



STONEFLY

DAS to SAN Migration Using a Storage Concentrator™

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Introduction

A common side effect of server consolidation projects or implementing a centralized Fibre Channel SAN is scores of unused disk arrays. Many organizations are reluctant to perform what they call "forklift upgrades."

This document explains three ways to migrate captured server disks (direct-attached external JBOD or RAID) to an IP SAN (Internet Protocol Storage Area Network) using the StoneFly *Storage Concentrator™*. The first section of the document describes the typical infrastructure before and after deploying an IP SAN. The second section explains the three methods of converting storage to an IP SAN using the *Storage Concentrator*.

This document assumes that you are an IT administrator in a small to medium business (SMB) who is responsible for this migration. It assumes that you are familiar with Microsoft Windows 2000/2003 OS, iSCSI, IP SANs, SNICs (Storage Network Interface Cards), and StoneFly's *Storage Concentrator* solutions.

Infrastructure

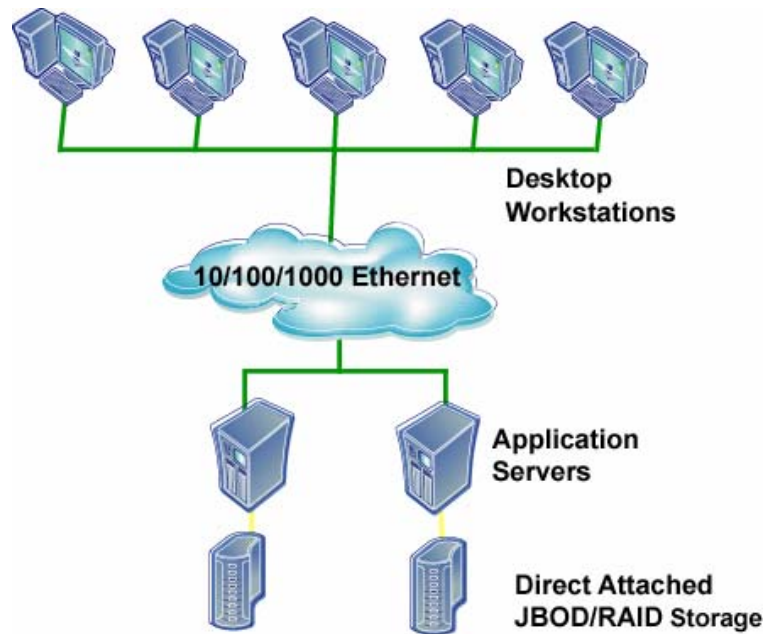
Infrastructure without an IP SAN

The following diagram depicts a typical SMB environment with these elements:

- External JBOD/RAID, each directly attached to an application server; when in this configuration, the JBOD/RAID is also known as *direct-attached storage* (DAS)
- A dedicated 10/100/1000 Ethernet LAN for file level activity such as SQL, Exchange, printing, and general file sharing activities between the servers and desktop workstations
- Four to six Windows application servers for applications such as Dbase (SQL, Oracle, SyBase, DB2, etc.) and email (ccmail, Exchange, etc.), a DNS/Active directory server, and file sharing on a W2K file server
- Desktop workstations

To access the data on a given JBOD/RAID, the desktop workstations must communicate with the application server attached to that JBOD/RAID. Therefore, in this configuration, JBOD/RAID are "trapped" behind the application servers.

