



# Apple User Interface

## Nomad Admin Application Human Interface Specification Version 1.5

July 9, 2004

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# Introduction

## Change History

- Version 1.5 (7/9/04)—Documents final UI for QA purposes. Any further changes will be handled as Radar bugs.
- Version 1.0 (5/5/04)—Documents the team's agreement on final, post-NAB UI. Remaining open issues are documented. Almost every screenshot has changed.
- Version 0.5 (3/24/04)—First draft

## Product Overview

The Nomad Admin application allows users to configure storage area networks that manage and store very large amounts of data. A brief user task overview follows:

- Define roles for SAN metadata controllers and clients, including a failover mechanism with one primary controller and standby controllers.
- Label and initialize RAID LUNs to make them available to the storage network. Aggregate LUNs into mountable storage volumes.
- Within volumes, define storage pools with differing performance characteristics, based on LUN performance and RAID configuration.
- Set up volume directories with affinities to storage pools.
- Set volume mount permissions, ownership and file system permissions, storage quotas.

# User Experience Requirements

The requirements below are listed below in order, from high to low priority.

1. *Provide overall ease of use*— For any Apple product, the GUI should follow principles of good design based on research in the areas of human cognition, perception, learning, and development. The GUI should support user needs by providing context, mental models, orientation (i.e., what tasks can I do? where do I go to do a task? where am I in the workflow?), feedforward (i.e, what does this control do?), feedback, mode awareness, and consistency. Wherever necessary, seamlessly handle just-in-time authentication to metadata controllers. Status information should be designed to support troubleshooting and decision-making. Relevant controls should be readily available from the status UI.
2. *Provide a clear workflow for initial setup.* — In the genesis case, a clear SAN setup workflow should be apparent. Also, the UI should discover, automate, and provide reasonable defaults wherever possible—e.g., discover connected SAN devices; auto-name available RAID arrays; provide lists of available servers and clients, etc. In the first release, there is no requirement for a setup assistant, so the goal is to make the genesis case as easy as possible in the admin GUI.
3. *Optimize for Mac OS X (server, clients, Xserve RAID).* — Favor ease of setup and use for Mac OS SAN devices. Nomad terminology should be industry standard (i.e., SNIA) unless there is a reason to use current Apple terminology. Where it is possible, provide “advanced” GUI for using third-party storage devices—i.e., ability to characterize the storage type, create pseudo devices, etc.
4. *Make it easy to manage, expand, and reconfigure SAN volumes.* — One of the few items of usage information we have is the importance of simple, easy capacity growth and reconfiguration. The admin GUI should allow ready access to available disks, make it easy to break down a SAN or volumes and build new ones. The GUI should also provide easy access to RAID Admin. In this release, there is no requirement to provide RAID Admin access to a specific array selected in Nomad.
5. *Provide a graphical representation of SAN topology.* — To some extent, provide a visual representation of SAN structure (i.e., the relationships between the SAN, servers, clients, volumes, stripe groups, and disks). In this release, structure may be shown in a list with disclosure. In future releases, we should try to provide clickable device icons with dynamic connection and performance information, as competitive applications do.

# UI Overview

## Documentation Issues

The Nomad product does not handle all tasks involved in setting up and managing a SAN. Users need to be told in the documentation that the following actions are done outside the product.

- *Physical setup, connection, and initialization of SAN components*—Before launching the Nomad Admin application, all metadata controllers, clients, RAID boxes, and Fibre Channel switches must be connected. In addition, RAID LUNs must be configured and initialized (which takes several hours) before they are recognizable and ready for use by Nomad.
- *Availability of other services*—Access to a mail server is required in order to use Nomad's email notification feature. Access to a U&G directory is required in order to provide directories with user and group permissions or impose storage quotas.

## Single Window Model

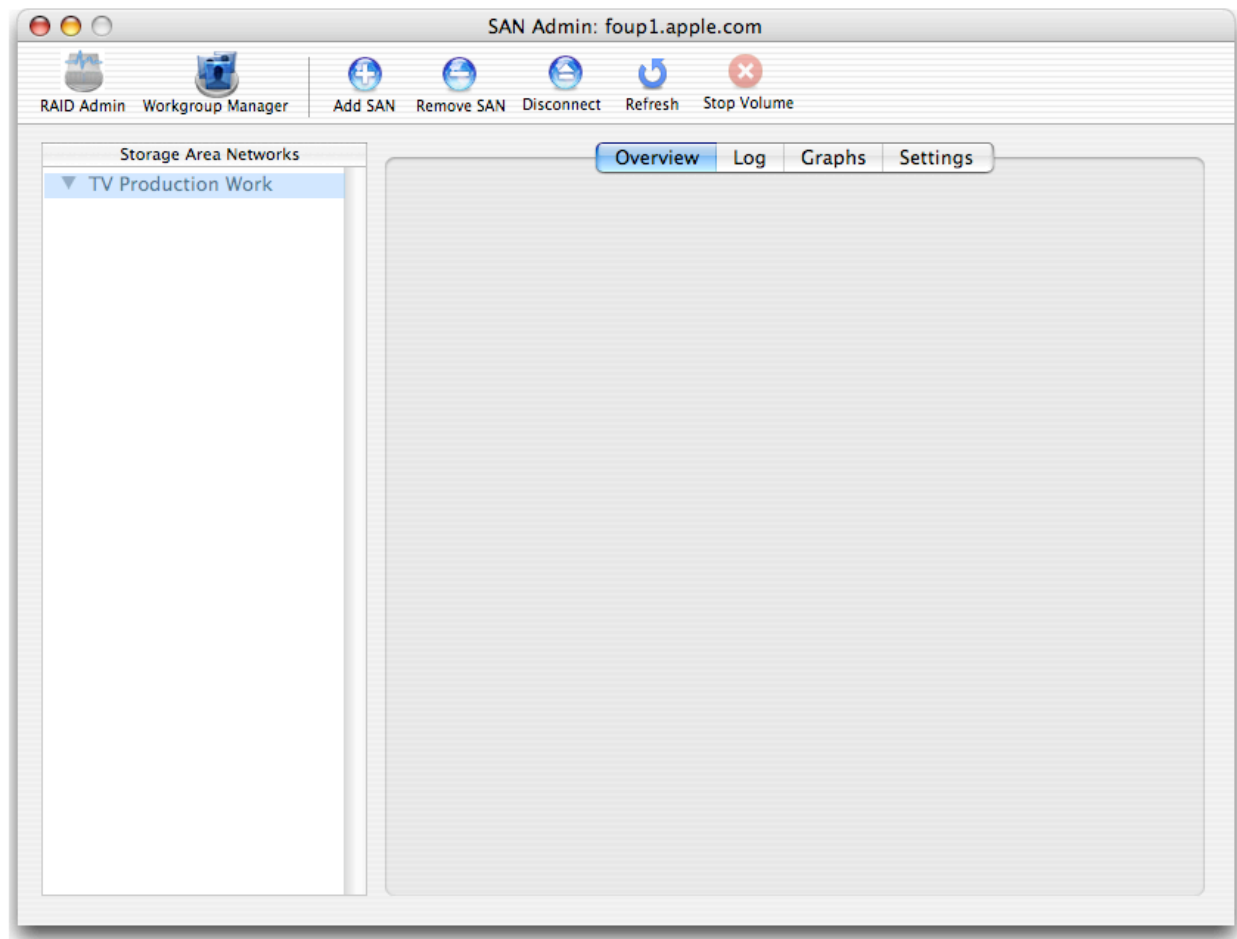
The Nomad Admin application leverages the engineering framework and plug-in architecture used for the Server Administration application. To a great extent, this architecture provides the HI for the product.

When the Nomad Admin application is launched, the window below opens. All functions are done in this window. The toolbar contains the following icons:

- RAID Admin—launches the RAID Admin application
- Workgroup Manager—launches the Workgroup Manager application
- Add SAN—presents the login sheet to add a SAN to the objects list (on the left); the SAN remains in the list across application launches until it is removed.
- Remove SAN—removed a SAN from the objects list; has no effect on the SAN configuration
- Connect / Disconnect—Connect or disconnect to the selected SAN, which is applicable

- Refresh—get information from the metadata controller of the selected SAN
- Start / Stop Volume—enable or disable the selected volume, whichever is applicable

Nomad Admin App Window



## Global Save Model

The Save button becomes available as soon as any of the SAN panes is “dirty.” Clicking Save does the following:

- puts the SAN and volume names in the Storage Area Network list
- pushes configuration or change information to all SAN controllers
- labels and initializes LUNs

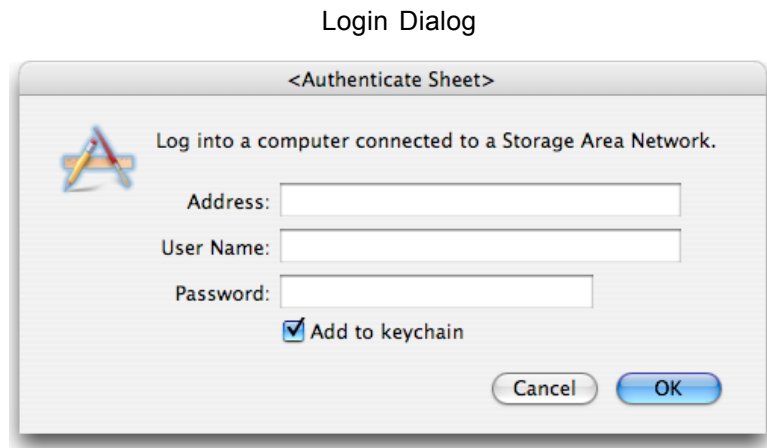
At Save, Nomad will validate that the following minimum configuration exists: 1 controller, 1 volume with 1 storage pool and 1 LUN. If this minimum does not exist, the user is told that the SAN cannot be saved until these items are set up.

The user can also save along the way—e.g, Save controller setup, then Save LUNs, then save storage, etc.

## Launching Nomad Admin

### Authentication

Upon launching, the Nomad Admin application presents the login dialog below. The user logs into a computer that is connected to a SAN and has Nomad installed.



### Login to a Configured SAN

Connecting to a configured SAN adds the SAN to the Storage Area Networks list and its information in the editing area on the right. If there is more than one SAN in the list, the new SAN is pre-selected in the list.

### Login to an Unconfigured SAN (Genesis Case)

Connecting to an unconfigured SAN adds *Untitled SAN* to the Storage Area Networks list, pre-selects *Untitled SAN*, and defaults the editing view to the Settings pane. See the next section for a walkthrough of the SAN creation task.

# Configuring a SAN

## Untitled SAN (Genesis Case)

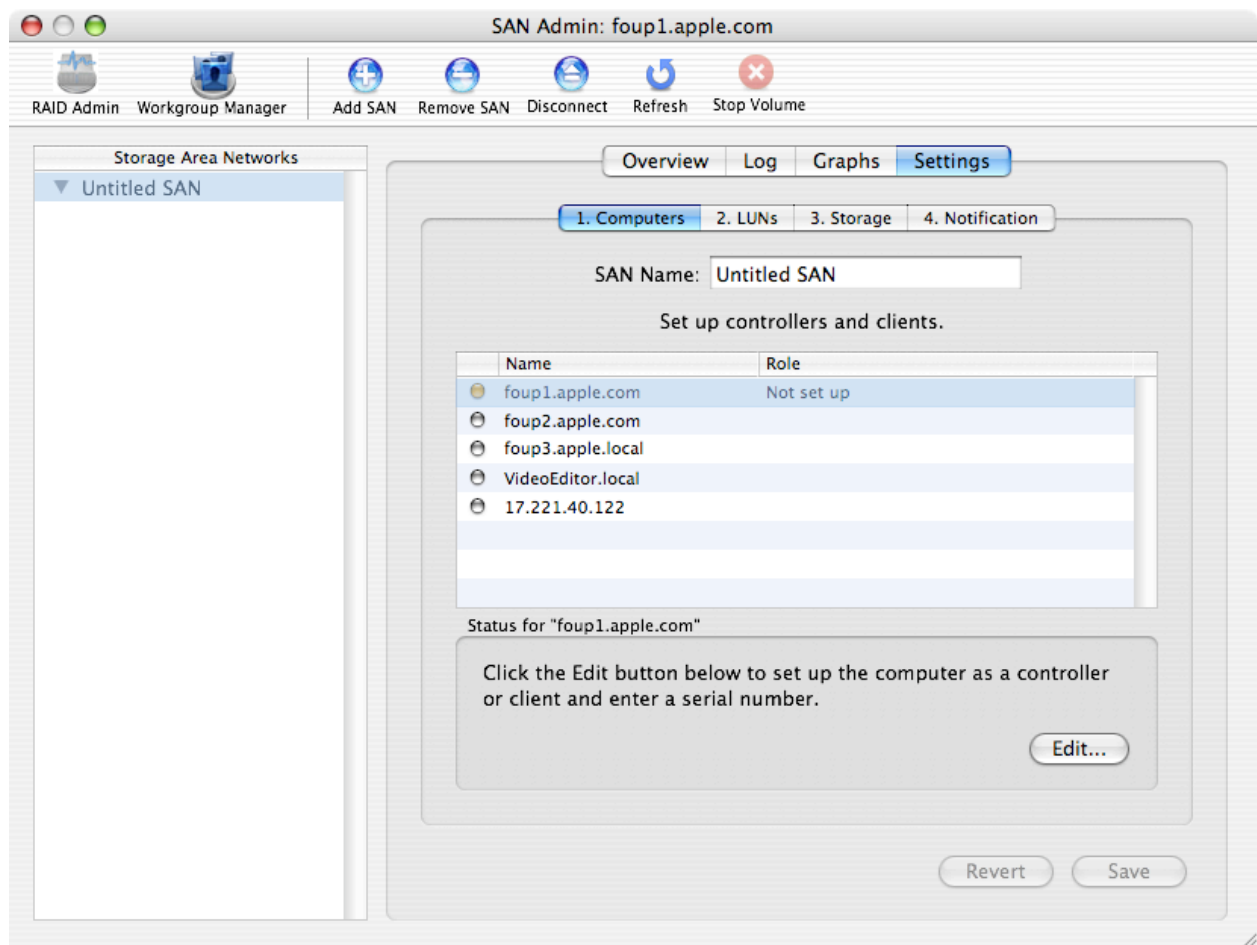
By default, an *Untitled SAN* opens to the first pane of the Settings tab: *1. Computers*. All computers connected to the SAN are automatically discovered and listed on this pane.

