search value. For example:

5   Click Apply to begin the search. The results are displayed in the window.

The search parameters remain active in the window, which enables you to repeat the search.

Min Volts is 25 [x]   clear search [x]   save search [⌕]
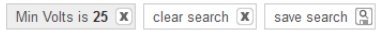
6   To start a new search, click **clear search** and click the Enhanced Search tab again.

Navigation and refresh

Screens available on the Configuration tab have built-in navigation and refresh aids. To scroll among pages of entries, use the navigation buttons at the bottom of the entry list. To refresh the screen view, click the Refresh icon ( ).

Multi-page scrolling and refresh are also available at the bottom of other screens in the GUI.

Configuring volumes

To configure volumes in an existing storage pool, click **Volumes** on the Configuration tab.

Volume information

The Volumes screen displays the following column information:

- Volume Name — Name of the volume as it was created
- Status — Online, Disconnected, Error with a link, or Warning with a link
- Capacity — Number of gigabytes allocated to the volume, including metadata. Click the ⊞ icon to expand the capacity (see Expanding capacity on page 38).
- Storage Pool — Name of the storage pool this volume belongs to
- Active Initiators — Link (such as "4 of 4") to the initiators for this volume, followed by an Edit button for changing the initiator group assignment. For more information, see Assigning an initiator group to a volume on page 44.
- Active Targets — Link to the target ports currently used to access this volume. (See the Viewing targets on page 49.)
- Preferred Cluster Node (HA only) — Link to the primary HA node for the volume. To see details about the preferred node and its active alerts (if any), click the corresponding link. (See Getting host information on page 59.)
- Delete — Deletes the selected volume (see Editing or deleting a volume on page 38).

Adding a volume

> **NOTE:** Volumes cannot be added if the total capacity of the storage pool has been used, or if one node of an HA cluster is down.

The following limitations apply to the creation of volumes:

Fibre Channel	• HA or standalone mode — a maximum of 32 volumes can be used concurrently.
iSCSI or InfiniBand/SRP	• Standalone mode — a maximum of 96 volumes can be used concurrently
	• HA mode — a maximum of 32 volumes can be used concurrently

To add a volume in the storage pool:

1 Click **Add Volume** on the upper left of the Volumes screen. The Add Volume dialog box is displayed:
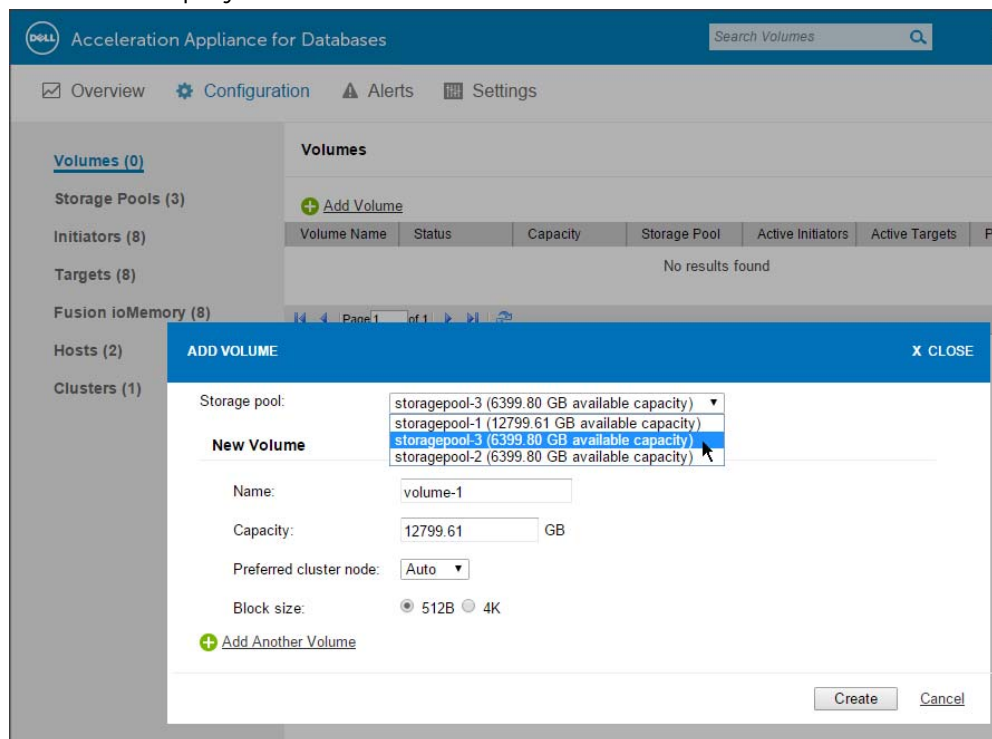
2 Select the storage pool to which the new volume must belong. If you have multiple storage pools, select the storage pool from the drop-down menu.

3 Enter the Volume Name (maximum of 16 alphanumeric characters, including dashes or underscores, starting with a letter).

4   Enter the capacity for the volume in GB. The minimum size is 1 GB, and values may be entered to two decimal places.

> **NOTE:** The default is the maximum size of the pool, so ensure that you set the size to a smaller amount if you do not want the volume to use all the available space.

5   If clustering has been set up for the system, you can select a Preferred Cluster Node (the default is Auto). This capability is available only with the high availability feature.

The preferred cluster node indicates which node normally serves the I/O to this volume. Here are some suggestions for choosing the preferred cluster node:

–   If you know how active a volume is, try manually load balancing volumes across cluster nodes.

–   If you do not know the activity rate but want to load-balance, alternate the preferred cluster node.

–   If you prefer a completely active:passive configuration, place all volumes on one active cluster node.

6   Use the default 512B block size or click **4K**.

7   To add more volumes, click **Add Another Volume**. Another New Volume section is displayed in the dialog box where you can configure additional capacity.

You can repeat the Add Another Volume process in this dialog box, and each new volume name is incremented by 1 (for example, volume0, volume1, volume2).

To cancel creating a new volume, click **Remove**.

8   When you have finished adding volumes, click **Create**.

Editing or deleting a volume

To edit the name of a volume:

1   Ensure that no initiators have access to the volume in question. To take a volume offline, you can click Edit in the Active Initiators column and remove all initiator access.

2   Click **Edit** to the right of the Volume Name (first column).

3   Enter the desired name for the volume.

4   Click outside the name field to save the new name.

To delete a volume:

1   Ensure that no initiators have access to the volume in question. (If you have assigned initiators to the volume, remove all initiator access to the volume.)

2   Click the 🗑 icon at the right of the volume entry and follow the prompt.

Expanding capacity

You can expand the size of a volume, up to the allowable capacity limit of the pool. However, you cannot directly decrease the size of the volume; to do that, you need to delete the volume (which deletes all its data) and then recreate it with a smaller capacity.

To expand a volume:

1   Click the ⊞ icon to the right of the capacity total for the volume. The Expand Volume dialog box is displayed, showing the current capacity in GB.

2   Type the new size in the Capacity field, which may include up to two decimal places.

> **NOTE:** The new size must be greater than the current size, and the resulting value must not cause the volume to exceed the total capacity for the storage pool.

This enables the Expand button in the dialog box.

3 Click **Expand**.

Columns and search (volumes)

To change the columns that are displayed on the Volumes screen:

1 Click **Columns**.
2 Clear or check the boxes as desired.
3 Click **Update Columns** to save the changes.

The SCSI Device ID is a combination of the Unit Serial Number and the Volume Name, joined by a dash. For example: 7235e4e6-dot104_rhel_v1

You can also use the basic Search feature and the Enhanced Search tab to find attributes in your Dell Acceleration Appliance for Databases that correspond to the column entries. See Basic search on page 32 and Enhanced search on page 32.

Managing initiators

Initiator nodes are computers that can gain access to shared storage on the Dell Acceleration Appliance for Databases. You can create, edit, or remove initiator ports as part of your configuration.

To manage initiators:

1   Click **Configuration**.
2   Click **Initiators** at the left side of the window. The Initiators screen is displayed.

> **NOTE:** The software attempts to auto-discover initiators, so they may already appear in the Initiators screen. Auto-discovered initiators have names that are identical to the port WWPN, IQN, or GUID.

The following columns are displayed:

- Name — Name (identifier or alias) of the initiator. If an alias has been created for the name, it is displayed at the left.
- Status — Status of the initiator: Active or Inactive
- <Identifier> — WWPN, IQN, or GUID for the initiator port. Figure 5-1, Figure 5-2, and Figure 5-3 show examples of different identifiers that can be displayed.

- Volumes — Number of volumes that are currently accessible by this initiator. Clicking this link displays the Volumes screen.
- Initiator Group — Group that this initiator has been assigned to. All members of a group have the same access rights to shared storage volumes on targets.
- OS — Type of operating system used on the initiator: AIX or Other.
- Delete — Click the 🗑 icon to delete the corresponding initiator.

Figure 5-1. Example of WWN identifiers

Name	Status	WWPN	Volumes	Initiator Group	OS	Delete
21:00:00:24:ff:38:f8:1a EDIT	⊖ Inactive	21:00:00:24:ff:38:f8:1a	0	EDIT		🗑
21:00:00:24:ff:38:f8:78 EDIT	⊖ Inactive	21:00:00:24:ff:38:f8:78	0	EDIT		🗑

Figure 5-2. Example of iSCSI IQN identifiers

Name	Status	IQN	Volumes	Initiator Group	OS	D...
win_1 EDIT	⊖ Inactive	iqn.1991-05.com.micr	0	WIN133 EDIT	Other	🗑
win_3 EDIT	⊖ Inactive	iqn.1991-05.com.micr	0	WIN133 EDIT	Other	🗑

Figure 5-3. Example of InfiniBand/SRP GUIDs:

Name	Status	GUID	Volumes	Initiator Group
0002:c903:00a0:2d71 EDIT	✔ Active	0002:c903:00a0:2d71	16	dot122 EDIT
0002:c903:00a0:2d72 EDIT	✔ Active	0002:c903:00a0:2d72	16	dot122 EDIT
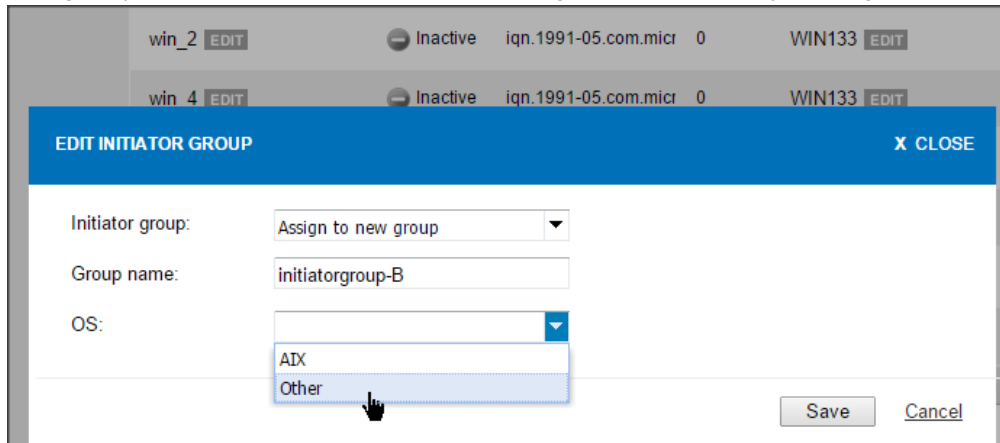
Creating initiator groups

An initiator group controls which initiators can see exported volumes (LUNs). When an initiator group is assigned to a volume, all (and only) those initiators in the group can access the volume.

> **NOTE:** You can also create and add individual initiators (see Adding individual initiators on page 46), but in most cases it is more effective to set up initiator groups first, to coordinate larger-scale initiator access.

To create or manage an initiator group:

1 Click **Edit** in the Initiator Group column. If no Group name is displayed to the left of the button, that means you are creating the Group; otherwise, you're editing the group name in the column. The Manage Initiator Group dialog box is displayed:

2 If you are creating a new initiator group, enter the initiator group name.

Do not use spaces in the initiator group name, as that may cause problems with group creation.

Or

If you are assigning an initiator to an existing group, use the drop-down menu to select the initiator group that this initiator is assigned to.

3 Use the drop-down menu to select the OS type (AIX or Other) for the initiator group.

4 Click **Save**.

5 Read the warning prompt in the confirmation dialog box that explains how initiator access is affected by Groups; then click **Confirm**.

> **NOTE:** Initiators sometimes may not auto-discover LUNs mapped from Dell Acceleration Appliance for Databases. To view LUNs you need to run `rescan-scsi-bus.sh` (Linux), **Rescan Disks** (Windows), or
> **Storage Adapters > Rescan** (ESXi).

Assigning an initiator group to a volume

NOTE: An individual initiator cannot be added to a volume; only an initiator group may be added.

To assign the active initiators for volumes:

1 Click **Configuration**.

2 On the left panel, click **Volumes**.

3 Click **Edit** in the Active Initiators column that corresponds to the volume you want to update.

The Edit Initiator Access dialog box is displayed.

4 Select an initiator group from the Initiator Group drop-down menu.

> **NOTE:** To avoid confusion, use a different naming scheme for initiators and groups, so you can easily tell them apart.

5 Click the target ports in the drop-down menu(s) for the host(s) you want the initiator to access. (By default, all the target ports are selected).

   You can also click **All Targets** or click different target ports.
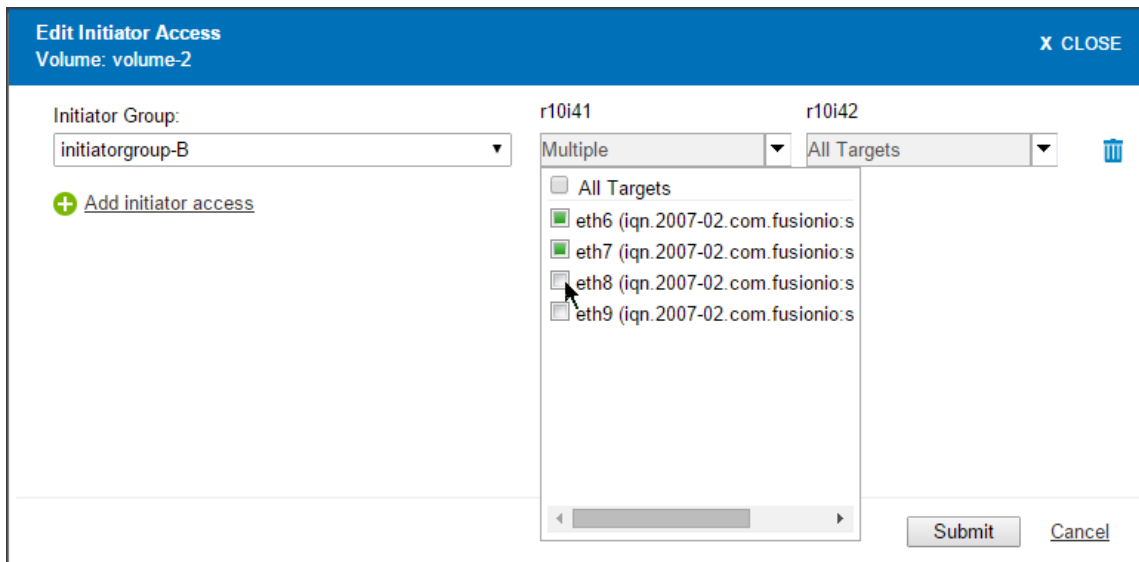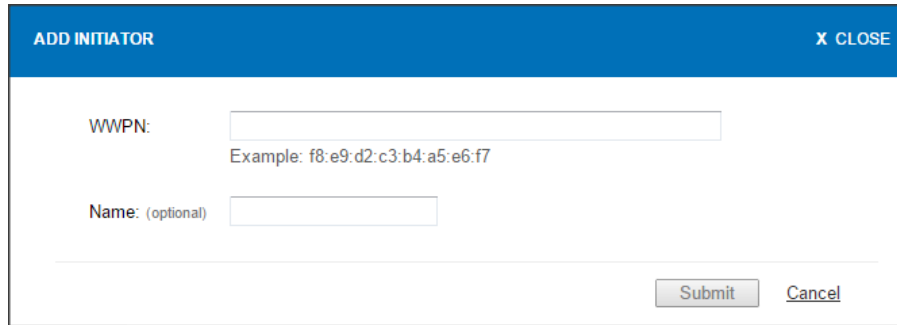
6 To remove (block) *all* access for an initiator group, click the 🗑 icon at the right of the configuration row. (This does not delete the initiator itself.)