Storage Consolidation

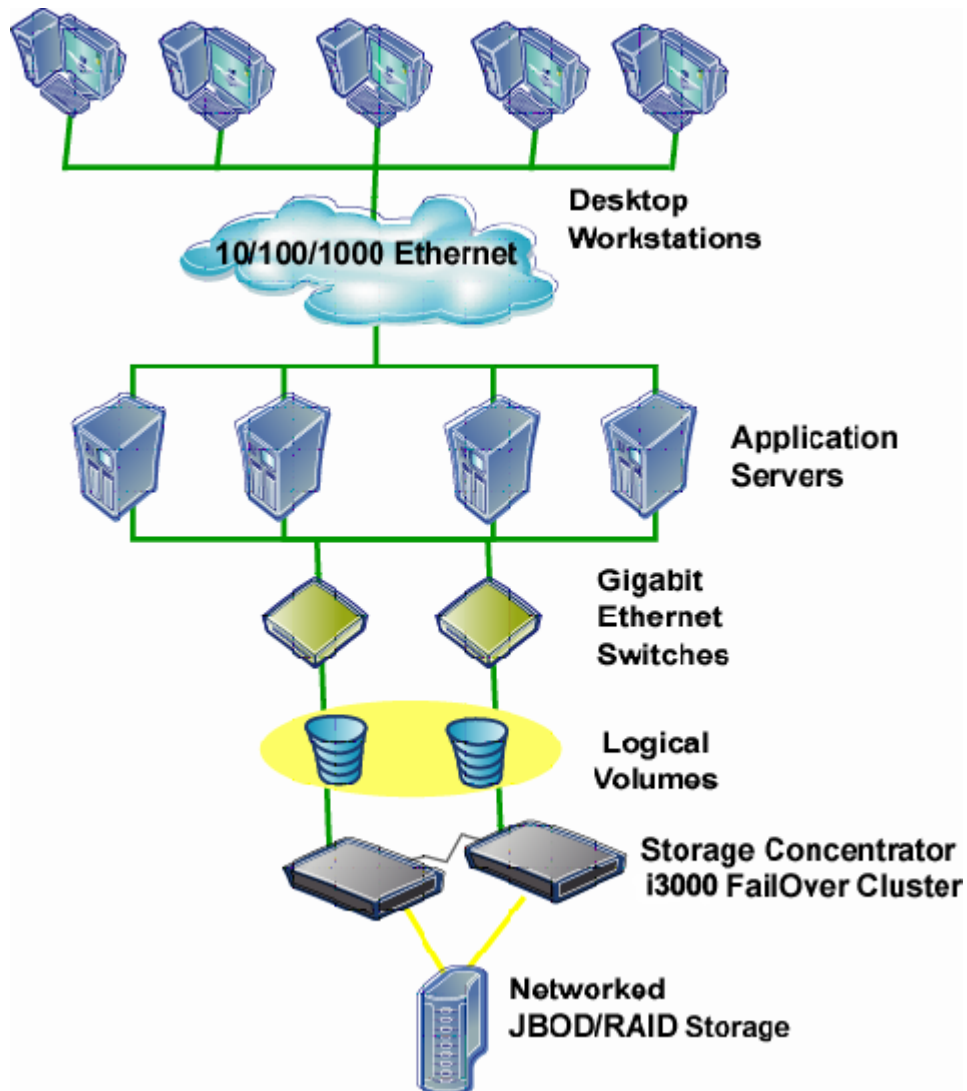


Infrastructure with an IP SAN

To share the storage on an IP SAN with many application servers, place a dedicated 10/100/1000 Ethernet switch behind the application servers. A StoneFly *Storage Concentrator* sits on this dedicated 10/100/1000 Ethernet IP SAN. The JBOD/RAID are located behind the *Storage Concentrator*. Each application server can use generic 10/100/1000 NIC cards with iSCSI software and/or dedicated SNIC hardware, as shown in the diagram below. In this environment, users can access stored data on any of the JBOD/RAID via any of the other servers, including application servers. You can use logical volumes to segregate data, but the JBOD/RAID are no longer physically trapped behind individual application servers.

The *Storage Concentrator* combines the functionality of an iSCSI-based storage router, bridge, and extensible logical volume manager to provide an end-to-end storage provisioning solution that significantly reduces the cost and complexity of managing storage assets. All *Storage Concentrators* provide intelligent block-level logical volume management to existing IP networks to pool existing and new storage assets, thus providing more efficient utilization, streamlined management, rapid deployment and reconfiguration of storage, and reduced SAN-based backup and restore times.

