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Lab Overview - HOL-1908-02-CHG - vSAN 6.7 Challenge Lab
Lab Guidance

Note: It will take more than 90 minutes to complete this lab. You should expect to only finish 2-3 of the modules during your time. The modules are independent of each other so you can start at the beginning of any module and proceed from there. You can use the Table of Contents to access any module of your choosing.

The Table of Contents can be accessed in the upper right-hand corner of the Lab Manual.

Lab Module List:

- **Module 1 - vSAN Configuration** (30 minutes) (Basic) Students are challenged to enable a vSAN Cluster and also utilize the vSAN Health Check and Configuration workflows.
- **Module 2 - vSAN Day-2 Operations** (30 minutes) (Basic) Students will be challenged to Scale their vSAN Cluster, leverage Storage Policies and Monitor vSAN.
- **Module 3 - vSAN Troubleshooting (Basic)** (30 minutes) (Basic) Students will be challenged to identify and resolve vSAN Troubleshooting issues at a Beginner Level.
- **Module 4 - vSAN Troubleshooting (Advanced)** (45 minutes) (Advanced) Students will be challenged to identify and resolve vSAN Troubleshooting issues at an Advanced Level.
- **Module 5 - vSAN Network Re-Configuration** (45 minutes) (Advanced) Students will be challenged to update IP addresses for vSAN's network interface.

Lab Captains:

- Ken Osborn, Sr. Systems Engineer, USA
- John Browne, Staff Technical Support Training Specialist, Ireland
- Aleksey Lib, Sr. Integration Architect, USA

Special Thanks for their guidance and assistance:

- Cormac Hogan, Director & Chief Technologist, Storage Product Marketing
- Pete Koehler, Senior Technical Marketing Manager
- Jase McCarty, Staff Technical Marketing Architect
- Jeff Hunter, Staff Technical Marketing Architect

This lab manual can be downloaded from the Hands-on Labs Document site found here:

http://docs.hol.vmware.com
Welcome to the vSAN Challenge Lab!

In this Lab we will challenge you to apply your vSAN knowledge as related to performing initial Configuration, Day-2 Operations and Troubleshooting Tasks within a vSAN Environment (we provide [Hints] along the way but try to resist the urge to click these unless absolutely necessary)!

In addition, we will also "Challenge you to Learn" about vSAN Interoperability with other VMware Products such as vRealize Operations Manager.

Thank you for joining us today and please enjoy your Lab.

**Location of the Main Console**

1. The area in the RED box contains the Main Console. The Lab Manual is on the tab to the Right of the Main Console.
2. A particular lab may have additional consoles found on separate tabs in the upper left. You will be directed to open another specific console if needed.
3. Your lab starts with 90 minutes on the timer. The lab can not be saved. All your work must be done during the lab session. But you can click the EXTEND to increase your time. If you are at a VMware event, you can extend your lab time.

This lab may be available in other languages. To set your language preference and have a localized manual deployed with your lab, you may utilize this document to help guide you through the process:

twice, for up to 30 minutes. Each click gives you an additional 15 minutes. Outside of VMware events, you can extend your lab time up to 9 hours and 30 minutes. Each click gives you an additional hour.

Alternate Methods of Keyboard Data Entry

During this module, you will input text into the Main Console. Besides directly typing it in, there are two very helpful methods of entering data which make it easier to enter complex data.

Click and Drag Lab Manual Content Into Console Active Window

You can also click and drag text and Command Line Interface (CLI) commands directly from the Lab Manual into the active window in the Main Console.

Accessing the Online International Keyboard

You can also use the Online International Keyboard found in the Main Console.

1. Click on the Keyboard Icon found on the Windows Quick Launch Task Bar.
Click once in active console window

In this example, you will use the Online Keyboard to enter the "@" sign used in email addresses. The "@" sign is Shift-2 on US keyboard layouts.

1. Click once in the active console window.
2. Click on the Shift key.

Click on the @ key

1. Click on the "@ key".

Notice the @ sign entered in the active console window.
**Activation Prompt or Watermark**

When you first start your lab, you may notice a watermark on the desktop indicating that Windows is not activated.

One of the major benefits of virtualization is that virtual machines can be moved and run on any platform. The Hands-on Labs utilizes this benefit and we are able to run the labs out of multiple datacenters. However, these datacenters may not have identical processors, which triggers a Microsoft activation check through the Internet.

Rest assured, VMware and the Hands-on Labs are in full compliance with Microsoft licensing requirements. The lab that you are using is a self-contained pod and does not have full access to the Internet, which is required for Windows to verify the activation. Without full access to the Internet, this automated process fails and you see this watermark.