7 Click **Submit** to grant initiator access.

Adding individual initiators

To add a single initiator to the Dell Acceleration Appliance for Databases node:

1 Click **Add Initiator**. The Add Initiator dialog box is displayed, with the first field as WWPN for Fibre Channel, GUID for InfiniBand/SRP, or IQN for iSCSI:
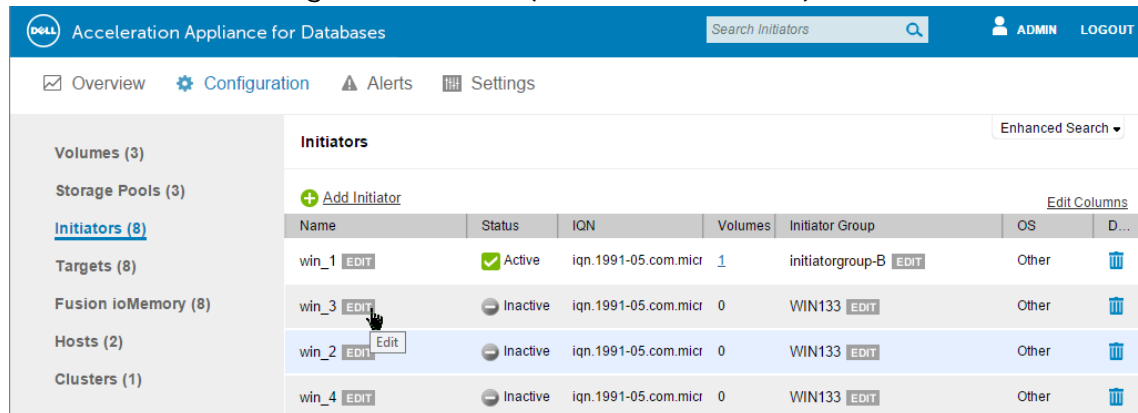
2 Enter the port address. This is the WWPN, GUID, or IQN.

3 Optionally enter a name for the initiator, up to 10 alphanumeric characters. The alias appears in the Name column of the Initiators screen.

4 Click **Submit**.

   NOTE: iSCSI initiators are not auto-discovered; they must be manually added.

Editing the initiator name

To edit an initiator name:

1 Click **Edit** to the right of the name (in the Name column).

2 Enter the desired name for the initiator.

3 Click outside the name field to save the new name.

Deleting an initiator

To delete an existing initiator:

1 Ensure that the initiator is not active on the network fabric.

2 Create a new temporary initiator group, such as "Remove" and add the initiator to that group. For details, see Creating initiator groups on page 42.

3 Click the 🗑 icon at the right of the row that corresponds to your temporary group. A confirmation similar to the following is displayed:
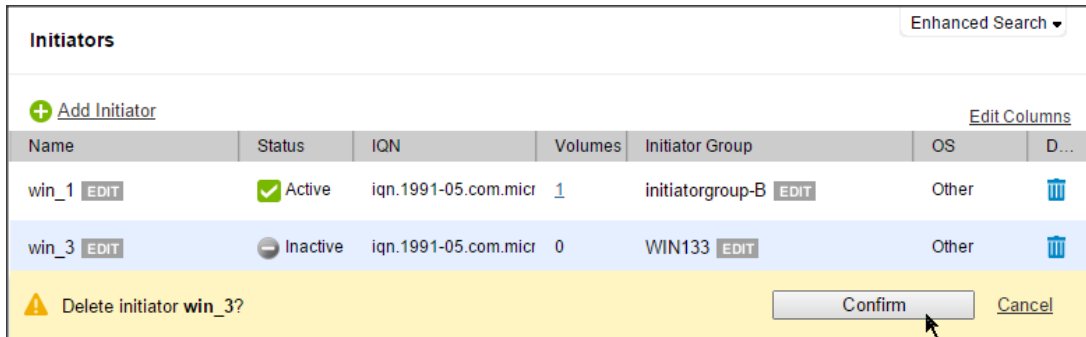
4 Click **Confirm** to remove the initiator from any groups to which it was assigned.

Columns and search (initiators)

To change the columns displayed:

1 Click the Columns link and clear or check the boxes, as required.
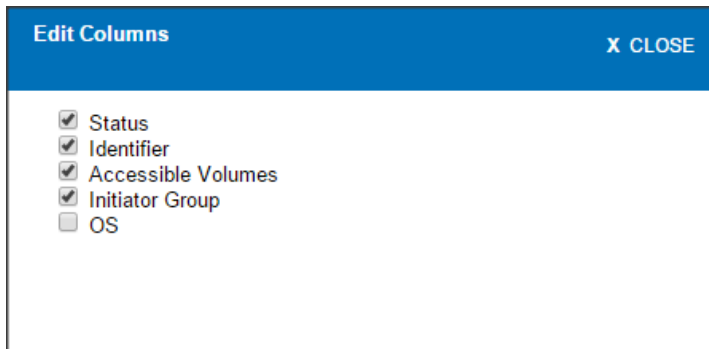
2 Click **Update Columns** to save the changes.

You can also use search functionality to find attributes that correspond to the column entries. See Basic search on page 32 and Enhanced search on page 32.

Viewing targets

Targets are accessible ports on the Dell Acceleration Appliance for Databases that can be used to attach directly to host interface ports or network switches.

To view targets in the storage pool, click **Targets**. The Targets screen is displayed:

Name	Target Port	Status	Link Speed	IQN	Volumes	Hostname
eth5 EDIT	Slot 1, Port 5	☑ Connect	40 Gbit/s	iqn.2007-02.com.fusic	16	r10i41
eth6 EDIT	Slot 3, Port 6	☑ Connect	40 Gbit/s	iqn.2007-02.com.fusic	16	r10i41
eth7 EDIT	Slot 3, Port 7	☑ Connect	40 Gbit/s	iqn.2007-02.com.fusic	16	r10i41
eth9 EDIT	Slot 2, Port 9	☑ Connect	40 Gbit/s	iqn.2007-02.com.fusic	16	r10i41
eth5	Slot 1, Port 5	Agent Offline	40 Gbit/s	iqn.2007-02.com.fusic	16	r10i42
eth6	Slot 3, Port 6	Agent Offline	40 Gbit/s	iqn.2007-02.com.fusic	16	r10i42
eth7	Slot 3, Port 7	Agent Offline	40 Gbit/s	iqn.2007-02.com.fusic	16	r10i42
eth9	Slot 2, Port 9	Agent Offline	40 Gbit/s	iqn.2007-02.com.fusic	16	r10i42

Targets   Enhanced Search ▾   Edit Columns

|◀ ◀ Page 1 of 1 ▶ ▶| ⟳   Displaying 1 - 8 of 8

Fibre Channel entries displays FC-WWPN, such as:

FC-WWPN: 21:00:00:0e:1e:11:f1:71

iSCSI entries displays IQN identifiers, such as:

iqn.2007-02.com.fusion:sn.2m232406fw:eth6

InfiniBand/SRP entries displays GUID identifiers, such as:

0002:c903:00fc:3211

The following columns are displayed:

- Name of the target — the value is the same as the Identifier field, unless it is modified.
- Target Port — Lists the slot and port number
- Status — Displays Connected or Agent Offline
- Link Speed — Data transfer rate of the link, in Gbps
- <Identifier> — WWPN for Fibre Channel, or IQN for iSCSI, or GUID for InfiniBand/SRP
- Volumes — Number of volumes being accessed through this target.
- Hostname (HA only) — Name of the host (cluster node) associated with this target port. Clicking the link displays details for the host (see Host configuration details on page 60).

Creating an alias for a target port

> **NOTE:** In HA environments, create aliases on both nodes. Log into the first node and add your rules, and then log into the second node and add the same rules.

You can create an alias for a target port, to provide an identifier that is easy to read and remember:

1. Click **Edit** in the Identifier column that corresponds to the target port for the added alias.
2. Enter the alias name for the port. This alias name must be unique in the Dell Acceleration Appliance for Databases — no duplicate aliases are allowed.
3. Click outside the edit box to save the name.
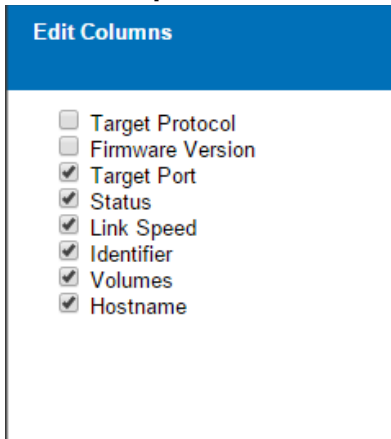
The alias now is displayed as the primary identifier for the target, and the WWPN, IQN, or Port GUID is displayed in parentheses next to it.

Columns and search (targets)

To change the columns that are displayed:

1. Click **Columns**.
2. Clear the check boxes as desired.

3   Click **Update Columns** to save the changes.

Edit Columns

☐ Target Protocol
☐ Firmware Version
☑ Target Port
☑ Status
☑ Link Speed
☑ Identifier
☑ Volumes
☑ Hostname

You can also use the basic Search feature and the Enhanced Search tab to find attributes in your Dell Acceleration Appliance for Databases that correspond to the column entries. See Basic search on page 32 and Enhanced search on page 32.

Managing Fusion ioMemory

You can manage the individual Fusion ioMemory devices in your host appliance by using the ioSphere GUI. To do so, click **Fusion ioMemory** in the Configuration screen. The Fusion ioMemory window is displayed

The following columns are displayed:

- Fusion ioMemory — ID of the Fusion ioMemory device. Clicking the ID link displays information about the device and actions you can perform. For details, see Fusion ioMemory configuration on page 54.

- Status — Real-time information on the read and write performance of the device, in MBps. If the device is unavailable, the Status is indicated as Host Offline. A red icon indicates an error condition; you can click the icon to view the Alert information.

- Hostname — Link to the Fusion ioMemory Configuration screen for this device. For details, see Fusion ioMemory configuration on page 54.

- Storage Pool — Name of the storage pool that this Fusion ioMemory device is assigned to

- Reserve Space — Amount of reserve space still available, as a percentage from 0 – 100%

- Device S/N — Serial number of the Fusion ioMemory device.
- Filesystems — Name of the filesystem this Fusion ioMemory device is using, if any
- Cluster Name — ID of the cluster this device is a part of, if any

Fusion ioMemory configuration

The shaded section at the left of the screen identifies the drives in your Dell Acceleration Appliance for Databases by Fusion ioMemory device serial number. Information for the selected Fusion ioMemory module is shown in the main section of the screen:

- *Settings* — For selected hosts, this section shows the Fusion ioMemory alias, device status (attached or detached), swap support (enabled or disabled), and beacon status (on or off).

  To rename the alias for a selected host, click **Edit** and type the new name.

  To enable the beacon for a drive, click **Enable**.

- Firmware — For selected hosts, this section shows the current VSL and firmware version.

- Low-Level Formatting — For selected hosts, this section shows the low-level formatting method (Factory Capacity, x, or y); total factory capacity in GB or GiB; format capacity in bytes; and formatted sector size in bytes.

NOTE: For details on the Live and Reports tabs, see Monitoring DAAD performance on page 67.

Using the info tab

The Info access tab on the Configuration screen supplies a variety of data about a selected Fusion ioMemory module within a host.

1 Click the host you want to view.

2 Click **INFO**. Information about the selected Fusion ioMemory device is displayed. Any alerts that were generated appear under the Alerts heading (see Handling DAAD alerts on page 77).

Columns and search (Fusion ioMemory)

The default columns for the Fusion ioMemory screen are shown to the right. To change the columns that are displayed:

1 Click **Columns**.
2 Clear or check the boxes as desired.
3 Click **Update Columns** to save the changes.

Edit Columns   **X CLOSE**

- ☑ Status
- ☑ Hostname
- ☑ Storage Pool
- ☐ Active Media
- ☐ Alias
- ☐ Beacon Status
- ☐ Board Kind
- ☐ Current Operation
- ☐ Current Operation Phase
- ☐ Current Operation Progress
- ☐ Device Label
- ☐ Device Name
- ☐ Driver Version
- ☐ ECC Bytes Per Codeword
- ☐ ECC Num Bits Correctable
- ☐ Factory Capacity
- ☐ Format UUID
- ☐ Current Firmware Revision
- ☐ Current Firmware Version
- ☐ Minimum Firmware Revision
- ☐ State
- ☐ Parent Agent Online
- ☐ Location Within Adapter
- ☐ PCI Device ID
- ☐ PCI Subsys Device ID
- ☐ PCI Subsys Vendor ID
- ☐ PCI Vendor ID
- ☐ PCIe Bandwidth
- ☐ PCIe Link Width
- ☐ PCIe Link Speed
- ☐ PCI Slot Power
- ☐ Port Within Adapter
- ☐ Swap Support
- ☐ Current RAM Used
- ☐ Peak RAM Used
- ☑ Reserve Space
- ☐ Sector Count
- ☐ Sector Size
- ☑ ioMemory S/N
- ☐ Session Read Ops
- ☐ Session Write Ops
- ☐ Formatted Size
- ☐ FPGA Temperature
- ☐ Total Physical Read
- ☐ Total Physical Written
- ☐ PCI Slot Id
- ☐ Agent Version
- ☐ Trim Service Active
- ☐ Host IP
- ☐ Agent Status
- ☐ Host OS
- ☐ OS Native Trim Active
- ☐ Agent Offline Since
- ☐ Trim Enabled
- ☐ Adapter Board Kind
- ☐ Power Amps
- ☐ Min Volts
- ☐ Peak Amps
- ☐ Peak Volts
- ☐ Peak Watts
- ☐ Power Volts
- ☐ Power Watts
- ☐ External Power
- ☐ Adapter PCIe Bandwidth
- ☐ Adapter PCIe Link Width
- ☐ Adapter PCIe Link Speed
- ☐ Adapter PCI Slot Power
- ☐ PCIe Power Limit
- ☐ Power Monitoring
- ☐ Adapter S/N
- ☐ Product Name
- ☐ Product Serial Number
- ☐ Product SKU
- ☐ Part Number
- ☐ Alt Part Number
- ☑ Filesystems

Update Columns   Cancel

You can also use the basic Search feature and the Enhanced Search tab to find attributes in your Dell Acceleration Appliance for Databases that correspond to the column entries. See Basic search on page 32 and Enhanced search on page 32.

Saved searches

You can save a search that uses Fusion ioMemory parameters. You can run the search later without having to set up the parameters.

To create a saved search:

1 Do a basic or enhanced search.

2 When the search is complete, click **save search** button that is displayed.
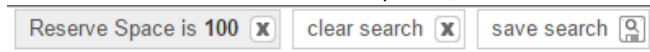
3   In the dialog box that is displayed, type a name for the search and click Save Search.
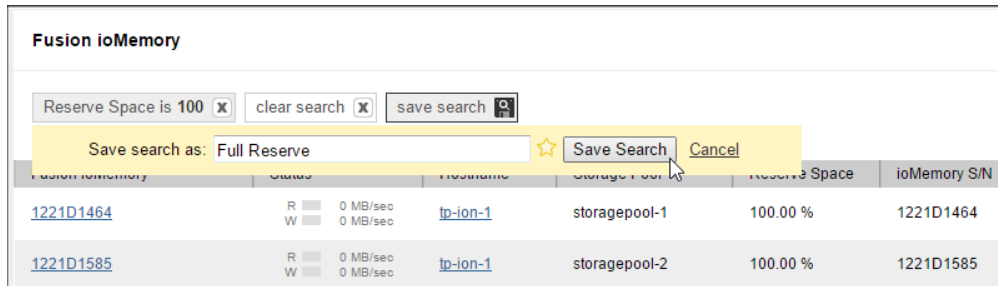
    A success message is displayed:
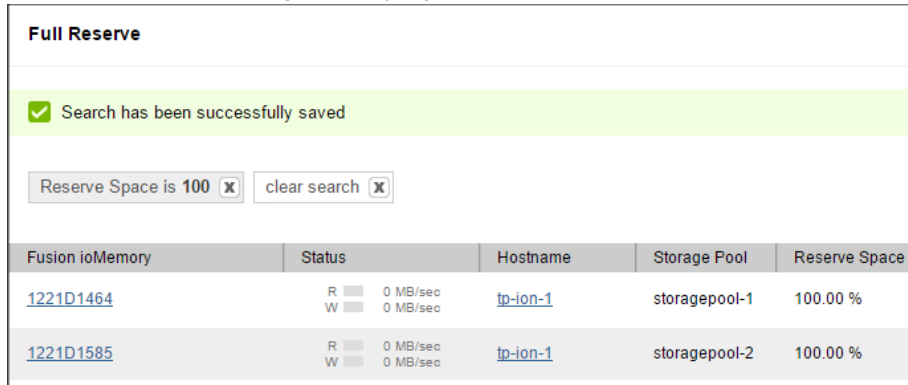
4 To retrieve the saved search, click the Saved Searches link in the Settings tab. See Saved searches on page 58 for more details.