The following diagram illustrates a typical IP SAN setup. The *Storage Concentrator i3000 FailOver Cluster* operates in the network core and manage the logical volumes on the physical storage volumes. The network administrator uses the *Storage Concentrator* to provide hosts with controlled access to these logical volumes. To ensure data integrity, Storage Concentrators use metadata to track physical data locations. This approach increases network intelligence by managing online storage to maximize physical storage resources without disrupting service. The in-network "storage intelligence" improves storage utilization and administrative efficiency.



Migrating data to an IP SAN allows the network administrator to convert data from storage that is directly attached to a server to storage that is on a network. The *Storage Concentrators* use TCP/IP, Ethernet, and iSCSI technologies to bring block-level storage intelligence to the IP networking core. This provides the benefits of SAN architecture while protecting investments in SCSI or fibre channel storage devices and eliminating storage complexity.

IP SAN Deployment

This section describes three methods of deploying an IP SAN with StoneFly's *Storage Concentrator*:

- *Method 1: Mirror the Data onto New Storage*
- *Method 2: Move the JBOD/RAID behind the Storage Concentrator and Migrate the Data via Tape*

- *Method 3: Move the JBOD/RAID behind the Storage Concentrator and Migrate the Data into Custom-Sized Logical Volumes*

Method 1: Mirror the Data onto New Storage

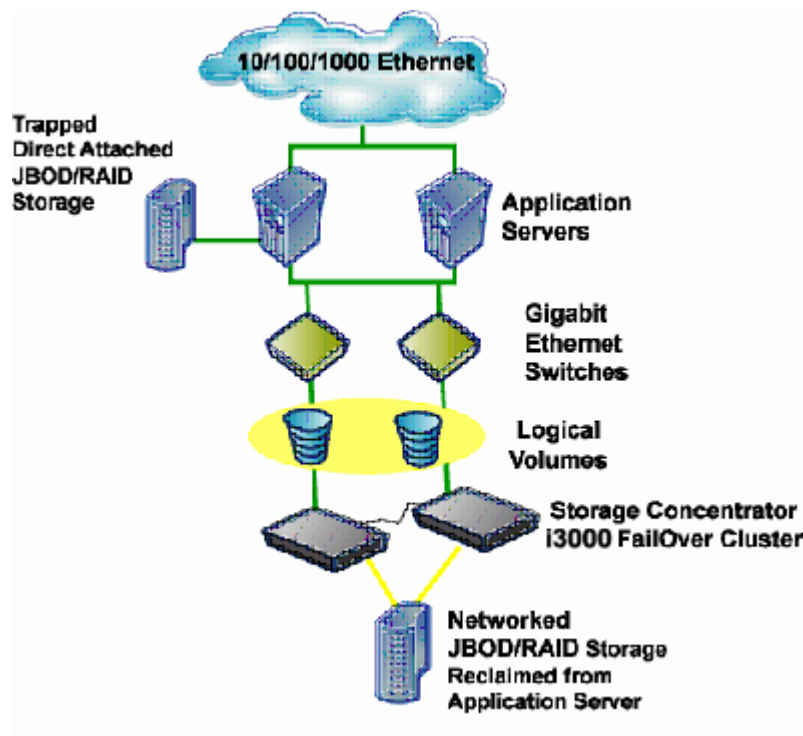
Method 1 assumes that you have purchased new JBOD/RAID disks, placed them behind the *Storage Concentrator* or *Storage Concentrator FailOver Cluster*, and plan to set up an IP SAN to manage the data. This method uses mirroring to minimize the disruption to the daily workflow and protect the integrity of your data.

First, create logical volumes for the IP SAN on the new JBOD/RAID. Then, use Microsoft Windows' built-in logical volume management tools to mirror your old direct-attached storage (DAS) to the logical volumes on the new IP SAN.