Computers stay on this list whether or not they are set up. The list provides an inventory of all computers on the network, which is valuable for troubleshooting.

The first computer in the list is the one the user logged into—in this case, *foup1.apple.com*.

### Untitled SAN (Genesis)

**Change Note:** A new column entitled *Failover Priority* has been added at the far right of the list, after *Role*. It is not shown below.



# 1. Setting Up SAN Controllers

Workflow prompts are provided in a context-sensitive well below the computers list. To configure controllers and clients, the user selects a computer and clicks the Edit button to open the Computer sheet.

## Context-Sensitive Computers Well

**Grey status bead:** The clear status bead means that computer status is unknown because the user has not authenticated. The well says...  
Status for "foup3.apple.com"  
Authenticate to the computer to see status or change settings.  
Authenticate...

**Yellow status bead:** The yellow status bead means that status is known, but the computer needs to be set up. The well says...  
Status for "foup3.apple.com"  
Click the Edit button below to set up the computer as a controller or client and enter a serial number.  
Edit...

**Green status bead:** The green status bead means that status is known, and the computer is available to the SAN. The well says...  
Status for "foup3.apple.com"  
Click the Edit button below to change computer settings.  
Edit...

**Red status bead:** The red status bead means that the computer has an error. The well says...  
Status for "foup3.apple.com"  
The computer has a problem: [ProblemDescription]. This text can run to three lines, so there's plenty of room to describe the problem and suggest a fix.

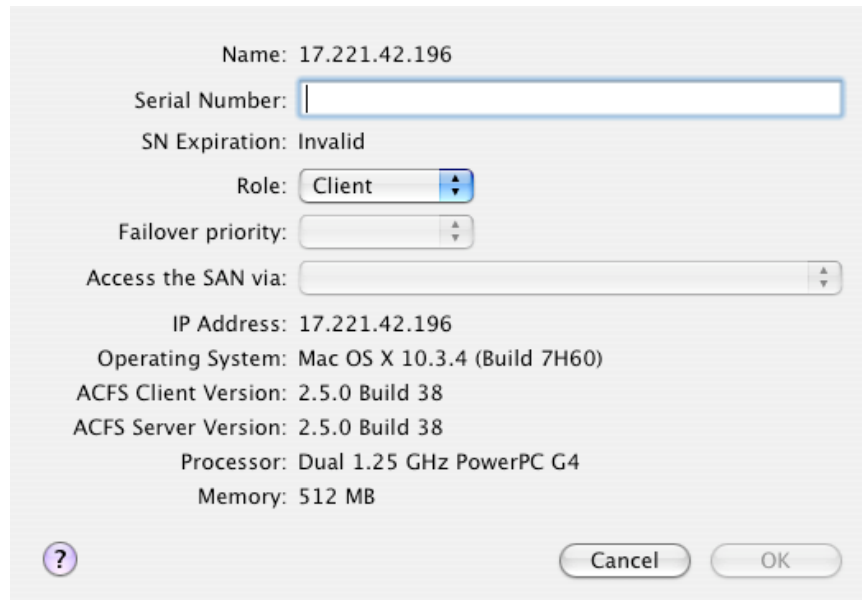
## Just-in-Time Authentication

Authentication as an administrator is required before the user can set up a computer. If necessary, the authentication sheet appears before the Computer sheet opens. If a problem is detected, an alert sheet tells the user that he cannot log onto the machine to set it up. See the Validations and Alerts section later in this document for more detail.

## Computer Sheet

On the computer sheet, the user enters a serial number, selects the computer's role (the default is Controller/Client), sets a failover priority (for controller/clients only), and specifies a Network Interface (NIC) via which to access the SAN.

Computer Sheet



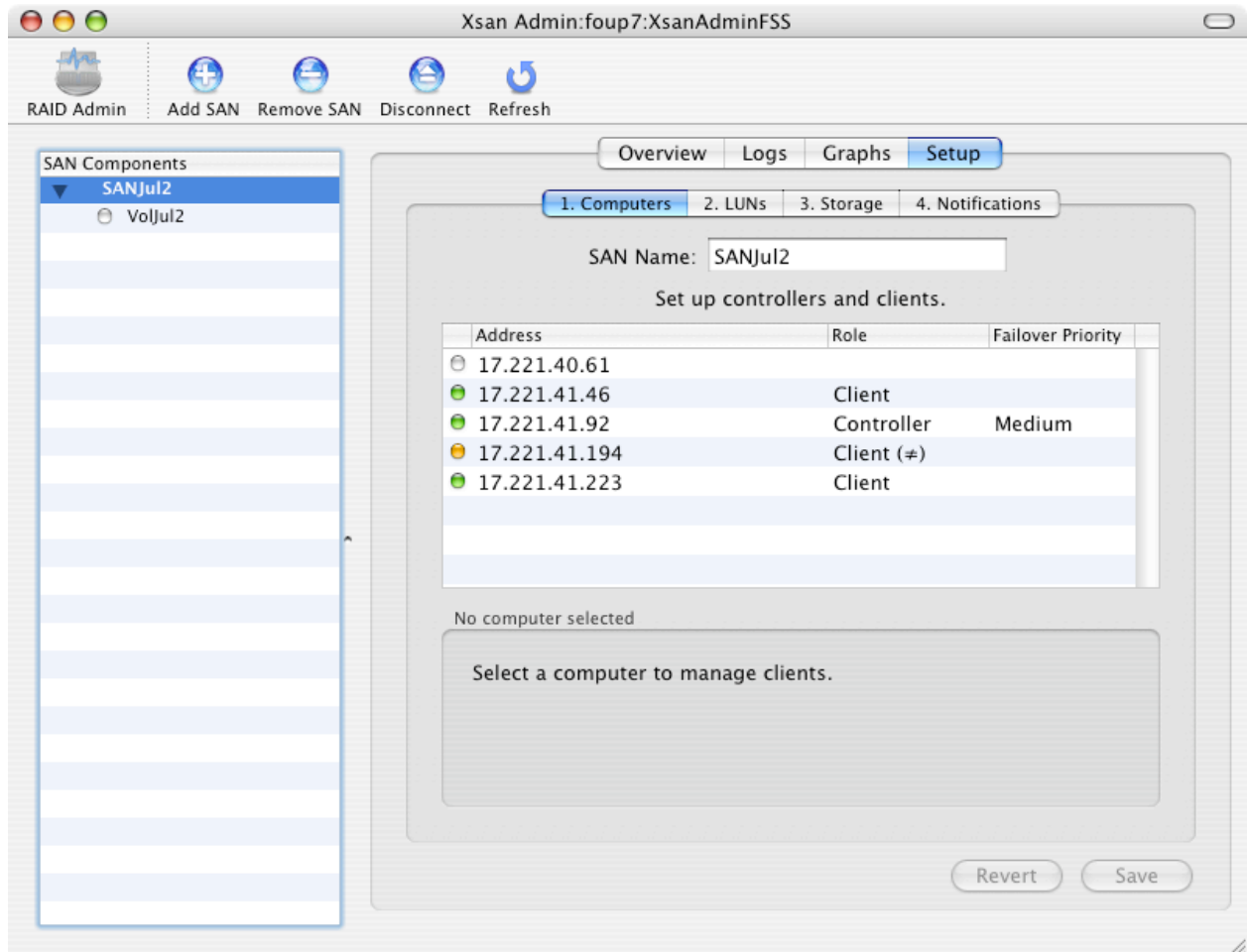
The screenshot shows a dialog box titled "Computer Sheet" with the following fields and information:

- Name: 17.221.42.196
- Serial Number:
- SN Expiration: Invalid
- Role:
- Failover priority:
- Access the SAN via:
- IP Address: 17.221.42.196
- Operating System: Mac OS X 10.3.4 (Build 7H60)
- ACFS Client Version: 2.5.0 Build 38
- ACFS Server Version: 2.5.0 Build 38
- Processor: Dual 1.25 GHz PowerPC G4
- Memory: 512 MB

At the bottom left is a help icon (a question mark in a circle). At the bottom right are "Cancel" and "OK" buttons.

When finished, the user clicks OK to dismiss the sheet and return to Settings. The mockup below shows the Controllers and Clients list with most of the computers set up.

### Controller and Clients



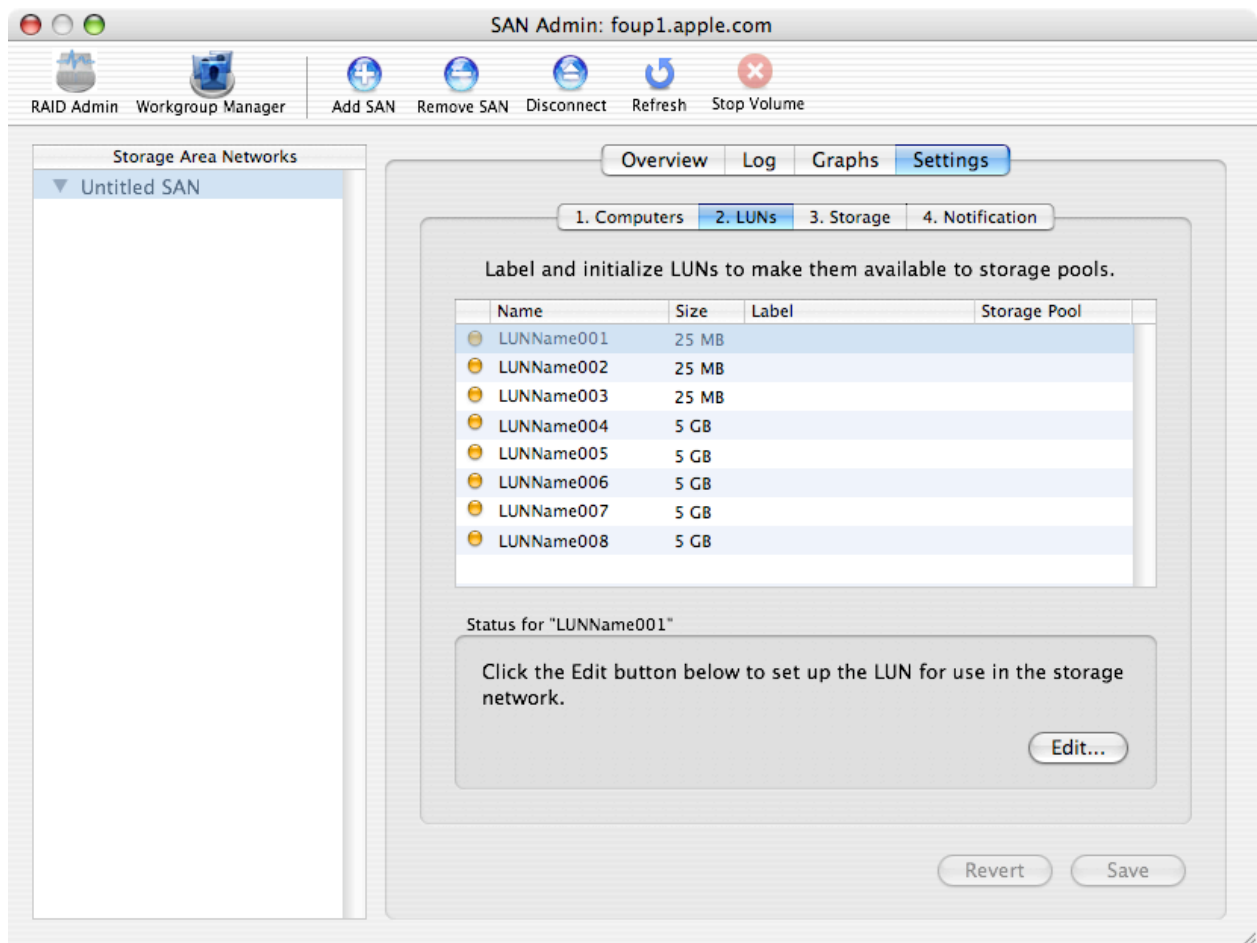
## 2. Setting up RAID LUNS

All RAID LUNs connected to the SAN are automatically discovered and listed on this pane.

LUNs stay on this list whether they are initialized or not and whether or not they are assigned to storage pools. The list provides an inventory of all LUNs on the network, which is valuable for troubleshooting.

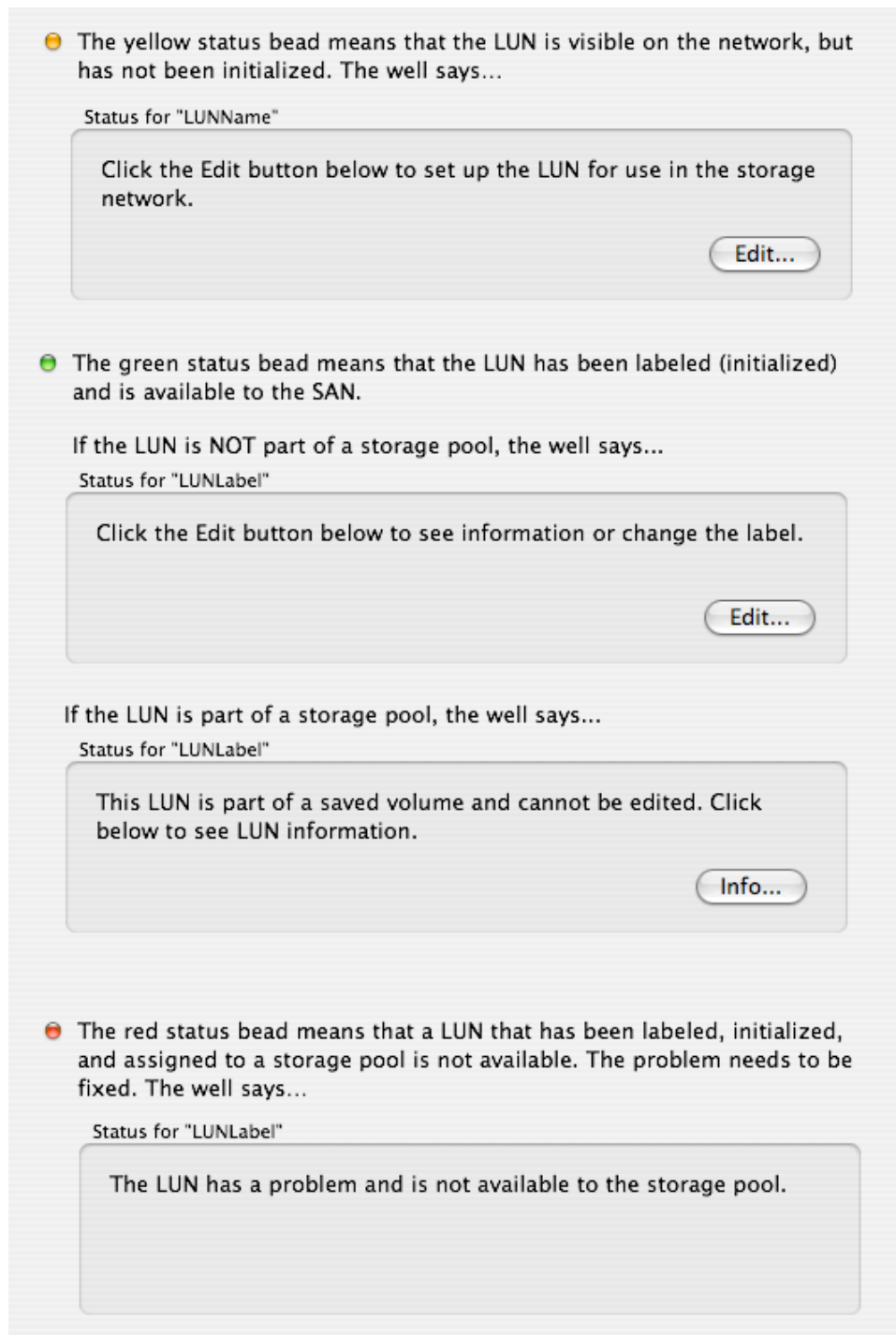
In the genesis case, the LUNs list is auto-filled and the context-sensitive well prompts the user to set up the selected LUN.