This cosmetic issue has no effect on your lab.

**Look at the lower right portion of the screen**
Please check to see that your lab is finished all the startup routines and is ready for you to start. If you see anything other than "Ready", please wait a few minutes. If after 5 minutes your lab has not changed to "Ready", please ask for assistance.
Module 1 - vSAN Configuration (30 minutes)
Introduction

Are you ready for vSAN Configuration Challenges?

This Module contains the following challenges:

- **Challenge 1: Enable vSAN 6.7**
- **Challenge 2: vSAN 6.7 Configuration Assist**
- **Challenge 3: vSAN 6.7 Health Check**

Please note that these Challenges assume a certain level of vSAN familiarity to complete 'on your own'. Fear not, in the event that you are not as familiar, you can still take the Lab and utilize the '(HINT)' links to thoroughly guide you through detailed completion steps for each Challenge. There also may be more than one method to solve a challenge. The goal is for you to learn and/or validate your existing knowledge along the way.
Challenge 1: Enable vSAN

It is very easy to enable vSAN. The only pre-requisites that must be in place prior are the configuration of a network interface for vSAN traffic and at least (1) Cache device and (1) Capacity device installed in your Server (or Storage Blade Modules) that you would like to be contributing storage to your vSAN Cluster.

Since vSAN is integrated directly into vSphere there are no Virtual Appliances to install or manage per Host. In addition, since the vSAN Datastore is an object based filesystem, we no longer need to worry about formatting a VMFS Datastore. vSAN takes complexity out of your Storage Environment by eliminating the need for LUNs and the associated questions around how to size LUNs, how many LUNs should be required, etc.

Let's get started!

Open Chrome Browser from Windows Quick Launch Task Bar

1. Click on the Chrome Icon on the Windows Quick Launch Task Bar.

vCenter Login

![vCenter Login Image]
1. Select the checkbox for "Use Windows session authentication".
2. Click Login

Alternatively, you can enter a User name of administrator@corp.local and a password of VMware1!

**Introduction**

For your first Challenge, you will be required to configure a vSAN Cluster that has the following characteristics:

1. 3-Node vSphere Cluster
2. Deduplication and Compression Required
3. 1x Disk Group per Host (containing 1x Cache Device and 2x Capacity Devices)

Note: vSAN Networking has already been configured

**Your Challenge: Create a vSAN Cluster**

Perform the steps listed below in order to begin the Challenge.

1. Configure vSAN (Hint)
2. Configure vSAN Capabilities to leverage Deduplication and Compression, but do **NOT** configure Encryption or Fault Domains (Hint)
3. Claim Disks - Create 1 Disk Group **per Host**.
   - Change your 'Group By:' Selector to Host view
   - Claim Disks using 1x 5GB Cache Device and 2x 10GB Capacity Devices per Diskgroup. (Hint)
4. Create Fault Domains (Hint)
5. Review your Ready to Complete selections and complete the Workflow to enable vSAN (Hint)
6. Monitor vSAN Datastore creation progress until complete (Hint)
7. Confirm that the vSAN Datastore has been formed and that Dedupe & Compression are enabled (Hint)
8. Check vSAN Capacity (Hint)
Challenge 2: Enable vSphere High Availability

An important aspect of a healthy vSAN environment is ensuring correct configurations, device firmware, and device drivers. vSAN 6.7 includes a vSAN Health UI to check hardware compatibility, burn-in testing, network configuration, vSAN configuration and adherence to VMware cluster recommendations.

Introduction

For this Challenge, you are required to enable vSphere High Availability in your vSAN in order to adhere VMware Cluster Setting recommendations. In the event of a vSphere Host failure, it is very important that vSphere HA is enabled so that any impacted Virtual Machines are automatically restarted on another functioning Host in the vSAN Cluster.

Your Challenge: Enable vSphere High Availability

Perform the step listed below in order to begin the Challenge.

1. Enable vSphere HA (Hint)
Challenge 3: vSAN Health Check

vSAN includes a wide range of Health Checks that actively monitor your vSAN environment for potential issues.

Introduction

For this Challenge, you are required to utilize the vSAN Health Check to see if there are any Errors and/or Warnings present in your environment.

Your Challenge: Utilize vSAN Health Check

Perform the steps listed below in order to begin the Challenge.

1. Check the Health of your vSAN Cluster. Note that Hardware Compatibility and Build Recommendation Warnings are expected in our nested Virtualization environment (Hint)
Conclusion

In this Module you flexed your Software Defined Storage Muscles by easily enabling your vSAN Cluster. In addition, you utilized the new vSAN 6.7 Configuration Assist option to ensure that VMware recommended settings were adhered to. You finished by spinning through the vSAN Health check capability and responded to a Warning that was present indicating that you should enable the vSAN Performance Service.