Getting host information

To get information about Dell Acceleration Appliance for Databases hosts (target system nodes), click **Hosts** in the Configuration screen.
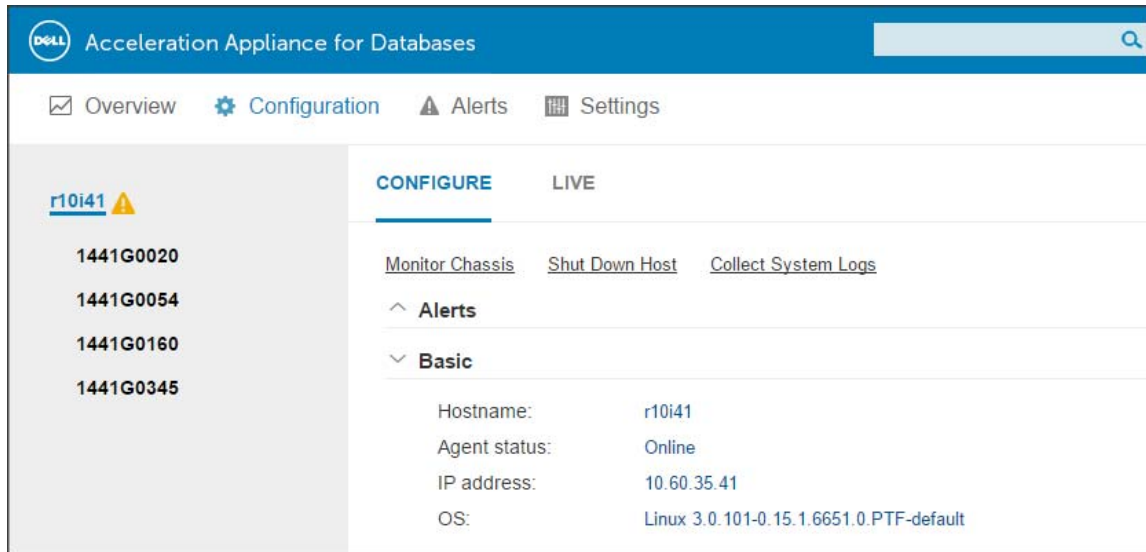
The following columns are displayed:

- Hostname — Name of the Dell Acceleration Appliance for Databases node, as set in First Boot. Click the Hostname link to display the Fusion ioMemory Configuration page (see Fusion ioMemory configuration on page 54).
- Host IP — IP address of the Dell Acceleration Appliance for Databases node
- Host OS — Operating system on the Dell Acceleration Appliance for Databases node
- Agent Status — Connectivity status of the Dell Acceleration Appliance for Databases agent: Online, error, or <alert>. If an error or alert condition is shown, clicking its link displays the Alerts page for details.
- Drives — List of serial numbers for the ioDrives installed in the Dell Acceleration Appliance for Databases node
- Cluster Name — Name of the cluster that this Dell Acceleration Appliance for Databases node is part of. Clicking this link displays the Dell Acceleration Appliance for Databases Clusters screen.

Host configuration details

To get more information about a host, click **Hostname** to view a Host Configuration screen.

The following fields are available:

- Monitor Chassis — This link connects to a chassis monitoring URL for the type of Dell Acceleration Appliance for Databases you are using.

- Shut Down Host — This link enables you to shut down the selected host. Verify the server name (upper left corner of the window) to ensure that you are shutting down the intended host. (See Shutting down a host on page 60.)

- Collect System Logs — This link enables you to download logs from the Dell Acceleration Appliance for Databases host for assistance in troubleshooting (see Collecting system logs on page 61). The logs are combined into a `.tar.bz2` file, which is downloaded to your browsers default download directory. If the is a USB drive plugged into the system, you have the option to save the logs file to the USB drive.

- Basic section — Displays the host name, agent status, IP address, and host OS version

Shutting down a host

1   Click **Shut Down Host**.

If the host you are shutting down is a standalone server, a confirmation dialog box is displayed.

2   Read the warning statement in the dialog box.

3   Click the type of shutdown you want:
    –   Shut down and halt
    –   Shut down and restart

4   Click **Confirm.**

    If the host is part of a cluster, a confirmation dialog box is displayed.

    a   Read the warning statement in the dialog box.

    b   Click the type of shutdown you want: shut down and halt, or shut down and restart.

    c   Click **Confirm.**

    NOTE: Shutting down one node of a cluster does not shut down the other node. If you want to shut down both nodes in your cluster, repeat this procedure on the other node.

Collecting system logs

1   Click **Collect System Logs**.
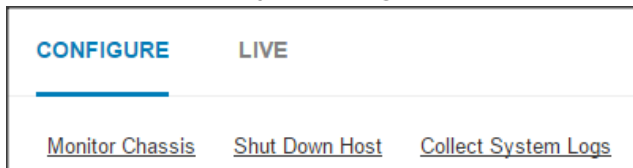
    If no USB drive is detected in the Dell Acceleration Appliance for Databases, the download begins immediately. The file is downloaded to the default *Download* directory for your browser.

    If a USB drive is detected, a dialog box is displayed so that you can specify where to save the system log. Ensure that there is enough free space on the USB drive for the logs, and then click **Download**.

Log information is captured to help Customer Support determine the cause of the problem. The log is generated as a `.tar.bz2` file, with a filename that indicates the date and time of the capture. For example, `fio-systemlog_20140218T105539.tar.bz2` indicates a date of 02/18/2014, at 10:55:39.
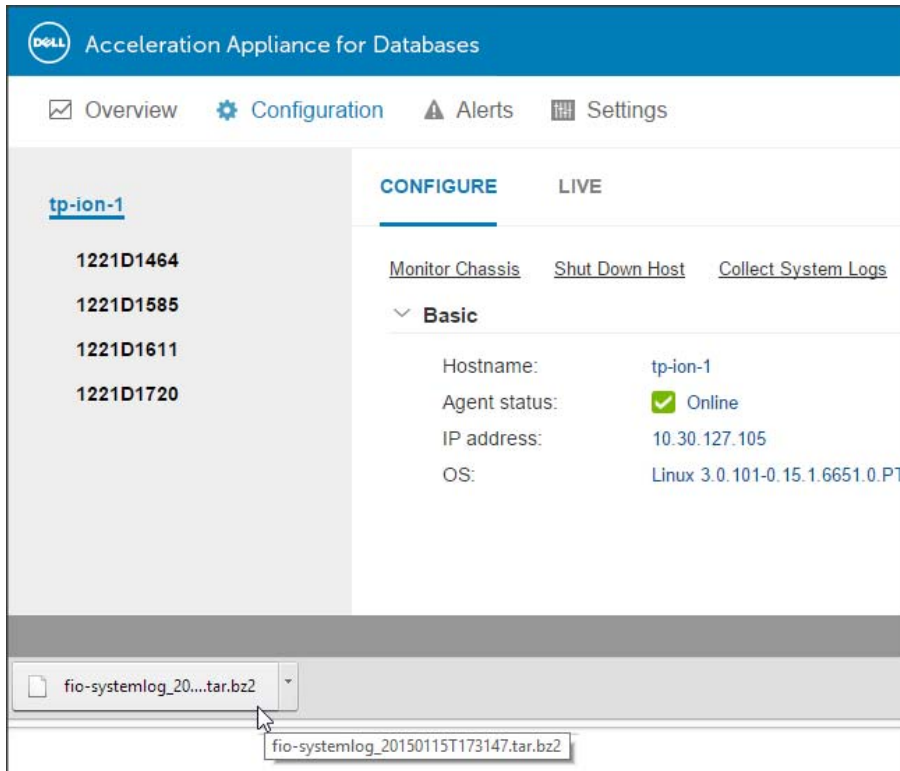
2   Click **Open** or **Save** in the browser dialog box that is displayed.

3   After you collect the log file, e-mail it to customer support for troubleshooting help. The email address for customer support can be obtained from dell.com/support/home.

Columns and search (hosts)

To change the columns that are displayed, click **Columns** and clear or check the boxes as desired. Then click **Update Columns** to save the changes.

The following non-default columns may also be selected:

- Agent Version — Version of the fio-agent running on the Dell Acceleration Appliance for Databases host

- Trim Service Active — Active or Inactive

- OS Native Trim Active — Active or Inactive

- Agent Offline Since — Beginning point at which the agent went offline, in YYYY:MM:DD format

- Trim Enabled — Whether the native Trim service is enabled

- Cluster IP Address — Cluster IP address for this host

You can also use the basic Search feature and the Enhanced Search tab to find attributes in your Dell Acceleration Appliance for Databases that correspond to the column entries. See Basic search on page 32 and Enhanced search on page 32.

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Managing clusters in HA configurations

> **NOTE:** For effective HA configuration, Dell recommends that your storage pool profile be set to Maximum Performance. See About storage pools for DAAD on page 25.

To manage clusters, click **Clusters** on the Configuration tab. The Clusters window is displayed.

The following columns are displayed:

- Cluster Name — Name of the cluster. Clicking the link displays information about the cluster and actions you can perform. For details, see Getting host information on page 59.

- Status — Status of the cluster: Online or Offline.

- Cluster IP Address — IP address for the cluster, as configured in the First Boot process.

Columns and search (HA)

To change the columns that are displayed for clusters:

1 Click **Columns**.

2 Clear or check boxes as desired.
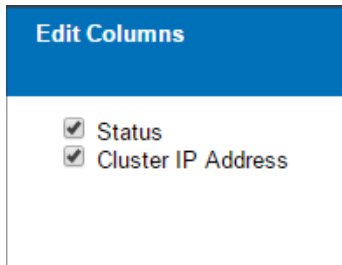
3 Click **Update Columns** to save the changes.

You can also use the basic Search feature and the Enhanced Search tab to find attributes in your Dell Acceleration Appliance for Databases that correspond to the column entries. See Basic search on page 32 and Enhanced search on page 32.

Monitoring DAAD performance

Dell Acceleration Appliance for Databases provides powerful, easy-to-use performance monitoring tools to help you analyze the effectiveness of your system. The main performance tools are

- Performance Graphs (Overview Tab)
- Live Meter View
- Reports

    NOTE: You can also use the Status column of the Fusion ioMemory screen to view real-time analysis of individual ioDrive performance. See Managing Fusion ioMemory on page 53.

Performance graphs (Overview tab)

The Overview tab provides a quick look at the bandwidth or IOPS performance for any host or Fusion ioMemory device in the Dell Acceleration Appliance for Databases, depending on your settings. It also displays activity for connected network devices.

To view the performance for currently running I/O on your system, click the Overview tab (and scroll to the bottom of the screen if necessary).

    NOTE: Your browser must support Adobe Flash so the performance graphs display correctly.

Your connected initiator contacts the Dell Acceleration Appliance for Databases host to update the performance graph. A few moments after connecting, a performance summary graph is displayed.

> **NOTE:** If you leave the Overview screen, the live connection is broken. Returning to the screen re-establishes the connection; previous performance data is not available as new data is displayed. Historical data is available, however, in Dell Acceleration Appliance for Databases reports. See
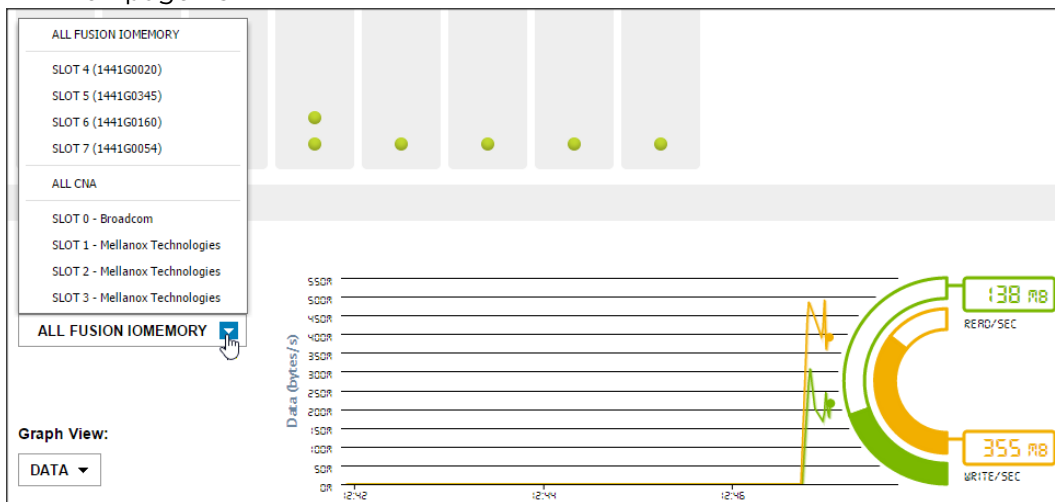
> **NOTE:** When you switch between Fusion ioMemory modules or network adapters, the software pauses to regenerate the performance data.

Interpreting performance figures

The performance figures viewed in Dell Acceleration Appliance for Databases based directly on the number of reads and writes made to individual Fusion ioMemory devices, not on reads and writes being made to a storage pool or volume. When reading live performance data, it is important to remember that writes can be duplicated many times across different drives in a RAIDset, and reads can be divided among multiple devices in the same RAIDset. Also, writes are duplicated across nodes in an HA configuration, so it is important to take into account your current Dell Acceleration Appliance for Databases configuration.

For example, suppose you have an HA cluster with one volume on a RAID 1 storage pool. Every write to the volume is duplicated first between each node in the cluster, and then to each drive in the RAID. The result would be a total of 4x the number of writes across the whole appliance, compared to the number made in a standalone system in Direct Access mode.

Live view

The Live View is a powerful tool for seeing real-time performance statistics within your Dell Acceleration Appliance for Databases. The following performance metrics are available:

- Read and write bandwidth, in MBps
- Read and write IOPS
- Average bandwidth and IOPS statistics over time
- Temperature, in degrees Celsius
- Current RAM usage
- Peak RAM usage
- Petabytes written (PBW) endurance
- Reserve space available

To access Live View:

1. Click the **Configuration** tab.
2. Click **Fusion ioMemory** at the left of the screen.
3. In the Fusion ioMemory screen, click the name of the Fusion ioMemory module you want to monitor.

4   Click the **Live** tab. The Live Meter View screen is displayed, with the Fusion ioMemory module selected.
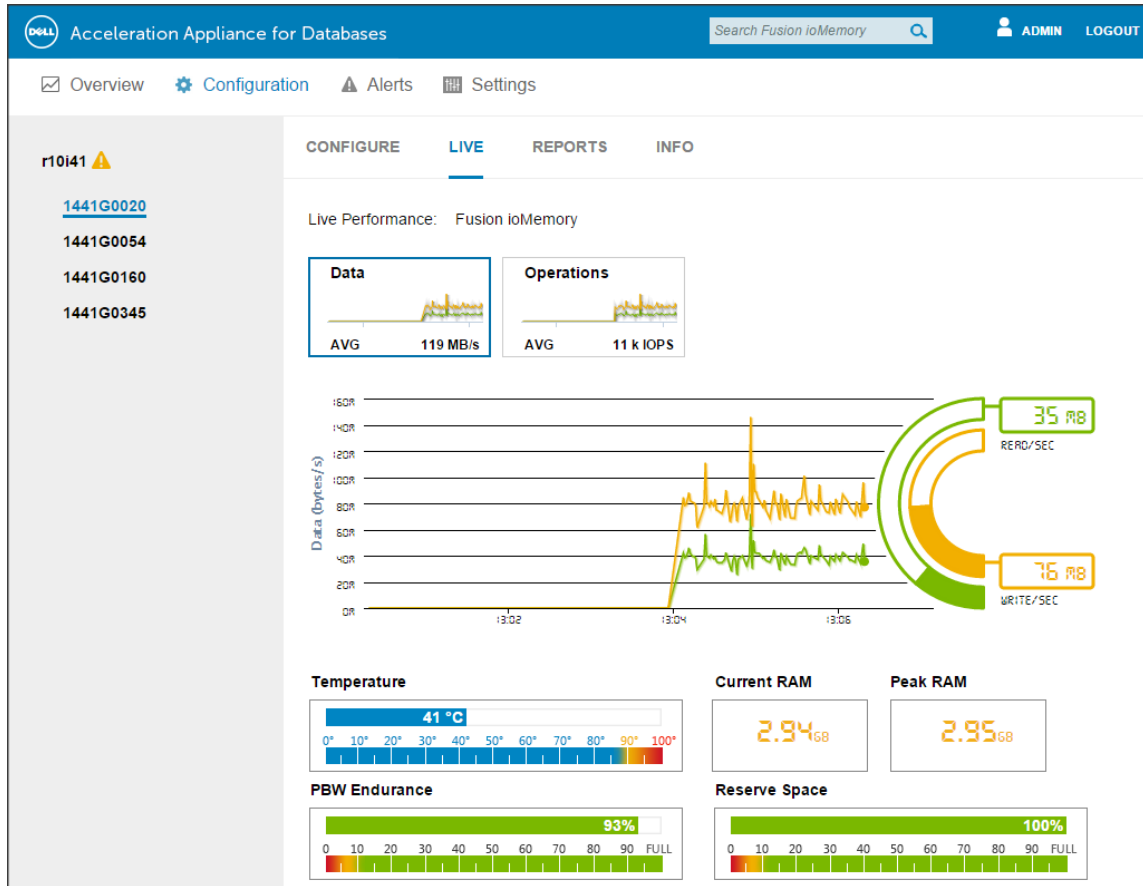
The performance graph works the same way as the one displayed in the Overview tab, with the added feature of Average bandwidth and IOPS performance over time (shown directly below the Data and Operations boxes).