Note: For this method to work, the logical volumes on your DAS must be dynamic.

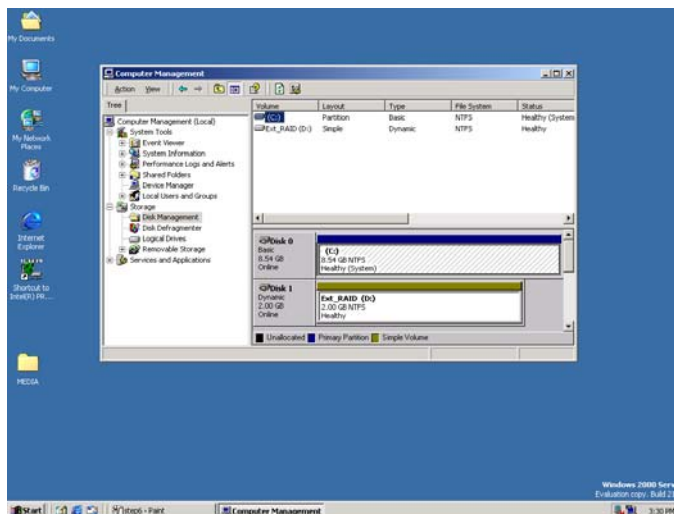
Once you mirror the data from the DAS onto the networked JBOD/RAID, break the mirror and move the old DAS behind the *Storage Concentrator* and use it as additional networked storage. Follow the directions below to move the DAS from other application servers onto the repurposed storage.

The diagram below illustrates the old and the new storage. The old storage appears as direct-attached JBOD/RAID (DAS) beside the application servers, and the new storage is located behind the *Storage Concentrator*.

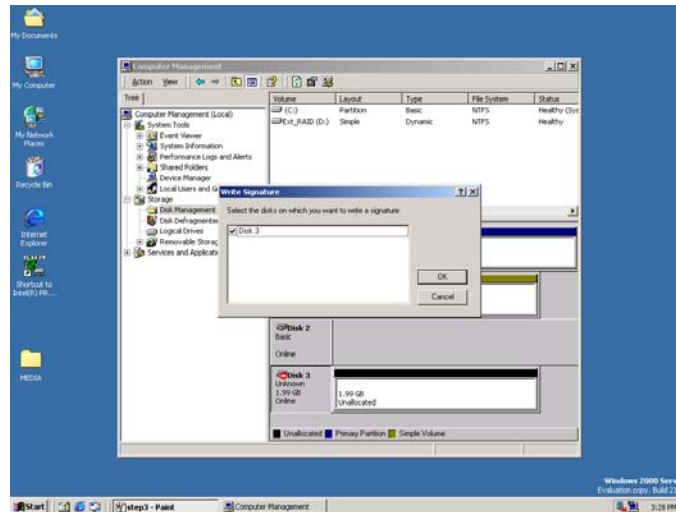


To mirror the data

1. Perform a full backup of all systems that will be affected by the migration.
2. Run a full verify of the backups, including random restores to confirm the data integrity.
3. Right click on **My Computer** and select **Manage**.
4. Click on **Disk Management** to see the external JBOD/RAID logical volume (ext_RAID, Disk 1 in this image) that contains your current data. The Computer Management screen appears.