LUNs pane (genesis)



Workflow prompts are provided in a context-sensitive well below the LUNs list.

### Context-sensitive LUNs well



**●** The yellow status bead means that the LUN is visible on the network, but has not been initialized. The well says...

Status for "LUNName"

Click the Edit button below to set up the LUN for use in the storage network.

Edit...

**●** The green status bead means that the LUN has been labeled (initialized) and is available to the SAN.

If the LUN is NOT part of a storage pool, the well says...

Status for "LUNLabel"

Click the Edit button below to see information or change the label.

Edit...

If the LUN is part of a storage pool, the well says...

Status for "LUNLabel"

This LUN is part of a saved volume and cannot be edited. Click below to see LUN information.

Info...

**●** The red status bead means that a LUN that has been labeled, initialized, and assigned to a storage pool is not available. The problem needs to be fixed. The well says...

Status for "LUNLabel"

The LUN has a problem and is not available to the storage pool.

To initialize a LUN, the user selects the LUN and clicks the Edit button to open the LUN sheet.

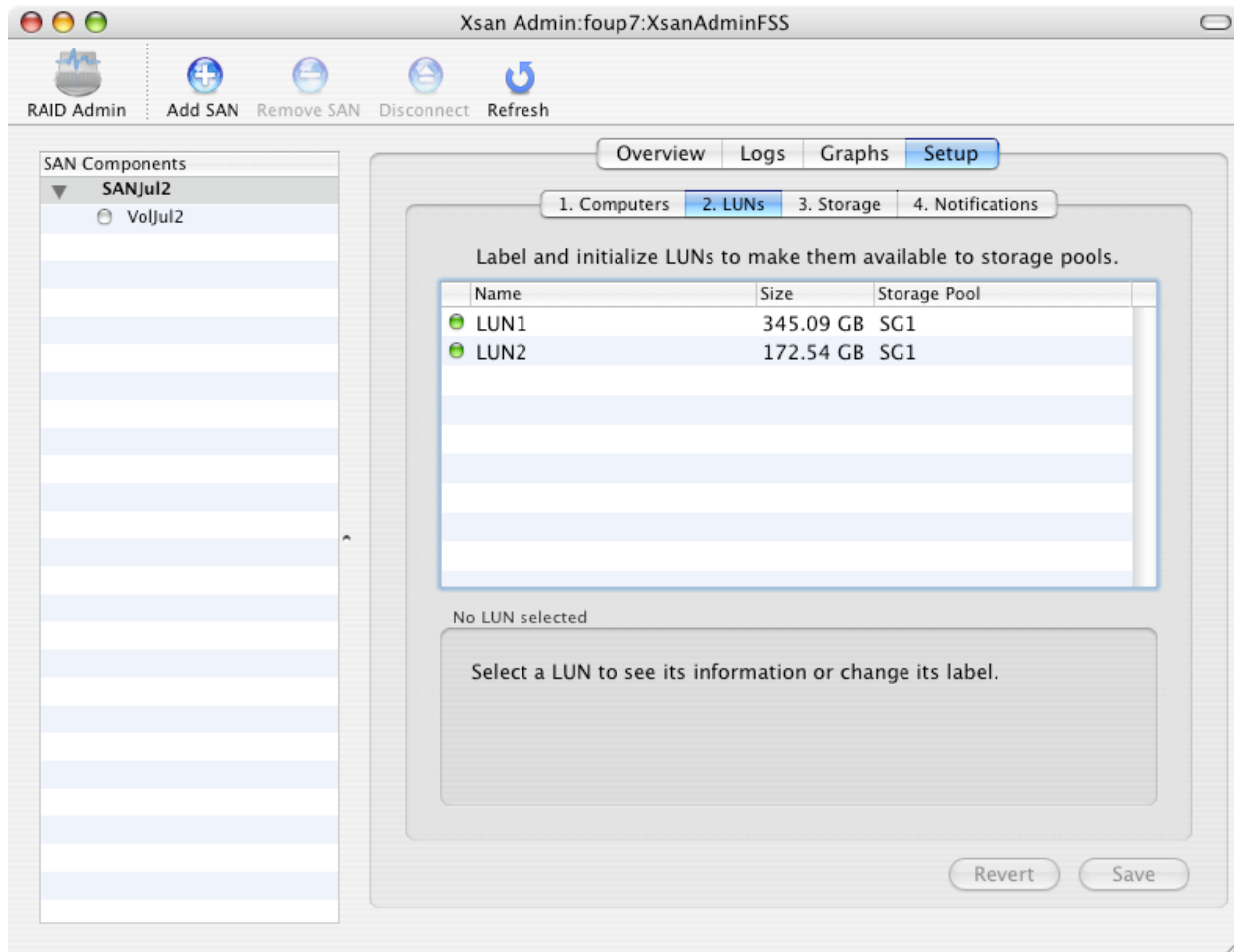
Entering a label and clicking OK makes the LUN available to storage pools (i.e., in the Available LUNs drawer), but does not *initialize it*. LUNs are only initialized at Save—i.e., clicking Save will initialize all labeled LUNs in the list. At that point, their status beads turn green.

LUN sheet



Until a LUN is saved as part of a storage pool, it can be re-labeled and/or re-initialized.

LUN pane (set up)

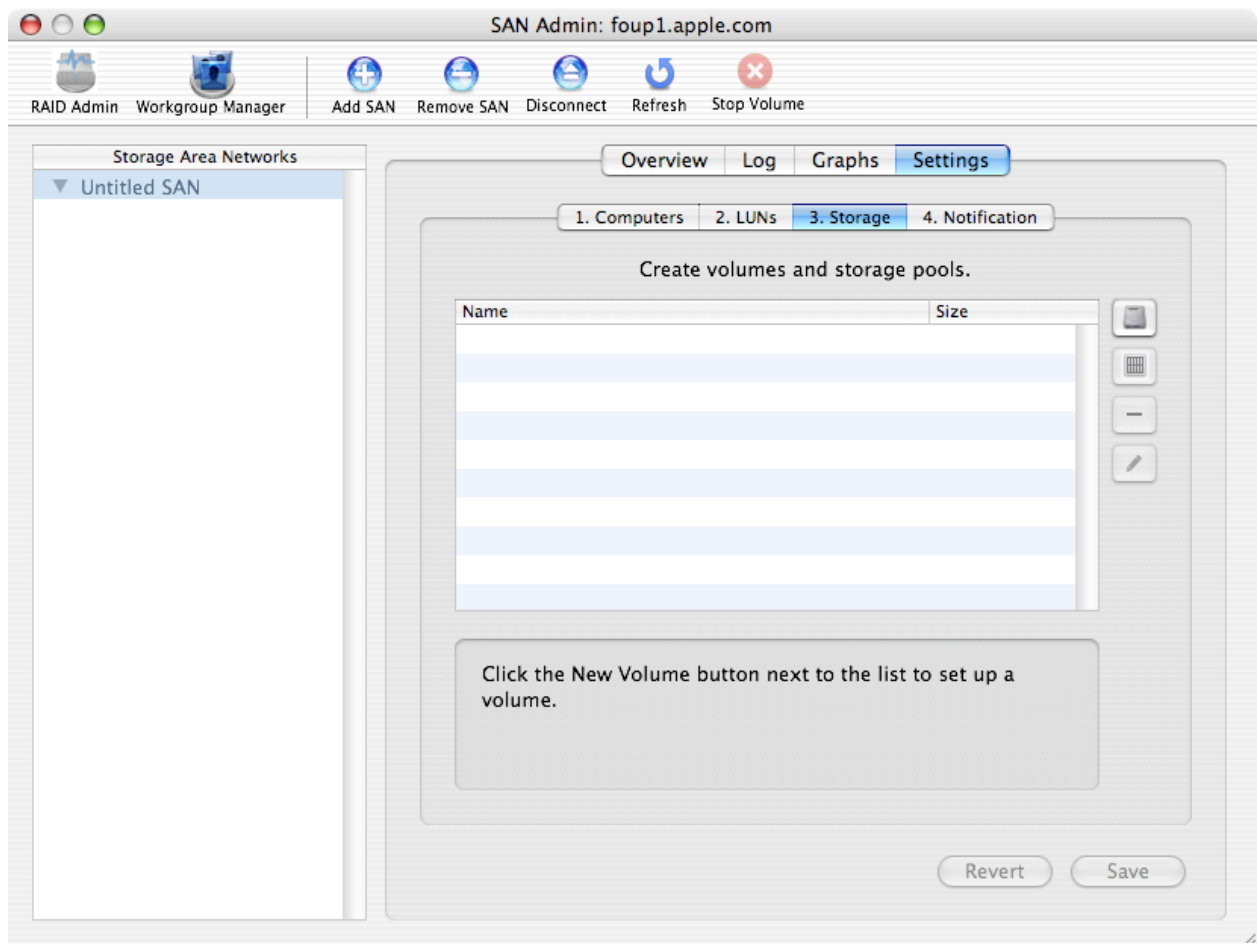


### 3. Setting Up Volumes and Storage Pools

The Storage pane is where volumes and storage pools are set up. In the genesis case, the user is prompted by the following UI:

- The context-sensitive well at the bottom of the pane prompts the user to set up a volume.
- The Volumes list is empty; only the New Volume button is available.
- Once a volume is set up, the well prompts the user to set up a storage pool.
- Once a storage pool is set up, the well prompts the user to add LUNs.

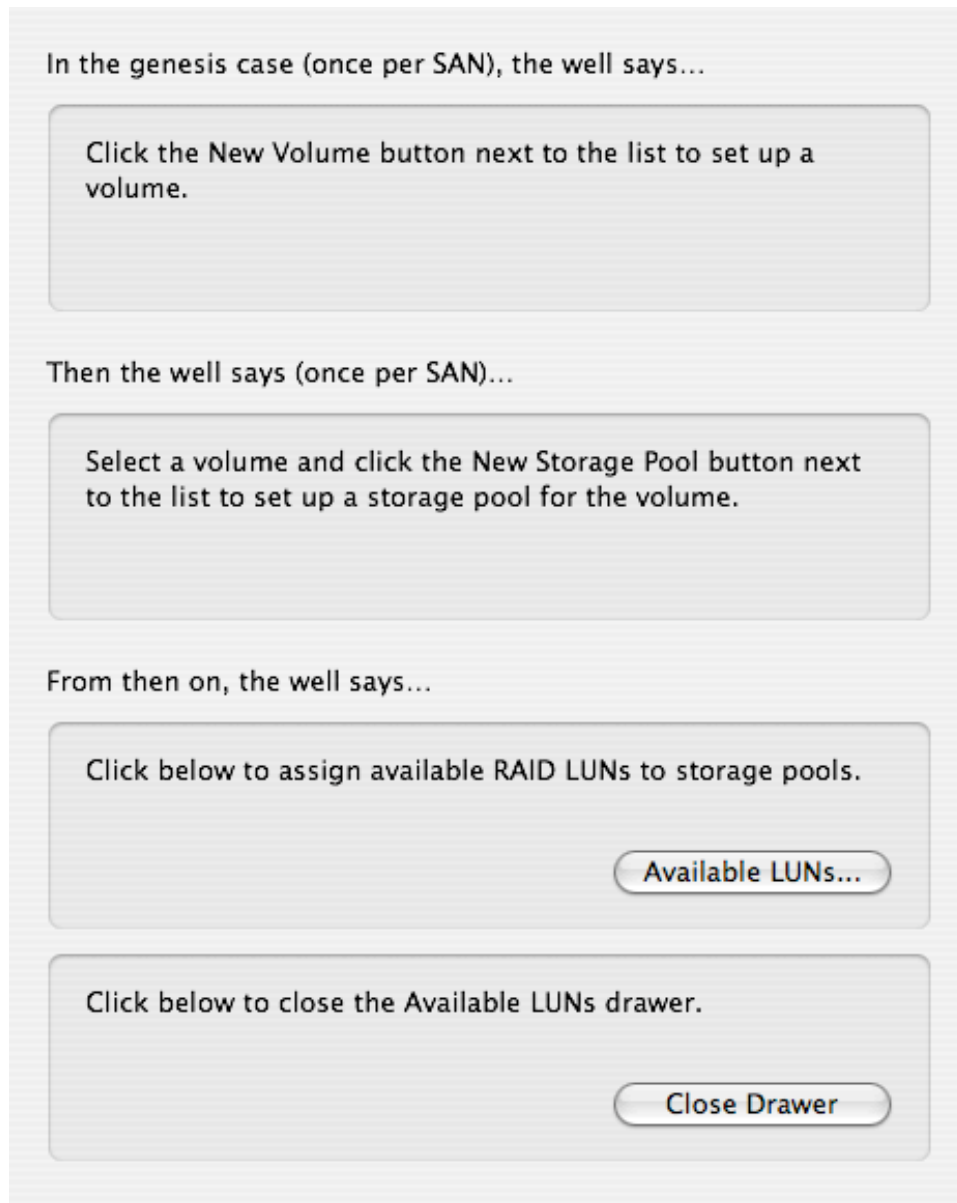
Storage pane (genesis)



## STORAGE SETUP PROMPTS

The context-sensitive well and storage list buttons act together to prompt the user, as shown below.

