



SGI® InfiniteStorage™ Gateway
Administrator Guide

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About This Guide

This guide provides basic information about configuring and administering the SGI® InfiniteStorage™ Gateway product.

Related Publications

The following SGI publications contain additional information:

- *DMF 6 Administrator Guide for SGI InfiniteStorage*
- *OpenVault Administrator Guide for SGI InfiniteStorage*
- *SGI COPAN 400 User Guide*
- *SGI COPAN 400T/TX System Administration Guide*
- *SGI InfiniteStorage Gateway Quick Start*
- *SGI Management Center for InfiniteStorage Administrator Guide*
- *SGI Modular InfiniteStorage (MIS) Platform Installation Guide*
- *SGI Modular InfiniteStorage (MIS) 1.5 Platform User Guide*
- *XFS for Linux Administration*
- *XVM Volume Manager Administrator Guide*

For detailed information about the Red Hat Enterprise Linux (RHEL) operating system, see the following website:

https://access.redhat.com/knowledge/docs/Red_Hat_Enterprise_Linux/

For more information about the LiveArc digital asset management features, see the online help and the following Mediaflux™ documentation:

- *Mediaflux Release Notes*
- *Mediaflux Administration Guide*
- *Mediaflux Command User and Developer Guide*

For more information about PSM, see the *Platform Service Manager Online Help* available from the PSM **Help** menu.

Obtaining Publications

You can obtain SGI documentation as follows:

- See the SGI Technical Publications Library at <http://docs.sgi.com>. Various formats are available. This library contains the most recent and most comprehensive set of online books, release notes, man pages, and other information.
- You can view release notes by accessing the *README_TITLE.txt* file for a given product. The release notes and manuals for some software components will be installed on the SGI Modular InfiniteStorage (MIS) server beneath the following directories:

```
/usr/share/doc/packages/sgi-issp-VERSION  
/usr/share/doc/packages/sgi-gateway-VERSION
```

The Mediaflux™ documents that support LiveArc are installed beneath the following directory:

```
/opt/livearc/docs
```

- You can view man pages by typing `man title` at a command line.

Conventions

The following conventions are used throughout this document:

Convention	Meaning
<code>command</code>	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
<i>variable</i>	Italic typeface denotes variable entries and words or concepts being defined.

user input	This bold, fixed-space font denotes literal items that the user enters in interactive sessions. (Output is shown in nonbold, fixed-space font.)
[]	Brackets enclose optional portions of a command or directive line.
...	Ellipses indicate that a preceding element can be repeated.
manpage(x)	Man page section identifiers appear in parentheses after man page names.
GUI	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, menus, toolbars, icons, buttons, boxes, fields, and lists.
mis#	In an example, this prompt indicates that the command is executed on the MIS server

Reader Comments

If you have comments about the technical accuracy, content, or organization of this publication, contact SGI. Be sure to include the title and document number of the publication with your comments. (Online, the document number is located in the front matter of the publication. In printed publications, the document number is located at the bottom of each page.)

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Introduction

This chapter discusses the following:

- "What is the SGI InfiniteStorage Gateway?" on page 1
- "Secondary-Storage Requirements for DMF Simplified Configuration" on page 3
- "How Does Migration Work?" on page 5
- "Administering the SGI InfiniteStorage Gateway" on page 15
- "Fixing Problems" on page 15

What is the SGI InfiniteStorage Gateway?

The SGI InfiniteStorage Gateway provides a single-enclosure server and primary-filesystem disk archiving solution that you can attach to appropriate secondary-storage media (see "Secondary-Storage Requirements for DMF Simplified Configuration" on page 3). It integrates the following major components:

- SGI Modular InfiniteStorage (MIS) server, which houses the primary cache for user filesystems with either a 40-drive capacity (expandable in 8-drive increments) or 72-drive capacity. Each set of 8 drives is configured as a single 6+2 RAID 6. A total of 8 drives are reserved for administrative use and spares. A full system has a raw capacity of 288 TB, of which 192 TB is usable filesystem space. On a full system, you can create filesystems ranging in size from one 192-TB filesystem up to eight 24-TB filesystems; on a full system, a given filesystem can range from 1 to 8 LUNs.

Note: These values are measured in powers of 1000 (TB), not 1024 (TiB).

This provides the following **theoretical** large-block bandwidth per LUN:

- Random writes: 250 MB/s
- Sequential writes: 500 MB/s
- Random reads: 330 MB/s
- Sequential reads: 600 MB/s

- A base two-port 10-Gbit Ethernet card (for either a 40-drive or a 72-drive system) with an option to add a two-port or a four-port 10-Gbit Ethernet card (for a maximum total of six ports).
- Four 8-Gbit Fibre Channel ports provide connection to the secondary-storage media. (The ports also run at 4 Gbit and 2 Gbit.)
- The Data Migration Facility (DMF), which monitors the capacity of online disk resources and transparently moves file data from the DMF-managed primary filesystem on online disk to secondary storage. Periodically or when the managed filesystems reach a certain level of fullness, DMF automatically migrates file data to two migration targets on secondary storage (creating two copies of the data in order to prevent file data loss in the event that a migrated copy is lost). Migrated files appear as normal files to users and are always easily accessible via high-performance network connections. By transparently managing the migration of file data, the SGI InfiniteStorage Gateway lets you cost-effectively maintain a seemingly infinite amount of data without sacrificing accessibility.
- SGI InfiniteStorage Gateway Management Center interface, which lets you do the following:
 - Configure DMF (if using the appropriate media, see "Secondary-Storage Requirements for DMF Simplified Configuration" on page 3)
 - Configure Network File System (NFS) exports
 - Configure Common Internet File System (CIFS) shares
 - Perform basic monitoring and operational tasks
 - Access the DMF Manager interface, which lets you perform detailed monitoring and managing of DMF when necessary
- *(Optional future offering)* LiveArc™ Archive Edition (AE) digital asset management interface, which includes the following features:
 - Data and metadata analyzers
 - Indexes of annotated image/video/audio and various forms of text
 - Replication
 - Write-once-read-many (WORM) capability to prevent data from being revised

At the factory, SGI preinstalls the required software and preconfigures the required administrative filesystems. When you purchase standard installation services, SGI

personnel will install the hardware, connect the appropriate storage, and (if using secondary storage that is appropriate for the DMF simplified configuration) create your user filesystems and configure DMF using information that you provide; see Chapter 2, "Initial Configuration" on page 17.

Note: The DMF simplified configuration relies on the requirements outlined in "Secondary-Storage Requirements for DMF Simplified Configuration" on page 3. If you want to differ from these requirements, contact SGI Professional Services for help with manual configuration, customization, and tuning.

Secondary-Storage Requirements for DMF Simplified Configuration

Note: The **simplified configuration** via the SGI InfiniteStorage Gateway Management Interface is supported for the limited set of secondary-storage devices listed here.

The **manual configuration** of any secondary-storage device supported by DMF is also possible; for configuration assistance with those devices, contact SGI Professional Services.

DMF requires that you attach secondary-storage media to the SGI InfiniteStorage Gateway system. DMF supports simplified configuration for the following secondary-storage devices:

- One or more of the following physical or logical tape libraries attached via Fibre Channel:
 - Spectra Logic® T50, T120, T-Series (T200, T380, T680), T950, and Tfinity libraries
 - Oracle® SL150, L180, L700, L700e, SL500 and SL3000 libraries using the SCSI interface

Under the simplified configuration, DMF makes two copies of file data onto two separate migration targets on secondary storage. The configuration process will divide the tapes in each library into two DMF *volume groups* (VGs), and each VG will be a migration target for DMF.

You can have up to four physical libraries.

- Unformatted SGI COPAN 400 native *massive array of idle disks* (MAID) SGI ZeroWatt™ disk. The COPAN MAID cabinet has up to 8 shelves and each shelf

will be a VG (migration target) for DMF; therefore, you must use shelves in pairs so that there are two migration targets.

Note the following requirements:

- Physical/logical libraries have the following requirements:
 - The cartridges in the physical/logical libraries that you select for DMF must not contain data that you want to preserve.



Caution: Any existing data will be destroyed.

- You cannot share volumes within one physical/logical library between DMF and any other application. If you split a physical library into two logical libraries via Shared Library Services (SLS) partitioning, you can use the first logical library for DMF and the second for another application; however, both libraries will appear on the DMF **Configuration** page in the Management Center, so you must ensure that you select only the library you want to use for DMF when completing the configuration.



Caution: DMF must own every volume in the physical/logical library assigned to DMF.

- All of the cartridges within a given physical/logical library must be of the same cartridge type.
- All of the drives within a given physical/logical library must be of the same drive type, such as Ultrium5 (although different manufacturers of the same drive type may be used, such as a mix of both HP Ultrium5 and IBM Ultrium5).
- The MIS provides four available Fibre Channel ports. If you require more connections for your storage media, you must add a Fibre Channel switch to the configuration.

Note: Ensure that the tape drive connections to the MIS Fibre Channel HBA initiator ports are segregated from any disk on the SAN, including COPAN MAID disks. You can accomplish this by using independent switches (in a separate SAN fabric) or by carefully zoning a single switch to avoid overlap.

- The DMF simplified configuration process expects each COPAN MAID shelf to be in an unformatted state. If you have an existing COPAN MAID system that you want to use with the SGI InfiniteStorage Gateway, you must first return it to unformatted (factory) state. See "Returning a Shelf to Factory State" on page 115.
- The DMF configuration requires that you specify the MIS hostname and the management IP address.
- After the DMF configuration completes, all of the secondary storage configured for DMF will be owned by DMF only and cannot be shared with another application.
- The name you assign to each physical/logical library and shelf must be unique.
- DMF uses *volume serial numbers* (VSNs) to identify data location in specific cartridges, therefore every VSN in the DMF environment must be unique:
 - For physical/logical libraries, the tape barcodes will determine the VSNs.
 - For shelves, the shelf name you choose will determine the VSNs on that shelf. You should name the shelves according to their physical location in the cabinet so that a shelf can be easily identified if service is required. You must follow the naming conventions specified in "Shelves Available for Configuration" on page 38.

How Does Migration Work?

This section discusses more details about DMF:

- "DMF Overview" on page 6
- "DMF-Managed Filesystems and Restricted Administrative Filesystems" on page 7
- "Constant Online Access for Users and Applications" on page 8
- "Automatic Monitoring of MIS Disk Space" on page 8
- "Migrating File Data " on page 10
- "Recalling File Data" on page 15
- "Automatic Backup" on page 15

DMF Overview

DMF monitors the user filesystems on the MIS disk, making two copies of **file data** on secondary storage but leaving **file metadata** in place so that users can access files without knowing the actual location of file data.

As the filesystems fill, DMF frees the data blocks of the least-recently accessed files on MIS disk, thereby always keeping space free for new files and recalled files. During the time that file data resides on both the MIS disk and the secondary storage, it will be returned to the user immediately from MIS disk; after its disk data blocks are freed, it will be recalled from secondary storage after a slight delay (depending upon the secondary-storage characteristics). Regardless of its actual location, all of the data is always available online to users via normal access methods.

Figure 1-1 describes the concept of the DMF migration cycle between the DMF-managed primary filesystem on MIS disk and the secondary storage.

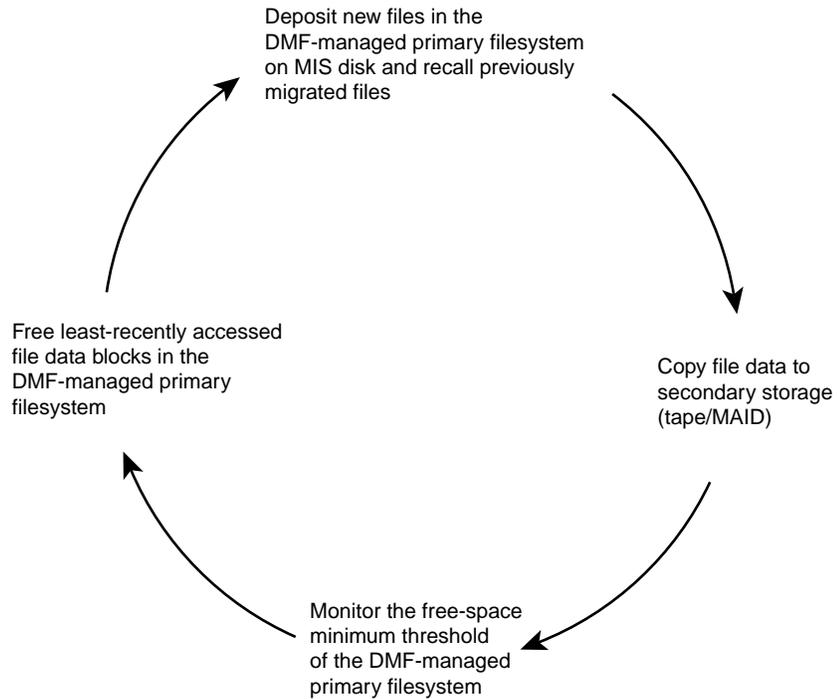


Figure 1-1 DMF Cycle

DMF-Managed Filesystems and Restricted Administrative Filesystems

In a full system, there can be up to eight user filesystems that will be monitored by DMF, one per MIS LUN. (A given filesystem can also consist of multiple entire LUNs.) You will determine this configuration when you create the filesystem; see "Create and Mount the User Filesystems" on page 33.

All of the filesystems beneath the `/dmf` directory are required for administration of DMF and (if installed) LiveArc AE. You should not manually modify any files in this directory and you cannot unmount these filesystems nor export them via NFS or CIFS. These filesystems are allotted a total of 8 TB on the MIS disk.

Constant Online Access for Users and Applications

DMF provides constant online access for users and applications, no matter where file data actually resides. DMF achieves this by moving file data onto secondary storage but leaving critical metadata (such as index nodes, or *inodes*, and directories) in the DMF-managed primary filesystems on the MIS disk. Because migrated files remain cataloged in their original directories, users and applications never need to know where the data actually resides; they can access any migrated file using normal processes. In fact, when drilling into directories or listing their contents using standard commands, a user cannot determine the location of file data within the storage tier; determining the data's actual residence requires special commands or command options. The only difference users might notice is a slight delay in access time. All of the data is always available online to users and applications, regardless of its actual location.

Automatic Monitoring of MIS Disk Space

DMF continuously monitors the DMF-managed primary filesystems on MIS disk so that it can maintain a certain amount of free space in those filesystems. This free space permits the creation of new files and the recall of previously migrated files. DMF maintains free space by freeing data blocks on the MIS disk for files that have already been migrated. DMF chooses to release the data blocks of the least-recently accessed files until the filesystem is well below the free-space minimum threshold. From a user's perspective, all content is accessible all of the time.

Figure 1-2 shows the concept of the free-space minimum threshold, where DMF will free the data blocks of less-recently accessed files (such as represented by the letter **A**) to empty the MIS disk well below the threshold as new files are added or as previously migrated files (such as represented by the letters **B** and **E**) are recalled.

Note: For simplicity, this figure does not show the second copy of file data. Data will be recalled from a second copy only if necessary.

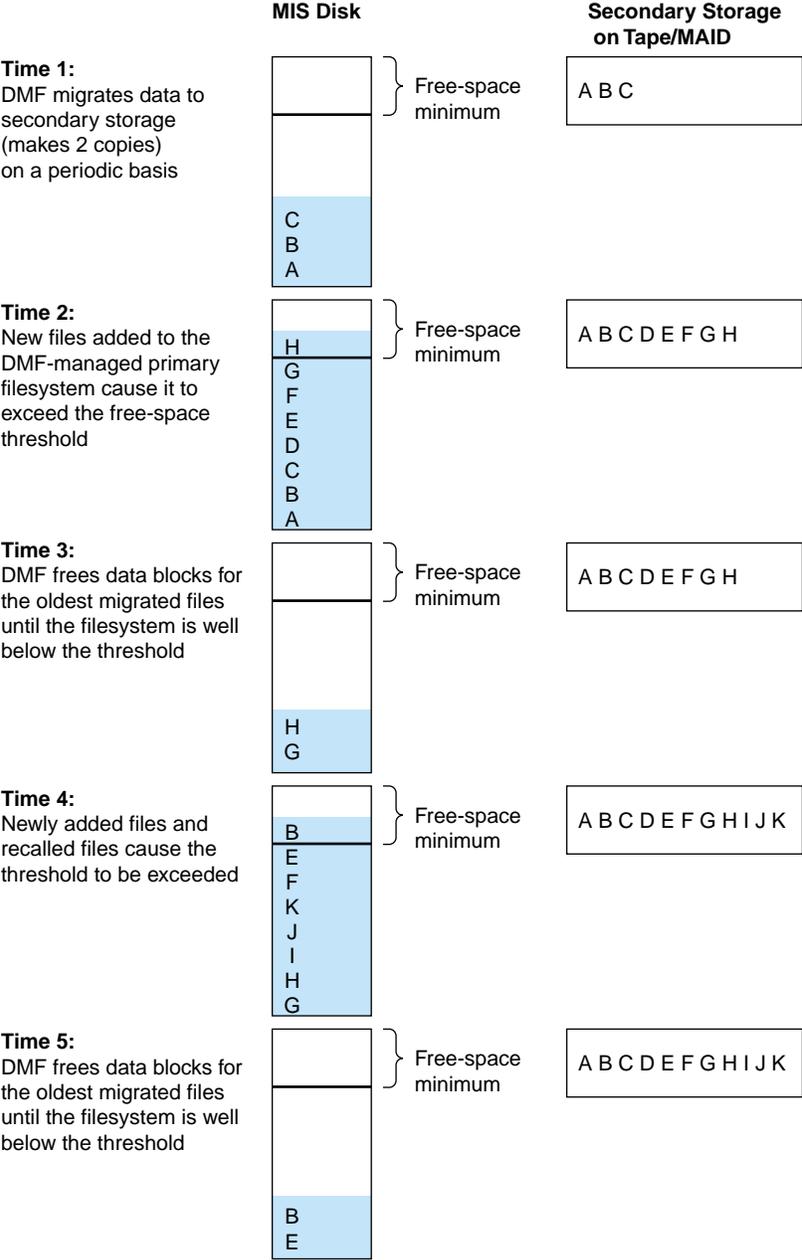


Figure 1-2 Free-Space Minimum Threshold

Migrating File Data

The SGI InfiniteStorage Gateway migration policy does the following:

- Makes two copies of migrated data. DMF places those copies on separate secondary-storage targets (in two separate volumes on the available physical/logical libraries or COPAN MAID shelves). Creating two copies prevents file data loss in the event that one copy is damaged.
- Migrates the data for most files to the secondary storage, other than recently-accessed files (to allow file content to stabilize). This occurs every 4 hours or when the free-space minimum threshold is exceeded.
- Keeps a small amount of data in the primary filesystem on MIS disk for each file even after migration (for use by file managers, in order to avoid unnecessary recall of a file due to directory browsing).
- Maintains at least 5% of the primary filesystem free for new data. When the filesystem reaches this threshold, DMF will free the already-migrated data blocks from the primary filesystem until 10% of the filesystem is free, selecting the least-recently accessed files first. (When LiveArc AE is installed, the numbers are 10% and 20%, respectively.)

During the period when the data has been copied to the secondary storage but remains in the data blocks on the MIS disk, the file is considered to be *dual-state*. If a user recalls a dual-state file, DMF retrieves it directly from the DMF-managed primary filesystem on MIS disk for fast access, rather than from one of the copies on secondary storage.

Only the most timely data resides on the higher-performance MIS disk; less timely data is automatically migrated to secondary storage, thereby leaving free space on the MIS disk that can be used for new files and newly recalled files. However, all of the data is always available online to users and applications, regardless of its actual location.

When the filesystem on MIS disk reaches the threshold, DMF frees the data blocks for the least-recently accessed files that have copies on secondary storage; such a file is considered from the DMF perspective to be *offline* and its data blocks are therefore available for new active data, either new files or recalled files. However, from the user perspective, the file is always online because the inodes and directories remain in the primary filesystem, allowing users to access the file by normal means.

Note: A file's data blocks can only be freed on the MIS disk after the data has been copied to secondary storage.

The following figures show concepts of DMF data migration:

- Figure 1-3 shows the concept of DMF data migration in which file data is copied from the MIS disk to the secondary storage, but the inode remains in place in the primary filesystem.
- Figure 1-4 shows the concepts of freeing filesystem space while retaining the filesystem metadata and recalling file data from secondary storage.

Note: For simplicity, these figures do not show the second copy of file data. Data will be recalled from a second copy only if necessary.

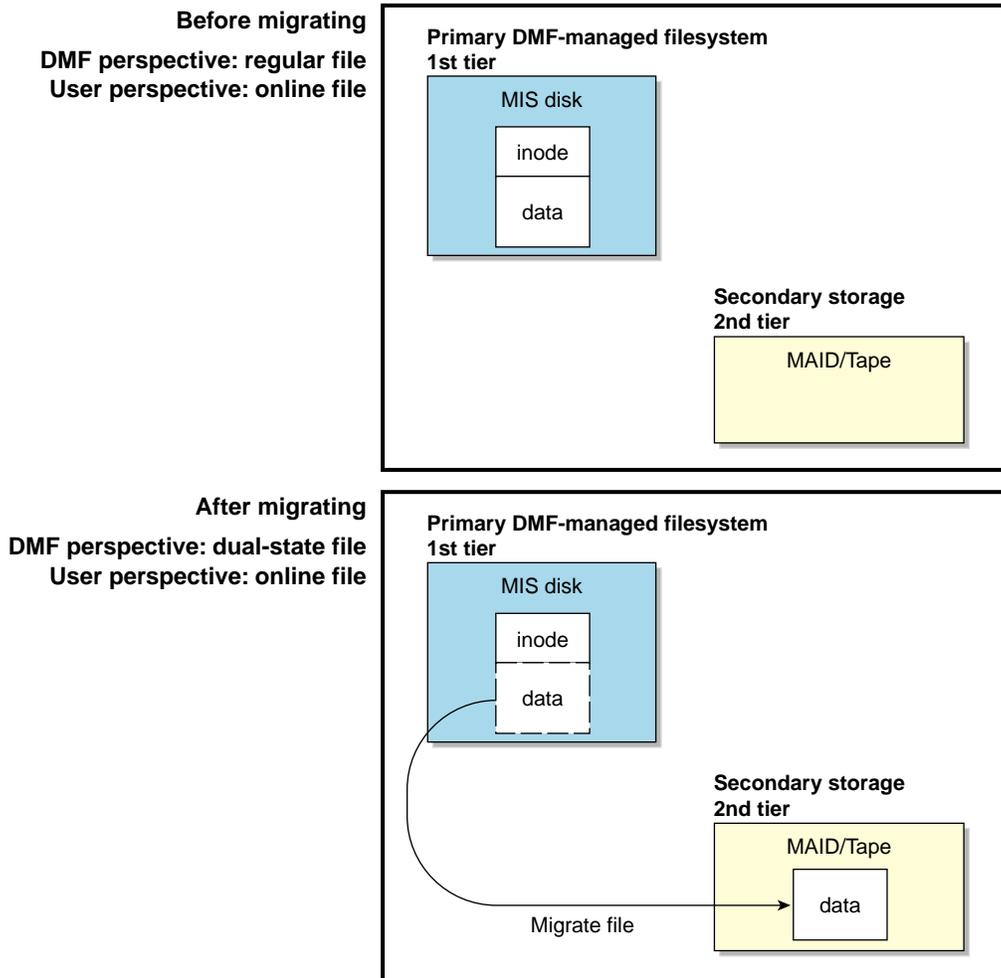


Figure 1-3 Migrating File Data

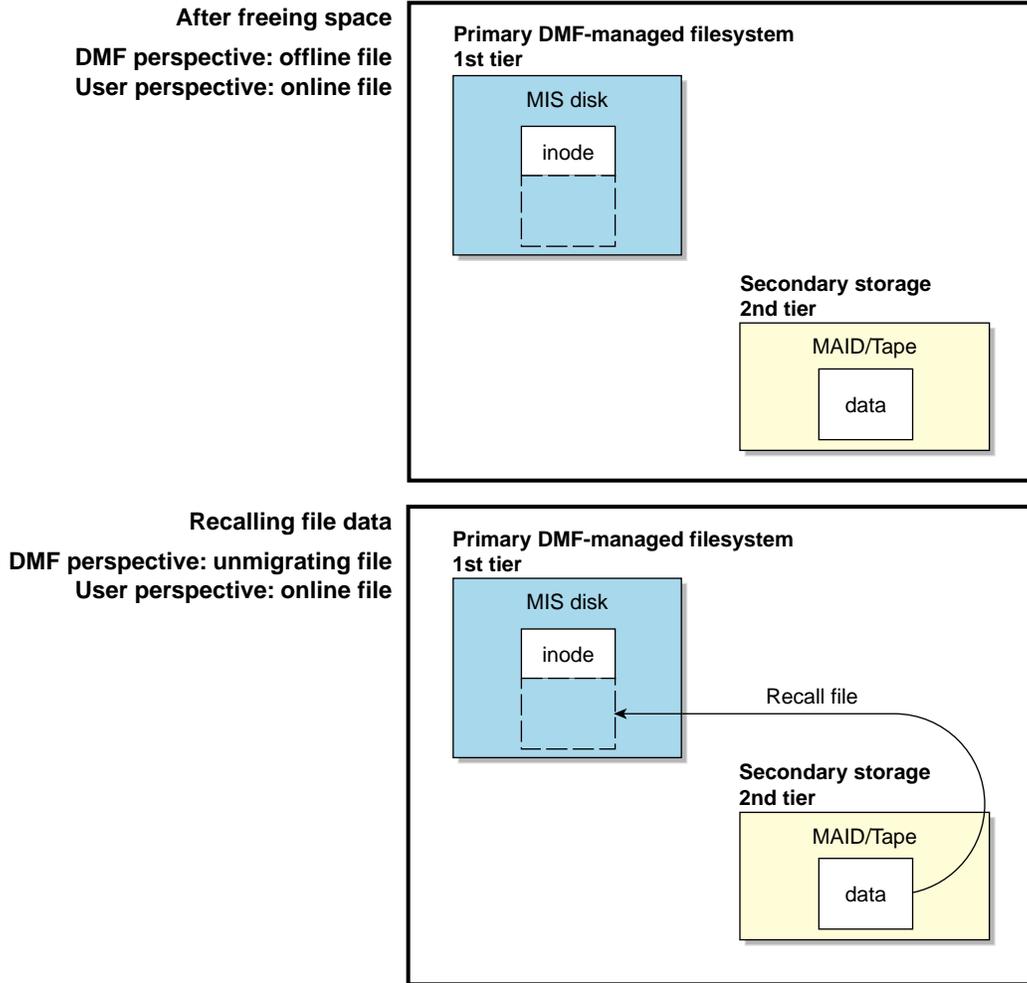


Figure 1-4 Freeing Filesystem Space and Recalling File Data

Figure 1-5 shows an example of the path that file data might take from an NFS client to a mount point on the MIS disk (for example, the /mnt0 mount point). The data is stored in the DMF-managed primary filesystem on the MIS disk and then migrated to the secondary storage (in this case, COPAN MAID shelves 0 and 1).

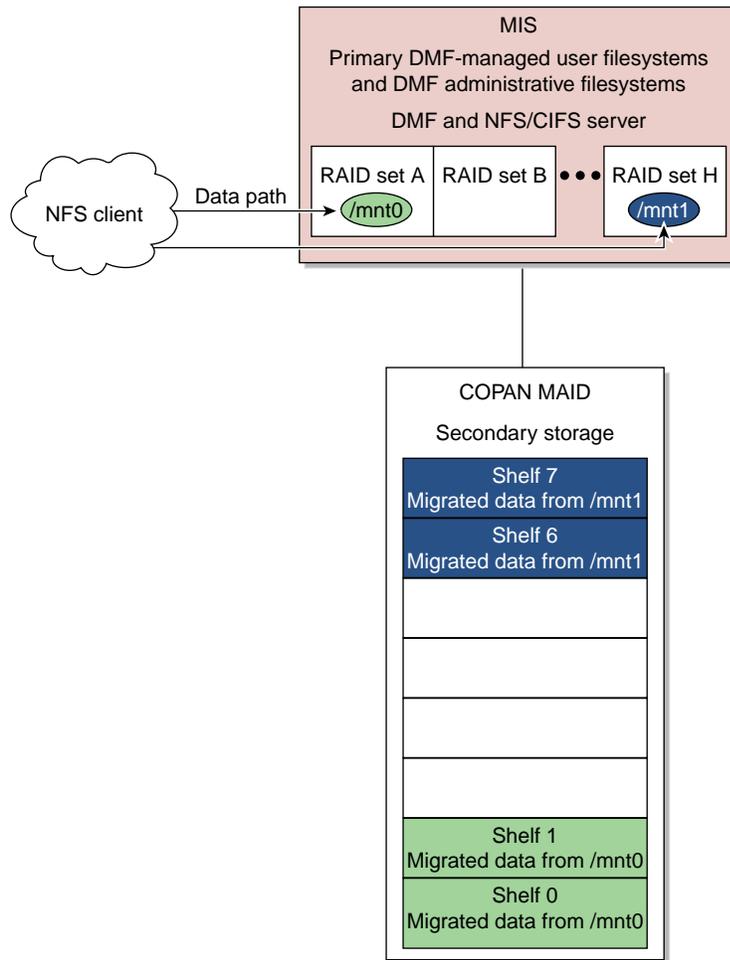


Figure 1-5 Example Data Path from NFS Client to COPAN MAID

Recalling File Data

A user retrieves a file simply by accessing it normally through NFS or CIFS; DMF automatically recalls the file's data from the secondary storage, caching it on the MIS disk as shown in Figure 1-4. After the data is restored to the MIS disk, the file once again becomes a *regular* file.

