
**Lab 4.1.2a Failover Share Cluster Lab**

**Introduction**

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In this lab, we install FreeNAS and configure a two-node cluster. This lab is a simulation of a highly available cluster. True high availability would require fully redundant Storage Area Network (SAN) hardware and a separate network for the shared storage traffic (disk I/O).

**Objectives**

In this lab, the student will:

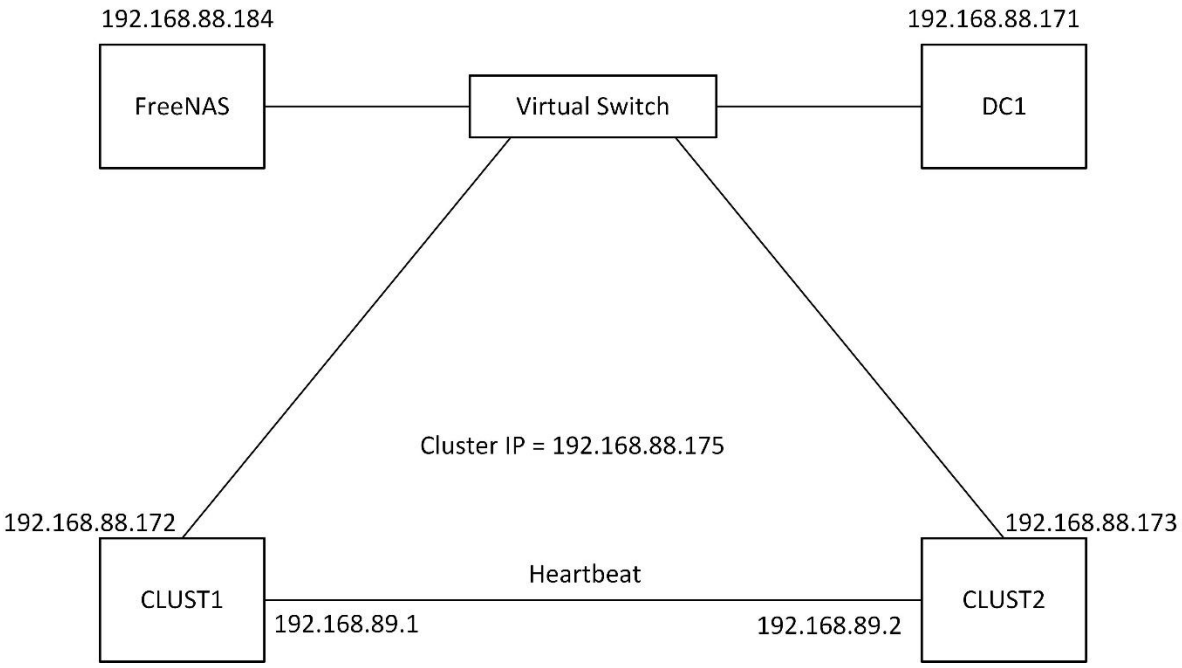
- Install, configure and manage virtual networking and storage [WECM]
- Install and configure a FreeNAS network appliance
- Create shared storage
- Configure both nodes to access the shared storage
- Mount the storage and create the cluster
- Create a share and test the cluster

**Equipment/Supplies Needed**

- Host Computer with VMware Workstation Pro
- FreeNAS Installer disk image file (ISO)
- Three Windows Server 2019 VMs created in the previous lab

**Assignment**

Student will configure a HA Cluster Lab environment, as shown in figure below. Do not use the FreeNAS VM created in Unit 3. Install a new VM of FreeNAS using version 11.2. You'll see a download link in Moodle for this version. Key activities include creation of the following:
(1) A FreeNAS Storage Appliance
(2) Two Node HA Cluster




**Procedure**

1. Install FreeNAS VM.

    a. Start VMWare Workstation.
    b. File\new virtual machine
    c. Select Custom **Next**
    d. Hardware compatibility (Workstation 15.x or higher is the default) **Next**
    e. Select Installer disc image file (ISO), select **Browse**
    f. Select the FreeNAS ISO (version 11.2) **Open, Next**
    g. **VM name = FreeNASU4**, select VM file location **Next**
    h. Leave # of processors at the default **Next**
    i. 4096MB RAM **Next** (wants 8GB of RAM)
    j. Host-only networking **Next**
    k. LSI Logic SCSI controller **Next**
    l. Virtual Disk Type = SCSI **Next**
    m. Create a new virtual disk **Next**
    n. 8GB, store as a single file **Next**
    o. Put disk in same file location as VM files **Save**, **Next**
    p. Select **Finish**.

