NetApp Insight 2011

CR-3-133
MultiStore Hands-On Advanced Lab

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# 1 LAB INFORMATION

This lab is pre-configured with Data ONTAP simulators that represent two physical filers, as well as several vFiler units.

See Appendix A for a reference on how the lab was configured.

All Passwords are **netapp123**:

- **Windows** \ LAB\Administrator : netapp123
- **NetApp and Linux** \ root : netapp123

## Table 1) Internal Lab IP Addresses

<table>
<thead>
<tr>
<th>System</th>
<th>IP Address</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows Server 2008 R2</td>
<td>192.168.0.11</td>
<td>RDP Jumphost, lab.local domain, CIFS shares and iSCSI LUNs</td>
</tr>
<tr>
<td>RHEL 5.4 Linux</td>
<td>192.168.0.31</td>
<td>OnCommand 5 and NFS mounts</td>
</tr>
<tr>
<td>FAS6280</td>
<td>192.168.0.210</td>
<td>Data ONTAP Simulator</td>
</tr>
<tr>
<td>FAS3270</td>
<td>192.168.0.211</td>
<td>Data ONTAP Simulator</td>
</tr>
<tr>
<td>vfiler1</td>
<td>192.168.0.221</td>
<td>vFiler unit for vFiler migrate</td>
</tr>
<tr>
<td>vfiler2</td>
<td>192.168.0.222</td>
<td>vFiler unit for vFiler DR</td>
</tr>
<tr>
<td>vfiler3</td>
<td>192.168.0.223</td>
<td>vFiler unit for DataMotion</td>
</tr>
</tbody>
</table>

The Windows jumphost is the machine which will you will connect to via RDP in your lab. It will be the host from which all of your lab configuration is done. It provides access to:

- System Manager 2.0R1
- PuTTY for SSH access (all sessions are preconfigured)
- NetApp Management Console 3.1
- OnCommand 5 Console shortcut
### Table 2: Data ONTAP Simulator Lab Configuration

<table>
<thead>
<tr>
<th>Data ONTAP Simulators (vfiler0)</th>
<th>FAS6280</th>
<th>FAS3270</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>user</strong></td>
<td>root</td>
<td>root</td>
</tr>
<tr>
<td><strong>passwd</strong></td>
<td>netapp123</td>
<td>netapp123</td>
</tr>
<tr>
<td><strong>IP</strong></td>
<td>192.168.0.210 (e0a)</td>
<td>192.168.0.211 (e0a)</td>
</tr>
<tr>
<td><strong>Subnet</strong></td>
<td>255.255.255.0</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td><strong>GW</strong></td>
<td>192.168.0.1</td>
<td>192.168.0.1</td>
</tr>
<tr>
<td><strong>IPSpace</strong></td>
<td>default-ipspace</td>
<td>default-ipspace</td>
</tr>
<tr>
<td><strong>dns domainname</strong></td>
<td>lab.local</td>
<td>lab.local</td>
</tr>
<tr>
<td><strong>dns server</strong></td>
<td>192.168.0.11</td>
<td>192.168.0.11</td>
</tr>
<tr>
<td><strong>Admin Host</strong></td>
<td>192.168.0.31</td>
<td>192.168.0.31</td>
</tr>
<tr>
<td><strong>rootvol</strong></td>
<td>root</td>
<td>root</td>
</tr>
<tr>
<td><strong>CIFS</strong></td>
<td>domain</td>
<td>domain</td>
</tr>
<tr>
<td><strong>CIFS Netbios Name</strong></td>
<td>fas6280</td>
<td>fas3270</td>
</tr>
<tr>
<td><strong>CIFS Admin</strong></td>
<td>administrator</td>
<td>administrator</td>
</tr>
<tr>
<td><strong>CIFS Admin Passwd</strong></td>
<td>netapp123</td>
<td>netapp123</td>
</tr>
<tr>
<td><strong>CIFS Share</strong></td>
<td>C$</td>
<td>C$</td>
</tr>
<tr>
<td><strong>NFS Export</strong></td>
<td>/vol/root</td>
<td>/vol/root</td>
</tr>
<tr>
<td>vFiler Units</td>
<td>v filer1</td>
<td>v filer2</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>user</td>
<td>root</td>
<td>root</td>
</tr>
<tr>
<td>passwd</td>
<td>netapp123</td>
<td>netapp123</td>
</tr>
<tr>
<td>IP</td>
<td>192.168.0.220 (e0b)</td>
<td>192.168.0.221 (e0b)</td>
</tr>
<tr>
<td>Subnet</td>
<td>255.255.255.0</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td>GW</td>
<td>192.168.0.1</td>
<td>192.168.0.1</td>
</tr>
<tr>
<td>IPspace</td>
<td>ipspace1</td>
<td>ipspace1</td>
</tr>
<tr>
<td>DNS domain</td>
<td>lab.local</td>
<td>lab.local</td>
</tr>
<tr>
<td>DNS server</td>
<td>192.168.0.11</td>
<td>192.168.0.11</td>
</tr>
<tr>
<td>Admin Host</td>
<td>192.168.0.31</td>
<td>192.168.0.31</td>
</tr>
<tr>
<td>rootvol</td>
<td>vfiler1_root</td>
<td>vfiler2_root</td>
</tr>
<tr>
<td>nasvol</td>
<td>vfiler1_nas</td>
<td>vfiler2_nas</td>
</tr>
<tr>
<td>sanvol</td>
<td>vfiler1_san</td>
<td>vfiler2_san</td>
</tr>
<tr>
<td>CIFS</td>
<td>domain</td>
<td>domain</td>
</tr>
<tr>
<td>CIFS Netbios Name</td>
<td>vfiler1</td>
<td>vfiler2</td>
</tr>
<tr>
<td>CIFS Admin</td>
<td>administrator</td>
<td>administrator</td>
</tr>
<tr>
<td>CIFS Admin Passwd</td>
<td>netapp123</td>
<td>netapp123</td>
</tr>
<tr>
<td>CIFS Share</td>
<td>vfiler1_nas</td>
<td>vfiler2_nas</td>
</tr>
<tr>
<td>NFS Export</td>
<td>/vol/vfiler1_nas</td>
<td>/vol/vfiler2_nas</td>
</tr>
<tr>
<td>iSCSI LUN</td>
<td>/vol/vfiler1_san/vfiler1_lun1</td>
<td>/vol/vfiler2_san/vfiler2_lun1</td>
</tr>
</tbody>
</table>
At the beginning of this lab, all vFiler units reside on the Data ONTAP Simulator representing a FAS6280.

Figure 1) Data ONTAP Simulator and vFiler Unit Layout

**FAS6280**

![Diagram of FAS6280 with vFiler units]

**FAS3270**

![Diagram of FAS3270 with vFiler units]
The Windows Server 2008R2 desktop is pictured below. On the desktop you will see a number of icons that have been placed there for your use in the lab:

Icons Column 1 top to bottom
- System Manager 2.0R1
- Putty
- OnCommand 5 Console
- NetApp Management Console (NMC 3.1)

Icons Column 2 top to bottom
- vFiler Shares (shortcuts to all vFiler CIFS shares and iSCSI drives)
2  DATAMOTION FOR VFILER

DataMotion for vFiler in Data ONTAP 8.1 contains a number of enhancements. vFilers can now be nondisruptively moved between any type of controller and any type of disk.