### Context-sensitive Storage well

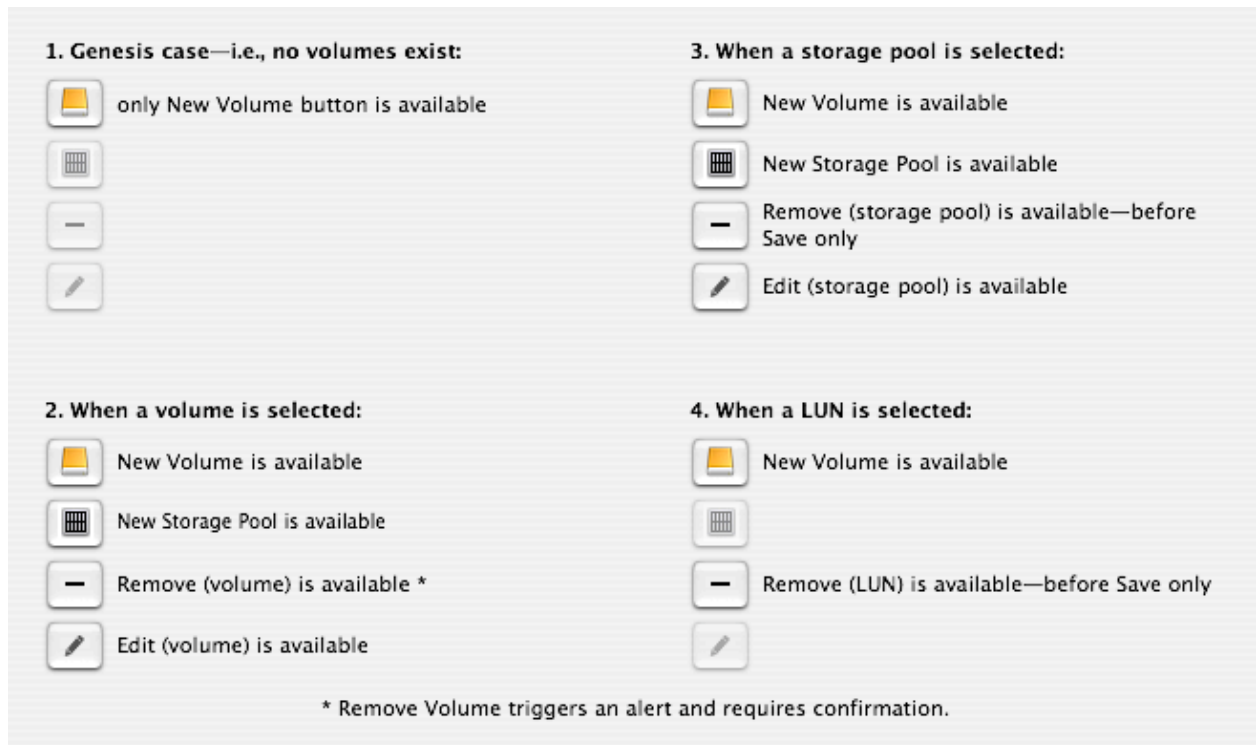


A step-by-step walkthrough of the genesis case goes as follows:

1. When the list is empty, only the **New Volume** button is available. The well prompts the user to click it to set up a volume.

2. The new volume is auto-selected in the list, and the other buttons become available. The well prompts the user to select a volume (already done) and click the New Storage pool button.
3. The new storage pool is auto-selected in the list. The well prompts the user to click the Available LUNs button to assign LUNs to the storage pool.

### Storage List buttons



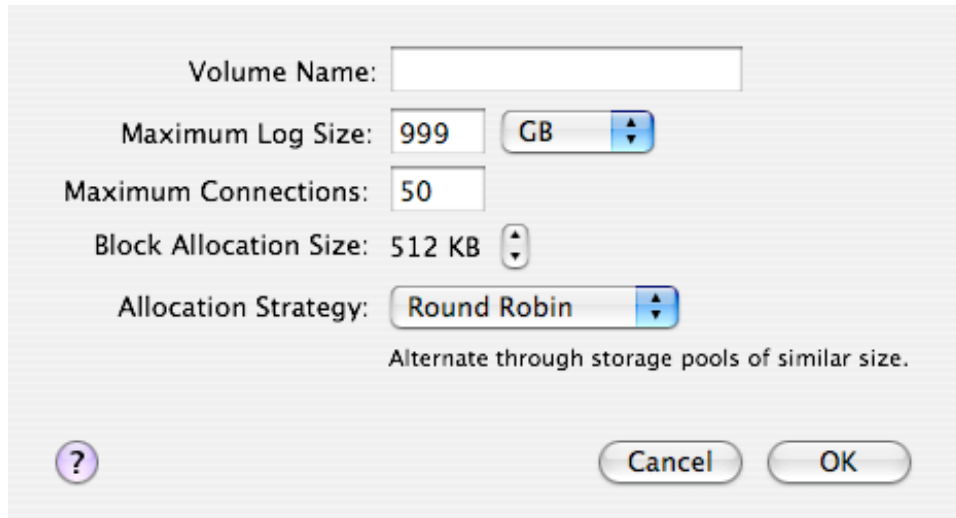
The behavior of the Remove button, in particular, is designed to prevent actions that would destroy a running volume:

- Before Save—LUNs, storage pools, and volumes can be removed—i.e., before the SAN is saved or before a new volume or storage pool is saved.
- After Save—volumes may be removed but the Remove button is not available for storage pools or LUNs. Clicking Remove for a volume invokes a confirmation sheet that asks if the user really wants to remove the volume and all of its storage pools from the SAN.

## Creating a Volume

Clicking the New Volume button next to the list opens the volume sheet.

Volume sheet



The screenshot shows a dialog box titled "Volume sheet" with the following fields and controls:

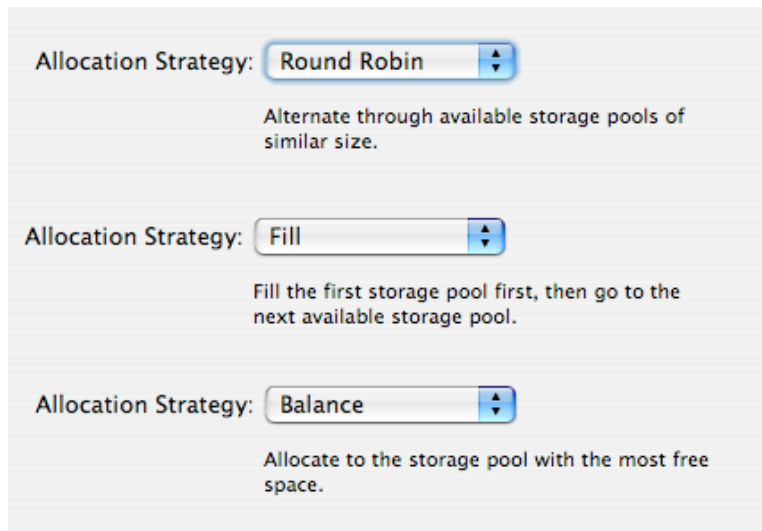
- Volume Name:
- Maximum Log Size:  GB (dropdown)
- Maximum Connections:
- Block Allocation Size: 512 KB (dropdown)
- Allocation Strategy: Round Robin (dropdown)

Beneath the Allocation Strategy dropdown, the text reads: "Alternate through storage pools of similar size."

At the bottom left is a help icon (question mark in a circle). At the bottom right are "Cancel" and "OK" buttons.

Allocation Strategy has explanatory text beneath it, as shown below.

Allocation Strategy



The screenshot shows three options for the Allocation Strategy:

- Round Robin**: Alternate through available storage pools of similar size.
- Fill**: Fill the first storage pool first, then go to the next available storage pool.
- Balance**: Allocate to the storage pool with the most free space.

## Creating a Storage Pool

Storage pools are groups of RAID LUNs configured to have certain performance characteristics. These are created on a sheet. Clicking the New Storage Pool button next to the Storage list opens the Storage Pool sheet. The first storage pool in a

volume must allow metadata and journal (see below). Subsequent storage pools may allow any data type.

Storage Pool Sheet for 1st and Subsequent Storage Pools

Storage Pool Name:

Use For:  Any data type  
 Journaling and metadata only  
The first storage pool must allow journaling and metadata.

Permissions:

Stripe Breadth:

Pathing Method:

Always use the same connection to access the disk.

Storage Pool Name:

Use For:  Any data type  
 Journaling and metadata only  
 User data only  
 Data with affinity "Subsequent SP"

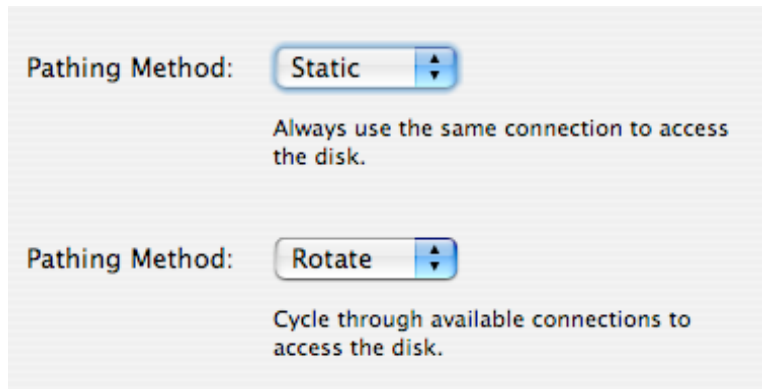
Permissions:

Stripe Breadth:

Pathing Method:

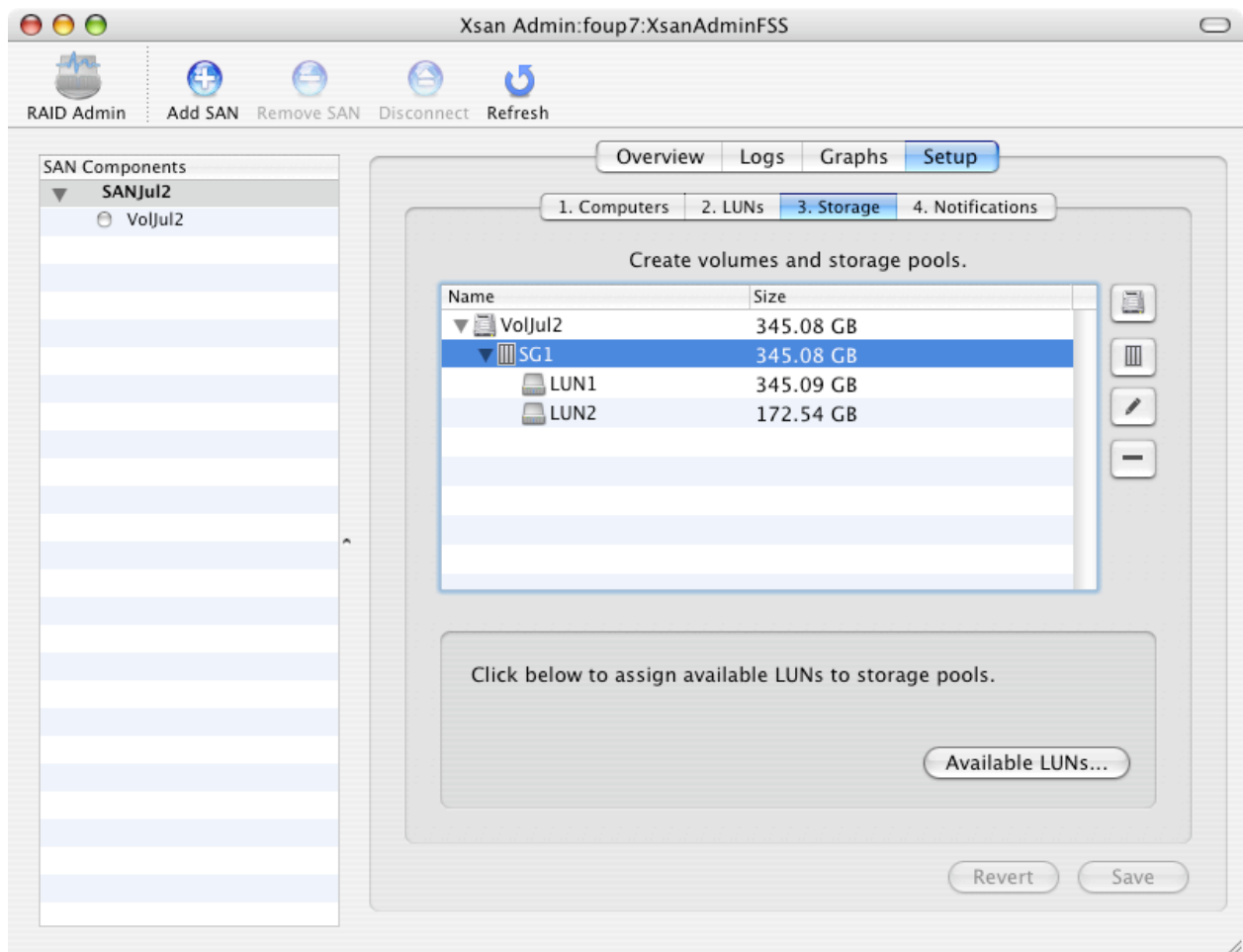
Always use the same connection to access the disk.

### Pathing Method Options



In the screenshot below, the storage list shows 1 volume set up. The volume has 1 storage pool (selected) with 2 LUNs assigned.

### Storage (set up)



## Assigning LUNs to a Storage Pool

In order to maximize storage pool performance, the admin will assign LUNs with similar performance characteristics—e.g., LUNs with the same sector size, capacity, and RAID level. Storage pool performance may be limited by the capacity of its lowest-capacity LUN.