You completed Module 1

Congratulations on completing Module 1.

If you are looking for additional information on vSAN Administration, try one of these:

1. vSAN 6.7 Documentation Center link
2. VMware Storage Hub for all things related to vSAN

Proceed to any module below which interests you most.

- **Module 2 - vSAN Day-2 Operations** (30 minutes) (Basic) Students will be challenged to Scale their vSAN Cluster, leverage Storage Policies and Monitor vSAN.
- **Module 3 - vSAN Troubleshooting (Basic)** (30 minutes) (Basic) Students will be challenged to identify and resolve vSAN Troubleshooting issues at a Beginner Level.
- **Module 4 - vSAN Troubleshooting (Advanced)** (45 minutes) (Advanced) Students will be challenged to identify and resolve vSAN Troubleshooting issues at an Advanced Level.
- **Module 5 - vSAN Network Re-Configuration** (45 minutes) (Advanced) Students will be challenged to update IP addresses for vSAN's network interface.

How to End Lab

To end your lab click on the **END** button.
Module 2 - vSAN Day-2
Operations (30 Minutes)
Introduction

Are you ready for vSAN Configuration Challenges?

This Module contains the following challenges:

- Challenge 1: Scale vSAN Up and Out
- Challenge 2: Configure Storage Policies
- Challenge 3: Monitor vSAN Performance

Please note that these Challenges assume a certain level of vSAN familiarity to complete 'on your own'. Fear not, in the event that you are not as familiar, you can still take the Lab and utilize the '(HINT)' links to thoroughly guide you through detailed completion steps for each Challenge. There also may be more than one method to solve a challenge. The goal is for you to learn and/or validate your existing knowledge along the way.

Lab Preparation

We will use our Module Switcher PowerCLI Application to prepare the environment.

Module Switcher

Double-Click the Module Switcher Desktop Shortcut
Module 2 Start

1. Click the **Module 2 Start** button

Monitor Progress

Monitor Progress until Complete.

• Press **Enter to continue** (and close the PowerCLI Window)

Note that it can take several minutes for the Module switcher to complete - thank you for your patience!

Lab Prep Complete

Your Lab has been successfully prepared for Module 2!
1. Click Window **Close** to safely stop the Module Switcher

**Please Note** that you cannot 'go back' and take Modules prior to the one you are currently in unless you end the lab and start it over again (for example: If you Start Module 4, you cannot use the Module Switcher to Start Labs 1, 2 or 3).
Challenge 1: Scale vSAN Out and Up

You've done your Homework and built the perfect vSAN 3-Node Cluster only now those pesky users are demanding more Compute resources and more Storage Capacity.

Time to get back to work!

Open Chrome Browser from Windows Quick Launch Task Bar

1. Click on the Chrome Icon on the Windows Quick Launch Task Bar.

vCenter Login

1. Select the checkbox for "Use Windows session authentication".
2. Click Login

Alternatively, you can enter a User name of administrator@corp.local and a password of VMware1!
Scale Out Introduction

A new Project has spun up out of nowhere in your Organization requiring additional Virtual Machines and associated Hyper-Converged Storage. Your 3-Node vSAN Cluster is going to need to grow, and fast! In this Challenge, you will be expected to scale out your vSAN Cluster by adding an additional vSphere Host and ensuring there are no service disruptions during this process.

The vSAN vmkernel network interface has already been configured by way of the vSphere Distributed Switch (vDS). Although vSAN supports a vSphere Standard Switch (vSS), using a vDS has plenty of benefits like ensuring consistency across your Cluster and easing the Administrative tasks required when adding new Hosts!

Your Challenge: Scale Out your vSAN Cluster

Perform the steps listed below in order to begin the Challenge.

1. Check your existing vSAN Cluster Capacity (Hint 1) (Hint 2)
2. Add esx-04a.corp.local to your existing vSAN Cluster (Hint)
3. Create a Single Disk Group using these parameters (Hint)
   - 1x Cache Device (5 GB)
   - 2x Capacity Device (10 GB)

Note: You will need to set 1 x Cache disk and 2 x Capacity disks with "Do Not Claim" option
   - 1x 'Spare' (Unclaimed Cache Device) (5 GB)
   - 2x 'Spare' (Unclaimed Capacity Devices) (10 GB)

1. Exit Maintenance Mode for esx-04a.corp.local (may require Web Client refresh) (Hint)
2. Confirm that your newly added Compute and Capacity is available (Hint 1) (Hint 2)

Scale Up Introduction

Not satisfied with the additional Compute node you just added, you decide that you better add even more Storage Capacity to your existing vSAN Cluster. Your ace Datacenter 'boots on the ground' team has just installed 2x additional SSD Capacity drives per Host. Now it's your job to scale up the Capacity for each Host by adding these drives to your vSAN Diskgroups and ensure that there are no service disruptions during this process.
Your Challenge: Scale Up your vSAN Cluster

Perform the steps listed below in order to begin the Challenge.