This lab will walk you through performing a complete DataMotion for vFiler operation.

Figure 2) DataMotion for vFiler Diagram

1. To begin this lab, open several SSH sessions. Double-click the PuTTY icon and login to the “FAS6280 (vfiler0)”, “FAS3270 (vfiler0)”, and “Linux” sessions, authenticating as root: netapp123. You should already have two of these sessions open.

2. Display your access to the NAS (CIFS and NFS) and SAN (iSCSI) connections on vfiler3. In the Linux PuTTY window, check the nfs mount:

```
[root@rhel54 ~]# ls -l /root/vfiler3
total 0
-rw-r--r-- 1 root root 12 Sep 30 01:17 test_vfiler3.txt
```
On the Windows machine, double-click “vFiler Shares” then click into each of the 3 vFiler shortcuts and confirm access to vfiler3_C$, vfiler3_nas and vfiler3_san.
<table>
<thead>
<tr>
<th>Name</th>
<th>Date modified</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>test_file3</td>
<td>9/3/2011 5:17 AM</td>
<td>Test Document</td>
<td>1 KB</td>
</tr>
</tbody>
</table>

1 Item
3. To get started with the DataMotion for vFiler process, double-click the NetApp Management Console (NMC) on the Windows 2008 Desktop. Enter the password "netapp123" then click Connect.

4. Click on the Hosts pane on the left.
5. Click on **vFiler Units** and select **vfiler3** in the window. Click the **Start migration** button.
6. Click **Next**.
7. Select **Online migration** and click **Next**.

**NOTE:** Online migration is the key to DataMotion for vFiler. This method of migration allows vFiler units to be moved non-disruptively between NetApp storage systems with a maximum pause in I/O of 120 seconds.

Offline migration will migrate vFiler units disruptively. The vFiler unit will be stopped and there is an undetermined amount of time for the pause in I/O while data cutover occurs.
8. Select fas3270 and click Next.
9. Click **Next** (take defaults – we only have one aggregate on each Simulator).
10. Click **Edit**.

Select the row in the table and click edit button for providing mandatory information like network interface.

To continue, click **Next**.
11. Select **e0b** for the network interface and click **Update**, then click **Next**.

![Edit binding](image1)

![vSphere Unit Migration Wizard](image2)

- Select the row in the table and click edit button for providing mandatory information like network interface.
- To continue, click **Next**.
12. Click **Next** (no SnapMirror throttle).
13. Click **Next**. We won’t cutover now so you can see how to do this manually.
14. Click **Next** on the information screen.
15. Click Finish.

16. You will be able to watch the status of the job as it progresses.
17. When the Status is shown as **Started, cutover required**, click the **Cut over** button. You can also run **Update** to resync the mirrors if a long period has passed. The cutover process will take a while to begin, but once the cutover has begun, the pause in I/O from clients will not exceed 120 seconds.
18. The migration cutover wizard starts. Click **Next**.
19. Click **Next**.
20. Leave the defaults (All static routes radio button and Store the migrated routes checkbox) and click **Next**.
21. Click **Next**.
22. Click **Finish**.

23. You will be able to watch the cutover job as it completes.
24. When the job window closes, the Migration Status is *Migrated, Cleanup Required*.

25. To see all jobs, click on the **Data** pane and select **Jobs**.
26. After this process you can again verify that after vfiler3 moved from the FAS6280 to the FAS3270 there is no outage to the data. Display your access to the NAS (CIFS and NFS) and SAN (iSCSI) connections on vfiler3. In the Linux PuTTY window, check the nfs mount:

```bash
[root@rhel54 ~]# ls -l /root/vfiler3
total 0
-rw-r--r-- 1 root root 12 Sep 30 01:17 test_vfiler3.txt
```

On the Windows machine, double-click "vFiler Shares" then click into each of the 3 vFiler shortcuts and confirm access to vfiler3_C$, vfiler3_nas and vfiler3_san.

27. If you want to try some additional functionality, try the **Rollback** function in the NMC. This moves vfiler3 back to the FAS6280. The **Clean Up** operations removes all the original source volumes, SnapMirror configuration, Snapshots, and vfiler configuration from the FAS6280.
3  VFILER MIGRATE (CLI)

In the previous section you migrated a vFiler unit nondisruptively using the Online Migration capability of Provisioning Manager. Here we will show you how to perform the same migration using the **v filer migrate** CLI command. If you recall, Provisioning Manager also has an Offline Migration capability. This is the same capability that you can manage from the CLI.

Both the Offline Migration and the CLI v filer migrate command use Asynchronous SnapMirror for mirroring and cutover of data. This means that the cutover may take an unknown amount of time based on the load of the system, and the cutover can not happen during a guaranteed time. Both of these methods are disruptive.

In this lab we will migrate vfiler1 from the FAS6280 simulator to the FAS3270. In this lab environment, the NFS and iSCSI clients will not see an outage because there is no load on the system and very little data in the volumes being mirrored. If you leave a CIFS window open to the vfiler1 CIFS share, you will notice a disconnection.

**NOTE:** The snapmirror.conf file on the 3270 will update every 3 minutes by default (you would change this for a production migration). Volumes must be the same name on the source and target systems. IPSpace names must be the same name on source and target systems (they were pre-created for these labs). The mirrors run from vfiler0 (physical controller) and not to the vFiler units directly.

For information on how to move vFiler units between controllers in the same HA pair, using v filer migrate (-m nocopy), see Appendix D.

1. To begin a v filer migrate process, first show the status:
   
   fas3270> v filer status -a

2. Then you will execute the migrate start command. Note that we are executing this command from the destination system, not from the source, so we have to provide a login and password for the source system.
   
   fas3270> v filer migrate start -c secure -l root:netapp123 vfiler1@fas6280

3. When prompted, answer **y** to keep the same **.220** IP address. Enter **e0b** for the interface, and use **255.255.255.0** for the subnet.

4. Now you can show the status of the migration. Wait until SnapMirror status shows as **idle** for all three volumes.
   
   fas3270> v filer migrate status vfiler1@fas6280

5. Once the SnapMirror status shows as idle, you can complete the migration. When you enter this command, the vFiler unit on the source system is stopped. A final incremental SnapMirror update is processed, and the vFiler unit is then started on the destination system.
   
   fas3270> v filer migrate complete -c secure -l root:netapp123 vfiler1@fas6280

6. You can now see that the vFiler unit has been moved:
   
   fas3270> v filer status -a # vfiler1 running on the 3270

   fas6280> v filer status -a # vfiler1 is gone on the 6280

7. As with the previous DataMotion for vFiler session, you can confirm that CIFS, NFS and iSCSI access continues for vfiler1 even though it has moved physical controllers.

   **NFS** (Linux)
   
   [root@rhel154 ~]# ls -l /root/vfiler1
   
   total 0
   -rw-r--r-- 1 root root 12 Sep 30 01:17 test_vfiler1.txt

   **CIFS** (access from vFiler Shares on desktop)
   
   \192.168.0.220\vfiler1_nas
iSCSI (access from vFiler Shares on desktop)

X:\
4  VFILER DR

A new plugin is available for the NetApp Management Console (NMC) that allows you to configure and activate vFiler DR relationships. This lab will show you how to use the plugin to configure a new vFiler DR relationship. You will then use the CLI to simulate an outage and activate the DR vFiler, and resync it with the source site.