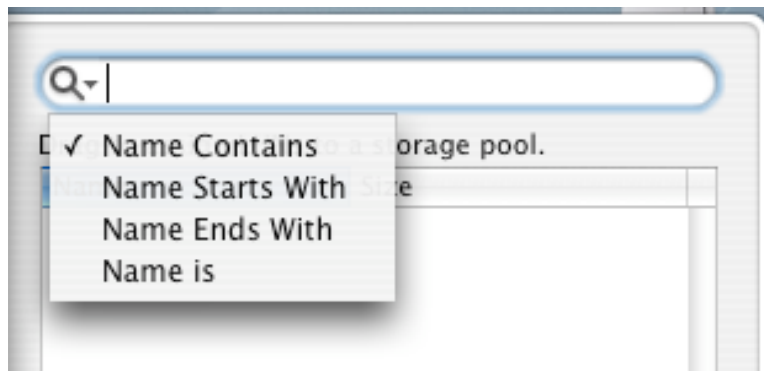
### AVAILABLE LUNS DRAWER

To add, the user clicks the Available LUNs button to open the drawer, then drags LUNs into storage pools.

A LUN is “available” when it has been labeled and initialized in the LUNs pane. The list sorts by LUN size (default) or user-defined name. A context-sensitive well at the bottom of the drawer provides information for the selected LUN.

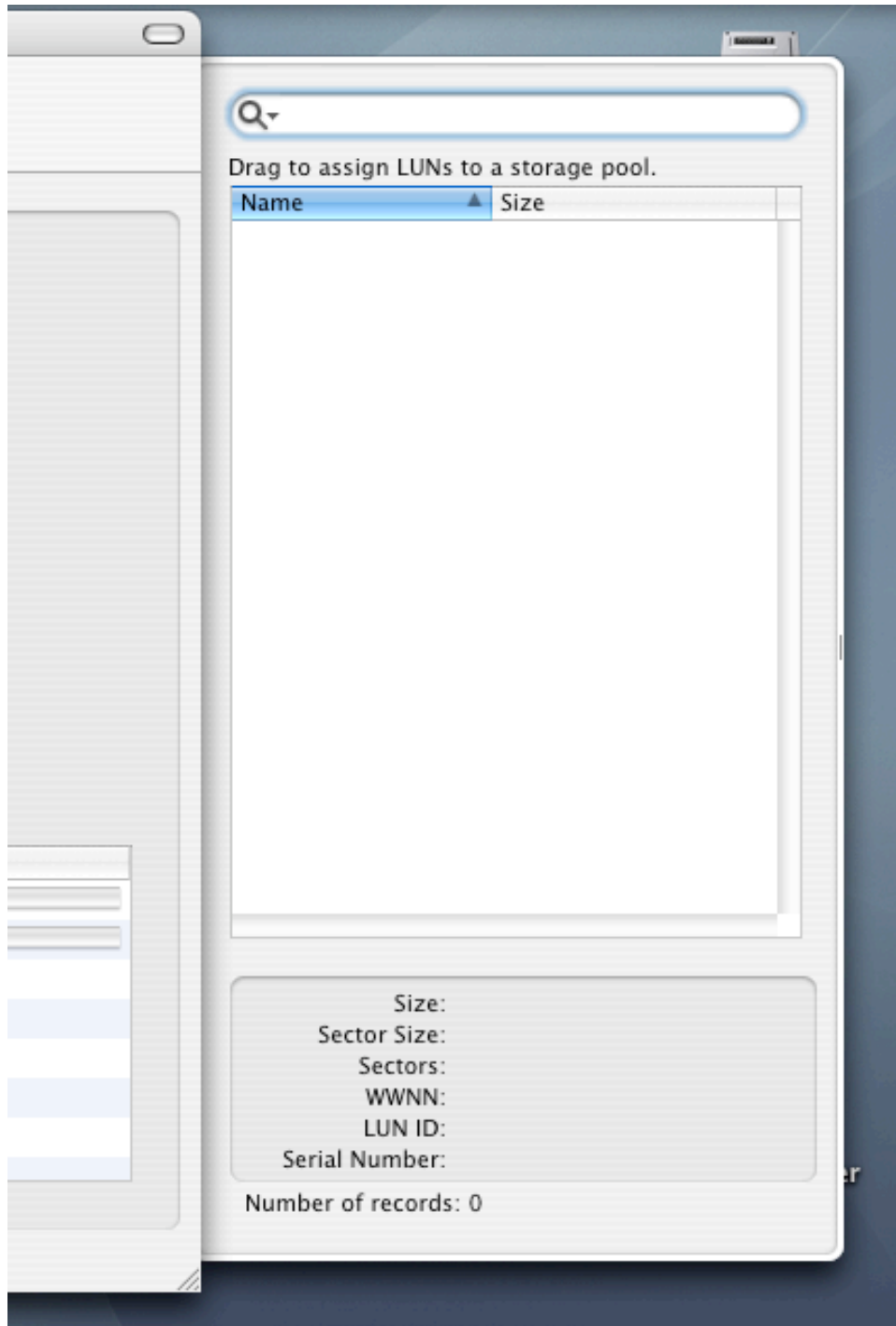
A Search widget at the top of the drawer allows users to display only LUNs that meet certain criteria.

LUN drawer popup



While the drawer is open, the Available LUNs button in the Storage pane toggles to Close Drawer. To close the drawer, the user clicks Close Drawer or drags the drawer closed. The drawer closes automatically if the user clicks out of the Storage pane.

Available LUNs Drawer

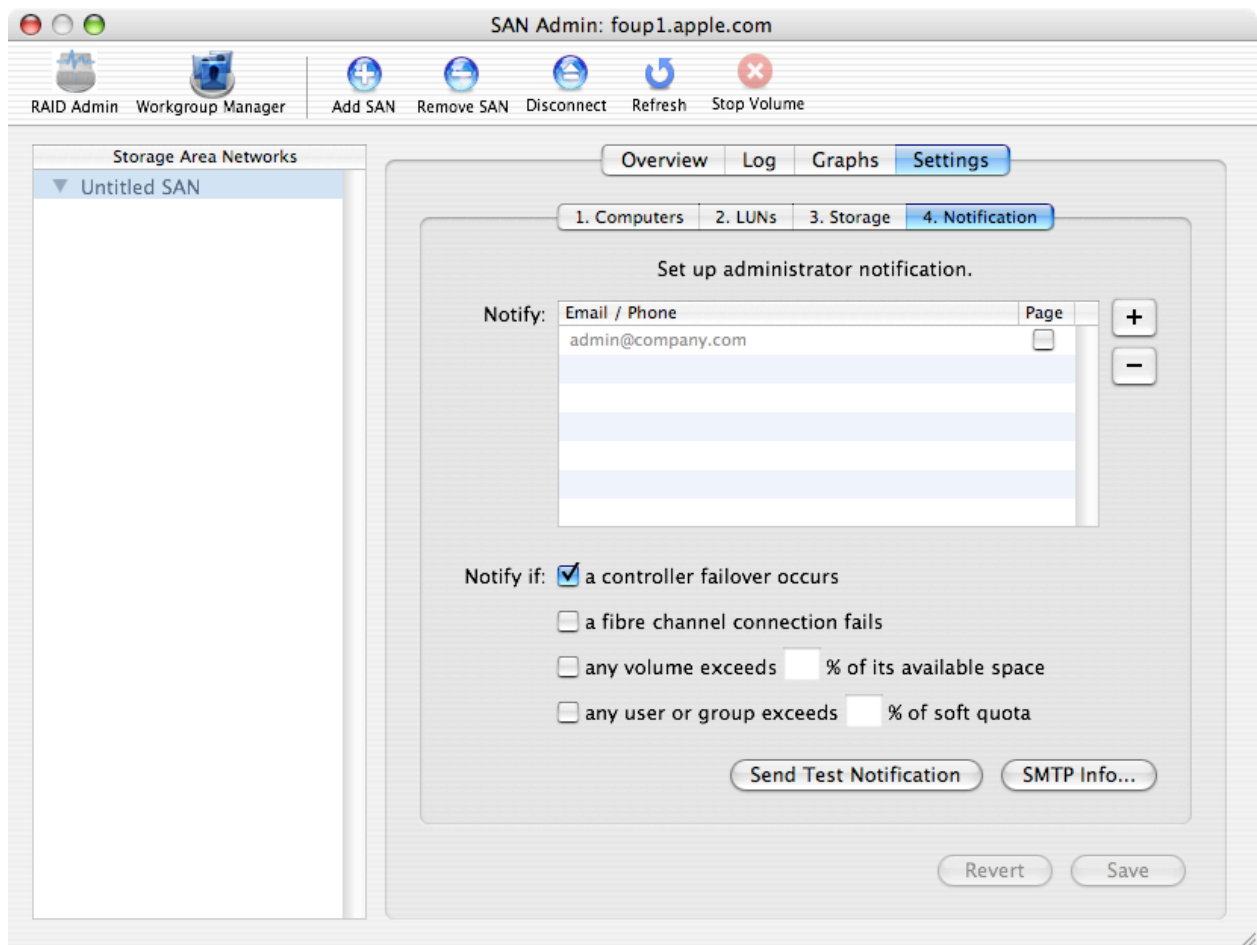


## 4. Setting Up Administrator Notification

To set up email or pager notification, the user clicks the Add (+) button to put a new item in the matrix. The user enters an email address or pager number in line and checks the Page checkbox, if applicable.

Default notification is for controller failover only. The Send Test Notification button allows a test email to be sent to the selected address. The Notify list allows multiple selections.


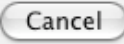

### Notification (Genesis)



SMTP Sheet

From Email Address:

Server Address:

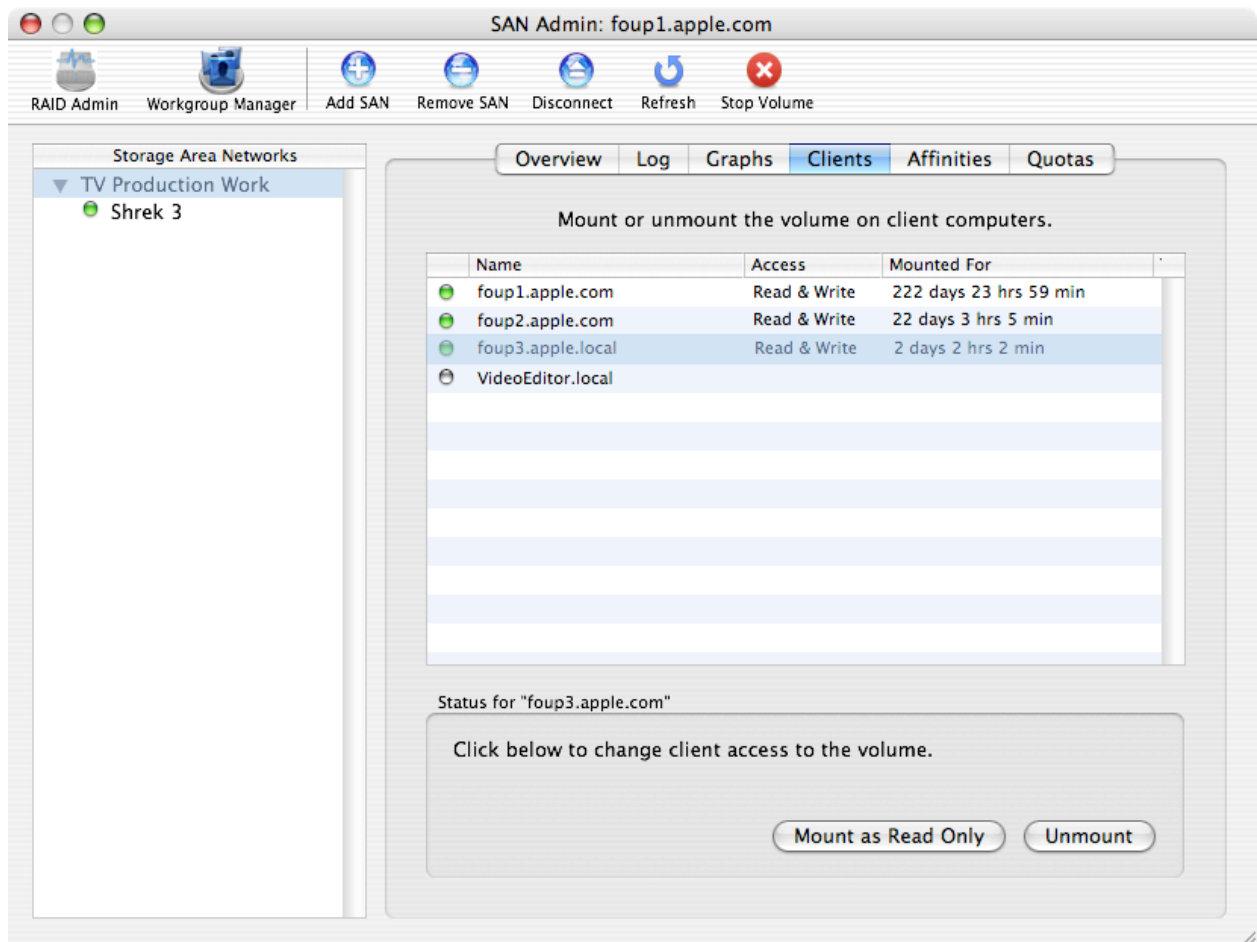
  

# Managing Volumes

## Clients

The Clients list is auto-populated with all SAN computers whose Role includes Client. Mount access can be set for multiple selections using the popup below the list. Mount access can be set to *Mount as Read & Write* or *Mount as Read Only*.

Clients—Mount/Unmount Volume



The contents of the well are context sensitive, depending on the selection.

Context-sensitive Clients well

● The clear status bead means that computer status is unknown because the user has not authenticated. The well says...

Status for "foup3.apple.com"

Authenticate to the computer to see status or change settings.

Authenticate...

● The yellow status bead means that the volume is not currently mounted. The well says...

Status for "foup3.apple.com"

Click a button to mount the volume.

Mount as Read Only Mount as Read & Write

● means that the user can mount/unmount the volume. The well says...

Status for "foup3.apple.com"

Click below to change client access to the volume.

Mount as Read Only Unmount

● The red status bead means that the client has an error. The well says...