1. Create a new Disk Group on each Host utilizing the unclaimed drives (Hint)
2. Confirm that each Host now contains a 2nd Disk Group (Hint)
3. Confirm that your newly added Capacity is available (Hint)
Challenge 2: Configure Storage Policies

Virtual SAN storage policies define storage requirements for your virtual machines. These policies determine how the virtual machine storage objects are provisioned and allocated within the datastore to guarantee the required level of service.

When you enable Virtual SAN on a host cluster, a single Virtual SAN datastore is created and a default storage policy is assigned to the datastore.

When you know the storage requirements of your virtual machines, you can create a storage policy referencing capabilities that the datastore advertises. You can create several policies to capture different types or classes of requirements.

Each virtual machine deployed to Virtual SAN datastores is assigned at least one virtual machine storage policy. You can assign storage policies when you create new virtual machines or you can apply them on-the-fly to existing (running) virtual machines.

Open Chrome Browser from Windows Quick Launch Task Bar

1. Click on the Chrome Icon on the Windows Quick Launch Task Bar.
vCenter Login

1. Select the checkbox for "Use Windows session authentication".
2. Click Login

Alternatively, you can enter a User name of administrator@corp.local and a password of VMware1!

Storage Policy Based Management Introduction

Life was going good until you received an urgent message indicating that you needed to quickly change the Storage characteristics for an existing Virtual Machine (and limit the amount of IOPS that it is able to consume). There are other VM's residing on your vSAN Datastore, increasing concerns about Noisy Neighbor conditions originating from your 'problem' VM that could negatively impact the environment. In addition, you would like to reduce the amount of space that this VM is utilizing.

With traditional Storage Array's you would need to ask your Storage team to provision a new LUN with new Storage capabilities (and you would then have to format this as a new VMFS Volume and migrate your VM to this new Datastore).

Within the VMware Software-Defined-Datacenter (SDDC) and vSAN Software Defined Storage (SDS) you can make these changes on-the-fly with no impact to your environment (and without having to interface with another team).
Your Challenge: Configure Storage Policy

Perform the steps listed below in order to begin the Challenge.

1. Create a new VM Storage Policy that has these vSAN Storage Capabilities (Hint)
   - **Primary level of failures to tolerate**: 1
   - **Failure tolerance method**: RAID-5/6 (Erasure Coding)
   - **IOPS limit for object**: 50

2. Apply newly created Policy to Virtual Machine named: "vSAN-VM_NoisyNeighbor" (Hint)
3. Check Policy Compliance (Hint)
4. Check IOPS Limit (Hint)
Challenge 3: Monitor vSAN Performance

vSAN 6.7 includes new Performance metrics that can be monitored via the vSphere Web Client. In this section, we Challenge you to examine Performance views for three separate vSAN related contexts:

- Overall vSAN Cluster Performance
- Individual vSphere Host Performance
- Individual Virtual Machine Performance

Open Chrome Browser from Windows Quick Launch Task Bar

1. Click on the Chrome Icon on the Windows Quick Launch Task Bar.

vCenter Login

1. Select the checkbox for "Use Windows session authentication".
2. Click Login

Alternatively, you can enter a User name of administrator@corp.local and a password of VMware1!

**Your Challenge: Monitor vSAN Performance**

Perform the steps listed below in order to begin the Challenge.

1. Find and Explore vSAN Cluster Performance Metrics (Hint)
2. Find and Explore Individual vSAN Host Performance Metrics (Hint)
3. Find and Explore Individual Virtual Machine vSAN Performance Metrics (Hint)
Conclusion

My, how far you have come in such a short amount of time. Thanks to the scalable nature of vSAN you were able to not only quickly add additional Compute power but also extra Storage Capacity. You also experienced first-hand the powerful ability to control vSAN Space Efficiency, Availability and Performance via Software-Policy Based Management. Lastly, you armed yourself with knowledge around where to go when looking to Monitor vSAN Performance Metrics.

You completed Module 2

Congratulations on completing Module 2.

If you are looking for additional information on vSAN Day-2 Operations:

- Go to VMware Storage Hub for all things related to vSAN

Proceed to any module below which interests you most.