4.1  CONFIGURING VFILER DR WITH THE ONCOMMAND 5 NMC PLUGIN

** The equivalent CLI to the GUI below **

```
fas3270> vfiler dr configure -u -c secure -l root:netapp123 vfiler2@fas6280
```

Figure 3) vFiler DR Diagram

1. Double Click the NetApp Management Console (NMC) on the Windows 2008 Desktop. Enter the password `netapp123` then click Connect.
Click on the **Hosts** pane on the left.
2. Click **vFiler DR Units** and select **vfiler2**. Click the **Protect** button.
3. Click **Next**.

4. Click **Next** as there is only one storage system in the list.
5. Click **Next**, as we are keeping the same IP and interface settings.

6. Click next to use the default protection values. The destination volumes have been precreated as part of the lab. In a real-world scenario you would need to create these.
7. Click **Next** to use the same DNS and NIS settings.

8. Click **Next**. If you needed to specify alternate source or destination IP addresses, you could do that here (for example, if you have a specific network for SnapMirror replication).
9. Enter the appropriate credentials for the source system (root : netapp123), and check the **Use secure command channel**, then click **Next**.
10. Click **Finish**.
11. Once the DR relationship has been defined, you can view it both in the NMC as well as the CLI. 
   NOTE: The NMC refreshes DR relationships slowly, so it may take several minutes for the 
   Protection Role to show as DR Backup.

12. You can also show the vfiler status using the CLI:

   fas3270> vfiler status
   vfiler0                          running
   vfiler3                          running
   vfiler2                          stopped, DR backup
4.2 ACTIVATE A DR VFILER

The elegance of vFiler DR is that it breaks all mirrors automatically, and it also contains the shares, exports, iSCSI mappings, IP addresses, and other settings from the source vFiler unit. Without vFiler DR, you would have to manually break mirrors, and recreate all of the configuration manually at the DR destination site. Note: You could activate from the vFiler DR plugin in the NMC above, but we will show via CLI.

Here you will shut down vfiler2 on the FAS6280 system, to simulate a disaster at the source site. The destination vfiler2 will be activated on the FAS3270 system.

1. First, you will simulate a disaster on the source system:
   fas6280> vﬁler stop vfiler2

2. Next, activate the DR vFiler on the destination system:
   fas3270> vﬁler dr activate vfiler2@fas6280

3. Display the vFiler status on each system. Obviously in a real disaster you may not be able to see that the vfiler on the source system is stopped, but this is a valid use case for DR testing.
   fas6280> vﬁler status -a
   fas3270> vﬁler status -a

4. As with the previous sessions, you can confirm that CIFS, NFS and iSCSI access continues for vfiler2 even though it has moved physical controllers.
   NFS (Linux)
   [root@rhe154 ~]# ls -l /root/vfiler2
   total 0
   -rw-r--r-- 1 root root 12 Sep 30 01:17 test_vfiler2.txt

   CIFS (access from vFiler Shares on desktop)
   \\192.168.0.221\vfiler2_nas

   iSCSI (access from vFiler Shares on desktop)
   Y:\

   "\"
4.3 RESYNC A DR VFILER

Now that you've simulated a disaster and seen how to bring up a DR vfiler at a destination site, you'll want to know how to resync the destination site with the source once the disaster is over. Note: You could resync from the vfiler DR plugin in the NMC above, but we will show via CLI.

In this section you will perform a vfiler DR resync back to the FAS6280 system, failover the DR vfiler, and resync again back to the destination. This will return vfiler2 back to the source system in the same state it was before we simulated a disaster above.

Figure 4) vfiler DR Resync Diagram

1. To resync the running DR vfiler2 back to the source production site:
   
   fas6280> vfiler dr resync -c secure -l root:netapp123 vfiler2@fas3270
   fas6280> vfiler dr status vfiler2@fas3270
   fas6280> snapmirror status
   fas6280> vfiler status -a

2. Once the SnapMirror status in step 1 shows as idle, you can then stop the DR vfiler and activate it again on the source production site. NOTE: Make certain you issue the commands on the correct simulators.
   
   fas3270> vfiler stop vfiler2
   fas3270> vfiler dr activate vfiler2@fas3270
   fas3270> vfiler status -a
   fas6280> vfiler status -a

3. Now, in order to restore the DR relationship so that the DR vfiler on the FAS3270 returns to the correct state of Stopped, DR Backup, you will need to again resync the relationship.
   
   fas3270> vfiler dr resync -c secure -l root:netapp123 vfiler2@fas6280
   fas3270> vfiler dr status vfiler2@fas6280
   fas3270> snapmirror status
   fas3270> vfiler status -a
4. Finally, you can release the SnapMirror relationships which are left over from the resync of the original source volumes:

```
fas3270> snapmirror release vfiler2_root fas6280:vfiler2_root
fas3270> snapmirror release vfiler2_san fas6280:vfiler2_san
fas3270> snapmirror release vfiler2_nas fas6280:vfiler2_nas
```
4.4 **VFILER DR USING EXISTING SNAPMIRROR**

A new option (-u) was introduced in Data ONTAP 7.3.5 and Data ONTAP 8.1 7-mode to allow creation of a vFiler DR relationship using an existing SnapMirror relationship. This means that if you have existing SnapMirror relationships between two storage controllers, you can use them to initialize a vFiler DR relationship. All volume mirrors must be initialized prior to using this option.

1. **Here, we will delete the existing DR relationship for vfiler2 on the FAS6280, use the volumes to create new initialized SnapMirror relationships with the FAS3270, and then use those relationships to create a new DR vfiler. This simulates a situation where you already have mirrored volumes and do not wish to perform a new baseline.**

```
fas3270> vfiler dr delete vfiler2@fas6280
fas3270> vol restrict vfiler2_root
fas3270> vol restrict vfiler2_nas
fas3270> vol restrict vfiler2_san
fas3270> snapmirror initialize -S fas6280:vfiler2_root vfiler2_root
fas3270> snapmirror initialize -S fas6280:vfiler2_nas vfiler2_nas
fas3270> snapmirror initialize -S fas6280:vfiler2_san vfiler2_san
```

2. **Once the SnapMirror status shows **idle**, you can create the vFiler DR relationship using the **-u** option:**

```
fas3270> vfiler dr configure -u -c secure -l root:netapp123 vfiler2@fas6280
```

When prompted, use the same IP address. Enter **e0b** as the interface, and **255.255.255.0** for the subnet mask. Answer **N** to use the same DNS settings.

3. **You can now check the status and you will see that the vFiler DR relationship has been created.**

```
fas3270> snapmirror status
fas3270> vfiler status
```

4. **NOTE: When using the **-u** command, the vFiler DR configure process will change the existing settings in **/etc/snapmirror.conf** to every 3 minutes. In a production scenario you will want to change these settings back to an interval of your choosing.**

**CLEANUP**

Stop the DR vFiler on the FAS6280 and activate the vFiler unit on the FAS3270:

```
fas6280> vfiler stop vfiler2
fas6280> vfiler status -a
fas3270> vfiler dr activate vfiler2@fas6280
fas3270> vfiler status -a
```
5 MOVING THE VFILER ROOT VOLUME

To move the root volume into a different aggregate, the vfiler must be stopped, destroyed and recreated using the same root volume name. The new root must be renamed to the old root name.