If you recall more files than the DMF-managed primary filesystem can currently contain, DMF migrates files and will free the data blocks of the least-recently accessed files until the filesystem is once again well below the free-space minimum threshold.

Automatic Backup

Each day, the SGI InfiniteStorage Gateway will migrate all data to the secondary storage and back up the inodes and directories in the DMF-managed filesystems. For more details about backups, see the SGI InfiniteStorage Gateway release notes; to access the release notes, see "Getting Help" on page 50.

Administering the SGI InfiniteStorage Gateway

You should monitor DMF on a daily basis to ensure that it is operating properly. After you complete the SGI InfiniteStorage Gateway configuration, several DMF automated tasks will periodically generate reports about activity, status, and errors that you should monitor. Additionally, some serious error conditions generate messages that you should investigate. See Chapter 4, "Basic DMF Monitoring and Management" on page 63.

Note: It is important that you examine these reports and messages regularly so that you can find problems in time to retrieve important information that can help diagnose the problem.

You should periodically monitor the system for available software updates. See "Create a Software Update Repository" on page 51.

Fixing Problems

If you run into problems, see Chapter 7, "Troubleshooting" on page 111, to determine if the issue is something you can easily solve yourself or if you should contact SGI

Support. If you suspect a serious problem, you should contact SGI Support promptly and then collect information about DMF to ensure that the problem can be fixed efficiently; see "Gathering DMF Data" on page 70.

Initial Configuration

At the factory, SGI preinstalls the required software and preconfigures the required administrative filesystems.

If you have purchased the standard installation services, SGI Support personnel will install the SGI InfiniteStorage Gateway hardware, connect the appropriate storage, and (when using storage that supports the DMF simplified configuration) create your user filesystems and configure DMF using information that you provide.

Note: If you want to use secondary storage that does not support the DMF simplified configuration or require other modifications, contact SGI Professional Services.

This chapter discusses the following tasks:

- "What the Customer Must Do to Prepare for Installation" on page 18
- "Install the Hardware" on page 18
- "Access the Management Center" on page 19
- "Set the Server Name and IP Address" on page 22
- "Reopen the Management Center" on page 23
- "Install the Licenses and Set the Management Center Password" on page 24
- "Set the System (root) Password and Email Address" on page 30
- "Create and Mount the User Filesystems" on page 33
- "Configure DMF" on page 36
- "Configure Other Features As Needed" on page 43

What the Customer Must Do to Prepare for Installation

The customer must do the following to prepare for the installation:

- Configure the site network to assign the MIS hostname and management IP address.

Note: You must assign an IP address that will remain constant.

- Ensure that your secondary storage contains at least 14 volumes. If you use physical/logical tape libraries for backup, at least one library must contain 30 additional backup volumes; this is not needed if you choose to use COPAN MAID as the backup target.
- Determine the number of user filesystems to create on the MIS server and the number of LUNs each filesystem will consume.
- Determine the names of the user filesystems.
- Provide a keyboard-video-mouse (KVM) console for use during the initial installation.

In most cases, the customer must provide the above information to the SGI Support person who will perform the hardware installation and the DMF simplified configuration for Spectra Logic, Oracle, or COPAN MAID secondary storage listed in "Secondary-Storage Requirements for DMF Simplified Configuration" on page 3.

Note: The SGI InfiniteStorage Gateway also supports manual configuration of any secondary-storage device supported by DMF. For configuration assistance with those devices, contact SGI Professional Services.

Install the Hardware

Hardware will normally be installed by SGI personnel, who will install the SGI Modular InfiniteStorage (MIS) server according to the directions in the following:

- *SGI InfiniteStorage Gateway Quick Start*
- *SGI Modular InfiniteStorage (MIS) Platform Installation Guide*
- *SGI Modular InfiniteStorage (MIS) 1.5 Platform User Guide*

Access the Management Center

This section discusses the following:

- "Management Center Requirements" on page 19
- "Access the Management Center for Initial Configuration" on page 20
- "User Interface Overview" on page 20

Management Center Requirements

The SGI InfiniteStorage Gateway Management Center is a web-based interface that lets you monitor and manage your system. It is an enhanced version of the SGI Management Center for InfiniteStorage (SMC IS). The Management Center requires the following:

- JavaScript™
- One of the following browsers:
 - Firefox® 3.6 or newer (Firefox is the preferred browser)
 - Internet Explorer® 8 or newer

Also note the following:

- The Management Center is only available on `eth0`, which is the bottom 1-Gbit Ethernet port on the MIS server.
- If you are running a browser on Windows, you must install the Arial Unicode MS font (or an equivalent) in order to display check marks for acknowledged alerts.
- If your system depends on `/etc/udev/rules.d/70-persistent-net.rules` for network interface configuration, make sure that an entry for `eth0` exists.

Access the Management Center for Initial Configuration

You will use the Management Center to initially configure the system. To access the interface at initial configuration, do the following:

1. Log in to the system console as `root` using the default system password (INSECURE):

```
login: root
password: INSECURE
```

2. Start the X Window system:

```
misconsole# startx
```

3. Start Firefox from the icon or enter the following:

```
misconsole# firefox
```

4. Access the following secure (**https**) website:

```
https://192.168.1.1:1178
```

Note: This IP address is set in the factory and is only for initial installation. To access the interface later, see "Accessing the Management Center After Initial Installation" on page 44.

5. Accept the security certificate. (It is safe to ignore the warning because the Management Center generates its own SSL certificates, rather than having the SSL certificates signed by a commercial certificate authority.) In Firefox, this will require a series of steps to add an exception and get the certificate.

User Interface Overview

To access the Management Center features, click one of the buttons displayed across the top of the screen. For example, select the following to view this guide or the product release notes:

```
Help
  > Documentation
```

This displays the **Documentation** page, shown in Figure 2-1.

Note: The **Documentation** page is accessible before you install any licenses.

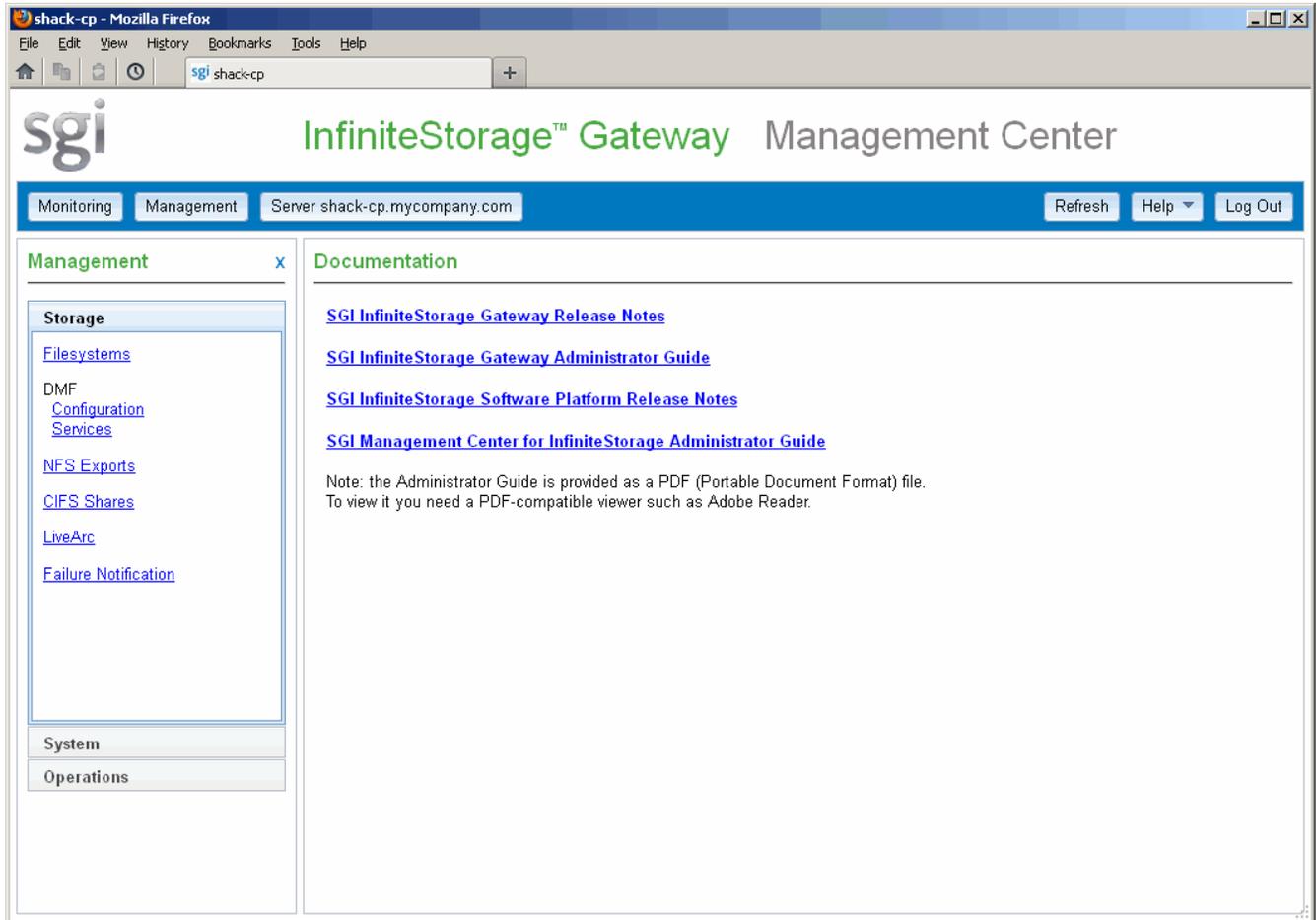


Figure 2-1 Documentation Page

If you click on the **Monitoring** or **Management** buttons, the interface will display a set of expandable tabs (such as **Storage**) in the left-hand pane; click a tab to expand it and display a list of features.

Set the Server Name and IP Address

When you first invoke the Management Center, you will be prompted to set the fully qualified domain name of the MIS server and public management IP address, shown in Figure 2-2. You should specify an address on the public network so that you can obtain your licenses. You must also program the domain name system (DNS) as appropriate for the site.

Figure 2-2 shows an example for a server named `shack-cp.mycompany.com` that uses a dedicated DHCP address. Figure 2-3 shows an example using a static IP address.

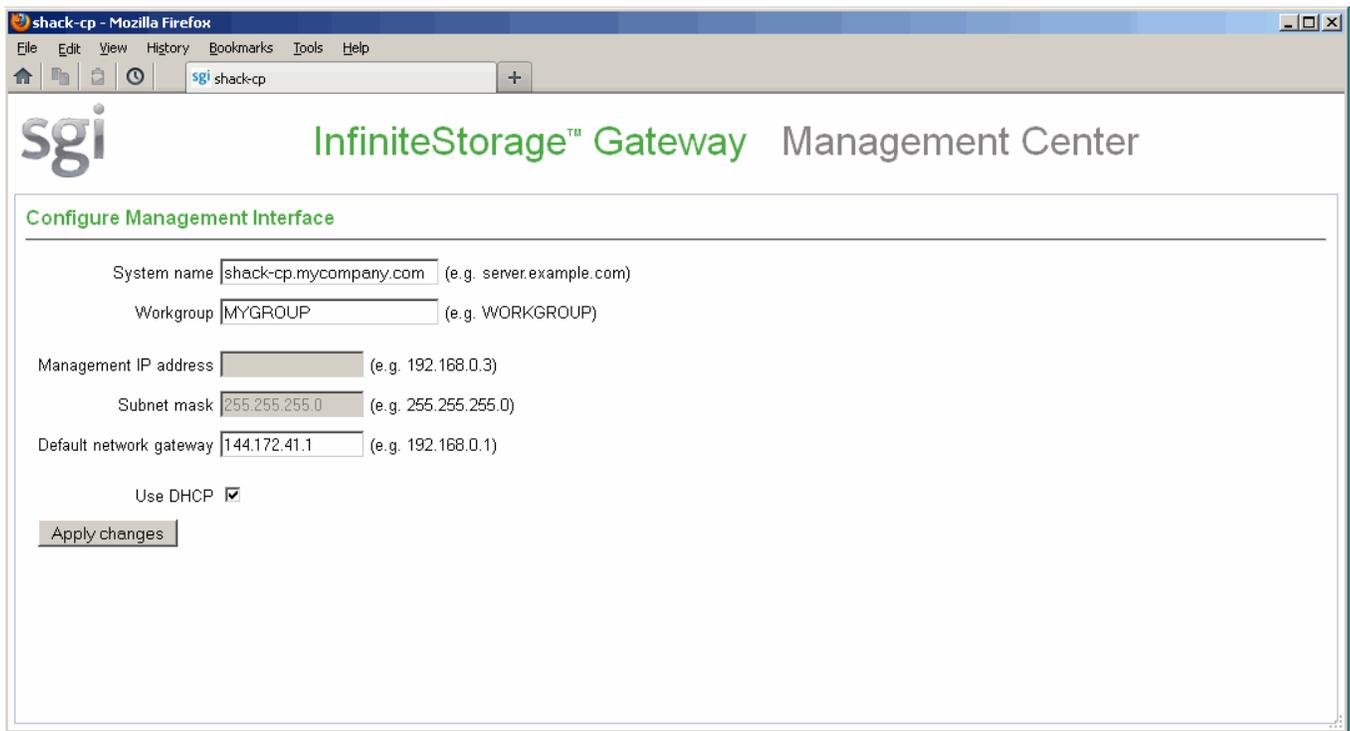


Figure 2-2 Server Name and Management IP Address Using Dedicated DHCP

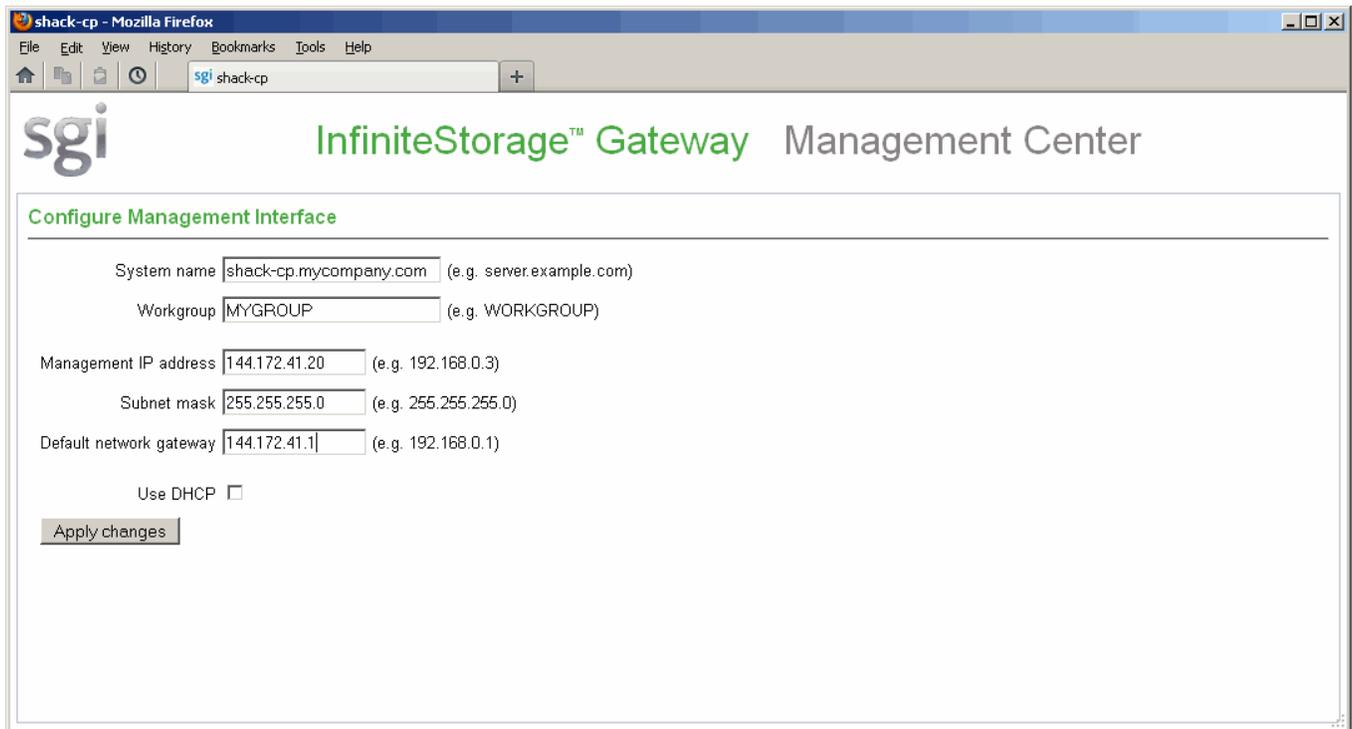


Figure 2-3 Server Name and Static Management IP Address

After this process completes, the system will automatically reboot.

Reopen the Management Center

After the reboot, you must reopen the Management Center via the new fully qualified domain name or IP address of the MIS server using the following secure (**https**) website:

`https://FQDN_of_the_MIS_Server:1178`

Install the Licenses and Set the Management Center Password

This section discusses the following:

- "Begin the License Installation Process" on page 24
- "Set the Management Center Interface Password" on page 26
- "Obtain the Licenses" on page 27
- "Install the Licenses" on page 28

Begin the License Installation Process

When you reopen the Management Center after naming the host, you will see the **Unlicensed** page, shown in Figure 2-4.

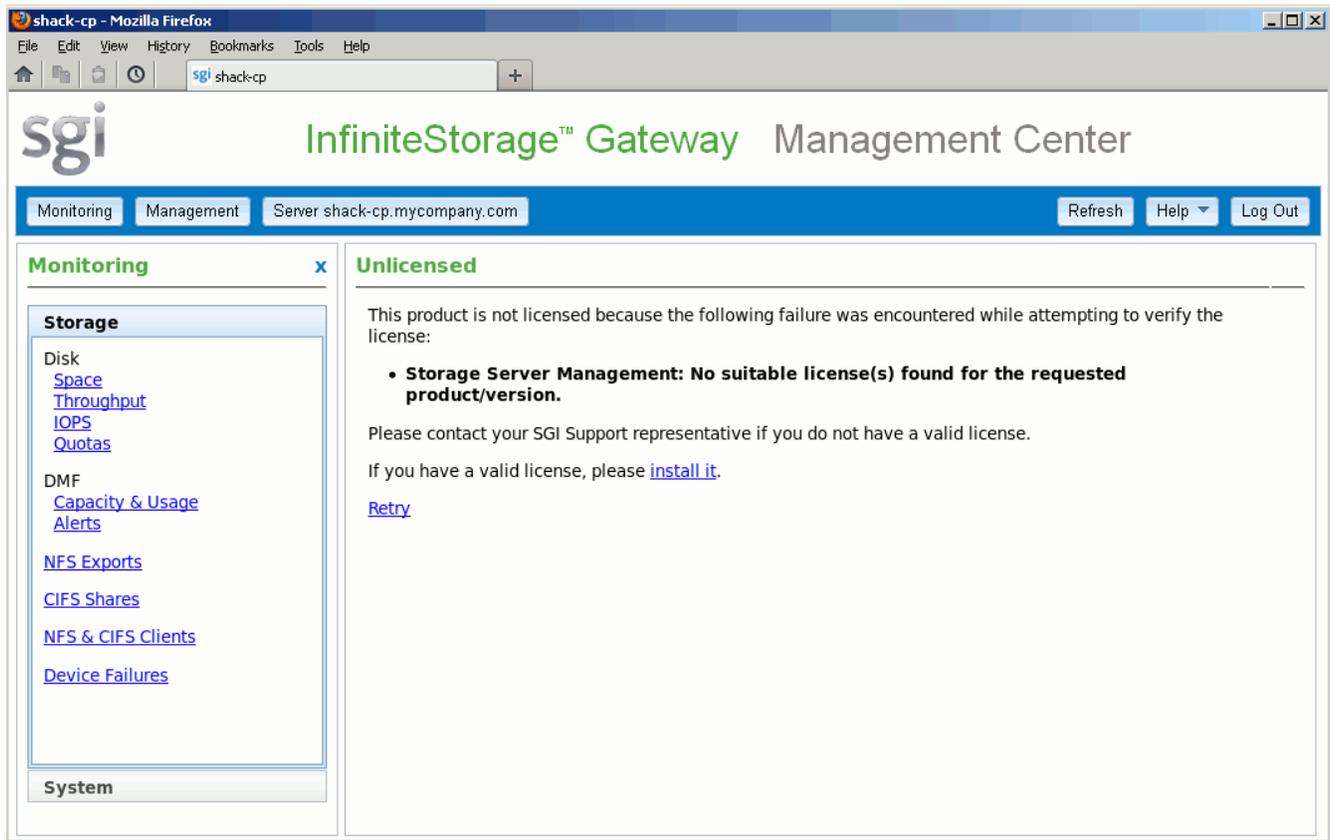


Figure 2-4 Unlicensed Page

To install the required licenses, click the **install it** link or click the **Management** button, the **System** tab in the **Management** pane, and then the **Licenses** feature, which is represented in this guide using the following format:

Management
 > **System**
 > **Licenses**

Before you can use the **Licenses** page, you must set the Management Center password, as described in the next section.

Set the Management Center Interface Password

Note: You are prompted to perform this step when you install the licenses.

Change the Management Center interface password to a secure password that is appropriate for your site by using the **Administrator Password** page shown in Figure 2-5. This page is also available from the following menu:

- Management**
- > System**
- > Administrator Password**

Enter the old password for the Management Center interface (the default is `INSECURE`) and the new password. If you are prompted to enable cookies, enter the new Management Center interface administrator password.

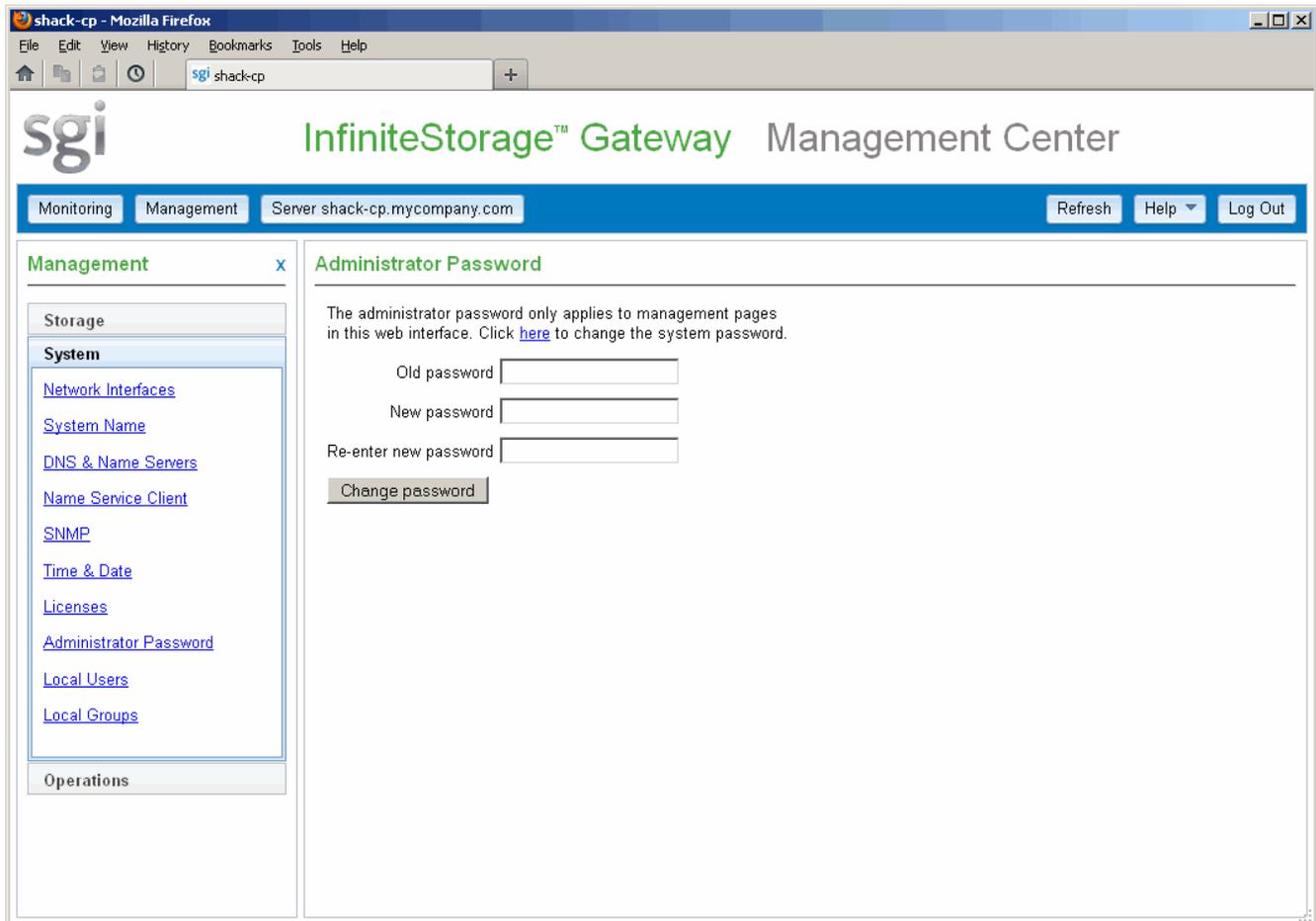


Figure 2-5 Management Center Interface Administrator Password

Obtain the Licenses

Your packet of materials includes entitlement IDs that allow you to request your permanent license keys for the SGI InfiniteStorage Gateway software. To obtain your permanent keys, use the information displayed on the **Licenses** page and visit the SGI software licensing website:

<http://www.sgi.com/support/licensing/>

Install the Licenses

To install the required Management Center license and Data Migration Facility (DMF) capability and capacity licenses, copy one key into the text area of the **Licenses** page and click **Add new license**, repeating for each key.

Note: You must paste and add the keys individually.

This action copies the key into the `/etc/lk/keys.dat` file on the SGI MIS server. Figure 2-6 shows the page with the licenses installed.

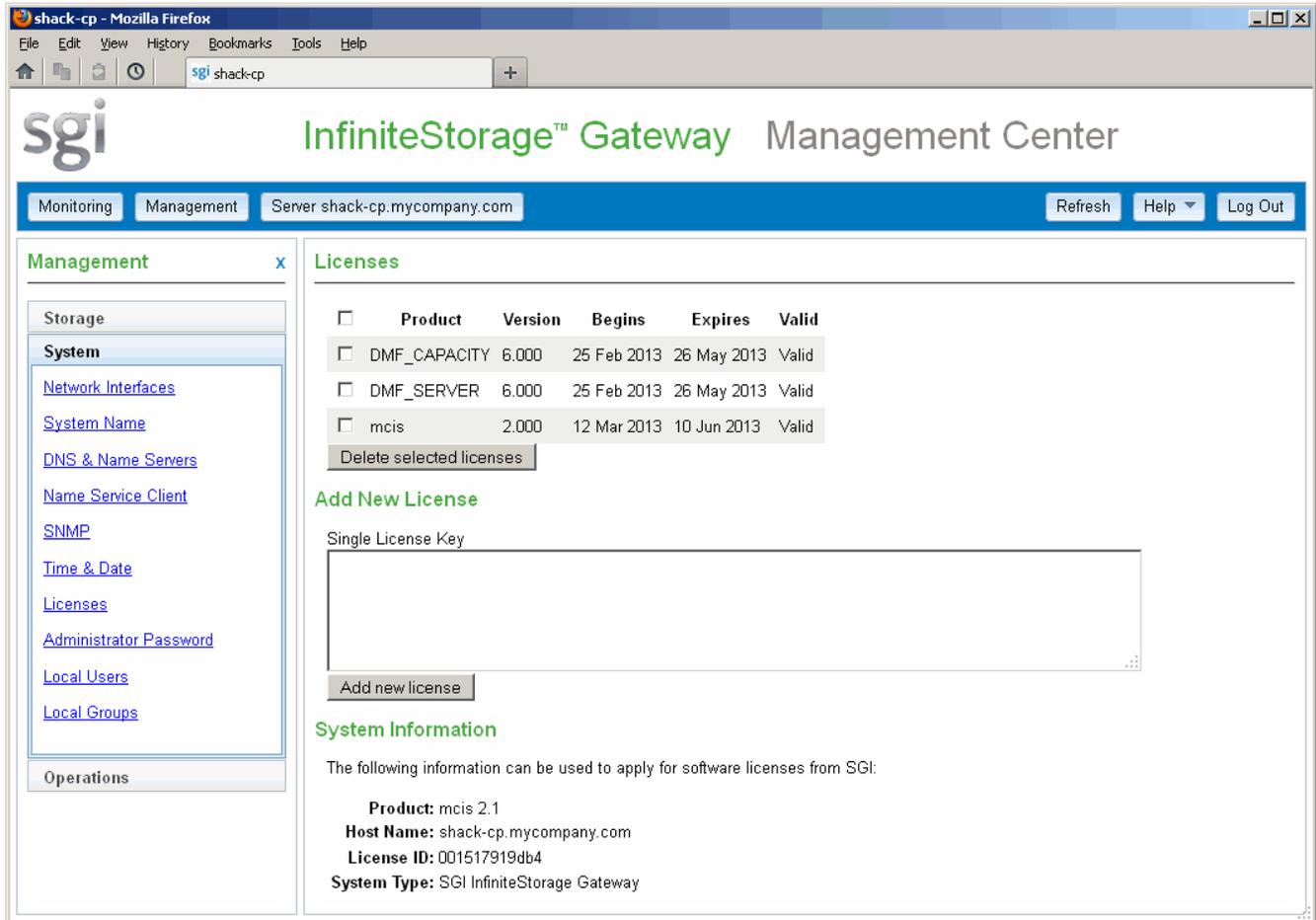


Figure 2-6 Licenses

Set the System (`root`) Password and Email Address

Set the MIS system (`root` user) password to a secure site-specific value and optionally set the `root` email address to an appropriate address. To do this, open the **Administrator Password** page, which is available from the following selection:

- Management**
- > **System**
- > **Administrator Password**

Then click the **here** link, highlighted in Figure 2-7.