Status for "foup3.apple.com"

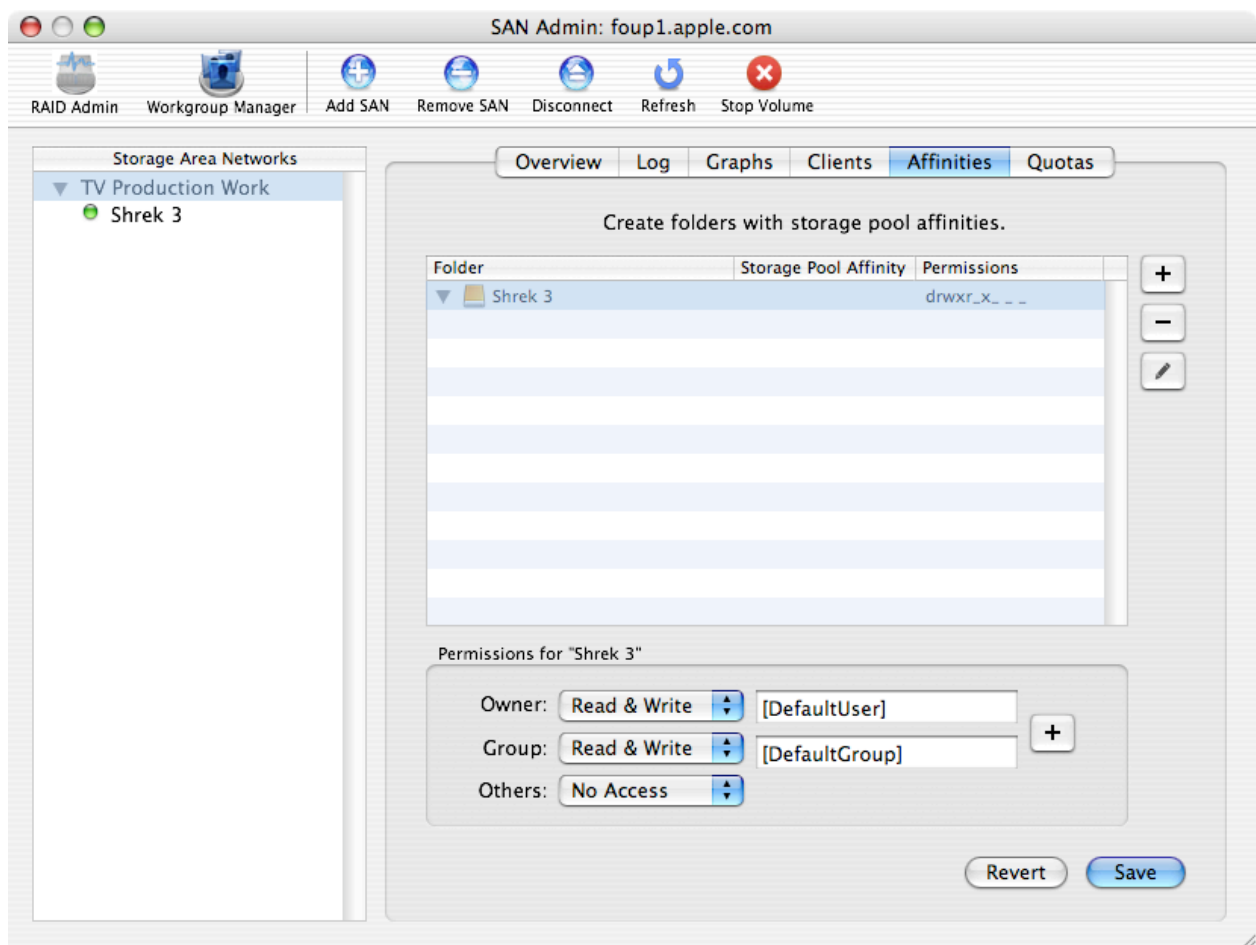
The computer has a problem: [ProblemDescription]. This text can run to three lines, so there's plenty of room to describe the problem and suggest a fix.

## Affinities

Different kinds of tasks and content may require different storage performance. For example, video ingest usually needs a higher-performance storage pool than audio editing. The Affinities feature allows an admin to create folders whose content is automatically directed to specific storage pools.

In the genesis case, only the volume shows in the list, with default permissions. Affinity is not an available setting for a volume.

### Storage Affinities (Genesis)



## PERMISSIONS

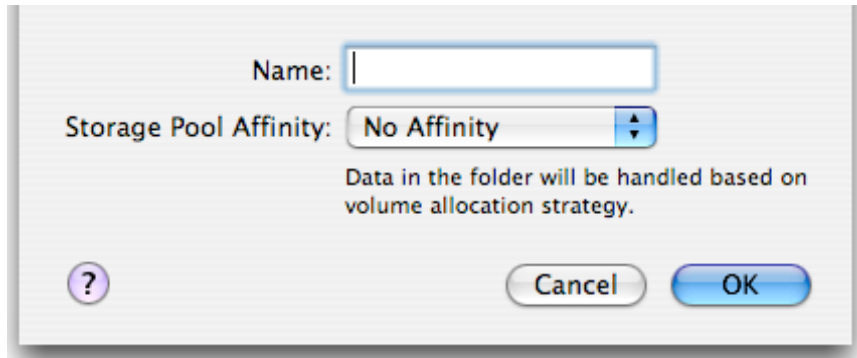
Volume and folder permissions are edited at the bottom of the pane. Clicking the Add (+) button next to Owner and Group opens the Users & Groups drawer. Items are dragged from the drawer into the text box with keyboard focus. A text box will not accept an item that doesn't belong—e.g., Owner will only accept users, etc. Multiple selections are allowed.

## STORAGE POOL AFFINITY

To create a folder with affinity, the user clicks the Add (+) button to open the sheet below. Text below the Storage Pool Affinity popup explains the choices. Storage pools that accept only metadata or journaling data do not appear in the popup menu.

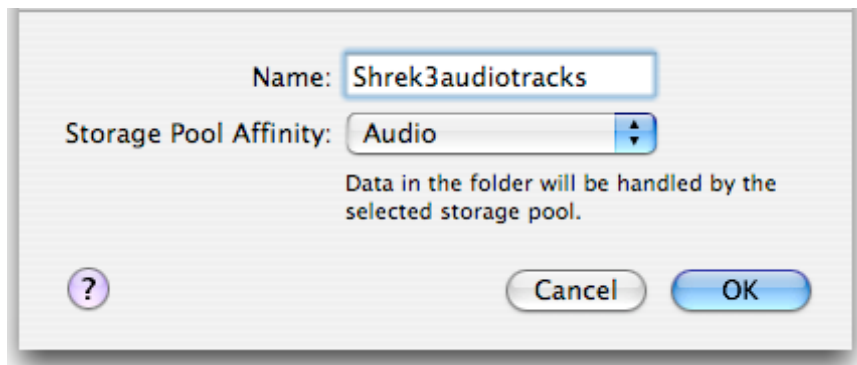
By default, the folder has no affinity..

Folder Sheet (default)



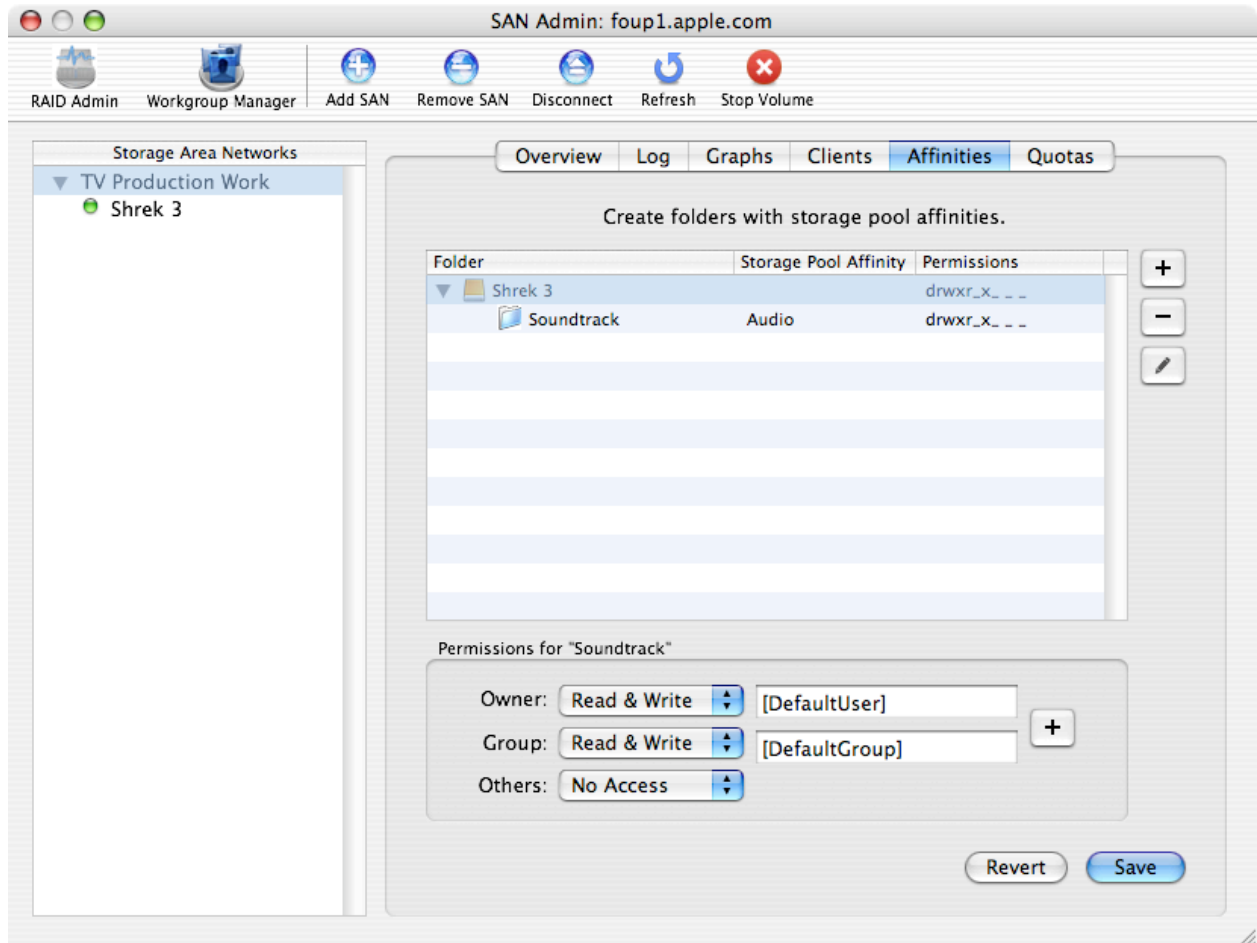
The screenshot shows a dialog box titled "Folder Sheet (default)". It contains a "Name:" label followed by an empty text input field. Below that is a "Storage Pool Affinity:" label followed by a dropdown menu currently set to "No Affinity". Underneath the dropdown is the text: "Data in the folder will be handled based on volume allocation strategy." At the bottom left is a help icon (a question mark in a circle). At the bottom right are "Cancel" and "OK" buttons.

Folder with Affinity



The screenshot shows a dialog box titled "Folder with Affinity". It contains a "Name:" label followed by a text input field containing "Shrek3audiotracks". Below that is a "Storage Pool Affinity:" label followed by a dropdown menu currently set to "Audio". Underneath the dropdown is the text: "Data in the folder will be handled by the selected storage pool." At the bottom left is a help icon (a question mark in a circle). At the bottom right are "Cancel" and "OK" buttons.

### Storage Affinities (set up)

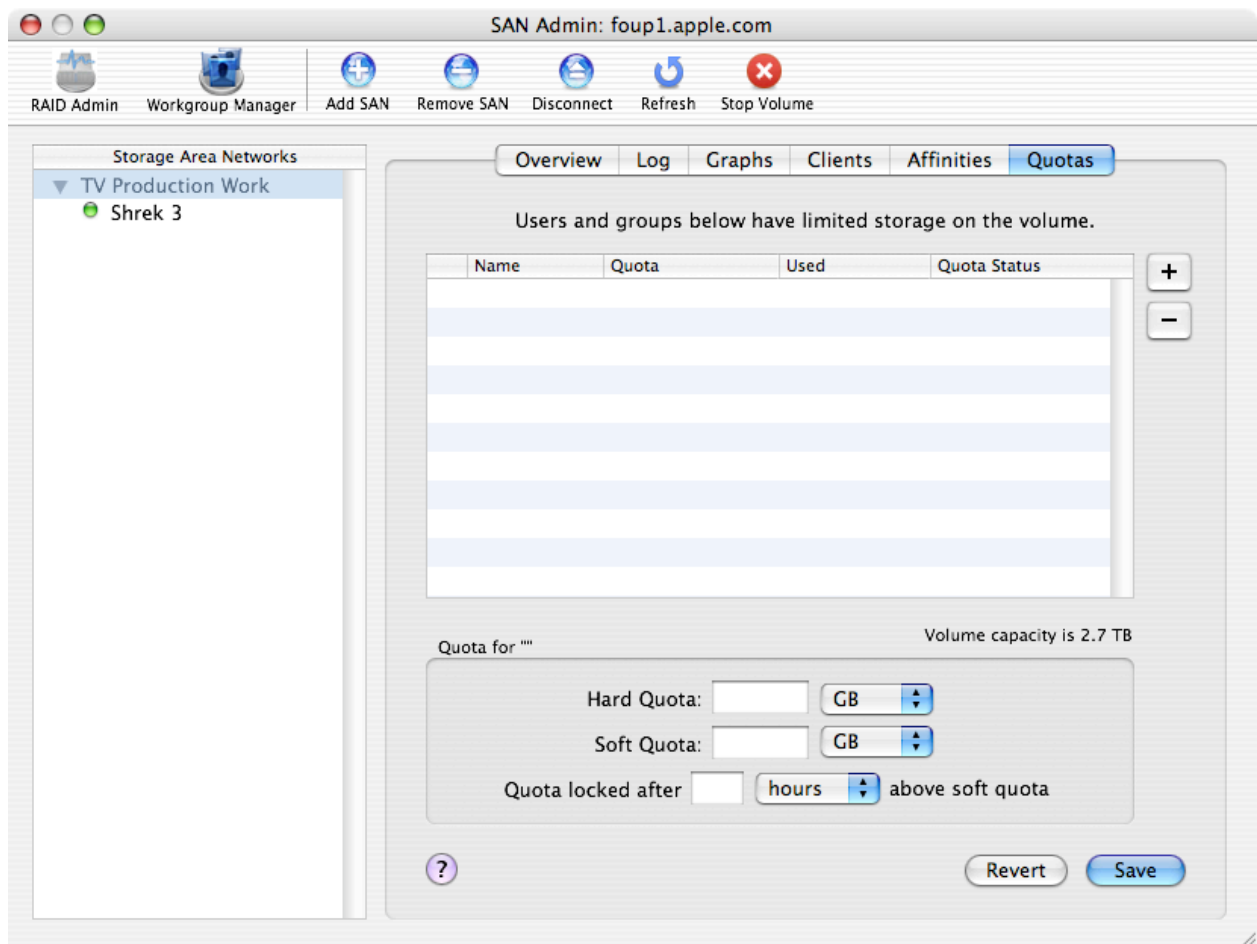


## Quotas

Quotas are used to restrict access to available volume space. Users and groups with no quotas have unlimited access to available space.

