FibreJet® Administration Guide

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Contents

1: Installing or Upgrading FibreJet®

PLEASE READ THE README FILE IN THE INSTALLER FOR THE LATEST CHANGES ADDED SINCE THE LAST BASE BUILD THAT MAY NOT BE REFLECTED IN THIS DOCUMENTATION.

What's On The Disk?

FibreJet® Installation CD
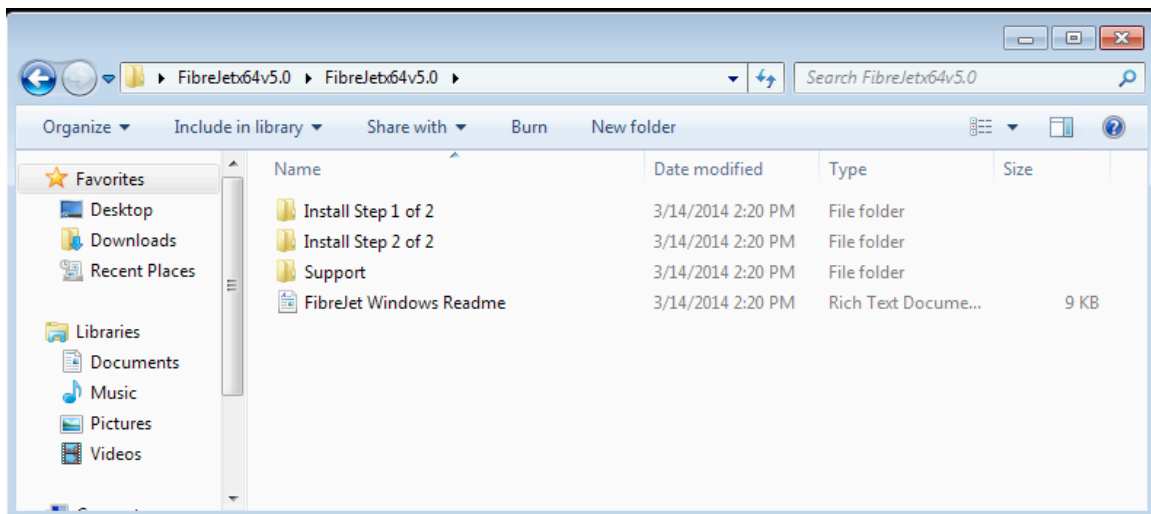
FibreJet® Installation CD Window

The install disk contains what you will need to install or uninstall FibreJet. If you are upgrading from a prior version of FibreJet you should first uninstall FibreJet, so please follow those instructions below first.

Installing FibreJet 5.0

If you received the installation as a zip file you must first completely uncompress the install to a folder before proceeding. If you try to launch the install from within the zip file it will not work correctly. Once uncompressed into its own folder you will see two folders "Install Step 1 of 2" and "Install Step 2 of 2". You should always read the "Readme" files located in these folders as they contain possibly later install instructions than this documentation.

First disable "User Access Control" on your machine and reboot. If you do not do this FibreJet will not be able to control the mounting and unmounting of your SAN storage. From the Run... menu (or search) enter "msconfig" to enter the "System Configuration" window. Under the "Tools" tab select "Change UAC Settings" and click Launch or "Disable UAC" (depending on which Windows OS you are using). To disable, make sure that "Never notify" is selected and Apply. A reboot may be necessary.

Install Step 1 of 2 is for the 2 filter drivers. Right-click "fjetff.inf" and select "Install". Next, right-click "fjetvf.inf" and select "Install".

Install Step 2 of 2 is for the application. Right-click "setup" and select "Run as administrator". Then follow instructions for installing. If you did not luanch it this way the FibreJet Service may not be installed correctly. If this is the case you will need to later install it using a Command Prompt from the "C:\Program Files (x86)\CommandSoft, Inc\FibreJet\FibreJet.app\Contents\Windows" directory and typing "FibreJetService - install".

Now reboot and FibreJet should be installed and running correctly. You can verify this by using a Command Prompt to run the following commands:

sc query fjetff

sc query fjetvf

sc query FibreJetService

All should indicate they are installed and running.

Uninstalling FibreJet 5.0

To uninstall FibreJet you should first stop the "FibreJet Service" from the service control manager, or from a command prompt that is run as administrator:

sc stop FibreJetService

Then from a command prompt that is run as administrator:

sc delete FibreJetService

sc delete fjetff

Then from an explorer window open to the directory "C:\Program Files (x86)\CommandSoft, Inc\FibreJet\Drivers" you will need to right-click the "fjetvfremove.inf" file and select "Install" to uninstall the fjetvf driver.

Lastly, under the Control Panel "Programs and Features" select FibreJet and click uninstall. After you reboot FibreJet will be completely uninstalled.

System Requirements

This version 5.x has been tested with Microsoft Windows 7 and 8 (64-bit).

Please refer to the Change Reference at the end of this document for more details on specific versions.

This version supports FireWire, Fibre Channel, iSCSI, Thunderbolt and AoE drives (depending on version purchased), with NTFS, FAT or Mac OS Standard, Extended or Journaled partitions or as hardware RAID Stripe or Mirror schemes.

FibreJet can support just about any SAN storage protocol that can be used with your computer. This includes Fibre Channel, iSCSI, Thunderbolt, AoE and others. We can add support for new hardware and drivers as third parties release them by adding the matching driver names to the supported list in FibreJet.

Cross-platform SANs working with Mac OS must have the database created on the Macintosh. The Macs must use Paragon's NTFS driver to read/write to NTFS disks (basic partitioned only) cross-platform. Windows must use MacDrive from MediaFour (APM or GPT partitioning) or Paragon HFS (GPT partitioning only) to see HFS+ partitions.

Some Anti-virus software, such as Symantec and Norton take control of storage volumes and were not designed to work with SAN software such as FibreJet that needs to mount / unmounts and control the volume access. Therefore these products are not compatible with FibreJet. CommandSoft recommends and is aware of other anti-virus software that was designed correctly to operate in SAN environments, including Microsoft Security Essentials and AVG.

This version is hardware independent and will work with most hardware that has Windows support.

Applying FibreJet® 5.0 upgrade codes

If you have purchased an upgrade from an older versions of FibreJet that requires you to update the FibreJet Hardware Key, then you will need to enter the upgrade codes one at a time given to you that corresponds to the Key Hardware ID in the window that is displayed:

FibreJet Volumes User Projects Edit Window Help

Hasp Key Hardware ID: 24EE8A87.

Hasp Key Revision 5.   Generation: 0
OSX Lion / OS9 / Windows enabled.
FibreChannel / iSCSI enabled.
Avid Cache / Cross Platform enabled.
Macintosh OS X 10.9, Windows 8

Enter Update Code:

Contact Commandsoft at (805) 730-7772 or email us at
support@commandsoft.com or go to www.commandsoft.com to
receive an upgrade code for a FibreJet Hardware Key.

http://localhost:1947/_int_/ACC_help_index.html

Close   Rescan   Update Key

FibreJet® Hardware Key upgrade.

Once the key is updated with all the right codes, FibreJet will launch next time without bringing up this window. Congratulations, you are now running FibreJet® 5.0! NOTE: Because the 5.0 upgrade code contains so many new features, it may take up to one minute to program the update key request so please be patient when applying the upgrade code to 5.0.

Release differences between Macintosh and Windows

The following features are not present in this release of FibreJet® for Windows:

- Application Disappears in the Background
- Suppress Access Requests
- Manage Meta-Data
- No custom icons or images
- No Toolbar customization
- No Data Migration
- No A/V Mode support for mounting
- Create a cross-platform SAN from the PC
- No Disassemble SAN command

- No icons indicating the type of file system
- Repair disk functionality is accessed differently in each version
- Windows has no support to manipulate Macintosh HFS options
- Windows doesn't show WWN information for disk

Overview of the Install windows

FibreJet

Welcome to the FibreJet Setup Wizard

The installer will guide you through the steps required to install FibreJet on your computer.

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Cancel   < Back   Next >

FibreJet

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○ I Do Not Agree   ○ I Agree

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[Cancel]   [< Back]   [Next >]

Customer Information

Enter your name and company or organization in the box below. The installer will use this information for subsequent installations.

Name:

Jim Wolff

Organization:

[Cancel]   [< Back]   [Next >]

FibreJet

Select Installation Folder

The installer will install FibreJet to the following folder.

To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".

Folder:

C:\Program Files (x86)\CommandSoft, Inc\FibreJet\   Browse...

Disk Cost...

Install FibreJet for yourself, or for anyone who uses this computer:

◉ Everyone

◯ Just me

Cancel   < Back   Next >

FibreJet

Confirm Installation

The installer is ready to install FibreJet on your computer.

Click "Next" to start the installation.

Cancel   < Back   Next >

FibreJet Setup Wizard windows

FibreJet® Windows folder after install

1. You might have an out of date Aladdin HASP driver for your hardware dongle. Run Windows Update to get the latest driver for your OS to enable correct function of the HASP key.

2. For a NEW SAN, follow the usual instructions but be aware that after creating the Database, volumes may take a long time to initially add under Windows. This is normal the first time. After all volumes are eventually added to the Database quit and reboot. If unable to quit, it may be due to open files (such as an open Windows Explorer window), so you can force quit the Application and reboot. Disable autorun to prevent explorer windows from opening for each volume during application startup. This delay is caused by a timeout because the OS holds the initial volumes as not being able to unmount. After timeouts this will continue. Be patient as you add all the volumes you need under control. This step is necessary to record in the Registry for each machine which volumes need to be protected at boot and may apply to each workstation the first time it is on the SAN and sees those volumes. This is why new workstations should be installed when no one else is using the volumes on the SAN.

3. For existing SAN and new workstation installs, you must run the application once, quit, reboot and run it again. This ensures that protected volumes are recorded in the Registry so that they can be properly protected on subsequent reboots. When first run, the behavior might be slow to unmount, or unable to unmount as described above. This is normal the first time and will not happen once this process is completed and you reboot once (also remember to disable autorun to prevent extra explorer windows from opening).

4. Once rebooted, the volumes that were having trouble "unmounting" will now be protected and should function normally without further delay once you launch the application. Once again, if you find the application reports a volume is unmounted but it indeed is not in Windows Explorer, that is probably because you need to enable the fjetff.sys (and.or fjetvf.sys) driver using Regedit as explained in step 6 above.

Once the initial workstation is setup in a new SAN installation, and you have followed all instructions on creating a single FibreJet database and adding SAN volumes under control, you are ready to install other workstations and should be aware of the note later below concerning adding new stations.

Windows paging file configuration after installation

If after installing the software and rebooting you get a message stating that there is no paging file then it should be configured. To manually reconfigure this file and avoid this message on future boots you must follow these instructions.

Start by opening System from the Control Panel folder.
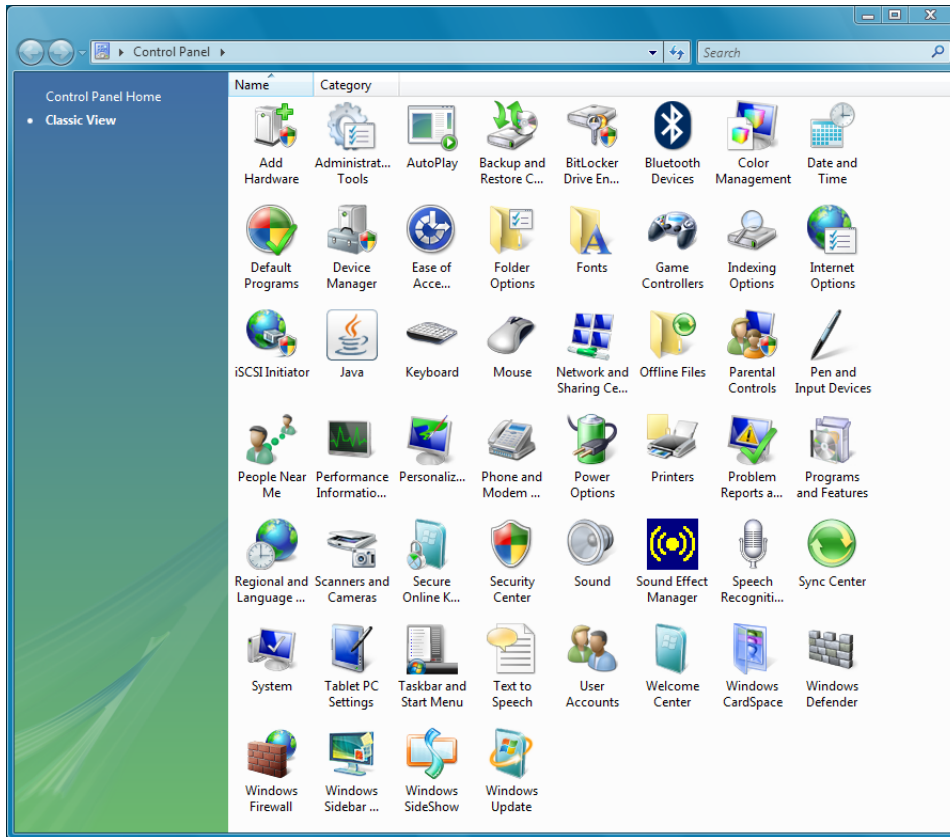
Control Panel window

Next you will be clicking on Settings from the Performance section of the advanced tab.
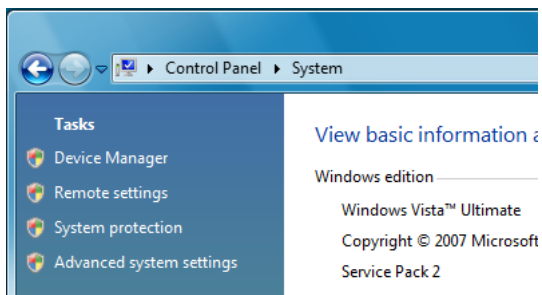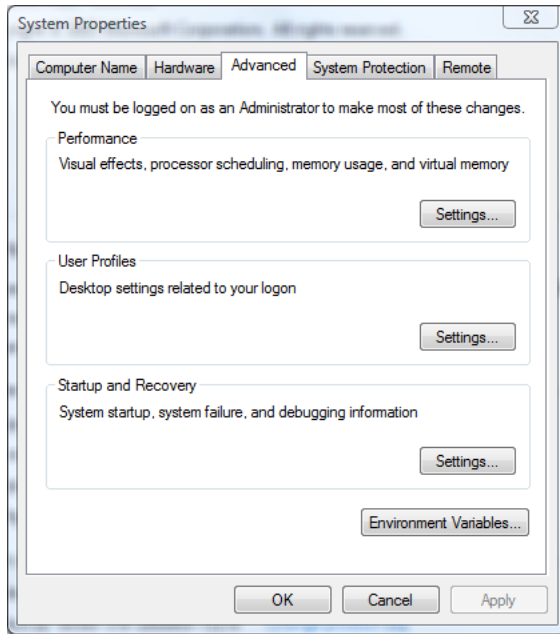
Performance area of Advanced tab from System Control Panel

Next you will click Change under the Virtual memory section.
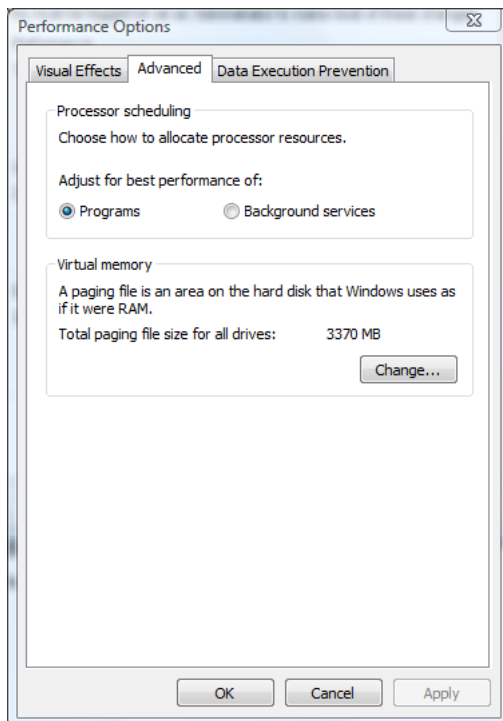
Performance Settings

Finally you will arrive at the actual Virtual Memory configuration, where you can configure it for the recommended size.
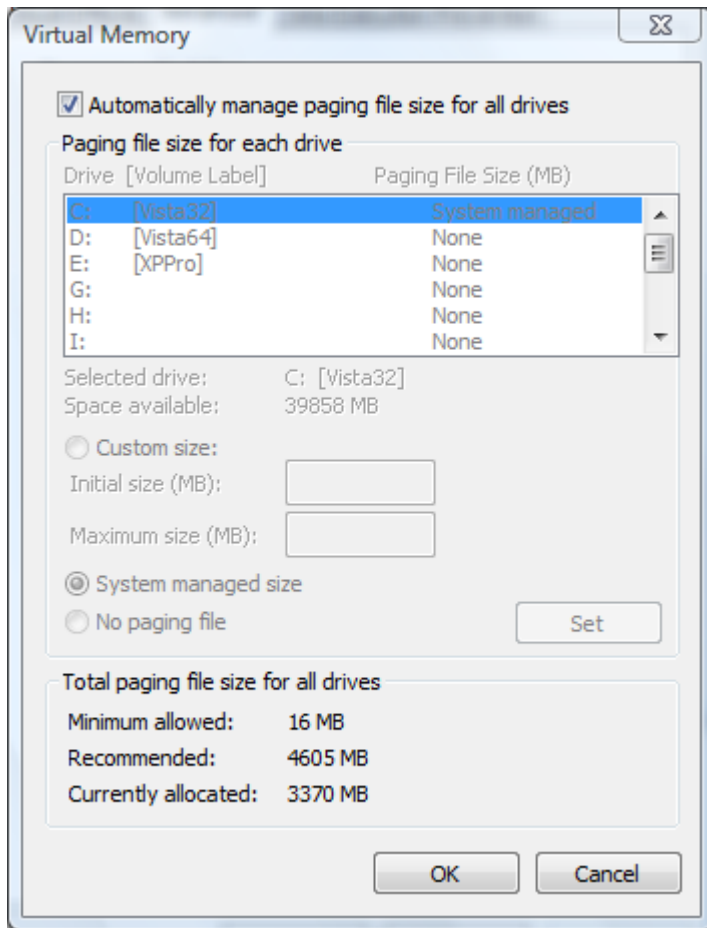
Virtual Memory Settings

Once configured as desired, click the Set button. On future boots you should no longer see the no paging file message.

NOTE about new station Installation

Anytime you add a new workstation to the SAN you should first do it without being physically connected to the SAN. Once all the software is properly installed you should boot the computer and immediately launch FibreJet so that it will protect the write-mounted SAN storage properly from then on. It is important that you run no other software and have no system process that will alter the SAN storage until FibreJet is run as the SAN storage is write mounted initially. WARNING: To prevent multiple-writers, it is required that no other workstations have any of the SAN storage mounted writeable when booting a new workstation into the SAN the first time before it has a chance to launch FibreJet to protect the SAN storage on itself.

NOTE about new storage Installation

A similar precaution must be taken when the Administrator adds new SAN volumes/storage to the SAN environment. To create new volumes, the Administrator enters Volume Maintenance Mode (VMM) inside FibreJet to allow the system to format new volumes. Then volumes are created in the standard way with the standard utilities such as the Disk Management console. After leaving VMM, and restarting FibreJet, the new volumes are added into the database by entering Administration Mode and using the Add Volumes command to locate the SAN volumes.

These new volumes are not protected on any other SAN workstations until FibreJet is launched at least once when the new volume is available. Because of this, precautions must be taking when adding new volumes into the SAN. The correct procedure is to make sure no machines have the new volume(s) write mounted, and then each SAN workstation that might have access to the new volume(s) must be rebooted and have FibreJet relaunched immediately to bring the new volume under SAN control. Once this is done on all SAN workstations, the volume(s) are now properly protected.

In prior versions of the software, any new storage was auto-protected when it first appeared at the expense of making it harder to use new local storage, such as additional internal drives, firewire attached drives, USB storage, etc. This concept was relaxed in later versions to allow no interference to newly appeared storage, thus allowing it to be used read/write as normal, until FibreJet is launched to protect any new storage that must be brought under SAN database control.

NOTE about drive letters and mount points

FibreJet mounts volumes using standard Windows OS APIs. This means it will use whatever standard drive letters and mount points configured for the volume in question using the standard Disk Management console. If you do not wish to use drive letters, they may be removed from the standard Windows Disk Management console. FibreJet Preferences allows you to specify a custom mount point to place all the FibreJet mounted media. By default this is C:\FibreJetVols. So, in addition to the usual drive letter you will also see the volumes mounted under the path C:\FibreJetVols. You can change this to a custom path in the Preferences. To not use mount points, you can configure this to go to a non-existent drive letter.
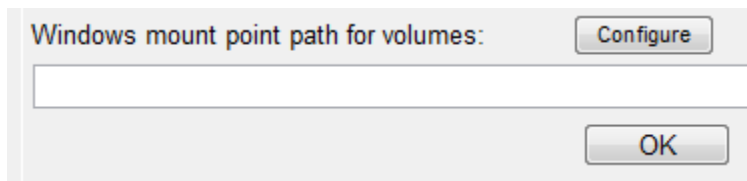
Configure Mount Point section in Preferences

NOTE about alternate cross-platform operation

Although normal cross-platform operation typically uses MacDrive so that Windows can see Mac disks, you may also use a product from Paragon called Paragon NTFS driver so that the Macintosh side can read and write to NTFS disks to achieve true cross-platform functionality. Without any third party product, you also have the option to use FAT32 disks to read and write on the Mac side, and have read-only access to the NTFS volumes.

NOTE about drive signatures and cross-platform SANs

In a cross-platform SAN with Macintosh disks and volumes, care must be taken to not write "Windows" signatures to your Mac Disks. If you do, you may discover that MacDrive will no longer recognize your Mac Disks, or you may have trouble on the Macintosh side seeing your Mac disks. This occurs when someone using the standard Windows Disk Management console is asked to write signatures to disks it doesn't understand. Care must be taken TO NOT write these signatures to any Mac disks. You should educate all users of the SAN on this so they will not write these signatures. If this happens by accident you should immediately call CommandSoft Support.

NOTE about cross-platform SANs and striping

Cross-platform SANs with Macintosh disks need to purchase MacDrive from a company called Mediafour before their Windows machines can see the Macintosh volumes. Additionally, if using ATTO Striping, a special version of MacDrive is required called CrossStripe. At this time, CrossStripe is only available for Windows XP 32 bit and Windows 2000. If the Mac side can see the striped volumes from the application, but the Windows side application shows missing, but does show them in the "Add Volumes…" window, then you must take additional steps so each side sees the same volume correctly. If this happens, then quit out of all SAN workstations except for one Windows workstation. Then from the Windows workstation, in Administration mode, remove the "missing" striped volumes from the

database entries. Then, use the "Add Volumes…" command to re-add them into the database correctly. Then, reboot that workstation. Once this is done, the other workstations, including Macs can be brought back onto the SAN.

NOTE about Windows Dynamic Disks

You can use Dynamic disks for SAN volumes, just not the Database volume (which must be located on one of the first four partitions of a Basic disk). However, if using Dynamic disks, be aware that once they are created and added to the SAN from a workstation, the other workstations must be rebooted and each must then run the Disk Management Console to import the Dynamic Disks. They will show up as a foreign disk set. You must right-click each and select "Import Foreign Disk" to get each workstation to recognize the Dynamic disk. Once imported, the SAN application on that machine will then recognize that volume as normal.

NOTE about AVID DS Nitris and other Unmounting software issues

Shared storage SANs require that the volumes be mounted and unmounted at various times to the users that need access to the storage. Standard Windows OS behavior requires that all open references to a file system volume be released by all software before it will allow the file system volume to be unmounted. If there are any open files by any software on a workstation FiberJet will be unable to change the state of the volume. This can occur even if there is a standard Windows Explorer window open to that volume. If you are having any issues changing the state of a volume with FibreJet, ensure that there are no open explorer windows and no software is holding open files to the volume.

Some software holds open files that are on a given volume in non-obvious manners. This can happen with network file sharing points of SAN volumes for instance. You may have to disable file sharing if you need to change the state of the volume in question. Another example is indexing software or even an open Windows Explorer or My Computer window.

AVID's DS Nitris software has an indexing service that can hold open files on a volume. When the state of the volume needs to be changed, you can first disable this indexing service and then re-enable it when done. This can be further automated by making a script command that can be quickly launched to perform this operation.

NOTE about regularly checking disks

As part of normal SAN storage life-cycle maintenance and problem prevention, it is recommended that the file systems be regularly checked. This way any problems found can be dealt with before developing further. Any time the SAN experiences machines crashing with write access to any volumes, those volumes should be checked to ensure the state of the file system is clean. This requires entering Volume Maintenance Mode, and running the standard file system checking utilities (chkdsk, Norton Utilities for example) while you are the only one with write access to the volume. In addition, you can run disk repair operations from within FibreJet using the Filesystem Repair command.

Right-clicking a volume will display properties. A checkmark "Allow Indexing Service" in the General Tab, might need to be turned off if you either have trouble unmounting a volume or you notice the volume needs to often be checked after crashing.

With a drive letter assigned, and write access to the volume, you can repair a disk from within the FibreJet Application. If the repaired disk still doesn't mount on another workstation, then write a small file to the disk and repair it again. This is a known NTFS issue and should clear up the problem of it not mounting on another workstation.

Refer to the menu command *Administration > SAN Health Checking* in this documentation to read about scheduling regular automated health checks with email notifications. Also see the menu command *Volumes > Volume Info* command to learn how to repair a drive each time before it is mounted writable for even more reliable file system maintenance.