2. Edit Virtual Machine settings (to add some hard drives).

    a. **Add** Hard Disk **Next**
    b. Select SCSI **Next**
    c. Create a new virtual disk **Next**
    d. 4GB, store as a single file **Next**
    e. Name it quorum.vmdk, browse to file location, quorum.vmdk **Save, Finish**
    f. **Add** Hard Disk **Next**

g. **Select** SCSI **Next**
h. Create a new virtual disk **Next**
i. 50GB, store as a single file **Next**
j. Name it storage0.vmdk, browse to file location, storage0.vmdk **Save, Finish, OK.**
k. Assign NIC to same Host only VMnet created in Lab 4.1.
l. **Screenshot FreeNASU4 VM settings.**

3. Configure the FreeNAS Appliance.

a. Power on the appliance VM.
b. FreeNAS installer **Enter**
c. Install/Upgrade **OK**
d. <8GB RAM, continue? **Yes**
e. Select 8GB drive to install FreeNAS on **Spacebar, OK**
f. Proceed? **Yes**
g. Set password for root account to whatever you want **OK**
h. Select **Boot via BIOS**
i. Success **OK**
j. Select Option #3 Reboot **OK**
k. (DHCP times out during boot, this is expected and can be ignored)
l. (Boots (after a few timeouts) to the console setup menu)
m. Select option #1 **Enter**
n. Select an interface: 1 **Enter**
o. Remove current settings? n **Enter**
p. Configure interface for DHCP? n **Enter**
q. Configure IPv4? Y **Enter**
r. Interface name? em0 **Enter**
s. IPv4 address: 192.168.88.184/24 **Enter**
t. Config IPv6? N **Enter**
u. **(**Press **ctrl-alt** to release the cursor from the FreeNAS vm)
v. **Screenshot FreeNAS VM home screen showing configuration, including IP address.**

4. Power on and logon to server DC1.
   a. Open Chrome browser, http://192.168.88.184 (IE won't work)
   b. User: root
   c. Password:
   d. **Log in** (Login to Legacy interface)
   e. Language: English
   f. Timezone: America\Chicago **Exit**
   g. In left pane, select Storage\volumes\volume manager
   h. **Manual Setup**
   i. Volume name: quorum
   j. Member disk: da1 (4GB) **Add volume**
   k. In left pane, select storage\volumes, select /mnt/quorum "Change permissions"
   l. Permission type: Windows **Change**

5. In the left pane, switch back to Storage\volumes\volume manager.

a. **Manual Setup**
b. Volume name: storage0
c. Member disk: da2 (50GB) **Add volume**
d. In left pane, select storage\volumes, select /mnt/storage0 "Change permissions"
e. Permission type: Windows **Change**
f. In the left pane, select services\iSCSI

g. Select the Portals tab **Add Portal**
h. Comment: storage
i. Accept default address and port (0.0.0.0:3260) **OK**
j. Select the Initiators tab **Add Initiator** keep defaults **OK**
k. Extents tab **Add Extent** name = quorum, type = file,
l. Path to the Extent: **Browse** to /mnt/quorum/quorum (add on the last "quorum" here), **Close**
m. Extent size = 1900MB **O**K
n. Extents tab **Add Extent** name = storage0, type = file,
o. Path to the extent: **Browse** to /mnt/storage0/storage0 (add on last "storage0" here), **Close**
p. Extent size = 46GB **OK**
q. Targets tab **Add Target**
r. Target name: quorum, portal group ID: 1, initiator group ID: 1 **OK**
s. Target tab **Add Target**
t. Target name: storage0, portal group ID: 1, initiator group ID: 1 **OK**
u. Associated Targets tab **Add Target/Extent** target=quorum, extent=quorum **Ok**
v. Associated Targets tab **Add Target/Extent** target=storage0, extent=storage0 **Ok**

**Screenshot the new Extent you created and configured**

w. In the left pane, select services\Control Services
x. Turn on iSCSI and SSH services, check both to start on boot
y. Click the tool icon next to SSH to see settings
z. "Check" Login as Root with password **OK**. NOTE: check the Windows Defender Firewall on the VM to ensure it is not blocking SCSI. You may need to configure the firewall to "Allow an app or feature through Windows Defender Firewall" to allow the iSCSI service through the firewall.