In the genesis case, the list is empty. Clicking the Add (+) button opens the Users & Groups drawer. Items are dragged to the list and quota information for the selected item is added below the list. The list allows multiple selections

### Volume Settings—Quotas (Genesis)



The mockup below shows a list with 3 quotas set. During editing, the list allows multiple selections so that several quotas can be set at once.

## THE QUOTAS LIST

- The Quotas column shows the Soft – Hard Quota range. If the Soft Quota is exceeded, the column shows a warning: [Soft Quota] in [hours or minutes to quota lockdown]. If the quota is locked to soft quota, only the soft quota, the new upper limit, is displayed, in red—e.g., **550 GB**.
- The Used column shows actual usage. If the quota is locked to soft quota, the usage text turns red—e.g., **550 GB**.
- The Quota Status column provides a visual status indicator—e.g. green if below soft quota, yellow if above soft quota, red if quota is locked. For more detail, see the Quota Walkthrough below.

### Volume Settings—Quotas

Users and groups below have limited storage on the volume.

Name	Quota	Used	Quota Status
Bob White	75 - 100 MB	50 MB	<span style="color: green;">██████████</span>
Interns	30 GB in 21 hrs	31 GB	<span style="color: yellow;">██████████</span>
Video Editors	<b>550 GB</b>	<b>550 GB</b>	<span style="color: red;">██████████</span>

Volume capacity is 2.7 TB

Quota for "Interns"

Hard Quota:  GB

Soft Quota:  GB

Quota locked after  hours above soft quota

Buttons: Revert, Save

## QUOTAS WALKTHROUGH

- *Quota OK (see "Bob White" )*—Bob White is operating within his quota. The *Quota* column shows a soft quota of 75 MB and hard quota of 100 MB. The *Used* column shows usage at 50 MB. The *Quota Status* bar represents the entire (hard) quota with a line marking the soft quota. Bob White's status bar is green because he has quota left—i.e., he's not "over the line."
- *Quota Overdrawn (see "Interns" )*—The Interns have exceeded their soft quota; they are "overdrawn." The *Quota* column shows the [Soft Quota] in [*n* hrs or min] message. The *Used* column shows usage at 31 GB. The *Quota Status* bar represents the entire (hard) quota with a line marking the soft quota. The Interns status bar is yellow because usage is "overdrawn" above soft quota—i.e., above the line.
- *Quota Locked (see "Video Editors" )*—The Video Editors have exceeded their soft quota for longer than the allowed time, so their hard quota is "locked" down to soft quota. The *Quota* column shows the soft quota, in red text. The *Used* column shows actual usage. The *Quota Status* bar has turned red because allowed time above soft quota has been exceeded and hard quota has been reset. It will turn back to green when usage falls below soft quota.

## QUOTA SETTINGS

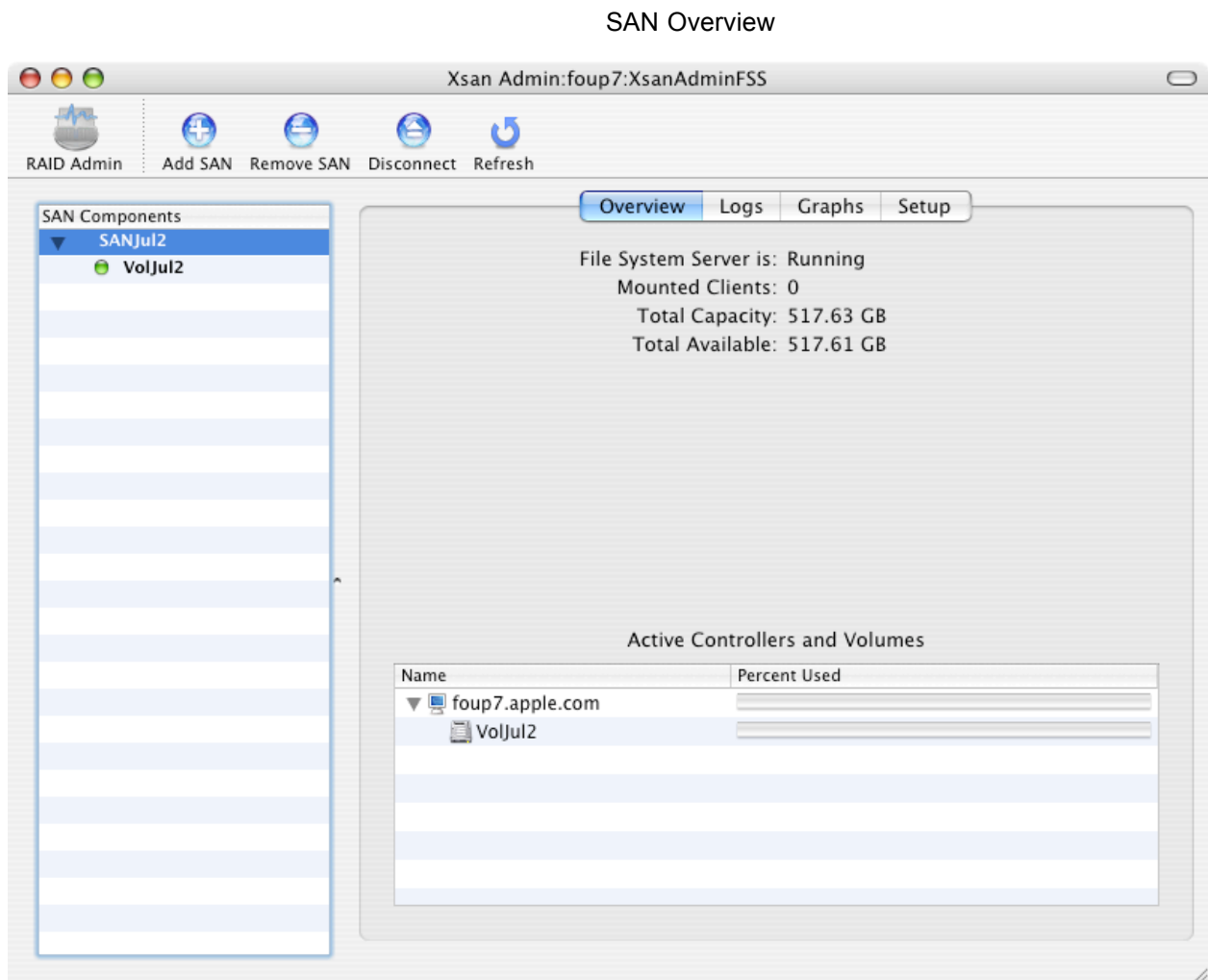
- Total volume capacity is shown just above the settings.
- The popup menu includes Bytes/KB/MB/GB/TB.
- Hard quota is constrained below volume capacity.
- Soft quota is constrained below hard quota.
- Quota is reduced to soft quota when time limit is exceeded. Reset happens automatically when usage drops below soft quota again.

## Monitoring SANs and Volumes

The Xsan monitoring UI closely resemble that for the Server Admin application: Overview, Logs, and Graphs.

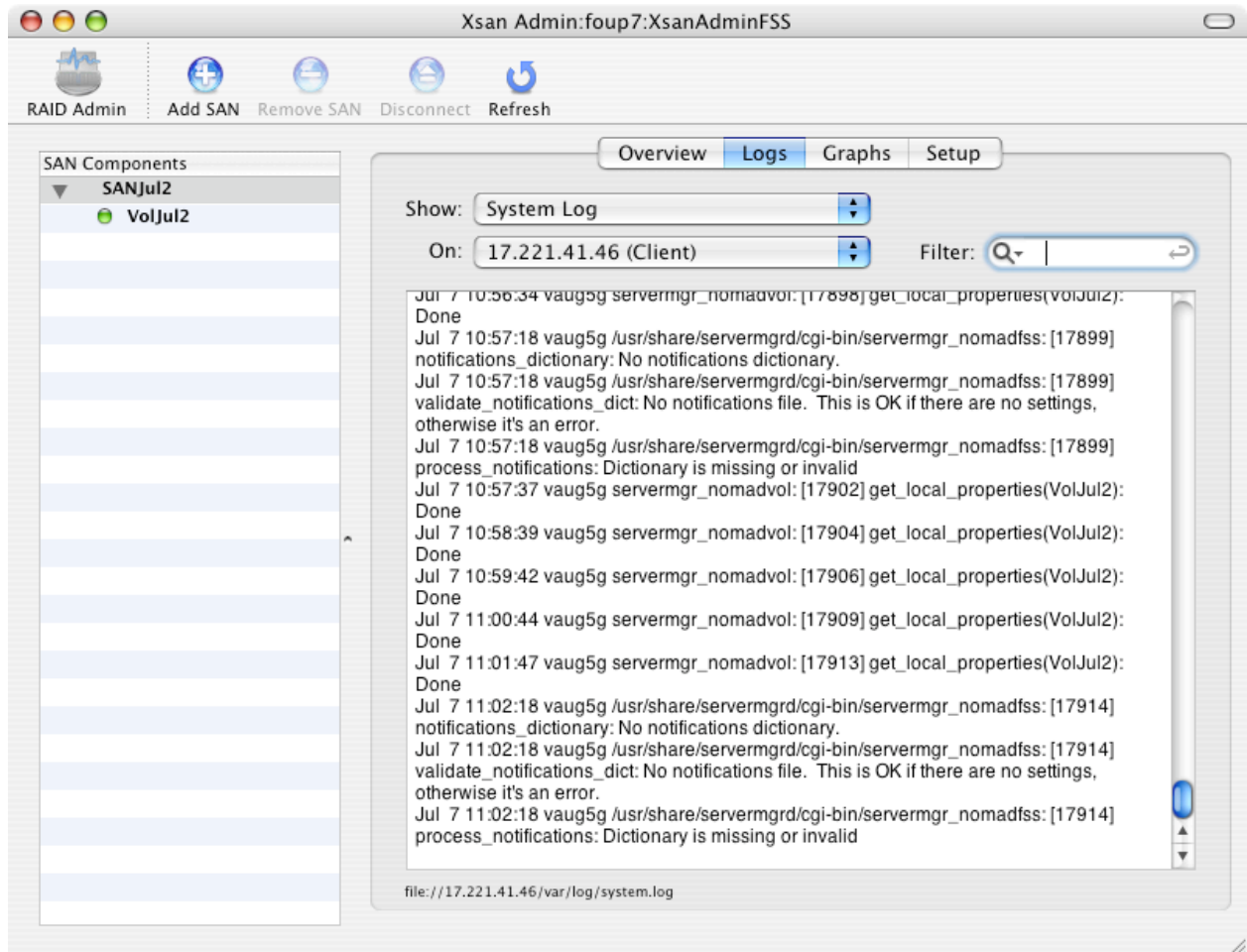
### Monitoring the SAN

The Overview pane shows whether the SAN is running and provides client and capacity information. The list at the bottom provides a visual indication of usage for each volume, by controller.



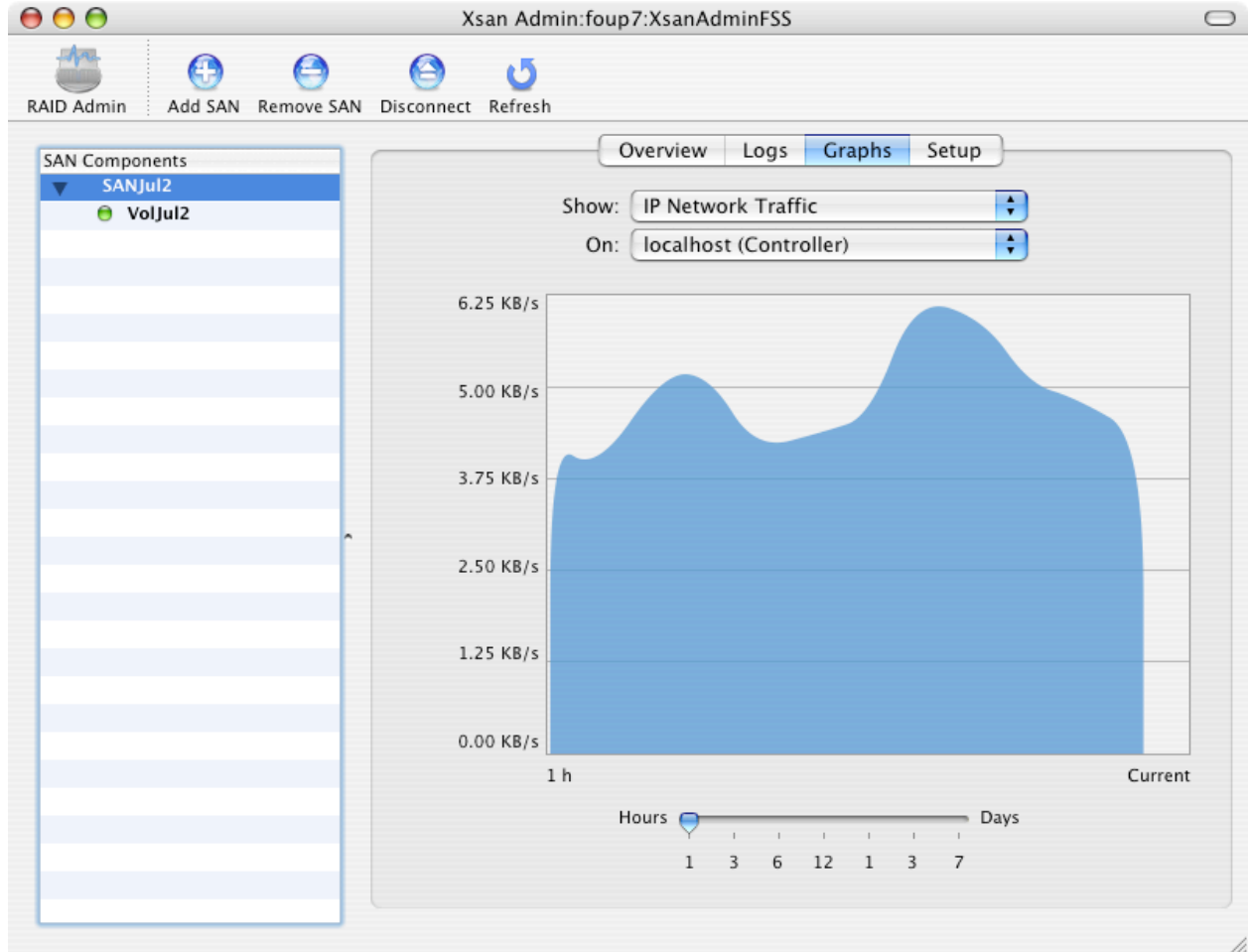
There is no single SAN log. Each controller in the SAN logs its own information separately. The Logs pane allows the user to see the log content by controller. The Filter widget allows text searching.