Configuring FibreJet

Setting up the storage for a new Windows Only FibreJet SAN

Once installed, FibreJet controls all SAN-attached storage in the sense that it prevents or allows that storage to be mounted on the computer (which prevents corruption of the file systems in a SAN environment due to multiple writers). When setting up a new FibreJet system that does not yet have a FibreJet database, nor storage that has been partitioned, you must first partition a Windows basic disk with a volume named FibreJet as one of the first four partitions.
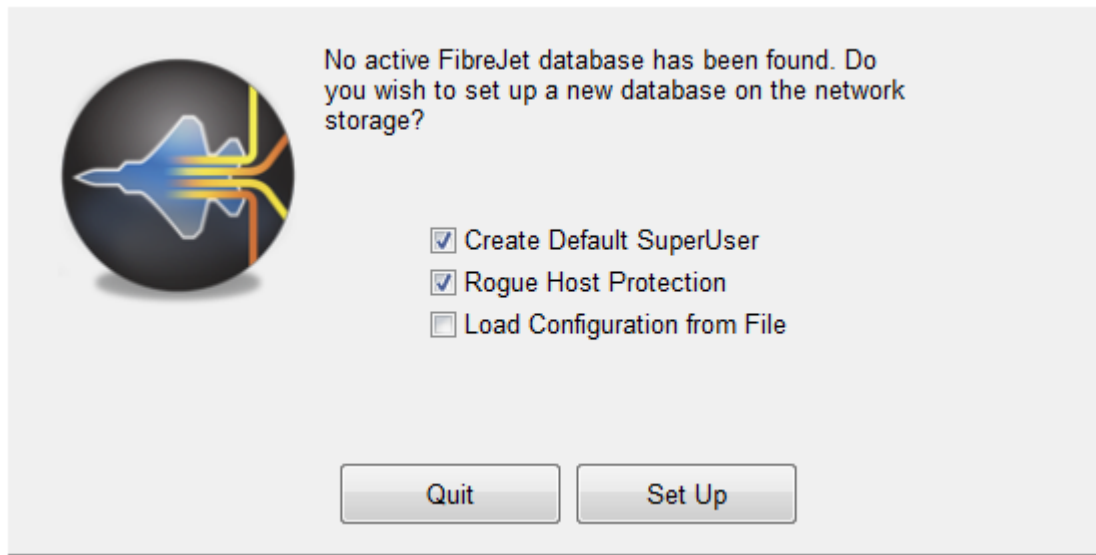
FibreJet® No Database, new SAN

Set up the SAN volumes using the Disk Management tool from the Windows Management Console or a third-party partitioning tool.

While setting up the network volumes, a disk volume needs to be created and named "FibreJet". This can be done to an existing partitioned LUN disk, or a newly partitioned LUN. The "FibreJet" volume must be on one of the first 4 partitions of a basic partitioned disk. We recommend making this volume 1 GB in size. This volume is taken over by FibreJet to serve as the coherent repository for volume mount and write status (the FibreJet database) and other FibreJet related Meta-data, such as messaging semaphores and custom UI icons. The remaining available storage can be partitioned as desired.

Please note that creating a FibreJet database in this manner is not currently cross-platform compatible with the current versions of FibreJet for Macintosh. If you require cross-platform database operation, you must create the FibreJet database on the Macintosh. For further information on cross-platform San creation, please see the FibreJet for OS X Administration Guide, included with the FibreJet for OS X Installer.

For further background information on partitioning your SAN, please read the SAN Reference section of this documentation for a discussion on SAN planning and partitioning strategies.
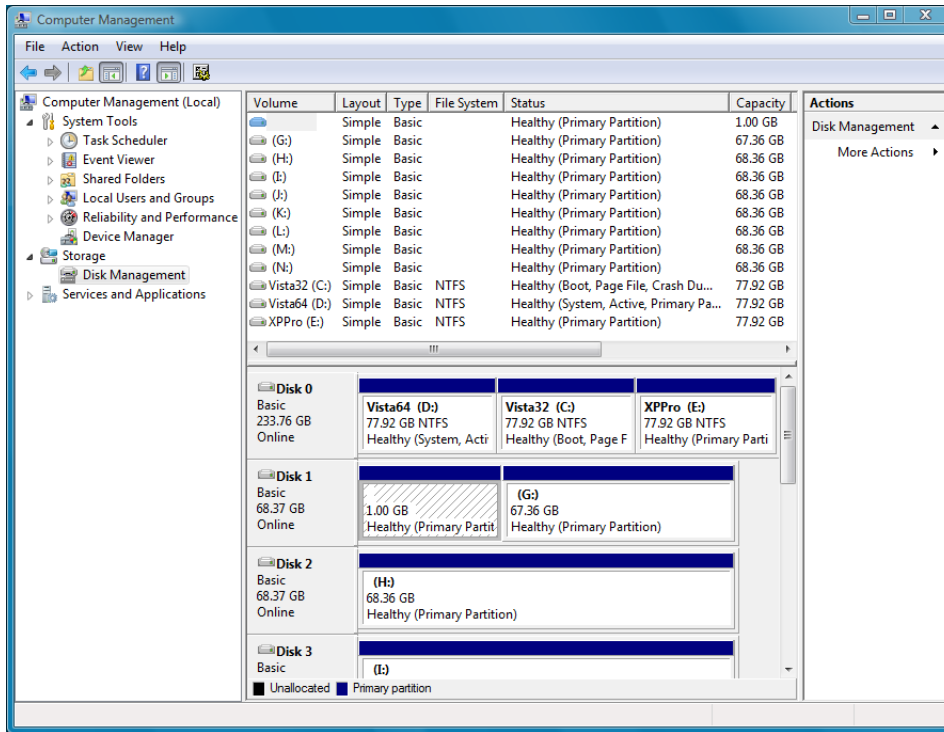
Windows Disk Management tool

Setting up the storage for an existing Windows only FibreJet SAN

If you are upgrading from a prior version of FibreJet your storage has already been configured and the upgrade is now complete. You need not do anything else at this point.

If have an existing FibreJet SAN and wish to add new un-partitioned storage, partition it and then run FibreJet to add the volumes into the FibreJet database using the Add Volumes command in Administration mode. You must relaunch FibreJet for it to recognize newly partitioned file systems.

Setting up the storage for Windows/Mac FibreJet SAN

Cross platform FibreJet storage can be setup with the file systems and platform access as indicated by the chart below.

File System	Macintosh	Windows
NTFS (basic)	read *	read/write
FAT	read/write	read/write
HFS+ (journaled and non-journaled)	read/write	read/write **

 * Note: read/write capability with Macintosh using Paragon's NTFS driver.

** Note: requires MacDrive by MediaFour.

To fully utilize the disk containing the database, on a cross-platform SAN, follow the FibreJet for Macintosh OS X procedure to create the database. Most importantly, on the Mac you partition the disk that will contain the FibreJet database and then allocate any remaining space on that disk as an HFS+ volume or volumes. Please see the FibreJet for OS X Administration Guide for specific information and procedures.

In order to maximize use of your storage, HFS+ and Windows volumes should reside on physically separate disks.

Cross platform file systems should be either HFS+ on GPT or Apple Partition Map (if using MacDrive), GPT only if using Paragon HFS+ or NTFS (if using Paragon NTFS). If your Windows OS supports GPT partitioning, then your NTFS partitions may exist cross platform as well. GPT partitioning circumvents a common Windows limitation of 2 TB LUN and file system sizes. Use ExFAT type drives for cross-platform operation not requiring any third party software.

If any Mac partition types will be used cross-platform by a Windows workstation, "Rogue Host Protection" mode must be turned OFF from FibreJet for Mac's Administration menu. Otherwise, those Mac partitions will not be accessible by the Windows workstations. This is due to the fact that MacDrive does not recognize the protected partitioning types while in Rogue Host protected mode.

Use standard Windows procedures to partition Windows volumes. Alternately, on a Mac, Apple's Disk Utility can be used to create any desired FAT volumes or NTFS volumes using Paragon NTFS for OS X. NTFS

volumes are not able to be created or written to on an OS X workstation without Paragon NTFS for OS X.
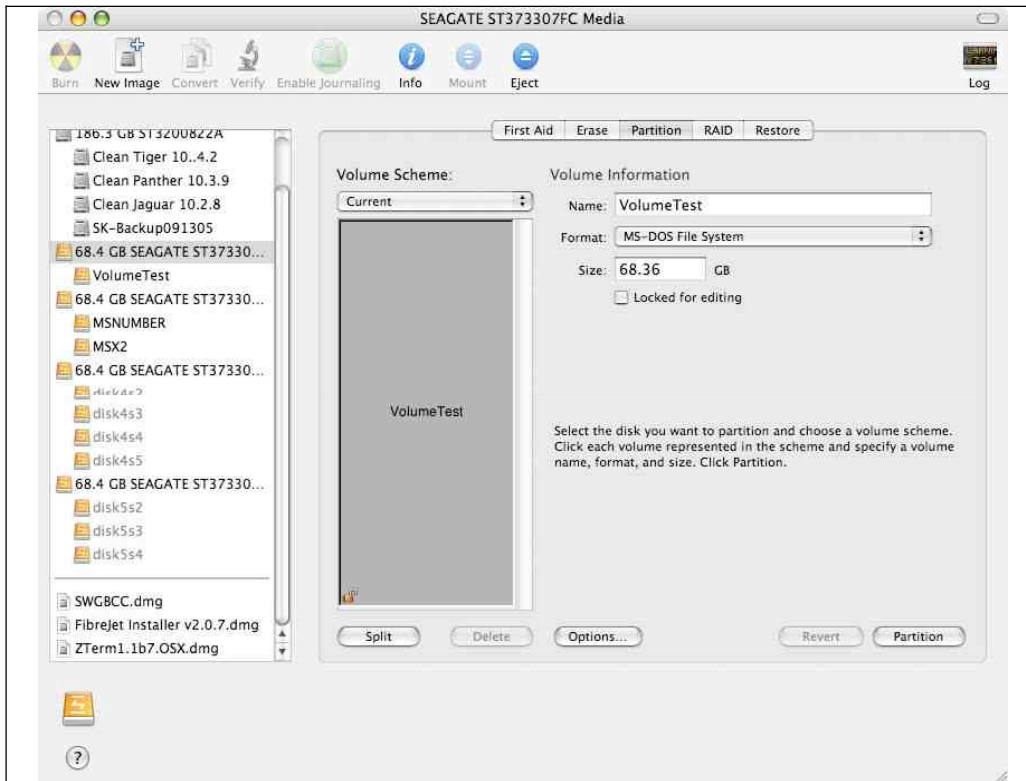
Apple's Disk Utility
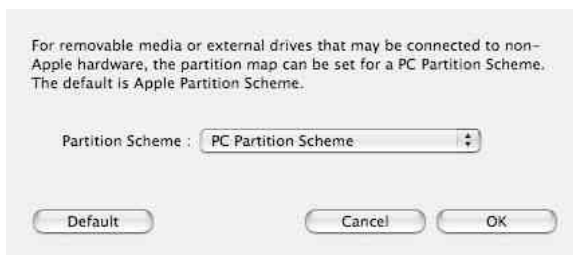
Apple's Disk Utility Partition

Large Number of Volumes support

Mount points can be assigned to volumes (i.e. when drive letters are used up) using standard Windows procedures. Some applications may or may not function correctly with mount points, irrespective of FibreJet.

Creating the Database

Once the volumes have been partitioned, mounted, the FibreJet application has been launched and has found the volume named "FibreJet", a window will appear asking to confirm the set up of a new FibreJet database:
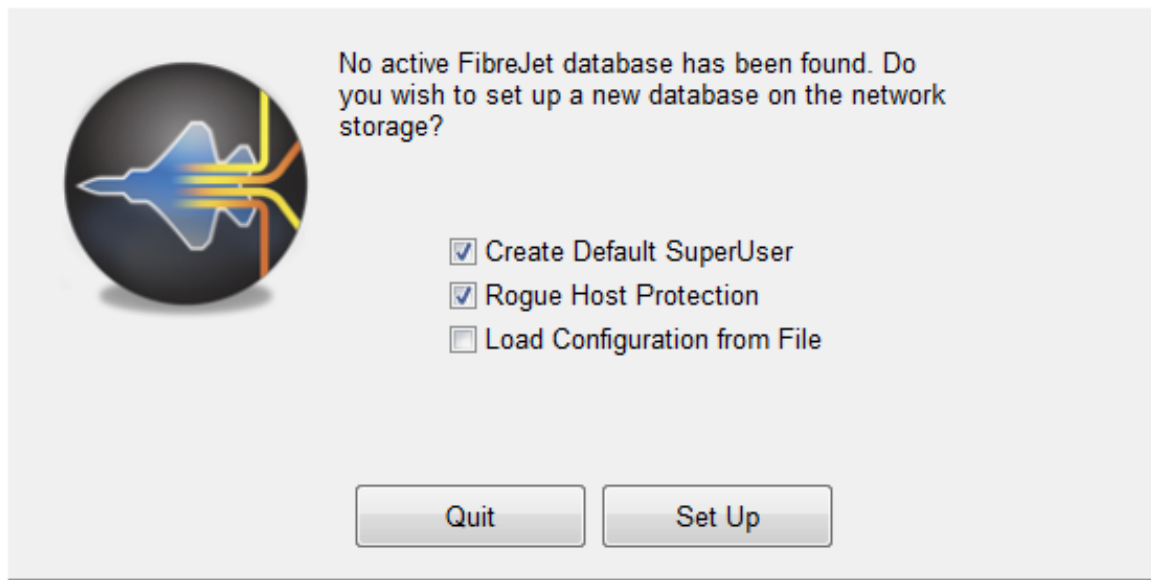
Click "Setup" to start the database creation process. You will see feedback in the bottom right of the User Interface giving you updated information on each stage of this process.

Click "Yes" to start the database creation process. Once this is completed, the "FibreJet" volume is changed in the partition map to be a FibreJet database.

NOTE: There should be only one FibreJet database per SAN system. You normally cannot create more than one database, but if existing SANs are combined more than one might exist. FibreJet will only pick the first database it finds, and warn if multiple are detected. If multiple exist, this must be remedied by deleting any extra databases.

Adding volumes to the database

A new database needs to know what volumes are to be under FibreJet control. Launch FibreJet and enter administration mode. Enter administration mode (via menu command or toolbar item) and select the Add Volumes command from the Administration menu (or toolbar item) to bring up the Add Volumes window.
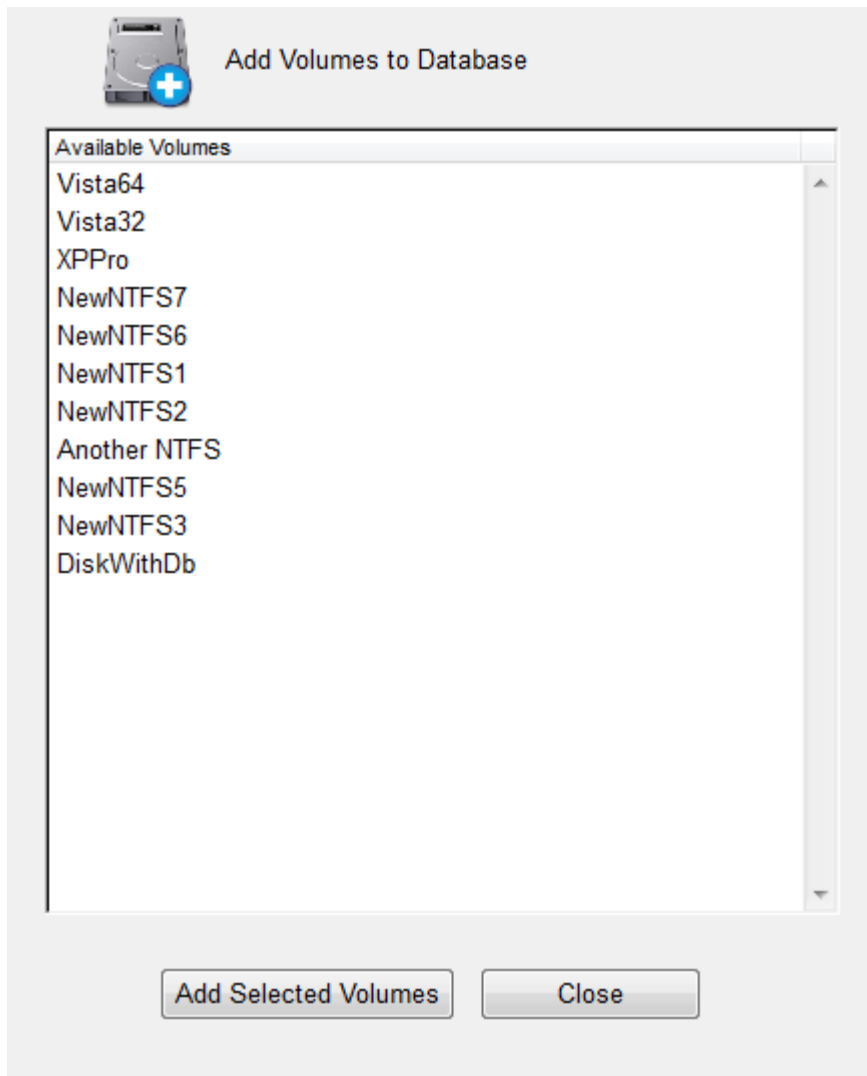
Add Volumes window

The Add Volumes window will display all volumes recognized by the OS, including local volumes. Select and add each volume, individually taking care to add only the volumes intended for the SAN, excluding local volumes such as boot volumes. Click 'Done' to return to the Administration window. New volumes will be displayed in the Administrator's disk list and available to administer. New volumes will automatically be added to the All Disks project, if one exists. Once the volumes have been added, then a reboot is required to take advantage of these volumes by this workstation and other Windows workstations connected to the SAN.

The FibreJet network should now be ready for use and the other user stations may be connected.

Once setup, other users may boot their computers and run FibreJet. If you wish to organize the storage for many users you will need to log into Administration mode to create Users and Projects.

Administrator login

If you need to manage the FibreJet Projects or perform other administrative functions, you must first enter administration mode by selecting "Administration…" from the "FibreJet" menu or clicking the administration "key" button in the application toolbar. A window will prompt you for the administration password. A newly created database will not have a password so click "Login" or just press "return" to enter the Administration screen.
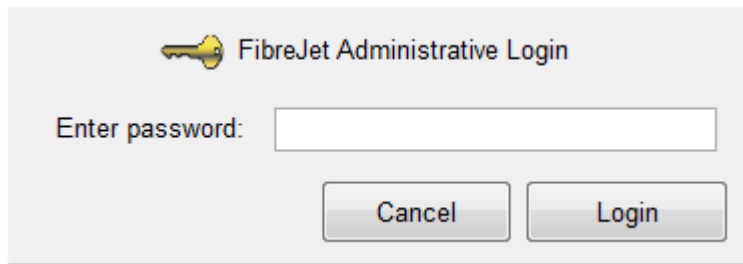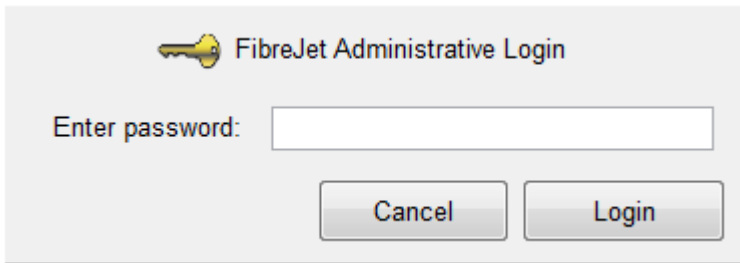
Type the password to access the administration window.

Updating an older Fibrejet® Database

2: Administering FibreJet®

Administrator login
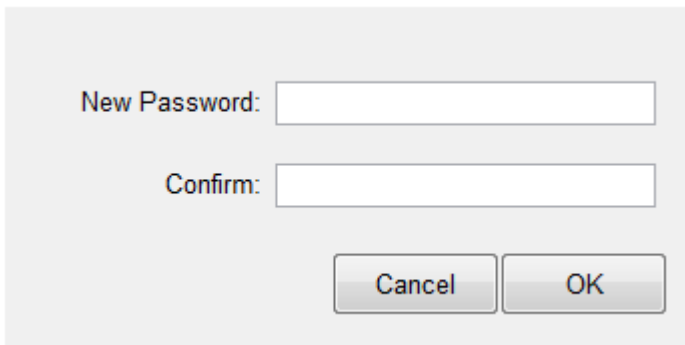
To enter administration mode, select *Administration…* from the *FibreJet* application menu or click the *Administrator* button in the application toolbar. A sheet will descend prompting you for the administrative password. A newly created or unprotected database will not have a password. Type the correct database password here, click *Login* or press *Return* to open the administration window.

Administrative Login Panel

Changing the administrative password

A newly created FibreJet® network will not have an administrative password. With the addition of new and powerful features in FibreJet 4.0, it is IMPERATIVE that you set an administration password, memorize it or write it down and store it safely. Wayward users can possibly damage your data with Administration abilities. To change the administrative password, select *Change Admin Password* from the *Administration* application menu. If you forget your password, CommandSoft can provide a security code for a one-time password reset.

Changing the administrative password

The Administration Window
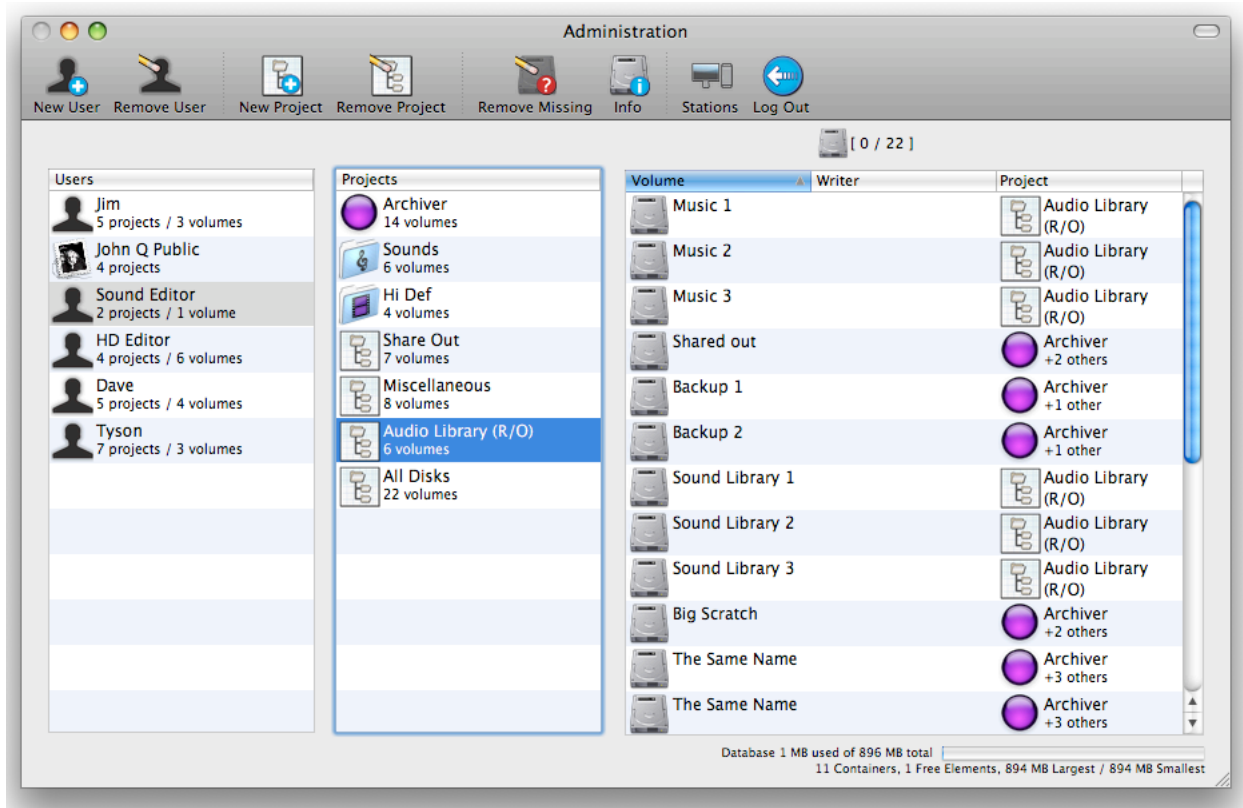
FibreJet® Administration Window

Central to the administration window are three tables showing the objects contained in the FibreJet® database. All of the network volumes available will appear in the largest table to the right. FibreJet® Projects appear in the middle and FibreJet® Users to the left.

At the bottom right of the window is a display indicating SAN Database usage statistics.

Volumes may be added to Projects or Users by dragging from the Volumes table and dropping on a Project or User item. Projects may likewise be added to Users.

Each table also generates a contextual menu that can be accessed with a right-click (or control-click). These menus provide functions for creating, removing or editing objects as well as the linking and unlinking of objects to other objects.

Creating a FibreJet® Project

Selecting *New Project…* in the *Administration* menu or toolbar will activate the project creation sheet shown below. The user name must be unique and at least one character. You can optionally require a password for the project as well. Volumes can be moved from the available pool to the project by drag and drop, double clicking or the arrow buttons. Checking the R/O option in the left hand table can set read-only status within the project. A custom icon can be assigned by dragging and dropping to the well or the custom icons popup menu (right-click on icon well).
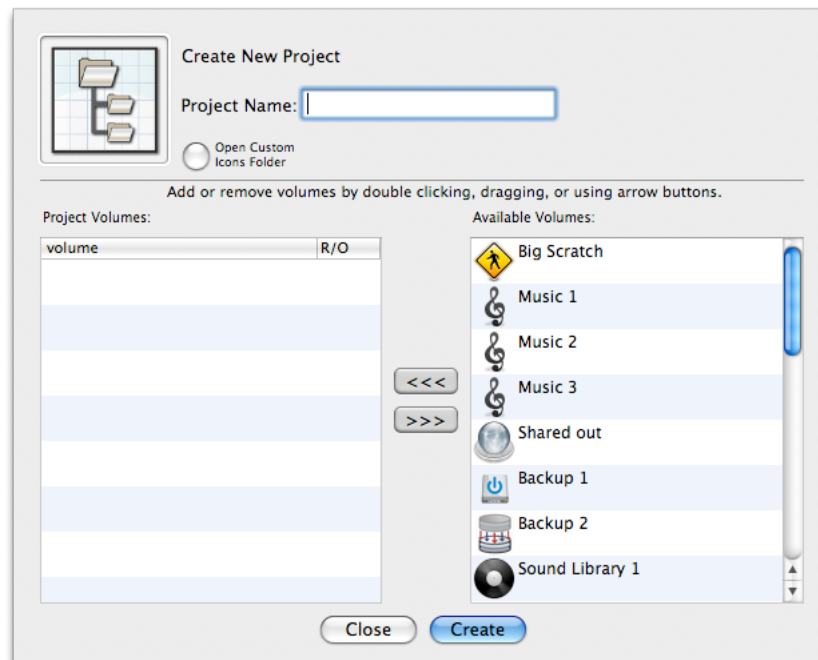
Project Creation Panel

When the configuration is complete, click *Create* to dismiss the sheet and create the project.