NOTE: You can rename any vfiler volume (including root) with `vol renameold new` at any time, however to actually move the root volume requires that we destroy and recreate the vfiler using the same name of the root volume before/after the move to another aggregate.

The procedure below will move the vfiler1_root volume to newroot (which will become vfiler1_root)

1. Create a new root volume, restrict it, and vol copy the existing root to the newroot:
   `fas3270> vol create newroot -s none aggr0 20m`
   `fas3270> vol restrict newroot`
   `fas3270> vol copy start -S vfiler1_root newroot`

2. Stop and destroy the vfiler:
   `fas3270> vfiler stop vfiler1`
   `fas3270> vfiler destroy vfiler1`

3. Rename volumes so the newroot is the same name as oldroot
   `fas3270> vol rename vfiler1_root oldroot`
   `fas3270> vol rename newroot vfiler1_root`

4. Online the new root volume and recreate the vfiler:
   `fas3270> vol online vfiler1_root`
   `fas3270> vfiler create vfiler1 -r /vol/vfiler1_root`

5. NOTE: The e0b interface will not be configured and needs to be configured. You will need to `ifconfig` the interface. You will also need to update the rc file in a production environment.
   `fas3270> vfiler status -a`
   `fas3270> ifconfig e0b alias 192.168.0.220`
   `fas3270> vfiler status -a`
SNAPMIRROR BETWEEN VFILER UNITS

Here we show two methods of mirroring between vfiler units on the same physical controller, one using the vfiler network, and the other using physical filer loopback address(vfiler0). The advantage of mirroring from a vfiler is if the vfiler moves, then the mirror follows. If you are mirroring from vfiler0, mirrors need to be resynced when moved to a new target controller. The advantage in mirroring from vfiler0 is if there is a DMZ or no network route between vFiler units, you can still replicate data.

NOTE: If you run snapmirror from the vFiler, the logs are in /etc/log/snapmirror of the vFiler, not vfiler0. Logs reside wherever the mirror runs (on both source and target).

NOTE: If you plan on using snapmirror multipathing, that is only supported in vfiler0 and not in individual vfilers. This is also required for snapmirror compression, so using vfiler0 for mirrors is most useful in these environments.

Figure 5) SnapMirror Using The vFiler Network

SNAPMIRROR USING THE VFILER NETWORK

1. Confirm you can ping both vfilers:
   fas3270> ping 192.168.0.220
   fas3270> ping 192.168.0.221

2. Next, create the volumes you want to mirror and add them to both vFiler units.
   fas3270> vol create vfiler1_source -s none aggr0 20m
   fas3270> vfiler add vfiler1 /vol/vfiler1_source
   fas3270> vol create vfiler2_dest -s none aggr0 20m
   fas3270> vfiler add vfiler2 /vol/vfiler2_dest

3. Now you can turn on SnapMirror and mirror the volumes.
   fas3270> vfiler run * snapmirror on
   fas3270> vfiler run * options snapmirror.access *
   fas3270> vfiler run vfiler2 vol restrict vfiler2_dest
   fas3270> vfiler run vfiler2 snapmirror initialize -S 192.168.0.220:vfiler1_source vfiler2_dest
   fas3270> vfiler run vfiler2 snapmirror status

Note: ndmpcopy can also be used vFiler to vFiler
SNAPMIRROR USING THE VFILER0 LOOPBACK

In this method, you do not use any externally connected network interfaces to carry the SnapMirror replication traffic. This means that you can mirror traffic between two vFiler units that do not have any network connection. This is a good way to replicate data from production to a DMZ.

Figure 6) SnapMirror Using vFiler0 Loopback

1. As above, create the volumes you want to mirror and add them to both vFiler units.
   ```bash
   fas3270> vol create vfiler1_source2 -s none aggr0 20m
   fas3270> vfiler add vfiler1 /vol/vfiler1_source2
   fas3270> vol create vfiler2_dest2 -s none aggr0 20m
   fas3270> vfiler add vfiler2 /vol/vfiler2_dest2
   ```

2. This time when you initialize the SnapMirror, note that the command has no IP source or destination address.
   ```bash
   fas3270> vol restrict vfiler2_dest2
   fas3270> snapmirror initialize -S vfiler1_source2 vfiler2_dest2
   fas3270> snapmirror status
   ```
APPENDIX A – LAB CONFIGURATION FOR REFERENCE

BASIC LAB CONFIGURATION

# username
root
# password
netapp123
# e0a
192.168.0.nnn/24
fas6280 nnn=210 fas3270 nnn=211 vfiler1 nnn=220 vfiler2 nnn=221 vfiler3 nnn=222
# gateway
192.168.0.1
# dns domain name
lab.local
# dns server
192.168.0.11
# cifs setup
multiprotocol; lab.local domain lab\administrator:netapp123
# cifs administrator
administrator
# cifs password
netapp123
# timezone
GMT
# language
C.UTF-8
# admin host
192.168.0.31

Make Windows 2008 (or other) DNS entries for all 5 systems (2 vfiler0, 3 vfiler)

CONFIGURATION FOR BOTH 6280 AND 3270 NODES

options autosupport.enable off
vol rename vol0 root
license add  # add license keys
options security.passwd.rules.history 0
options httpd.enable on
options httpd.admin.enable on
options tls.enable on
options ndmpd.enable on
options snapmirror.enable on
options snapmirror.access *
options timed.servers 192.168.0.11
options timed.enable on
cifs setup (for all vfiler0 and vfilers) - keep names fas6280, fas3270, vfiler1, vfiler2, vfiler3

n no wins
1 multiprotocol
netapp123 root password
1 domain lab.local
netapp123 local administrator netapp123
options licensed_feature.flexcache_nfs.enable on
options licensed_feature.iscsi.enable on
options licensed_feature.multistore.enable on
options licensed_feature.nearstore_option.enable on
vfiler limit 4
reboot
vol create vfiler1_root -s none aggr0 20m
vol create vfiler1_nas -s none aggr0 400m
vol create vfiler1_san -s none aggr0 400m
vol create vfiler2_root -s none aggr0 20m
vol create vfiler2_nas -s none aggr0 400m
vol create vfiler2_san -s none aggr0 400m
vol create vfiler3_dmotion_root aggr0 10g # 6280 only. Not 3270. 3270 will autocreate from dmotion
options autologout.console.timeout 180
options autologout.telnet.timeout 180
ipspace create ipspace1
ipspace assign ipspace1 e0b
ipspace list