6. Switch to server DC1.
   a. In Server Manager, select Tools\Active Directory Users and Computers
   b. Create the clusters OU if not already created
   c. Create two new computers named CLUST1 and CLUST2 in the new Clusters OU.
   d. In Server Manager, select Tools\DNS to open the DNS Manager
   e. In DNS Manager, create "A" Record for the FreeNASU4 VM
   f. Create a second "A" record for "CLUST1" with IP = 192.168.89.1 (Heartbeat network)
   g. Create a second "A" record for "CLUST2" with IP = 192.168.89.2 (Heartbeat network)

   **Screenshot DNS to show the new records added**

7. Mount the storage.
   a. Logon to CLUST1 as testXX\administrator (where XX are your initials)
   b. Right click the desktop and click **Personalize**
   c. Change the Background (This makes it easier to tell the servers apart)
   d. In server manager, select Tools\iSCSI Initiator
   e. If not running, select **yes** to turn on the service
   f. Targets tab, Target=freenasu4.testXX.net (Where XX are your initials)
   g. Select **Quick Connect...**
   h. Connect both targets, then click **Done.** (Both targets should be active)
   i. (Discovery tab has been populated already)
   j. Select "Volumes and Devices" tab
   k. Click **AutoConfigure,** Click **OK**
   l. In Server Manager, select Tools\Computer Management
   m. Select "Disk Management". (Our 2 new drives are now visible)
   n. Right click each disk, click "Online"
   o. Right click first disk, select "Initialize" Select GPT
   p. Both disks are selected, click **OK**
   q. Now we want to format each disk using all the space...
   r. Rt-click unallocated space on 1st disk, select "New Simple Volume" **Next**
   s. "All the space" **Next**, Drive letter = Q **Next**, volume label=quorum, **Next**, **Finish**
   t. Rt-click on 2nd disk, select "New Simple Volume" **Next**
   u. "All the space" **Next**, Drive letter=S **Next**, volume label=storage0, **Next**, **Finish**
   v. Reboot the VM.

   **Screenshot the new storage on CLUST1**

8. Switch to server CLUST2.
    a. Repeat the process to mount the storage on CLUST2
    b. Logon to CLUST2 as testXX\administrator (where XX are your initials)
    c. In server manager, select Tools\iSCSI Initiator
    d. If not running, select **yes** to turn on the service
    e. Target tab, Target=freenasu4.testXX.net (Where XX are your initials)
    f. Select **Quick Connect...**
    g. Connect both targets, then click **Done.** (Both targets should be active)
    h. (Discovery tab has been populated already)
    i. Select "Volumes and Devices" tab
    j. Click **AutoConfigure,** Click **OK**
    k. Server Manager, Tools\Computer Management
    l. Select "Disk Management". (Our 2 new drives are now visible)
    m. (The drives are already configured, just bring them online)
    n. Right click each disk, click "Online"
    o. Rt-click each volume, select "Change Drive Letter and Paths…"
    p. Click **Change,** change the drive letters to match CLUST1, **OK**
    q. Both servers now have access to the shared volumes. Do not add any files or folders before the cluster is configured. Doing so may corrupt the volumes.

**Screenshot the new storage on CLUST2**

9. Install Failover clustering on both servers.
    a. Switch to CLUST1
    b. In Server Manager, Manage\Add Roles and Features **Next**, Role Based **Next**, CLUST1 **Next**, **Next**,
    c. Failover Clustering **Add Features**, **Next**,
    d. Check "Restart the destination computer automatically if required", **Install**
    e. After install completes, click **Close**
    f. Server reboots…

10. Switch to server CLUST2.
    a. In Server Manager, Manage\Add Roles and Features **Next**, Role Based **Next**, CLUST2 **Next**, **Next**,
    b. Failover Clustering **Next**, **Add Features**, **Next**,
    c. Check "Restart the destination computer automatically if required", **Install**
    d. After install completes, click **Close**
    e. Server reboots...