- **Module 3 - vSAN Troubleshooting (Basic)** (30 minutes) (Basic) Students will be challenged to identify and resolve vSAN Troubleshooting issues at a Beginner Level.
- **Module 4 - vSAN Troubleshooting (Advanced)** (45 minutes) (Advanced) Students will be challenged to identify and resolve vSAN Troubleshooting issues at an Advanced Level.
- **Module 5 - vSAN Network Re-Configuration** (45 minutes) (Advanced) Students will be challenged to update IP addresses for vSAN's network interface.

How to End Lab

To end your lab click on the END button.
Module 3 - vSAN Troubleshooting (30 Minutes, Beginner)
Introduction

This Module contains the following lessons:

- Challenge 1: Troubleshoot vSAN Network
- Challenge 2: Troubleshoot vSAN Disk

Please note that these Challenges assume a certain level of vSAN familiarity to complete 'on your own'. Fear not, in the event that you are not as familiar, you can still take the Lab and utilize the '(HINT)' links to thoroughly guide you through detailed completion steps for each Challenge. There also may be more than one method to solve a challenge. The goal is for you to learn and/or validate your existing knowledge along the way.

Lab Preparation

To prepare our Lab Environment we will now have you run your ModuleSwitcher as well as prepare the vSAN Training (Failure Injection) Tool Environment.

Module Switcher

Double-Click the Module Switcher Desktop Shortcut

Module 3 Start

1. Click the Module 3 Start button
Monitor Progress

Monitor Progress until Complete.

• Press **Enter to continue** (and close the PowerCLI Window)

**Module Switcher Complete**

1. Click Window **Close** to safely stop the Module Switcher

**vSAN Training Introduction**

Some people think half the fun is breaking things (in order to repair and learn in the process).

Let's inject some failures into our vSAN Cluster so that you can do just that.

To accomplish this, we'll be using a tool simply called, "**vSAN Training**". This tool will inject a hidden (from you) failure condition and it will be your job to figure out what is wrong and then mitigate the issue.
Prepare vSAN Training

• Double-click the Prepare vSAN Training desktop shortcut

Monitor Progress

1. Monitor Progress then Press Enter to continue...

Launch vSAN Training Site

Open Chrome Browser from Windows Quick Launch Task Bar
1. Click on the **Chrome Icon** on the Windows Quick Launch Task Bar.

![Chrome Icon](image)

1. Within your Chrome Browser select the **New Tab** Button
2. Click the **vSAN Training** Bookmark

**vSAN Training Site**

![vSAN Training Site](image)

- Review the **vSAN Training** Site Information

You are now ready to proceed with the first challenge!
Challenge 1: Troubleshoot vSAN Network

In a Perfect World, troubleshooting would not be required and everything would run flawlessly, 24x7.

In our World, things happen and that is why you get paid the Big Bucks to restore order and availability.

Let's dig into some Troubleshooting Exercises!

vCenter Login

1. Select the checkbox for **Use Windows session authentication**.
2. Click **Login**

Alternatively, you can enter a User name of **administrator@corp.local** and a password of **VMware1**!
Your Challenge: Troubleshoot vSAN Network

Perform the steps listed below in order to begin the Challenge.

1. Enter the number 1 for your vSAN Training Scenario ID then click Submit (Hint)
2. Review the vSAN Training Site Results (Do NOT Close this Window) (Hint)
3. Examine the Health of the vSAN Cluster via the vSphere Web Client using vSAN Health Check (Hint)
4. Resolve the Identified Issue (Hint)
5. Retest vSAN Health and confirm that Issue is resolved (Hint)
6. If you could not resolve the Issue, select Clear Scenario via the vSAN Training Tool
7. If you could resolve the Issue, select Back via the vSAN Training Tool
Challenge 2: Troubleshoot vSAN Disk

Hardware Failures can happen when we least expect them, let’s proceed.

vSAN Training Site

- Confirm that the vSAN Training Site is ready for our next Scenario ID

Your Challenge: Troubleshoot vSAN Disk

Perform the steps listed below in order to begin the Challenge.

Please Note that it can take up to 5 minutes to inject this failure condition within our Lab Environment (if you would prefer not to wait, you can skip this Challenge and move on to the next set of Advanced Challenges - thank you!)

1. Enter the number 8 for your vSAN Training Scenario ID then click Submit (Hint)
2. Review the vSAN Training Site Results (Do NOT Close this Window) (Hint)
3. Examine the Health of the vSAN Cluster via the vSphere Web Client using vSAN Health Check  
   (Hint)

4. Select Clear Scenario via the vSAN Training Tool and review Instructions.
   ◦ Note that not all of the Instructions apply in our case - select the Hint for more information  
   (Hint)

5. Return the vSAN Cluster to its working state via the Guidance in Step 4.  
   (Hint)

6. Retest vSAN Health and confirm that Issue is resolved  
   (Hint)

7. Click Back on the vSAN Training Tool Website
Conclusion

In this Module you injected failure conditions for vSAN Network and vSAN Disk. As part of this process, you learned how to leverage the vSAN Health Check to identify the behavior that occurs during these type of troubleshooting scenarios.