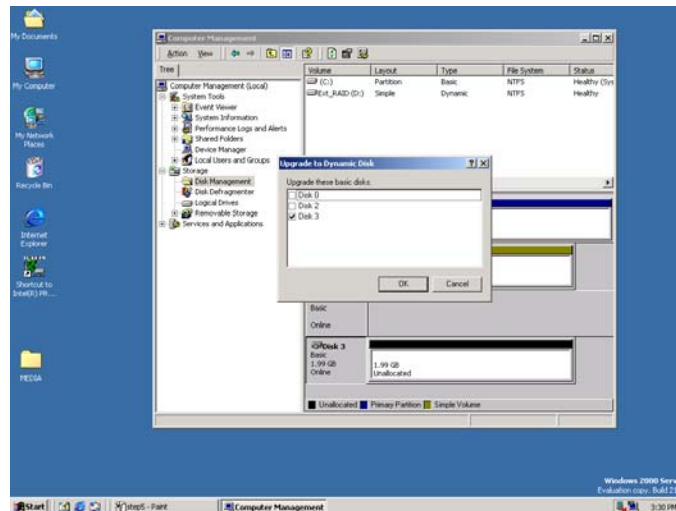


5. Create a new logical volume on the *Storage Concentrator*. This volume must be as large or larger than the logical Windows volume on the current external JBOD/RAID.
6. Set the access rights so that the DAS can see the new IP SAN logical volume on the *Storage Concentrator*.
7. Configure the iSCSI initiator control panel to let the application server's OS see the new IP SAN logical volume on the *Storage Concentrator*.
8. Right click on **My Computer**, right click on **Manage**, and select **Disk Management**.
9. Right click on the new IP SAN volume (Disk 3) and select **Write Signature**. The Write Signature dialog box appears.



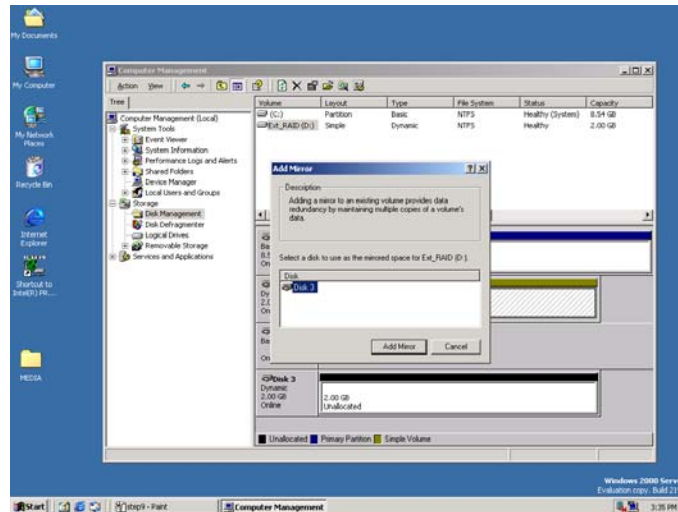
10. Select the new IP SAN volume (Disk 3) and click **OK**.

11. Right click the new IP SAN volume and choose **Upgrade to Dynamic Disk**. The Upgrade to Dynamic Disk dialog box appears.

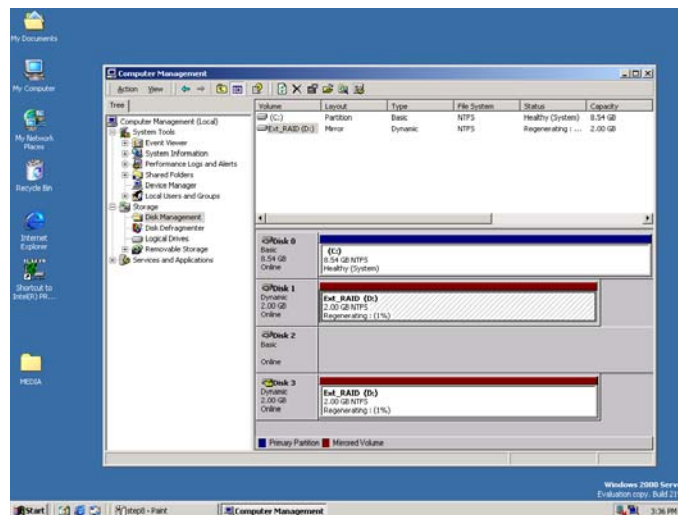


12. Select the new IP SAN volume (Disk 3) and click **OK**.

13. Right click the external JBOD/RAID logical volume (ext_RAID, Disk 1) that you want to mirror onto the new IP SAN volume. This logical volume must be dynamic. Select **Add Mirror**. The Add Mirror dialog box appears.