Click to access the "System Password" page
where you can change the root password

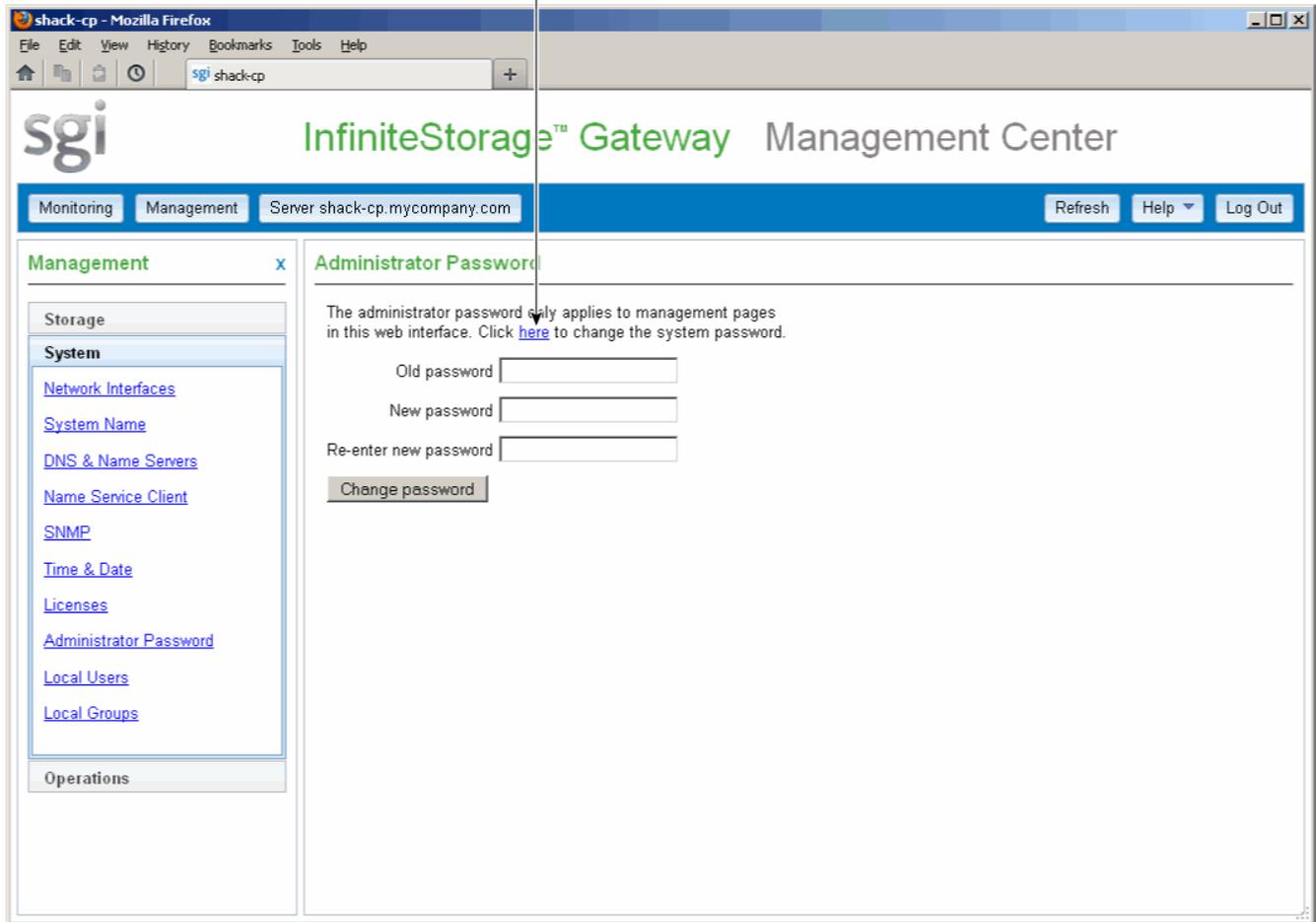


Figure 2-7 Accessing the Link to the System System root Password Page

This will display the **System Password** page, as shown in Figure 2-8. The default initial system (root) password is INSECURE.



Caution: Ensure that you remember the new root password.

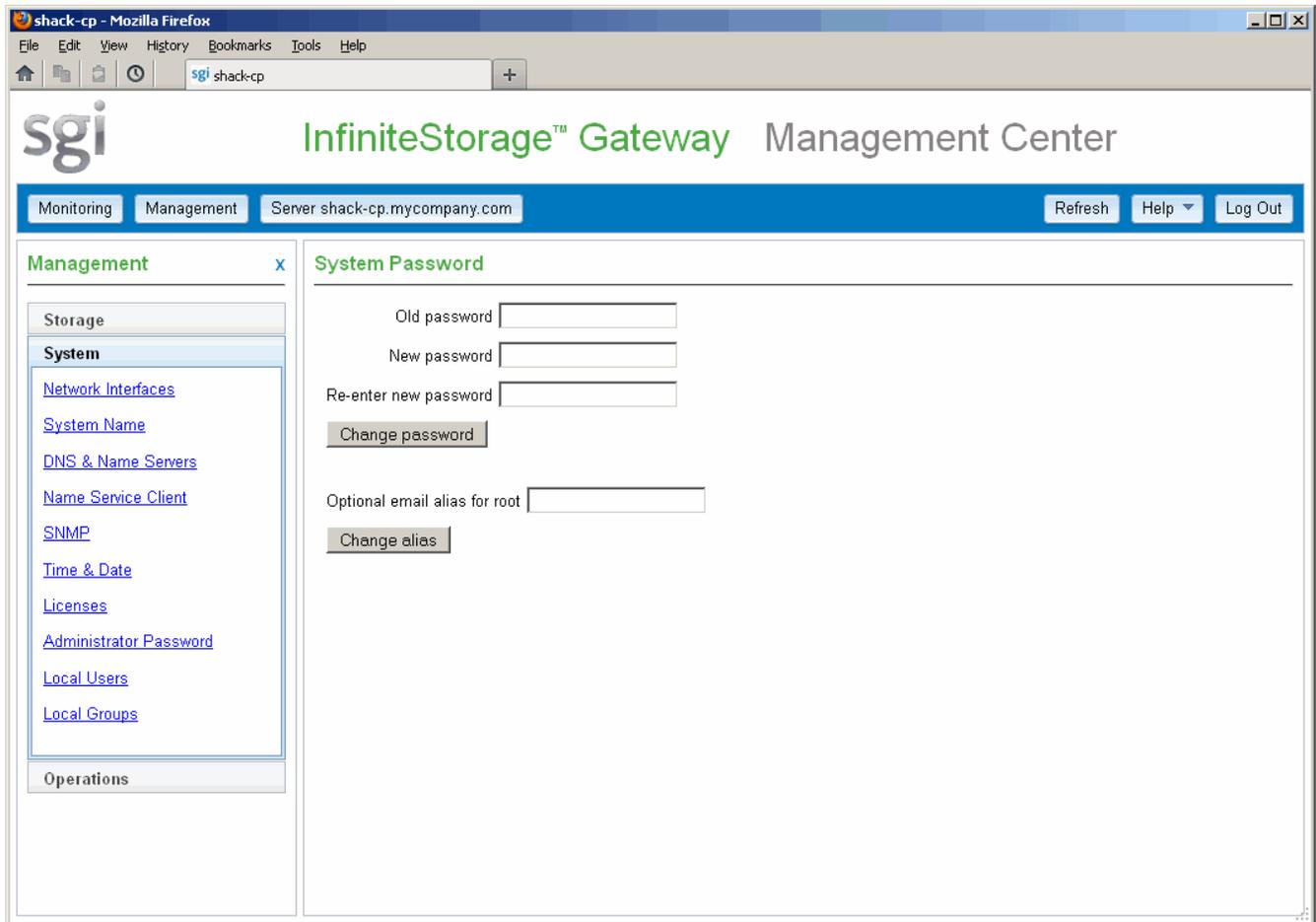


Figure 2-8 Changing the System (root) Password and Email Address

Create and Mount the User Filesystems

Do the following to create and mount your user filesystems:

1. Access the **Filesystems** page:

Management
 > **Storage**
 > **Filesystems**

2. Enter a filesystem name. For example, enter `dmfusr1` for a filesystem that should have a mount point of `/dmfusr1`.
3. Select the number of LUNs that the filesystem will span.
4. Click **Build**. The system will take a few moments to build the new filesystem over the selected number of LUNs.
5. Repeat as needed for each filesystem.

Figure 2-9 shows an example of adding a user filesystem named `dmfusr1` that will use a single LUN.

2: Initial Configuration

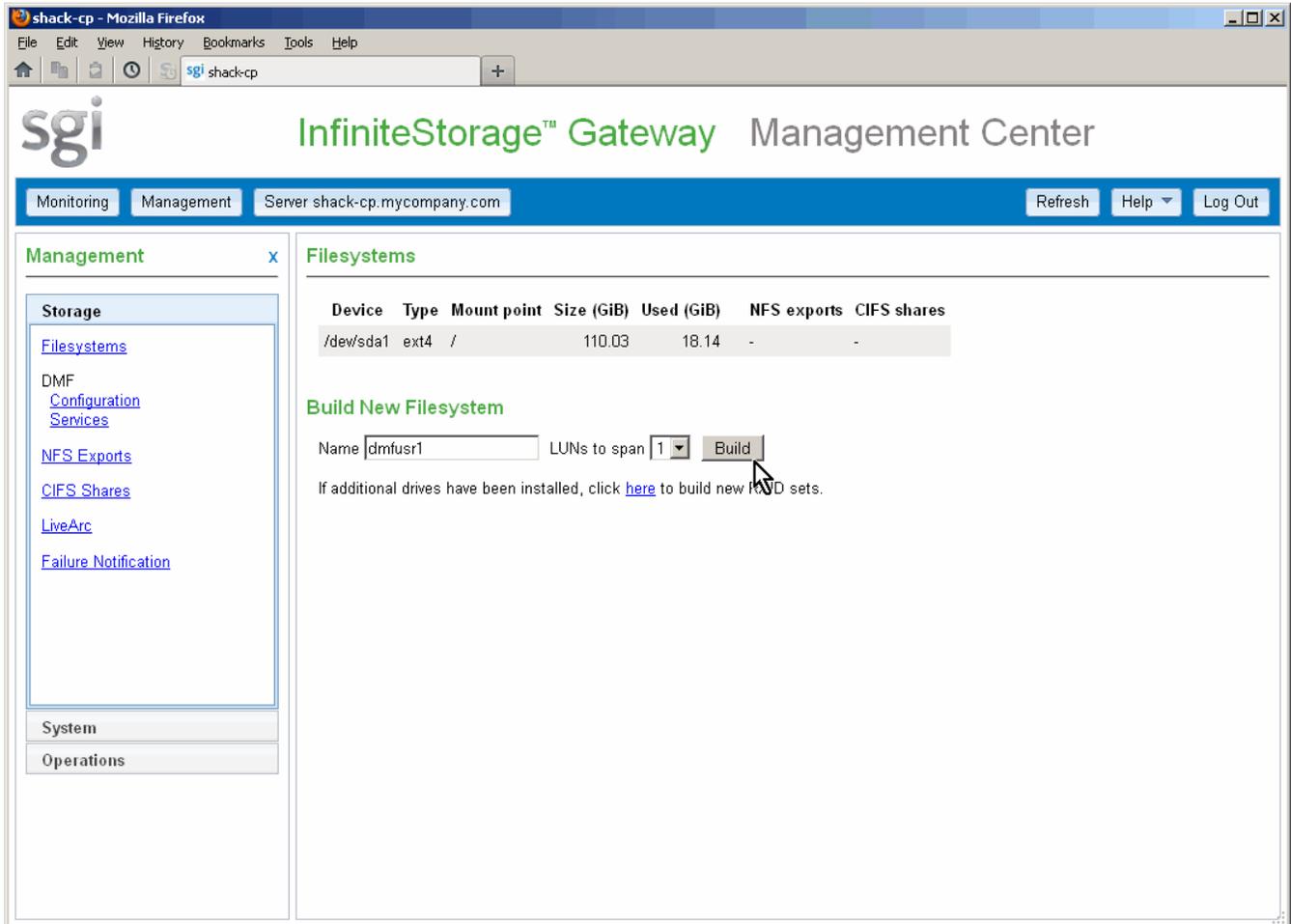


Figure 2-9 Adding a User Filesystem

Each new user filesystem will automatically be mounted with the appropriate options. Figure 2-10 shows the **Filesystems** page after building two user filesystems (dmfusr1 and dmfusr2).

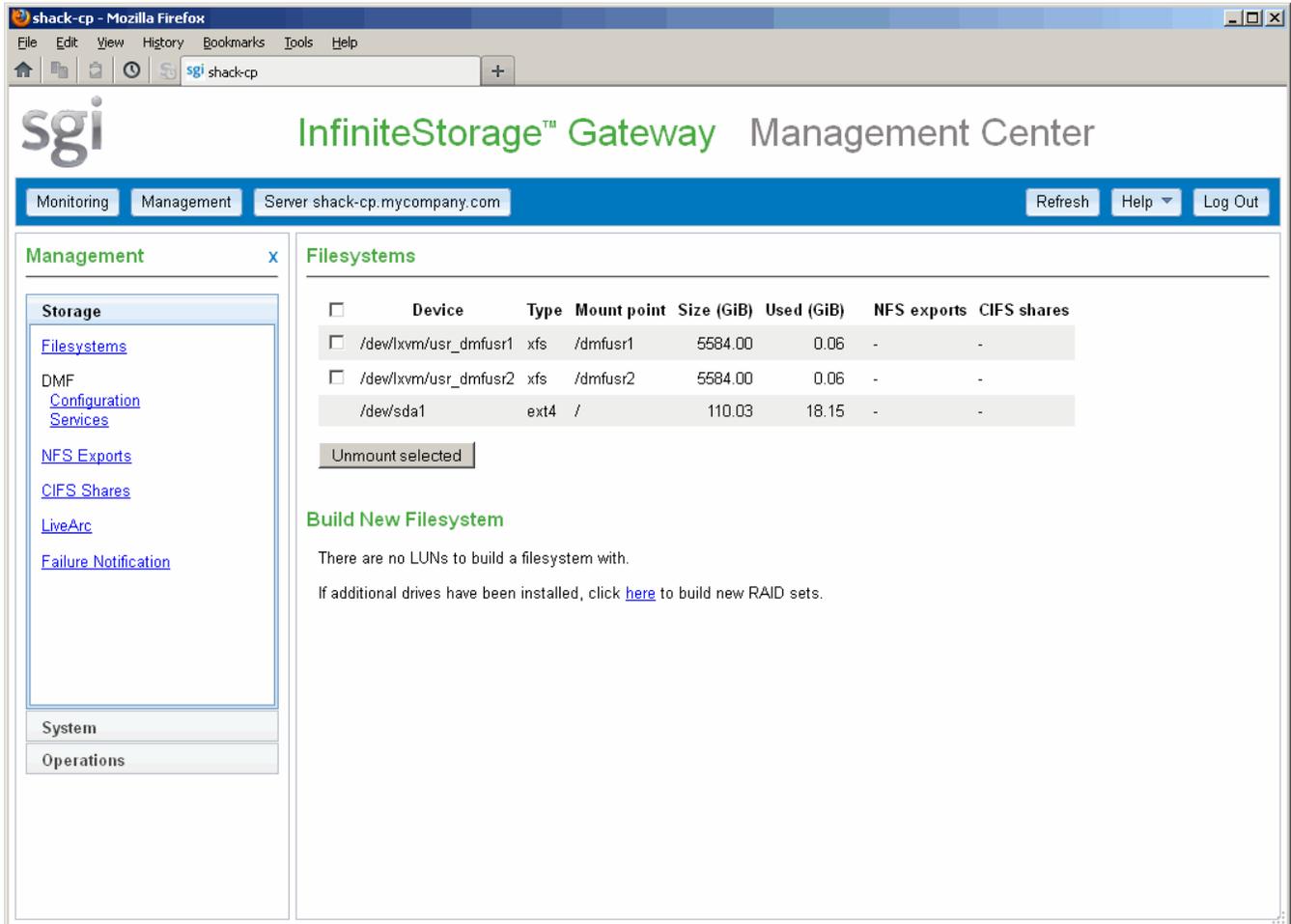


Figure 2-10 Filesystems Page

Configure DMF

To begin configuration, use the **DMF Configuration** page shown in Figure 2-11, which is available from the following selection:

Management
 > **Storage**
 > **DMF Configuration**

At initial configuration, accessing this page will automatically probe the connected hardware in order to discover and display the available physical/logical libraries, COPAN MAID shelves, and user filesystems. (If there was a problem with the hardware installation, the page will display an error. In this case, you must correct the hardware connection and then select **Probe hardware**.)

This section discusses the following areas of the **DMF Configuration** page:

- "Libraries Available for Configuration" on page 38
- "Shelves Available for Configuration" on page 38
- "User Filesystems Available for DMF Management" on page 40
- "Required Information" on page 40
- "Apply Changes and Obtain Configuration Status" on page 40

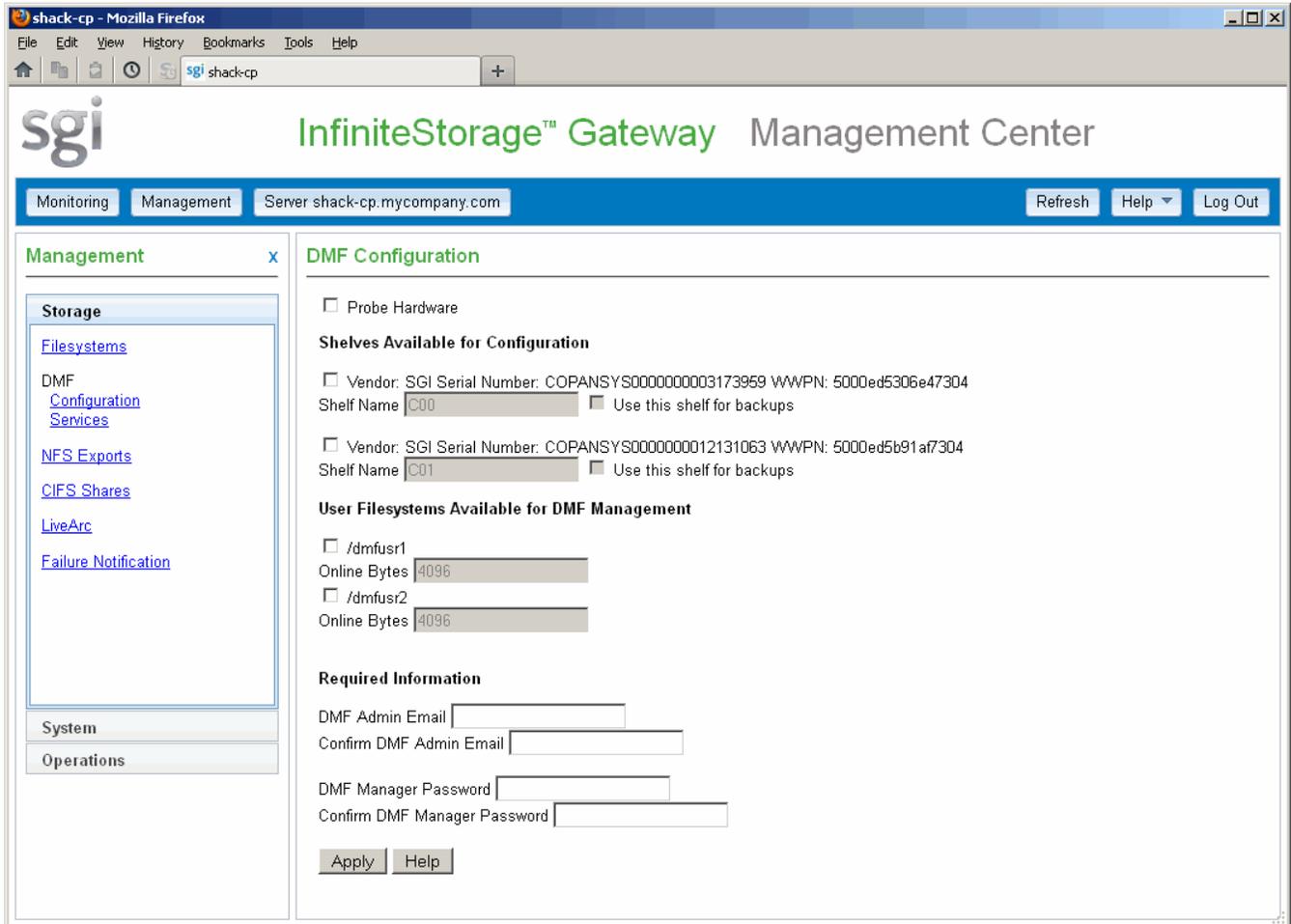


Figure 2-11 DMF Configuration Page

Libraries Available for Configuration

Select the physical/logical libraries that you want to use as secondary storage. Give each library a unique name that is 8 or fewer characters.

If a library should be used for backups of metadata and DMF administrative filesystems, select it.

Note: The DMF configuration process will divide a given library into two migration targets, known as *volume groups (VGs)*.

Shelves Available for Configuration

Select the unformatted COPAN MAID shelves that you want to use as secondary storage. Each shelf is a single migration target, therefore you must configure shelves in pairs in order to have the required two migration targets.

Do the following:

1. Determine the available devices on the COPAN MAID shelves that are visible on the SCSI bus:
 - a. Log in to the Platform Service Manager (PSM) GUI for the COPAN MAID cabinet, where *ipaddress* is the IP address of the PSM server:

```
http://ipaddress:8180/psmweb/
```

The MAID shelves will be displayed in order from shelf 7 (top) through shelf 0 (bottom), as applicable.

- b. Drill down to the shelf details and note the WWPN of both ports on each shelf.

For example, suppose the port numbers for shelf 2 are as follows:

```
Port 0 WWPN: 50:00:ED:5E:35:C3:43:03
Port 1 WWPN: 50:00:ED:5E:35:C3:43:04
```

You will look for numbers similar to the above (but using lowercase and without colon delimiters) in the output shown on the **Configure DMF System** page. Only one of the port WWPNs will be found, even if both ports are connected to the system, because the discover operation chooses one as the primary port.

For more information about PSM, see the *Platform Service Manager Online Help* available from the PSM **Help** menu.

- c. Match the device WWPN shown on **Configure DMF System** page with the shelf WWPN obtained in step 1b. For example, the `/dev/sg4` WWPN `5000ed5e35c34303` corresponds to the shelf 2 port 0 WWPN of `50:00:ED:5E:35:C3:43:03`. Therefore, in this example, device `/dev/sg4` equates to shelf 2.
2. Give each shelf a unique 3-character name in the format `Cnn`, where `nn` corresponds to the cabinet number and physical position of the shelf within that cabinet, such as `C02` for the third shelf from the bottom (shelf 2) of cabinet 0, as shown in Figure 2-12.

Note: It is important that you name a shelf appropriately (corresponding to its physical location) so that it can be easily identified if service is required.

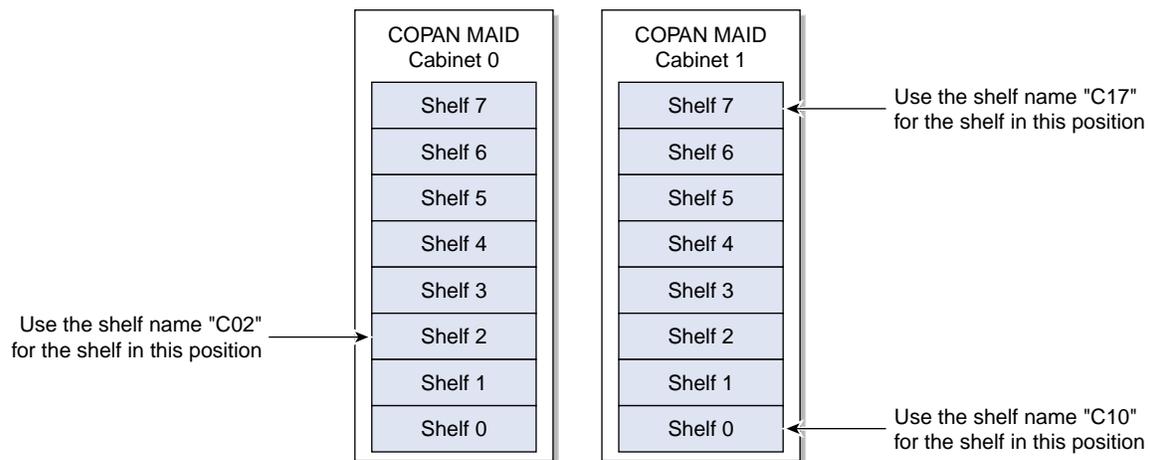


Figure 2-12 Correlating Shelf Position and Shelf Name for COPAN MAID

3. If a shelf should be used for backups of metadata and DMF administrative filesystems, select it.

User Filesystems Available for DMF Management

Select the user filesystems that you want DMF to manage. When configured for use with DMF, the data in these filesystems will be monitored by DMF and be migrated to secondary storage as appropriate.

If you select a filesystem, you can specify the minimum number of bytes at the beginning of each user file that will always remain online after migration, (for use by file managers, in order to avoid unnecessary recall of a file due to directory browsing); the default is the filesystem block size.

Required Information

Set and confirm the following:

- Email address that you want to receive DMF administrative notifications. (Notification messages sent by DMF are also available via DMF Manager.)
- Administrative password for the DMF Manager graphical user interface. This password is required to perform changes via DMF Manager.

Note: If you later want to change the DMF admin email address or change the DMF Manager admin password, you can do so via DMF Manager. See "Accessing DMF Manager" on page 73.

Apply Changes and Obtain Configuration Status

To apply your selections, click **Apply**, as shown in Figure 2-13.

Depending upon your site's implementation, configuration can be a lengthy process. Whenever you want to see the progress, click **Configuration Status** to refresh the output on the page. When the process finishes, a message will be sent to the DMF admin email address that you specified on the configuration page. Figure 2-14 shows an example of the completed configuration status that appears after clicking **Configuration Status**.

After the configuration is complete, DMF and the OpenVault mounting service will be configured and the volumes on the secondary storage will be ready to hold migrated data. The selected libraries/shelves will be configured to store backups and DMF will be running and ready to migrate data. This process will send two informational DMF alerts, confirming that the configuration has completed and that DMF has been started.

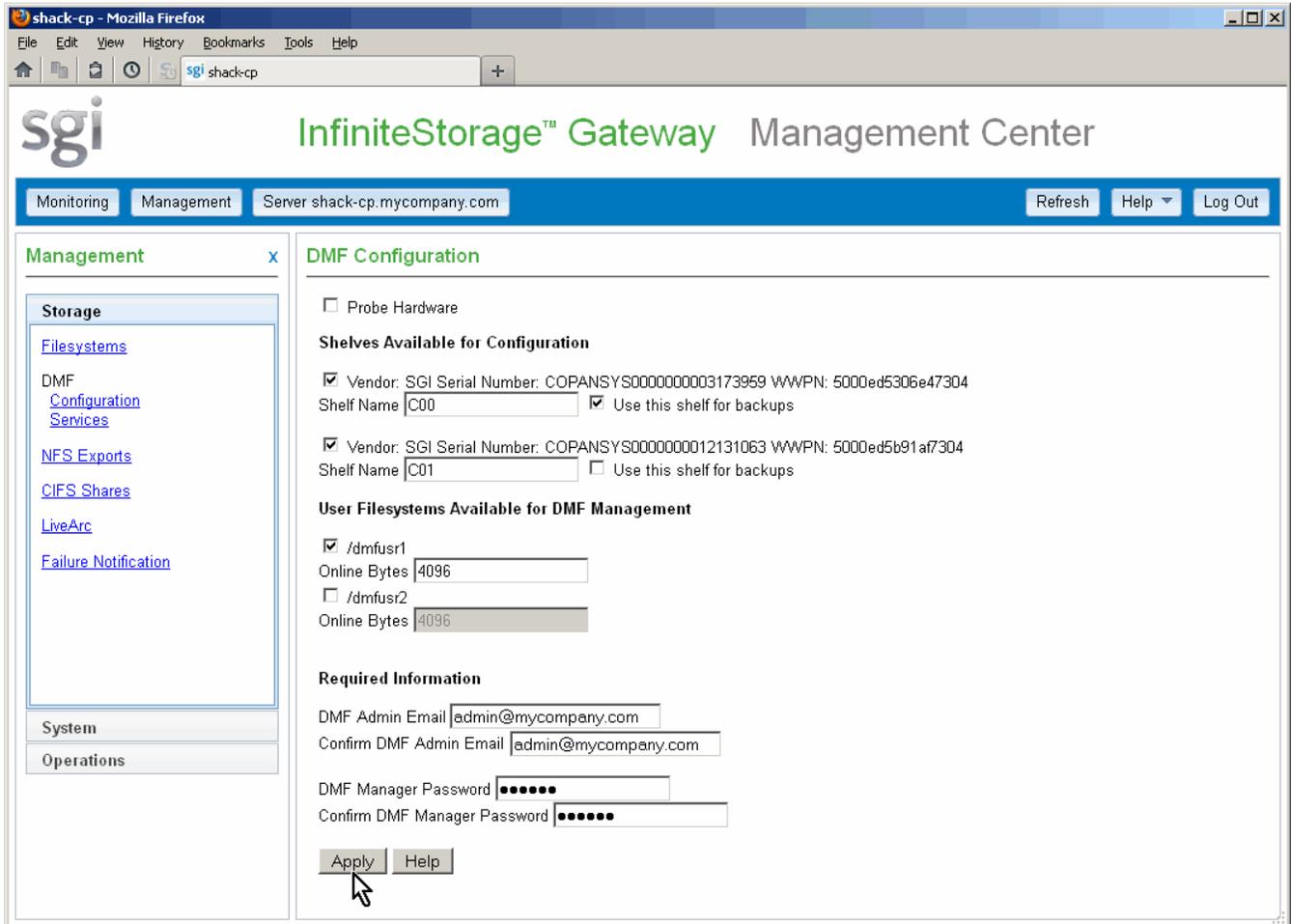


Figure 2-13 Applying the Configuration

2: Initial Configuration

The screenshot shows a web browser window titled "shack-cp - Mozilla Firefox" with the URL "sgi shack-cp". The page header displays the SGI logo and "InfiniteStorage™ Gateway Management Center". A navigation bar includes "Monitoring", "Management", and "Server shack-cp.mycompany.com", along with "Refresh", "Help", and "Log Out" buttons.