Editing a FibreJet® Project

The same Project panel can be used for editing an existing Project. To edit a Project, double click on the project in the Administration window, or select *Project Information* from the *Projects* menu or toolbar, or Project table contextual menu with the Project selected in the Project table.

Adding Volumes to a Project

Volumes may be added to a Project by dragging selected Volumes from the right and dropping them on a Project listed on the left, or alternatively, using the contextual menu on the Volume display list.

Removing Volumes from a Project
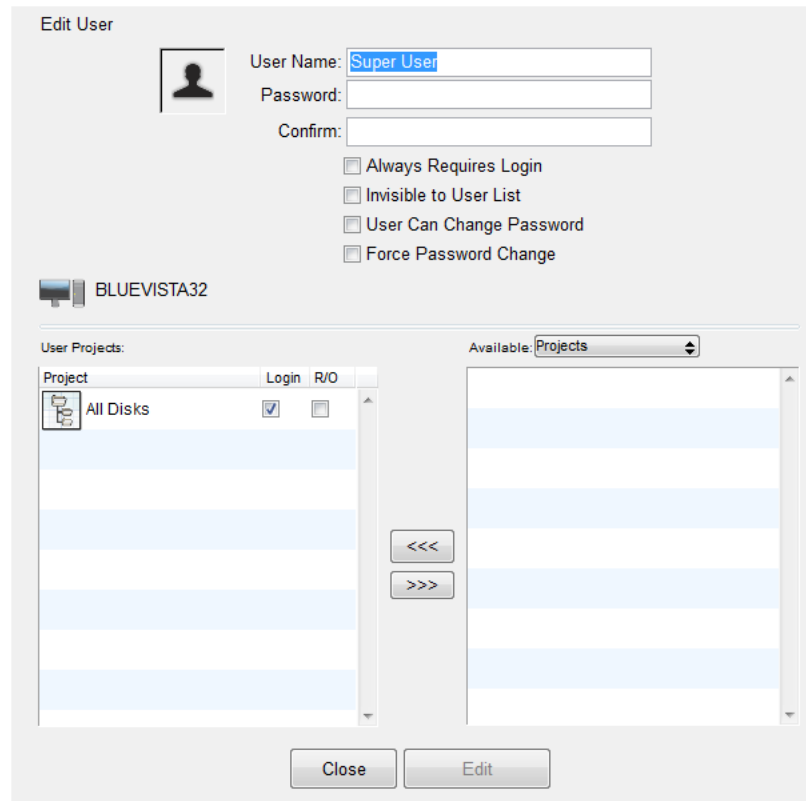
Volumes may be removed from a Project using the contextual menu on the Volume display list. Volumes will also be removed from a Project if that Project is removed.

Removing FibreJet® Projects

Projects may be removed by selecting *Remove Project* from the left hand selected Project contextual menu. A selected Project may also be removed using the *Remove Project* button found on the Administration window toolbar. Upon validation, the Project will be removed from the database, and all member Volumes will be released from membership.

Creating and Editing FibreJet® Users

Users may be viewed, edited or created by double-clicking on a User in the FibreJet® Administration window, or by selecting *New User* or *Edit User* in the toolbar or applications *Users* menu.

FibreJet® New/Edit User Panel

The bottom left table displays the projects that this user can open, on the right are projects the user cannot currently open. To move projects from one column to the other, select and double click, drag and drop, or select and use the arrow buttons. Changes will not take place until the *Edit* button is pressed.

Every user contains a default project that is always open. Volumes may be dragged to a user in the administration window to add them to this direct user project. Volumes added to the user in this way appear in the left hand table and may be removed in the same way as projects. Available volumes will be displayed when *Volumes* is selected in the popup *Available* menu.

Checkmark settings for setting the user login, read-only option for included projects can be seen in the left table.

Adding Projects to Users

Projects or volumes may be added to a user using the New/Edit User panel as described above. Projects may also be added to a user in the administration window by dragging and dropping projects onto users, or the contextual menu on the project table.

Removing Projects from Users

Projects or volumes may be removed from a user using the New/Edit User panel as described above. Projects may also be removed from a user in the administration window by using the contextual menu on the project table.

Managing User Mount Profiles

Mount Profiles can be created by users running FibreJet® anywhere. Once created, Mount Profiles can be loaded by that user on any FibreJet® station. Mount Profiles can be removed from a user in administration mode with the *Remove All Profiles* button in the user panel.
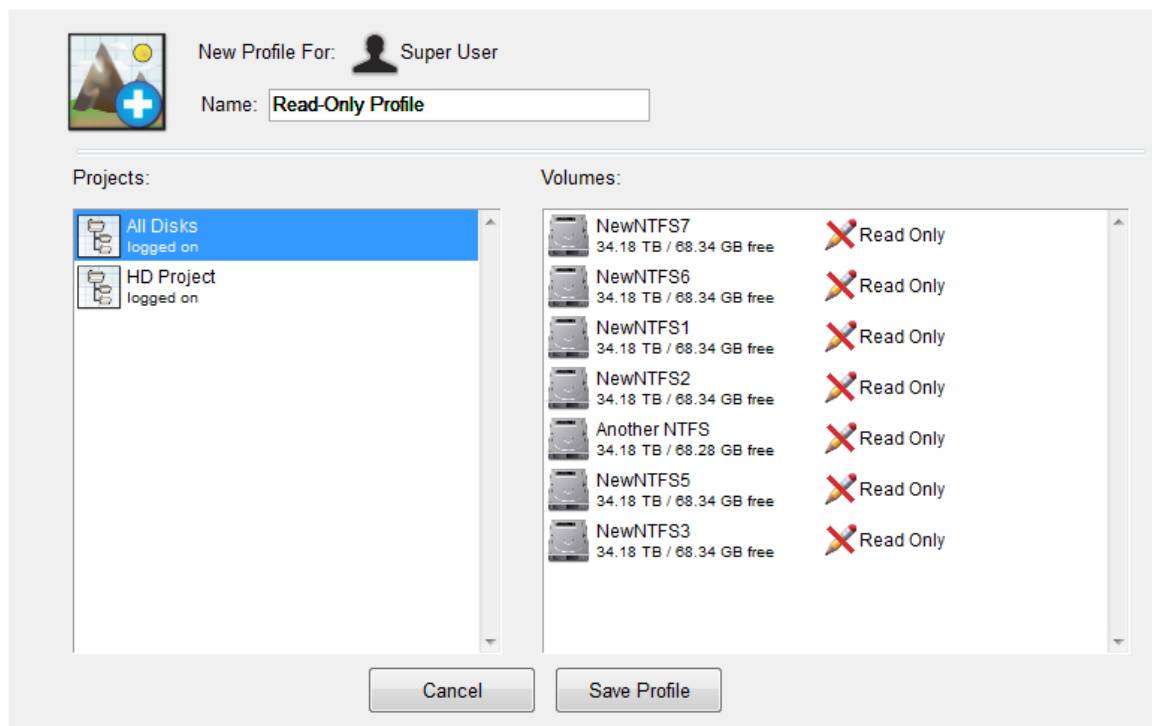
Create Mount Profile Window
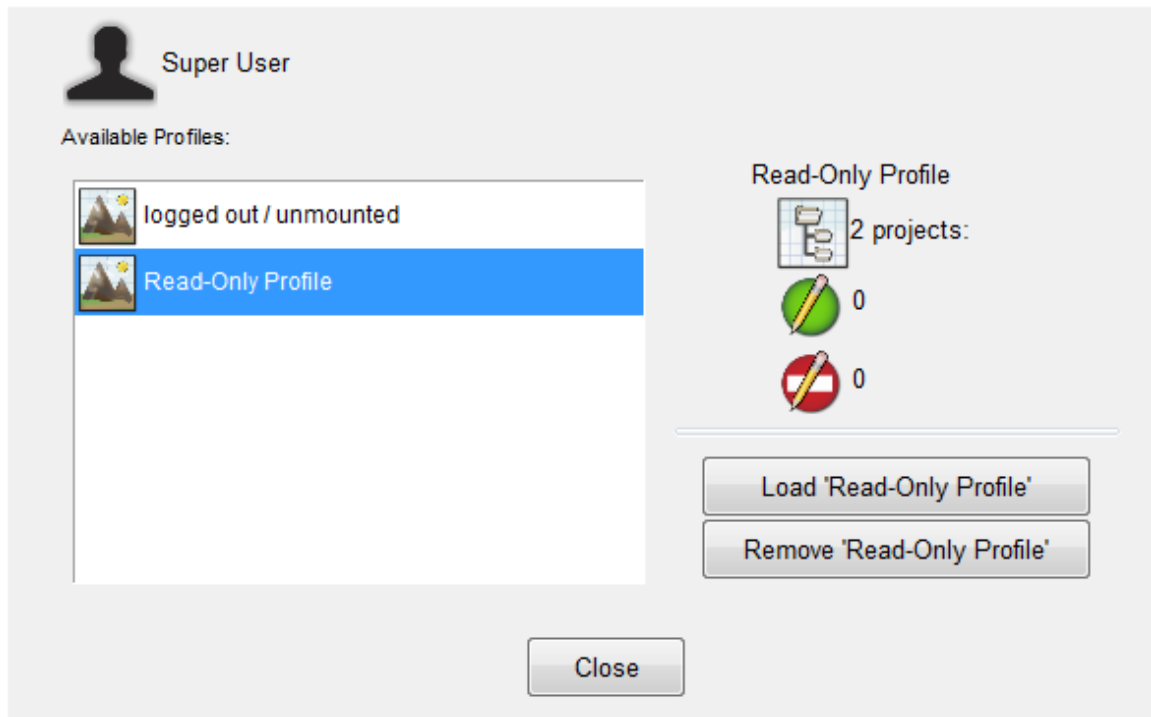
Show Profiles for a User Window

User Options

Always Requires Login

If checked, this user will not auto-login when FibreJet® starts.

Invisible To User List

If checked, this user will not appear in the user login lists, and login information must be entered manually.

User Can Change Password

If checked, the user can change this user's password from the user menu, without entering administrative mode.

Force Password Change

If checked, this user's password must be changed at first user login.

FibreJet® Stations

Stations represent the computers that are connected to the networked storage. Stations, like volumes, are automatically added to FibreJet®. Stations can be viewed in the stations panel, accessible from the administration window toolbar.
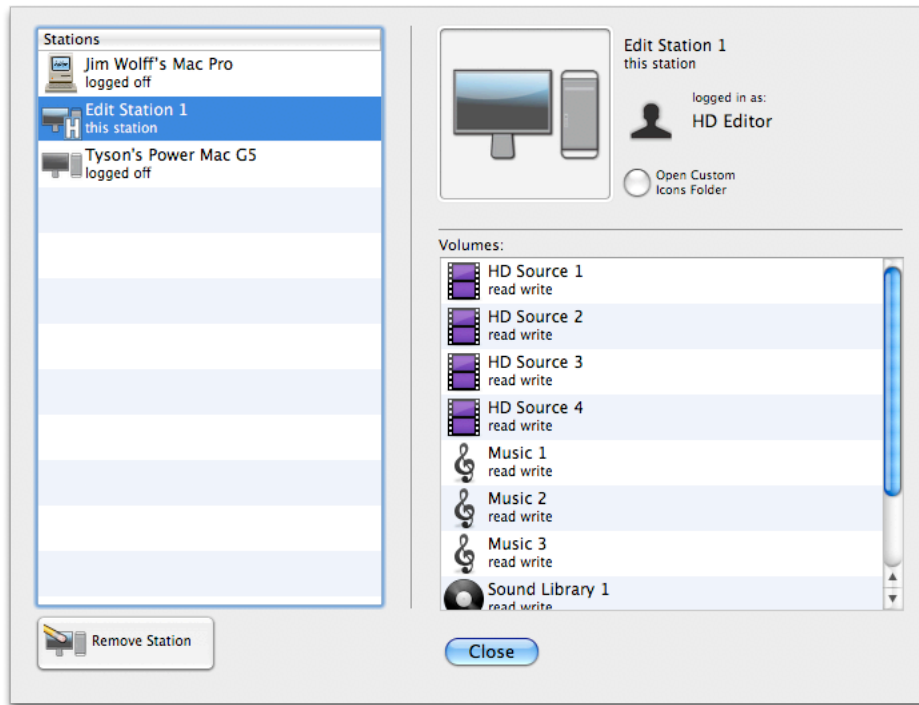
Stations Panel

Changing the name of a station

The default name for a station comes from the *Computer Name* field in the *Sharing* system preferences panel. If you wish to change the station name you can double-click the station in the stations panel.
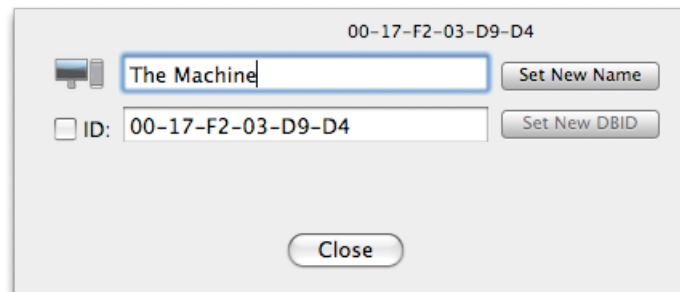
Editing Station Name

Changing the ID of a station

WARNING: We do not recommend ever changing the ID of a station under normal circumstances. The default ID comes from the MAC (Media Access Control) address, which should be unique to your machines physical Ethernet port hardware. You must be on the station you are trying to change the ID for this option to even be available. The only reason to change this is if you find it in conflict with another Station on your SAN.

Auto Save Last Mount State

This option is applicable to the station as a whole, rather than a specific user (whom may login from any Station on the SAN). And it will automatically save and restore the SAN volumes state that were last used on the Station.

Removing Stations

Stations may be removed with the *Remove Station* button at the bottom left of the stations panel. FibreJet® will not allow removal of the local station, and stations should not be removed while active on the SAN.

Station Volume States

At the right of the stations panel is a list of volumes associated with the selected station. This shows the current station-volume states as reflected in the database. If the local station (indicated by *this station* tag) is selected, the volumes displayed will be those currently accessible to the logged in user.

Forcing Release of Volume Ownership

If a non-local station is selected in the stations list, a *Force Release* button will appear at the bottom right. Pressing this will cause any owned volumes to be released from the selected station. This command should only be used if it is definitely known that the selected station is shut down or disconnected from the storage.

The FibreJet Log Window

When in Administration Mode, the Window menu will contain an item called *FibreJet Admin Log*. Selecting this window will bring forth a log window that chronicles the goings on of all things FibreJet.

FibreJet Admin Log at startup

```
Building Disk Model for disk26
----------------------------------------------------------------------------------------
IOMedia Partition disk26s1, Size 209715200, Name EFI System Partition, Content C12A7328-F81F-11D2-BA4B-00A0C93EC93B, UUID B4C55DD2-813C-4163-B208-F76DFEF9E3E9
IOMedia Partition disk26s2, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID 2EA9B31A-2F36-4873-80D7-A6E68E210A24
IOMedia Partition disk26s3, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID FA0C6C90-F41D-4EF8-AEBA-62EAD21C5C99
IOMedia Partition disk26s4, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID 5682C190-6D11-4B21-99D7-9CD43536B757
IOMedia Partition disk26s5, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID 088F2512-AC76-48E3-BF92-32E1F34D3A76
IOMedia Partition disk26s6, Size 20504576000, Name Untitled, Content EBD0A0A2-B9E5-4433-87C0-68B6B72699C7, UUID 1BF05EC1-C08A-47AF-AE5C-9CD20A01737B
IOMedia Partition disk26s7, Size 20429058048, Name Untitled, Content EBD0A0A2-B9E5-4433-87C0-68B6B72699C7, UUID AE2EBC3A-4782-4FD4-BFF3-14B2E950F978
IOMedia Partition disk26s8, Size 20370358272, Name Apple_HFS_Untitled_2, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID BB10CA42-7162-4A78-83B0-C5D869759CB0
IOMedia Partition disk26s9, Size 134217728, Name Booter 0x93066187, Content 426F6F74-0000-11AA-AA11-00306543ECAC, UUID 6A3668F9-7C41-4E9E-85FC-4E310A3A3645
IOMedia Partition disk26s10, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID A1B7B3B9-729D-4775-8B8D-9B2C9D54B7C4
IOMedia Partition disk26s11, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID 20B0A75D-A9A6-4C95-AB51-095261342EB1
IOMedia Partition disk26s12, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID D37BD7F0-9E1B-46DD-8E0D-032922ACE098
IOMedia Partition disk26s13, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID 968F2A37-9A4C-4FFC-A02C-E3BBDC6328CD
IOMedia Partition disk26s14, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID 64D614BB-EE24-4D8F-82FF-09C7C4A18EEE
IOMedia Partition disk26s15, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID 9BDDE185-FC0F-421A-9B43-5C20F1614049
IOMedia Partition disk26s16, Size 20504576000, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID 56FD691F-631B-4205-95DC-F5398867C821
IOMedia Partition disk26s17, Size 39130083328, Name Untitled, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID E8F0CE62-429F-4981-B263-AFBB60A6F67B
Disk partitioning appears to be GUID Partition Type
     Start Block        Block Count
            0                     1 PROTECTIVE MBR - PROTECTIVE MBR - (null)
            1                     1 PRIMARY PARTITION HEADER - PRIMARY PARTITION HEADER - (null)
            2                    32 PRIMARY PARTITION TABLE - PRIMARY PARTITION TABLE - (null)
           34                     6 Apple_Free - Apple_Free - (null)
           40                409600 EFI System Partition - B4C55DD2-813C-4163-B208-F76DFEF9E3E9 - B4C55DD2-813C-4163-B208-F76DFEF9E3E9
           40                409600 [BACKUP]EFI System Partition - B4C55DD2-813C-4163-B208-F76DFEF9E3E9 - B4C55DD2-813C-4163-B208-F76DFEF9E3E9
       409640              40048000 [BACKUP]Untitled - 2EA9B31A-2F36-4873-80D7-A6E68E210A24 - 2EA9B31A-2F36-4873-80D7-A6E68E210A24
       409640              40048000 Untitled - 2EA9B31A-2F36-4873-80D7-A6E68E210A24 - 2EA9B31A-2F36-4873-80D7-A6E68E210A24
      40457640                262144 Apple_Free - Apple_Free - (null)
      40719784              40048000 [BACKUP]Untitled - FA0C6C90-F41D-4EF8-AEBA-62EAD21C5C99 - FA0C6C90-F41D-4EF8-AEBA-62EAD21C5C99
      40719784              40048000 Untitled - FA0C6C90-F41D-4EF8-AEBA-62EAD21C5C99 - FA0C6C90-F41D-4EF8-AEBA-62EAD21C5C99
      80767784                262144 Apple_Free - Apple_Free - (null)
      81029928              40048000 [BACKUP]Untitled - 5682C190-6D11-4B21-99D7-9CD43536B757 - 5682C190-6D11-4B21-99D7-9CD43536B757
      81029928              40048000 Untitled - 5682C190-6D11-4B21-99D7-9CD43536B757 - 5682C190-6D11-4B21-99D7-9CD43536B757
     121077928                262144 Apple_Free - Apple_Free - (null)
     121340072              40048000 Untitled - 088F2512-AC76-48E3-BF92-32E1F34D3A76 - 088F2512-AC76-48E3-BF92-32E1F34D3A76
     121340072              40048000 [BACKUP]Untitled - 088F2512-AC76-48E3-BF92-32E1F34D3A76 - 088F2512-AC76-48E3-BF92-32E1F34D3A76
     161388072                262144 Apple_Free - Apple_Free - (null)
     161650216              40048000 [BACKUP]Untitled - 1BF05EC1-C08A-47AF-AE5C-9CD20A01737B - 1BF05EC1-C08A-47AF-AE5C-9CD20A01737B
     161650216              40048000 Untitled - 1BF05EC1-C08A-47AF-AE5C-9CD20A01737B - 1BF05EC1-C08A-47AF-AE5C-9CD20A01737B
     201698216              39900504 [BACKUP]Untitled - AE2EBC3A-4782-4FD4-BFF3-14B2E950F978 - AE2EBC3A-4782-4FD4-BFF3-14B2E950F978
     201698216              39900504 Untitled - AE2EBC3A-4782-4FD4-BFF3-14B2E950F978 - AE2EBC3A-4782-4FD4-BFF3-14B2E950F978
     241598720              39785856 [BACKUP]Apple_HFS_Untitled_2 - BB10CA42-7162-4A78-83B0-C5D869759CB0 - BB10CA42-7162-4A78-83B0-C5D869759CB0
     241598720              39785856 Apple_HFS_Untitled_2 - BB10CA42-7162-4A78-83B0-C5D869759CB0 - BB10CA42-7162-4A78-83B0-C5D869759CB0
     281384576                262144 Apple_Free - Apple_Free - (null)
     281646720                262144 Booter 0x93066187 - 6A3668F9-7C41-4E9E-85FC-4E310A3A3645 - 6A3668F9-7C41-4E9E-85FC-4E310A3A3645
     281646720                262144 [BACKUP]Booter 0x93066187 - 6A3668F9-7C41-4E9E-85FC-4E310A3A3645 - 6A3668F9-7C41-4E9E-85FC-4E310A3A3645
     281908864              40048000 [BACKUP]Untitled - A1B7B3B9-729D-4775-8B8D-9B2C9D54B7C4 - A1B7B3B9-729D-4775-8B8D-9B2C9D54B7C4
     281908864              40048000 Untitled - A1B7B3B9-729D-4775-8B8D-9B2C9D54B7C4 - A1B7B3B9-729D-4775-8B8D-9B2C9D54B7C4
     321956864                262144 Apple_Free - Apple_Free - (null)
     322219008              40048000 Untitled - 20B0A75D-A9A6-4C95-AB51-095261342EB1 - 20B0A75D-A9A6-4C95-AB51-095261342EB1
     322219008              40048000 [BACKUP]Untitled - 20B0A75D-A9A6-4C95-AB51-095261342EB1 - 20B0A75D-A9A6-4C95-AB51-095261342EB1
     362267008                262144 Apple_Free - Apple_Free - (null)
     362529152              40048000 [BACKUP]Untitled - D37BD7F0-9E1B-46DD-8E0D-032922ACE098 - D37BD7F0-9E1B-46DD-8E0D-032922ACE098
     362529152              40048000 Untitled - D37BD7F0-9E1B-46DD-8E0D-032922ACE098 - D37BD7F0-9E1B-46DD-8E0D-032922ACE098
     402577152                262144 Apple_Free - Apple_Free - (null)
     402839296              40048000 Untitled - 968F2A37-9A4C-4FFC-A02C-E3BBDC6328CD - 968F2A37-9A4C-4FFC-A02C-E3BBDC6328CD
     402839296              40048000 [BACKUP]Untitled - 968F2A37-9A4C-4FFC-A02C-E3BBDC6328CD - 968F2A37-9A4C-4FFC-A02C-E3BBDC6328CD
     442887296                262144 Apple_Free - Apple_Free - (null)
     443149440              40048000 Untitled - 64D614BB-EE24-4D8F-82FF-09C7C4A18EEE - 64D614BB-EE24-4D8F-82FF-09C7C4A18EEE
     443149440              40048000 [BACKUP]Untitled - 64D614BB-EE24-4D8F-82FF-09C7C4A18EEE - 64D614BB-EE24-4D8F-82FF-09C7C4A18EEE
     483197440                262144 Apple_Free - Apple_Free - (null)
     483459584              40048000 [BACKUP]Untitled - 9BDDE185-FC0F-421A-9B43-5C20F1614049 - 9BDDE185-FC0F-421A-9B43-5C20F1614049
     483459584              40048000 Untitled - 9BDDE185-FC0F-421A-9B43-5C20F1614049 - 9BDDE185-FC0F-421A-9B43-5C20F1614049
     523507584                262144 Apple_Free - Apple_Free - (null)
     523769728              40048000 [BACKUP]Untitled - 56FD691F-631B-4205-95DC-F5398867C821 - 56FD691F-631B-4205-95DC-F5398867C821
     523769728              40048000 Untitled - 56FD691F-631B-4205-95DC-F5398867C821 - 56FD691F-631B-4205-95DC-F5398867C821
     563817728                262144 Apple_Free - Apple_Free - (null)
     564079872              76425944 Untitled - E8F0CE62-429F-4981-B263-AFBB60A6F67B - E8F0CE62-429F-4981-B263-AFBB60A6F67B
     564079872              76425944 [BACKUP]Untitled - E8F0CE62-429F-4981-B263-AFBB60A6F67B - E8F0CE62-429F-4981-B263-AFBB60A6F67B
     640505816                262151 Apple_Free - Apple_Free - (null)
     640767967                    32 BACKUP PARTITION TABLE - BACKUP PARTITION TABLE - (null)
     640767999                     1 BACKUP PARTITION HEADER - BACKUP PARTITION HEADER - (null)

Building Disk Model for disk27
----------------------------------------------------------------------------------------
IOMedia Partition disk27s1, Size 209715200, Name EFI System Partition, Content C12A7328-F81F-11D2-BA4B-00A0C93EC93B, UUID F7AC4429-A7BB-4919-8E0D-29A50A5361EA
IOMedia Partition disk27s2, Size 939524096, Name Apple_HFS_Untitled_2, Content 48465300-0000-11AA-AA11-00306543ECAC, UUID C43931A2-B000-4935-8D53-5F9B512EB11E
```

You can also open this file using the Console application found in /Applications/Utilities/Console.   [Clear History] [Load Entire File]

FibreJet Admin Log show discovery

Anything notable that occurs will be put into the log. This includes critical user choices, especially those that can destroy data. The log is a useful support tool that allows support to see exactly the structure of the SAN objects and how they are being used so when there is a problem there is plenty of information available about what is going on.

Many functions write to this log so it is a useful window to have open while running many features such as Data Migration and Expansion and Managing Meta Data.