You can also hover over a data point in the graph to display a popup for statistics:
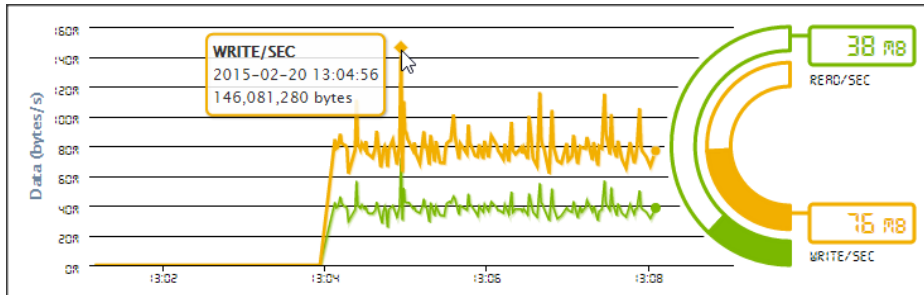
> **NOTE:** Navigating away from the Live tab resets the statistics for the next time the tab is opened.

In addition, the Live View offers several other performance metrics:

- Temperature — Indicates the current operating temperature of the selected Fusion ioMemory device, in degrees Celsius. The right-hand edge of the scale shows the warning and failure points for high temperatures in the device.

- Current RAM — Shows the maximum amount of RAM allocated to the Dell Acceleration Appliance for Databases software in this server (host).

- Peak RAM — Shows the highest amount of RAM this Fusion ioMemory module has actually used.

- PBW Endurance — Shows the projected lifetime endurance for the Fusion ioMemory device. 100% means virtually no reading or writing has occurred. As the NAND flash wears, the endurance percentage drops until eventually it reaches a warning or failure point at the left of the scale.

- Reserve Space — Indicates how much reserve space is available on the Fusion ioMemory device. 100% means the maximum reserve allocated at format time is available; 0% means no reserve space is available.

To switch to IOPS monitoring, click the **Operations** box. An Operations (IOPS) view is displayed:
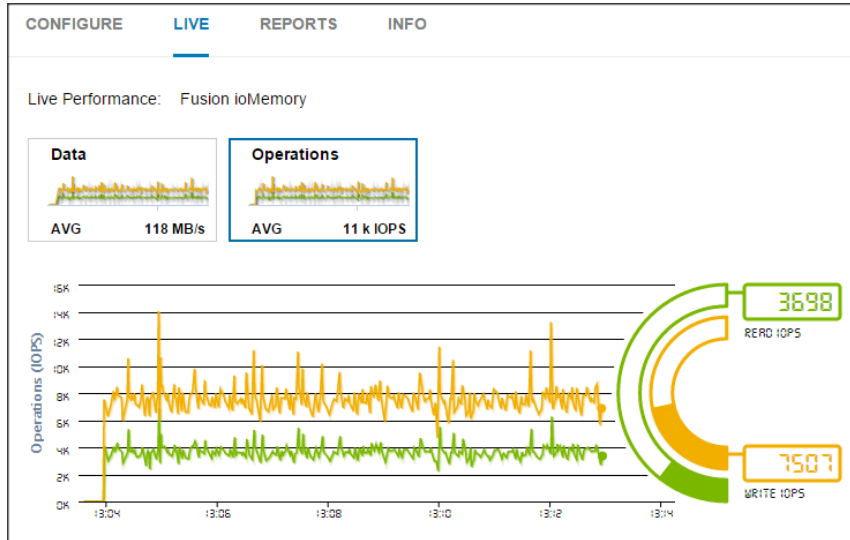
Viewing performance for multiple devices

To view aggregated performance statistics for Dell Acceleration Appliance for Databases:

1   Click the host name at the left of the window. A Fusion ioMemory selection drop-down is displayed in the main window.

2 When you click it, you can a) click **All Fusion ioMemory** for the host (default); or b) clear the **All Fusion ioMemory** checkbox and click just the modules you want to monitor.
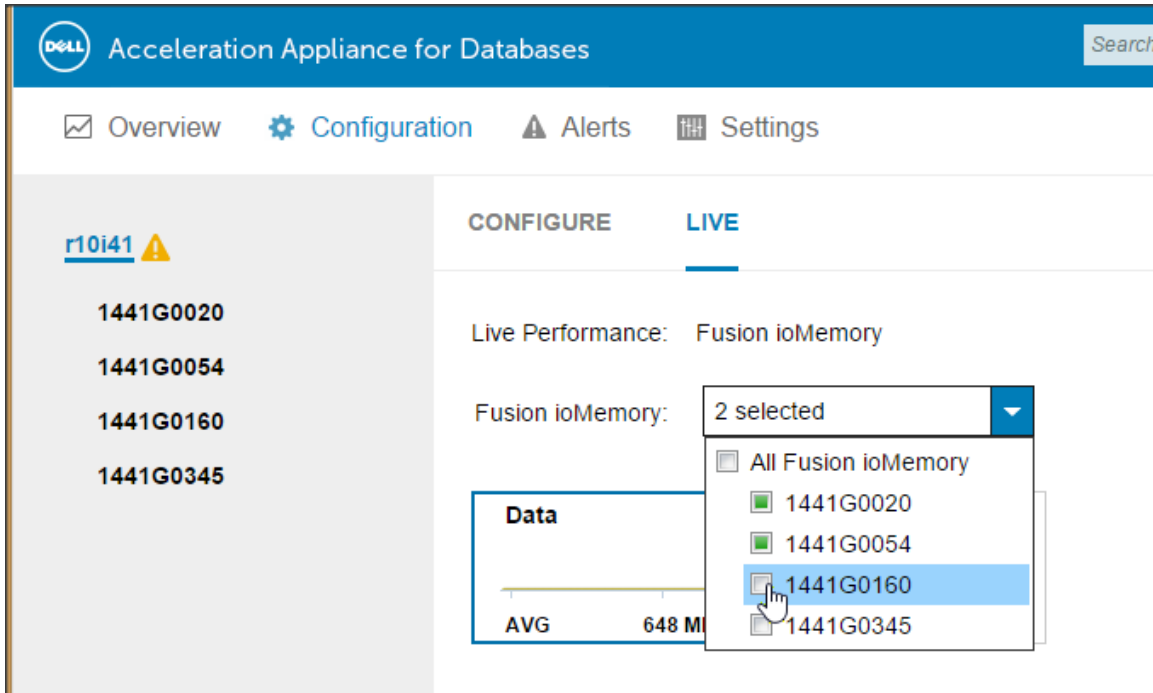
The following performance statistics are *aggregated* for all selected Fusion ioMemory modules:

- Live data
- Live operations
- Current RAM
- Peak RAM

Performance statistics for PBW Endurance and Reserve Space are *averaged* for all selected Fusion ioMemory modules:

Temperature corresponds to the *highest* value found for any Fusion ioMemory device.

> **NOTE:** When multiple devices are clicked, the Reports and Info tabs are not available.

Reports

To view historical reports for Dell Acceleration Appliance for Databases performance on a *single* Fusion ioMemory module:

1 Navigate to the Fusion ioMemory Configuration screen:
Configuration > Fusion ioMemory > <Fusion ioMemory module>.

2   Click the Reports access tab. (If the Reports tab is not accessible, ensure that you
    have clicked only one host in the left side of the screen.)

Operations report

By default, an operations performance report is displayed. The report date range starts
with the date the Dell Acceleration Appliance for Databases software was installed,
until the current date; these dates can be changed. The vertical timelines appear every
4 hours, for reference.
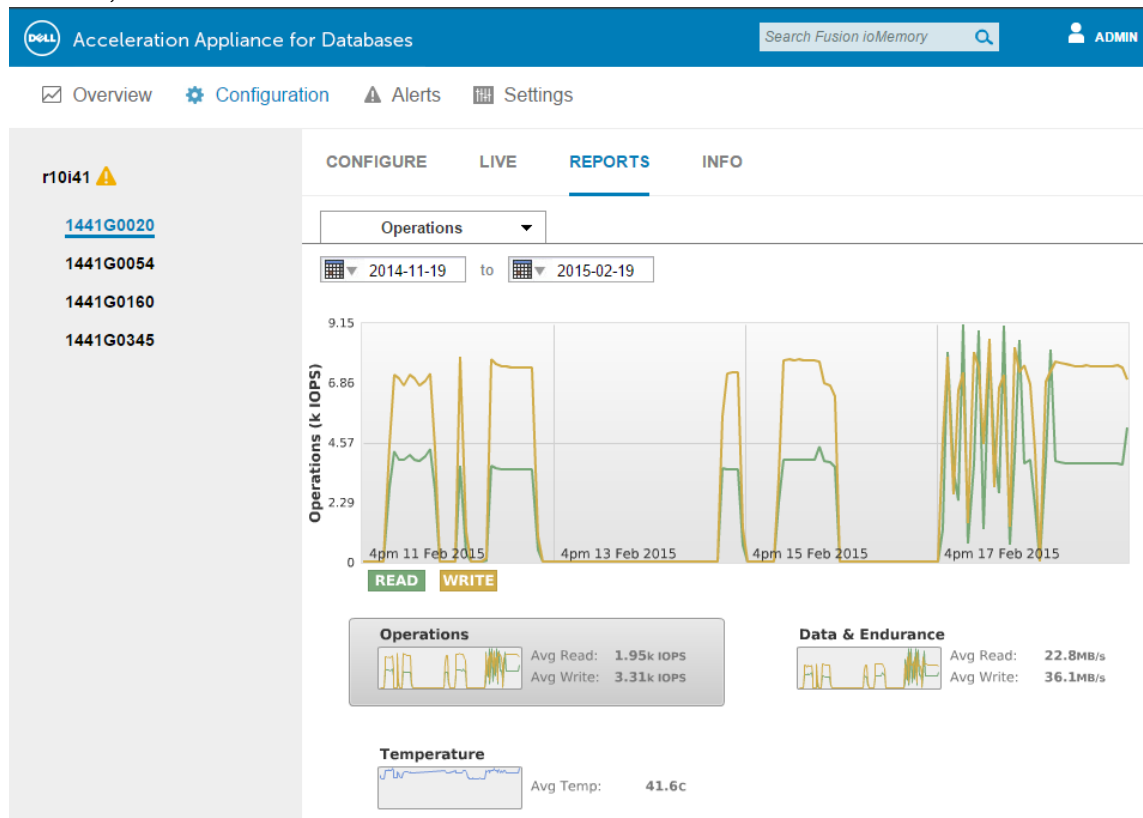
The following performance metrics are captured:

• Results graph — Shows the statistics (IOPS, bandwidth, data/endurance, or
  temperature) for the date range

• Operations summary — Shows the average read and write IOPS (or bandwidth).
  Click the summary rectangle to view the IOPS or bandwidth details in the Results
  graph.

• Data and endurance summary — Shows the average data rate for reads and writes
  across the date range. Click the summary rectangle to view the data and endurance
  details in the Results graph.

- Temperature — Shows the average temperature in degrees Celsius for the date range. Click the summary rectangle to view the temperature details in the Results graph

Changing report parameters

To change the type of information to be graphed in the report, click the tab (Operations by default) and click the type of data you want to monitor.
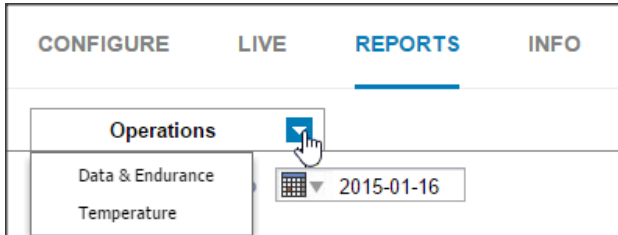
To change the date range for the report, click and use the two provided calendars to click the From and To dates for the report.
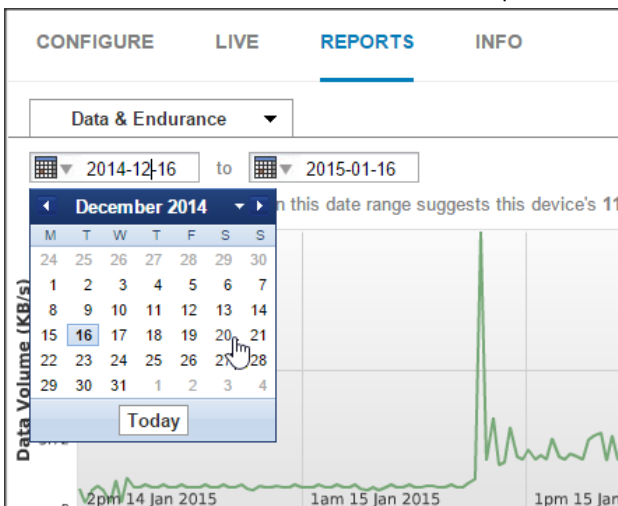
The software generates a performance report for the date range you selected. To exit the Reports access tab, click the Configuration tab.

Data and endurance report

The Data and Endurance report displays the data volume (MBps read and write) over the report date range. An estimate is given of the device's write-endurance lifespan, based on the current data volume rate.
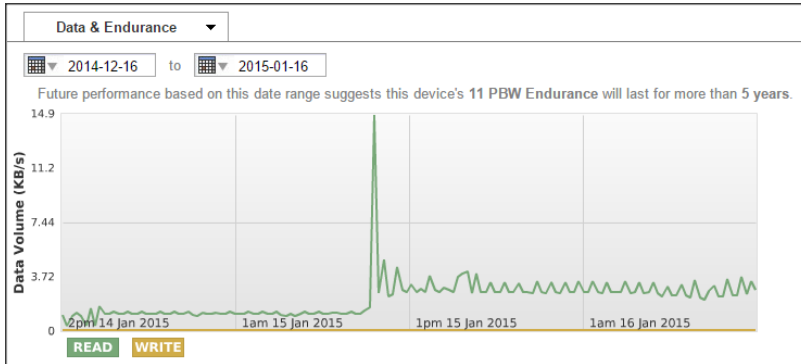
Temperature report

The Temperature report displays the device temperature in degrees Centigrade over the report date range.
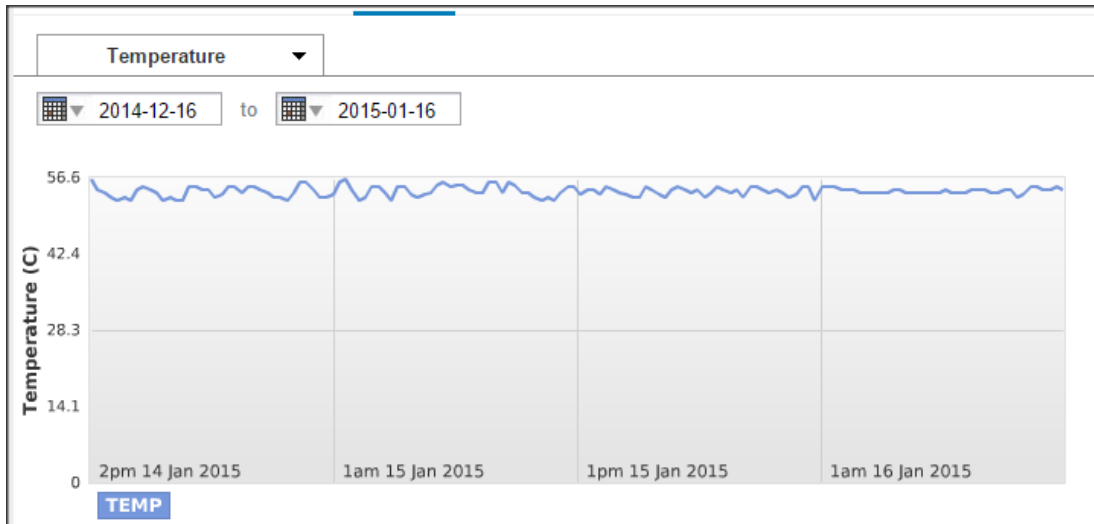
Handling DAAD alerts

Dell Acceleration Appliance for Databases generates alerts in the GUI to notify you of potential performance issues. If there are active alerts, the Alerts icon in the Task Bar pulsates to notify you until you click it:

To view alerts (informational, warning, or error conditions) that have been received on any of the configured volumes, click the Alerts tab.