CONFIGURE VFILERS ON FAS6280

vfiler1
fas6280> vfiler create vfiler1 -s ipspace1 -i 192.168.0.220 /vol/vfiler1_root
        /vol/vfiler1_nas /vol/vfiler1_san
Setting up vfiler vfiler1
Configure vfiler IP address 192.168.0.220? [y]:
Interface to assign this address to: e0b
vfiler run vfiler1 cifs shares -add vfiler1_nas /vol/vfiler1_nas
vfiler run vfiler1 cifs shares
vfiler run vfiler1 options snapmirror.enable on
vfiler run vfiler1 options snapmirror.access *
vfiler run vfiler1 secureadmin setup ssh   # enter all all defaults
vfiler run vfiler1 secureadmin enable ssh
vfiler run vfiler1 exportfs -av
fas6280> vfiler run vfiler1 igroup create -i -t windows vfiler1_iscsi
fas6280> vfiler run vfiler1 igroup add vfiler1_iscsi iqn.1991-05.com.microsoft:win2k8r2.lab.local
fas6280> vfiler run vfiler1 lun create -o noreserve -s 32m -t windows
        /vol/vfiler1_san/vfiler1_lun1
fas6280> vfiler run vfiler1 lun map /vol/vfiler1_san/vfiler1_lun1 vfiler1_iscsi

vfiler2
fas6280> vfiler create vfiler2 -s ipspace1 -i 192.168.0.221 /vol/vfiler2_root
        /vol/vfiler2_nas /vol/vfiler2_san
Setting up vfiler vfiler2
Configure vfiler IP address 192.168.0.221? [y]:
Interface to assign this address to: e0b
fas6280> vfiler run vfiler2 cifs shares -add vfiler2_nas /vol/vfiler2_nas
fas6280> vfiler run vfiler2 cifs shares
fas6280> vfiler run vfiler2 secureadmin setup ssh # enter all all defaults
fas6280> vfiler run vfiler2 secureadmin enable ssh
fas6280> vfiler run vfiler2 exportfs -av
fas6280> vfiler run vfiler2 igroup create -i -t windows vfiler2_iscsi
fas6280> vfiler run vfiler2 igroup add vfiler2_iscsi iqn.1991-05.com.microsoft:win2k8r2.lab.local
fas6280> vfiler run vfiler2 lun create -o noreserve -s 32m -t windows /vol/vfiler2_san/vfiler2_lun1
fas6280> vfiler run vfiler2 lun map /vol/vfiler2_san/vfiler2_lun1 vfiler2_iscsi

vfiler3
fas6280> vfiler create vfiler3 -s ipspace1 -i 192.168.0.222 /vol/vfiler3_dmotion_root
Setting up vfiler vfiler3
Configure vfiler IP address 192.168.0.222? [y]:
Interface to assign this address to: e0b
fas6280> vfiler run vfiler3 cifs shares -add vfiler3_root /vol/vfiler3_dmotion_root
fas6280> vfiler run vfiler3 cifs shares
fas6280> vfiler run vfiler3 secureadmin setup ssh # enter all all defaults
fas6280> vfiler run vfiler3 secureadmin enable ssh
fas6280> vfiler run vfiler3 exportfs -av
fas6280> vfiler run vfiler3 igroup create -i -t windows vfiler3_iscsi
fas6280> vfiler run vfiler3 igroup add vfiler3_iscsi iqn.1991-05.com.microsoft:win2k8r2.lab.local
fas6280> vfiler run vfiler3 lun create -o noreserve -s 32m -t windows /vol/vfiler3_dmotion_root/vfiler3_lun1
fas6280> vfiler run vfiler3 lun map /vol/vfiler3_dmotion_root/vfiler3_lun1 vfiler3_iscsi

Edit /etc/rc and enter manually the line below to add a default route in the IPSpace:
fas6280> vfiler run vfiler1 route add default 192.168.0.1 1

SETTINGS TO CHANGE FOR ALL VFILER UNITS
vfiler run * options security.passwd.rules.history 0
vfiler run * options httpd.admin.enable on
vfiler run * options tls.enable on
vfiler run * options ndmpd.enable on
vfiler run * options snapmirror.enable on
vfiler run * options snapmirror.access *
vfiler run * options iscsi.ip_based_tpgroup on # data motion requirement

OTHER CONFIGURATION
Create 9 desktop shortcuts (3 per node) C$, vfiler_nas, vfiler_san (shortcut to x:, y:, z:) drives.
Write a file to each NAS share and iSCSI LUN.
Add NFS mounts in the linux machine’s /etc/fstab for /root/vfiler1 /root/vfiler2 /root/vfiler3
SOFTWARE INSTALLATION

Install Java, Perl, Adobe Flash, System Manager 2.0R1, NetApp Management Console (NMC), and the vFiler DR plugin for the NMC on the Windows host and add the two simulators (6280, 3270) to System Manager.

Install OnCommand 5.0 on the Linux host:

```
./occore-setup-5-0-linux-x64.sh
dfm plugin add filerconfig_Linux64.zip
```

Download the 8.1RC1 64-bit plugin from NOW:


```
dfm service stop http
dfm service start http
dfm option set vFilerMonInterval=1min
dfm vfiler add all
```
8 APPENDIX B – CREATE A VFILER WITH SYSTEM MANAGER 2.0

1. Open System Manager 2.0 from the icon on the Windows desktop. Select the FAS3270 and click the Login button.

2. Click on vFiler units.
3. Click on **Create**.
4. Click **Next**.

5. Fill in the details below (vfilername: test, browse for existing vfiler1_root volume) and click **Next**.
6. Fill in the networking details. Enter **ipspace1** for the IPSpace, **192.168.0.223** for the IP address, **255.255.255.0** for the netmask, **e0b** for the interface, and click **Next**.

7. Click on 3 protocols (all but RSH) and click **Next**.
8. Enter the admin host 192.168.0.31 and the password netapp123 and click Next.

9. Click Next.
10. Click **Finish**.

11. Add 2 more volumes. Select the **test** vFiler unit and click **Edit**.
12. Select the **Storage** tab and click the **Add** button.

13. Click the ellipse ... and add the volumes `vfiler1_nas` and `vfiler1_san`, then click **Save**.
14. Select the **DNS** tab, enter **lab.local** and **192.168.0.11**, then click **Save and Close**.
APPENDIX C – CREATE A VFILER WITH PROVISIONING MANAGER

NOTE: You will need to add a vfiler default route by adding a `route add default` statement in the vfiler0 /etc/rc file.

Steps required to create a vFiler unit using Provisioning Manager:

- Create a resource pool
- Create a vFiler template
- Create a vFiler unit
- Create a provisioning policy
- Create a dataset and assign storage

CREATE A RESOURCE POOL

1. Open the NetApp Management Console (NMC) and select the Hosts Pane → Storage Systems, click the Details tab on the bottom, then click on the FAS3270. Confirm that all licenses you need are installed.
2. From the navigation pane, click **Data > Resource Pools**. Click the **Add** button to start the setup wizard.
3. Click Next.

Welcome to the Add Resource Pool Wizard.

This Wizard will help you construct resource pools.

Resource pools are collections of physical resources from which storage containers can be provisioned.

To continue, click Next.
4. Enter **test** in General Properties then click **Next**.
5. Click on the **fas3270** and click the > arrow to add to the resource pool, and click **Next**.
6. Leave the Resource pool label blank and click **Next**.
7. Confirm Space Thresholds (increase thresholds per below) and click **Next**.