You've finished Module 3

Congratulations on completing Module 3.

If you are looking for additional information:

- Go to VMware Storage Hub for all things related to vSAN

Proceed to any module below which interests you most.

- **Module 4 - vSAN Troubleshooting (Advanced)** (45 minutes) (Advanced)
  Students will be challenged to identify and resolve vSAN Troubleshooting issues at an Advanced Level.

- **Module 5 - vSAN Network Re-Configuration** (45 minutes) (Advanced)
  Students will be challenged to update IP addresses for vSAN's network interface.

How to End Lab

To end your lab click on the **END** button.
Module 4 - vSAN Troubleshooting (45 Minutes, Advanced)
Introduction

This Module contains the following lessons:

- **Challenge 1 - Troubleshoot vSAN Configuration**
- **Challenge 2 - Troubleshoot vSAN Services**
- **Challenge 3 - Troubleshoot vSAN Virtual Machines**

Please note that these Challenges assume a certain level of vSAN familiarity to complete 'on your own'. Fear not, in the event that you are not as familiar, you can still take the Lab and utilize the (HINT) links to thoroughly guide you through detailed completion steps for each Challenge. There also may be more than one method to solve a challenge. The goal is for you to learn and/or validate your existing knowledge along the way.

Lab Preparation

To prepare our Lab Environment we will now have you run your **ModuleSwitcher** as well as prepare the **vSAN Training (Failure Injection) Tool** Environment (if required).

Challenge 1 - Troubleshoot vSAN Configuration

**Module Switcher**

Double-Click the **Module Switcher** Desktop Shortcut
Module 4 Start

1. Click the **Module 4 Start** button

Monitor Progress

![Monitor Progress Image]

Monitor Progress until Complete.

(Please note that this startup routine can take a few minutes to complete, thank you for your patience!)

• Press **Enter to continue** (and close the PowerCLI Window)

**NOTE:** Due to an error in the start up script, Desktop background will incorrectly list that you are working on Module #3. Ignore this as this does not affect the functionality of your lab.
Module Switcher Complete

1. Click Window **Close** to safely stop the Module Switcher

vSAN Training Introduction

NOTE: If you just took Module 3 - vSAN Troubleshooting (Beginner), you do NOT need to prepare the vSAN Training Tool again and can skip the remaining content by clicking here to proceed to your first Challenge in this Module.

If you have just started this Challenge Lab directly and not taken Module 3, please continue:

Prepare vSAN Training

- Double-click the **Prepare vSAN Training** desktop shortcut
Monitor Progress

- Monitor Progress then **Press Enter to continue...**

Launch vSAN Training Site

1. Within your Chrome Browser select the **New Tab** Button
2. Click the **vSAN Training** Bookmark
vSAN Training Site

Inject a new scenario, assuming the cluster is currently in perfect health and has been returned to the default configuration. Your assignment will be to identify the issue that was injected and resolve it and restore the cluster to full health.

Use random scenarios by default, and only if you want to repeat a particular scenario use the input box to ask for a specific scenario.

(You are recommended to use a fresh environment and don’t use it for other purpose since the injection error may break the testbed)

Pressing the button will trigger a task which can be watched in the vSphere Web Client. Once it completes successfully, the scenario has been created and your assignment starts. Please don’t take any actions before then. Also don’t change any settings unrelated to the assignment, as it may break the training software.

Cluster Name: RegionA01-COMP01

(Now we have scenario 1-8)
Scenario ID (leave blank for random):

Submit

- Review the **vSAN Training** Site Information

You are now ready to proceed with the first challenge!
Challenge 1: Troubleshoot vSAN Configuration

Humans make mistakes and when flying without the safety net of proven automation, configuration drift can become a real challenge.

Onward, brave Troubleshooter.

Open Chrome Browser from Windows Quick Launch Task Bar

1. Click on the Chrome Icon on the Windows Quick Launch Task Bar.

vCenter Login

1. Select the checkbox for "Use Windows session authentication".
2. Click Login

Alternatively, you can enter a User name of administrator@corp.local and a password of VMware1!
vSAN Training Site

Inject a new scenario, assuming the cluster is currently in perfect health and has been returned to the default configuration. Your assignment will be to identify the issue that was injected and resolve it and restore the cluster to full health. Use random scenarios by default, and only if you want to repeat a particular scenario use the input box to ask for a specific scenario.