11. Switch to server CLUST1.
    a. Tools\Failover Cluster Manager
    b. Select "Validate Configuration", **Next**, select CLUST1 and CLUST2 **OK Next**, Run all tests **Next**, **Next**, When finished **View Report**
    c. Make sure all tests pass. Save report on desktop for future reference.
    d. Select "Create the cluster using the validated nodes" **Finish**, Cluster name=cluster,
    e. Cluster IP = 192.168.88.175 , (Uncheck the .89 network), **Next**
    f. (At this point, look at the cluster OU to note the only objects are CLUST1 and CLUST2)
    g. Continue the Create Cluster Wizard...
    h. Add all available storage to cluster **Next**, **Finish**
    i. (Cluster is created)
    j. (A computer object named "Cluster" is created in the cluster OU)
    k. Expand the left pane in cluster manager to see roles, nodes, storage, and networks
    l. Configure a role...
    m. Rt-click Roles, select "Configure Role..." **Next**, "File Server" **Next**,
    n. File server for general use **Next**, name=TXShare1, IP=192.168.88.190 **Next**
    o. Select cluster disk **Next**, **Next**, **Finish**

p. Status shows "Failed" in Roles because the cluster object needs permissions to create computer objects in the cluster OU.

12. Switch to server DC1.
    a. Open Active Directory Users and Computers.
    b. Under "View", Check "Advanced Features" (to make security tab visible)
    c. Rt-click clusters OU, properties, security tab, add computer account CLUSTER,
    d. (add object type "Computer" to the search)
    e. Select the CLUSTER account, click **Advanced**, Select Cluster account, click **Edit**,
    f. Check "Create Computer Objects" **OK**, **OK**, **OK**

13. Switch to server CLUST1, rt-click TXShare1 in roles, **Start Role**, now up and running.
14. Switch to DC1 and refresh Active Directory Users and Computers (Action\Refresh), see that TXSHARE1 computer object is created.

    **Screenshot TXSHARE1 in Active Directory**

15. Switch to server CLUST1,
    a. Right-click the TXShare1 File Server role
    b. Select "Add File Share"
    c. Select "Quick" profile (SMB or NFS, using default should be fine) **Next**, **Next**,
    d. Name=Docs **Next**, **Next**,
    e. **Create** the Docs share

16. Switch to server DC1.
    a. DNS Manager, see TXShare1 IP is there.
    b. Open file explorer, map a drive to \\txshare1\docs
    c. Go to the share, create a folder called "test"
    d. Create a file called test.txt

17. Test the cluster by bringing down one of the nodes.
    a. Switch to CLUST1.
    b. Look at Roles in Failover Cluster Manager, see CLUST1 is owner
    c. Shut down and power off CLUST1

18. Switch to server CLUST2.
    a. Look at Roles in Failover Cluster Manager, see clust2 is pending, then running owner

19. Switch to server DC1.
    a. Go to the share drive and open test.txt
    b. The File is accessible even though CLUST1 is down.
    c. Congratulations, your highly available share cluster is working!

    **Take a screenshot that shows test.txt is open and CLUST1 is shut down.**

**Place all screenshots in a Word or PDF document and upload that document for grading. Submit the following items for grading as evidence of successful lab completion.**

| Concerns<br>Working Towards Proficiency | Criteria<br>Standards for This Competency | Accomplished<br>Evidence of Mastering Competency |
|---|---|---|
| | Screenshot FreeNASU4 VM settings | 1 correct answer, 12.5 points |
| | Screenshot FreeNAS home screen showing config and IP address | 1 correct answer, 12.5 points |
| | Screenshot new ISCI extent | 1 correct answer, 12.5 points |
| | Screenshot new DNS records | 1 correct answer, 12.5 points |
| | Screenshot new storage on CLUST1 | 1 correct answer, 12.5 points |
| | Screenshot new storage on CLUST2 | 1 correct answer, 12.5 points |
| | Screenshot TXSHARE1 in Active Directory | 1 correct answer, 12.5 points |
| | Screenshot of test.txt open with CLUST1 shutdown | 1 correct answer, 12.5 points |