![Add Resource Pool Wizard]

<table>
<thead>
<tr>
<th>Space thresholds</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable event generation</td>
<td></td>
</tr>
<tr>
<td>Nearly Full threshold (%)</td>
<td>90</td>
</tr>
<tr>
<td>Full threshold (%)</td>
<td>95</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aggregate overcommitted thresholds</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate overcommitted thresholds are specified as a percentage of aggregate size</td>
<td></td>
</tr>
<tr>
<td>Enable aggregate overcommitted thresholds</td>
<td></td>
</tr>
<tr>
<td>Nearly overcommitted threshold (%)</td>
<td>3000</td>
</tr>
<tr>
<td>Overcommitted threshold (%)</td>
<td>4000</td>
</tr>
</tbody>
</table>

To continue, click Next.
8. Click Finish.
9. You can now see your created Resource Pool.
CREATE A VFILER TEMPLATE

1. From the navigation pane, select Policies > vFiler Templates. Click the Add button to start the setup wizard.
2. Click **Next**.
3. Enter **test** and click **Next**.
4. Add DNS settings. Enter **lab.local** for the domain name and **192.168.0.11** for a name server. Click on **Add** then click **Next**.
5. For CIFS Settings, select **MultiProtocol**, **Active Directory** and click **Next**.

6. Click **Finish**. You can now see your created vFiler Template.
CREATE A VFILER UNIT

1. From the navigation pane, select **Hosts > vFiler Units**. Click the **Add** button to start the setup wizard.
2. Click **Next**.
3. Enter `test` for the name, ipspace1 as the IPSpace. Select **NFS**, **CIFS** and **iSCSI**, then click **Next**.
4. Select fas3270 and click **Next**.
5. Click **Next**.

6. Click **Add** to enter IP bindings. Enter the IP, netmask, e0b (which will be part ipspace1 from prior setting) and click **Add**.
7. Click **Next**.
8. Select the vfiler template **test**, enter the domain password (**netapp123**), and click **Next**.
9. Enter the password `netapp123` and click **Next**.
10. Click **Next**.
11. Click **Finish**.
ADDITIONAL TASKS OUT OF SCOPE OF THIS EXAMPLE

Create a provisioning policy: Policies → Provisioning
Create a dataset and assign storage: Data → Datasets
APPENDIX D - VFILER MIGRATE WITH NO DATA COPY

For Reference Only – this is not possible in the simulator hands-on lab.

SnapMover was previously a separate license and product name. In Data ONTAP 7.3.2 and Data ONTAP 8.0 and later, the SnapMover license and product name have been discontinued. The functionality has been included with the MultiStore license. This functionality can not be demonstrated in a simulator since we don’t have software disk ownership, but see below for more information.

The major requirement is that the vFiler owns ALL volumes in ALL aggregates used by that vFiler. For FAS controllers, it only works between 2 cluster nodes since both can see the disks at the same time.

The vfiler migrate command is issued only once to do the migration since no data mirroring is done, just vfiler stop, disk reassign, and vfiler start. The command to use is:

```
vfiler migrate -m nocopy
```

Figure 7) vFiler Migrate No Copy Diagram

MultiStore® POC Example
vFiler migrate with SnapMover

ONE Step, ONE Command Migration
Disks/LUNs reassign to different physical node
No Data is Migrated

FAS6080> vFiler migrate -m nocopy vFiler1@fas6280

Requirements
- SnapMover license (included with MultiStore®)
- Disks/LUNs are under software disk ownership
- Disks/LUNs are connected to source/dest nodes
It is possible to migrate an existing physical controller to a vFiler unit. There are many considerations to plan for moving a physical controller into a vFiler. There will be downtime to migrate to a vFiler, but if you plan (and pre-write commands or scripts) for all the considerations below, the downtime can be short. In many cases you may take vfiler0 and create more than one vFiler, and that can be extrapolated from the list below.

There are a lot of small things to migrate from vfiler0 into the vFiler and these considerations also apply when migrating from one physical controller to another physical controller. Below is a checklist of topics without ONTAP commands (anyone doing this work should know the commands or where to find them). A pre-written plan to execute on-site is the key to success when migrating to a vFiler from a physical controller.

- A vFiler needs its own small root volume
  - Create a root volume for the vFiler
- iSCSI Nodename and LUN Mappings
  - Rename the vfiler0 iscsi nodename and reassign the iscsi nodename on the vFiler to match former vfiler0 for no client change (you can leave it different but need to make changes on the clients if you do).
  - Create iGroups in the vFiler
  - Map LUNs to iGroups
- Hostname
  - Need a new hostname (either for vfiler0 or vFiler depending on which keeps the original hostname). For no host change, often vfiler0 is renamed and the vFiler assumes the name of vfiler0.
- IPSpaces
  - Do you need to create a separate network from the default ipspace?
- IP and Interface, DNS, NIS, LDAP
  - You need a new IP (often put a new management IP on vfiler0 and move existing interfaces on vfiler0 to the vFiler).
- Domain Membership, FilerSID, Recreate shares and exports
  - We need to rejoin the domain from vFiler using the same netbios name we had in vfiler0, then rejoin with vfiler0 with a new netbios name. Typically vfiler0 rejoins the domain with a new name to free the computer account first.
- SnapMirror Relationships
  - Need to manually setup additional volumes and then create the dr vfiler manually, then resync it. Use vfiler0 for the relationship, so this typically involves a new IP address since the new vFiler typically assumes the physical filer address and you have a new hostname and IP for vfiler0 which will be the source of the mirror for vfiler dr. You could use the vfilerIP for snapmirror, but not if using vfiler dr.
  - If OperationsManager use vfiler0 for relationships and update snapmirror.access.
- NDMP Backups
  - If any backups are set to run against vfiler0 and it’s ip changes, change the backup software to authenticate to vfiler0’s new IP/name. NDMP works for copying but does not work for backup to tape from a vFiler. NDMP backups for the data will need to re-authenticate to vfiler0.
- SnapVault Relationships
  - Operations Manager uses vfiler0 (hosting filer) for SnapVault relationships. Modify / restart vaults from vfiler0 between source and target instead of direct vfiler to vfiler.
  - Set snapvault.access and ndmpd.preferred_interfaces on vfiler0.
- **VSCAN**
  - If any vscanners are set to run against vfiler0 and its ip changes, change the vscan software to authenticate to vfiler0's new IP/name. Unless you want vscan from the vFiler (most often vscan is centralized for all vFilers at vfiler0).

- **Netbios Aliasing**
  - If any netbios aliases are used by vfiler0, they need to be moved to the vFiler. NOTE: this might be an issue if you leave resources on vfiler0 that also need the alias. The same alias can't be in more than one filer (virtual or physical). If all resources move to the vFiler, we can move it from vfiler0, but if not, users may be impacted.

- **AutoHome directories**
  - If any autohome directories are setup for any volumes moving from vfiler0 to the vFiler, they must be removed from vfiler0 and setup again in the vFiler.

- **Local User Accounts**
  - Create local user accounts in vfiler0 in the vFiler. There is a method to export and import registry entries for users.

- **Local Groups**
  - Check for local groups from the windows mmc and/or /etc/lclgroups.cfg. Make entries in the new vfiler for any groups needed in the vFiler.

- **Domain User Accounts**
  - Always check to see if domain user accounts are used in vfiler0 so they can be added to the vFiler.

- **SNMP**
  - Match SNMP settings if any snmp monitors are used (OpsManager, etc.)

- **Quotas**
  - If any quotas are set on volumes moving from vfiler0 to the vFiler, the /etc/quotas entries need to be removed from /etc/quotas on vfiler0 and created in /etc/quotas on the vFiler, then "quota on volname" in the vFiler for the volume.