14. Select the IP SAN volume (Disk 3) and click **Add Mirror**.
15. The new IP SAN volume now contains a mirror of the original external JBOD/RAID logical volume.

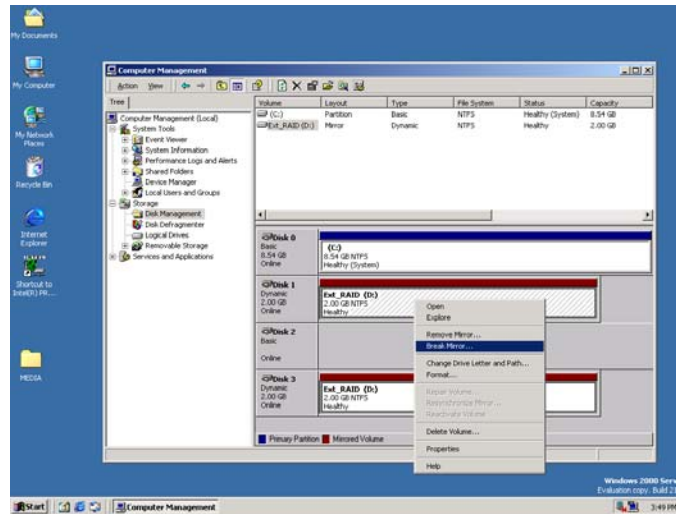


To break the mirrored external JBOD/RAID logical volume

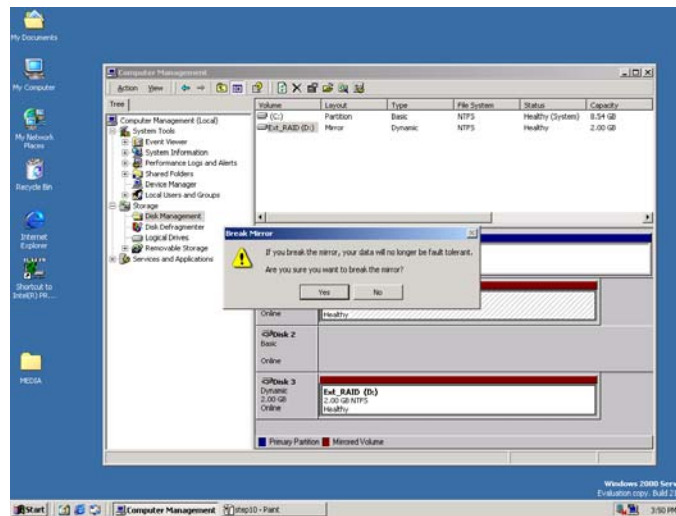
Once you have mirrored your DAS to an IP SAN logical volume, break the mirror and remove the old JBOD/RAID from behind the application server and place it behind the *Storage Concentrator*. This is known as *breaking* the mirrored external JBOD/RAID logical volume. After it is placed behind the *Storage Concentrator*, the JBOD/RAID can become part of the networked storage, and you can mirror data from other DAS onto it.