3: Other Maintenance Operations

FibreJet® Volume Maintenance

Proactive volume maintenance is a best practice in a busy production environment. Multiple users and applications, application crashes, power failures and improper shutdowns could all potentially damage file systems, directory structures and user document integrity, regardless of hardware RAID mirroring or redundancy modes. Small errors in file system integrity can cascade over time with regular read and write operations into file system failures and subsequent loss of user data. FibreJet® has a *Volume Maintenance Mode* that can be enabled to allow regular disk maintenance using your disk repair utility. FibreJet® 5 has built in disk checking and repair routines that can be accessed from the *Administration > SAN Heath Checking…* and *Volume > Info* menu in Administration mode as described earlier.

Protection from hardware failures can be mitigated with use of hardware RAID controllers. CommandSoft recommends using RAID level 6 for maximum hardware protection of LUN storage.

Protection from software failures is another matter, however. File systems can have their integrity compromised over time, especially with software bugs and computer crashes at inopportune times. This occurs regardless of RAID controller usage and still causes corrupt file systems. This is why you ALWAYS should implement a backup solution for your SAN data. When this happens it is best to always immediately check and repair any damage to file systems that were mounted with write access at the time of the crash.

Many SANs contain terabytes of data. There must be a backup scheme in place to protect this large amount of data from software failures and corruption since hardware RAID protection does nothing to protect data from this type of corruption.

The best defense against computer crashes and buggy software corruption is to regularly check and repair your file systems so errors do not accumulate and cascade into a large number of unrecoverable errors.

Please read the section on the menu command *SAN Health Checking…* to learn about automating this important operation.

Also be aware of the volume options that can be configured with the *Info* button to check the file system each time it is mounted Writable. You also have options to email results of these tests.

File system checks from these commands are archived for each time and each file system for later review if needed by support personnel.

Volume Maintenance Mode and using third party utilities

The *Administration > FibreJet Services…* menu command as well as *Volumes > Volume Maintenance Mode On* command are used to put the all the SAN into Volume Maintenance Mode or just the selected disks, respectively. This is used when you wish to use 3rd party utilities to perform disk operations, such as checking and repairing corruption to a volume, or partitioning storage. These applications will fail to work if you do not enter *Volume Maintenance Mode* in some way first. No other users should be on the FibreJet® SAN while using *Volume Maintenance Mode* as the disk operations being conducted may put the storage in an uncontrollable state, which could potentially lead to data corruption through multiple writers.

CommandSoft recommends that Journaling be enabled on your HFS+ extended volumes whenever possible. Although there is a slight write performance penalty for doing this, it is usually worth the gains in reliability and stability of the file system. If you find that the performance hit is not something that can be tolerated because you need more or higher quality video streams, for example, then this option can always be turned off. With Journaling enabled you will find that you will not need to enter *Volume Maintenance Mode* as often to perform disk maintenance and repair checking. Nevertheless, it is important to remember that regular volume maintenance and repair is a best practice in a busy production environment. Use the *Journaling On/Off Selected Volumes* command from the "Volumes" menu while in Administration mode to enable or disable journaling for the selected file system. Typically, with current modern fast hardware and configurations, you would keep journaling enabled.

NOTE: The file systems must first be mounted with write access in order to change the Journaling mode.

If you are simply checking or repairing a disk that can still be mounted, you should first "grab" write access to those volumes you wish to operate before entering *Volume Maintenance Mode*. Doing this is a precaution against someone else on the SAN using the disk writable while you are trying to repair it, if they ignored the directions to stay off the SAN.

When FibreJet® is in *Volume Maintenance Mode*, other stations running FibreJet® are prevented from performing most functions, and stations not running FibreJet® are prevented from running FibreJet®. Since *Volume Maintenance Mode* strips off some of the network volume protection, it is generally important to keep other stations off the network as much as possible when using *Volume Maintenance Mode*. In some cases it is OK to perform maintenance on a selected volume only variety as long as you are sure no one else is using it.

NOTE: When in *Volume Maintenance Mode*, the network is switched on-the-fly out of *Rogue Host Protection Mode* (if it was in that mode). This changes the partition maps on the disks so that 3rd party utilities will see normal entries, as they would expect. When you leave *Volume Maintenance Mode* the system is placed back into its prior state (applicable to the entire SAN Volume Maintenance kind).Forcing Access From a Crashed or Missing Station

Forcing Access From a Crashed or Missing Station

What happens if a station crashes while still retaining access to one or more FibreJet® volumes? This is not an uncommon scenario, and requires a way for another user to forcibly remove the write access to any volumes from the offline station. When using this functionality, it is important to physically verify this station does not have the volume-mounted with read-write access.

To forcibly remove write access from an offline or disabled station:

1. Verify that the station does not have read-write access to the volume being forced (otherwise multiple-writer corruption will result).

2. In the FibreJet® Administration window, click the Stations to select the station in question, select the volume in the right hand panel.

3. Click the Force Release Volume button.

FibreJet Was Not Cleanly Shut Down

If FibreJet® crashes while launching or prematurely crashes, you may see the following message at the next launch of FibreJet®:
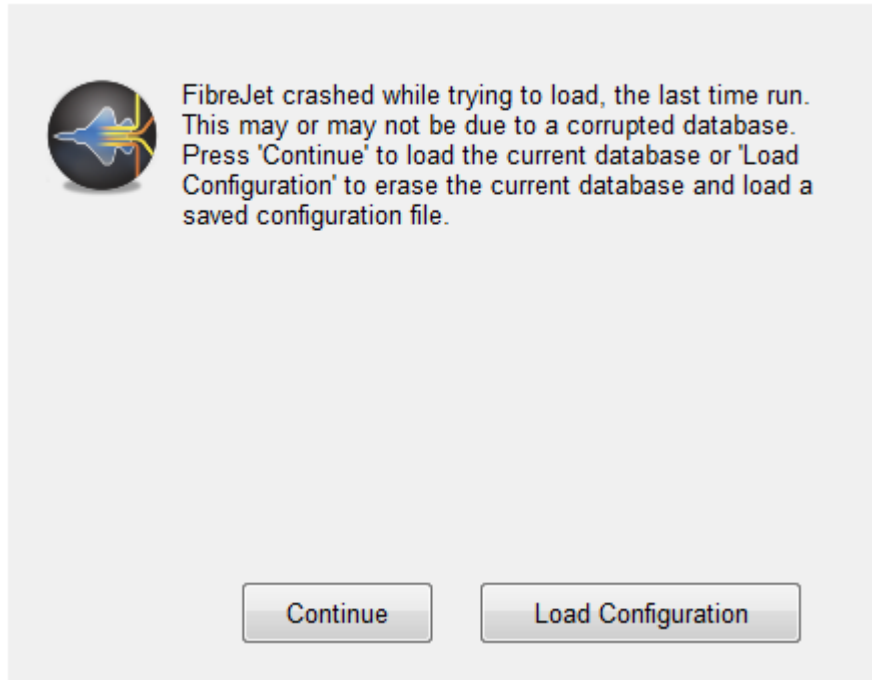

FibreJet® load configuration after crash sheet

Users should simply click *Continue.* It is possible, though improbable that the FibreJet® database has been corrupted. If this were to occur, administrators have the option of clicking *Load Configuration* to select a configuration file that has been previously saved or from an automatic backup located in *Library/Application Support/CommandSoft/FibreJet.* If there is an administration password (administrators are encouraged to assign a password), FibreJet® will ask for the password in order to proceed with restoration of the database from a configuration file. **Once you restore a Database Configuration, the Administration password will be reset and a new one will need to be assigned**.

Volume Information Panel

Volume information can be obtained on a selection of volumes by using the *Volume Information* command from the Volumes menu while in Administration mode:
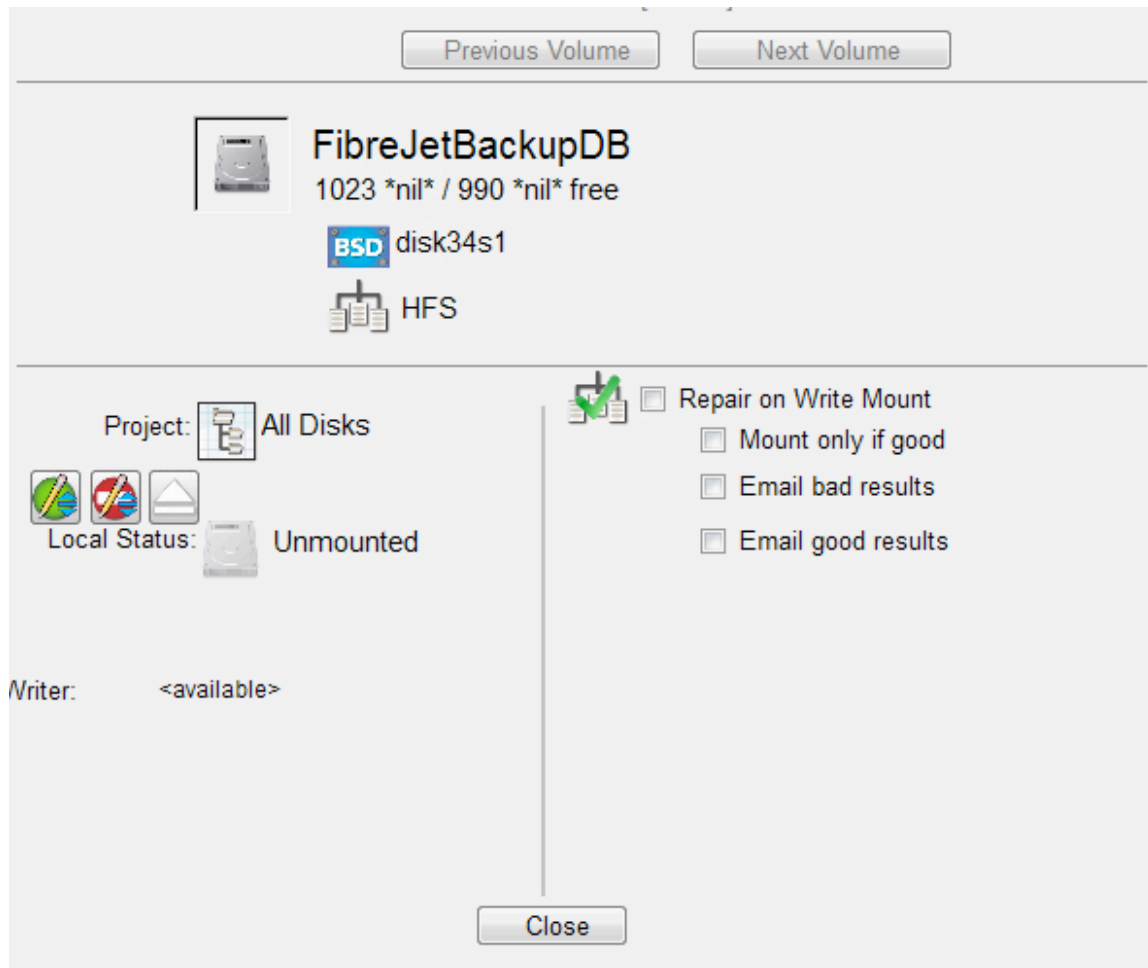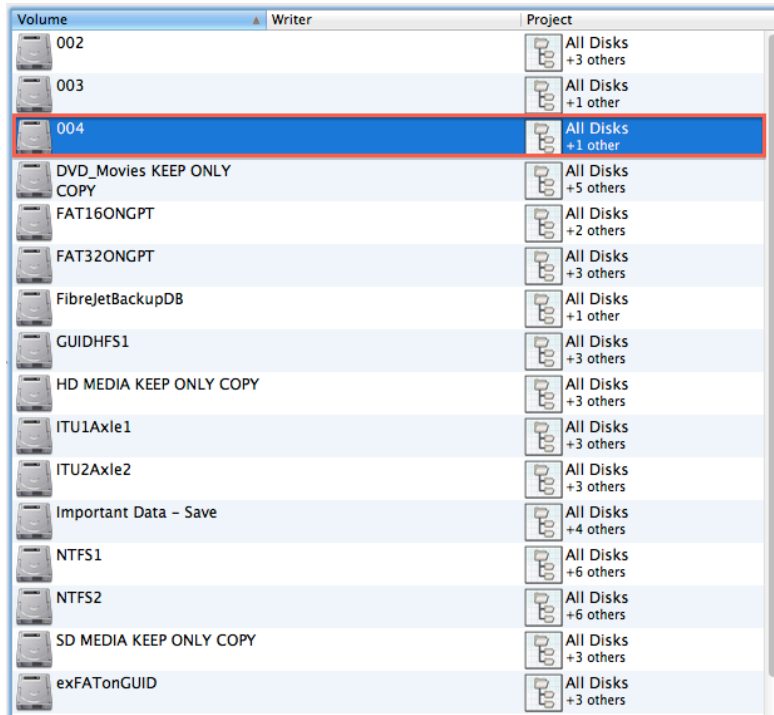

Volume Information Panel

This sheet allows the user to cycle through the selected volumes. Interesting information in this sheet includes used and total space on the volume, the state of Journaling on the file system, the BSD name of the file system, and the Fibre Channel World Wide Names (WWN) of the devices that contribute to the file system. For a striped file system (RAID-0) there will be a list of WWNs. In the lower section of the sheet is a listing of how the file system is being accessed by other users.

Check on Write Mount (and sub options)

If you decide you want your file system checked every time it is mounted writable you can check this option. The other options offset below this are only valid if Check on Write Mount is checked. Mount only if good will continues to mount the volume only if the check reported that the volume is good. Email bad/good results gives options to send the results of the check to an email address. The email address in question is configured under *Administration > SAN Health Checking…* command.

More on Setting up the Automated volume checking

To use the automated disk-checking feature first you must launch the FibreJet Administration mode. Once inside Administration mode look at the volume list that is presented and select a volume. As you see below I have selected volume 004. Double click the volume. And a pop up will occur.

As you can see in the picture above there are 4 boxes that you can check. Check on write mount means that every time the volume is mounted writable a scan will occur to check the health of the volume. Please be aware that when this option is checked checking of a volume could take excess of 30 minutes and up to a couple hours depending on how large and how much data you have on the volume being checked.

The next option you have is the Mount only if good feature. This means exactly what it says. When you mount a volume and it is being checked and there are some errors that were found when being mounted it would not attempt to mount it writable. It is possible this volume may still be read only. This is to help protect further corruption or errors.

The next two options are for the getting the results back to you. You can either only email the good the bad or both of the results. Email must be set up under *Administration > SAN Health Checking...* window as described next.

Setting up the email preferences for volume checking

To set up the email settings for getting the results of you volume scan simply again go into administration mode and select the administration drop down at the top of the screen
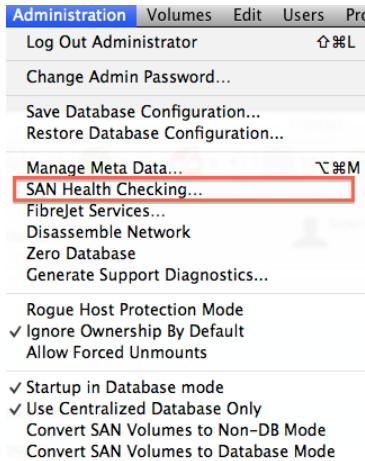
From there select the SAN Health Checking . . . A new screen will appear as follows:
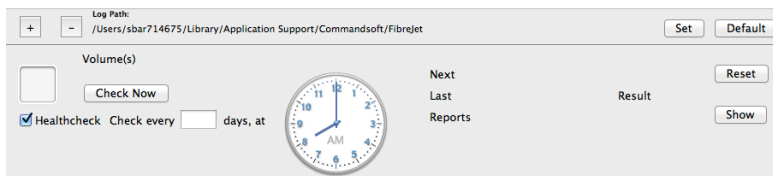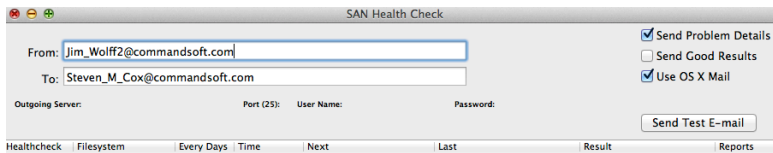
Simply fill out the information needed. Then from now on as long as you have the preference checked on the volume that is being checked you will be emailed a copy of the volume check that just occurred on your machine.

Setting the times and volumes for automated checking

In the same window where you added the emails for the reports you will simply go down to the Plus and Minus buttons (pictured above). Once you have pressed the Plus button a volume list will pop up and you will select the volumes you would like to be checked automatically when there may be nobody on the SAN (usually a certain time of day, like in the middle of the night).
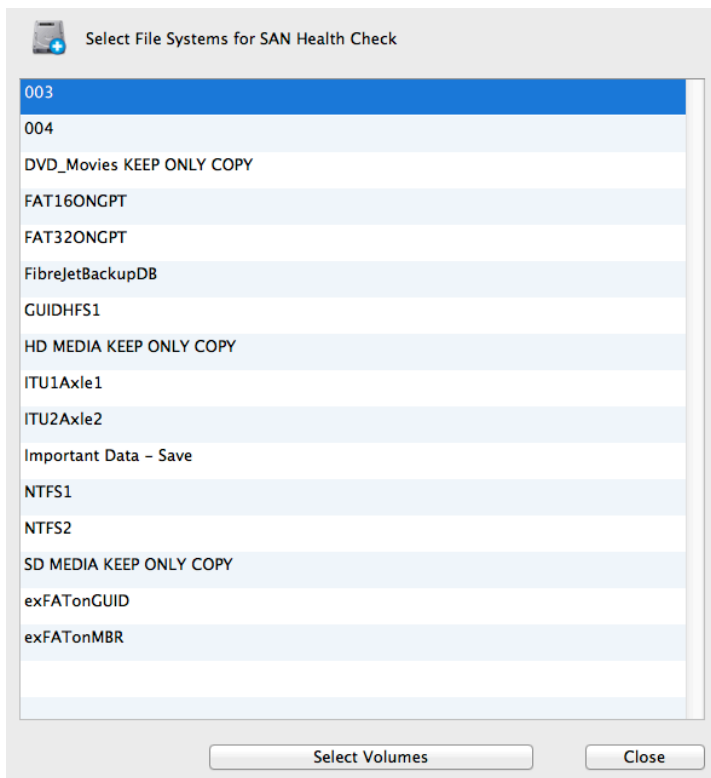
Once you have selected the volumes you want to be checked at a certain time of the day. (We recommend this to be done either early in the morning or late at night when nobody is on the SAN and you just leave the computer on with FibreJet running that you configured this to be done.) You will then select the individual volumes you have added and choose a time you would like them to be checked. And you will also select scan increment. Such as every One-day or Five days or any number of days that you see fit, in the box below you will see the example we have set up for 12:00AM checking.

Healthcheck	Filesystem	Every Days	Time	Next	Last	Result	Reports
YES	002	1	12:00 AM	3/10/14 9:51 AM	3/10/14 9:51 AM	N/A	5
YES	003	1	12:20 AM	3/10/14 9:51 AM	3/10/14 9:51 AM	N/A	0
YES	004	1	12:40 AM	3/10/14 9:51 AM	3/10/14 9:51 AM	N/A	0

Log Path:
/Users/sbar714675/Library/Application Support/Commandsoft/FibreJet   [Set] [Default]

004
[Check Now]   Next 3/11/14 9:51 AM   [Reset]
   Last 3/10/14 9:51 AM   N/A
☑ Healthcheck Check every 1 days, at 12:40 AM   0 Reports   [Show]

## Opening FibreJet in "NO Database Startup" mode

In FibreJet 5 we have added a new feature that lets you launch with no Database. This feature is mainly useful for small SANs with few workstations. In this mode all workstations can see the SAN storage and there is only one user. This mode does not use the features of having a database such as having projects and multiple users. It may also be considered for use in really large SANs with 1000's of volumes where managed zoning and exposure to a subset of storage to each workstation is controlled by a switch configuration.

To go into no database more when launching FibreJet hold down the option Key upon launching the application. Doing so will start FibreJet in no database mode and it will look like this:
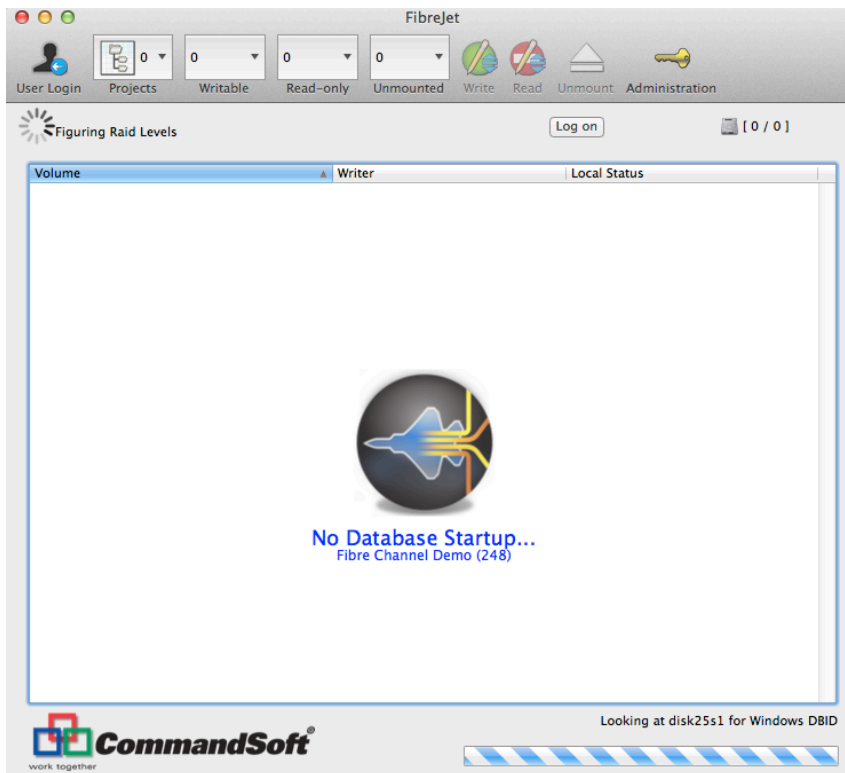
When first launching the application like this you must wait for every drive to mount then unmount so FibreJet can write a hidden file to the volume to detect who has ownership of each volume to make sure you do not get a multi write scenario.

To make this change permanent, and so you do not have to always hold down the option key you will then go into the FibreJet administration mode
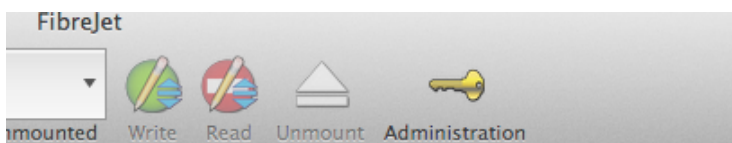
From inside the administration mode you will go to the administration drop down and uncheck where is says Startup in Database mode.
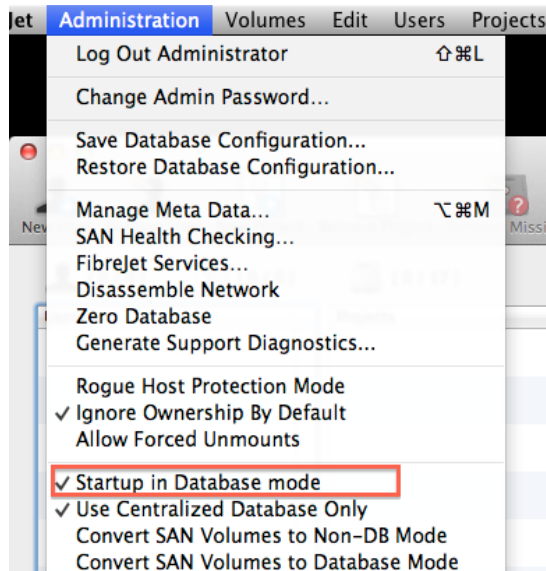
After this has been unchecked quit and restart FibreJet, from now on, on this machine you will always start up in no database mode. To make this change SAN wide you must do this on all machines connected to your SAN using FibreJet.

CRITICAL WARNING ABOUT MIXED MODE SAN WORKSTATIONS

The default mode for a FibreJet install is to have both *Startup in Database mode* and *Use Centralized Database Only* checked, because this mimics the behavior of older versions (e.g. pre 5.0) of FibreJet.

If ANY workstation on your SAN is expected to ever use No Database Mode startup then you must manually make sure that all SAN workstations do not have *Use Centralized Database Only* checked. The reason this is important is because otherwise you will open your SAN to the possibility of multiple writers to a volume. If *Use Centralized Database Only* is checked then it will ignore the ownership mechanism used by No Database Mode. Therefore make sure this option is unchecked on all your SAN workstations for this case.
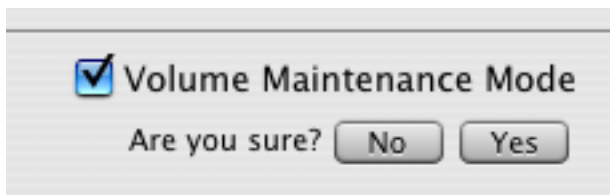
FibreJet® Services and Deprecated System Preference Panel

FibreJet® 5.0 moves all three panels that used to be available in the FibreJet® System Preference Panel inside the application under different menu

commands. The FibreJet® System Preference panel is now deprecated and was never available in the Windows version anyway. These options are described in *Administration > FibreJet Services…* command (see following).
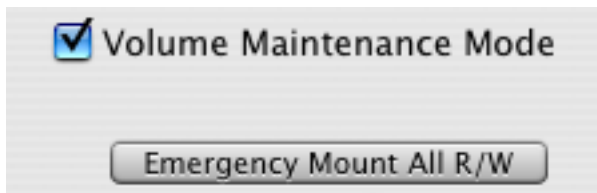
Volume Maintenance Mode (VMM)

Volume Maintenance Mode allows other software, such as disk repair and partitioning utilities to control the disks in order to function correctly. If the network is in *Rogue Host Protection Mode* when entering VMM, it will be taken out of this mode until leaving VMM. Once checked, you must confirm by clicking the *Yes* button below the checked VMM option to place the system in VMM.