The main content area is titled "DMF Configuration" and shows the following configuration status:

- Configuration status.**
- Email will be sent to address given at configuration time when completed.
- Updated: Fri Apr 12 2013 12:48:30 GMT-0500 (Central Daylight Time)
- Configure Shelves: C00 C01 Configure Filesystems: /dmfus1, Send email to: admin@mycompany.com
- Step 1 of 6 : Confirm parameters and system requirements.
- Step 2 of 6 : Configure shelf or shelves.
 - Configure C00 COPANSYS0000000003173959
 - Configuring this shelf will take approximately 30 minutes..
 - Start Time: Fri Apr 12 11:09:31 MDT 2013
 - End Time: Fri Apr 12 11:27:51 MDT 2013
 - Configure C01 COPANSYS00000000012131063
 - Configuring this shelf will take approximately 30 minutes..
 - Start Time: Fri Apr 12 11:28:03 MDT 2013
 - End Time: Fri Apr 12 11:43:30 MDT 2013
- Step 3 of 6 : Add shelf volumes.
 - Added 542 volumes to DMF.
 - Added 572 volumes to DMF.
- Step 4 of 6 : Configure DMF for filesystem(s).
- Step 5 of 6 : Initializing the DMF audit system.
- Step 6 of 6 : Starting systems.
- DMF State: UP
- Messages:
 - All systems are operational.
- Last Update: 2013-04-12T11:46:52
- You may need to refresh any open DMF Manager sessions to see the changes reflected.
- Mailing admin@mycompany.com

A "Configuration Status" button is located at the bottom of the page.

Figure 2-14 Completed Configuration Status

Configure Other Features As Needed

To configure other features, such as NFS exports or CIFS shares, use the features available from the **Management** pane in the Management Center. For details about basic monitoring and management features, see the *SGI Management Center for InfiniteStorage Administrator Guide*, which is available from the following selection:

Help

> **Documentation**

> **SGI Management Center for InfiniteStorage Administrator Guide**

This section provides an overview of the following basic Management Center features:

- "Accessing the Management Center After Initial Installation" on page 44
- "Monitoring Features" on page 44
- "Management Features" on page 46
- "Server Summary Feature" on page 48
- "Refresh Capability" on page 50
- "Getting Help" on page 50
- "Logging Out" on page 50

Accessing the Management Center After Initial Installation

To access the Management Center after initial installation, do the following:

1. Launch a web browser to the following secure (**https**) website, where *FQDN_of_the_MIS_Server* is the fully qualified domain name or IP address of the eth0 interface for your MIS system:

```
https://FQDN_of_the_MIS_Server:1178
```

Note: At initial installation, the interface uses a default IP address. See "Access the Management Center for Initial Configuration" on page 20

2. Accept the security certificate. In Firefox, this will require a series of steps to add an exception and get the certificate.

Note: The certificate warning is safe to ignore because Management Center generates its own SSL certificates, rather than having the SSL certificates signed by a commercial certificate authority.

Monitoring Features

This section discusses the following monitoring features:

- "Monitoring Storage Tab" on page 44
- "Monitoring System Tab" on page 45

Monitoring Storage Tab

The **Storage** tab provides access to the following monitoring features:

- Disk **Space** displays the disk space used on each filesystem.
- Disk **Throughput** displays the amount of data that is transferred to and from the disks.
- Disk **IOPS** displays a bar graph of disk I/O per second (IOPS) for each active filesystem.

- **Disk Quotas** displays the disk user/group quotas that provide limits on the number of files and the amount of disk space a user/group is allowed to consume on each filesystem. If you log in, you can modify the settings for user and group quotas.
- **DMF Capacity & Usage** displays the capacity of the DMF-managed filesystems on the MIS server. See "DMF Capacity & Usage" on page 65.
- **DMF Alerts** displays the unacknowledged alerts sent by DMF. See "DMF Alerts" on page 66.
- **NFS Exports** displays statistics about Network File System (NFS) exports.

Note: Reverse lookup for NFS clients must be properly configured in the DNS server because the NFS server will always try to do a reverse lookup on client IP addresses. Improper configuration will cause delays.

- **CIFS Shares** displays statistics about Common Internet File System (CIFS) shared files.
- **NFS & CIFS Clients** displays various I/O criteria by which to display information about the storage server's clients.
- **Device Failures** displays details about failed storage devices.

Monitoring System Tab

The **System** tab provides access to the following monitoring features:

- **Alerts** displays messages from the system logs. If you log in, you can acknowledge alerts.
- **CPU Utilization** reports metrics for CPU use.
- **Network Throughput** displays the amount of data transferred through each network interface card (NIC).
- **Hardware Inventory** shows a summary of the hardware configuration, including the CPUs, memory, network controllers, and SCSI disks.
- **Software Versions** displays the installed operating system level and the version numbers of key software packages. If updates are available, a link will be displayed.

Note: The display of updates requires an update repository. See "Create a Software Update Repository" on page 51.

Management Features

This section discusses the following management features:

- "Management Storage Tab" on page 46
- "Management System Tab" on page 47
- "Management Operations Tab" on page 47

Management Storage Tab

The **Storage** tab provides access to the following management features:

- **Filesystems** displays a brief description of the available local filesystems and lets you do the following:
 - Mount/unmount user filesystems
 - Build new filesystems
 - Build new RAID sets
- **DMF Configuration** provides access to DMF configuration tasks. See:
 - Chapter 2, "Initial Configuration" on page 17
 - Chapter 3, "Configuration Changes" on page 51
- **DMF Services** displays the current status and lets you stop or restart all of the services related to DMF. See "DMF Services" on page 69.



Caution: Always stop services via the Management Center. Do not manually stop services via the command line.

- **NFS Exports** lets you configure filesystems so that they are available for network clients by means of the NFS network protocol.

- **CIFS Shares** lets you configure filesystems so that they are available for network clients by means of the CIFS network protocol.
- **LiveArc** (if installed) lets you configure LiveArc AE digital asset management. See Chapter 6, "Using LiveArc AE Digital Asset Management" on page 85.
- **Failure Notification** lets you configure notification of failed devices.

Management System Tab

The **System** tab provides access to the following management features:

- **Network Interfaces** configures the network interfaces for the system.
- **System Name** sets the hostname and management IP address for the server.
- **DNS & Name Servers** specifies how to map hostnames to IP addresses for the system.
- **Name Service Client** specifies various directory services that manage information associated with the network users, such as mapping user names with user IDs and group names with group IDs.
- **SNMP** enables Simple Network Management Protocol (SNMP) access.
- **Time & Date** sets the local time and enables automatic time synchronization with NTP.
- **Licenses** provides information about the installed licenses and lets you add and delete licenses.
- **Administrator Password** changes the Management Center administrator password.
- **Local Users** creates or imports local user accounts.
- **Local Groups** creates or imports local groups.

Management Operations Tab

The **Operations** tab provides access to the following management features:

- **Save/Restore Configuration** saves the files in the `/etc` directory or restores those saved files.

- **Gather Support Data** collects copies of the storage server's software and hardware configuration and log files, which may be needed by SGI Support for troubleshooting purposes.
- **Gather DMF Data** collects details about DMF and the OpenVault mounting service (including core files, logs, journals, configuration information, and file listings), which may be needed by SGI Support for troubleshooting purposes. See "Gathering DMF Data" on page 70.
- **Shut Down System** lets you reboot or power down the system after a specified number of minutes.

Server Summary Feature

The **Server** button displays a **Summary** page that contains the following:

- Current time as reported by the server
- System uptime
- Number of users
- Load average
- Number of unacknowledged alerts
- DMF state (see "DMF State" on page 63)
- CPU utilization
- Disk space utilization
- Disk throughput
- Network throughput
- The number of NFS and CIFS clients

The ticks along the status bars represent the average value over the past day or hour, rather than the immediate value that is shown by the graph. You can drill down to more detailed status by clicking the headings to the left of the graphs. Click **History** to view the historical status of a parameter. Click other links, such as **Alerts**, to access other pages.

Figure 2-15 shows an example **Summary** page.

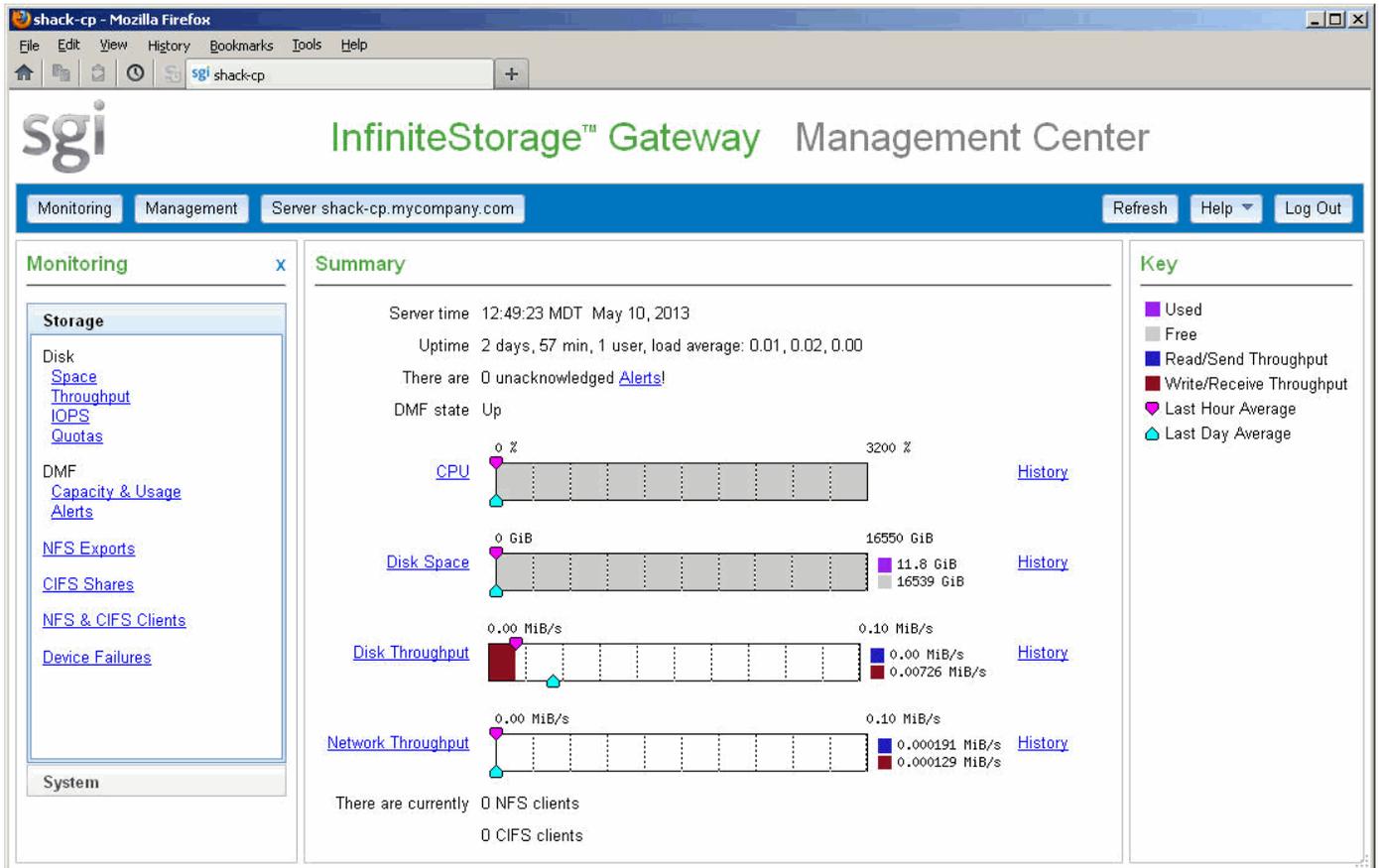


Figure 2-15 Summary Page

For information about DMF status, see "DMF State" on page 63.

Note: To expand the size of the **Summary** page, click the **X** in the **Monitoring** pane to close that pane. To make the **Monitoring** pane reappear, click the **Monitoring** button.

Click **History** to view the historical status.

Refresh Capability

The **Refresh** button reloads the currently displayed page.

Getting Help

The **Help** button provides access to information about SGI InfiniteStorage Gateway, including the following:

- Copyright, trademark, and open-source statements
- Links for contacting support and providing feedback
- Information about conventions for units of measure, IP addresses, and color-coding of data flow directions
- Product guides and release notes

Logging Out

The **Log Out** button exits from management functions. When you log out, the Management Center displays the server **Summary** page. If you are logged out and try to access a management task, you will be prompted to log in. You must enable cookies to log in.

Configuration Changes

This chapter discusses the steps you should perform to update the software, change the secondary-storage hardware, or manage additional user filesystems with DMF:

- "Update the Software" on page 51
- "Install Additional Archive Media" on page 54
- "Upgrade the MIS Drives" on page 54
- "Update the DMF Configuration" on page 58
- "Change the MIS Server Hostname" on page 60

To change the DMF administrative email address or reset the DMF Manager admin password, see Chapter 5, "Advanced DMF Monitoring and Management" on page 73.

Update the Software

This section discusses the following:

- "Create a Software Update Repository" on page 51
- "Install Updates" on page 54

Create a Software Update Repository

To receive software updates, you must first set up an update repository according to the instructions in the ISSP release notes, available from the following selection in the Management Center:

- Help**
 - > **Documentation**
 - > **SGI InfiniteStorage Software Platform Release Notes**

When updates are available, a notice will be displayed on the **Software Versions** page, available from the following selection in the Management Center:

- Monitoring**
- > System**
- > Software Versions**

Click the **updates** link to list the updates; Figure 3-1 shows the location of this link.

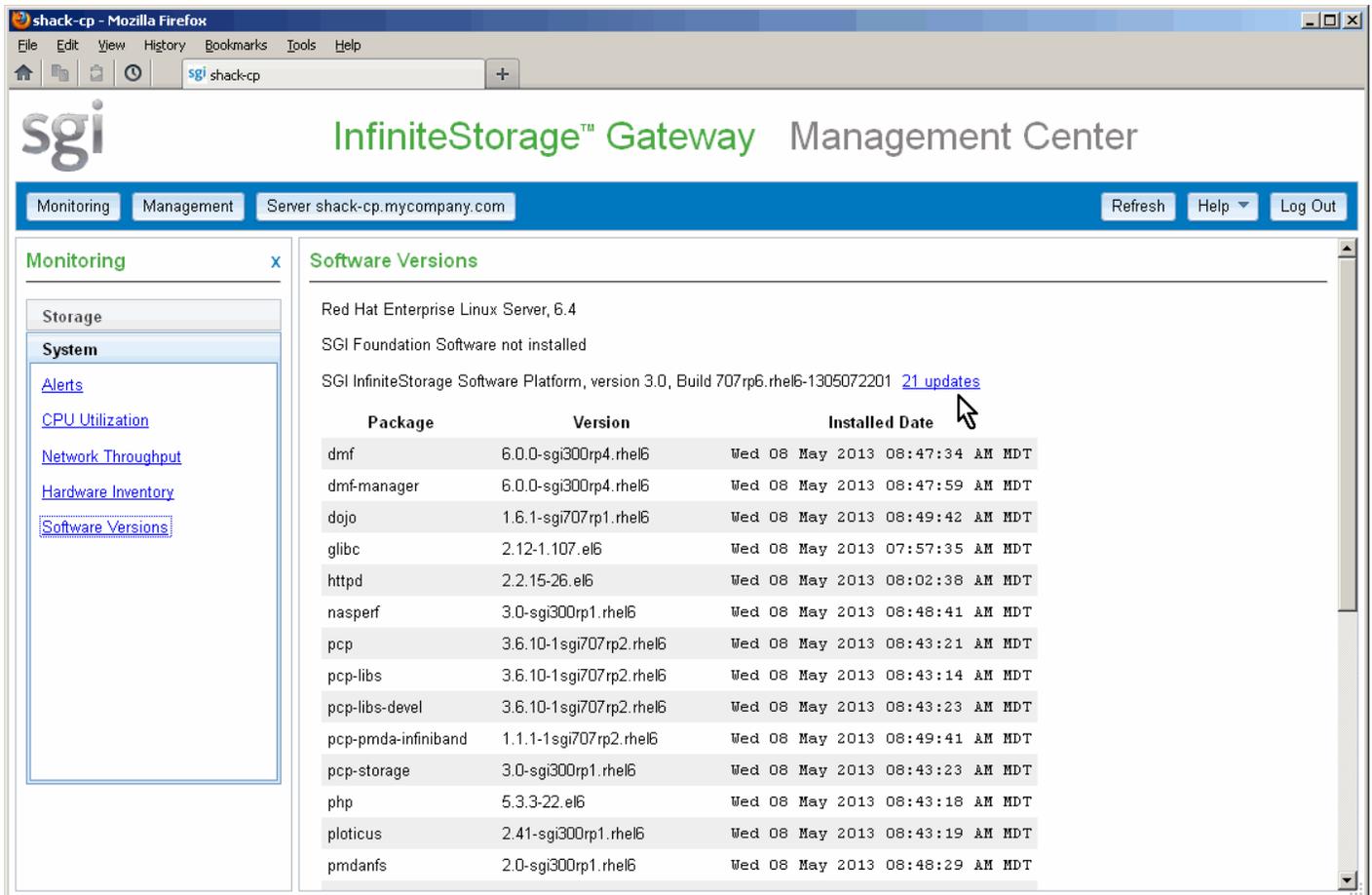
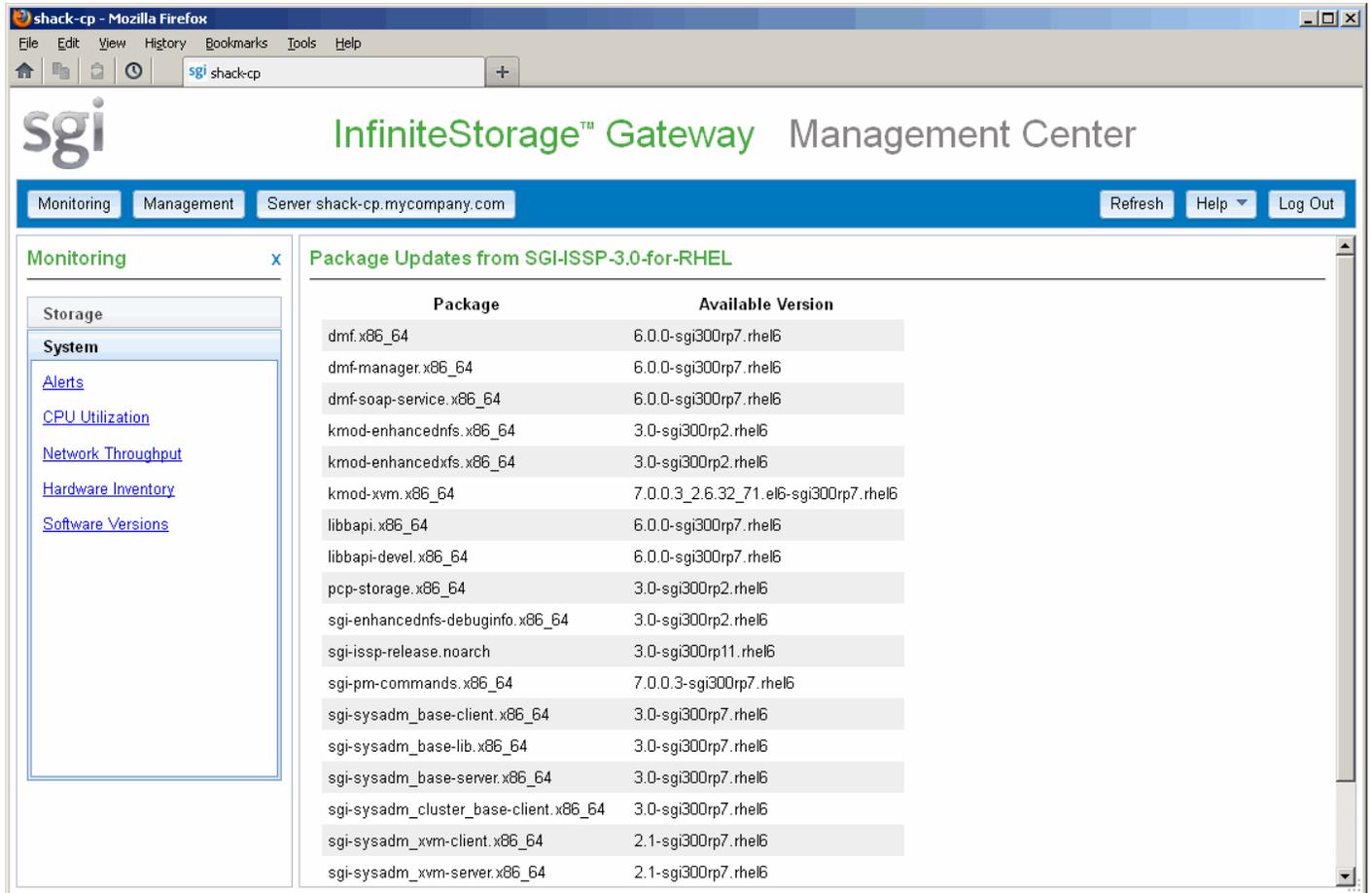


Figure 3-1 Notification of Software Updates on the **Software Versions** Page

After you click the **updates** link, you will see a list of the available updates, such as the example shown in Figure 3-2.



The screenshot shows the SGI InfiniteStorage Gateway Management Center interface. The main content area displays a table titled "Package Updates from SGI-ISSP-3.0-for-RHEL". The table has two columns: "Package" and "Available Version". The table lists various packages and their corresponding available versions.

Package	Available Version
dmf.x86_64	6.0.0-sgi300rp7.rhel6
dmf-manager.x86_64	6.0.0-sgi300rp7.rhel6
dmf-soap-service.x86_64	6.0.0-sgi300rp7.rhel6
kmod-enhancednfs.x86_64	3.0-sgi300rp2.rhel6
kmod-enhancedxfs.x86_64	3.0-sgi300rp2.rhel6
kmod-xvm.x86_64	7.0.0.3_2.6.32_71.el6-sgi300rp7.rhel6
libbapi.x86_64	6.0.0-sgi300rp7.rhel6
libbapi-devel.x86_64	6.0.0-sgi300rp7.rhel6
pcp-storage.x86_64	3.0-sgi300rp2.rhel6
sgi-enhancednfs-debuginfo.x86_64	3.0-sgi300rp2.rhel6
sgi-issp-release.noarch	3.0-sgi300rp11.rhel6
sgi-pm-commands.x86_64	7.0.0.3-sgi300rp7.rhel6
sgi-sysadm_base-client.x86_64	3.0-sgi300rp7.rhel6
sgi-sysadm_base-lib.x86_64	3.0-sgi300rp7.rhel6
sgi-sysadm_base-server.x86_64	3.0-sgi300rp7.rhel6
sgi-sysadm_cluster_base-client.x86_64	3.0-sgi300rp7.rhel6
sgi-sysadm_xvm-client.x86_64	2.1-sgi300rp7.rhel6
sgi-sysadm_xvm-server.x86_64	2.1-sgi300rp7.rhel6

Figure 3-2 Package Updates

Install Updates

For information about installing updates, see the instructions provided with the README file that accompanies the update and the information on the SGI update server:

<http://update.sgi.com>

You will be automatically redirected to the appropriate Supportfolio location, which requires a Supportfolio login.

Install Additional Archive Media

Install the new physical/logical library or new COPAN MAID shelf.

If you are using COPAN MAID, take note of the physical position of the shelf within the cabinet so that you can appropriately name the shelf in a later step. Shelves are numbered from 0 (bottom) to 7 (top).

Note: It is important that you name a shelf appropriately (corresponding to its physical location) so that it can be easily identified if service is required. See Figure 2-12 on page 39.

Upgrade the MIS Drives

You can upgrade the SGI InfiniteStorage Gateway in 8-drive increments, up to a maximum system with 72 drives. Each 8-drive increment is configured as a single 6+2 RAID 6.

Do the following:

1. Install the drive hardware as directed.
2. Open the SGI InfiniteStorage Gateway Management Center, as described in "Accessing the Management Center After Initial Installation" on page 44.

3. Access the **Filesystems** page:

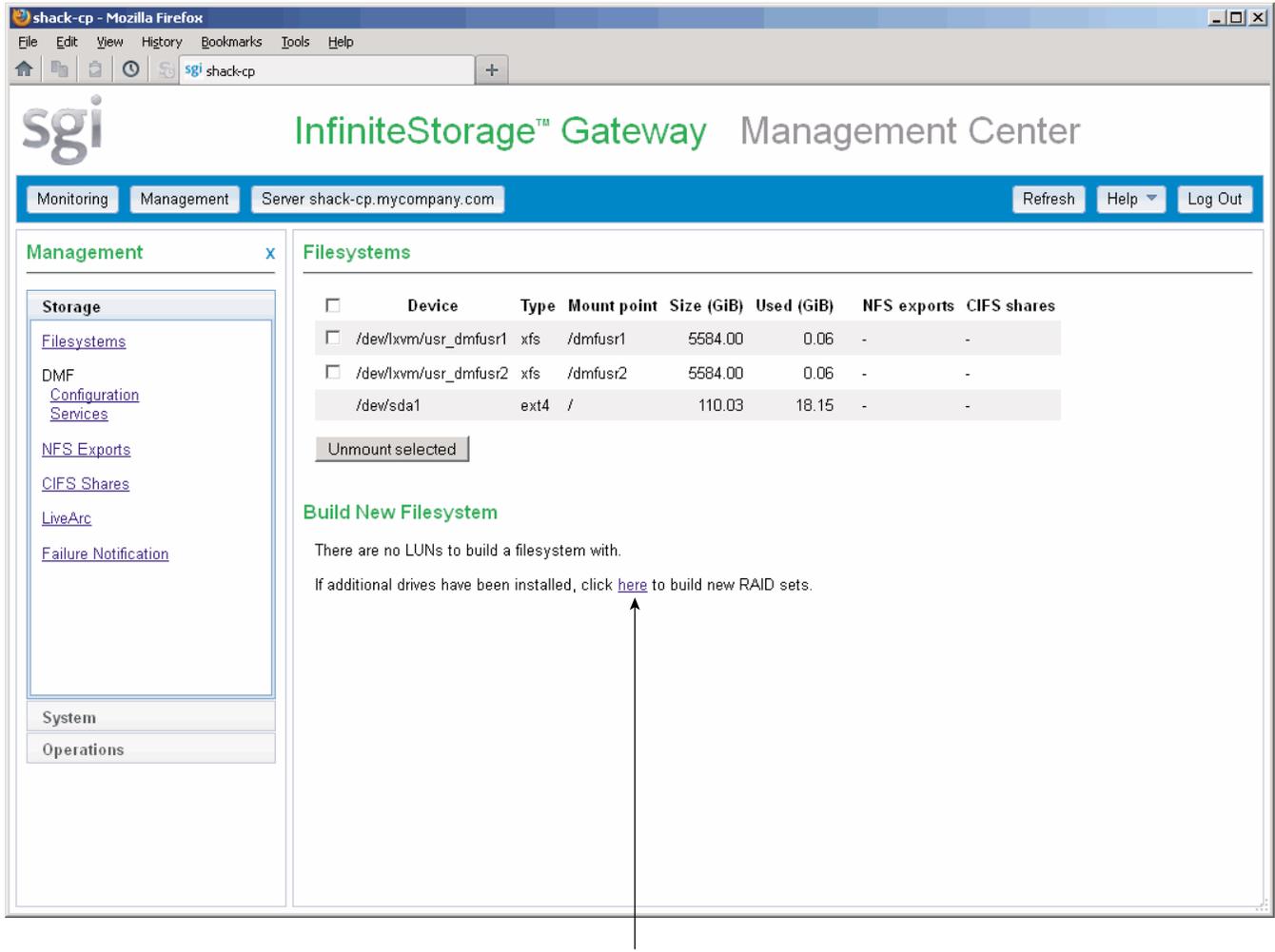
Management

> **Storage**

> **Filesystems**

4. Click the link to build the new RAID sets, shown in Figure 2-10 on page 35.

3: Configuration Changes



Click to build new RAID sets

Figure 3-3 Building RAID Sets

Note: I/O performance will be degraded until the RAID is fully initialized.