- **User Mappings**
  - Copy usermap.cfg entries needed in vfiler1 from vfiler0 (modify / copy / delete as needed for each vfiler)

- **CIFS, NFS, iSCSI Options**
  - List all options from vfiler0 and match on the vFiler

- **Fpolicy settings**
  - Need to run fpolicy setup in the vFiler

- **Widelinks**
  - /etc/symlink.translations (move from the physical controller to the vFiler).

- **SSH, RSH setup**
  - Both of these need to be enabled and configured in the vFiler.

- **Volume Names**
  - Volume names must be the same on the source and destination for migrate, dr and data motion.
1. Double Click the PuTTY icon, select the session for FAS3270 (vfiler0), and login as root: netapp123
2. Create a test vFiler unit using the CLI. The initial command is shown below - you can copy and paste the command directly into the PuTTY window to avoid spelling mistakes. Continue following the output of the command and provide answers where indicated in bold.

```bash
tvfiler create test -s ipspace1 -i 192.168.0.223 /vol/vfiler1_root
/vol/vfiler1_nas /vol/vfiler1_san
```
Configure vFiler IP address 192.168.0.223? [y]: y
Interface to assign this address to {e0b}: e0b
Netmask to use: [255.255.255.0]: 255.255.255.0
Please enter the name or IP address of the administration host: 192.168.0.31
Do you want to run DNS resolver? [n]: y
Please enter DNS domain name []: lab.local
Please enter the IP address for first nameserver []: 192.168.0.11
Do you want another nameserver? [n]: n
Do you want to run NIS client? [n]: n
 Default password for root on vFiler test is "."
New password: netapp123
Retype new password: netapp123
Do you want to setup CIFS? [y]: y
(1) Multiprotocol filer
(2) NTFS-only filer
Selection (1-2)? [1]: 1
Enter the password for the root user []: netapp123
Retype the password: netapp123
The default name for this CIFS server is 'TEST'.
Would you like to change this name? [n]: n
Data ONTAP CIFS services support four styles of user authentication.
Choose the one from the list below that best suits your situation.
(1) Active Directory domain authentication (Active Directory domains only)
(2) Windows NT 4 domain authentication (Windows NT or Active Directory domains)
(3) Windows Workgroup authentication using the filer's local user accounts
(4) /etc/passwd and/or NIS/LDAP authentication
Selection (1-4)? [1]: 1
What is the name of the Active Directory domain? [lab.local]: lab.local
Enter the name of the Windows user [Administrator@LAB.LOCAL]:
Password for Administrator@LAB.LOCAL: netapp123
(1) CN=computers
(2) OU=Domain Controllers
(3) None of the above
Selection (1-3)? [1]: 1
Do you want to create the TEST\administrator account? [y]: y
Enter the new password for TEST\administrator: netapp123

3. Show the vFiler status. The -r option will show you network and volume details for each vFiler. The -a option will show you more details. Try all three!

```bash
vfiler status
vfiler status -r
vfiler status -a
```

4. Rename your vFiler:

```bash
vfiler rename test fas3270_vfiler1
vfiler status
```
5. Change the vFiler limit (max vfilers on the system):
   NOTE: to increase this value, you must reboot for it to take effect. Limits are based on memory. The Data ONTAP Simulator is limited to a maximum of 11 and defaults to 3. This lab is preset to a maximum of 4.

<table>
<thead>
<tr>
<th>vFiler Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAS Controllers with &lt;1GB RAM</td>
</tr>
<tr>
<td>FAS Controllers with &gt;=1GB RAM</td>
</tr>
<tr>
<td>FAS Controllers with &gt;=2GB RAM</td>
</tr>
</tbody>
</table>

   Here we change the vfiler limit in this lab to a maximum of 5.

   vfiler limit
   vfiler limit 5
   vfiler limit

6. Allow and disallow protocols per vFiler unit. You can show all protocols, which by default are all enabled. However, the protocol must be licensed on vfiler0 in order for the vFiler unit to use it.

   vfiler status -a
   Disallow rsh, ftp and http:
   vfiler disallow fas3270_vfiler1 proto=rsh proto=ftp proto=http
   vfiler status -a  # confirm
   Allow ftp:
   vfiler allow fas3270_vfiler1 proto=ftp
   vfiler status -a  # confirm


   Using the vfiler context command will take you into a command menu just for that specific vfiler. Notice that the command prompt changes after you execute this command.

   vfiler context fas3270_vfiler1
   fas3270_vfiler1@fas3270> vol status
   Use the same command to return to the main context of vfiler0.
   fas3270_vfiler1@fas3270> vfiler context vfiler0
   fas3270_vfiler1@fas3270> vfiler context vfiler0

   From the command shell, you can also run a command directly to a vfiler without switching context:
   vfiler run fas3270_vfiler1 vol status
   You can use this same method to run a command against all vFiler units from vfiler0. Notice how vfiler0 sees ALL volumes and fas3270_vfiler1 only sees its own volumes.
   vfiler run * vol status
   If you use qtrees, you can see which volumes and qtrees are owned by which vFiler unit:
   qtree status -v
8. Interactive and non-interactive ssh directly to the vFiler unit.

Data ONTAP 8.1 7-Mode adds a fully interactive secure shell to vFiler units. In addition, the former non-interactive secure shell is also available. To use either of these shells, you first need to set up ssh on the vFiler unit. Hit enter for all defaults in the command output.

```
vfiler run fas3270_vfiler1 secureadmin setup ssh
```

To test the newly configured secure shell, double-click the PuTTY icon and select the Linux session, authenticating as root:netapp123

**NOTE:** Ignore the “Access Denied” message after entering the root login id.

How to use interactive ssh login to a vFiler. Answer “yes” to the fingerprint question and use the netapp123 password. Note that the vol status only shows volumes accessible to vfiler1.

```
[root@rhel54 ~]# ssh -l root 192.168.0.223
fas3270_vfiler1@fas3270> vol status
fas3270_vfiler1@fas3270> exit
```

How to use non-interactive ssh login to the same vFiler. Again, use the same netapp123 password.

```
[root@rhel54 ~]# ssh -l root 192.168.0.223 vol status
```
9. Stop and start a vFiler unit.
   NOTE: All vFiler units are started on system boot, even if they were stopped prior to boot. The vfiler stop command is not persistent across reboots. You can set a loader environment variable to disable all vFiler network connectivity at boot by running "setenv no-vfiler-ips? true" at a boot loader prompt. You COULD also put "vfiler stop vfilername" in the /etc/rc file, but the vfiler would run for a short while after boot.

   vfiler stop fas3270_vfiler1
   vfiler start fas3270_vfiler1

10. Destroy a vFiler unit. When this command is issued, all the volumes assigned to the vFiler unit are reassigned to vfiler0, including the vFiler root volume that contains all of the configuration for the vFiler unit.

    vfiler stop fas3270_vfiler1
    vfiler destroy fas3270_vfiler1
    vfiler status -a

11. Recreate the vFiler unit you just destroyed. As long as the root volume is preserved, you can recreate the vfiler unit. If the data volumes were destroyed, they can be recreated using the same volume names.

    vfiler create fas3270_vfiler1 -r /vol/vfiler1_root -b fas3270_vfiler1
    NOTE: We didn’t specify the other 2 volumes that were in the vFiler unit, but they are added back from the root volume configuration. You will see the .223 address is not configured after the "-r" to recreate so an ifconfig is needed to rebind to e0b (below).