(You are recommended to use a fresh environment and don't use it for other purpose since the injection error may break the testbed)

Pressing the button will trigger a task which can be watched in the vSphere Web Client. Once it completes successfully, the scenario has been created and your assignment starts. Please don't take any actions before then. Also don't change any settings unrelated to the assignment, as it may break the training software.

Cluster Name: RegionA01-COMP01

(Now we have scenario 1-8)
Scenario ID (leave blank for random): 
Submit

• Confirm that the vSAN Training Site is ready for our next Scenario ID

Your Challenge: Troubleshoot vSAN Configuration

Perform the steps listed below in order to begin the Challenge.

1. Enter the number 2 for your vSAN Training Scenario ID then click Submit (Hint)
2. Review the vSAN Training Site Results (Do NOT Close this Window) (Hint)
3. Examine the Health of the vSAN Cluster via the vSphere Web Client using vSAN Health Check (Hint)
4. Correct the misconfiguration for the impacted Host (Hint)
5. Retest vSAN Health and confirm that Issue is resolved (Hint)
6. Click Back on the vSAN Training Tool Website
Challenge 2: Troubleshoot vSAN Services

If only things would stay running the way they are supposed to - let's work on spotting a challenge in our environment and take steps to resolve the situation.

vSAN Training Site

Confirm that the vSAN Training Site is ready for our next Scenario ID

Your Challenge: Troubleshoot vSAN Services

Perform the steps listed below in order to begin the Challenge.

1. Enter the number 3 for your vSAN Training Scenario ID then click Submit (Hint)
2. Review the vSAN Training Site Results (Do NOT Close this Window) (Hint)
3. Examine the Health of the vSAN Cluster via the vSphere Web Client using vSAN Health Check (Hint)
4. Use Putty to connect to the impacted Host via SSH and check the state of the impacted Service (Hint)
5. Within your existing Putty session, remediate the impacted Service (Hint)
6. Retest vSAN Health and confirm that Issue is resolved (Hint)
7. Click Back on the vSAN Training Tool Website
Challenge 3: Troubleshoot vSAN Virtual Machines

Our vSAN Datastore isn't of much use if we aren't using it as a home for our Virtual Machines, but what happens when you are unable to build a new VM?

Hold on tight for your final vSAN Troubleshooting Challenge (and thank you for being here)!

vSAN Training Site

- Confirm that the vSAN Training Site is ready for our next Scenario ID

Your Challenge: Troubleshoot vSAN Virtual Machines

Perform the steps listed below in order to begin the Challenge.
1. Enter the number 5 for your vSAN Training Scenario ID then click Submit (Hint)
2. Review the vSAN Training Site Results (Do NOT Close this Window) (Hint)
3. Attempt to build a new Virtual Machine within the vSAN Cluster (Hint)
4. Figure out why you are unable to build this new Virtual Machine (Hint)
5. Correct the condition and re-attempt the Virtual Machine build if desired (Hint)

All Troubleshooting Challenges Completed!
Conclusion

In this Module you injected failure conditions for vSAN Network and vSAN Disk. As part of this process, you learned how to leverage the vSAN Health Check to identify the behavior that occurs during these type of troubleshooting scenarios.

You've finished Module 4

Congratulations on completing Module 4.

If you are looking for additional information:

- Go to VMware Storage Hub for all things related to vSAN

Proceed to any module below which interests you most.

- Module 5 - vSAN Network Re-Configuration (45 minutes) (Advanced)
  Students will be challenged to update IP addresses for vSAN's network interface.

How to End Lab

To end your lab click on the END button.
Module 5 - vSAN Network Re-Configuration (45 minutes)
Introduction

Are you ready for vSAN Configuration Challenges?

This Module contains the following challenges:

• Challenge 1: Changing IP addresses for vSAN's interfaces

Please note that these Challenges assume a certain level of vSAN familiarity to complete 'on your own'. Fear not, in the event that you are not as familiar, you can still take the Lab and utilize the '(HINT)' links to thoroughly guide you through detailed completion steps for each Challenge. There also may be more than one method to solve a challenge. The goal is for you to learn and/or validate your existing knowledge along the way.

Lab Preparation

We will use our Module Switcher PowerCLI Application to prepare the environment.

Module Switcher

Double-Click the Module Switcher Desktop Shortcut
Module 5 Start

1. Click on Module 5 Start button

Monitor Progress

Monitor Progress until Complete.

- Press Enter to continue (and close the PowerCLI Window)

**NOTE**: Due to an error in the start up script, Desktop background will incorrectly list that you are working on Module #3. Ignore this as this does not affect the functionality of your lab.
Lab Prep Complete

Your Lab has been successfully prepared for Module 5!