VMM Confirm buttons YES and NO

Emergency Mount All R/W button while in VMM

VMM Emergency Mount All R/W button

Each time the computer is started, FibreJet® prevents SAN attached volumes from mounting. In special cases, the Administrator may need to have the volumes mounted outside of FibreJet®'s control. One of these cases may be when setting up a new network or performing partitioning of disk repair on an existing network. The Administrator can use the *Emergency Mount All R/W* button in this case to mount the SAN volumes with Read/Write access.
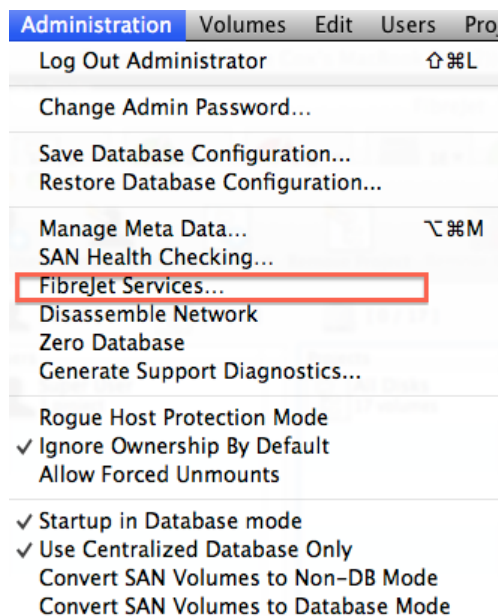
NOTE: While FibreJet® is actually running, the *Emergency Mount All R/W* button will appear to do nothing. This is because FibreJet® is preventing the volumes from actually being allowed to mount. If you need this feature, make sure that FibreJet® is not already running. If it is, quit the application. Be aware that FibreJet® may be setup to automatically launch when you log

into the computer as a startup item, so check that it is not running if you need this functionality.

WARNING: This should only be done if this is the only station on the SAN with volumes mounted, otherwise it could result in multiple-writers corrupting the file systems. It should also not be done by any user, but only the designated Administrator of the SAN.

Single Volume, Volume Maintenance Mode and Admin VMM

The 2nd area that this Volume Maintenance mode can be found is inside the FibreJet application in itself. In order to access this area log into FibreJet then go into Administration mode. And select the administration drop down tab as you see below.

Select the FibreJet Services; you will then see a new window appear.

You can then go into VMM from there, as you can see this is where the FibreJet Services panel was moved into the application from the System Preference Pane version.

Also only in FibreJet 5 we have implemented a way to go into single volume VMM. In order to do this you 1st will select the volume you want to go into VMM on, in Administration mode. As you can see below I have selected 5 volumes.

Then at the top of your screen select the Volumes drop down;

You then will select the Volume Maintenance Mode On. After selecting this only the selected volumes that you had highlighted before will go into VMM. It will look like so;

Reset Database

This button clears the database write lock and access request semaphores for the selected FibreJet® database. This button performs similar operations like the *Free Database Write Lock* and *Free Access Request Lock* commands in the FibreJet® application.

Clear Database

This button removes all items from the selected database, leaving it empty. This button is useful for emptying a large database with many projects if you want to start over. In case you change your mind, the FibreJet® database should be backed up. This button is the same as the *Zero Database* command in the Administration menu.

Delete Database

Deletes the selected database and returns the partitions to a mounted HFS plus volume. If after using this command a FibreJet® volume does not appear, reboot the computer, put the system in *Volume Maintenance Mode* with the FibreJet® System Preference panel, and use the *Emergency Mount All R/W* button to remount the FibreJet® database volume as a normal HFS plus volume. This button performs the same operations as *Disassemble Network* command in the Administration menu.

Hardware Key Settings

The *Hardware Key* tab has been moved in the FibreJet® application *FibreJet > Update License…* menu command. Upgrade codes can be obtained from CommandSoft to add FibreJet® features.

Hasp Key Hardware ID: 249D93AF.

Hasp Key Revision 5.   Generation: 0
OSX Lion / OS9 / Windows enabled.
FibreChannel / iSCSI enabled.
Avid Cache / Cross Platform enabled.
Macintosh OS X 10.9, Windows 8

Enter Update Code:

Contact Commandsoft at (805) 730-7772 or email us at
support@commandsoft.com or go to www.commandsoft.com to
receive an upgrade code for a FibreJet Hardware Key.

http://localhost:1947/_int_/ACC_help_index.html

Close   Rescan   Update Key

Update License command

4: FibreJet Best Practices
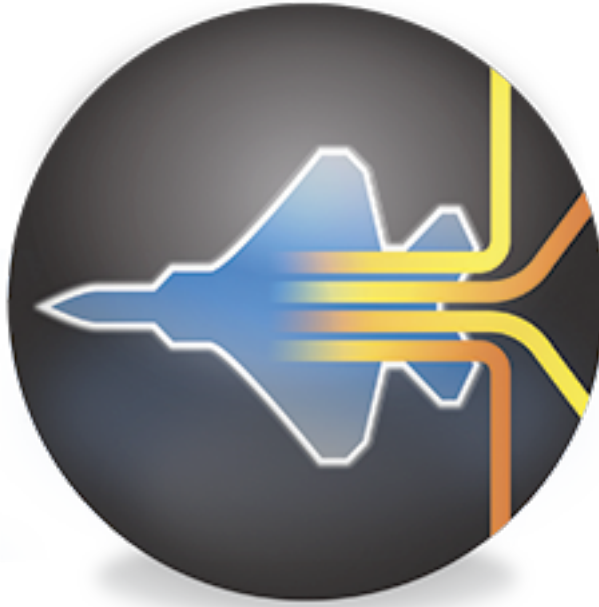
Updated May 9, 2013

Introduction

The technology behind FibreJet dates back to the very first SANs in 1994. Approaching 20 years of use and 10,000+ seats this is proven safe and reliable technology. It has survived this long because of its simplicity and the fact that it has few "moving parts" that can break.

NOTE: Some of the following applies to Macintosh and some applies to Windows. The purpose of this document is to provide supplemental information on how to best operate FibreJet in todays environments using the latest OS, Applications and SAN information. This will be updated form time to time as needed.

Here are a few of the following topics that will be addressed:

- Is FibreJet in the I/O Path?
- Is FibreJet involved in writing the file system?
- Can FibreJet corrupt a file system?

- My computer hung or crashed, why should I verify my file systems?
- Why do I need backups?
- Why hardware RAID protected storage does not prevent file system corruption
- Common Causes for and Prevention of Storage Area Network File System Corruption
- Best Practices for Volume Maintenance and keeping repairs to a minimum
- How to determine what processes are holding open files on a volume preventing it from being unmounted or refreshed
- Turning off Spotlight indexing because it is preventing dismounting or refreshing
- Turning off Avid indexing Service because it is preventing dismounting or refreshing
- Disabling boot file system checking on Windows
- FibreJet database requirements
- Partitioning SAN storage
- Contacting Commandsoft

Upgrading from older versions of FibreJet®

When installing a newer version of FibreJet® on a SAN that has an older version, make sure that the install is done first on a single machine with all other machines on the SAN powered off. Once installed on this machine and rebooted, run the new version of FibreJet® at least once. This will ensure that any database updates that may be required by the new version are done in a clean way. Then proceed to install the new version on each of the remaining machines, rebooting each after the install is complete.

Disassembling and reassembling a FibreJet® network

Do not disassemble and reassemble a FibreJet® SAN while any other machines are powered on the SAN, otherwise you may introduce a multiple-writer situation, and also have missing disks listed in the database.

ATTO Striping – 128 or 256 KB Interleave setting

When using ATTO Striping (e.g. ExpressStripe at least v3.0), you should remember to set the interleave factor to at least 128 KB to ensure maximum performance for most operations, including video. The default interleave

factor is 32 KB and it is easy to miss or forget this setting when partitioning the disks with RAID 0 striping. This setting is on a partition basis, so you must click on each partition in the partition window and set the interleave factor to 128 KB from the popup menu for each partition. Failure to do this will result in sub-optimal performance of the storage. If you accidentally forget, the only way to fix it is to repartition the storage again, which will result in the loss of any data you have on those partitions if you do not first backup.
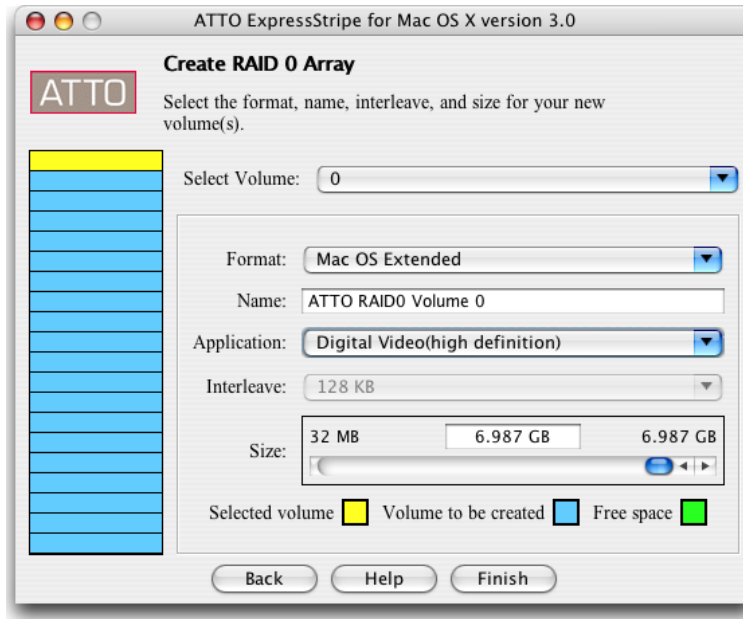
Interleave set to at least 128 KB, must be done for each partition separately

Uninstalling FibreJet®

To uninstall FibreJet you should first stop the "FibreJet Service" from the service control manager, or from a command prompt that is run as administrator:

sc stop FibreJetService

Then from a command prompt that is run as administrator:

sc delete FibreJetService

sc delete fjetff

Then from an explorer window open to the directory "C:\Program Files (x86)\CommandSoft, Inc\FibreJet\Drivers" you will need to right-click the "fjetvfremove.inf" file and select "Install" to uninstall the fjetvf driver.

Lastly, under the Control Panel "Programs and Features" select FibreJet and click uninstall. After you reboot FibreJet will be completely uninstalled.

Energy Saver and SAN disk sleeping causes spin down

Certain Fibre Channel HBA cards and drivers do not by default filter out SCSI START-STOP commands (such as Apple's HBA). These commands are sent to disk drivers when the computer is shutdown or when the power management sleeps. They cause the disks to spin down into a sleep mode.

This is not desirable in a SAN environment where more than one machine is actually connected to the same storage. Bad things can happen, including dropped video frames. If you are using a Qlogic Fibre Channel card with CommandSoft's Qlogic HBA driver it will automatically filter out SCSI START-STOP commands preventing this problem. Some HBA vendors have solutions to this problem, and others don't. If you are not using a Qlogic HBA with CommandSoft's driver, then you may want to contact the HBA company to see if they have a setting that will filter out SCSI START-STOP commands.

To mitigate the severity of this problem, you may configure the Energy Saver control panel in Mac OS X *System Preferences.…* You should uncheck the *Put the hard disk to sleep when possible* setting, as well as set the *Put the computer to sleep when it is inactive for:* to never. This will prevent the computer from sending as many SCSI START-STOP commands as it usually does, but is not guaranteed to prevent it from sending any of them as a filtering driver would.

If you are using Apple's HBA, a patched driver is available that will not put the hard drives to sleep. Alternatively, it is possible to edit Apple's "AppleLSIFusionMPT.kext"'s Info.plist XML file. This file can be located by control-clicking or right clicking and selecting *Show Package Contents* and add "Protocol Characteristics" Dictionary with a "Multiple Initiators" Boolean entry set to "Yes" under the IOKitPersonalities, AppleLSIFusionFC Dictionary entry).

Sometimes the Finder does not show mounted volumes

Under certain circumstances it has been observed that the Finder does not show volumes, even when they are mounted. This seems to happen more with larger networks and older Mac OS X versions. This is rare, but if it does happen you can relaunch the Finder to get it showing the mounted volumes.

Bring up the *Force Quit* dialog with option-command-escape, select the Finder, and click the *Relaunch* button. If you suspect this is happening to you bring up a Terminal window *(/Applications/Utility/Terminal)* and type "ls /Volumes" to show all the mounted volumes. If this list doesn't reflect what you see on the screen you may relaunch the Finder. Also, you should check your Finder preferences to make sure you have checked the option to display mounted volumes on the desktop.

Finder volume shows as folder or /Volumes has folders

Some path circumstances in certain software can lead to a condition where the */Volumes* path has wrong information. The */Volumes* folder is supposed to contain the mount points to real file systems. Sometimes this can contain a real folder that is the name of a file system but is indeed just a folder. When this happens FibreJet will show the volume with a folder icon and sometimes this can happen in the Finder as well. If this ever occurs, make sure and look inside the */Volumes* path (you can use the *Go* command in the Finder to get there) and if you see real folders inside there they should be deleted to rectify this situation after you check inside to see if any data needs to be copied out of the folder onto a real disk.

Adding and removing storage from a FibreJet® SAN

Adding Storage

When storage is added to a FibreJet® SAN, its volumes are automatically added into the FibreJet® Database. Because Mac OS X takes a while (sometimes up to 30 seconds) to recognize newly added storage, it will also take FibreJet® a little while to add the new storage into the FibreJet® Database.

If storage is added that is not yet partitioned, you should enter *Volume Maintenance Mode* before partitioning or repartitioning the storage, and leave *Volume Maintenance Mode* when you are done with this step. The newly partitioned storage will then be added to the FibreJet® Database after a short delay.

Removing Storage

If you wish to remove storage from a FibreJet® SAN, and you are running your network with *Rogue Host Protection* turned on (see the Administration menu), then you should unmount all volumes associated with the storage to be removed on all machines, and enter *Volume Maintenance Mode* before

physically removing the storage from the SAN. The act of entering *Volume Maintenance Mode* will convert the partition map on the storage back to its standard format so that other systems can use the storage without FibreJet®. If you are not running your system with *Rogue Host Protection* turned on then you may skip the step involving *Volume Maintenance Mode*.

After emptying Trash the free space should be more

When operating in a multi-user shared volume environment a trash management policy should be established. Poor management could allow trashed files to accumulate causing loss of usable disk capacity until rectified. Loss off usable space may not be obvious or easily detectable by individual users. This is an artifact of how the ".Trashes" folder is handled by Mac OS X in multi-user environments and shared volume environments.

By Default the SAN is set to observe globally enforced user-permissions. The Administration Menu in FibreJet® has *Ignore Ownership by Default* un-checked. This then leaves the SAN-volumes open to observing the "Ignore ownership on this volume" check-mark (get-info on a write-mounted SAN volume in the Finder). With normal ownership being enforced the hidden ".Trashes" folder on volumes has sub-folders with the UNIX user number (e.g. 501, 502, 503 etc...) corresponding to the SAN-global (LDAP etc...) UNIX user ID. Trashed files are placed there and preserved independently among users as is normal multi-user Mac OS X behavior independent of FibreJet®.

A few suggestions to help manage trash are as follows; 1) have users regularly remember to empty their trashes when using the volume, or 2) have a "super-user" script that can be regularly be executed against the drive when write access is held which will empty all the ".Trashes" sub-folders, or 3) Devise a means to "automate" trash emptying when a user logs-out or shuts down, but before FibreJet® unmounts the volumes.

Is FibreJet in the I/O Path?

FibreJet is not required to perform Input / Output to the storage devices. File system reading and writing occur without interference from FibreJet. Without FibreJet installed you can still access all your SAN storage from a workstation. If you try this, make sure that is the only workstation turned on at the time, otherwise multiple workstations having access will corrupt your data.

This is the purpose of FibreJet installed on your workstation -- it prevents more than one workstation from writing to the same file system at the same time by regulating when and in what state a file system is mounted. Once mounted however, the OS accesses this and FibreJet does nothing.

Is FibreJet involved in writing the file system?

FibreJet is not a file system nor is it a storage system. FibreJet is not involved in writing the file system. FibreJet is something that works on top of standard, non-proprietary storage and file systems on the computer's Operating System (OS). Its primary purpose is to allow or disallow a file system being able to mount. When allowed to mount, FibreJet regulates whether it is mounted read-only or read-write. FibreJet prevents multiple workstations from gaining write access to the same file system at the same time.

This access gateway, allowing a file system to be mounted or not is the only role FibreJet has in interacting with the file system volumes of the OS. Once it is allowed to be mounted, FibreJet is not involved in what happens to read or write to the file system volume.

Can FibreJet corrupt a file system?

FibreJet cannot corrupt a file system because FibreJet does not write to the file system. In fact FibreJet's whole purpose as a product is to prevent file system corruption from occurring on a SAN. Without FibreJet, a Storage Area Network allowing disk access to multiple workstations would cause the file systems on those disks to quickly become corrupt. A SAN without FibreJet has no way to maintain cache coherence between accesses to metadata on the file systems that can be written. By coordinating who can singularly hold write access to file system at any given time, FibreJet prevents multiple workstations from gaining write access to the file system at the same time, thus preventing file system corruption.

This SAN architecture, called volume-level SAN, has vulnerabilities to file system corruption because anything that bypasses FibreJet's protection against multiple-writers will open the SAN up to possible corruption (as would happen if FibreJet was not installed for example).

If the user does not keep their workstations configured correctly, and does not address regular Volume Maintenance properly, they can open themselves up to more file system corruption over time than would occur on a disk that is directly connected to only one workstation as opposed to many workstations in the SAN case.

In addition, if the user improperly uses some advanced features of FibreJet, including force-dismounting, and/or force-releasing ownership, it could lead to a file system problem, if used improperly, because the file system might be in an inconsistent state or artificially create a multiple-writer situation. These cases are well known and should be avoided as outlined in the documentation and in this document.

My computer hung or crashed, why should I verify my file systems?

The computer OS has built file system checking and repair tools because file system corruption can and often does occur on heavily used workstations with a variety of different applications. There are not many users who have not experienced a computer hang or crash. Because this happens, more often on computers with a wide diversity of heavy use by multiple applications, it can be expected that sometime file systems issues will have to be dealt with accordingly over time. Identifying those cases quickly is the key to keeping things working smoothly.

Both hardware problems and software problems can lead to file system problems, prompting the need to verify that the file systems are in a consistent state. Some common sense must be applied to when likely problems can develop so that actions can regularly be taken to ensure consistent file system state.

A SAN hardware problem at just the right time might lead to an inconsistent file system. A workstation software problem, such as a hang or crash just at the right time might lead to an inconsistent file system problem.

If these occur it would be wise to take the time to verify the file systems your workstation had access to at the time, are in a consistent state, by following the regular volume maintenance procedures which allow you to verify and repair problems that might occur (as described later in this document).

Why do I need backups?

Despite what some people are taught about their system, everyone needs backups of one kind or another. One common misconception among people who purchase hardware protected RAID storage systems is that they cannot fail and are protected against failures and file system corruption. Nothing can be further from the truth! All kinds of software-based file system corruption can occur.

For these and other reasons, everyone needs to have backups. Especially of their most valuable data they can not live or operate their business without. The more backups and more often they are done the better, but exactly what kind of backup is something left for the customer to evaluate the risks to their particular situation.

We find a really useful type of backup system is an incremental backup system whereby only changes since the last backup are necessary, making the backups both small and very quick to perform relative to a full backup. Apple's Time Machine is a nice system as it allows you to go back in time and pick out groups of files for restoration from a time line of many versions.

Some environments deal with huge amounts of transient data in the form of film / video files in the process of editing a timeline. Often in these cases the raw material is already backed up somewhere or can be retrieved or recreated easily. In these cases the most important thing to have backup is the work product which is all the editing and special effects that have been applied to a timeline.

Why hardware RAID protected storage does not prevent file system corruption

While some hardware RAID provides some level of protection against hardware failures, some are better than others. If you do not invest in spare parts, such as extra controllers, SFP's, cables, switches and switch ports, and hot-spare drives, then you are open to disaster. If you do not rigorously monitor the health status of the RAID you are open to disaster.

We have story after story about people with RAID-5 protected storage who lose all their data because they weren't paying attention to one drive failure and they quickly are followed by another failure leaving all their data unrecoverable. This can happen because drives manufactured at the same time can also tend to fail around the same time. RAID-6 protected storage and survive two drive failures, so it is a little better. But in the end, if the user is not paying attention to the health of the RAID they can easily lose it all.

Another very common situation, even with a fully healthy RAID (from a hardware perspective), is the customer who thinks their RAID would somehow protect against file system corruption from occurring. This is not the case at all. A RAID protected hardware storage devices knows nothing about a file system, nor how it is structured. It only responds to raw read / write block commands from the workstations in a dumb fashion. Hence, the fact of life that anything that can corrupt a file system on a normal disk can corrupt a file system on a RAID-protected storage device.

Common Causes for and Prevention of Storage Area Network File System Corruption

There are generally two forms of Storage Area Networks in use today. Metadata server based SANs and Volume level SANs. Possible file system corruption causes differ between the two types of SANs.

Metadata server SANs use a server and a combination of ethernet for metadata traffic and another transport, such as Fibre Channel to transfer data. Volume level SANs do not need a server, and instead each workstation transfers the metadata and data over a transport such as Fibre Channel or iSCSI.

From a workstation perspective, a volume level SAN appears to be directly connected storage to the workstation OS. A Metadata server based SANs appears and functions with the OS more like a NAS (Network Attached Storage) because every I/O has to communicate to a Metadata server over Ethernet to transact the Metadata for I/O before it can transfer data for the I/O over the SAN. Metadata server SANs require a server whose sole purpose is to sit and be the only one to transact file system metadata in a dedicated fashion, similar to dedicated NAS servers.

General Causes for File System Corruption

File system corruption occurs when the Metadata of the file system becomes inconsistent. Metadata is information that keeps track of how a file systems data is mapped to the sectors on storage. This includes such information as what blocks are allocated to what file, which blocks are free, the names and attributes of the files and directories, and the hierarchal arrangement of files and directories on the file system volume.

Because of the fundamental difference in architecture, the potential causes for file system corruption differ between the two types of SANs due to what workstations can potentially make the Metadata of the file system inconsistent.

The case of corruption to a file system in a Metadata based SAN as compared to corruption on a normal workstation with direct attached storage (e.g. internal drive) is almost virtually the same because a single workstation is the only one manipulating the Metadata for the file system. The most common cause for corruption in these cases involve the computer hanging or crashing at just the right time leaving the Metadata in an inconsistent state. Another common corruption cause is hardware failure anywhere along the I/O path to the physical drive.

Volume level SANs have all the same potential causes for file system corruption mentioned above plus a few others. The additional potential causes for file system corruption mainly stem from the fact that each workstation zoned into a volume-level SAN has direct access to the Metadata for a file system since the disks appear to the workstation to be directly attached. One additional cause is that those workstations are operating other applications instead of singularly severing out metadata. Those other applications and uses give way to a high chance of hanging or crashing the computer while also being responsible for the file system Metadata. Another factor is the additional physical exposure of the Metadata to multiple workstations, giving way to a higher chance of multiple-writer situations that have to be avoided.

The following are common events that can lead to file system corruption in these SANs:

1. Taking over write access of a file system via misuse of force release
2. A process holding open files on a file system making dismount not function or force-release
3. Unable to dismount a file system, refresh a read-only mount, or release ownership

If these events happen in the wrong circumstances, or you are not sure, you should perform volume maintenance to make sure the file system is still in a good state.

Do not improperly force release ownership of a file system volume so you can mount it writable if someone else has write access. This causes a multiple-writer situation whereby more than one workstation can change the Metadata of a file system thus leaving it in an inconsistent state that will require it to be repaired as soon as possible.

If you cannot unmount a volume to properly release write ownership, also do not force unmount it nor force release ownership from the station from another workstation to gain write ownership. This causes a multiple-writer situation where more than one workstation is changing the metadata leaving it in an inconsistent state. Also, force dismounting at the wrong time can lead to hangs or crashes which can lead to needing volume maintenance.

Whether on Macintosh or Windows, many processes can cause the same things preventing file system state changes. Many processes can hold open files preventing them from being unmounted. A QuickTime process is sometimes known for improperly holding something on a volume preventing it from unmounting. Activity Monitor can show this and force quitting this process will then allow the volume to be unmounted or refreshed. Final Cut Pro is also known to hold onto volumes. These are just a few.

Non-SAN users don't experience these because they always have all their file systems mounted all the time. Only in a SAN environment do users expect to change what and how they are using groups of storage.

This document will help you deal with these and other cases that may arise. If you follow the advice in this document you can keep your file systems in

healthy condition or catch and fix issues early before they cause bigger problems.
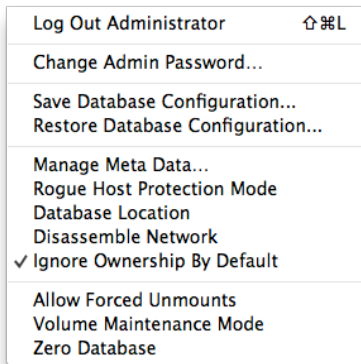
Best Practices for Volume Maintenance and keeping repairs to a minimum

CommandSoft strongly recommends all SAN administrators implement regularly scheduled SAN health checking and volume maintenance. FibreJet Preferences window has some options that can impact when and how often Volume Maintenance should be performed:
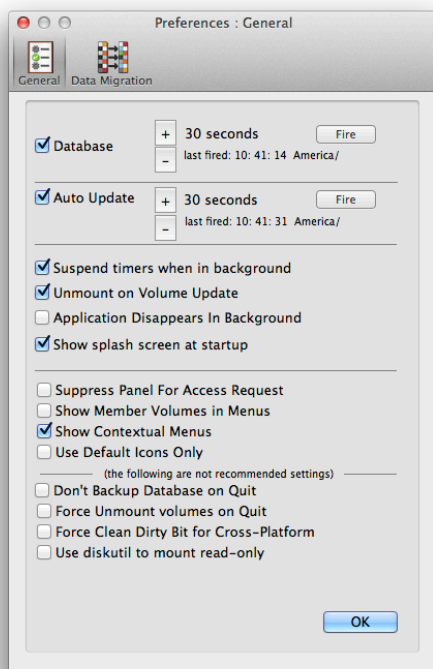
Force unmount volume on Quit

If the OS or another process has open files on a file system volume, then the OS will not allow the volume to be unmounted. This can occur for a variety of reasons, none of which are related to FibreJet nor under the control of FibreJet. Applications, OS, as well as processes can hold onto volumes for various reasons. This preference, and the corresponding option in Administration mode menu "Allow Forced Unmounts", were created to allow users to take drastic actions to unmount these volumes.

```
Log Out Administrator                ⇧⌘L
Change Admin Password...

Save Database Configuration...
Restore Database Configuration...

Manage Meta Data...
Rogue Host Protection Mode
Database Location
Disassemble Network
✓ Ignore Ownership By Default

Allow Forced Unmounts
Volume Maintenance Mode
Zero Database
```

Even the OS Finder itself similarly presents this option (to force unmount) when trying to unmount or eject a disk that is held onto by other processes. Although users demand this ability, it presents a problem for those processes responsible for holding onto those volumes. In some cases, they are processing data on that volume for a valid purpose and forcing the volume to go away can have negative impacts to running applications as well as the consistency of the file system or individual file contents.