    vfiler status -a

   To reconfigure the network interface:

   ifconfig e0b 192.168.0.223 netmask 255.255.255.0 up
   vfiler status -a
12. Create another vFiler unit (fas3270_vfiler2):

   vfiler create fas3270_vfiler2 -s ipspace1 -i 192.168.0.224 /vol/vfiler2_root
   /vol/vfiler2_nas /vol/vfiler2_san

   Configure vFiler IP address 192.168.0.224? [y]: y
   Interface to assign this address to {e0b}: e0b
   Netmask to use: [255.255.255.0]: 255.255.255.0
   Please enter the name or IP address of the administration host: 192.168.0.31
   Do you want to run DNS resolver? [n]: y
   Please enter DNS domain name []: lab.local
   Please enter the IP address for first nameserver []: 192.168.0.11
   Do you want another nameserver? [n]: n
   Do you want to run NIS client? [n]: n
   Default password for root on vFiler test is "."
   New password: netapp123
   Retype new password: netapp123
   Do you want to setup CIFS? [y]: y
   (1) Multiprotocol filer
   (2) NTFS-only filer
   Selection (1-2)? [1]: 1
   Enter the password for the root user []: netapp123
   Retype the password: netapp123
   The default name for this CIFS server is 'fas3270_vfiler2'.
   Would you like to change this name? [n]: n
   Data ONTAP CIFS services support four styles of user authentication.
   Choose the one from the list below that best suits your situation.
   (1) Active Directory domain authentication (Active Directory domains only)
   (2) Windows NT 4 domain authentication (Windows NT or Active Directory domains)
   (3) Windows Workgroup authentication using the filer's local user accounts
   (4) /etc/passwd and/or NIS/LDAP authentication
   Selection (1-4)? [1]: 1
   What is the name of the Active Directory domain? [lab.local]: lab.local
   Enter the name of the Windows user [Administrator@LAB.LOCAL]:
   Password for Administrator@LAB.LOCAL: netapp123
   (1) CN=computers
   (2) OU=Domain Controllers
   (3) None of the above
   Selection (1-3)? [1]: 1
   Do you want to create the FAS3270_VFILER2\administrator account? [y]: y
   Enter the new password for FAS3270_VFILER2\administrator: netapp123

13. Using config dump to save settings including cifs shares and other configuration settings for every vFiler unit on the system:

   vfiler run * config dump -f -v dump1.txt

   Check the vfiler0 dump file at \192.168.0.211\c$\etc\configs
   Check the vfiler1 dump file at \192.168.0.223\c$\vol\vfiler1_root\etc\configs
   Check the vfiler2 dump file at \192.168.0.224\c$\vol\vfiler2_root\etc\configs
14. Using FlexShare to prioritize volumes in vFiler units. FlexShare allows you to set priority of access to volumes on the NetApp storage system. It has 5 grades of priority from VeryLow to VeryHigh. With this functionality you can control priority of access to vFiler units by setting one vFiler unit's volumes to low and another to high.

Show no priority set yet:
```
priority show
priority show volume -v
```

Enable FlexCache priority:
```
priority on       # enable priority defaults
priority set io_concurrency=512   # disable disk controls
```

Set very high priority on fas3270_vfiler1_nas volume and very low priority to fas3270_vfiler2_nas volume
```
priority set volume vfiler1_nas level=VeryHigh system=VeryHigh
priority set volume vfiler2_nas level=VeryLow system=VeryLow
```

Show priority is set:
```
priority show
priority show volume -v
```

Create 2 CIFS shares for testing:
```
You could also use NFS or create LUNs with iSCSI, then apply priority to those volumes.
vfiler run fas3270_vfiler1 cifs shares -add vfiler1_nas /vol/vfiler1_nas
vfiler run fas3270_vfiler2 cifs shares -add vfiler2_nas /vol/vfiler2_nas
```

Open CIFS shares (administrator | netapp01) in a Windows Explorer window:
```
\192.168.0.223\vfiler1_nas
\192.168.0.224\vfiler2_nas
```

Begin the copy process – take a large file or directory and copy to each share (copy something from the C: drive)

Start a copy of the large directory or file to vfiler2_nas first (low priority) then to vfiler1_nas soon after (high priority) and the vfiler1_nas copy will run faster.

This test doesn’t show exact throughput (not using a metric other than watching), however it shows how FlexShare works.

Turn off priority:
```
priority off
```

NOTE: On a system with FlashCache cards, you can selectively cache volumes AND enable priority on those volumes. What this means in a multi-tenant architecture is that you can cache and give high FlexShare priority to certain tenant volumes, and turn off cache and give lower priority to other tenant volumes.
15. FlexClone a vFiler volume and add that clone to another vFiler unit. This is very useful in a test/dev environment, or moving data from test to production. Another use case here would be taking internal production data and sharing it out on a vFiler that is in a DMZ. These commands all need to be run from vfiler0:

```
snap create vfiler2_nas clone_snap
vol clone create vfiler2_nas_clone -s none -b vfiler2_nas clone_snap
vfiler run * vol status
vfiler status -a
vfiler add fas3270_vfiler1 /vol/vfiler2_nas_clone
vfiler status -a
```

Figure 8) FlexClone Between vFiler Units
16. Move the source of the cloned volume from one vfiler to another.

   `vfiler move fas3270_vfiler2 fas3270_vfiler1 /vol/vfiler2_nas`

   This command may fail because the volume is a CIFS share. If so, delete the share and rerun the command.

   `vfiler run fas3270_vfiler2 cifs shares -delete vfiler2_nas`
   `vfiler move fas3270_vfiler2 fas3270_vfiler1 /vol/vfiler2_nas`
   `vfiler status -a`

   **Figure 9** Move A Clone Source Between vfiler Units

17. Remove a volume from vfiler1 and it is reassigned back to vfiler0. You can then add the volume back to vfiler2. This achieves the same object as `vfiler move` but here you see the remove and add functions.

   `vfiler remove fas3270_vfiler1 /vol/vfiler2_nas_clone`
   `vfiler run * vol status`
   `vfiler status -a`
   `vfiler add fas3270_vfiler2 /vol/vfiler2_nas_clone`
   `vfiler run * vol status`
   `vfiler status -a`

   **Figure 10** Add and Remove Volumes From vfiler Units
18. Destroy vfiler1 and add all its resources to vfiler2 (both network and volumes):

   vfiler stop fas3270_vfiler1
   vfiler destroy fas3270_vfiler1

   vfiler add fas3270_vfiler2 -i 192.168.0.223 /vol/vfiler1_san /vol/vfiler1_nas
   /vol/vfiler2_nas
   vfiler status -a

19. Remove an IP and volume from vfiler2:

   vfiler remove fas3270_vfiler2 -i 192.168.0.223
   vfiler remove fas3270_vfiler2 /vol/vfiler1_san
   vfiler status -a

20. Stop and destroy vfiler2 and destroy the clone volume for the next labs:

   vfiler stop fas3270_vfiler2
   vfiler destroy fas3270_vfiler2
   vfiler status -a
   vol offline vfiler2_nas_clone
   vol destroy vfiler2_nas_clone