5. Create filesystems, as described in "Create and Mount the User Filesystems" on page 33.

Update the DMF Configuration

Do the following:

1. Open the Management Center, as described in "Accessing the Management Center After Initial Installation" on page 44.
2. Select the following:

Management
 > **Storage**
 > **DMF Configuration**

3. If you made hardware changes that are not discovered, click **Probe Hardware** and **Apply**.

Note: **Probe** will discover changes and make them available for configuration. Because the probe request can cause an interruption of current DMF activity, you should only use this feature when DMF is inactive. See "DMF Services" on page 69.

4. Select the new storage or filesystems, as described in "Configure DMF" on page 36.
5. Click **Apply**.

Figure 3-4 shows an example of adding the user filesystem `/dmfusr2` to the configuration so that it can be managed by DMF.

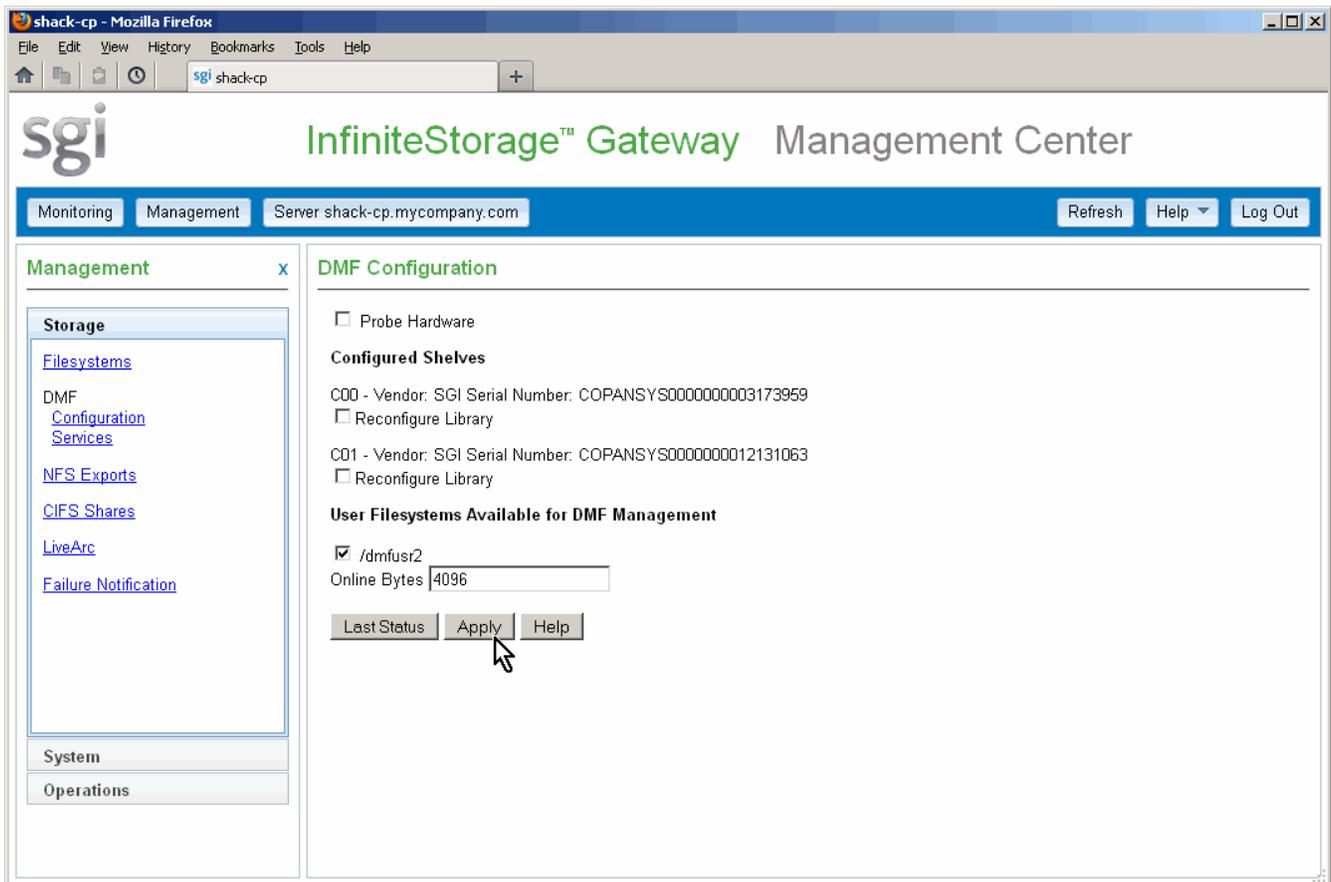


Figure 3-4 Updating the Configuration

Before applying your changes, DMF will make a backup copy of the DMF configuration file. Depending upon your changes, the configuration update can be a lengthy process. Whenever you want to see the progress, click **Configuration Status** to refresh the output on the page.

When the configuration update is complete, DMF will be up and ready to migrate data. When the process finishes, a message will be sent to the DMF admin email address and appropriate informational DMF alerts will appear.

Change the MIS Server Hostname

Before changing the MIS server hostname, all traffic to the DMF-managed filesystem must have completed migrating or recalling files because when you change the hostname of the MIS server, all DMF services will be terminated and the system will be rebooted after successful renaming.

Note: You must assign an IP address that will remain constant, either a static IP address or a dedicated DHCP address.

To change the hostname, access the **System Name** page:

Management
 > **System**
 > **System Name**

Figure 3-5 shows an example.

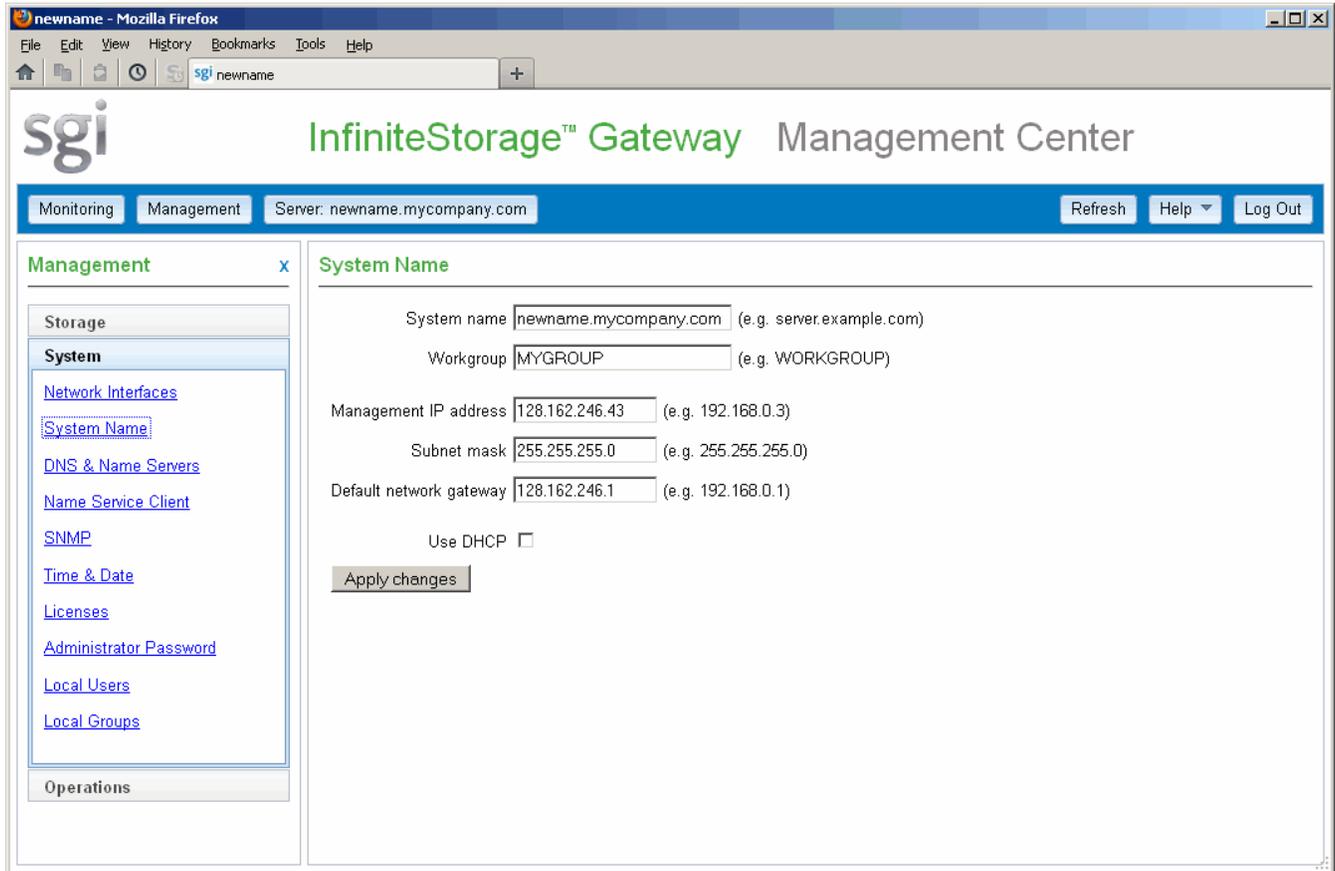


Figure 3-5 Changing the System Hostname

Basic DMF Monitoring and Management

This chapter discusses the following tasks you will perform with the SGI InfiniteStorage Gateway Management Center:

- "Monitoring DMF" on page 63
- "Managing DMF" on page 69

To open the Management Center, see "Accessing the Management Center After Initial Installation" on page 44.

Also see Chapter 5, "Advanced DMF Monitoring and Management" on page 73.

Monitoring DMF

This section discusses the following basic DMF monitoring tasks:

- "DMF State" on page 63
- "DMF Capacity & Usage" on page 65
- "DMF Alerts" on page 66

For information about other monitoring tasks (such as monitoring disk space, NFS/CIFS exports, and system alerts), see *SGI Management Center for InfiniteStorage Administrator Guide*.

DMF State

To determine the overall DMF status, look at the **DMF state** output in the **Summary** page available when you click the **Server *MIS_servername*** button. The possible DMF states are:

Up	DMF is up and operational
Attention	DMF is up and operational, but there are alerts that should be attended to
Degraded	DMF is migrating data, but not in its optimal configuration

- Down** DMF is not able to migrate data and requires immediate attention
- Unavailable** The DMF Manager service (dmfman) is down, therefore no status can be reported (although the dmf service may actually be up)
- Unconfigured** DMF has not been configured

If you click on the DMF state, you will see a summary of the current status, as shown in Figure 4-1.

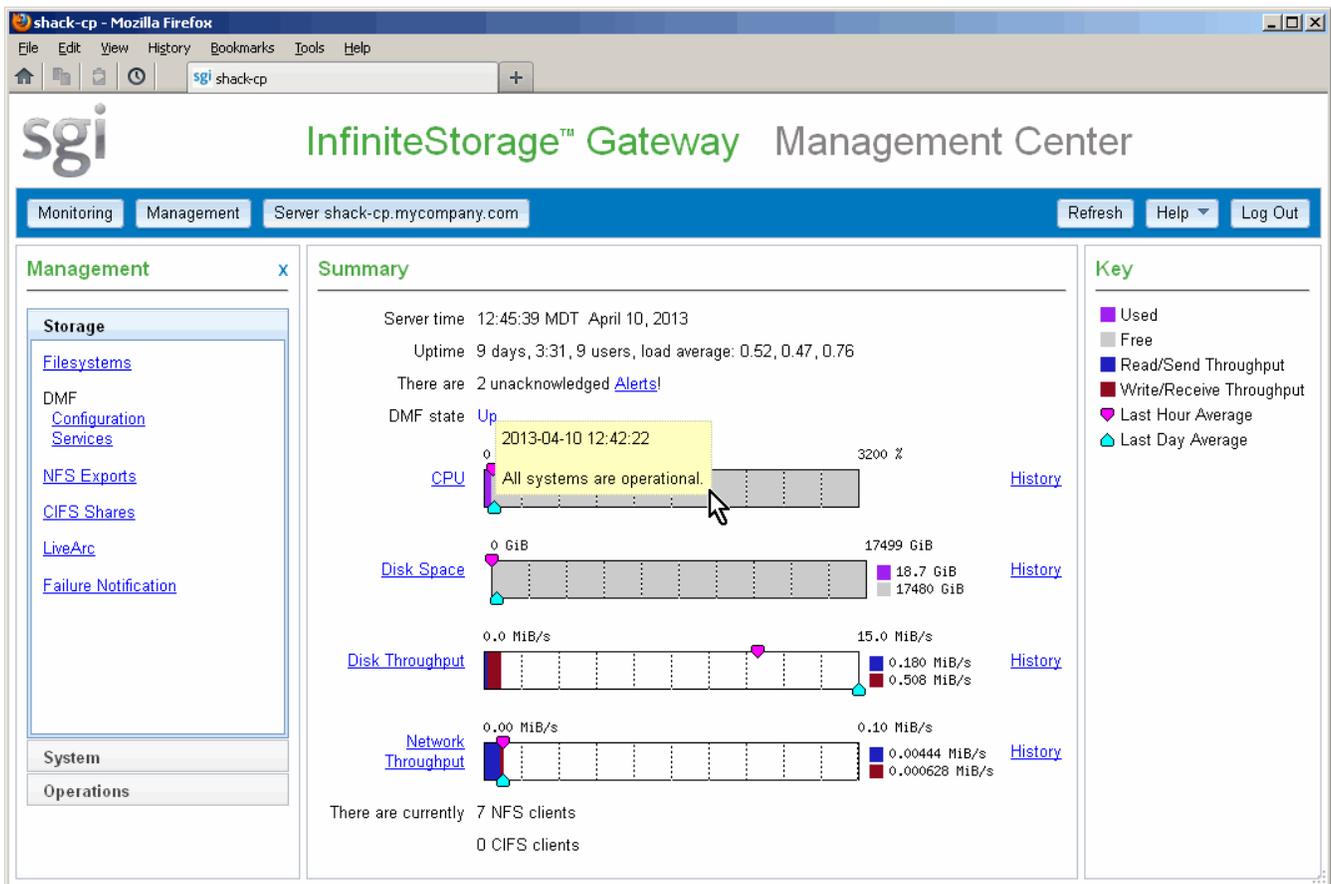


Figure 4-1 DMF State Shown in Server Summary Page

To restart the services associated with DMF, see "DMF Services" on page 69.

DMF Capacity & Usage

To determine the capacity of the DMF-managed primary filesystem on the MIS disk, view the **DMF Capacity & Usage** page, shown in Figure 4-2, which is available from the following selection:

Monitoring
 > **Storage**
 > **DMF Capacity & Usage**

This page provides the following information:

- **Volume Group** is the name of the DMF volume group (VG) that applies to the specified library server on the physical/logical library or the COPAN MAID shelf
- **Size** is the total capacity of the filesystem in megabytes (MB)
- **Active** is the total amount of migrated data (in MB) that may be recalled (also represented as a percentage)
- **Avail** is the total migrated data (in MB) on all volumes within the VG (also represented as a percentage)

Note: Some of the space will not be available for migration because it has been reserved.

4: Basic DMF Monitoring and Management

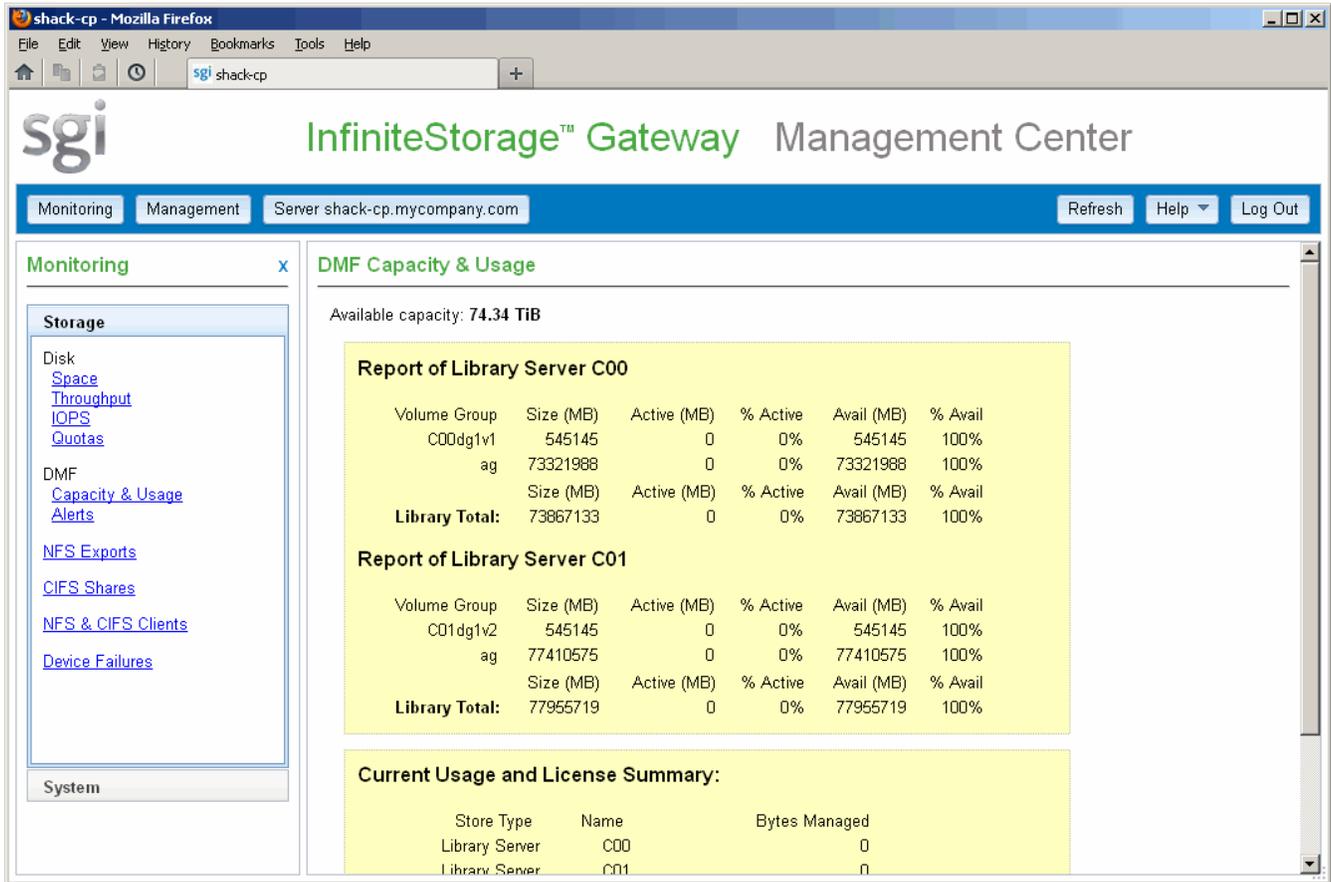


Figure 4-2 DMF Capacity & Usage

DMF Alerts

The Alerts page is available from the following selection:

- Monitoring**
- > Storage**
- > Alerts**

The **Alerts** page displays the unacknowledged alerts (by default, grouped by date and message), and has the following sortable fields:

- **Time** is the date and time at which a particular alert was issued (by default, alerts are sorted by time from most recent to oldest)
- **Alert Message** is the notice, warning, or critical error reported during the operation of DMF
- **Priority** is an icon (as shown in Figure 4-3) that represents the severity of the alert
- **Count** is the number of times this particular alert has been issued within one calendar day

Note: Identical alerts are grouped and only the time that the last alert was issued is displayed. To view all alerts and their corresponding time stamps, view the **Alerts** page via **DMF Manager**; see Chapter 5, "Advanced DMF Monitoring and Management" on page 73.

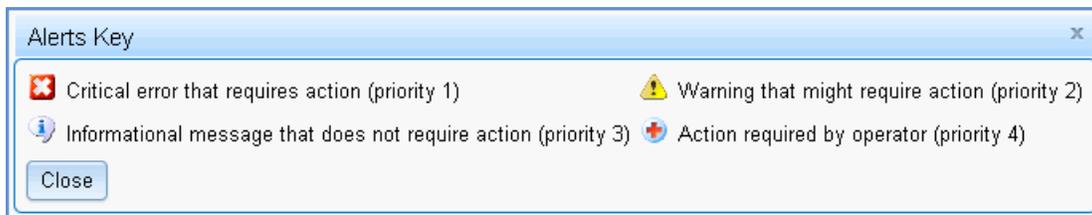


Figure 4-3 Alerts Key

Figure 4-4 shows an example **DMF Alerts** page. For more details about a given alert or to acknowledge DMF alerts, you must open DMF Manager; see "Accessing DMF Manager" on page 73, and "Acknowledging DMF Alerts" on page 79.

4: Basic DMF Monitoring and Management

The screenshot shows the SGI InfiniteStorage Gateway Management Center interface. The browser window title is "shack-cp - Mozilla Firefox" and the address bar shows "sgi shack-cp". The page header includes the SGI logo and "InfiniteStorage™ Gateway Management Center". A navigation bar contains "Monitoring", "Management", and "Server shack-cp.mycompany.com" with "Refresh", "Help", and "Log Out" buttons.

The main content area is divided into two sections: "Monitoring" and "DMF Alerts".

Monitoring

- Storage
 - Disk
 - [Space](#)
 - [Throughput](#)
 - [IOPS](#)
 - [Quotas](#)
 - DMF
 - [Capacity & Usage](#)
 - [Alerts](#)
 - [NFS Exports](#)
 - [CIFS Shares](#)
 - [NFS & CIFS Clients](#)
 - [Device Failures](#)
- System

DMF Alerts

1 - 4 of 4 items 10 | 25 | 50 | 100

Time	Alert Message	Priority	
2013-Apr-10 12:51:03	Started DMF.	Info	
2013-Apr-10 12:50:28	Stopped DMF.	Info	
2013-Apr-10 12:41:35	Configuration Command: ID=3 completed	Info	
2013-Apr-10 12:23:53	Configuration Command: ID=2 completed	Info	

Figure 4-4 DMF Alerts

Managing DMF

This chapter discusses the following basic DMF management tasks:

- "DMF Services" on page 69
- "Gathering DMF Data" on page 70

For information about other management tasks (such as managing filesystems, network interfaces, and system shutdown), see *SGI Management Center for InfiniteStorage Administrator Guide*.

DMF Services

The **DMF Services** page is available from the following selection:

Management
 > **Storage**
 > **DMF Services**

The **DMF Services** page shown in Figure 4-5 displays the current status and lets you stop or restart all of the services related to DMF:

Service	Description
dmf	DMF service
dmfman	DMF Manager graphical user interface service
openvault	OpenVault mounting service
pcp	Performance Co-Pilot (PCP) performance monitoring and management framework
pcp-storage	PCP tools for performance monitoring in the Management Center and DMF Manager

This page also lets you access the DMF Manager graphical user interface, where you can change the DMF admin email and get more details about DMF. To open the GUI, click **Open DMF Manager**; for more information, see "Accessing DMF Manager" on page 73.

4: Basic DMF Monitoring and Management

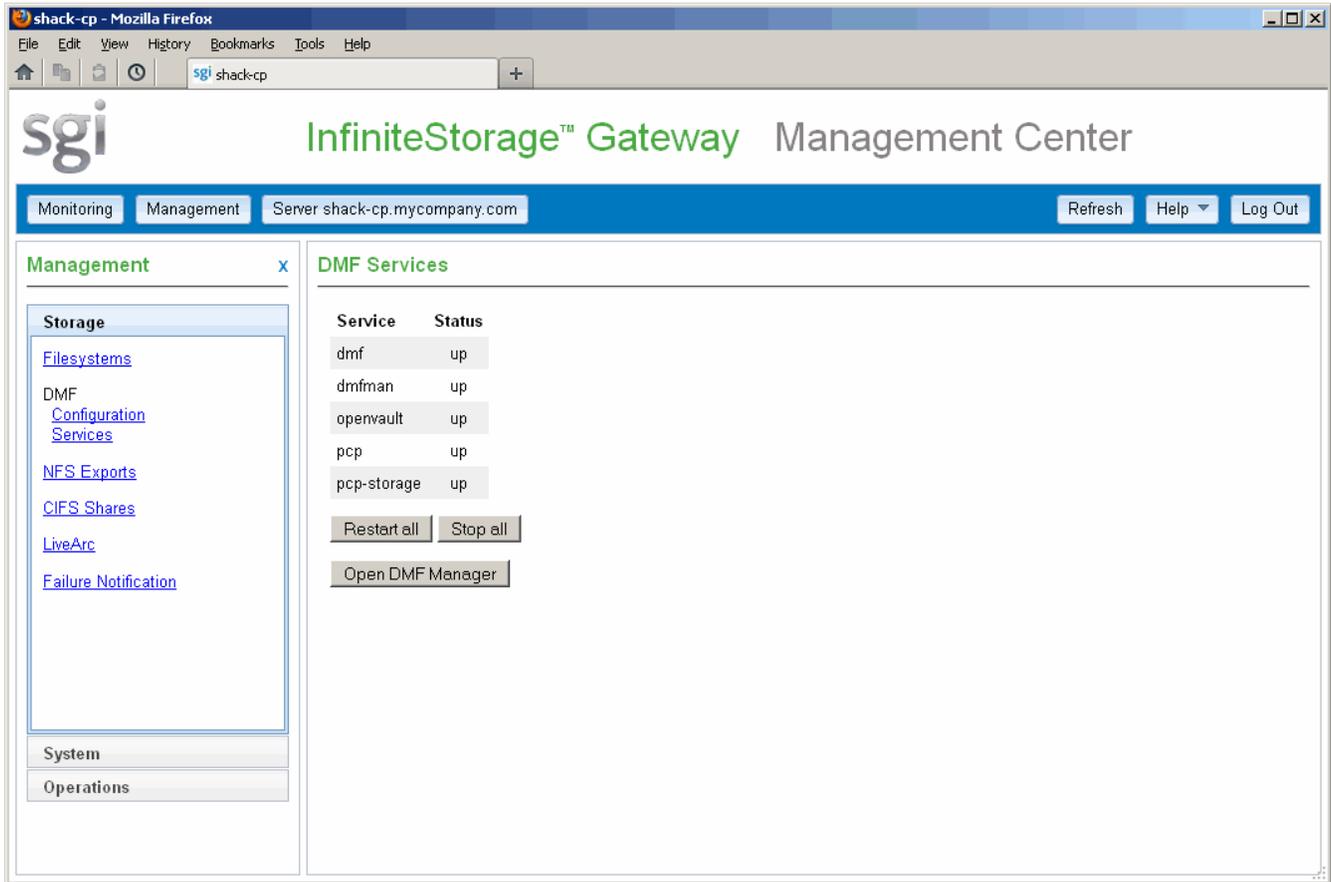


Figure 4-5 DMF Services

Gathering DMF Data

If there is a problem with DMF, SGI Support may request DMF data in order to find and resolve the problem. The **Gather DMF Data** page lets you collect details about DMF and the OpenVault mounting service, including core files, logs, journal, configuration information, and file listings. Existing archives will be listed with their date and size; you can remove or upload them.

Note: If you have opened a case with SGI Support, please contact your representative and request an upload directory on `shell.sgi.com` before proceeding.

To collect the DMF data, click the **Gather data** button. Figure 4-6 shows an example.