The following columns are available in the results table:

- Type — Type of alert: Informational, Warning, or Error
- Summary — Description of the problem that caused the alert
- Item — Detailed information on the alert item
- Hostname — Name of the host server where the alerts occurred
- Time Reported — UTC time when the alert was generated

The following filters are available above the results table:

- Warnings — Click to show only warning alerts.
- Errors — Click to show only error alerts.
- Info — Click to show only informational alerts.

- Show only active alerts — Click this box to show only alerts that are still active, not those that have been resolved.
- Dates — In the Dates drop-down menu, click one of these options to filter alerts by date:
  - All dates (since Dell Acceleration Appliance for Databases was installed on this system)
  - For the last 365 days
  - For the last 128 days
  - For the last 10 days

In the cells of the results table, you can also take additional actions::

- Displaying alert descriptions — Click the "plus" icon next to an alert summary. For example:

- Item link– Click the Item link to view the configuration for the Fusion ioMemory module that produced the alert.
- Hostname link– Click a hostname for details about the host (see Getting host information on page 59).
- Archive link– Click the Archive link (rightmost column) to archive the alert.

Also, when there are one or more active alerts in a category, an icon representing the most serious type of alert (error, warning, or informational) is displayed next to that category in the left pane. For example:

You can then click a category marked by an icon to view the alerts.

Columns and search (alerts)

To change the columns that are displayed:

1 Click **Columns**.

2 Clear or check the boxes as desired.

3 Then click **Update Columns** to save the changes.
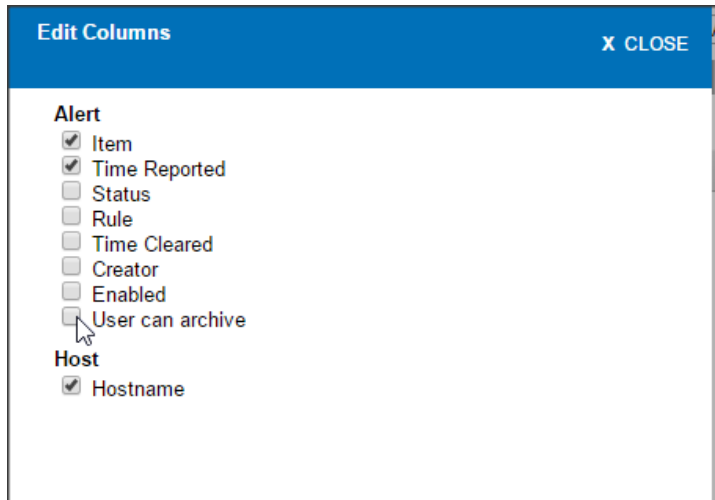
The following non-default columns may be clicked:

- Status — Cleared or Set
- Rule — ID number for the corresponding rule
- Time Cleared — Time (UTC-7) when the alert was cleared
- Creator — System-generated alerts or the username who created the alert rule
- Enabled — True if the alert rule is enabled; False otherwise.
- User can archive — True or False. This is True for active alerts that originated from a user rule or a failed command, and false for all other cases. See Archiving alerts on page 79.

You can also use the basic Search feature and the Enhanced Search tab to find attributes in your Dell Acceleration Appliance for Databases that correspond to the column entries. See Basic search on page 32 and Enhanced search on page 32.

Archiving alerts

Active alerts that originated from a user rule or a failed command are not automatically cleared when the alert condition is resolved. To remove these from the list of active alerts, you can archive them; that way, they appear only when you show all alerts.

To archive an alert:

1 Ensure that the "User can archive" column shows True for the alert.

2   In the far right column for the alert, click **Archive**. (This column has no heading name.)

> **NOTE:** Not all alerts can be archived.

Alerts by category

If you need to limit the display of alerts to a certain category, you can click any of the links at the left of the Alerts screen:
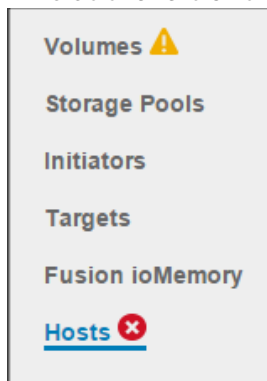
The example shows that one or more error alerts exist for Volumes and Hosts.

> **NOTE:** These links display only alert information; they should not be confused with the Configuration screens for the categories.

Configuring DAAD settings

Settings enables you to configure a wide variety of settings for your Dell Acceleration Appliance for Databases software. Click the left-hand link for the type of setting you want to configure.

The groups are Application, Users, and Alerts, each with several link choices:

Application

The Application menu features links that help users manage access to the Dell Acceleration Appliance for Databases software.

Network

The Network settings screen shows a variety of network information for each port in the Dell Acceleration Appliance for Databases host. (Edit buttons are visible only to administrators.)

Network								
Cluster Name		r10i40						
Timezone		PST						
NTP Server		2.opensuse.pool.ntp.org						
Gateway		10.60.35.1						
DNS		10.60.10.20						
Cluster Node	Port	Status	IP Address	Port address	Subnet Mask	Mode	...	Link Speed
r10i41	0	Up	10.60.35.41 EDIT	54:9f:35:09:80:f4	255.255.255.0 EDIT	Management EDIT	...	1 Gbit/s
r10i41	1	Down	Unavailable EDIT	54:9f:35:09:80:f5	Unavailable EDIT	Management EDIT	...	Unavailable
r10i41	2	Down	Unavailable EDIT	54:9f:35:09:80:f6	Unavailable EDIT	Management EDIT	...	Unavailable
r10i41	3	Down	Unavailable EDIT	54:9f:35:09:80:f7	Unavailable EDIT	Management EDIT	...	Unavailable
r10i41	8	Down	192.168.2.1	f4:52:14:58:4c:50	255.255.255.0	Cluster	...	40 Gbit/s
r10i41	9	Up	192.168.21.41 EDIT	f4:52:14:58:4c:51	255.255.255.0 EDIT	iSCSI EDIT	...	40 Gbit/s
r10i41	6	Up	192.168.22.41 EDIT	f4:52:14:64:28:20	255.255.255.0 EDIT	iSCSI EDIT	...	40 Gbit/s
r10i41	7	Up	192.168.23.41 EDIT	f4:52:14:64:28:21	255.255.255.0 EDIT	iSCSI EDIT	...	40 Gbit/s
r10i41	4	Down	192.168.1.1	f4:52:14:64:28:70	255.255.255.0	Cluster	...	40 Gbit/s
r10i41	5	Up	192.168.20.41 EDIT	f4:52:14:64:28:71	255.255.255.0 EDIT	iSCSI EDIT	...	40 Gbit/s
Page 1 of 2								Displaying 1 - 10 of 20

At the top of the screen, information is displayed for the DAAD Cluster Name (or DAAD Host Name, depending on your configuration), the time zone, the NTP Server address, Gateway address, and DNS. The columns in the screen display the following information:

- Cluster Node (HA systems only) — Identifies the node of the cluster
- Port — Number of the Ethernet port for this host
- Status — Connection status for the port: Up, Down, or Unavailable
- IP Address — IP address for the node port. Click Edit to change the address.

  NOTE: If a port is in Cluster mode, the IP address, subnet mask, and mode are not editable.

- Port Address — WWPN for Fibre Channel, IQN for iSCSI, or GUID for InfiniBand/SRP
- Subnet Mask — Click Edit to change the subnet mask address.

- Mode — Management, iSCSI, or Cluster. Click Edit to switch between Management and Cluster modes.
- MTU — Maximum Transmission Unit size: 1,500 or 9,000 bytes
- Link Speed — Data transmission speed for the network link, in Gbps

Remote access

> **NOTE:** In HA environments, set remote access on both nodes. Log into the first node and set remote access, and then log into the second node and set remote access.

You can configure users' and hosts' remote access settings here.

- *Agent Push Frequency* (optional) — Indicates the number of seconds between pushes (uploads) of data from Fusion ioMemory modules to the Dell Acceleration Appliance for Databases host, with the default at 15 seconds. Increasing this number makes updates less frequent (and history/report information less detailed). Decreasing this number makes updates more frequent, but this could affect performance if you are using many clients (more than 20 or 30, for example).
- Host Name — In the dropdown list, enter or click an IP address that does not change in an uncontrolled way (such as a DHCP lease that expires). This address is used by Agent services to communicate to the Dell Acceleration Appliance for Databases Server. For tips on selecting a host name, click the blue icon next to Host

Name. See Setting the Hostname and Routing Information in the *Dell Acceleration Appliance for Databases Configuration Guide* for information about host name requirements.

- Port — By default, the port is set to 443; you can change the port depending on your requirements
- Pre-configured SSL Certificate (less secure) — A pre-configured certificate is provided but results in untrusted certificate messages. It is less secure than using a certificate made specifically for your server that is signed by a trusted CA.
- Custom SSL Certificate (more *secure)* — Click this option to update your own Key, Certificate, and optional CA Chain. With this option is clicked, **Save Changes** is disabled until the Key and Certificate values are specified.

Agents

Dell Acceleration Appliance for Databases automatically grants access to agents, so further configuration with the Agents feature is not necessary.

Database

> **NOTE:** In HA environments, any changes you make to the History Database configuration need to be made on both nodes. Log into the first node and change the History Database configuration, and then log into the second node and make the same configuration changes.

Click the Database link at the left of the Settings screen to view the History Database dialog box.

History Database

Manage various aspects of the database.

History Database Size

Current Database Size	900.1KB
Keep Historical Data	360 days
	Estimated database size: 13.0MB

Save Changes

The History Database captures the raw performance data that is used in Dell Acceleration Appliance for Databases reports, such as bandwidth, IOPS, temperature, and endurance.

To adjust the size of your history database:

1 In the Keep Historical Data field, specify how many days to include in the historical data.

   By default, the last 30 days of data are kept; the maximum is two years (730 days). The estimated database size is calculated as you change the number of days' worth of data.

2 **Click** Save Changes.

Saved searches

> **NOTE:** In HA environments, create saved searches on both nodes. Log into the first node and create your saved searches, and then log into the second node and create the same saved searches.

The Saved Searches link enables you to retrieve searches that have been saved by any user of the Dell Acceleration Appliance for Databases. .
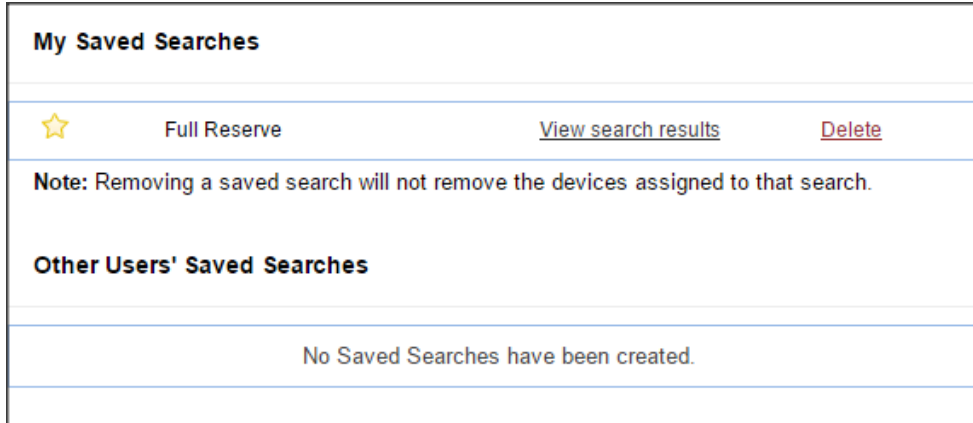
You can click **View search results** to see the results in the Fusion ioMemory screen.

To delete a saved search (but not its devices):

1   Click the Delete link. A Delete confirmation message is displayed:
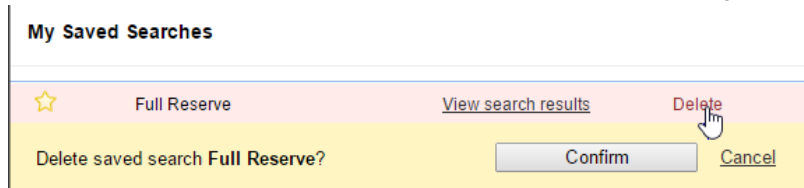
2   Click Confirm to complete the deletion. A success message is displayed:
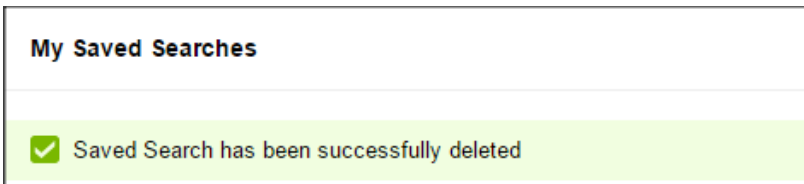
3   To delete a search that was created by another user, you must be logged in as an Admin role.

Users

The Users links help you create and manage user accounts and user roles.

Local accounts

> **NOTE:** In HA environments, create the local account on both nodes. Log into the first node and create the local account, and then log into the second node create the local account.

Click the Local Accounts link to view the Local Accounts dialog box.
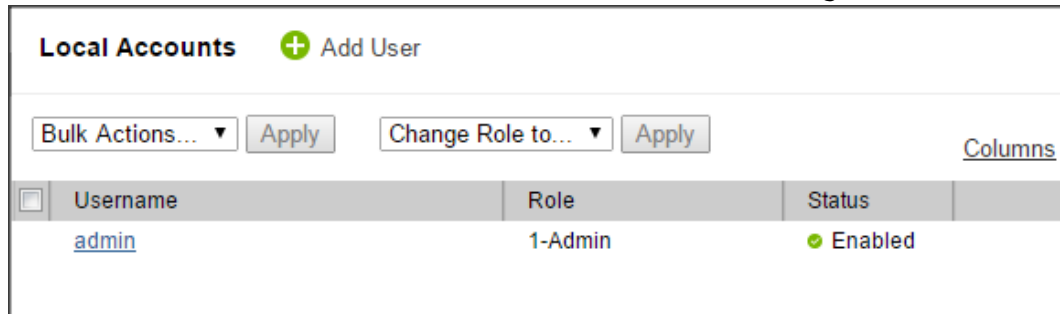
To add a user:

1 Click **Add User**. The Add User dialog box is displayed.
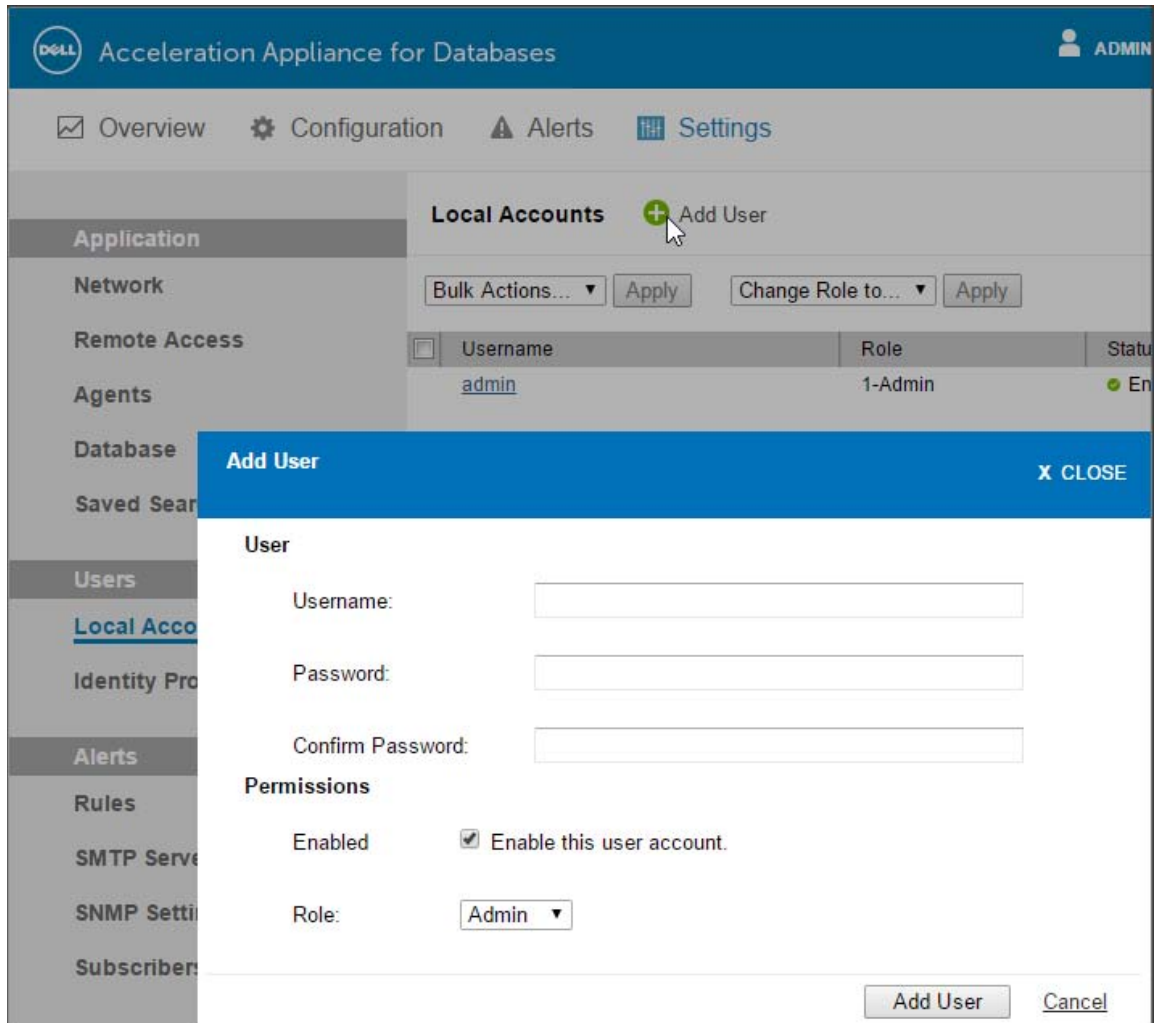
2 Enter a unique username and password, and then confirm the password.