If the user is not very careful about how and when they force unmount something, they could be adding problems to their system and possibly causing problems on the file system.

If a read-only mounted volume is force unmounted, then the file system itself is not affected. However an application relying on that volume may hang or crash, leading to problems on other write-mounted volumes potentially.

If a volume that is mounted writeable is force unmounted, then not only may the workstation hang or crash, but it is possible it may leave the volume in an inconsistent state needing volume maintenance.

This problem is noticed more in a SAN environment, because only in a SAN environment does the situation arise where a user is used to mounting and unmounting sets of volumes depending on what they are doing. In a normal environment with internal drives, they are in one state, e.g. mounted writable at all times, with no expectation of changing their state or being unmounted.

For these reasons, it is not recommend that these options are used, unless the user is willing to perform the required volume maintenance as a result of choosing to use force unmounting.

Unmount on Volume Update

Updating a read-only volume requires it to first unmount. This sometimes lead to force-unmounting when it cannot be unmounted. In the preferences, there is a option called "Unmount on Volume Update", that if unchecked, will utilize a Macintosh OS feature available in certain OS releases that allows the contents of the read-only volume to be partially updated without it being unmount. This can be used to a limited extent if you find yourself unable to update the read-only volume in the normal way by having it first unmount.

Force Clean Dirty Bit for Cross-Platform

This advanced, and not recommend option, was developed in response to SAN users in cross-platform Windows and Macintosh environments where the file systems were HFS based and MacDrive was used on the Windows side to mount the HFS volumes.

When a HFS file system is mounted writable, a dirty bit is set in its volume header to indicate to the system is has not cleanly been unmounted (e.g. the workstation may have crashed). In the case where the computer hangs or crashes, this dirty bit is an indication to the OS when it encounters the file system that it requires a file system check because it may be inconsistent, needing repairs. This is done, and usually any minor problems due to the crash are handled.

What was happening on the Windows side using older version of MacDrive is that MacDrive refused to mount a HFS disk if its dirty bit was set. For SAN users, this meant if someone had the HFS drive mounted writable, then no one on the Windows side could mount it read-only until the user with write access unmounted the volume (thus indicating a cleanly unmounted file system).

This option mitigated that situation by periodically flushing the volume and artificially clearing the dirty bit, thus allowing MacDrive to mount the drive read-only. The OS when writing to the drive so this option was a limited solution to the problem however rewrites the dirty bit very often.

More recent version of MacDrive present the user with the option to mount the drive anyway when it notices the dirty bit is set. Also, a competing product called Paragon HFS allows HFS drives on Windows and does not have the same issue MacDrive has with mounting the volumes. Together, this makes using this option no longer necessary.

The problem with forcing this bit to clean of course is that if there indeed is a problem with the file system that was not addressed, the problem goes unnoticed and can accumulate with other problems over time necessitating the need to perform volume maintenance to fix all the issues.

For these reasons, it is not recommend that this option be used, unless the user is willing to perform the required volume maintenance as a result of choosing this.

SAN Heath Checking

Read the section on SAN Heath Checking window. This is where you may configure a workstation to automatically check disks at a preconfigured time and archive a report of the results. You can also have the software email you if there are problems you need to be made aware of. If problems are reported, it is time to do Volume Maintenance and repair the file systems as soon as possible.

Check on Write Mount Volume Info option

You should also read the section describing the Write On Mount checkmark under the Volume Information window inside Administration. This is where you can force a file system check to be performed any time a volume is mounted writable. You can also configure it to only allow mounting if there are no problems found. You can also be emailed results so you can be alerted if the file system needs to be repaired as soon as possible.

Improper use of Force-Release Ownership

FibreJet maintains information on what workstation has ownership of a file system volume allowing it to be mounted writable. This is how it prevents more than one workstation from gaining write access at a time.

An advanced feature allows clearing this information, which amounts to force-releasing ownership of the file system volume. The sole purpose of this feature was to clear a potential situation where a workstation that owns write access to a file system crashes, leaving this state in the database.

If this workstation was for example broken and taken off of the SAN then this ownership would be maintained preventing anyone from obtaining write access to the file system volume, where in reality no workstation had write access. This would clear this situation.

However, some users mistakenly assume that a workstation does not have the file system mounted writable (when it really does), and force release ownership so that they can grab write access. The problem with this is that force release ownership only force releases the ownership information, and does not ensure that the file system volume is not actually mounted writable on the workstation in question.

Therefore, if used without physically verifying that the workstation in question does not have that file system mounted writable, the user will be creating a multi-writer situation. This directly leads to file system corruption that must immediately be address with volume maintenance.

How to perform Volume Maintenance

Ideally for utmost safety, Volume Maintenance should be performed when no one is on the SAN, and all volumes are unmounted by all workstations, and all workstation are turned off. However, if done carefully, it can be performed on individual file systems that workstation maintains ownership for via FibreJet.

If you have write access to a file system volume via FibreJet then that ownership will prevent other users from gaining write access to the volume. In this case, you can perform volume maintenance on the file system you own.

NOTE: You must be careful not to do anything to any other file system volumes, since while in volume maintenance mode you could unintentionally mount writable another file system that another workstation also has mounted writable. This would create a multiple-writer situation compromising the file system consistency. This is why it is safest to have no one else using the SAN with any mounted volumes when doing volume maintenance.

To enter Volume Maintenance Mode, go into FibreJet Administration mode, and from the Administration menu select "Volume Maintenance Mode". When you are finished with all maintenance, you can leave Volume Maintenance Mode by clicking the "Leave Volume Maintenance mode" button.

Alternatively, if you are not running FibreJet, you can enter Volume Maintenance Mode by using the FibreJetCLI command line interface. From a Terminal or Command Prompt change directory into the "/Applications/CommandSoft/FibreJet/FibreJet.app/Contents/MacOS " (or equivalent Windows path) and type "FibreJetCLI --maintenancemode ON".

On Macintosh, you can also use the FibreJet System Preference panel to enter Volume Maintenance Mode as illustrated.
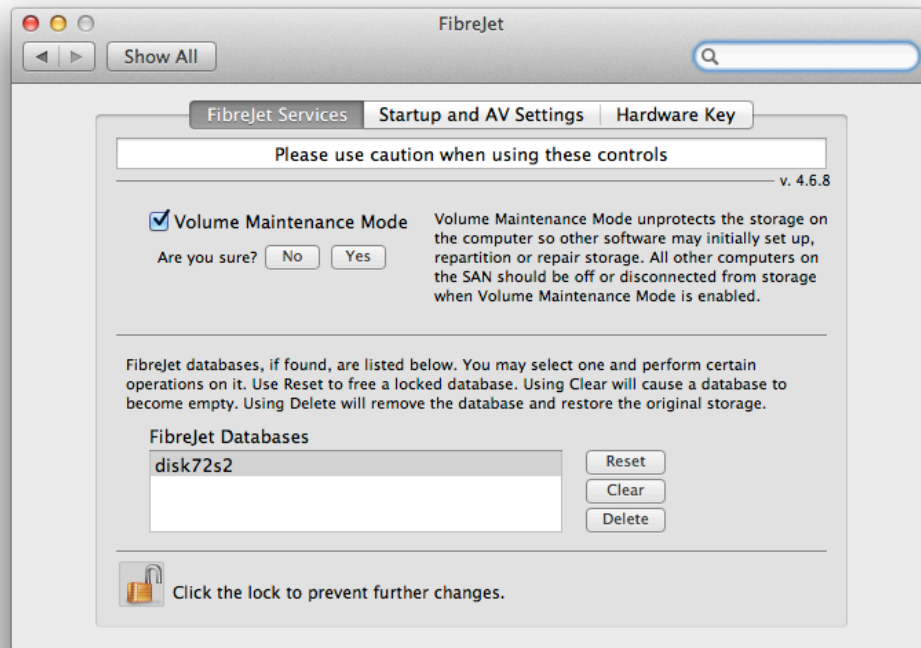
Once in Volume Maintenance Mode, there is nothing on that workstation protecting from any software from mounting the storage read/write. This is why the user must take care to not mount writable a file system that another user may be using at the time and why it is recommended all volumes be dismounted on all workstations and no user be using the SAN while maintenance is occurring.

The next step is to perform file system verification or repair on the file systems you wish to perform maintenance. This is done different ways depending on which operating system you are using and which utility you are using. On Macintosh, the built in Disk Utility is often used to verify and repair disks. You will see a "Verify Disk" and "Repair Disk" button when the

file system is selected. Some types of problems can not be fixed with Disk Utility and are better repaired using a third party utility called Disk Warrior (http://www.alsoft.com/diskwarrior/). On Windows you can use the "CHKDSK driveletter:" command to verify a disk and "CHKDSK driveletter: /F" to repair, where driveletter is something like H: for example. There are also alternative ways to do the same thing on Windows.
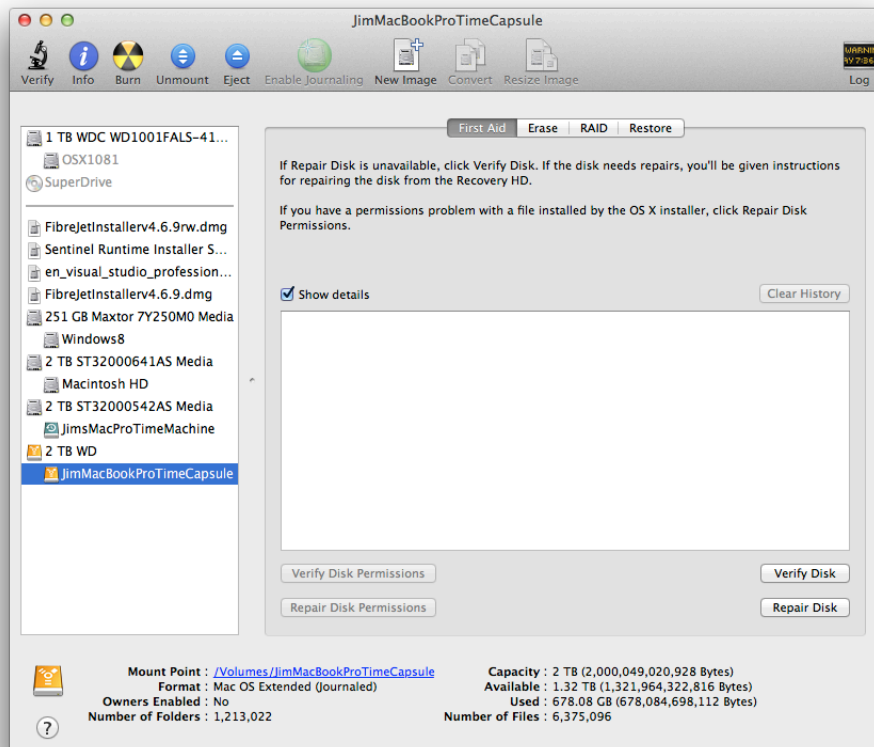
Once all file system that needed volume maintenance have been verified or repaired turn Volume Maintenance Mode back off.

How to determine what processes are holding open files on a volume preventing it from being unmounted or refreshed

Under a normal computing environment without a SAN, users do not expect to mount and unmount different storage during the boot cycle. Because they interact with storage that is always mounted read/write they are unaware if any applications, processes or the OS itself is holding open files on any file systems.

Open files on a file system prevent a volume from dismounting. SAN users expect to switch the state of storage sets during the boot cycle, often dismounting or mounting read-only or read/write during the boot cycle.

This SAN use often leads to a situation where volumes are unable to unmount due to open files. On Macintosh, the Finder will present an option to the user to force-unmount a volume. On Windows, certain operations requiring the volume to be unmounted, will give the user a similar option to force-close all open Handles (e.g. open files). FibreJet follows this OS model, and allows preferences to be configured to allow force-unmounting and to force-unmount on quit.

The problem with force unmount is in some cases it will cause your computer or applications to hang or crash because someone was actually relying on using that volume or files therein. This can also in some cases lead to minor corruption of the file system necessitating volume maintenance.

Another user situation sometimes arises out of this in that a user is unable to release write ownership of a volume because of open file. This then leads someone on the SAN to force-release ownership from this workstation thus creating a multiple-writer situation which quickly leads to file system inconsistencies again necessitating volume maintenance.

Therefore, great care must be taken when using any of these advanced features, to ensure the file system is left in a healthy state. When it is suspected one of these advanced features are necessary, such as force-unmounting, there are some tools that can be utilized to help determine what processes are actually holding open files and if it prudent to proceed to force-umount a file system volume.

Mac OS X 10.8.x (Mountain Lion) and the case for open files

It has come to our attention that Mountain Lion has a curios feature (bug?) that can often hold open files on a file system volume for no apparent reason. Then, after a period of time (15 minutes sometimes) all of a sudden the file system can be unmounted. In this case, the tools described next do not show any processes holding open files on the file system, nonetheless the file system will not normally unmount. It can be argued that in this case, it might be OK to use force-unmount.

Determining open files under Macintosh

Sometimes it is obvious what is holding open files on a file system volume preventing it from changing states, such as dismounting. There are also times when you have quit all open applications and are still unable to dismount a file system.

There are system processes that can get started as a result of another application, such as QuickTime processes, that have been shown to hold onto a volume after everything is finished. You can see this using the Activity Monitor application in the /Applications/Utilities folder. Other times, it is a system process, for example related to Spotlight indexing, called mds or mdworker that processes metadata and creates the Spotlight index database. More often than not, tracking down what is causing this is even more elusive.

The primary Unix commands for determining open files on file systems are `lsof` and `fuser`. To list all the open files on all file systems mounted through the `/Volumes` path type the following into a terminal window:

```
sudo lsof | grep /Volumes
```

This would output something like:

```
COMMAND    PID          USER    FD      TYPE         DEVICE  SIZE/OFF    NODE NAME

notifyd    19           root    50r     DIR          1,1     4556        130
/Volumes/OSX1081/System/Library/CoreServices

notifyd    19           root    51r     REG          1,1     986272      326408
/Volumes/OSX1081/System/Library/CoreServices/boot.efi

notifyd    19           root    52r     REG          1,1     478         332859
/Volumes/OSX1081/System/Library/CoreServices/SystemVersion.plist

notifyd    19           root    53r     REG          1,1     3418        207388
/Volumes/OSX1081/System/Library/CoreServices/PlatformSupport.plist

notifyd    19           root    54r     REG          1,1     533         346990
/Volumes/OSX1081/System/Library/CoreServices/.disk_label

...

mds        44           root    txt     REG          1,1     863         348981
/Volumes/OSX1081/.Spotlight-V100/Store-V2/FCE53424-3E3A-4B23-852E-
017BF01C8EF8/live.0.indexGroups

mds        44           root    txt     REG          1,1     8           348987
/Volumes/OSX1081/.Spotlight-V100/Store-V2/FCE53424-3E3A-4B23-852E-
017BF01C8EF8/live.0.indexCompactDirectory

mds        44           root    txt     REG          1,1     2056        348986
/Volumes/OSX1081/.Spotlight-V100/Store-V2/FCE53424-3E3A-4B23-852E-
017BF01C8EF8/live.0.indexDirectory
```

You can also use `fuser` to list all the process numbers with references to a volume. If the volume name was `MEDIA` you would type:

`sudo fuser –c /Volumes/MEDIA/`

This would output something like:

`/Volumes/OSX1081/: 17 19 44 330`

The numbers identify the processes involved. To find additional information, for example on process 44, you would use the following.

`ps -p 44`

Which would give some further insight into process 44:

```
  PID TTY           TIME CMD

   44      ??                                                     0:47.71
/System/Library/Frameworks/CoreServices.framework/Frameworks/Metadata.framework/Support/m
ds
```

Once you have shed light on which processes are holding open references on the file system in question, you have to make a judgment call as to what to do next from one of the following:

A. Reboot computer
B. Kill the processes involved and try again to dismount
C. Force dismount the volume

Sometimes the processes are actually doing something they are supposed to do on the file system in question, such as indexing the volume or processing some media. Other times there may be a bug in the process and it should not be holding onto anything on the file system.

What should you do? Rebooting the computer is always the safest option. If you kill the process in question you could interfere with potentially legitimate work it was doing and possibly leave it in a inconsistent state that may effect whatever files it was processing. If you simply force-dismount the volume then you are taking away the processes ability to continue doing its work, which could potentially hang / crash the machine. As discussed earlier, hanging / crashing a machine or doing something at just the wrong time can effect a file systems integrity leading to the need for Volume Maintenance.

If it is a running application holding the file system open, you can simply quit the application (or force-quit if it is hung). Force quit is available in the Apple menu. If you decide to kill processes, you can use Activity Monitor to do this, or from a command line (Terminal) you can type the following, to kill process 330 for example, you would type:

```
sudo kill -9 330
```

You will have to develop a sense of what is the best course of action (option A. B. or C.) for what you are facing. After dealing with one of these options, it is always a good idea to at least verify the file system in question so that you can learn whether the action you took lead to any problems to be aware of in the future.

Determine open files (Handles) under Windows

The primary method for determining open files on Windows is a set of tools called SysInternalsSuite. This can be accessed via http://technet.microsoft.com/en-us/sysinternals.

Handle (handle)

Process Explorer (procexp)

From and Command Prompt you can run `handle` and see output like this:

```
------------------------------------------------------------------------
cmd.exe pid: 3340 JIMWOLFF\Jim

    8: File  (RW-)   C:\SysinternalsSuite

   70: File  (RW-)   C:\Windows\WinSxS\amd64_microsoft.vc90.crt_1fc8b3b9a1e18e3b
_9.0.30729.6871_none_08e717a5a83adddf

------------------------------------------------------------------------
conhost.exe pid: 3376 JIMWOLFF\Jim

    C: File  (RW-)   C:\Windows

   34: File  (RW-)   C:\Windows\WinSxS\amd64_microsoft.vc90.crt_1fc8b3b9a1e18e3b
_9.0.30729.6871_none_08e717a5a83adddf

   7C: Section       \Windows\Theme749229330

   80: Section       \Sessions\1\Windows\Theme3696839717
```

```
   A4: File  (RW-)   C:\Windows\WinSxS\amd64_microsoft.windows.common-controls_6

595b64144ccf1df_6.0.9200.16384_none_418c2a697189c07f

   BC: Section        \Sessions\1\BaseNamedObjects\windows_shell_global_counters

   CC: File  (R-D)   C:\Windows\Fonts\StaticCache.dat

------------------------------------------------------------------------------

handle.exe pid: 5004 JIMWOLFF\Jim

   10: File  (RW-)   C:\Windows

   24: File  (RW-)   C:\SysinternalsSuite

   40: File  (RW-)   C:\Windows\WinSxS\x86_microsoft.windows.common-controls_659

5b64144ccf1df_5.82.9200.16384_none_bf100cd445f4d954

   6C: File  (RW-)   C:\Windows\WinSxS\x86_microsoft.vc90.crt_1fc8b3b9a1e18e3b_9

.0.30729.6871_none_50944e7cbcb706e5

------------------------------------------------------------------------------

handle64.exe pid: 556 JIMWOLFF\Jim

   18: File  (RW-)   C:\SysinternalsSuite

   20: File  (RW-)   C:\Windows\WinSxS\amd64_microsoft.windows.common-controls_6

595b64144ccf1df_5.82.9200.16384_none_7762d5fd3178b04e

   54: File  (RW-)   C:\Windows\WinSxS\amd64_microsoft.vc90.crt_1fc8b3b9a1e18e3b

_9.0.30729.6871_none_08e717a5a83adddf


C:\SysinternalsSuite>
```

From here you can run `procexp` to kill the process in question if desired.

Alternatively, if you know the file causing problems, but you want to know who is holding access, you can use a product such as `Unlocker` from http://www.emptyloop.com/unlocker/ or WholLockMe from http://www.dr-hoiby.com/WholLockMe/. When installed you can right click on the file and run these to list what process is using the file.

Turning off Spotlight indexing because it is preventing dismounting or refreshing

If you find Spotlight is the one interfering with dismounting file systems, you can control individual volumes use of Spotlight several ways. Through FibreJet you should have the volume in question mounted writable:
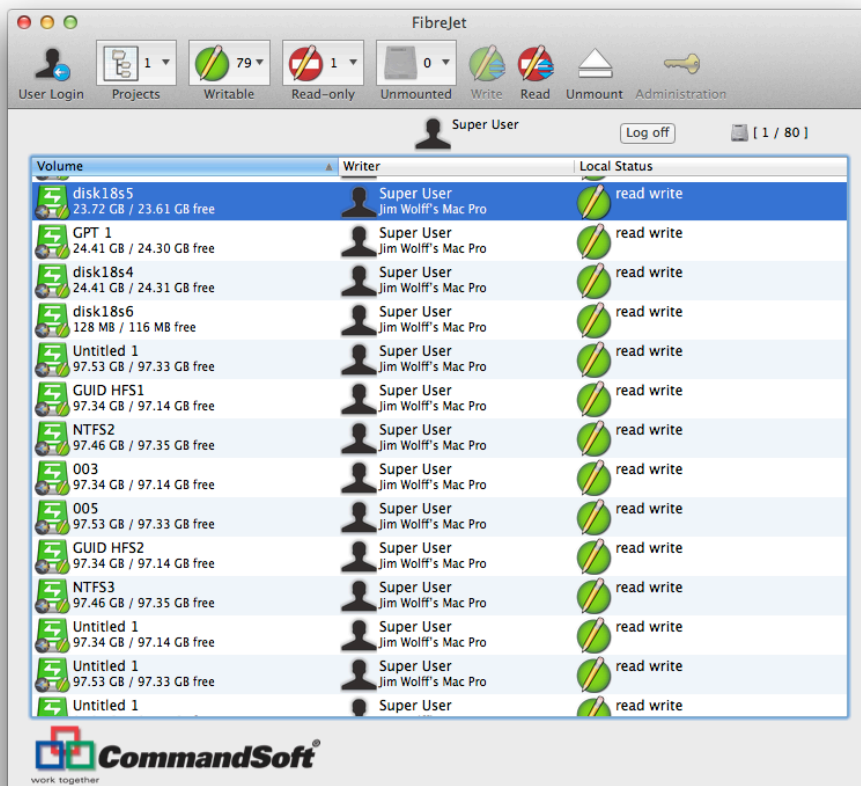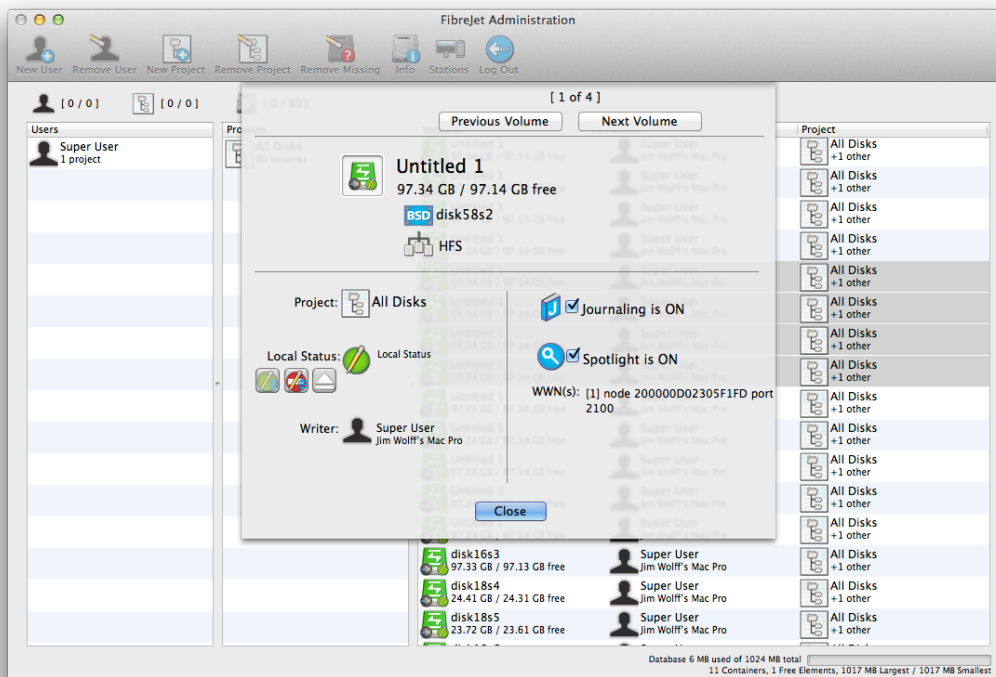
Then, from Administration mode you can select the file system volume you want to change the Spotlight state and either use the Volumes menu:
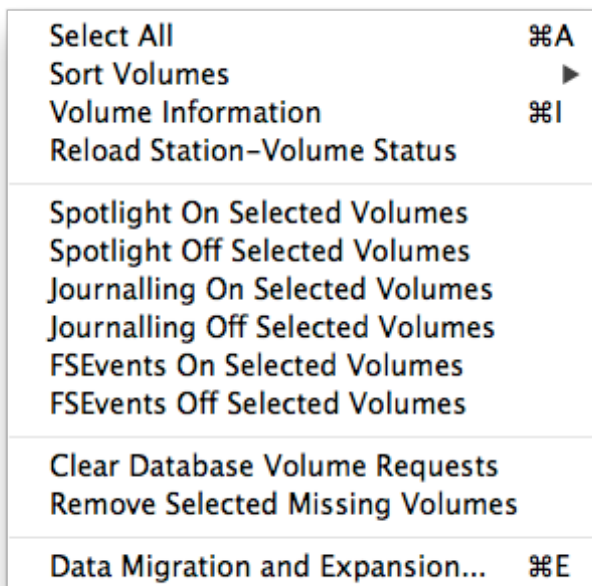
You can also use the Info button to do this, which will bring up the following:

From here you can see the options to either disable or enable Spotlight for the volume. This will effect the volume SAN-wide. From the Terminal you can also use `sudo mdutil` directly to change aspects of Spotlight:

```
jim-wolffs-mac-pro-2:~ jimwolff$ sudo mdutil

Password:

Usage: mdutil -pEsa -i (on|off) -d volume ...

        Utility to manage Spotlight indexes.

        -p              Publish metadata.

        -i (on|off)     Turn indexing on or off.

        -d              Disable Spotlight activity for volume (re-enable using -i on).

        -E              Erase and rebuild index.

        -s              Print indexing status.

        -a              Apply command to all volumes.

        -V vol          Apply command to all stores on the specified volume.

        -v              Display verbose information.

NOTE: Run as owner for network homes, otherwise run as root.
```

To completely disable or reenable Spotlight on an individual workstation you can use the following from a Terminal:

```
sudo launchctl unload -w /System/Library/LaunchDaemons/com.apple.metadata.mds.plist

sudo launchctl load -w /System/Library/LaunchDaemons/com.apple.metadata.mds.plist
```

Turning off Avid indexing Service because it is preventing dismounting or refreshing

On Windows, the AVID DS Nitris product has an indexing service that runs on the machine and can prevent changing states of file systems once mounted. If you stop that service, change states, and then restart the service you can avoid these problems. Use the Windows Service Control Manager to find and control this service:
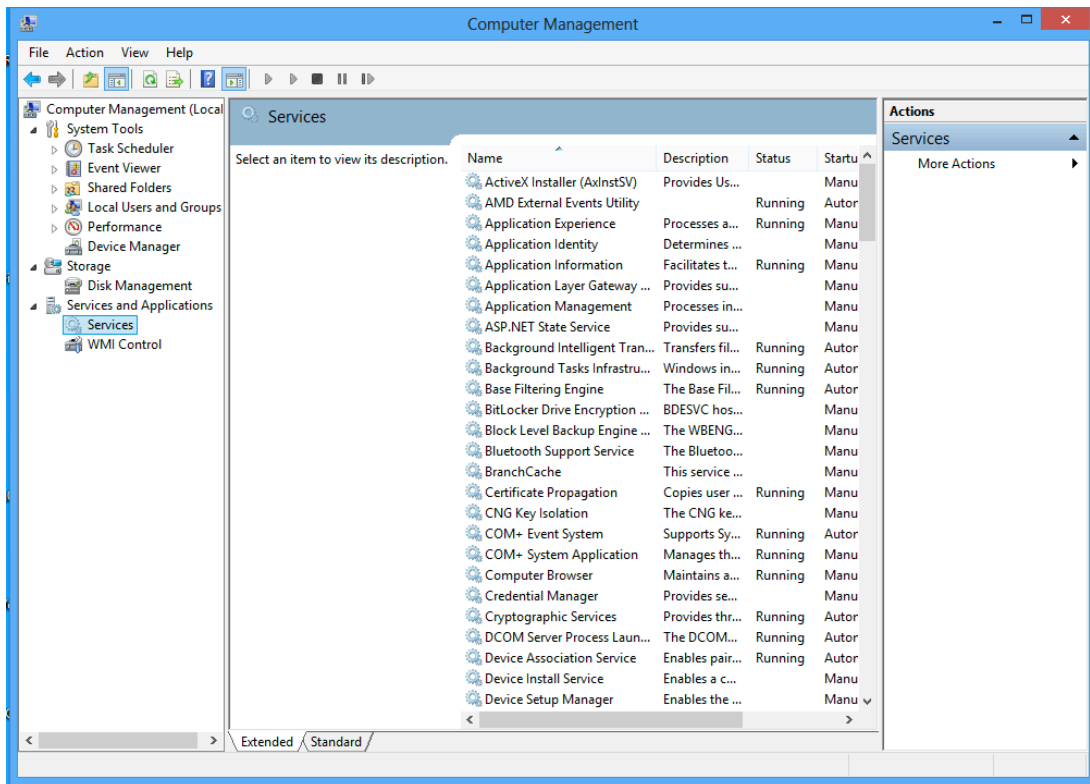
You can get to this by right-clicking Computer and selecting Manage. Then scroll through the services to find the AVID one which will allow you to stop and start it as needed.

Disabling boot file system checking on Windows

If you assign Drive letters to SAN volumes, then it is possible for Windows to encounter the drive early in the boot process. When this happens before

any FibreJet software is running, it can not prevent the file system from being checked or repaired by the Windows OS. If another SAN workstation has these drives mounted writable, and this workstation boots, it will see these as needing repair. This can lead to problems.

You must mark the SAN file systems on each workstation to disabled this automatic disk check and repair during boot. If you SAN file systems are drive letters D:, E: and F: you would type the following in a Command Prompt to configure this:

```
chkntfs /x D: E: F:
```

Once configured, this workstation will not perform this automatic check. Other options are /D to restore defaults, /X to exclude and /C to schedule a file system to be checked.

NOTE: FibreJet 5.x for Windows now does this command listing all SAN volumes each time it is start up.

FibreJet database requirements

It is recommended that a separate LUN (disk, logical unit number), about 1 GB in size, be put aside on the SAN to become the FibreJet SAN Database. It is also recommended that the LUN that contains the FibreJet database not be used to also contain file system volumes. The usual way this is accomplished is by having the administrator configure the RAID to publish a separate LUN to the SAN for this purpose.

Another requirement is that the database LUN not be disk 0 on the system. You can see this in Disk Utility (on Mac by looking at its BSD name) or Disk Management (on Windows by looking at its Disk number). Rarely this occurs because usually disk 0 is assigned the internal boot drives of the system. However it is known to happen. If this occurs, it is usually because the database LUN was made the first LUN to be published from the RAID controller. Make sure the database LUN is not the first LUN created on the RAID controller to avoid this situation.

The database LUN must also be 512 bytes per sector. When creating a LUN sometimes people create the LUN block size as something other than 512 (e.g. such as 4096 or 8192). This can not be the case for the database LUN.

To create a cross-platform compatible FibreJet database, partition the LUN on a Macintosh using APM or GUID Partitioning scheme and create a single HFS+ partition 1 GB in size called FibreJet. To create a windows-only FibreJet database the LUN must be a simple MBR partition 1 GB in size named FibreJet (NTFS or FAT).

Once the FibreJet application is launched and the database is created, you can then bring other SAN stations online by booting them. They must boot after the database is created otherwise they will not recognize the database partition.

Partitioning SAN storage

For maximum compatibility across platforms, it is recommended that SAN file systems be partitioned as GUID Partition Type Scheme (GPT), and not Apple Partition Map (APM)

SAN workstation read the layout of the SAN storage partitions only once during system startup. If storage is partitioned while other workstations are online, they will not recognize the new partitions. Indeed, what they will see is the old partitions and the old volumes on that storage. If you try to use that old "view" of the storage, then you will be corrupting the new format written by the one workstation that partitioned the storage.

Therefore, anytime storage partitions are reconfigured it is safest to do this with all other workstations turned off. You must be in Volume Maintenance Mode to be able to repartition SAN storage. Once you have repartitioned the SAN storage, and have given FibreJet the opportunity to recognize the new storage on one workstation, then the other workstations can be turned back on.

Technically, if you do not change anything in the "partition map" in terms of size or allocation of where the file system is located you should not have to be so strict. However, it turns out the utilities for partitioning storage are unpredictable in this respect. Even if they appear to not change the "size" or "position" of anything, we have observed otherwise. Therefore, the only safe move without being so strict is to restrict SAN file systems changes to only erasing the contents of a file system (which is totally different than the repartition case).

Cross-platform considerations when Partitioning

If Macintosh and Windows need to access the same storage, it is recommended you choose a file system that is native to the majority of the SAN workstations for cross-platform use. If that choice is NTFS, then you will need Paragon NTFS on the Macintosh side to access those read/write. If that choice is HFS+, then you can use Paragon HFS on the Windows side. If you do use Paragon HFS you must partition your HFS+ file systems using the GUID Partition Type Scheme (GPT), and not Apple Partition Map (APM), otherwise FibreJet will not be able to see those file systems on Windows. Alternatively, you can use MacDrive on the Windows which does work with both GPT and APM type partitioning with FibreJet, however it has the issue with mounting volumes with dirty-bit set (see the sub-section Force Clean Dirty Bit for Cross-Platform).

Contacting CommandSoft Support

Following the advice in this document should help you keep your file systems in tiptop shape. If you have questions contact CommandSoft support at support@commandsoft.com or by calling 805-730-7772.

work together

CommandSoft, Inc.

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Santa Barbara, CA 93101 U.S.A.

www.commandsoft.com

5: Menu Reference

Administration Menu

Log Out Administrator		Shift+Ctrl+L
Change Admin Password...		
Save Database Configuration...		
Restore Database Configuration...		
Manage Meta Data...		Ctrl+Alt+M
SAN Health Checking...		
FibreJet Services...		
Disassemble Network		
Zero Database		
Generate Support Diagnostics...		
Allow Forced Unmounts		
✓	Startup in Database mode	
✓	Use Centralized Database Only	
Convert SAN Volumes to Non-DB Mode		
Convert SAN Volumes to Database Mode		

FibreJet® Administration Menu

Log Out Administrator

Logs out of Administration mode and returns to user mode.

Change Admin Password

Changes the Administration password.

SAN Health Checking…

Brings up the SAN health-checking window. Please see the chapter on SAN health setup for more information.

FibreJet Services…

Please see this information in the alternative way to go into VMM above.
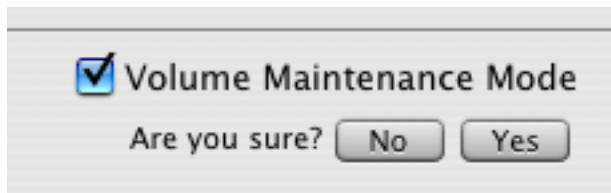
New Project…

Creates a new project.

Database Location

Displays information about other volumes on the same device as the database. This can be useful in finding the Database volume in Disk Utility.

Alternatively you can use the *Volume Information* sheet (described earlier) to see the BSD name of a file system, which can assist in finding the same file system in Disk Utility. The FibreJet® System Preference panel also will list the volume names associated with the database, if any of them are mounted. The volumes must be mounted in some state for this window to show those that are also on the same storage as the database partition.
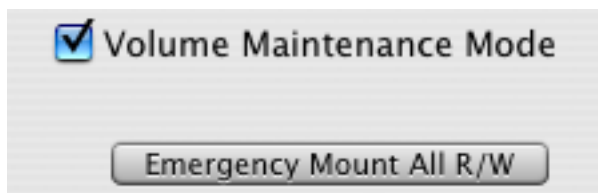
Volume Maintenance Mode (VMM)

Volume Maintenance Mode allows other software, such as disk repair and partitioning utilities to control the disks in order to function correctly. If the network is in *Rogue Host Protection Mode* when entering VMM, it will be taken out of this mode until leaving VMM. Once checked, you must confirm by clicking the *Yes* button below the checked VMM option to place the system in VMM.

VMM Confirm buttons YES and NO

Emergency Mount All R/W button while in VMM

VMM Emergency Mount All R/W button

Each time the computer is started, FibreJet® prevents SAN attached volumes from mounting. In special cases, the Administrator may need to have the volumes mounted outside of FibreJet®'s control. One of these cases may be when setting up a new network or performing partitioning of disk repair on an existing network. The Administrator can use the *Emergency Mount All R/W* button in this case to mount the SAN volumes with Read/Write access.
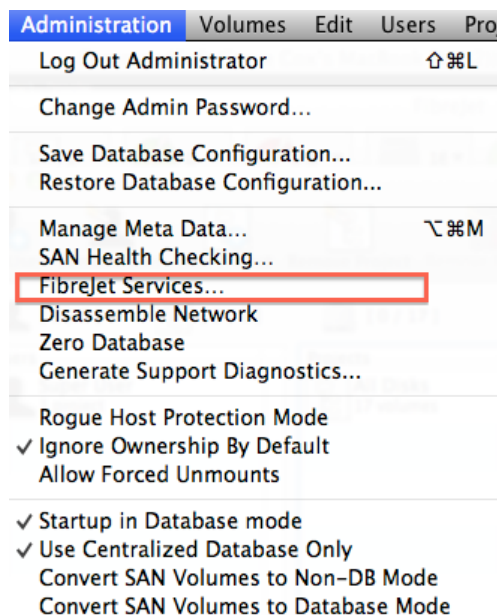
NOTE: While FibreJet® is actually running, the *Emergency Mount All R/W* button will appear to do nothing. This is because FibreJet® is preventing the volumes from actually being allowed to mount. If you need this feature,

make sure that FibreJet® is not already running. If it is, quit the application. Be aware that FibreJet® may be setup to automatically launch when you log into the computer as a startup item, so check that it is not running if you need this functionality.

WARNING: This should only be done if this is the only station on the SAN with volumes mounted, otherwise it could result in multiple-writers corrupting the file systems. It should also not be done by any user, but only the designated Administrator of the SAN.
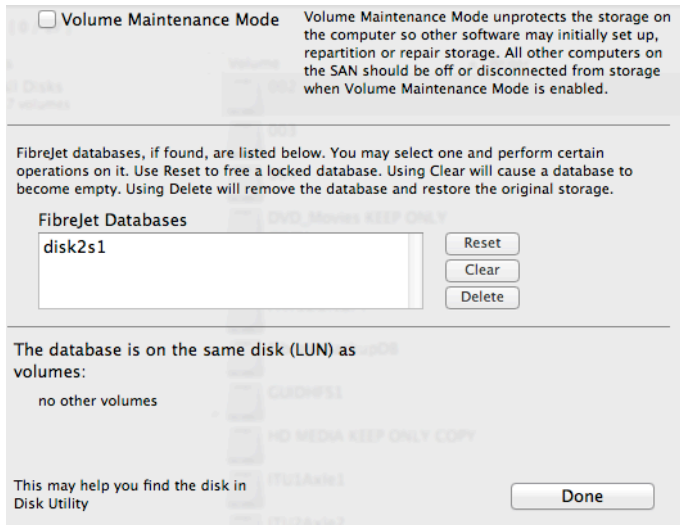
Single Volume, Volume Maintenance Mode and Admin VMM

The 2nd area that this Volume Maintenance mode can be found is inside the FibreJet application in itself. In order to access this area log into FibreJet then go into Administration mode. And select the administration drop down tab as you see below.
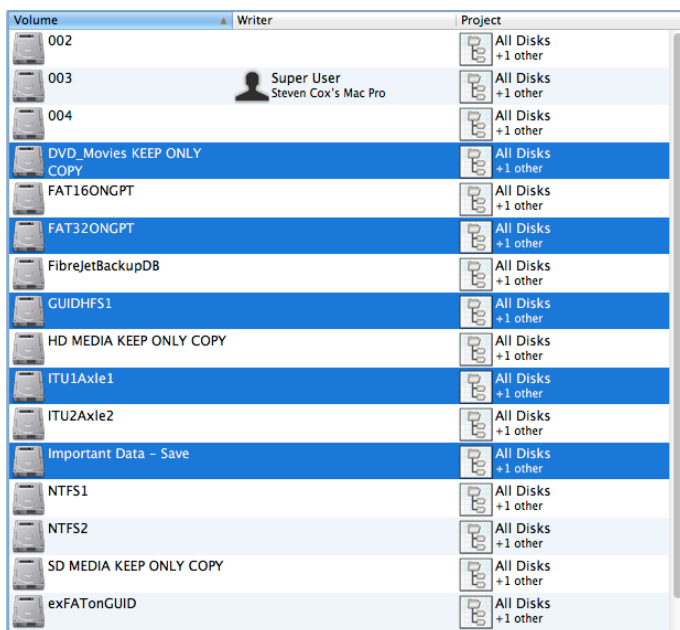

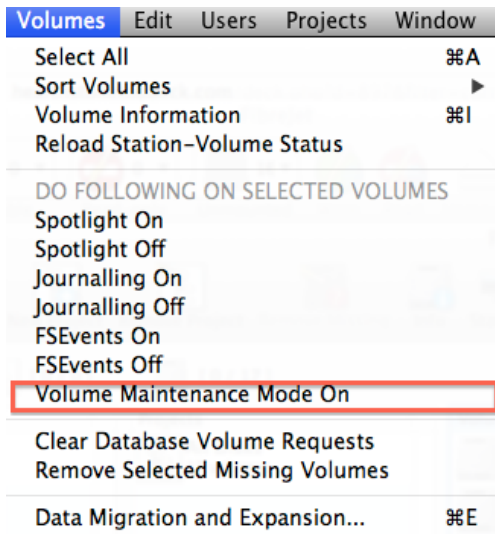Select the FibreJet Services; you will then see a new window appear.

You can then go into VMM from there, as you can see this is where the FibreJet Services panel was moved into the application from the System Preference Pane version.
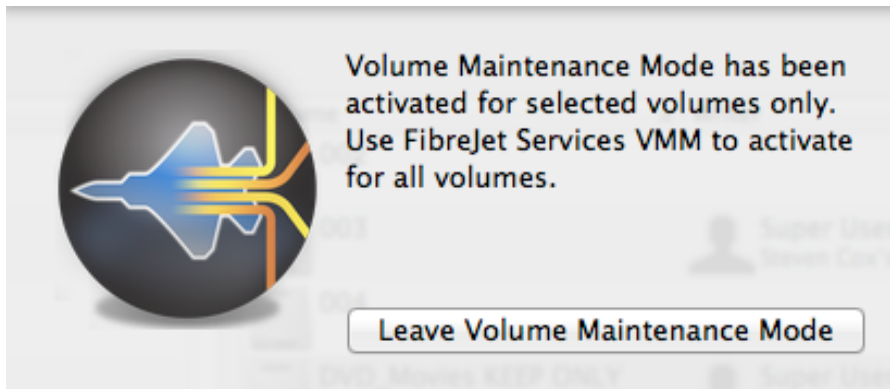
Also only in FibreJet 5 we have implemented a way to go into single volume VMM. In order to do this you 1st will select the volume you want to go into VMM on, in Administration mode. As you can see below I have selected 5 volumes.
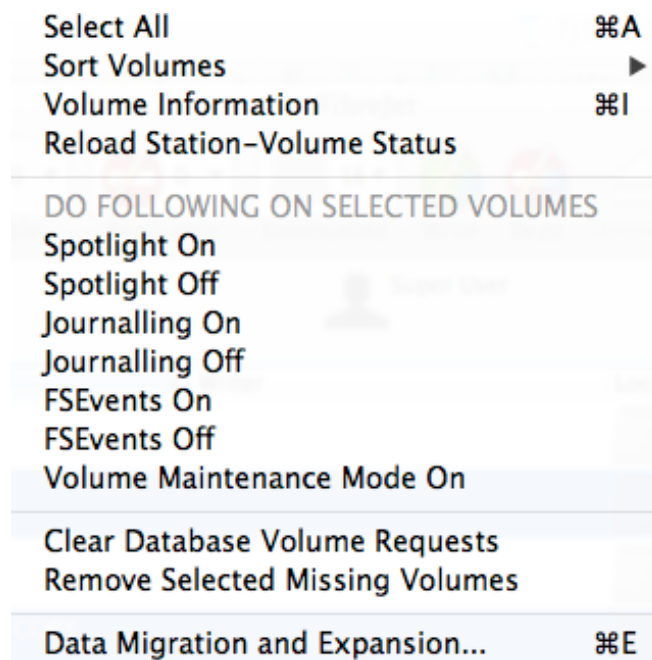

Then at the top of your screen select the Volumes drop down;

You then will select the Volume Maintenance Mode On. After selecting this only the selected volumes that you had highlighted before will go into VMM. It will look like so;

Volumes Menu

Administration Volumes Menu

Select All

This will select all the file systems.

Sort Volumes

This will sort the volumes by name, size, free size, owner or status.

Volume Information

This will display a sheet for the selected volumes that allows you to see such things as the BSD name, WWNs of the file system, the status of journaling and how different users are using the volume.

Reload Station-Volume Status

This will reload from the database the most current status of how each user is accessing the file systems. Use this command to refresh the Administration window view of the file systems and how they are being used. This will update contextual menu lists with the current status as well.

Volume Maintenance Mode On

This will enable the single volume VMM as described above in the single VMM mode area. Please see the chapter on VMM.

Clear Database Volume Requests

Clears any access request messages in the Database that may be pending. A volume could be involved in a messaging access request or series of requests and could be unavailable to be mounted. Using this command rectifies that situation.

Remove Selected Missing Volumes

This will eliminate entries in the database for file systems that the system cannot detect. For example, when storage is removed from a FibreJet® SAN, the file systems that were on that storage will show up as missing the next time the system is used. After a while many missing file systems may accumulate that have no chance of reappearing. If this occurs, this command may be used to clean up the database of the missing volumes you no longer need to track. This frees up the database to hold additional volumes that otherwise might overflow if you have an extremely full database

Remove Selected Missing Volumes

This will eliminate entries in the database for file systems that the system cannot detect. For example, when storage is removed from a FibreJet® SAN, the file systems that were on that storage will show up as missing the next time the system is used. After a while many missing file systems may accumulate that have no chance of reappearing. If this occurs, this command may be used to clean up the database of the missing volumes you no longer need to track. This frees up the database to hold additional volumes that otherwise might overflow if you have an extremely full database.

Users Menu
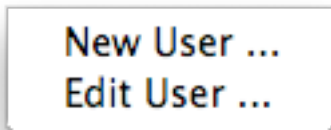
New User ...
Edit User ...
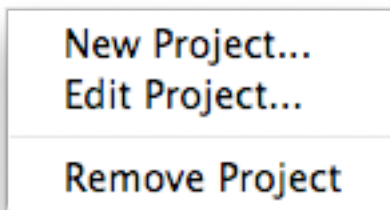
New User…

Creates a new user. You can name the user and enter a password.

Edit User…

Edits an existing user including their name and password and other options.

Projects Menu

New Project...
Edit Project...

Remove Project

New Project…

Creates a new Project.

Edit Project…

Edits properties for an existing Project.

Remove Project

Removes an existing Project.

Window Menu
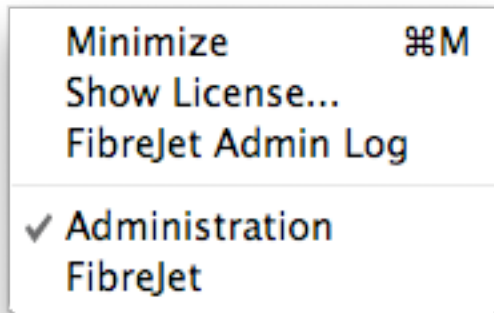
Minimize

Minimizes FibreJet to the Dock and hides all FibreJet® windows.

Show License…

Shows the CommandSoft FibreJet® License Agreement.

FibreJet® Admin Log

Displays the Administration Log.

Administration

Goes to the Administration window, provided that access is enabled and the correct password, if applicable, is entered.

FibreJet®

Goes to the main FibreJet® window.

Users Contextual Menu

User Information

Shows information about the selected user.
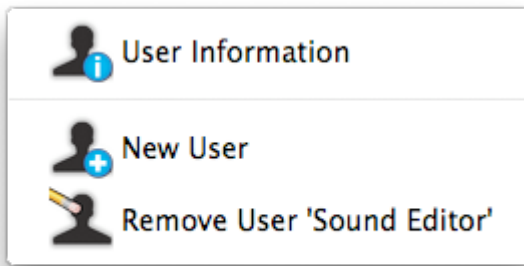
New User

Creates a new user and allows you to enter options for the new user.

Remove User 'username'

Removes the selected user.

Projects Contextual Menu
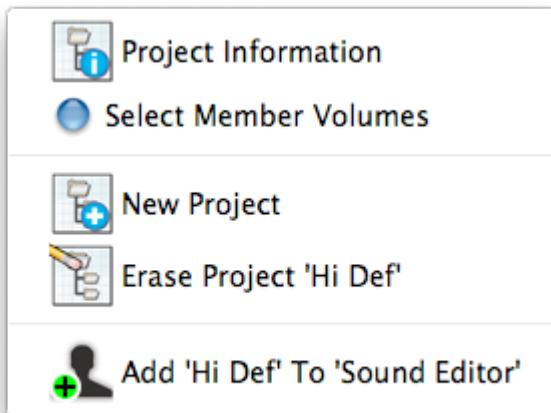
Project Information

Shows the Project Information panel for selected project.

Select Member Volumes

Selects volumes that are members of the selected project.

New Project

Shows the New Project panel.

Erase Project 'projectname'

Remove selected project from database after confirmation.

Add 'projectname' To 'username'

Adds the currently selected project to the currently selected user.

Volumes Contextual Menu
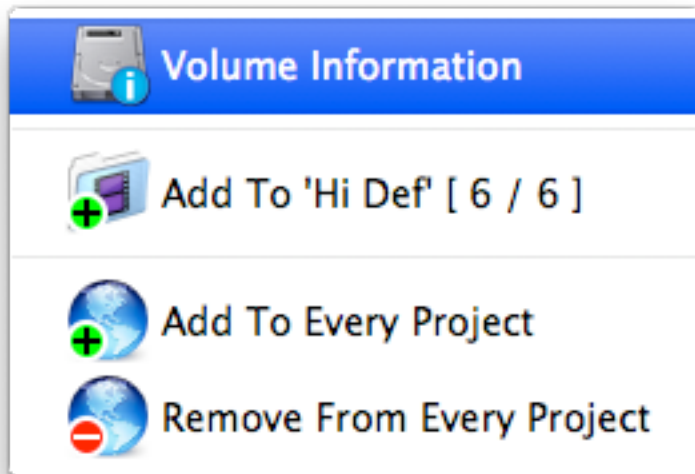
Volume Information

Shows the Volume Information panel for selected volumes.

Add To 'projectname'

Adds the currently selected volumes to the currently selected project.