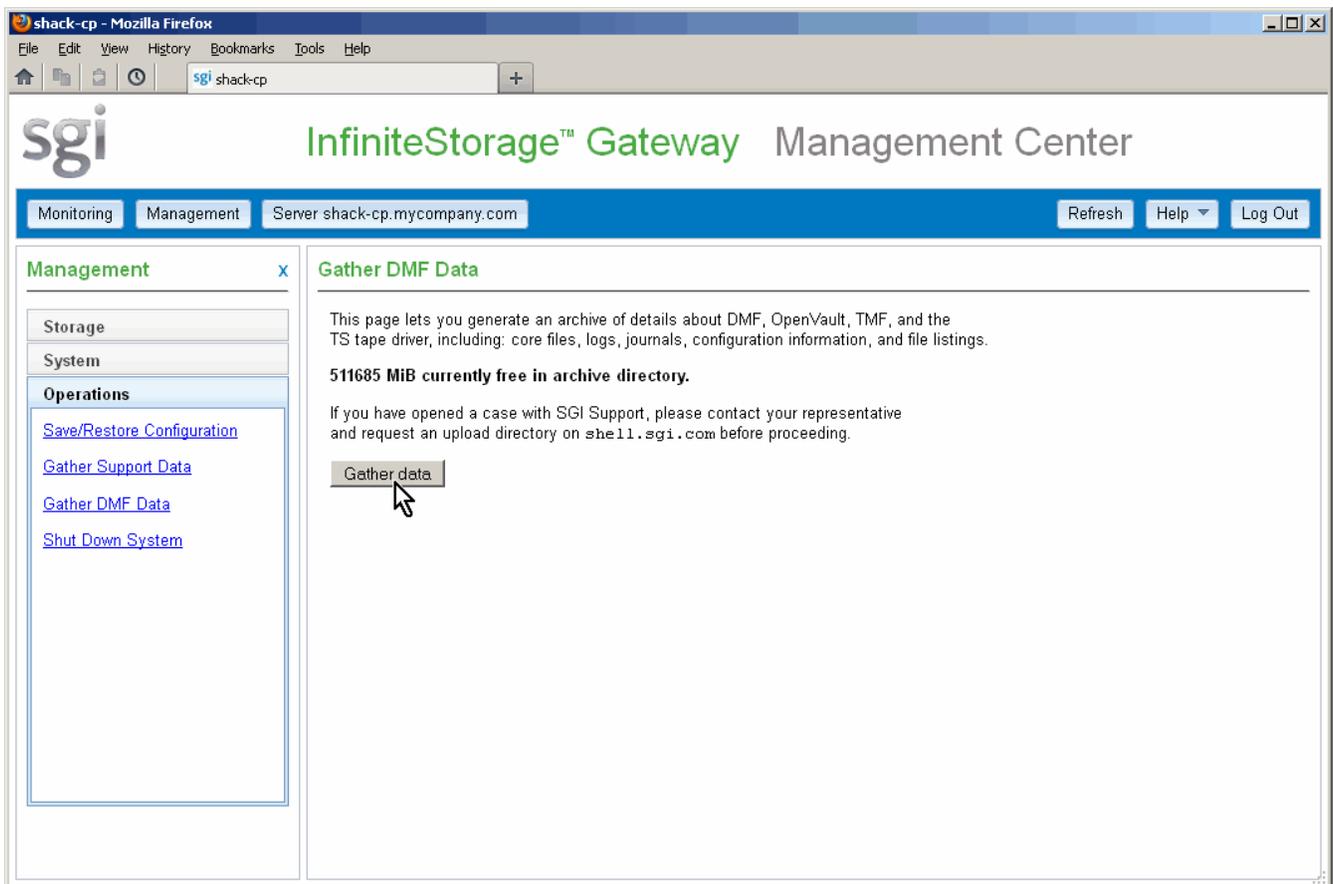


Figure 4-6 Gather DMF Data

Advanced DMF Monitoring and Management

This section discusses the following:

- "Accessing DMF Manager" on page 73
- "Monitoring DMF Status" on page 75
- "Monitoring Capacity of the Secondary Storage" on page 77
- "Acknowledging DMF Alerts" on page 79
- "Monitoring the Status of OpenVault Libraries" on page 81
- "Determining the Migration State of a File" on page 82

Accessing DMF Manager

To access DMF Manager, do the following:

1. Click the **Open DMF Manager** button in the **DMF Services** page, shown in Figure 5-1, which is available from the following selection:

Management
 > **Storage**
 > **DMF Services**

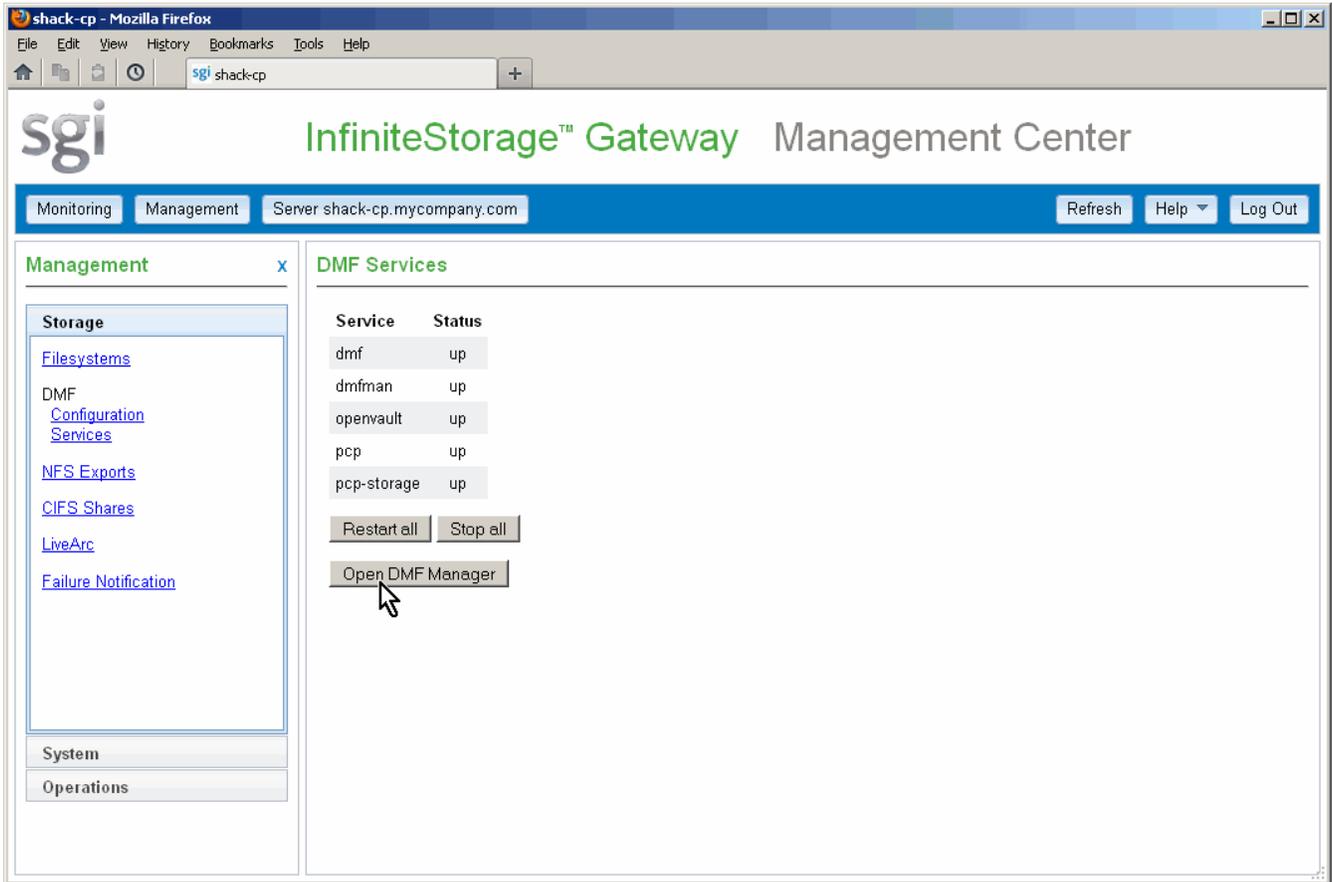


Figure 5-1 Accessing DMF Manager

2. If necessary, accept the DMF Manager security certificate.

Note: The certificate warning is safe to ignore because DMF Manager generates its own SSL certificates, rather than having the SSL certificates signed by a commercial certificate authority.

If you need help using DMF Manager, select the following from the DMF Manager menu bar:

Help
 > **Getting Started**

Monitoring DMF Status

When you initially open DMF Manager, you will see the **Overview** page, which displays a high-level logical view of the SGI InfiniteStorage Gateway environment, including the relationships and status of components.

With a glance at the DMF Manager **Overview** page, you can see if the system is operating properly. An icon in the upper-right corner indicates if DMF is up (green) or down (upside down and red). If DMF requires attention, DMF Manager makes actions available to identify and resolve problems. The tool volunteers information and provides context-sensitive online help. DMF Manager also displays performance statistics, allowing you to monitor DMF activity, filesystems, and hardware.

Figure 5-2 is an example of the **Overview** page. It shows that DMF is up (green icon), there are some informational messages, and there are some unacknowledged alerts.

5: Advanced DMF Monitoring and Management

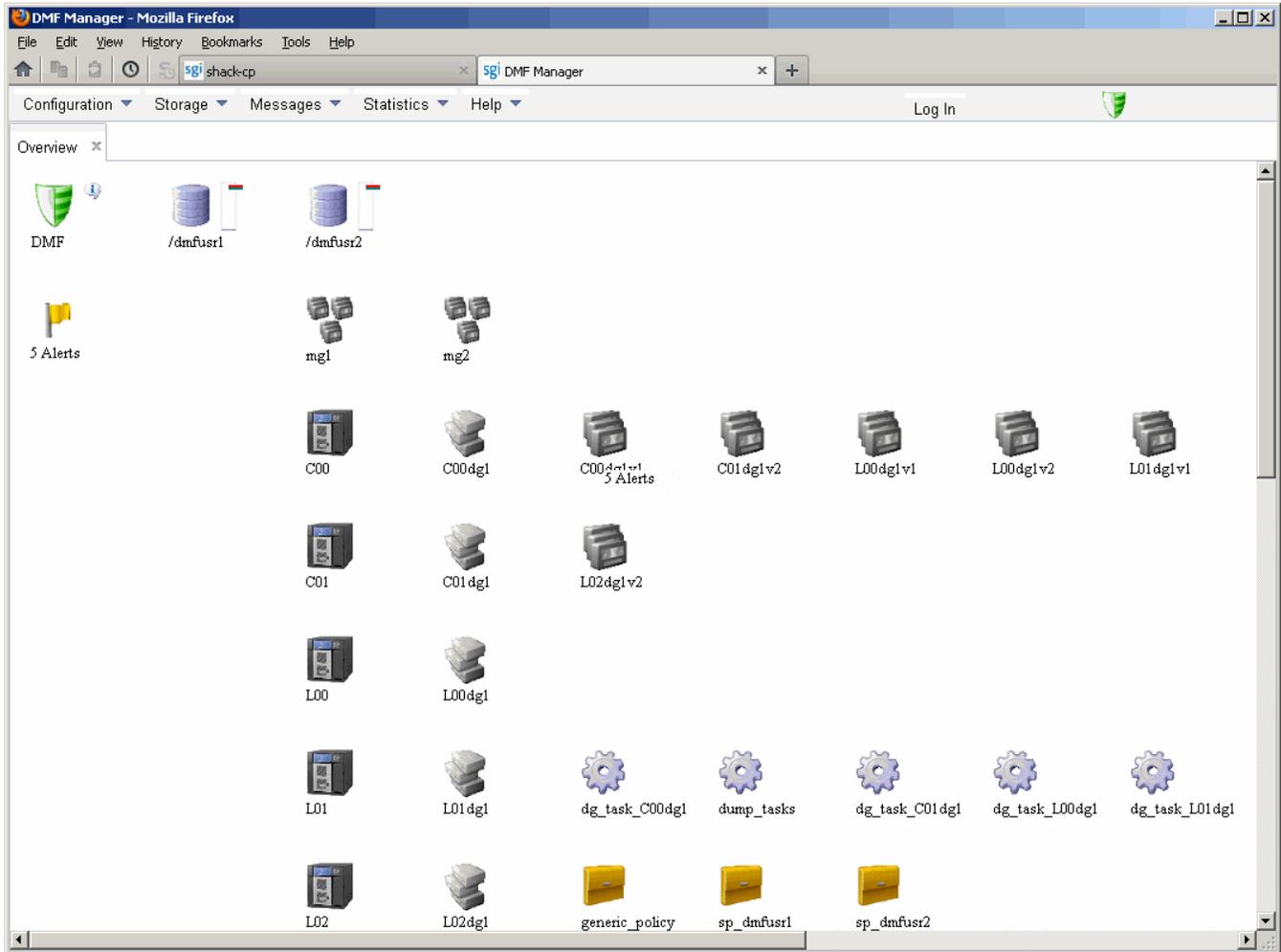


Figure 5-2 DMF Manager Overview

If you suspect a problem with DMF, see "Contacting SGI Support and Collecting Data for Problem Analysis" on page 116.

For more information, access the *DMF 6 Administrator Guide for SGI InfiniteStorage* by selecting the following in DMF Manager:

Help
> **Admin Guide**

Monitoring Capacity of the Secondary Storage

To determine the available space on the secondary storage, do the following:

1. Select the following DMF Manager menu, as shown in Figure 5-3:

Statistics
> **DMF Resources**

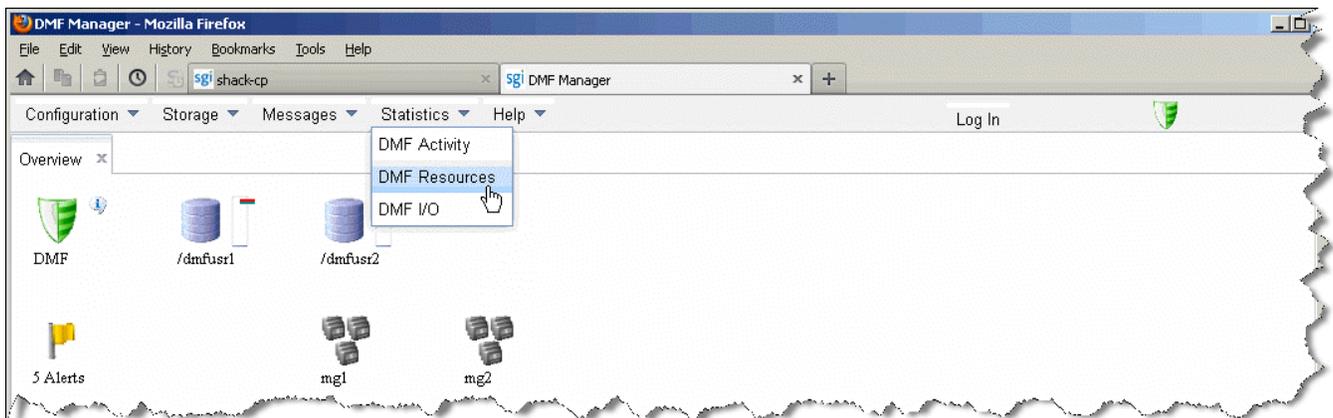


Figure 5-3 Accessing Statistics for DMF Resources

2. Select **Volume Groups** and the particular volume group that you want to monitor.
3. Examine the display.

Figure 5-4 shows an example.

5: Advanced DMF Monitoring and Management

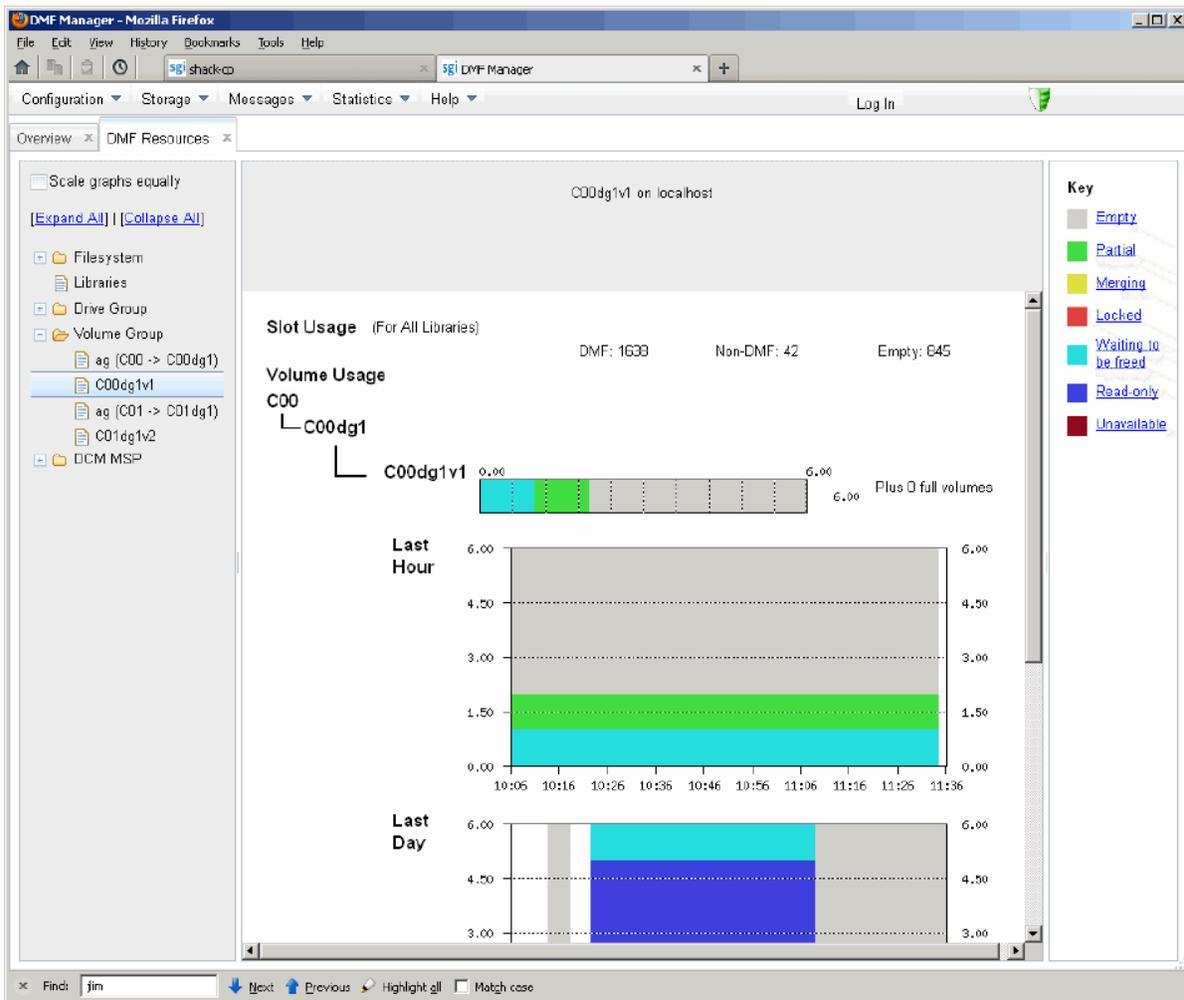


Figure 5-4 Volume Group Statistics in DMF Manager

Note: Some DMF configuration parameters use multipliers that are powers of 1000, such as KB, MB, and GB. However, the **DMF Activity**, **DMF Resources**, and **DMF I/O** pages use multipliers that are powers of 1024, such as kiB, MiB, and GiB. For example, this means that 1 MiB/s is $2^{20} = 1048576$ bytes per second.

Acknowledging DMF Alerts

To acknowledge DMF alerts, log in as the DMF Manager admin user and choose the following from the menu bar:

Messages
> **Alerts**

For more information about an alert, select it and choose **Help on this alert**, as shown in Figure 5-5.

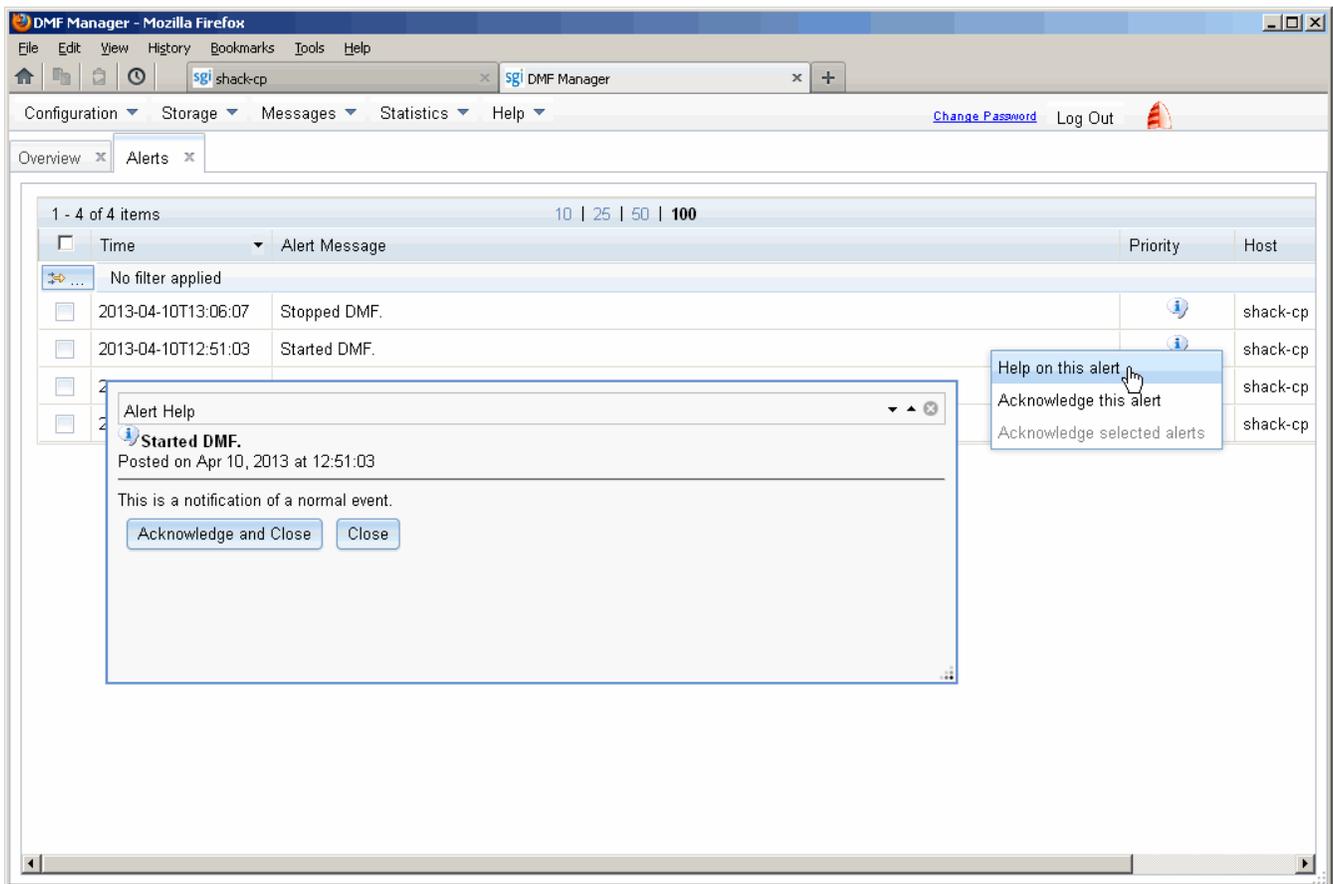


Figure 5-5 DMF Manager Alerts Page with Additional Help

To acknowledge one or more alerts, select them and choose **Acknowledge selected alerts**, as shown in Figure 5-6. For more information about filtering, sorting, and acknowledging alerts, see the chapter about DMF Manager in *DMF 6 Administrator Guide for SGI InfiniteStorage*.

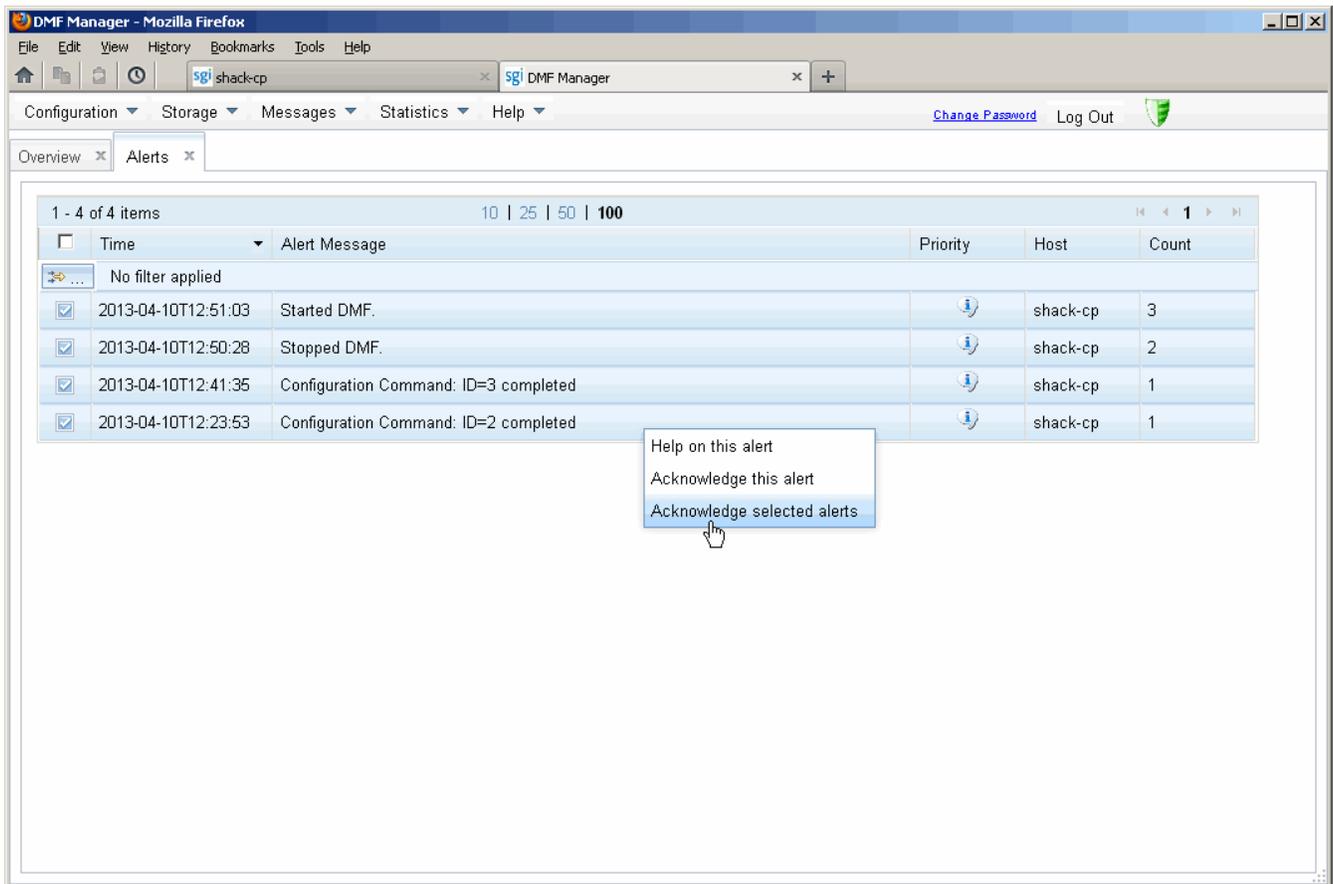


Figure 5-6 Acknowledging DMF Alerts

Monitoring the Status of OpenVault Libraries

To determine the status of the OpenVault libraries on a physical/logical library or COPAN MAID shelf, do the following:

1. Select the following DMF Manager menu:

Storage
 > Libraries

2. Select the particular library that you want to monitor or use the scroll bars.
3. Examine the display.

For more information about status, right-click in the **Status** column header and select **What is "Status"**, as shown in Figure 5-7.

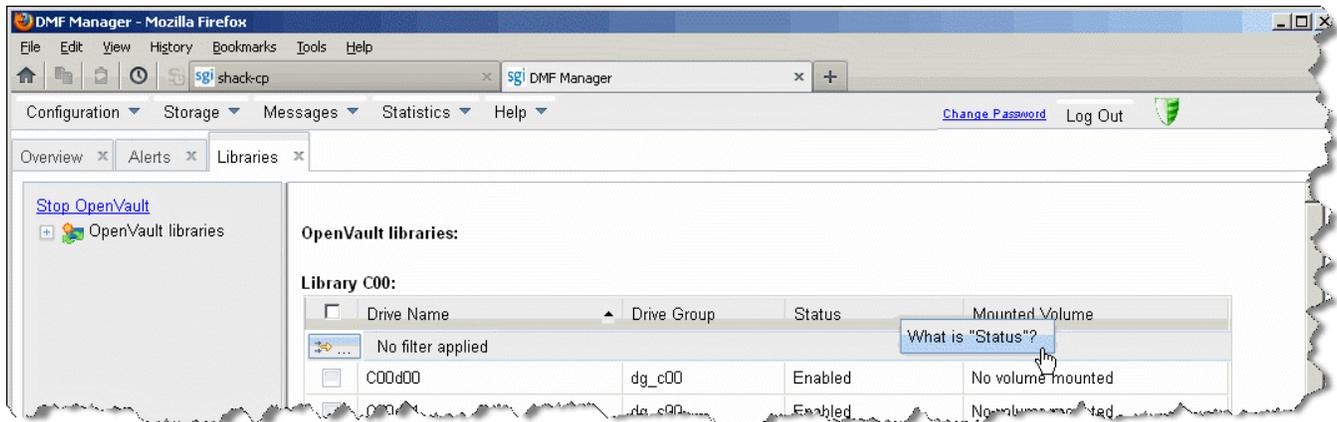


Figure 5-7 OpenVault Library Status

Determining the Migration State of a File

To determine the migration state of a given file, do the following:

1. In a shell on the MIS server, use the `dmf ls(1)` or `dmf find(1)` commands, which are similar to the Linux `ls(1)` and `find(1)` commands.