1. Right click the external JBOD/RAID logical volume in the Computer Management window and select **Break Mirror**.

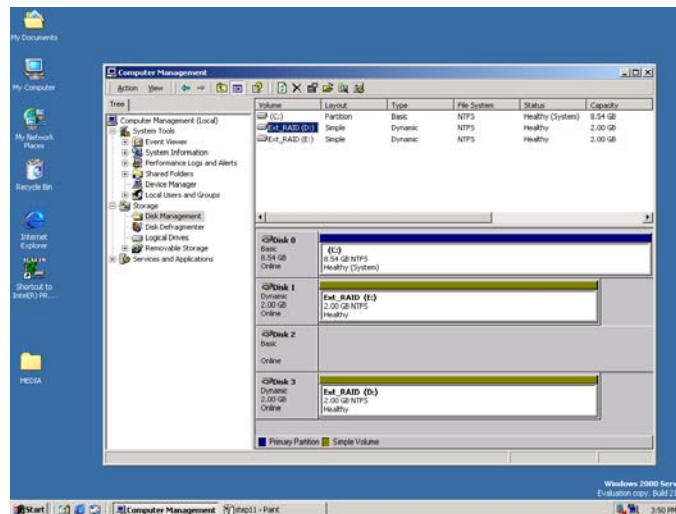
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2. Click **Yes** to confirm.



You should now see two separate drive letters for the external logical volume.



3. Remove the directly-attached external JBOD/RAID from the application server. Move it behind the *Storage Concentrator* along with your new storage, and use it as the destination for data from the next application servers' DAS.

Note: You will create new IP SAN volumes from this old JBOD/RAID for the other Application Servers.

Method 2: Move the JBOD/RAID behind the Storage Concentrator and Migrate the Data via Tape

Method 2 assumes that you plan to set up an IP SAN in your current environment (see diagram in *Infrastructure without an IP SAN*, page 2) and move your data via tape backup and restore.

You can move the JBOD/RAID before or after backing up its data to tape. This section explains both options.

To back up the data to tape and then move the JBOD/RAID

Follow these steps for the DAS associated with each of your application servers.

1. Perform a full tape backup of all data on the DAS.
2. Run a full verify of the backups, including random restores to confirm the data integrity.
3. Delete the logical volumes on the external JBOD/RAID.
4. Move the external JBOD/RAID to the *Storage Concentrator*.
5. Create new IP SAN logical volumes on the newly-attached JBOD/RAID, using the *Storage Concentrator's* provisioning volume management tool.

Warning: This deletes all data from the disks.

6. Create new Windows volumes on the IP SAN volumes. Create a new partition and NTFS file system on each volume.
7. Restore the data from tape to the new IP SAN volumes.
8. Amend your automated backup scripts to accommodate the new storage location.

To move the JBOD/RAID and then back up the data to tape

The *Storage Concentrator* has a "Direct Path™" feature that allows an application server to see the external JBOD/RAID after you have detached it from the application server and placed it behind the *Storage Concentrator*. This enables you to move the external JBOD/RAID from the application server to the StoneFly Concentrator *before* backing up the data to tape, rather than after.

Warning: Be sure to back up your data *before* creating the IP SAN logical volumes on the JBOD/RAID, since creating logical volumes erases all the data on the disk.

Follow these steps for the DAS associated with each of your application servers.

1. Move the external JBOD/RAID to the *Storage Concentrator*. Ensure that you can see it from the application server connected to the tape backup device.
2. Perform a full tape backup of all data on the DAS.
3. Run a full verify of the backups, including random restores to confirm the data integrity.
4. Delete the logical volumes on the JBOD/RAID.
5. Create new IP SAN logical volumes on the newly-attached JBOD/RAID, using the *Storage Concentrator's* provisioning volume management tool.

Warning: This deletes all data from the disks.