The **Enable this user account** box is checked by default. If you want to create this account but have it be disabled, clear the checkbox.

3 In the Role list, click the role for the user: **Admin** (allowed to see and perform all operations) or **Monitor** (view-only access; cannot perform configuration operations).

4 Click **Save**.

To *edit* a username, click **Username** and type the new name.

To *delete* a user, click the corresponding **Delete** link.

Bulk actions

Using the checkboxes next to each user, you can click an action to apply to all the selected users. The bulk actions are Enable, Disable, and Delete; the Roles are Admin and Monitor. Rights for the selected role are automatically applied to each selected user.
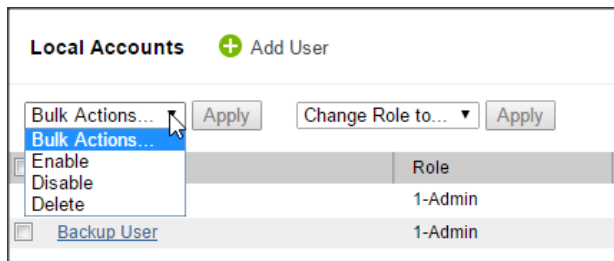
Changing passwords

> **NOTE:** In HA environments, change the user password on both nodes. Log into the first node and change the password, and then log into the second node and change the password.

To change a user password, click a username in the screen. To change your password while you are logged in, click your user name on the upper right corner of the screen. Either action displays the Edit User dialog box.

1 **Click** Change Password.

2 Type the old password and new password, and then confirm the new password.

3 Click Save Changes.

> **NOTE:** If you change another user's password, you do not need to enter the old password, and you must be the Dell Acceleration Appliance for Databases Admin. However, when you change the admin's account password, you must enter the old password.
>
> If you forget your admin password, you can reset it by running setup password at the command line. For details, see the *Dell Acceleration Appliance for Databases CLI Reference Guide*.

Columns

The default columns for the Local Accounts screen are Role, Status, and Delete. To change the columns that are displayed, click the Columns link and clear or check the boxes as desired. Then click Update Columns to save the changes.
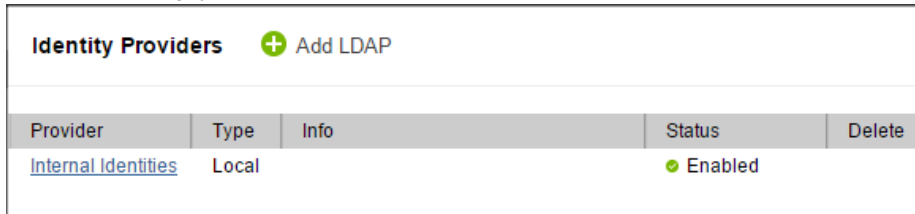
Identity providers (LDAP)

> **NOTE:** In HA environments, add identity providers on both nodes. Log into the first node and add your identity providers, and then log into the second node and add the same identity providers.

Currently, Dell Acceleration Appliance for Databases supports internal identities and LDAP identity providers:

To add or change internal identities for Dell Acceleration Appliance for Databases, click **Internal Identities**. The Local Accounts screen is displayed, where you can add or change internal accounts. See Local accounts on page 86.

LDAP

- To add an LDAP provider, click the Add LDAP link. The Add LDAP wizard opens so you can configure the connection, add mapping and roles, test LDAP settings, and add additional LDAP settings.
- To edit an LDAP entry, click its Provider link.
- To delete an LDAP entry, click the Delete link next for the provider.

  > **NOTE:** For more information on setting up LDAP providers, refer to the Fusion ioSphere Management Solution documentation available at dell.com/support/home

Alerts

The Alerts menu helps users manage Dell Acceleration Appliance for Databases alerts.

About rules

Here you can create, edit, and review rules that generate alerts.

> **NOTE:** For basic information on alerts, see Handling DAAD alerts on page 77.

Alert Rules	⊕ Add Rule				
All	⚠ Warnings	✖ Errors	ⓘ Info		
Alert	**Description**		**Creator**	**Status**	**Delete**
ⓘ Cluster degraded.	A host has left the Cluster.		Manage...	✔ Enabled	
✖ Host left the Cluster.	The host has left the Cluster.		Manage...	✔ Enabled	
ⓘ Cluster restored.	The Cluster has been restored.		Manage...	✔ Enabled	
✖ The appliance left the cluster d	Refer to the Knowledgebase, User Guides, or Customer ...		Manage...	✔ Enabled	
✖ Kernel error on cluster node	The cluster node has encountered a kernel error and sho...		Manage...	✔ Enabled	
✖ Split Brain.	Multiple cluster hosts believe they are active and the othe...		Manage...	✔ Enabled	
✖ Unsupported device firmware	A system device is operating with unsupported firmware. ...		Manage...	✔ Enabled	
✖ Cluster communication unavail	The redundant cluster communication link is down.		Manage...	✔ Enabled	
✖ Fatal hardware failure	A non-correctable hardware failure has been detected an...		Manage...	✔ Enabled	
⚠ Kernel crash detected	A kernel crash has been detected and the system has be...		Manage...	✔ Enabled	
◀◀ ◀ Page 1 of 13 ▶ ▶◀ 🔁				Displaying 1 - 10 of 121	

The following columns are available:

- Alert — Name of the alert
- Description — Cause for the alert, or additional information
- Creator — Source of the alert rule
- Status — Enabled or Disabled
- Delete — A delete link for each custom-created rule (system rules cannot be deleted)

Adding rules
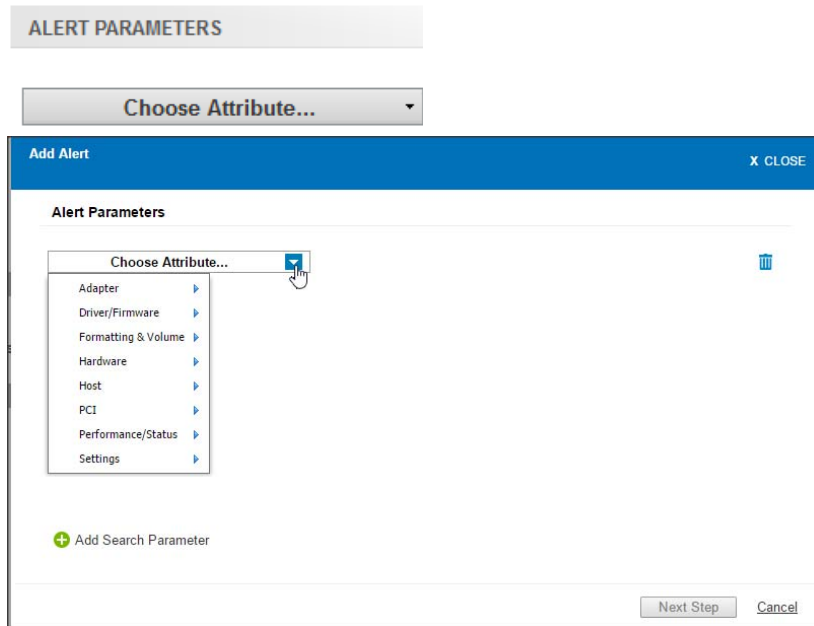
> **NOTE:** In HA environments, add custom alert rules on both nodes. Log into the first node and add your rules, and then log into the second node and add the same custom alert rules.

To add a custom alert rule that sends the specified alert,

1   Click the Add Rule link. The Add Alert dialog box is displayed.

2   Click Add search parameter. The Choose Attribute button is displayed.

> If you need to add more attributes for your alert rule, click the Add Search Parameters link as many times as necessary.

3   Click **Choose Attribute** and click an attribute from the drop-down menu.

Repeat the process for any additional Choose Attribute buttons you have displayed. (Conditions for all attributes must be met in order for the alert to be sent.)

4   If you need to remove an attribute from the search, click the 🗑 icon next to it.

5   Click **Next** Step to view the Add Alert dialog box.

6   In the Alert Type box, click **Info**, **Warning**, or **Error**.

7   Type the Alert Name (to display in column 1 of the Alert Rules screen) and the Alert Description (to display in column 2).Sp

8   Check **Enabled** to enable the alert rule.

> **NOTE:** If you need to go back and change the parameters you selected, click **Edit Parameters** and make the necessary changes.

9   Click **Add Alert** to add the alert rule.

Editing and deleting custom alert rules

- To edit a custom rule entry, click **Rule**.
- To delete a custom rule entry, click **Delete**.

Only custom rules can be modified and deleted; you cannot change system rules.

SMTP server

> **NOTE:** In HA environments, configure the SMTP server on both nodes. Log into the first node and configure the SMTP server, and then log into the second node and configure the SMTP server.

In order for Dell Acceleration Appliance for Databases to send alert emails, you must first configure the SMTP server settings here.

SMTP Server

An SMTP server is required to receive alert notifications.

Sender

Sender Name: (optional)

Sender Email:

SMTP Server Address

Server Host Name:

Server Port Number: 25

Use SSL: ☐ Yes, use SSL.

Authentication
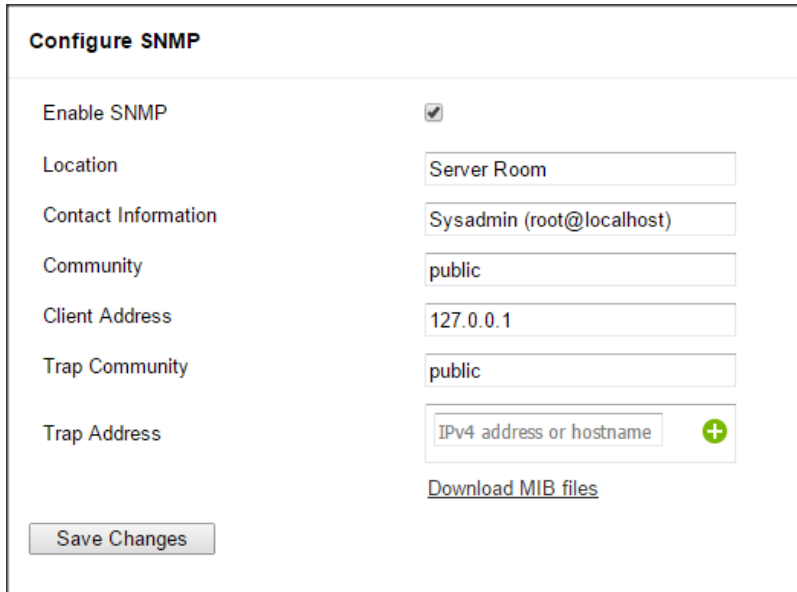
Username:

Password:

Save Changes

Type the information in the fields on the SMTP Server dialog box and click **Save Changes**. All fields are required except Sender Name and Use SSL.

SNMP settings

The Configure SNMP screen enables you to configure SNMP for the Dell Acceleration Appliance for Databases. If you already have the Dell Acceleration Appliance for Databases cluster, the settings are automatically copied to all of the cluster nodes.

To configure SNMP:

1. To disable SNMP (enabled by default), clear the Enable SNMP checkbox.

2. In the Location field, enter the SNMP host or cluster name. By default, this field contains the host or cluster name assigned in the First Boot process.

3. To specify contact information (such as an e-mail address) for the person being notified of the SNMP traps, complete the Contact Info field.

4. To identify the SNMP community who can access the appliance, complete the Community field. The default value is public.

5. In Client Address, specify the IP address, or address mask, for where the SNMP traps should be sent.

6. To identify the SNMP community where SNMP traps are sent, complete the Trap Community field. The default value is public.
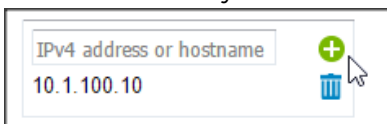
7. To specify the address where SNMP traps are sent, enter the IPv4 address or hostname in the Trap Address field.

   To specify an additional address (up to four may be used), click the ⊕ icon to display another entry field:

To delete an SNMP trap address, click the 🗑 icon to the right of the entry.

8   You can click **Download MIB files** to download a .zip file containing the main `.MIB` file (`fioIoDimm.MIB`) and supporting files to your default download folder. The `fioIoDimm.MIB` file is discussed in SNMP MIB information on page 117.

9   Click Save Changes.

Subscribers

> **NOTE:** In HA environments, add subscribers on both nodes. Log into the first node and add your subscribers, and then log into the second node and add the same subscribers.

Dell Acceleration Appliance for Databases can send email alerts to standard or SMS email addresses. After configuring the SMTP server settings, you can create subscribers and assign them to receive specific alerts.

To add a Subscriber:

1   Click **Add Subscriber** at the top of the Subscriber screen to display the Add Subscriber dialog box.

2   In the Email field, enter a standard or SMS email address to designate where the alerts are to be sent.

3   Optionally, enter the subscriber name. You can also disallow alert notifications to the subscriber; they are enabled by default.

4   To notify this subscriber when an alert is set or cleared, check the corresponding box under **Notify when Set and Cleared**. When the **Set** box is clicked, the **Cleared** box can also be clicked.

Editing and deleting subscribers

In the Subscribers page:

- To edit a subscriber, click the subscriber email address link.

- To delete a subscriber, click the **Delete** link next to the subscriber.

    NOTE: Most mobile carriers offer free Email-to-SMS gateways that can be used to forward simple text emails to mobile phones. Check with your provider to determine your Email-to-SMS email address.

Glossary of terms

Host — Refers to an independent machine that may or may not contain Fusion ioMemory devices.

Initiator — An initiator of I/O is analogous to a client in a client/server system. Initiators use a SCSI transport protocol to access block storage over a network. A database or mail server is an initiator, for example.

InfiniBand GUID — Port identifier for InfiniBand/SRP, in a format similar to this: 0002:c903:004c:7535

IQN — iSCSI Qualified Name for a port, consisting of IQN, the date in YYYY-MM format, the reversed domain name (such as org.acme), and an optional storage target name.

LUN — Logical Unit Number. A LUN is usually synonymous with a virtual volume or physical disk drive. In Dell Acceleration Appliance for Databases, a LUN is an exported path of Dell Acceleration Appliance for Databases volume, between the DAAD target port and the client initiator port. One Dell Acceleration Appliance for Databases volume can have multiple LUNs.

Port — A physical location on a piece of hardware in a slot. For example, a target port may be referenced as slot 1, port 1.

Storage Pool — An aggregation of Fusion ioMemory or RAID block devices. Block devices can be added to a pool. Pools are created by a storage profile, and they may reside on the Dell Acceleration Appliance for Databases host or HA cluster. For HA, storage pools are created on both nodes of a cluster but are referenced on only one of the HA nodes.

Storage Profile — A pre-determined group of settings that the user selects when creating a storage pool. The storage profile is an attribute of the storage pool.

Target — The opposite of an initiator. It is a receiver of I/O operations, analogous to a server in a client/server system. The target for I/O is the provider of (network) storage — a SAN disk array is a traditional target. Dell Acceleration Appliance for Databases is an all-flash storage target by comparison.

Volume — A logical construct identifying a unit of data storage. A volume is allocated to allow for expandability within the space constraints of a pool. For Dell Acceleration Appliance for Databases, a volume is not necessarily directly linked to a physical device.

WWPN — World-Wide Port Number; an ID that uniquely identifies a Fibre Channel port.