### SAN Logs

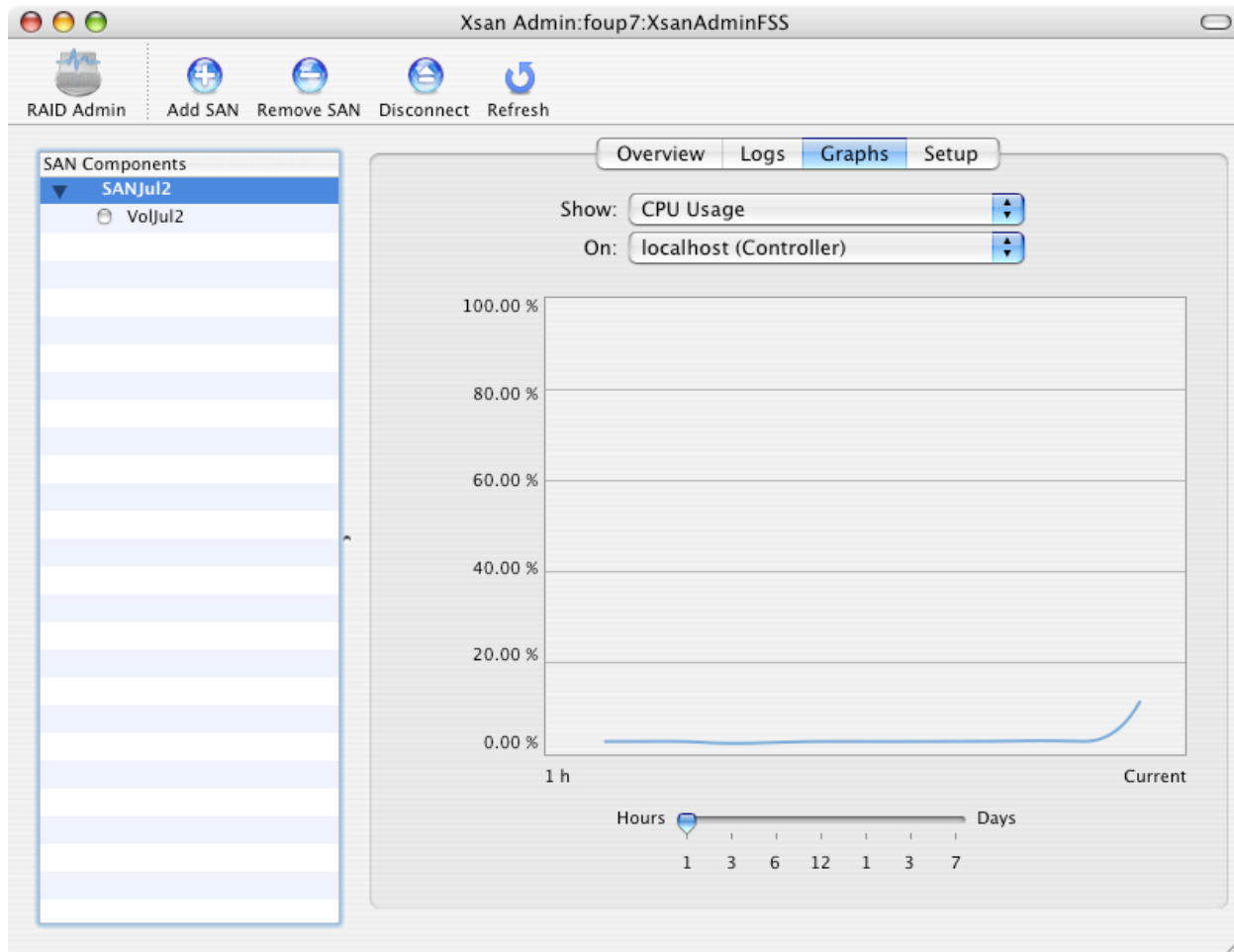


Graphs provide controller-specific usage information, presented as either volume or line graphs, as appropriate to the information type.

### SAN Graphs—Network



### SAN Graphs—CPU Usage



## Monitoring a Volume

The Overview pane shows whether the volume is running and provides client, controller, and capacity information. The list at the bottom provides a visual indication of usage for each storage pool in the volume.

Volume Overview

Xsan Admin: foup7:VolJul2

RAID Admin Add SAN Remove SAN Disconnect Refresh Stop Volume

SAN Components

- SANJul2
  - VolJul2

Overview Logs Clients Affinities Quotas

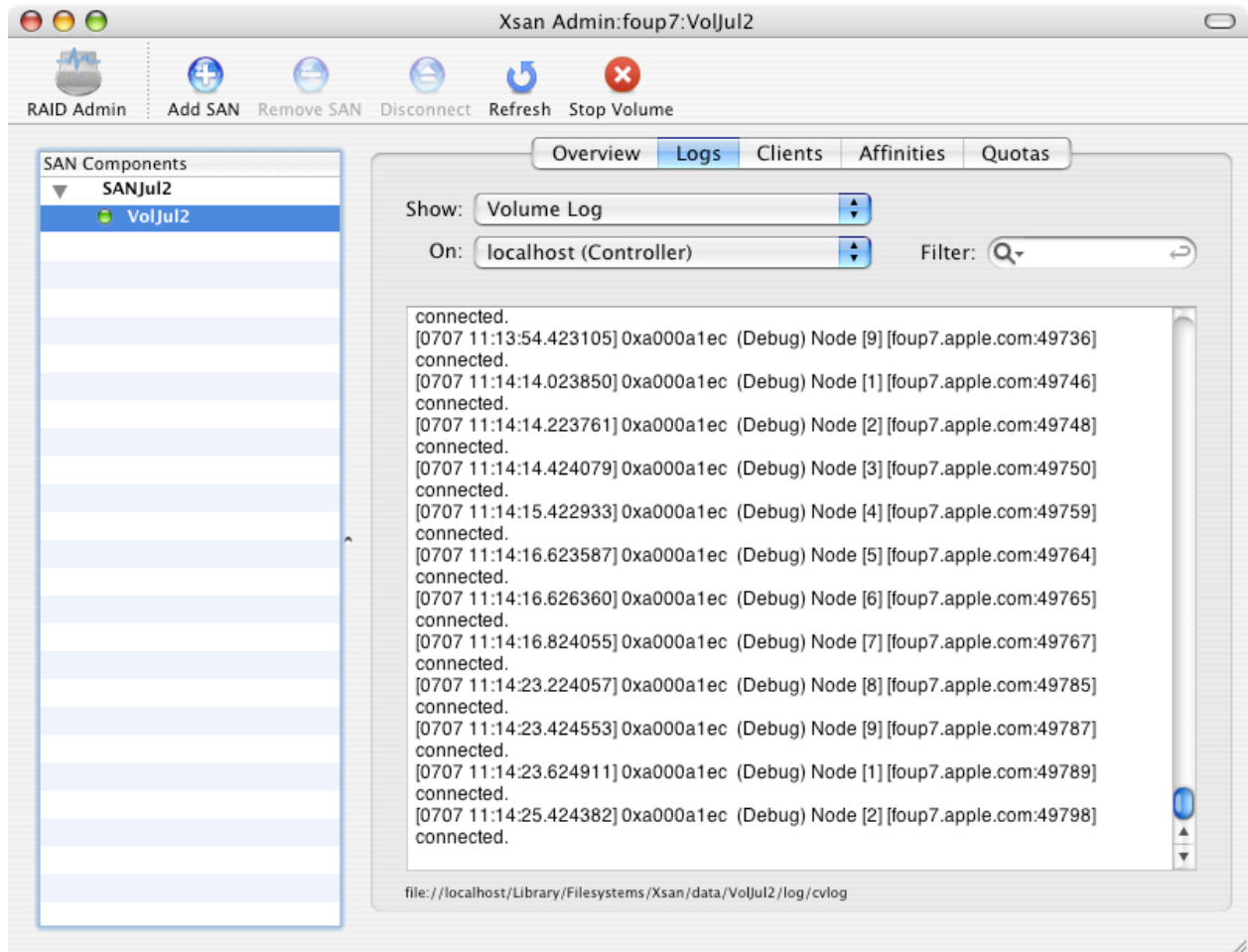
Volume VolJul2 is: Running  
Mounted Clients: 0  
Capacity: 517.63 GB  
Available: 517.61 GB  
Hosted by: foup7.apple.com  
Creation time: Fri Jul 2 14:27:22 2004  
Volume Uptime: 18 hours, 55 minutes  
License: Valid

Storage Pools

Name	Capacity	Available	Percent Used
VideoSGJul2	345.09 GB	345.07 GB	<div style="width: 99.7%;"></div>
AudioSGJul2	172.54 GB	172.54 GB	<div style="width: 0%;"></div>

Since a volume can be hosted by various controllers, and each controller logs its own information separately, a single volume's logs may reside on multiple computers. The Logs pane allows the user to see the log content by controller. The Filter widget allows text searching.

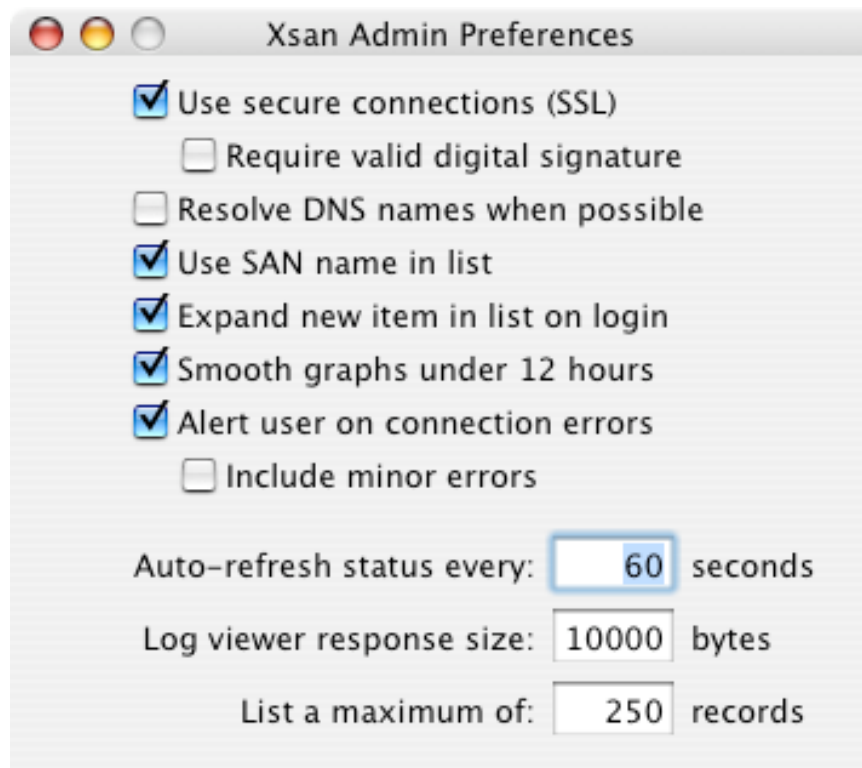
### Volume Logs



## Xsan Preferences

Preference are available from the Xsan application menu in the menu bar. Default preferences are shown below. Click the OK button (not shown) to save any changes.

Xsan Application Preferences



## Validation, Alerts, and Progress

The application will need alerts or notification in the cases described below.

### At login

- “Nomad not installed” alert

### At SAN Save

- “Unable to save the SAN because some items are missing...” Tell the user that the minimum configuration must include at least 1 controller/client and 1 volume with a storage pool and a LUN.
- “Unable to save the SAN because no storage pool is specified for metadata or journaling data.” Tell the user that at least that at least one storage pool must accept this data. By default, it goes to the first storage pool. For higher performance, exclusive metadata and journal data storage pools may be specified.
- “Unable to set up some computers because authentication was not correct” if final authentication fails because the information was incorrect. In this case, Status is set to “Not set up” in the Controllers and Clients list.
- “Unable to set up some computers because they could not be reached” if final authentication fails because the computer could not be reached. In this case, Status is set to “Not set up” in the Controllers and Clients list.

### As Needed

- “Are you sure you want to change the computer’s role?” if downgrading a controller to a client. This is potentially destructive because it could cause a loss of SAN configuration info.
- “Are you sure you want to change mount access for this client?” *if* we make mount/unmount/remount automatic upon changing the access setting.
- “Unable to authenticate to computer” if pre-flight validation for login fails.

- “Save changes?” alert if the user leaves the SAN Settings or Volume Settings context before completing a creation or editing task.
- “Are you sure you want to assign this LUN to the storage pool?” alert if the admin attempts to assign a LUN that doesn’t match existing storage pool performance capacity—e.g., if LUN performance is lower, which would lower the performance capacity of the storage pool.
- “LUN initialization failed” alert
- “Another LUN is already using this label” alert