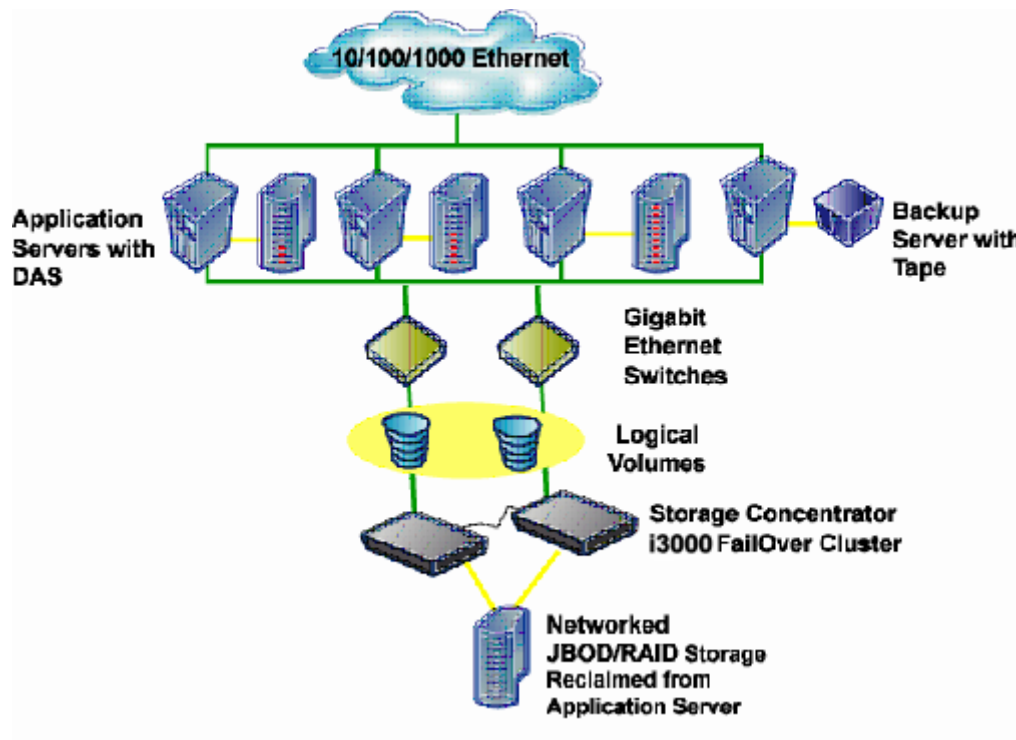
6. Create new Windows volumes on the IP SAN volumes. Create a new partition and NTFS file system on each volume.
7. Restore the data from tape to the new IP SAN volumes.
8. Amend your automated backup scripts to accommodate the new storage location.

Method 3: Move the JBOD/RAID behind the Storage Concentrator and Migrate the Data into Custom-Sized Logical Volumes

Method 3 takes advantage of the fact that most DAS is not fully utilized. Like Method 2, it assumes that you have not purchased new storage. In this method shown below, you back up the least-used DAS to tape, move that JBOD/RAID behind the *Storage Concentrator*, create a logical volume on the JBOD/RAID that matches the size of the backed-up data, and restore the data to the custom-sized logical volume.

The remaining space on the JBOD/RAID is available for the data that are currently on other DAS. Create logical volumes in the remaining space that match the size of the data on the other DAS, then mirror the data from each DAS into the corresponding logical volume. As you empty the data from a DAS, move it behind the *Storage Concentrator* and use it to create more custom-sized logical volumes.

This method requires careful planning, but is more efficient than either of the first two methods.



To tape and mirror the data

1. Perform a full backup of all DAS data.
2. Run a full verify of the backups, including random restores to confirm the data integrity.
3. Identify how much space is being used on each of the DAS.

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4. Back up the data on the DAS that has the smallest disk usage, then move that external JBOD/RAID to the *Storage Concentrator*. To do this, follow the steps in
5. *Method 2: Move the JBOD/RAID behind the Storage Concentrator and Migrate the Data via Tape*, page 10. You may use either of the approaches described in that section.
6. Create an IP SAN logical volume that matches the size of the data (plus any anticipated expansion needs), then release the unused disk space.
7. Restore the data from tape to the new IP SAN logical volume.
8. Create additional IP SAN volumes on the disk that you just cleared, customizing the size of each volume to the size of the data on the DAS.
9. Mirror the other application servers' DAS onto these new IP SAN volumes. To do this, follow the steps in *Method 1: Mirror the Data onto New Storage*, page 4. As you did there, move the JBOD/RAID from the application servers to the *Storage Concentrator* as they become available, and use them for more IP SAN logical volumes.