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Contacting technical support

Dell Acceleration Appliance for Databases drivers, utilities, and related documentation are available at:

dell.com/support/home

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To get help with your Fusion ioMemory devices, contact your Dell Technical Service representative or access the Dell Support website.

Choose the method of contacting Dell that is convenient for you.

> **NOTE:** The safety information that shipped with your system provides important safety and regulatory information. Warranty information may be included within this document or as a separate document.

Appendix A: WEEE Advisement disposal

In 2002 the European Union introduced the Directive on Waste Electrical and Electronic Equipment (WEEE). The main aim of the Directive is to ensure that WEEE is collected and treated separately. WEEE may contain hazardous substances that should not end-up in the (human) environment and can have adverse effects on it if they do.

Furthermore, WEEE is a vast source of raw materials. With the ever rising worldwide demand for new equipment and the ever decreasing volume of natural raw materials, letting this potential source go to waste is unacceptable.

If equipment is collected separately, the equipment can be recycled and up to 85 to 90% of the equipment can be re-used as new material, saving the use of virgin raw materials and energy of producing these.

For reasons, Dell expects customers to dispose of the material in an environmentally friendly way. Electrical and Electronic Equipment is labeled with the following crossed-out, wheeled-bin symbol indicating that the equipment should be disposed of, by the end user, separate from other types of waste.

The EU Directive and national legislation define various situations and financing options for doing so. Customers should contact their sales representative/dealer/distributor and our company on disposal, collection and recycling options and terms and conditions in your country.

Appendix B: System alert rules and alert parameters

This appendix lists the Error and Warning alerts for Dell Acceleration Appliance for Databases, as well as parameters or attributes you can use to build custom alerts.

Errors

Table B-1. Dell Acceleration Appliance for Databases Errors

Alert	Description
Host left the ION Cluster.	Host left the ION Cluster.
The appliance left the cluster due to an unexpected failure.	Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Missing ioMemory	The cache Fusion ioMemory device is missing and is not functional. Ensure that the Fusion ioMemory device is present in the appliance. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Kernel error on cluster node	The cluster node has encountered a kernel error and should be restarted to correct the problem.
Configuration Error	An error occurred while performing a configuration operation.
Cluster communication unavailable	The redundant cluster communication link is down.
Fatal hardware failure	A non-correctable hardware failure has been detected and the hardware may need to be replaced. Refer to Customer Support to correct the problem.
Incompatible PCI slot bandwidth	The bandwidth of the PCI slot is incompatible with the Fusion ioMemory device. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Partially write throttled. Reason unavailable.	The Fusion ioMemory device has reduced its write performance. No reason given. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Partially write throttled. User requested.	The Fusion ioMemory device has reduced its write performance. Write throttling set by user. Correct this condition to restore write operations.
Partially write throttled. Out of index space.	The Fusion ioMemory device has reduced its write performance. Out of index space. Promptly replace the device after backing up its data.

Table B-1. Dell Acceleration Appliance for Databases Errors (continued)

Alert	Description
Partially write throttled. Out of available memory.	The Fusion ioMemory device has reduced its write performance. Out of available memory. Increase the amount of server memory or reduce the number of running applications, then restart to continue.
Partially write throttled. Groomer failure.	The Fusion ioMemory device has reduced its write performance. Groomer could not free enough blocks to continue. Review the errors in the driver logs and correct this prior to restarting. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Partially write throttled. Hardware failure experienced.	The Fusion ioMemory device has reduced its write performance. NAND chip hardware failure experienced. Promptly replace the device after backing up its data.
Partially write throttled. Close to wearout.	The Fusion ioMemory device has reduced its write performance. Close to wearout. Formatting to a smaller size frees up reserve. Replace the device after backing up its data, or refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Partially write throttled. Power limit.	The Fusion ioMemory device has reduced its write performance. The Fusion ioMemory device exceeds the PCIe power specification. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Partially write throttled. No auxiliary power.	The Fusion ioMemory device has reduced its write performance. No auxiliary power cable is connected. Shut down and power off the server, connect the auxiliary power cable to the device, and restart the server.
Partially write throttled. Internal failure.	The Fusion ioMemory device has reduced its write performance. Internal failure. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Completely write throttled. User requested.	The Fusion ioMemory device is not allowing write operations. Write throttling set by user. Correct this condition to restore write operations.
Completely write throttled. Reason unavailable.	The Fusion ioMemory device is not allowing write operations. No reason given. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.

Table B-1. Dell Acceleration Appliance for Databases Errors (continued)

Alert	Description
Completely write throttled. Internal failure.	The Fusion ioMemory device is not allowing write operations. Internal failure. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Completely write throttled. Close to wearout.	The Fusion ioMemory device is not allowing write operations. Close to wearout. Formatting to a smaller size frees up reserve. Replace the device after backing up its data or refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Completely write throttled. Hardware failure experienced.	The Fusion ioMemory device is not allowing write operations. NAND chip hardware failure experienced. Promptly replace the device after backing up its data.
Completely write throttled. Power limit.	The Fusion ioMemory device is not allowing write operations. The Fusion ioMemory device exceeds the PCIe power specification. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Completely write throttled. No auxiliary power.	The Fusion ioMemory device is not allowing write operations. No auxiliary power cable is connected. Shut down and power off the server, connect the auxiliary power cable to the device, and restart the server.
Completely write throttled. Out of available memory.	The Fusion ioMemory device is not allowing write operations. Out of available memory. Increase the amount of server memory or reduce the number of running applications, then restart to continue.
Completely write throttled. Groomer failure.	The Fusion ioMemory device is not allowing write operations. Groomer could not free enough blocks to continue. Review the errors in the driver logs and correct this prior to restarting. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Completely write throttled. Out of index space.	The Fusion ioMemory device is not allowing write operations. Out of index space. Promptly replace the device after backing up its data.
Volume access inconsistency on ION Cluster.	The volume does not have the same initiator access on each of the cluster hosts.

Table B-1. Dell Acceleration Appliance for Databases Errors (continued)

Alert	Description
ioMemory Inconsistency on ION Cluster.	Cluster hosts have Fusion ioMemory devices that differs in count, type, or capacity.
Split Brain	Multiple cluster hosts believe they are active and the other is offline.
Internal error	The Fusion ioMemory device has encountered an internal error and has been temporarily disabled. All Reads and Writes fail. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
VCCaux voltage is out of range.	VCCaux voltage is out of range. All Reads and Writes fail. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Temperature at a critical level.	The temperature of this device is at a critical threshold. All Reads and Writes fail. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Incompatible PCI slot bandwidth	The bandwidth of the PCI slot is incompatible with Fusion ioMemory. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Flashback protection not available.	The Fusion ioMemory device has exhausted its flashback protection. Promptly replace the device after backing up its data. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Temperature has surpassed a critical level.	The temperature of this device has surpassed a critical threshold. All Reads and Writes fail. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
PCI express non-correctable errors were encountered.	PCIe non-correctable errors were encountered. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Unsupported device firmware	A system device is operating with unsupported firmware. Download the system logs and refer to Customer Support to correct the problem.

Table B-1. Dell Acceleration Appliance for Databases Errors (continued)

Alert	Description
VCCint voltage is out of range.	VCCint voltage is out of range. All Reads and Writes fail. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Volume has diverged from its peer.	Volume has diverged from its peer.
Volume Inconsistency on ION Cluster.	The volume does not exist on all cluster hosts.
RAID is in a failed state.	Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Pool is in a failed state due to failed RAID.	Pool is in a failed state due to failed RAID.
Storage Pool Inconsistency on ION Cluster.	The storage pool does not exist on all cluster hosts.
Host clock drastically out of sync.	The host's clock is over a day different from the management server's clock. Operations requiring a license may exhibit undefined behavior.
Temperature exceeding threshold.	The temperature sensor is exceeding its threshold. Provide more cooling to the area.
Chassis cooling is insufficient.	The chassis cannot properly cool all components. Repair or install cooling devices.
The power supply has failed.	The power supply has failed. Repair or replace the power supply.
Chassis power is insufficient.	The chassis cannot properly supply power to all components. Repair or install power supplies.
The fan has failed.	The fan has failed. Repair or replace the fan.
Boot RAID is in a failed state.	Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.

Warnings

Table B-2. Warning Alerts

Alert	Description
Host clock out of sync.	The host's clock is over an hour different from the management server's clock. Data graphs may exhibit undefined behavior.

Table B-2. Warning Alerts (continued)

Alert	Description
Kernel memory problem	A kernel memory problem has been detected and the system should be restarted to correct the problem. Download the system logs and send to Customer Support for further review.
Pool has a RAID which has no spares and is vulnerable if a subsequent failure occurs.	Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Temperature high.	The temperature of this device is approaching a critical threshold. If exceeded, further write operations are prevented. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Missing LEB map.	The Fusion ioMemory device is missing a LEB map. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Lifespan write governing activated.	Write lifespan governing activated, performance may be limited. If this condition persists, reduce write load or consider an Fusion ioMemory device with a higher volume rating. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Power loss protection disabled.	Power loss protection has been disabled on this device, introducing the risk of data corruption in the event of a power failure. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Close to wearout.	The Fusion ioMemory device is close to wearing out — reduced-write mode is triggered when reserve is depleted.
Media upgrade in progress.	A media upgrade is in progress. The Fusion ioMemory device is not usable until it is low-level formatted. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Power write governing activated.	Power write governing activated, performance may be limited. If this condition persists, switch to a higher powered PCIe slot or attach external power cable.
Sub-optimal PCI slot bandwidth.	The bandwidth of the PCI slot is not optimal for the Fusion ioMemory device. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.

Table B-2. Warning Alerts (continued)

Alert	Description
Reserve is depleted.	The Fusion ioMemory device reserve is depleted — reduced-write or read-only mode is triggered when device is attached. Formatting to a smaller size frees up reserve. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Over PCIe power budget alarm triggered.	Over PCIe power budget alarm triggered. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Thermal write governing activated.	Thermal write governing activated, performance may be limited.
PCI errors	PCIe correctable errors were encountered. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Minimal mode: Unknown reason	The Fusion ioMemory device is currently running in a minimal state. Unknown reason. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Minimal mode: Hardware failure.	The Fusion ioMemory device is currently running in a minimal state. Device has a hardware failure. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Minimal mode: Channel init fail.	The Fusion ioMemory device is currently running in a minimal state. General channel initialization failure. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Minimal mode: Driver out of date.	The Fusion ioMemory device is currently running in a minimal state. The currently installed version of the driver is not compatible with this device. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Minimal mode: Firmware out of date	The Fusion ioMemory device is currently running in a minimal state. The firmware on this device is not compatible with the currently installed version of the driver. Please use the Update Firmware operation to update the firmware. Otherwise, refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.

Table B-2. Warning Alerts (continued)

Alert	Description
Minimal mode: Unsupported NAND.	The Fusion ioMemory device is currently running in a minimal state. Device has unsupported NAND. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Minimal mode: Insufficient memory.	The Fusion ioMemory device is currently running in a minimal state. Device is currently running in a minimal state because there is not enough memory to load the driver. Add additional memory or disable the page file on this device if the page file is enabled. Otherwise, refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Minimal mode: Internal problem.	The Fusion ioMemory device is currently running in a minimal state. Device has encountered an internal error and is currently running in a minimal state. Refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Minimal mode: Insufficient power.	The Fusion ioMemory device is currently running in a minimal state. Device requires supplemental power. Power down the computer, connect the supplemental power adapter to the device, and restart the computer. Otherwise, refer to the Knowledge Base, User Guides or Customer Support to resolve the problem.
Minimal mode: SMP boot mode.	The Fusion ioMemory device is currently running in a minimal state. Device is in SMP bootloader mode. Attempt to update the firmware. Otherwise, refer to the Knowledge Base, User Guides or Customer Support to correct the problem.
Minimal mode: Card limit exceeded.	The Fusion ioMemory device is currently running in a minimal state. Only a limited number of this type of device may be used on this system. Refer to the Knowledge Base, User Guides or Customer Support to correct the problem.

Table B-2. Warning Alerts (continued)

Alert	Description
Minimal mode: User forced.	The Fusion ioMemory device is currently running in a minimal state. The Fusion ioMemory device is currently running in a minimal state because it was placed in that state by a user. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Minimal mode: Dual plane not supported.	The Fusion ioMemory device is currently running in a minimal state. Device has been configured for dual-plane mode but does not support dual-plane mode. Refer to the Knowledge Base, User Guides or Customer Support to correct the problem.
Minimal mode: Missing midprom data.	The Fusion ioMemory device is currently running in a minimal state. Device is missing midprom data. Refer to the Knowledge Base, User Guides or Customer Support to correct the problem.
Minimal mode: Unsupported Operating System.	The Fusion ioMemory device is currently running in a minimal state. Device does not function on the current operating system. Contact customer support for assistance.
Minimal mode: Fallback firmware.	The Fusion ioMemory device is currently running in a minimal state. Board running on FALLBACK firmware image. Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Power write governing activated.	Power write governing activated, performance may be limited. If this condition persists, switch to a higher powered PCIe slot or attach external power cable.
Cluster communication degraded	A single path of the redundant cluster communication link is disconnected.
Thermal write governing activated.	Thermal write governing activated, performance may be limited. If this condition persists, increase air flow, lower room temperature or reduce write load.
System problem detected	The system has encountered an unexpected issue and a restart is recommended to correct the problem. If this condition persists, refer to Customer Support for further review.
Pool is running in a degraded state due to failed RAID (not rebuilding).	Pool is running in a degraded state due to failed RAID (not rebuilding).

Table B-2. Warning Alerts (continued)

Alert	Description
Pool is running in a degraded state due to failed RAID and is rebuilding.	Pool is running in a degraded state due to failed RAID and is rebuilding.
RAID has no spares and is vulnerable if a subsequent failure occurs.	Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Volume is not in sync with its peer.	Check the status of each host in the cluster and restart or repair the failed cluster host. Otherwise, refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Volume is re-synchronizing with its peer.	Volume is re-synchronizing with its peer.
A port is disconnected.	A port is disconnected.
RAID is running in a degraded state (not rebuilding).	RAID is running in a degraded state (not rebuilding).
RAID is running in a degraded state and is rebuilding.	Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
A previously connected port has been disconnected.	A previously connected port has been disconnected.
Some of the previously connected ports have been disconnected.	Some of the previously connected ports have been disconnected.
Chassis cooling is not redundant.	One or more fans do not have a backup. Repair or install redundant fans.
Temperature near threshold.	The temperature sensor is nearing its threshold. Provide more cooling to the area.
Non-critical power supply condition.	A non-critical condition is present on the power supply. Repair or replace the power supply.
Non-critical fan condition.	A non-critical condition is present on the fan. Repair or replace the fan.
Chassis power is not redundant.	One or more power supplies do not have a backup. Repair or install redundant power supplies.
Boot RAID is running in a degraded state (not rebuilding).	Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.
Boot RAID has no spares and is vulnerable if a subsequent failure occurs.	Refer to the Knowledgebase, User Guides, or Customer Support to correct the problem.

Alert parameter attributes

These attributes are available in the **Choose Attributes** drop-down menus of the Add Rule dialog box, in the Settings tab.