For example, the following command displays the files in the `/dmi4/abc` directory:

```
mis# dmls -l /dmi4/abc
total 68584
-rw-r--r-- 1 abc sys 16373855 2006-07-22 15:01 (OFL) dmf_tst.00005
-rw-r--r-- 1 abc sys 26362860 2006-07-22 15:02 (OFL) dmf_tst.00015
-rw-r--r-- 1 abc sys 36199305 2006-07-22 15:03 (OFL) dmf_tst.00025
-rw-r--r-- 1 abc sys 39310090 2006-07-22 15:04 (OFL) dmf_tst.00035
-rw-r--r-- 1 abc sys 51488786 2006-07-22 15:06 (OFL) dmf_tst.00045
-rw-r--r-- 1 abc sys 16373855 2006-07-22 15:52 (OFL) dmf_tst.00163
-rw-r--r-- 1 abc sys 36199305 2006-07-22 15:53 (UNM) dmf_tst.00183
-rw-r--r-- 1 abc sys 39310090 2006-07-22 15:55 (OFL) dmf_tst.00193
-rw-r--r-- 1 abc sys 17829904 2006-07-22 15:59 (UNM) dmf_tst.00223
-rw-r--r-- 1 abc sys 14572782 2006-07-22 16:06 (UNM) dmf_tst.00233
-rw-r--r-- 1 abc sys 16373855 2006-07-22 16:08 (OFL) dmf_tst.00246
-rw-r--r-- 1 abc sys 27294750 2006-07-22 17:12 (DUL) dmf_tst.00606
-rw-r--r-- 1 abc sys 72121722 2006-07-22 17:17 (OFL) dmf_tst.00616
-rw-r--r-- 1 abc sys 22807602 2006-07-22 17:24 (DUL) dmf_tst.00636
```

DMF regards files as being of one of the following types:

- *Regular files* (REG) are user files residing only on the DMF-managed primary filesystem on MIS disk.
- *Migrating files* (MIG) are files whose copies in secondary storage are in progress.
- *Migrated files* are files that have one or more complete migrated copies and no pending or incomplete migrated copies. Migrated files are one of the following types:
 - *Dual-state files* (DUL) are files where the data resides both on primary filesystem on MIS disk and on the secondary storage
 - *Offline files* (OFL) are files where the data is no longer on the primary filesystem on MIS disk (however, the data is always available online from the user perspective)
 - *Unmigrating files* (UNM) are previously offline files in the process of being recalled to primary filesystem on MIS disk
 - *Partial-state files* (PAR) are files with some combination of dual-state, offline, and/or unmigrating regions

Note: DMF does not migrate pipes, directories, or special files.

Like a regular file, a migrated file has an inode. An offline file or a partial-state file requires the intervention of DMF to recall its offline data; a dual-state file is accessed directly from the primary filesystem on MIS disk.

The operating system informs the DMF daemon when a migrated file is modified. If anything is written to a migrated file, the offline copy is no longer valid, and the file becomes a regular file until it is migrated again.

For more information, see the man pages and the *DMF 6 Administrator Guide for SGI InfiniteStorage*.

Using LiveArc AE Digital Asset Management

Note: LiveArc AE is an optional future offering.

LiveArc Archive Edition (AE) digital asset management is an optional component of the SGI InfiniteStorage Gateway. This chapter discusses the following:

- "Tuning NFS Clients for LiveArc AE" on page 85
- "Accessing the LiveArc AE Tools" on page 87
- "Changing the LiveArc AE Password" on page 96
- "Searching Assets" on page 96
- "Replicating Data" on page 99
- "Analyzing Data" on page 104
- "Indexing Data" on page 106
- "Using WORM" on page 108

Tuning NFS Clients for LiveArc AE

If you have LiveArc AE, it requires that I/O operations from NFS clients arrive in a timely fashion through the NFS server. A long lag between write I/O operations may cause LiveArc AE to prematurely convert a new file into a permanent asset. Subsequent writes to that new file will result in unintended creation of an additional asset version, with each new copy consuming additional disk space.

To ensure that LiveArc AE operates properly, you should use correct NFS client settings. Use one of the following methods:

- "Set the Synchronous Mount Option for NFS Clients" on page 86
- "Set Global System Tunable Parameters for NFS Clients" on page 86

Set the Synchronous Mount Option for NFS Clients

To tune NFS clients for LiveArc AE, you can use the `sync` mount option for the virtual memory (VM) subsystem in the `/etc/fstab` file on each client.

For example, to export `/dmfusrl` for a client NFS server with an IP address of `192.168.1.50`, and a mountpoint of `/LiveArc1`:

```
192.168.1.50:/dmfusrl          /LiveArc1  nfs  rw,sync,hard,intr 0 0
```

Note: This method can result in slower I/O.

For more information, see the `fstab(5)` man page.

Set Global System Tunable Parameters for NFS Clients

To tune NFS clients for LiveArc AE, you can set the `dirty_writeback_centisecs` and `dirty_expire_centisecs` VM system tunable parameters:

- Set the parameters temporarily by using the `sysctl(8)` command:

```
mis# sysctl -w "vm.dirty_writeback_centisecs=value"
mis# sysctl -w "vm.dirty_expire_centisecs=value"
```

- Set the parameters permanently upon reboot by adding the following lines to the `/etc/sysctl.conf` file:

```
vm.dirty_writeback_centisecs = value
vm.dirty_expire_centisecs = value
```

Note: These parameters are global. With this method, every filesystem (including non-NFS filesystems) on the NFS client will be affected.

For more information, see the `sysctl(8)` and `sysctl.conf(5)` man pages and the `/usr/src/linux/Documentation/sysctl/vm.txt` file.

Accessing the LiveArc AE Tools

To manage the LiveArc AE digital asset management capabilities, you will use the following tools:

- "Arcitecta Desktop" on page 87
- "LiveArc AE Configuration Interface" on page 89
- "Command-Line Services in the Mediaflux Terminal" on page 91
- "Remote Access to Command-Line Services" on page 95

Arcitecta Desktop

Note: The Arcitecta™ Desktop requires Java 1.6 and the latest version of Firefox or Internet Explorer® 9.

The Arcitecta Desktop lets you manage LiveArc AE. To access the Arcitecta Desktop, do the following:

1. Access the Arcitecta Desktop by pointing your browser to the following URL:

`http://MIS_server_IPaddress/desktop`

2. Enter the LiveArc AE password at the prompt:

Domain: system
User: manager
Password: change_me (default)

Note: You should change the password and only provide it to those persons who you want to access the LiveArc AE configuration. See "Changing the LiveArc AE Password" on page 96.

3. Select **Run** to run the application.
4. Double-click the icon for the tool that you want to use.

Figure 6-1 shows the introductory screen of the Arcitecta Desktop, highlighting the **Asset Finder**.

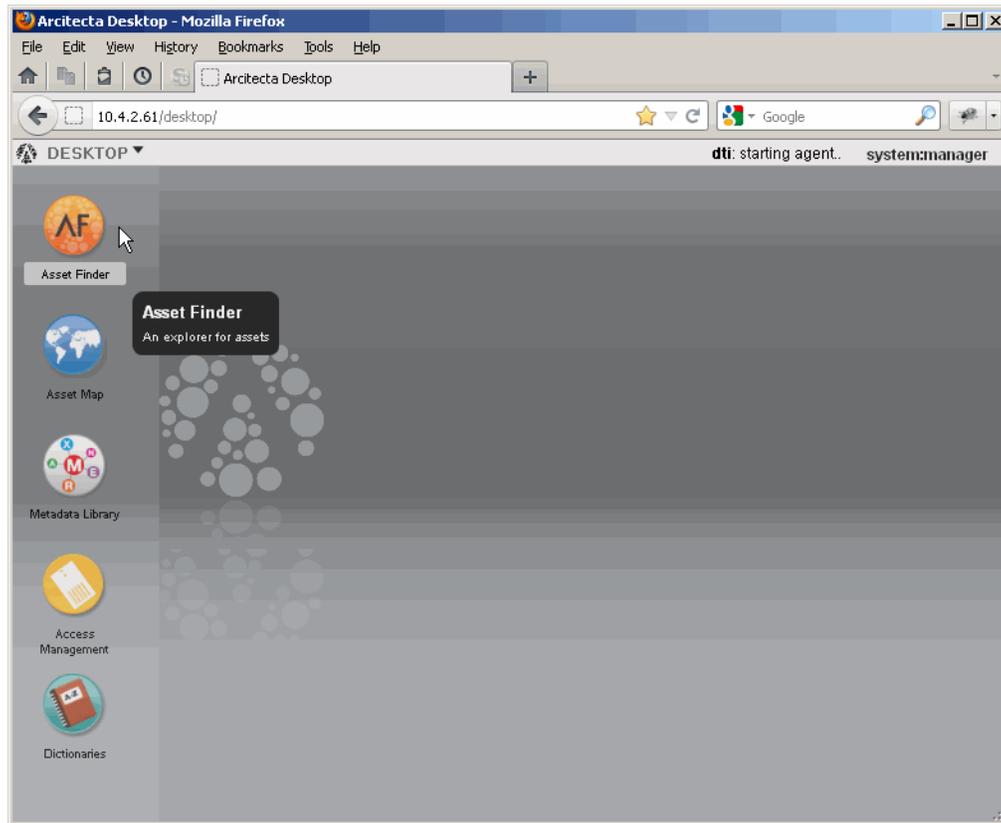


Figure 6-1 Arcitecta Desktop

LiveArc AE Configuration Interface

To access the LiveArc AE configuration interface, do the following:

1. Open **LiveArc Configuration** page, shown in Figure 6-2, which is available from the following selection:

Management
 > **Storage**
 > **LiveArc**

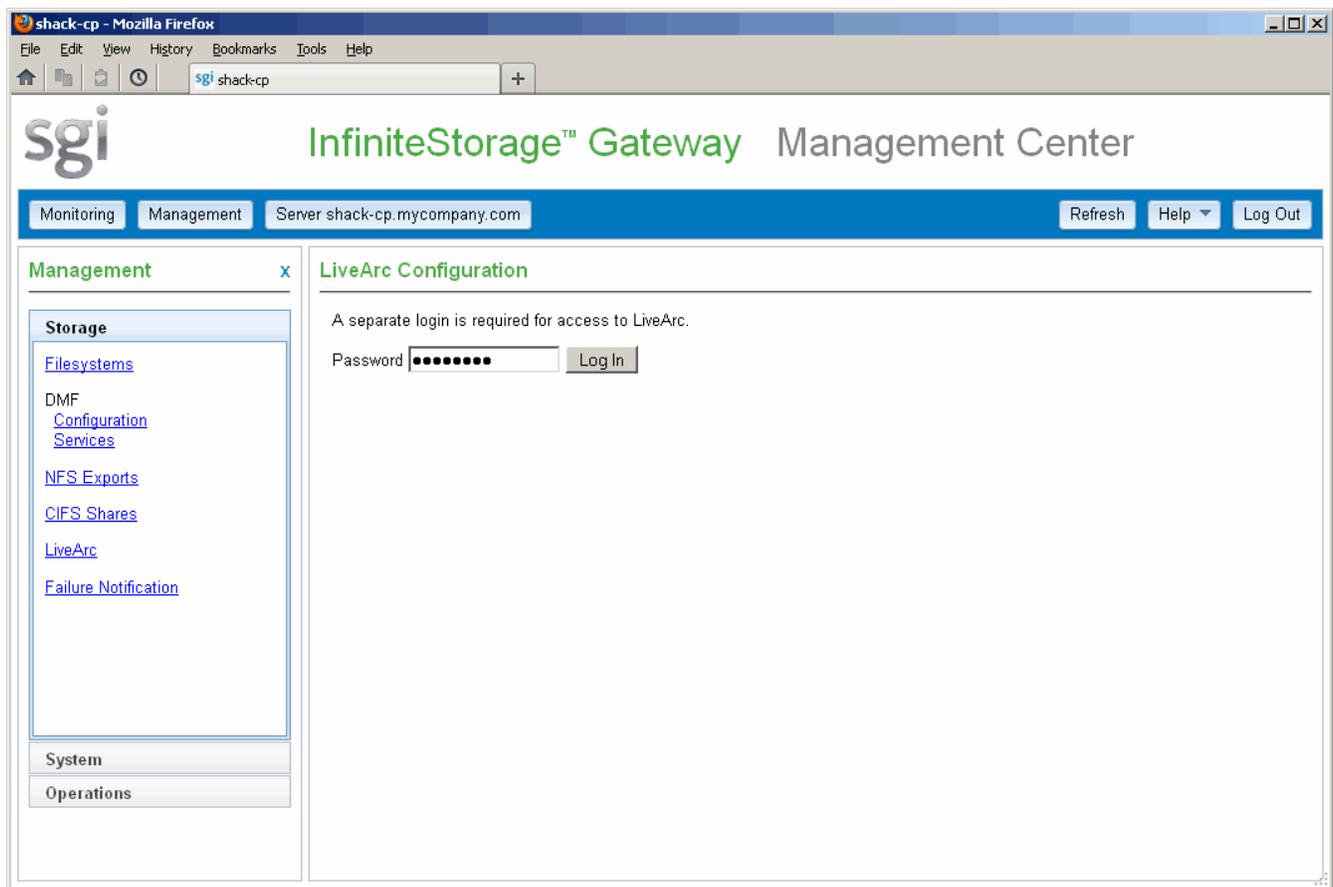


Figure 6-2 Accessing the LiveArc Configuration Page

2. Enter the LiveArc AE system password, which by default is `change_me`.

Note: You should change the password and only provide it to those persons who you want to access the LiveArc AE configuration. See "Changing the LiveArc AE Password" on page 96.

When you enter the LiveArc AE password in the interface, you have 10 minutes to make changes. Operations submitted after the 10-minute permission period has elapsed will result in a `UUID expired` message.

If another user logs in during your 10-minute period, any further operations you make will result in an `Invalid UUID` message.

3. Click the LiveArc AE feature you want to configure and provide the required information:
 - **Replication**, see "Submitting a Replication Job" on page 102
 - **Analyzers**, see "Analyzing Data" on page 104
 - **Indexes**, see "Indexing Data" on page 106
 - **WORM** (write-once, read-many), see "Using WORM" on page 108

For more information about LiveArc AE, click **Documentation** to see the following:

Mediaflux Release Notes

Mediaflux Administration Guide

Mediaflux Command User and Developer Guide

Command-Line Services in the Mediaflux Terminal

To access the services available from the LiveArc AE command line, do the following:

1. Do one of the following to open the Mediaflux terminal:

- Access an `xterm` on the MIS server and run the following command:

```
mis# java -jar /opt/livearc/bin/aterm.ajar &
```

Note: Do not use this method if you are updating LiveArc AE packages.

- Copy the `/opt/livearc/bin/aterm.ajar` file from the MIS server to a remote desktop that has Java 1.6 installed and execute the file on that desktop.
-

Note: Do not use X11 to remotely display `aterm` from the MIS server back to your desktop.

2. Enter the following information in the **Login** window:

Server: *MIS_IPaddress*

Transport: `HTTP`

Port: `80` (default, or number selected in `network.tcl`)

Domain: `system`

User: `manager`

Password: `change_me` (default)

Click **Login**.

Figure 6-3 shows an example.

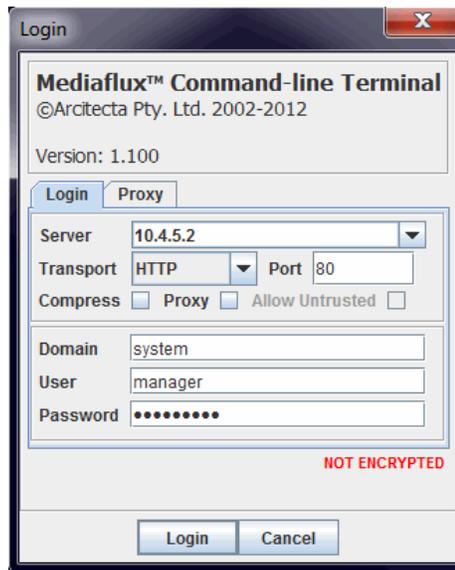


Figure 6-3 Mediaflux Login

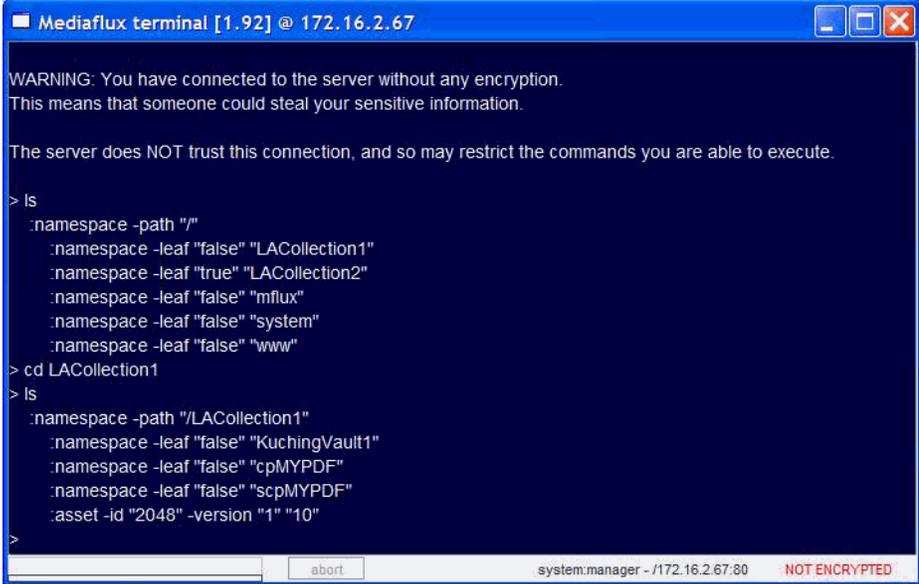
Note: If the Mediaflux terminal is idle for more than a minute, you will be logged out.

LiveArc AE provides a large number of command-line services, some of which are similar to Linux commands. For example:

- "Listing Collection Contents" on page 93
- "Viewing the LiveArc AE Version and Installed Packages" on page 94
- "Changing the Mediaflux Display Characteristics" on page 94
- "Getting Help with Command-Line Services" on page 95

Listing Collection Contents

To list the contents of a collection and navigate through the collections, use the `ls` and `cd` commands, as shown in Figure 6-4.



```
Mediaflux terminal [1.92] @ 172.16.2.67
WARNING: You have connected to the server without any encryption.
This means that someone could steal your sensitive information.

The server does NOT trust this connection, and so may restrict the commands you are able to execute.

> ls
:namespace -path "/"
:namespace -leaf "false" "LACollection1"
:namespace -leaf "true" "LACollection2"
:namespace -leaf "false" "mflux"
:namespace -leaf "false" "system"
:namespace -leaf "false" "www"
> cd LACollection1
> ls
:namespace -path "/LACollection1"
:namespace -leaf "false" "KuchingVault1"
:namespace -leaf "false" "cpMYPDF"
:namespace -leaf "false" "scpMYPDF"
:asset -id "2048" -version "1" "10"
>
```

system.manager - /172.16.2.67:80 NOT ENCRYPTED

Figure 6-4 Listing Directory Contents and Navigating Directories

Viewing the LiveArc AE Version and Installed Packages

To see the version of LiveArc AE and the packages that are installed, use the `server.version` and `package.list` commands, as shown in Figure 6-5.

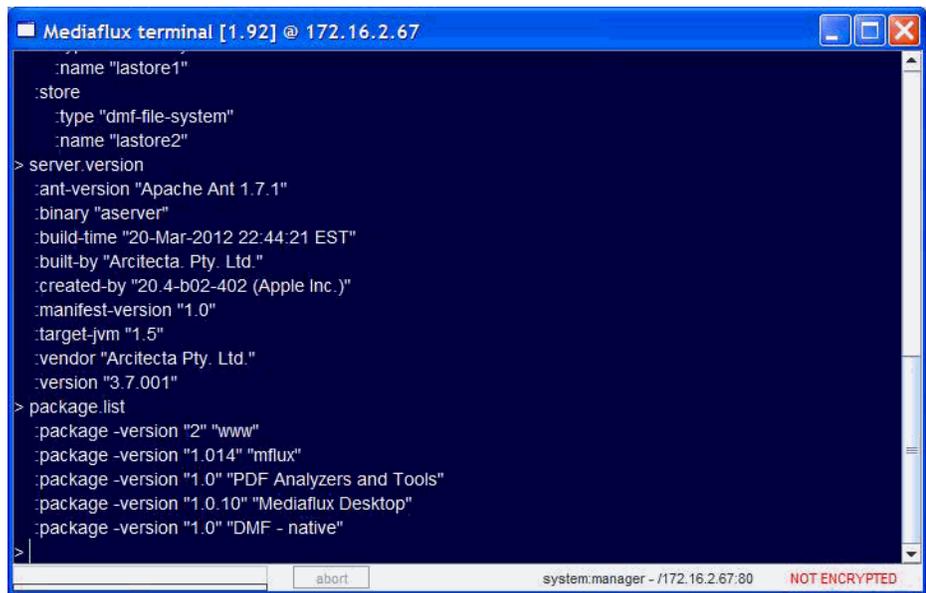


Figure 6-5 Listing LiveArc AE Installation Information

Changing the Mediaflux Display Characteristics

To change display characteristics for the current login session (changes are not persistent), use the `display` command.

Getting Help with Command-Line Services

For more information about command-line services, you can do the following:

- For a list of all available services, enter the following:

```
> help
```

- To get help about a specific command:

```
> help commandname
```

For example, for more information about the `display` command:

```
> help display
```

- Press the `tab` key after entering a command name for brief help about command format.

Also see *Mediaflux Command User and Developer Guide*.

Remote Access to Command-Line Services

If you are logged on remotely to the MIS server and do not have X11 capabilities, you can use the `mflogon` and `mfcommand` commands to access the Mediaflux command-line services:

```
mis# mflogon LiveArc_password
```

```
mis# mfcommand service_name
```

For example, to view the list of installed packages:

```
mis# mfcommand package.list
:package -version "2" "www"
:package -version "1.014" "mflux"
:package -version "1.0" "PDF Analyzers and Tools"
:package -version "1.0.10" "Mediaflux Desktop"
:package -version "1.0" "DMF - native"
```

To get a list of all available services, redirect the output of the `help` command to a text file. For example, to send the `help` text to a file named `service.txt`:

```
mis# mfcommand help > service.txt
```

Changing the LiveArc AE Password

To change the LiveArc AE password, do the following:

1. Access the Mediaflux command-line terminal as described in "Command-Line Services in the Mediaflux Terminal" on page 91.
2. Enter the following in the Mediaflux terminal:

```
> authentication.user.password.set: domain system :password newpassword :user manager
```

For more information, see "Command-Line Services in the Mediaflux Terminal" on page 91.

3. Change the password in the following file:

```
/etc/.mediaflux
```

Searching Assets

One instance of LiveArc AE resides on the MIS server. As data is ingested, LiveArc AE will analyze and index the content and metadata.

To search using LiveArc AE, do the following:

1. Open the Arcitecta Desktop as directed in "Arcitecta Desktop" on page 87.
2. Double-click the orange **AF** icon to open the **Asset Finder** window.
3. Select the type of data you want to search and drill down as needed. For a directory, you can toggle between a deep or shallow search by clicking the spyglass icon:
 - **Deep Search** searches all directories within the selected collection from this point down
 - **Shallow Search** searches only the specified directory

As you type in the search field, the tool will suggest terms that match. You can type a single letter to view a pop-up window of suggestions; you can highlight one to make it appear in the search window, then press **Enter** to make it appear in the middle panel.

For example, Figure 6-6 shows that LiveArc AE will search for entered terms in only the `MyHTML` directory, which is part of the `LACollection1` on the `lastore1` data store.

To change the way LiveArc AE parses data, see:

- "Analyzing Data" on page 104
- "Indexing Data" on page 106

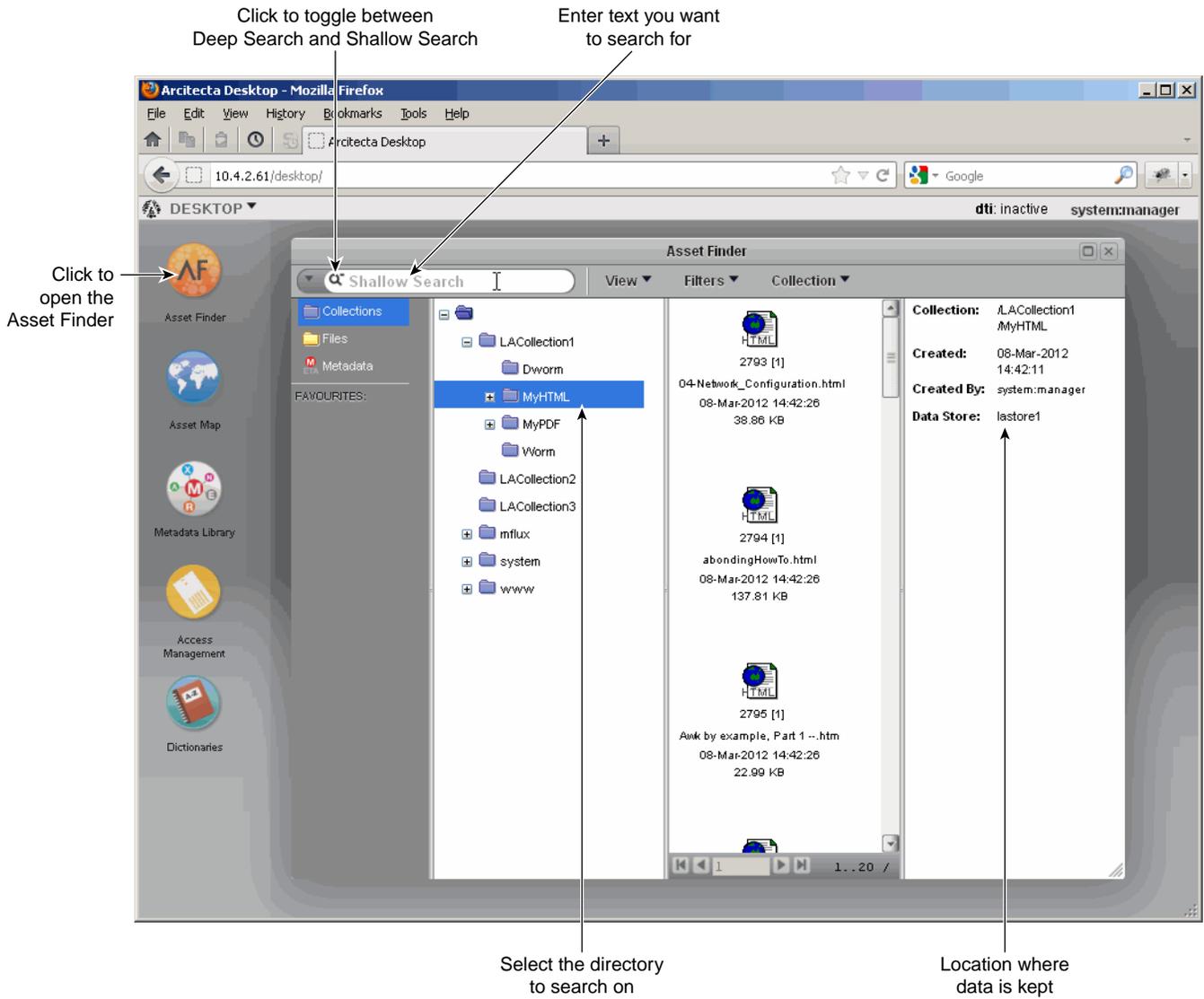


Figure 6-6 Searching for Text in the Asset Finder

Replicating Data

The LiveArc AE replication feature creates a copy of a namespace on a LiveArc AE system that is outside of this SGI InfiniteStorage Gateway configuration, using the location created in "Creating a Replication Vault" on page 99. You can use replication to do the following:

- Synchronize data sets between mobile or regional repositories and central enterprise repositories
- Manually initiate replication or you can configure it to occur automatically

Replicating data has two parts:

- "Creating a Replication Vault" on page 99
- "Submitting a Replication Job" on page 102

Creating a Replication Vault

To create a replication vault, do the following:

1. Find the name of the collection on the source node that holds the namespace you want to replicate:
 - a. Open the Arcitecta Desktop, as directed in "Arcitecta Desktop" on page 87, on the source node, such as `server1`.
 - b. Double-click the orange **AF** icon to open the **Asset Finder** window.
2. Browse through the tree, expanding as necessary by clicking on the + symbol next to a collection name.
3. Find the namespace that you want to replicate.

For example, Figure 6-7 shows that the namespace `scpMyPDF` is in the `LACollection1` collection.

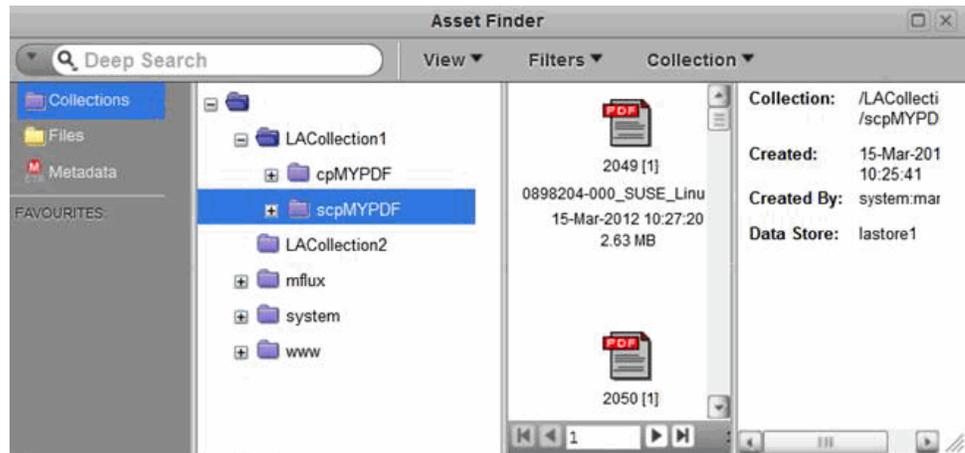


Figure 6-7 Selecting a Namespace to Replicate

You will use this information when entering the source **Namespace** field in the LiveArc AE UI **Replication** panel. See "Submitting a Replication Job" on page 102.