Add To Every Project

Adds the selected volumes to every project.

Remove From Every Project

Removes the selected volumes from every project.

6: Use the Command Line Utility FibreJetCLI.exe

For users wishing to use scripting to automate certain functions of FibreJet, or those who just like using command line rather than GUI, FibreJet offers a command line utility for these needs.

It is recommended that, when using FibreJetCLI, the user quit out of the normal FibreJet application (with the graphical interface).

Inside the FibreJet program, follow the path from the FibreJet.app application bundle folder to Contents/MacOS/FibreJetCLI (or Contents/Windows/FibreJetCLI.exe if on Windows), which is the command line utility. This utility can be run in interactive or scripting mode.

Typing "FibreJetCLI" from a command line prompt (while the current directory is set to the path described above) activates interactive mode. Remember to "cd" into the correct directory, otherwise the OS will not be able to find the FibreJetCLI.exe file. Also, if on certain Mac OS versions, you must type a ./FibreJet CLI (a period forward slash) in order to get the command to execute).

Providing any command line options to the FibreJetCLI command will cause it to operate in scripting mode.

NOTE: Most all of the scripting mode usages require the –p PASSWORD option to validate that administrator password for the operation. If you have no administrator password then this is uncessary.

To get a list of online help about the command, type "FibreJetCLI –h" from the command line. This will list the latest documentation about using the utility from scripting mode:

```
FibreJetCLI(1)

NAME
        FibreJetCLI -- Command Line Interface for SAN control

SYNOPSIS
        FibreJetCLI [-hvi] -p PASSWORD [-l | -a | -x | -c | -z | -d VOLUME | -r VOLUME | -
e VOLUME | -w VOLUME | -u VOLUME | -f VOLUME, | -m [ON | OFF] | -b FILEANME]

DESCRIPTION
        The FibreJetCLI utility will command the FibreJet(r) SAN to perform various
        operations. This tool may be combined with scripting to automate certain
        SAN operations.
        The --password option is required for all but help and interactive commands.

        WARNING: This command leaves volumes in their state on exit, unlike the
        application which unmounts everything on exit. As a result, if you mount
```

```
        volumes writable, they will remain in the database as owned by yourself.
        After you are done with the volume, run FibreJetCLI again
        with the option to either unmount or mount readable any volumes so ownership
        is properly released in the database for other users.

        The following options are available:


        -h, --help                      Print this help message.

        -v, --verbose                   Increase verbosity.

        --version                       Print version.

        -i, --interactive               Interactive menu system mode.

        -p, --password PASSWORD                 Required    administration    access
password PASSWORD.

        -l, --list                      List all volumes and their mount state.

        -d, --update VOLUME             Issue update command to VOLUME.

        -b, --updateall                         Issue   update   command   to   all   read-
mounted volumes.

        -a, --mountallread              Mount all seen volumes read-only.

        -r, --mountread VOLUME          Mount VOLUME read-only.

        -e, --mountavenabled VOLUME     Mount VOLUME AV mode enabled.

        -w, --mountwrite VOLUME                 Mount VOLUME read-only.

        -g, --mountexclusive VOLUME     Mount VOLUME exclusive.

        -u, --unmount VOLUME            Unmount VOLUME.

        -x, --unmountall                Unmounts all volumes.

        -f, --forceownershiprelease VOLUME   Force database ownership release.
            Because this command can create multiple writers to a volume, thus
            corrupting its contents, this should only be used in extremem cases
            where you are sure the other owner's machine has crashed and is not
            actually using the volume.

        -m, --maintenancemode [ON │ OFF]    Turn volume maintenance mode ON or OFF.

        -c, --clearmessagequeue                 Clear  the  databases  pending  request
messages.

        -z, --emptydatabase             Clear the database to empty.

EXIT STATUS
        The FibreJetCLI utility exits 0 on success, and >0 if an error occurs.
        0       CLI_NO_ERROR. Operation was successful.
        1       CLI_ERROR_FRAMEWORK_INITIALIZATION_FAILED.
        2       CLI_ERROR_HASP_INITIALIZATION_FAILED.
        3       CLI_ERROR_HASP_KEY_NOT_FOUND.
        4       CLI_ERROR_HASP_KEY_BAD_VERSION.
        5       CLI_ERROR_HASP_KEY_NO_LONGER_DETECTED.
        6       CLI_ERROR_HASP_DEMO_EXPIRED.
        7       CLI_ERROR_HASP_MISSING_FEATURE.
        8       CLI_ERROR_NO_DATABASE.
        9       CLI_ERROR_FAILED_TO_UNMOUNT.
        10      CLI_ERROR_FAILED_TO_MOUNT_READABLE.
        11      CLI_ERROR_FAILED_TO_MOUNT_WRITEABLE.
        12      CLI_ERROR_VOLUME_OWNED_BY_ANOTHER_USER.
        13      CLI_ERROR_NO_SUCH_VOLUME.
        14      CLI_ERROR_VOLUME_MISSING.
        15      CLI_ERROR_FAILED_AUTHENTICATION.
        16      CLI_ERROR_AUTHENTICATION_NEEDED.
        17      CLI_ERROR_UNEXPECTED_PARAMETER.
```

```
        18      CLI_ERROR_DATABASE_ERROR.
        19      CLI_ERROR_INTERNAL_ERROR.
        1       EXIT_FAILURE.
        0       EXIT_SUCCESS.
        64      EX_USAGE. At least one arg required.
        69      EX_UNAVAILABLE. No hardware key or key configured incorreclty.
        78      EX_CONFIG. Unable to configure shared memory, tool start problem, or no
database found.
        71      EX_OSERR. Unable to connect to Disk Arbitration. Try reboot.
        70      EX_SOFTWARE. Error opening database or wrong database version.

COMPATIBILITY

LEGACY DESCRIPTION

EXAMPLES
        FibreJetCLI -m ON
        Enters volume maintenance mode.

        FibreJetCLI -c
        Clears database message queue.

        FibreJetCLI -p "admin pw" -w VolName1 -w VolName2
        Mounts writable the two volumes named VolName1 and VolName2
        using the Administrator password of "admin pw".

        FibreJetCLI -p "" -w "SAN Disk 1" -w "SAN Volume Film" -w "SAN Volume Graphics"
        Mounts writable the three volumes named SAN Disk 1, SAN Volume Film,
        and SAN Volume Graphics, using an empty password.

        FibreJetCLI -p "" -u "SAN Disk 1" -u "SAN Volume Film" -u "SAN Volume Graphics"
        Unmounts when done the three volumes named SAN Disk 1, SAN Volume Film,
        and SAN Volume Graphics, using an empty password.

SEE ALSO

STANDARDS

HISTROY
        The FibreJetCLI utility first appeared in version 2.7.2 on Windows.

                        November 1, 2009
```

When launched without any options, interactive mode presents the user with the following:

```
CommandSoft(r) FibreJet(r) CLI v4.0 Interactive Mode
Copyright (c) 2009 by CommandSoft, Inc. All Rights Reserved Worldwide.
By using this software you agree to the software license terms in the installer.

Initializing framework...Initializing framework 0, done [NO ERROR]

[p] Authenticate Administrator.
[l] List volumes and states.
[v] Verbosity level.
[h] List Command Line Help.
[d] Update VOLUME.
[b] Update all volumes.
[a] Mount all volumes read-only.
[r] Mount VOLUME Readable.
[e] Mount VOLUME AV Mode.
[w] Mount VOLUME Writable.
[g] Mount VOLUME Exclusive.
[u] Unmount VOLUME.
[x] Unmount all volumes.
[f] Force VOLUME ownership release.
[m] Volume Maintenance Mode.
[c] Clear database message queue.
[z] Empty database and start with new database.
```

```
[q] Quit.
>
```

Before doing much in interactive mode, the user is required to type the Administration password using the 'p' command. This will make sure the password is correct.

When combined with the –verbose a lot of output will be generated, especially during "Initializing framework…". This can be copy and pasted into an email and sent to support@commandsoft.com in order to diagnose problems.

Because FibreJetCLI interacts with the FibreJet database, as the normal GUI application does, it claims ownership when gaining write access. When getting write access, the FibreJetCLI requires that the volume actually be available in the database and no other user have it mounted writable. This is a requirement because a scripting program would be unable to interact with FibreJet's messaging to request write access from the other user.

FibreJetCLI is combined with scripting to automate tasks required by workstations. One such use would be in a Backup automation. The Backup workstation would use the FibreJetCLI in a script to mount writable all the volumes is wishes to backup.

At the end of the backup, the script would call the FibreJetCLI again to unmount all the volumes it is finished using.

The FibreJetCLI is used from scripting mode such that it is called to perform an operation, such as mounting writable, to a list of provided volumes in one call. After the call is complete, those volumes would be mounted with write access and "owned" in the database by that station so other users would not be able to mount the volumes writable.

On Windows, each time FiberJetCLI is launched, it locally "unmounts" all the SAN volumes on that workstation, while not "releasing" any ownership of volumes that were mounted writable and "owned" before the launch. Because of this behavior, the user must always be aware the explicitly reverse any writable mounts that were done with the FibreJetCLI by calling it after they are done with the volumes in question with the –u (unmount) option to not only unmount the volumes they are done with but also "release" them from the database so they appear available to other users.

The FibreJetCLI command with scripting can perform multiple operations of different types during a single call. To perform more than one operation simply supply the command to perform along with any required volume information.

For example:

```
        FibreJetCLI --mountwrite "SAN  Disk  1" —-mountwrite  "SAN
Volume Film" --mountread "SAN Volume Graphics"
```

Mounts writable the two volumes named SAN Disk 1, SAN Volume Film and mounts readable the volume SAN Volume Graphics (using an empty Administrator password). Then, to release ownership after you are done use:

```
        FibreJetCLI --unmount  "SAN  Disk  1"  —-unmount  "SAN  Volume
Film" —unmoung "SAN Volume Graphics"
```
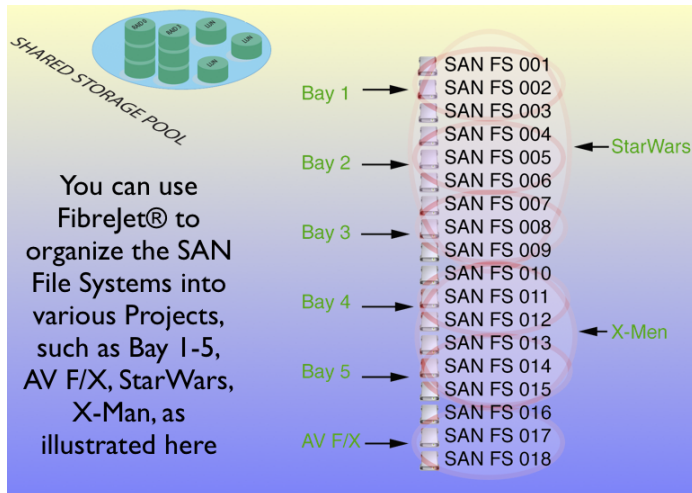
7: SAN Reference

The following is a depiction of a simple 8 station FibreJet® SAN for a workgroup of Final Cut Pro® users:
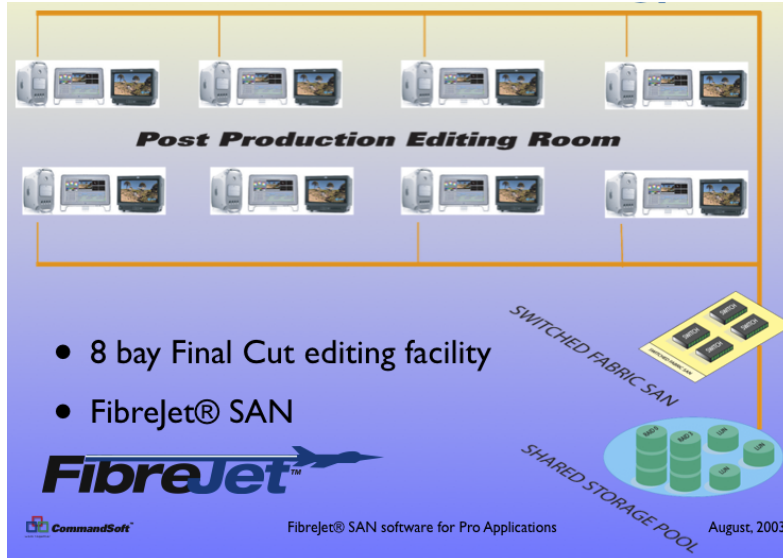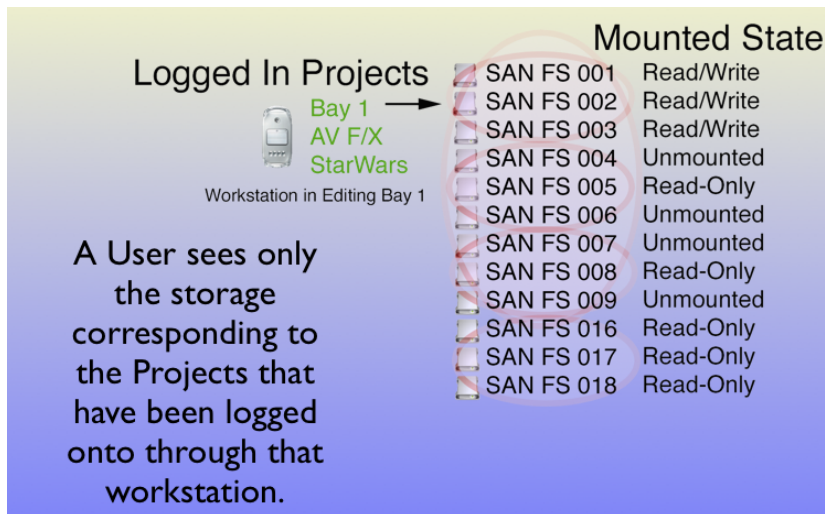

FibreJet® is a multi-reader, single-writer at a time per file system SAN management product with sophisticated Pro Applications project management storage support. FibreJet® dynamically manages file system traffic so that data is safe and does not get clobbered when everyone tries to write to the storage.
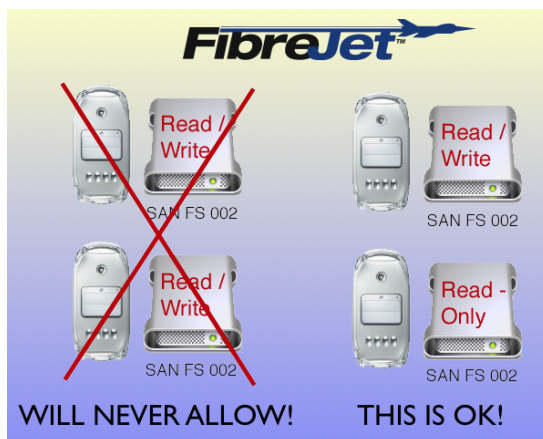
FibreJet® manages and organizes the SAN attached storage pool among workstations so that storage resources can be assigned dynamically. Pro Applications Storage Project Management allows password-protected project assignment so only authorized users will see the storage to which they have access.

You can use FibreJet® to organize the SAN File Systems into various Projects, such as Bay 1-5, AV F/X, StarWars, X-Man, as illustrated here
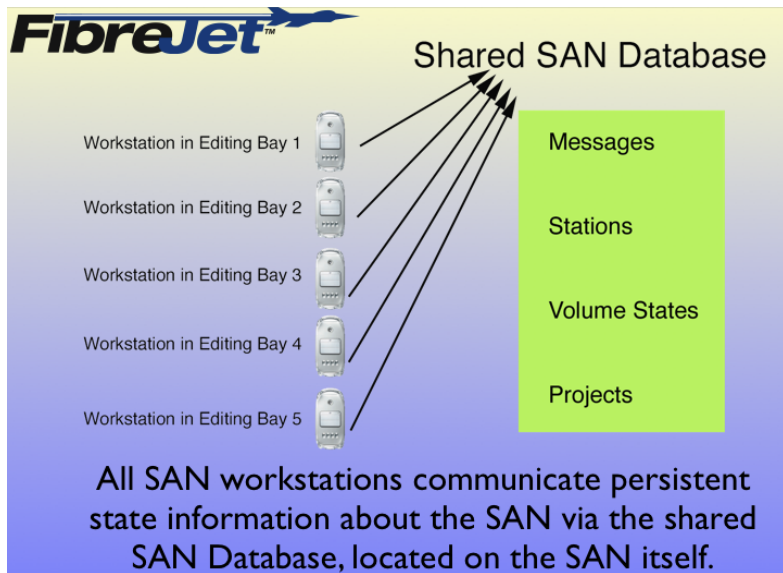
FibreJet® is not normally in the I/O path of the Operating System (once mounted), so it does not affect performance in any way. FibreJet® in essence globally manages how file systems are mounted and unmounted on a machine...and then gets out of the way! The global state of the SAN is stored in a SAN accessible FibreJet® database.
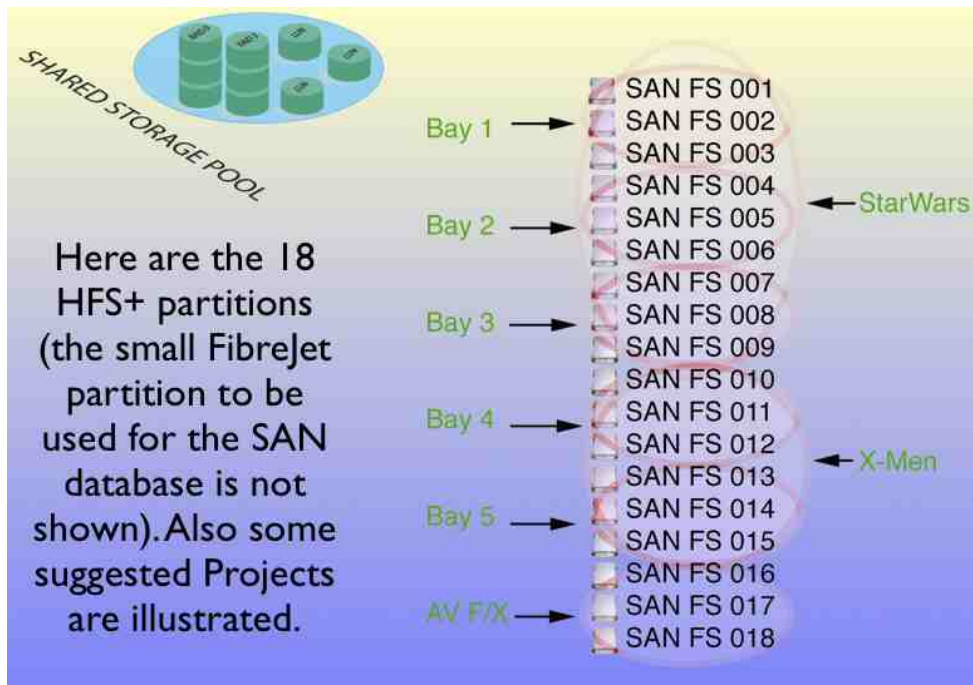

A User sees only the storage corresponding to the Projects that have been logged onto through that workstation.

The FibreJet® Database records the persistent state of the SAN, as illustrated below:

8: SAN Installation and Design Example

- NOTE: This example is for a Macintosh only SAN. The design and steps to install, for Windows, are generally similar but differ in detail.

- Installation may be required in your facility.

- Connect cables to storage. For XServe RAID, copper cables are included with SFP ends ready to plug into a switch.

- Rack-mount units are nice to organize the switch and storage in a machine room (available from www.commandsoft.com or www.apple.com).

- Connect Uninterruptible Power Supply (optional) and plug in all power cables.

- Turn switch on and wait for power-up test.

- Turn all storage on and wait for power-up-test.

- Boot first workstation.

- For RAIDs, follow instructions for administration and configure as recommended (e.g.RAID-6, at least 1 LUN per controller)

- Before building a SAN, you must design the SAN according to the requirements for aggregate bandwidth, total capacity, and workflow. This determines the amount of storage, how the network fabric is built (sometimes of multiple switches in a fabric mesh or multiple SANS), and how the Pro Apps users and workstations will utilize the storage throughout the project cycles.

- Design Storage Partitioning Plan: Next steps depend on individual needs and take into account total number of workstations, the type of content and Pro Apps being used, and work-flow design among users intending to share content and projects. If this is something your local administrator cannot handle alone, involve a solutions professional in this design discussion, such as available from the professional services group at CommandSoft.

- Example: 2.52 TB XServe RAID, 5 workstations doing uncompressed SD with Kona SD, Final Cut Pro 4, etc.

- Common stock footage, audio effects might be located on 1/6 of the storage, and organized into a read-only password protected project by an Administrator. This would allow the 5 editors to access the material in this project but prevent them from making changes.

- The remaining 5/6 of the storage could be divided equally among the 5 workstations, and in such a way as to allow 3 equal partitions for each workstation (representing 1/6 of the total storage)

- Lastly, we must account for a small section of storage for the FibreJet® SAN database, which is required by the software to maintain the global-state of the SAN and perform command requests to other workstations that wish to request / respond to write access.

- We have a fully populated RAID, single RAID-6 LUN on each controller (1.01 TB each). First we will use ATTO ExpressStripe software for OS X to create a small non-striped 100 to 1000 MB HFS+ partition named FibreJet®. This fulfills the requirement for the FibreJet® database.

- To keep things simple we will create 18 HFS+ partitions striped across the two RAID controllers, each 113.7 GB in size with the interleave set to 128KB (which maximizes performance). This will allow as a start, 3 partitions each for the 5 workstations, plus 3 partitions for the video and audio library. How they will actually be put to use is another matter, this is just a starting guide and plan (more on actual use cases later)

- You may name the partitions anything you wish, however it is highly recommended to give them meaningful names. Large installs with hundreds of partitions have demonstrated that keeping consistent names can help asset management issues. For now, you might even just name them SAN FS 001 through SAN FS 018

- Typically, access to the storage will be organized into named and password protected projects which is how users will interact.

Here are the 18 HFS+ partitions (the small FibreJet partition to be used for the SAN database is not shown). Also some suggested Projects are illustrated.

- Although not required, it is recommended to restart the first workstation at this point as a test of the network, and to prepare for the next step which is creating the FibreJet® SAN Database.

- Do not be alarmed if you rebooted and don't see any of the striped storage partitions that you just created. FibreJet® SAN software is already working to protect the SAN storage and this is normal so just proceed.

- You should see the one small (32 MB) HFS+ volume you created called "FibreJet®". This will become the SAN database.

- Launch FibreJet®, and when you see the message to setup a new database, simply click the setup button to let FibreJet® create the SAN database! This will take some time so be patient.

- As FibreJet® creates the database, and adds the volumes to the database, it does things to the partition maps (only if *Rogue Host Protection* is checked) that describe the type of file systems so that the storage will be protected even from multiple-writers as a result of a rogue workstation on the SAN without any FibreJet® software. At anytime in the future it is easy to convert the partition maps back to the unprotected state if so desired (by unchecking *Rogue Host Protection Mode* in Administration mode).

- Although not necessary, it is recommended to now restart the first workstation as a final test.

- At this point the SAN is fully operational and ready to go.

- Boot the remaining workstations.

- Launch FibreJet® on each workstation, and verify that the application finds the database.

- Each workstation is automatically added to the database the first time it is encountered.

- By default, an "All Disks" project in the new database will allow all users access to all the volumes. You will see all the volumes listed in the application window, and will be able to select and mount them as needed.

- The next step is implementing a strategy to manage access to the storage according to needs

- Here we will enter Administration mode (Administration menu *Administration..* command) in FibreJet® and perform several project operations. The initial password blank.

- Once in Administration Mode, change the Administration password.

- Next, double-click on the "All Disks" project, set a password for it, and click the "Always require login" checkmark. This will make it so users will not simply have access to all the disks when they initially start FibreJet®.

- Next, create a new read-only project called AV F/X, and drag and drop 3 of the volumes you wish to use for this purpose onto the "AV F/X" project icon.

- Next create projects and assign storage according to how the users will need the data.

- This is really up to you. Some use cases are suggested, but there are unlimited possibilities.

- You may start out by creating a project for each workstation that each has 3 drives. Then as editors need to collaborate on a project or share data, they can mount more drives or log into each others projects as needed to access the storage.

- If write-access is held by another user, it may be requested simply by double-clicking (or drag-dropping to the grab target) and typing a request message to that user (whom may then grant or deny the request with a response message)

- An editor will launch FibreJet® and it will by default restore the storage to the last state it was left.

- Typically an editor would be logged into the read-only "AV F/X" project for the stock footage and audio effects. They would also be logged into a set of drives that have write access for their project footage, effects, and scratch disks (e.g. Bay 1 Project). Additionally they might have mounted read-only file systems they don't often need, or that they might be sharing some content from another user.

- Some Pro Apps don't recognize newly mounted storage unless they are restarted. Once recognized they can be used as any other storage, for projects, effects, scratch disks, etc...

9: Change Reference

Version 5.0 Notes (2013-9-22):

Version 5.0 is a major paid update just like in the past between every other major version release. The major update to 5.0 also includes an additional year of support. As always, if you did not elect to maintain a valid current support agreement on your SAN the cost will be higher to get you back under support and upgraded to 5.x platform.

Major Feature Highlights:

-- Multiple-writer capable with XSan integration (requires MetaData OS X Server computer).

-- Option to run without a SAN database (but limits features, such as will lose ability to group projects / users and permissions). This is intended for SANs that do not mind each workstation accessing all reachable SAN volumes.

-- SAN Health-check automation (record of user scheduled file systems checks, can email you when problem discovered)

-- General speed-ups, faster discovery launching, GUI improvements.

-- Support for Latest OS, latest drivers and adapters (iSCSI, Thunderbolt, etc.)

-- Single-Volume Volume Maintenance Mode

-- Option to pre-check file system each time mounted. This will immediately alert users if they need to perform Volume Maintenance (repair a volume).

-- Integration of FibreJet System Preferences into application, special "startup-mode" to enter "admin" tool functions and by-pass normal startup

-- Dynamic drive letter management with optional range specification (windows)

-- Improvements to Windows GUI

-- Version 5.0 is released in conjunction with Macintosh OS X 10.9 (Mavericks). The 5.x platform will be releasing many other new features that did not make it in time for this release, so try to keep your 5.x version up to date and watch for new features to come!