Table B-3. Alert Parameter Attributes

Category	Alert Attribute
Adapter	Adapter Board Kind, Adapter PCI Slot Power, Adapter PCIe Bandwidth, Adapter PCIe Link Speed, Adapter PCIe Link Width, Adapter S/N, External Power, Min Volts, PCIe Power Limit, Peak Amps, Peak Volts, Peak Watts, Power Amps, Power Monitoring, Power Volts, Power Watts
Cluster	Cluster IP Address, Cluster Name
Driver Firmware	Current Firmware Revision, Current Firmware Version, Driver Version, Minimum Firmware Revision
Formatting & Volume	Format UUID, Formatted Size, Sector Count, Sector Size
Hardware	Alt Part Number, Board Kind, Device Label, Device Name, Device S/N, ECC Bytes per Codeword, ECC Num Bits Correctable, Factory Capacity, Location within Adapter, Part Number, Port within Adapter, Product Name, Product SKU, Product Serial Number, Fusion ioMemory S/N
Host	Agent Version, Host IP, Host OS, Host Offline Since, Host Online, Hostname, OS Native Trim Active, Trim Enabled, Trim Service Active
PCI	PCI Device ID, PCI Slot Number, PCI Slot Power, PCI Subsys Device ID, PCI Subsys Vendor ID, PCIe Bandwidth, PCIe Link Speed, PCIe Link Width
Performance/Status	Active Media, Alias, Current Operation, Current Operation Phase, Current Operation Progress, Current RAM Used, FPGA Temperature, Host Online, Peak RAM Used, Reserve Space, Session Read Ops, Session Write Ops, State, Total Physical Read, Total Physical Written, Fusion ioMemory
Settings	Beacon Status, Swap Support

Appendix C: SNMP MIB information

This appendix describes most of the fields in the `fioIoDimm.MIB` file included in the Dell Acceleration Appliance for Databases software. For more information on SNMP configuration, see

Table C-1. MIB Revision and Conditions

Name	Description	Data Type
`fusionIoDimmMibRevMajor`	MIB major version. This increments when incompatible structural changes occur.	Integer
`fusionIoDimmMibRevMinor`	MIB minor version. This increments when minor additions occur.	Integer
`fusionIoDimmMIBCondition`	Overall MIB condition	1=other; 2=OK; 3=degraded; 4=failed

Table C-2. DimmInfo Data

Name	Description	Data Type
`fusionIoDimmInfoTable`	There is an entry in this table for each ioDrive device installed.	Sequence of `fusionIoDimmInfoEntry`
`fusionIoDimmInfoEntry`	Each entry represents an ioDrive device.	FusionIoDimmInfoEntry
`fusionIoDimmInfoIndex`	Unique index for ioDrive entries	Integer (1-256)
`fusionIoDimmInfoStatus`	Overall status of the ioDrive device	1=other; 2=OK; 3=degraded; 4=failed
`fusionIoDimmInfoName`	System control device name for this device	Display string (0-25)
`fusionIoDimmInfoSerialNumber`	Serial number of this device	Display string (0-50)
`fusionIoDimmInfoPartNumber`	System part number of this device	Display string (0-50)

Table C-2. DimmInfo Data (continued)

Name	Description	Data Type
`fusionIoDimmInfoSubVendorPartNumber`	Sub-vendor system part number of this device	Display string (0-50)
`fusionIoDimmInfoSparePartNumber`	Spare part number of this device	Display string (0-50)
`fusionIoDimmInfoAssemblyNumber`	Assembly number of this device (HW revision)	Display string (0-50)
`fusionIoDimmInfoFirmwareVersion`	Firmware version of this device	Display string (0-50)
`fusionIoDimmInfoDriverVersion`	Device driver version	Display string (0-50)
`fusionIoDimmInfoUID`	Device UID written at format time	Display string (0-50)

Table C-2. DimmInfo Data (continued)

Name	Description	Data Type

`fusionIoDimmInfoState`	Current state of the attached client device. In order to function normally, the device must be in the attached state.
	
	Quiescent states:
	
	attached = device is ready for normal use;
	
	detached = device is stopped;
	
	minimal = Fusion ioMemory VSL software is loaded but firmware needs updating;
	
	error = device is not working properly
	
	Transitional states:
	
	attaching = device is initializing;
	
	scanning = part of device initialization;
	
	detaching = device is stopping;
	
	formatting = the format operation is in process;
	
	updating = the firmware is being updated
	
	Operations:
	
	attach = make device operational;
	
	detach = take device off-line;
	
	format = re-formats device;
	
	update = firmware update
	
	The device state must be minimal or detached to update the firmware and must be detached in order to format.
		Integer:
		
		unknown(0)
		
		detached(1)
		
		attached(2)
		
		minimal(3)
		
		error(4)
		
		detaching(5)
		
		attaching(6)
		
		scanning(7)
		
		formatting(8)
		
		updating(9)
		
		attach(10)
		
		detach(11)
		
		format(12)
		
		update(13)

Table C-2. DimmInfo Data (continued)

Name	Description	Data Type
fusionIoDimmInfoClientDeviceName	Name of the attached client device.	Display string (0-25)
fusionIoDimmInfoBeacon	Writing a true value here turns on the LED flashing beacon for visual card identification. A false value turns the LED beacon off.	Boolean
fusionIoDimmInfoPCIAddress	Device address on the PCI bus	Display string (0-15)
fusionIoDimmInfoPCIDeviceID	Device PCI ID	Display string (0-25)
fusionIoDimmInfoPCISubdeviceID	Device PCI sub-device ID	Display string (0-25)
fusionIoDimmInfoPCIVendorID	Device PCI vendor ID	Display string (0-25)
fusionIoDimmInfoPCISubvendorID	Device PCI sub-vendor ID	Display string (0-25)
fusionIoDimmInfoPCISlot	Device PCI slot number	Display string (0-16)
fusionIoDimmInfoWearoutIndicator	True = device has surpassed the wearout threshold.	Boolean
fusionIoDimmInfoWritableIndicator	0 = Write-reduced; 1= non-writable (read-only); 2= normal; 3=unknown	Integer (0-3)
fusionIoDimmInfoInternalTemp	Current internal temperature of the device in degrees Celsius	Integer (-100-100)
fusionIoDimmInfoHealthPercentage	Estimate of the health of the drive expressed as the remaining percentage of drive life before write rate is reduced due to wearout. If the health percentage is not available, the value is set to -1.	Integer (0-100)
fusionIoDimmInfoShortTermWearoutDate	Obsolete	
fusionIoDimmInfoLongTermWearoutDate	Obsolete	
fusionIoDimmInfoShortTermNonWritableDate	Obsolete	
fusionIoDimmInfoLongTermNonWritable Date	Obsolete	

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Table C-2. DimmInfo Data (continued)

Name	Description	Data Type
fusionIoDimmInfoMinimalMode Reason	Reason the device is in minimal mode: 0=unknown; 1=firmware out of date; 2=low power; 3=dual-plane mode failed; 5=internal error; 6=card limit exceeded; 7=device not in minimal mode; 8= unsupported OS; 9= insufficient memory; 10= bootloader mode; 11= missing midprom; 12= unsupported NAND; 13= driver out of date	Integer (0-13)
fusionIoDimmInfoReducedWrit eReason	Reason the device is in reduced write mode: 0=none; 1=user request; 2= no metadata blocks; 3=out of memory; 4=die failure; 5= wearout; 6=limited adapter power; 7=internal error; 8=power limited; 9= unknown; 10=groomer failure	Integer (0-10)
fusionIoDimmInfoMilliVolts	Current voltage level of the PCIe 12-volt bus in millivolts. 0= value could not be determined.	Integer (0-65535)
fusionIoDimmInfoMilliVoltsP eak	Peak voltage level of the PCIe 12-volt bus in millivolts. 0= value could not be determined.	Integer (0-65535)
fusionIoDimmInfoMilliVoltsM in	Minimum voltage level of PCIe 12-volt bus in millivolts. 0= value could not be determined.	Integer (0-65535)
fusionIoDimmInfoMilliWatts	Current wattage drawn on the PCIe 12-volt bus in milliwatts. 0= value could not be determined.	Integer (0-65535)
fusionIoDimmInfoMilliWattsP eak	Peak wattage drawn on the PCIe 12-volt bus in milliwatts. 0= value could not be determined.	Integer (0-65535)

Table C-2. DimmInfo Data (continued)

Name	Description	Data Type
fusionIoDimmInfoMilliAmps	Amperage flowing on the PCIe 12-volt bus in milliamps. 0= value could not be determined.	Integer (0-65535)
fusionIoDimmInfoMilliAmpsPeak	Peak amperage flowing on the PCIe 12-volt bus in milliamps. 0= value could not be determined.	Integer (0-65535)
fusionIoDimmInfoAdapterType	Type of ioDimm adapter: 0=ioDrive; 1= ioDriveLowPro2; 2=ioDrive Duo; 3=ioSAN; 4=unknown; 5-ioOctal	Integer (0-5)
fusionIoDimmInfoAdapterPort	Port number of this ioDimm on the adapter. -1= the port number is not available.	Integer (-1-65535)
fusionIoDimmInfoAdapterSerialNumber	Serial number of the adapter where this ioDimm is connected.	DisplayString (0-50)
fusionIoDimmInfoAdapterExtPowerPresent	True=external power is connected on the adapter where this Fusion ioMemory module is connected.	Boolean
fusionIoDimmInfoPowerlossProtectDisabled	True=power loss protection is available but disabled.	Boolean
fusionIoDimmInfoInternalTempHigh	True=the internal temperature is nearing the maximum rating.	Boolean
fusionIoDimmInfoAmbientTemp	Current ambient temperature of the device in degrees Celsius.	Integer (-100-100)
fusionIoDimmInfoPCIBandwidthCompatibility	Bandwidth compatibility of the PCIe slot. If the value is not optimal, the status and condition variables are set accordingly. 0=incompatible; 16= suboptimal; 2048= optimal; 32768=unknown	Integer

Table C-2. DimmInfo Data (continued)

Name	Description	Data Type
`fusionIoDimmInfoPCIPowerCompatibility`	Power compatibility of the PCI-E slot. If the value is not optimal, the status and condition variables are set accordingly. 0=incompatible; 16= suboptimal; 2048= optimal; 32768=unknown	Integer
`fusionIoDimmInfoActualGoverningLevel`	Level of governing currently in effect on the device. This may be due to high temperature, power shortage, or to prolong life of the drive. 0=none; 1=light; 2= moderate; 3=heavy; 4= unknown	Integer
`fusionIoDimmInfoLifespanGoverningLevel`	Level of contribution for longevity. Governing may be impacted for the sake of prolonging longevity of the device. 0=none; 1=light; 2= moderate; 3=heavy; 4= unknown	Integer
`fusionIoDimmInfoPowerGoverningLevel`	Level of contribution due to lack of power. Governing may be impacted due to a lack of power available to the device. 0=no governing active; 1= light governing; 2= moderate governing; 3= heavy governing; 4= governing level unavailable	Integer

Table C-2. DimmInfo Data (continued)

Name	Description	Data Type
fusionIoDimmInfoThermalGove rningLevel	Level of contribution due to high temperatures. Governing may be impacted due to the device reaching high temperatures. 0=no governing active; 1= light governing; 2= moderate governing; 3= heavy governing; 4= governing level unavailable	Integer
fusionIoDimmInfoLifespanGov erning Enabled	Obsolete	Boolean
fusionIoDimmInfoLifespanGov erningTgtDate	Obsolete	Display string (0-25)
fusionIoDimmInfoInternalTem pCritical	True=temperature is at a critical level.	Boolean
fusionIoDimmInfoInternalTem pShutdown	True=temperature has surpassed a critical level, and the device shuts down.	Boolean
fusionIoDimmInfoPcieErrorsI ndicator	True=uncorrectable PCIe errors have been detected on the PCIe bus.	Boolean
fusionIoDimmInfoMissingLebM apIndicator	True=the device is missing a LEB map and cannot be attached.	Boolean
fusionIoDimmInfoVccIntError Indicator	True=the device is experiencing a VccInt out-of-range error.	Boolean
fusionIoDimmInfoVccAuxError Indicator	True=the device is experiencing a VccAux out-of-range error.	Boolean
fusionIoDimmInfoOverPowerIn dicator	True=the device is experiencing an over-power error. Plug in external power to solve the problem.	Boolean
fusionIoDimmInfoUpgradeInPr ogress Indicator	True=the device is currently in the process of being upgraded to a new major revision of the VSL driver.	Boolean

Table C-2. DimmInfo Data (continued)

Name	Description	Data Type
`fusionIoDimmInfoInternalTempHigh Threshold`	Threshold at which temperature is considered high (warning level), and temperature-high trap is fired	Integer
`fusionIoDimmInfoInternalTempCriticalThreshold`	Threshold at which temperature is at a critical level, and a critical temperature trap is fired	Integer
`fusionIoDimmInfoInternalTempShutdownThreshold`	Threshold at which temperature is at a shutdown level, and a critical temperature trap is fired	Integer
`fusionIoDimmInfoVirtualController Number`	Number of this virtual controller on the physical Fusion ioMemory device	Integer
`fusionIoDimmInfoVirtualControllerCount`	Total number of active virtual controllers on the physical Fusion ioMemory device	Integer
`fusionIoDimmInfoActiveMediaPercent`	Total active media on the device, as a percent	Integer

Table C-3. DimmExtn Data

Name	Description	Data Type
`fusionIoDimmExtnTable`	Fusion-io ioDrive extension table	Sequence OF FusionIoDimmExtnEntry
`fusionIoDimmExtnEntry`	Entry in the fusionIoDimmExtnTable	FusionIoDimmExtnEntry
`fusionIoDimmExtnIndex`	Unique index for the ioDrive extension table. There should be an entry in this table for each entry in the ioDrive table	Integer (1-256)
`fusionIoDimmExtnTotalPhysCapacityU`	Upper word of the total physical capacity in bytes	Counter
`fusionIoDimmExtnTotalPhysCapacityL`	Lower word of the total physical capacity in bytes	Counter

Table C-3. DimmExtn Data (continued)

Name	Description	Data Type
`fusionIoDimmExtnUseablePhys CapacityU`	Obsolete	Counter
`fusionIoDimmExtnUseablePhys CapacityL`	Obsolete	Counter
`fusionIoDimmExtnUsedPhysCap acityU`	Obsolete	Counter
`fusionIoDimmExtnUsedPhysCap acityL`	Obsolete	Counter
`fusionIoDimmExtnTotalLogCap acityU`	Upper word of the total logical capacity in bytes as formatted	Counter
`fusionIoDimmExtnTotalLogCap acityL`	Lower word of the total logical capacity in bytes as formatted	Counter
`fusionIoDimmExtnAvailLogCap acityU`	Obsolete	Counter
`fusionIoDimmExtnAvailLogCap acityL`	Obsolete	Counter
`fusionIoDimmExtnBytesReadU`	Upper word of the total number of bytes read since the device was formatted	Counter
`fusionIoDimmExtnBytesReadL`	Lower word of the total number of bytes read since the device was formatted	Counter
`fusionIoDimmExtnBytesWritte nU`	Upper word of the total physical bytes written	Counter
`fusionIoDimmExtnBytesWritte nL`	Lower word of the total physical bytes written	Counter
`fusionIoDimmExtnLogBytesWri ttenU through` `fusionIoDimmExtnConfidenceI nterval`	Obsolete	Counter
`fusionIoDimmExtnFormattedBl ockSize`	Block size that this device is formatted to use.	Integer (512 or 4096)
`fusionIoDimmExtnCurrentRAMU sageU`	Upper word of the current RAM usage in bytes for the drive	Counter
`fusionIoDimmExtnCurrentRAMU sageL`	Lower word of the current RAM usage in bytes for the drive	Counter

Table C-3. DimmExtn Data (continued)

Name	Description	Data Type
`fusionIoDimmExtnPeakRAMUsageU`	Upper word of the peak RAM usage in bytes for the drive	Counter
`fusionIoDimmExtnPeakRAMUsageL`	Lower word of the peak RAM usage in bytes for the drive	Counter

Table C-4. DimmCapacity Data

Name	Description	Data Type
`fusionIoDimmCapacityTable`	Table of usable physical capacity values over time	Sequence of `fusionIoDimmCapacityEntry`
`fusionIoDimmCapacityEntry`	Defines an entry of the usable physical capacity history table	`FusionIoDimmCapacityEntry`
`fusionIoDimmCapacityInfoIndex`	ioDrive index — correlates to the drive index in the info table.	Integer (1-256)
`fusionIoDimmCapacityIndex`	Unique index for the usable physical capacity log	Integer (1-1000)
`fusionIoDimmCapacityValueU`	Upper word of the physical usable capacity at this point in time	Counter
`fusionIoDimmCapacityValueL`	Lower word of the physical usable capacity at this point in time.	Counter
`fusionIoDimmCapacityTimestamp`	Time stamp of this value entry	SimpleTime

Table C-5. DimmWrite Data

Name	Description	Data Type
`fusionIoDimmWriteTable`	Log of write volume history	Sequence of `fusionIoDimmWriteEntry`
`fusionIoDimmWriteEntry`	Entry in the write volume history table	fusionIoDimmWriteEntry
`fusionIoDimmWriteInfoIndex`	ioDrive index — correlates with the index in the info table.	Integer (1-256)

Table C-5. DimmWrite Data (continued)

Name	Description	Data Type
`fusionIoDimmWriteIndex`	Unique index for this write volume entry	Integer (1-1000)
`fusionIoDimmWriteValueU`	Upper word of the total physical number of bytes written at a given moment in time	Counter
`fusionIoDimmWriteValueL`	Lower word of the total physical number of bytes written at a given moment in time	Counter
`fusionIoDimmWriteTimestamp`	Timestamp entry for this value	SimpleTime

Table C-6. DimmTempData

Name	Description	Data Type
`fusionIoDimmTempTable`	Device temperature history table	Sequence of `fusionIoDimmWriteEntry`
`fusionIoDimmTempEntry`	Entry in the device temperature history	fusionIoDimmWriteEntry
`fusionIoDimmTempInfoIndex`	ioDrive index — correlates with the index in the info table.	Integer (1-256)
`fusionIoDimmTempIndex`	Unique index for this temperature log entry	Integer (1-1000)
`fusionIoDimmTempValue`	Current temperature of the device in degrees Celsius	Integer
`fusionIoDimmTempTimestamp`	Timestamp entry for this value	SimpleTime