4. Open the Arcitecta Desktop on the destination node, such as `server2`:
 - a. Highlight the namespace of the collection that corresponds to the collection where you want the new vault to reside.
 - b. Confirm that the **Data Store** field displayed in the right-most panel is on an appropriate data RAID set, such as `lastore0` shown in Figure 6-8.



Caution: Never select a namespace that has a **Data Store** field of `db`, which is only for use by LiveArc AE software.

- c. Right-click and select **Create Sub-Collection**, as shown in Figure 6-8.

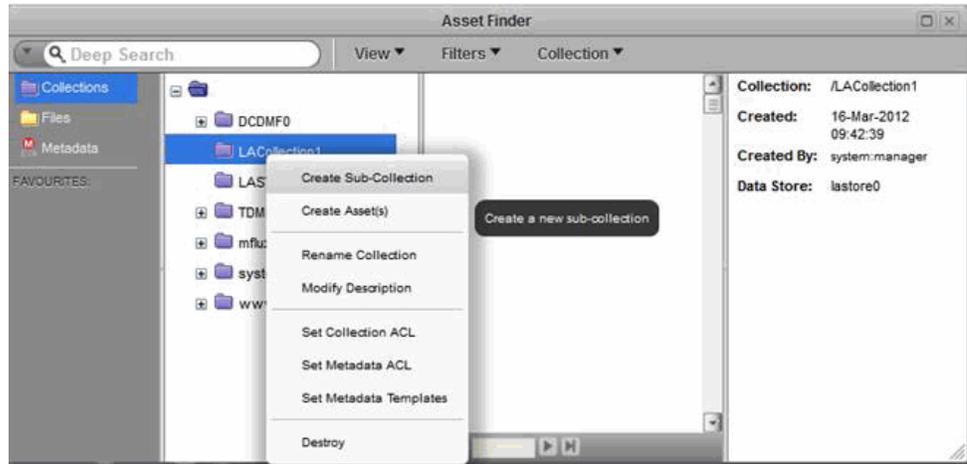


Figure 6-8 Creating a Sub-Collection for a Replication Vault

- d. Enter the name of the replication vault. For ease of association, you might want to use a name that corresponds to the collection name, such as `RepVault1` for the `LACollection1` collection, as shown in Figure 6-9. You can optionally enter notes in the **Description** field and then click **Create Sub-Collection**.



Figure 6-9 Naming a Replication Vault

The result will be a replication vault named RepVault1 in the LACollection1 collection on server2, as shown in Figure 6-10.

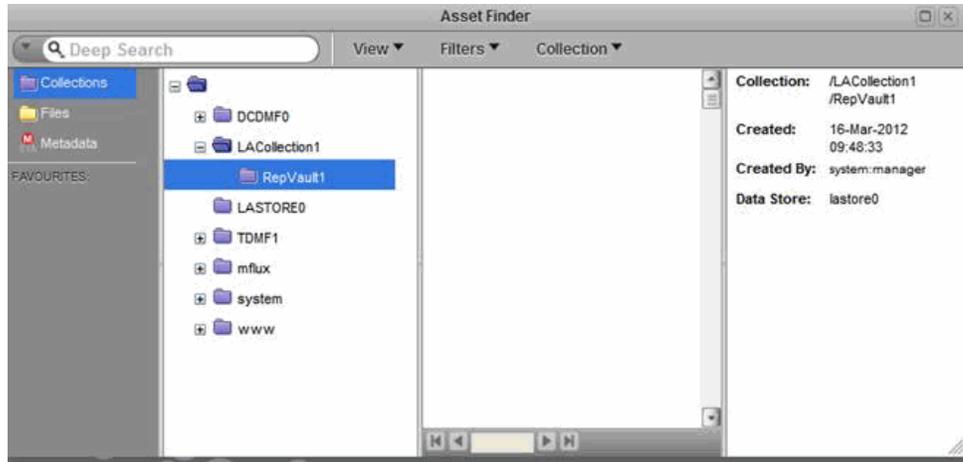


Figure 6-10 Completed Replication Vault

5. Use the **Replication** tab in the LiveArc AE UI to create a replication job. See "Submitting a Replication Job" on page 102.

Submitting a Replication Job

The **Replication** feature on the **LiveArc Configuration** page in the Management Center displays active jobs. To open the Management Center, see "Accessing the Management Center After Initial Installation" on page 44.

To submit a new job, enter the following:

- IP addresses of the source and the destination
- Namespace at the source (see step 1 of "Creating a Replication Vault" on page 99)
- Namespace at the destination
- Name of the job

You can select and copy text from the **Parameters** field and paste it into the input fields. Click **Submit job** to submit the new replication job.

For example, Figure 6-11 shows a new job named RepPDF that will replicate information from LACollection1 to LACollection2 on the node with an IP address of 10.4.2.100.

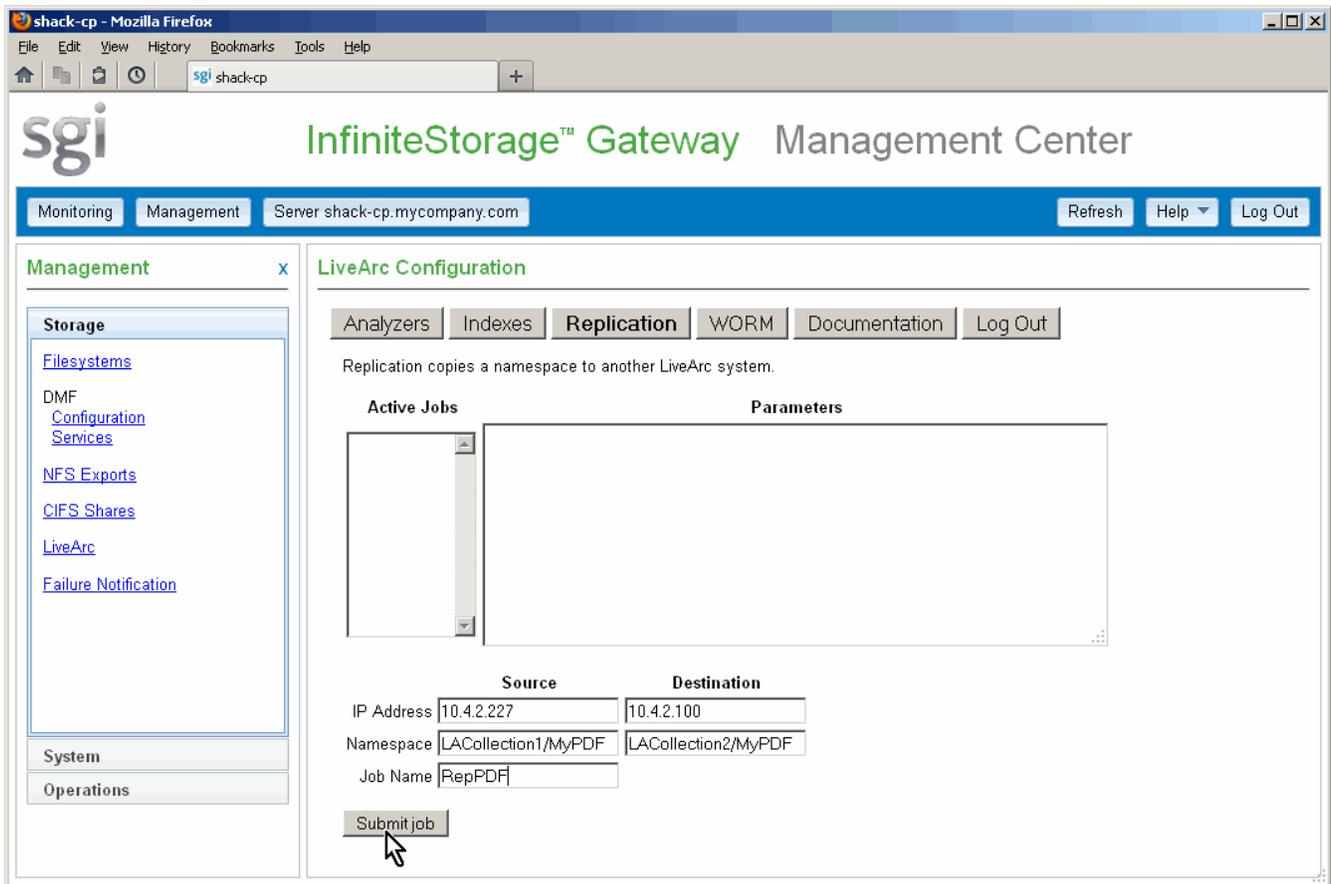


Figure 6-11 Creating a New Replication Job

Note: Clicking **Submit job** executes a script that sets up a passwordless `ssh(1)` session, which will exist for the duration of the replication process. When the script exits normally, it destroys the required permission keys. If the script is interrupted, however, the keys may not be destroyed; in this case, you should manually remove the keys from the remote and local server.

Analyzing Data

The **Analyzers** feature on the **LiveArc Configuration** page in the Management Center extracts metadata and content from assets. To open the Management Center, see "Accessing the Management Center After Initial Installation" on page 44.

Note: The analyzers are application-aware and as such they do not log formatting and control-like characters.

The analyzer will decode the following:

- Plain text:

```
:mime-type "text/plain"  
:extension "bas"  
:extension "c"  
:extension "cc"  
:extension "gcc"  
:extension "h"  
:extension "txt"  
:extension "vb"
```

- Single image/video/audio file dimensions and the following metadata:
 - Exchangeable image file format (EXIF)
 - International press telecommunications council (IPTC) information interchange model (IIM)

Any extensions that follow the specification are included, for example:

```
:extension "jpeg"
:extension "png"
:extension "tiff"
:extension "wav"
```

- Portable document format (PDF):

```
:extension "pdf"
```

- Extensible markup language (XML) formatted text:

```
:extension "xml"
```

By default, LiveArc AE searches all of the above. (Icon search is reserved for later use.)

You can also add other extensions (for example, `.bash` for plain text) by using the LiveArc AE services. If you need to use the LiveArc AE command-line interface, take note of the class and type information so that you can select the appropriate data. For more information, see "Command-Line Services in the Mediaflux Terminal" on page 91, and the Mediaflux documentation.

To find out which analyzers are installed on your system, execute the following commands:

```
mis# mflogon LiveArc_password
mis# mfcommand asset.content.analyzer.describe
```

For example, the following shows that XML text, plain text, and PDF text will be searched (the output you see for your system may differ):

```
mis# mflogon LiveArc_password
mis# mfcommand asset.content.analyzer.describe
:analyzer -type "builtin" -class "arc.oX"
:  type "text/xml"
:  type "application/xml"
:  type "application/xhtml+xml"
:  metadata "false"
:  text -enabled "true" "true"
:  icon "false"
:analyzer -type "builtin" -class "arc.oW"
:  type "text/plain"
:  metadata "false"
:  text -enabled "true" "true"
```

```
:icon "false"  
:analyzer -type "builtin" -class "arc.oV"  
:type "image"  
:metadata -enabled "true" "true"  
:text "false"  
:icon "false"  
:analyzer -type "plugin" -class "arc.mf.pdf.analyzer.PDFAnalyzer"  
:type "application/pdf"  
:metadata -enabled "true" "true"  
:text -enabled "true" "true"  
:icon "false"
```

For more information about entering commands, see "Remote Access to Command-Line Services" on page 95.

Note: If you are using `aterm`, no `mflogon` is needed and you do not need the `mfcommand` prefix. For example, at the `>` prompt in the `aterm` window, you would enter the following:

```
> asset.content.analyzer.describe
```

Indexing Data

The **Indexes** feature in the Management Center creates a database of the first two ASCII characters in data strings of the enabled type. (To open the Management Center, see "Accessing the Management Center After Initial Installation" on page 44.)

The database allows the Arcitecta Desktop **Asset Finder** to provide suggestions that match text you enter in the search window.



Caution: Depending upon the data indexed, the Index database can become almost as large as the data.

You can specify that an index is created for any combination of the following types of text:

Type	Description
atext	Annotated video
ctext	Content text
dtext	Description text
mtext	Metadata text
ntext	Names text

Click on a check box to select or deselect it, then click **Apply changes**, as shown in Figure 6-12.

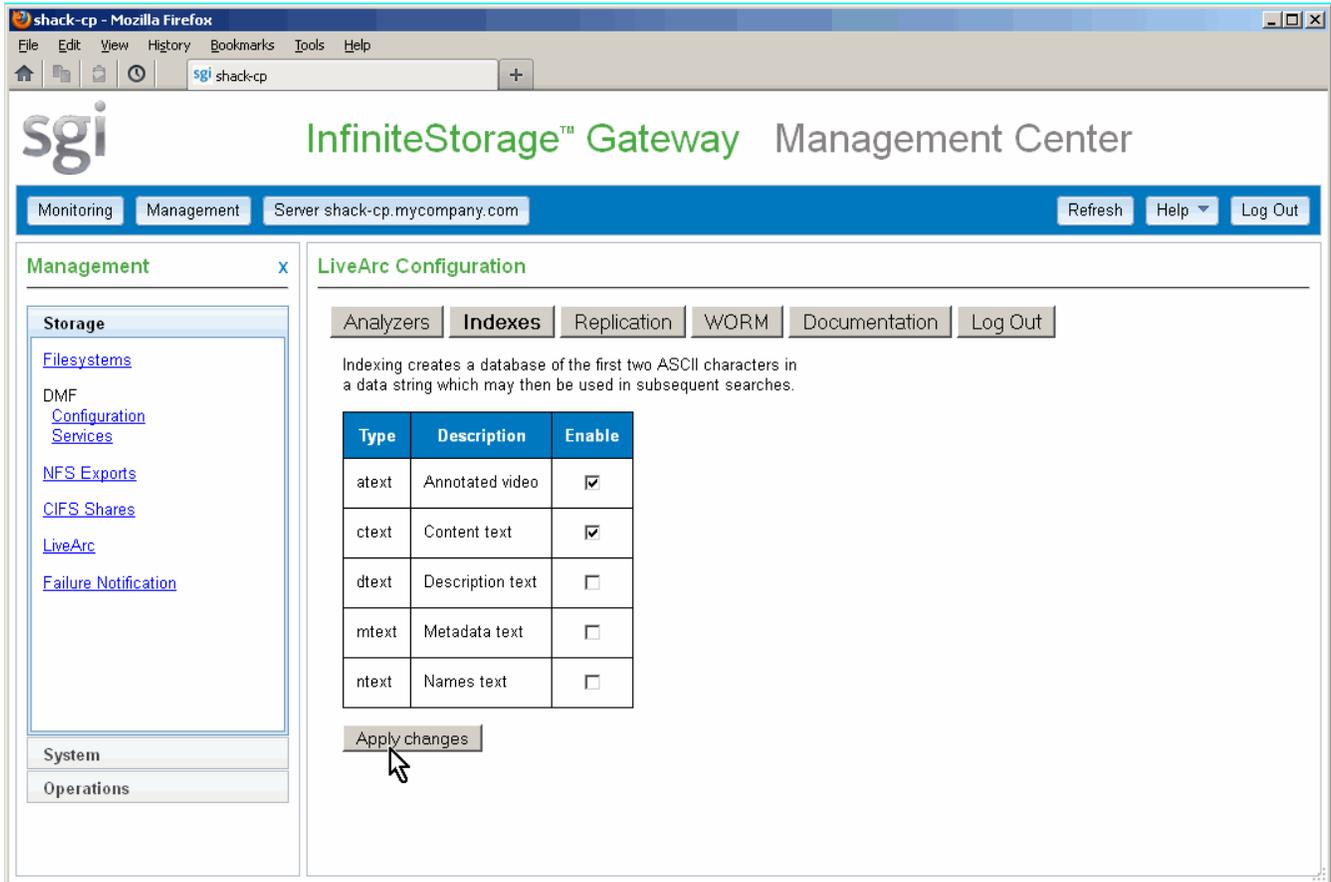


Figure 6-12 Configuring Indexes in LiveArc AE

Using WORM

The **WORM** (write-once, read-many) feature allows namespaces to set a policy that forces assets into a read-only state.

Using the Management Center, you can select either of the following WORM modes for a given namespace:

- **Instant** places all files in the namespace into a read-only state

- **Delayed** places a file in the namespace into read-only state only after a user or application does one of the following:
 - Calls the LiveArc AE service `asset.set.readonly`
 - Sets the access mode to any combination of read-only access modes

(To open the Management Center, see "Accessing the Management Center After Initial Installation" on page 44.)

You must enter the namespace, which must include the absolute LiveArc AE path as a prefix separated by a forward slash. If you intend to use both forms of WORM, SGI recommends that you use namespace names that clearly identify the form. For example, you could use `LACollection1/Worm1` for an instant WORM and `LACollection1/Dworm1` for a delayed WORM. Figure 6-13 shows an example.



Caution: Never use the `mflux`, `system`, or `www` collections, which contain the LiveArc AE software and are stored in the `db` data store. You must never use this data store for your site's data.

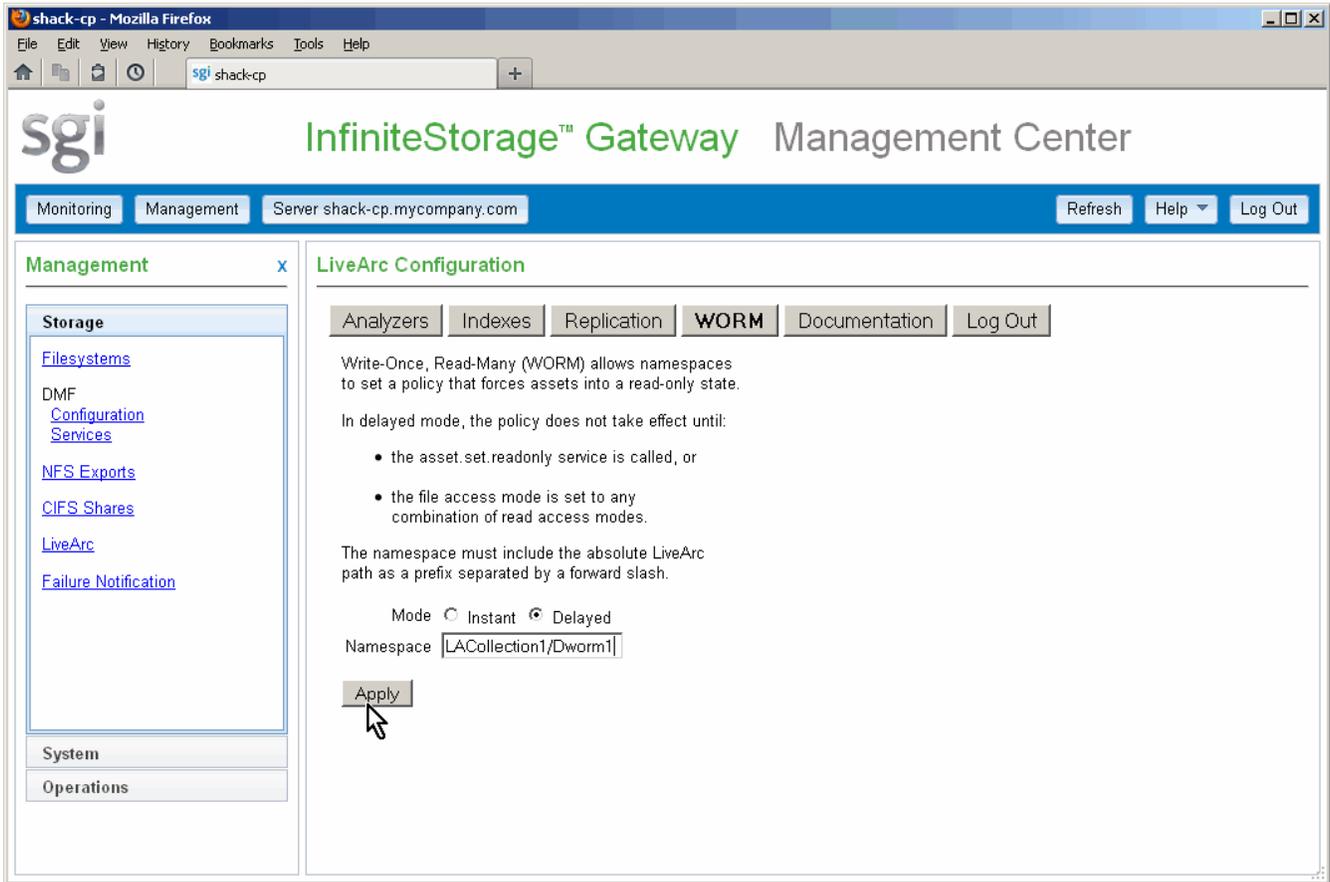


Figure 6-13 Adding a Delayed WORM Namespace

Troubleshooting

This chapter discusses the following:

- "Firefox is Already Running" on page 111
- "Configuration Problems" on page 111
- "DMF Problems" on page 112
- "Restoring DMF-Managed Filesystems and DMF Databases" on page 115
- "COPAN MAID Problems" on page 115
- "Contacting SGI Support and Collecting Data for Problem Analysis" on page 116

Firefox is Already Running

If you are unable to use the SGI InfiniteStorage Gateway Management Center, verify that you have all of the software requirements in place. See "Management Center Requirements" on page 19.

If you are unable to access an application such as DMF Manager, you might have to exit the existing Firefox process. For details, see:

http://kb.mozillazine.org/Profile_in_use

Configuration Problems

This section discusses the following:

- "Unconfigurable Libraries" on page 112
- "Unconfigurable Shelves" on page 112
- "User Filesystem Does Not Appear in the Configuration" on page 112

Unconfigurable Libraries

If a library is listed under the **Unconfigurable** header, it means that it does not meet the requirements for SGI InfiniteStorage Gateway configuration with DMF. For example, there may be an insufficient number of volumes. See "Secondary-Storage Requirements for DMF Simplified Configuration" on page 3.

Unconfigurable Shelves

If a COPAN MAID shelf is already formatted, it cannot be configured for DMF. You must unformat the shelf and return it to factory state, see "Returning a Shelf to Factory State" on page 115.



Caution: Unformatting a shelf will destroy any existing data.

User Filesystem Does Not Appear in the Configuration

If an expected user filesystem does not appear in the **Configure DMF System** page, ensure the filesystem is mounted with the `dmi` option according to the output of the `mount(1)` command.

For example, the following output shows that the `dmfusr1` filesystem is ready for DMF use (mounted with the `dmi` option) but the `dmfusr2` filesystem is not (mounted, but without the `dmi` option):

```
mis# mount | grep dmfusr
/dev/lxvm/user0 on /dmfusr1 type xfs (rw,noatime,dmi,mtpt=/dmfusr1)
/dev/lxvm/user1 on /dmfusr2 type xfs (rw,noatime,mtpt=/dmfusr2)
```

See "Create and Mount the User Filesystems" on page 33.

DMF Problems

This section discusses the following:

- "Examining DMF Details via DMF Manager" on page 113
- "Unable to Recall Data" on page 114

Examining DMF Details via DMF Manager

DMF Manager denotes areas with problems by adding a yellow or red icon next to the component that is experiencing problems, depending upon severity. For example, Figure 7-1 shows that although DMF is still running, there are warnings that may require action (red icon). To investigate, hover the mouse over the shield icon to display pop-up help that describes the warning.

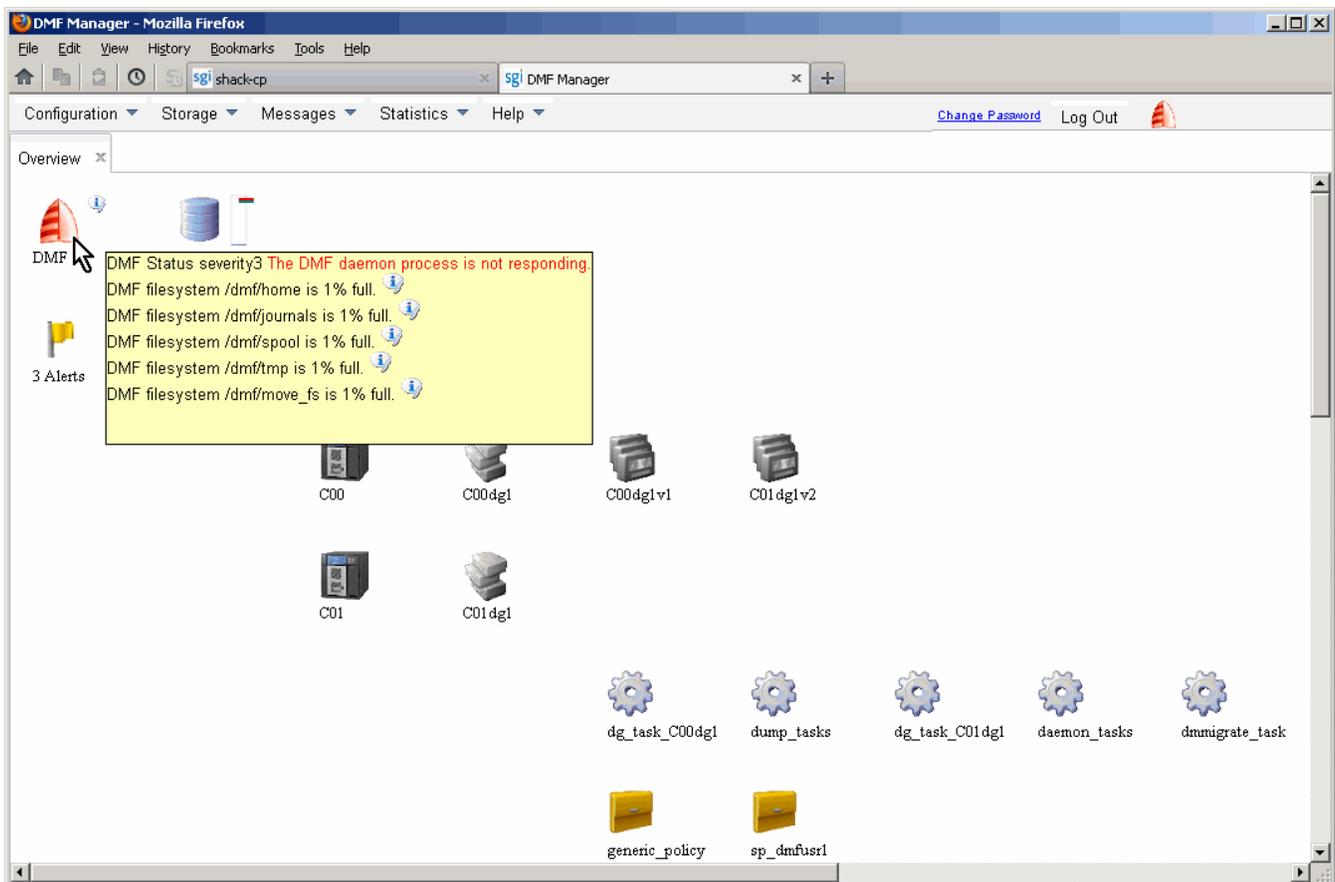


Figure 7-1 DMF Manager Showing Problems

For details, click the **Alerts** icon flag and select **Show Alerts...** or choose the following from the DMF Manager menu bar:

Messages
> **Alerts**

Either action will open the **Alerts** page, which displays the unacknowledged messages (similar to the **Alerts** page in the Management Center), but also provides more information about a particular alert if you select it and choose **Help on this alert**, as shown in Figure 5-5 on page 79. For more information, see "Acknowledging DMF Alerts" on page 79.

You can also use the following page to view daily activity reports (those containing critical log errors show red warning symbols):

Messages
> **Reports**

If the **Overview** page indicates that there are problems, consult the *DMF 6 Administrator Guide for SGI InfiniteStorage* or call SGI Support.

Unable to Recall Data

Under circumstances such as the following, the migrated data will be unavailable:

- The MIS server is down
- The shelf or library is down
- The LUN is down
- There are problems with the filesystem on the LUN

If the MIS server is down, access to all data on the secondary storage is unavailable.

Restoring DMF-Managed Filesystems and DMF Databases

To restore DMF-managed filesystems and databases, see the information in the SGI InfiniteStorage Gateway release notes available from the following selection in the Management Center:

Help
 > **Documentation**
 > **SGI InfiniteStorage Gateway Release Notes**

For additional help, contact SGI Support.

COPAN MAID Problems

This section discusses the following:

- "COPAN MAID Power-On: Requires SGI Support" on page 115
- "Returning a Shelf to Factory State" on page 115

COPAN MAID Power-On: Requires SGI Support

Powering on a COPAN MAID system requires a specific sequence of steps. You must call SGI Support for assistance.

Returning a Shelf to Factory State



Caution: Unformatting a shelf will destroy any existing data.

To return a COPAN MAID shelf to unformatted factory state, use the SGI `ov_copan unformat` command. For more information, see the `ov_copan(8)` man page. If you did not use the `ov_copan` command to originally format the shelf, see the *SGI COPAN 400 User Guide*.

Contacting SGI Support and Collecting Data for Problem Analysis

If the other topics in this chapter do not solve the problem, contact your local SGI Customer Support Center:

<http://www.sgi.com/support>

You can also contact your authorized service provider.

If you are in North America, you can call the Technical Assistance Center at: 1 (800) 800 4SGI

If you are outside North America, see the following website for the appropriate Customer Service phone number:

<http://www.sgi.com/support/supportcenters.html>

If you notice problems with DMF, contact your representative and request an upload directory on `shell.sgi.com`. Then collect DMF information, as described in "Gathering DMF Data" on page 70. This will run scripts to gather the relevant system and DMF information that will help SGI Support analyze the problem. To gather information about the system, use the **Gather Support Data** link from the same page. Also see the section about gathering support data in *SGI Management Center for InfiniteStorage Administrator Guide*.

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