1. Click Window Close to safely stop the Module Switcher

Please Note that you cannot 'go back' and take Modules prior to the one you are currently in unless you end the lab and start it over again (for example: If you Start Module 4, you cannot use the Module Switcher to Start Labs 1, 2 or 3).
Challenge 1: vSAN Network Re-Configuration

In this module, you are playing a role of vSphere / vSAN administrator who has to deal with the EVIL network administrator who is asking you to update your vSAN cluster's IP range allocated to vSAN's network interfaces from one range to another. Since vSAN fully supports network multi-homing (i.e. utilizing multiple VMkernel network interfaces for carrying vSAN traffic), you will follow a workflow of creating new vSAN network interface and updating IP configuration for the initially created network interfaces used by vSAN communication. And you are going to do this with a live and running Virtual Machines!

Open Chrome Browser from Windows Quick Launch Task Bar

1. Click on the Chrome Icon on the Windows Quick Launch Task Bar.

vCenter Login

1. Select the checkbox for "Use Windows session authentication".
2. Click Login
Alternatively, you can enter a User name of `administrator@corp.local` and a password of `VMware1`!

### Your Challenge: Change IP addresses for vSAN's interfaces

**Perform the steps listed below in order to begin the Challenge.**

1. Examine the networking configuration of ESXi hosts connected to vDS via the vSphere Web Client (Hint) (Hint)
2. Examine placement of VM's components across vSAN nodes (Hint)
3. Create New Distributed Port Group (Hint)
4. Connect ESXi hosts to the New Port Group, create new VMkernel interfaces (vmk4) on all hosts and assign IPs (Hint)
5. Examine the impact of networking changes (Hint)
6. Update IP addresses for initial vSAN VMkernel interface (vmk3) on esx-01a host (Hint)
7. Review impact to the VMs / vSAN Cluster after single host IP configuration change (Hint) (Hint)
8. Update IP addresses for initial vSAN VMkernel interface (vmk3) on all other hosts (Hint)
9. Review vSAN cluster's network health after all ESXi hosts' IPs were updated (Hint)
10. Review environment for any HA warnings and remediate (if needed) (Hint)
Conclusion

In this Module, you successfully updated IP address range assigned to vSAN's VMkernel adapters without impacting any of your vSAN workloads.

Consequentially, you also observed vSAN's capability of supporting multiple VMkernel adapters for vSAN's traffic and observed vSAN's capabilities to withstand loss of one of the network interfaces. While in this simulated environment, we reused the same physical network interfaces for both VMkernel adapters, in production environments, customers may want to utilize additional physical network devices (as well as different VLANs, switches, etc) as a way to protect vSAN environments from a single point of failure.

You've finished Module 5

Congratulations on completing Module 5.

If you are looking for additional information:

- Go to VMware Storage Hub for all things related to vSAN

You now successfully completed all of the modules in HOL1908-02-CHG Challenges LABs. We hope you enjoyed your Hands-on-Lab experience and will come back and try out all of our other labs. Thank you for your time.

How to End Lab

To end your lab click on the END button.
Appendix - Hints & Solutions
Module 1 - vSAN Configuration

Appendix - Module 1 Hints and Solutions

This module contains the following lessons:

- Challenge 1 - Enable vSAN
- Challenge 2 - vSAN Configuration Assist
- Challenge 3 - vSAN Health Check

Hints and Solutions for the first challenge

**Challenge 1 - Hints and Solutions**

Enable vSAN Hints and Solutions

**Create a vSAN Cluster**

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Configure** Sub-Menu
3. Select **Services**
4. Click **Configure**
Configure vSAN Services

1. Enable the *Deduplication and Compression Services*
2. Click **Next**

Back To **Your Challenge: Create a vSAN Cluster**

Claim Disks

1. In order to more easily see Disk Allocation by Host, change the **Group by:** filter to **Host**
2. Note that we are claiming 1x 5.00 GB Cache Device and 2x 10.00 GB Capacity Devices (All Flash)
3. Note that for all 3 Hosts there will be a Total Cache claimed size of 15.00 GB and Total Capacity of 60.00 GB
4. Click Next

Back To **Your Challenge: Create a vSAN Cluster**

### Create Fault Domains

1. Click Next

Back To **Your Challenge: Create a vSAN Cluster**
1. Confirm Settings including **Total vSAN datastore Capacity and Cache** Amounts
2. Click **Finish**

Please note that it can take up to 5 minutes in our nested Lab Environment for this step to complete - thank you for your patience!

Back To **Your Challenge: Create a vSAN Cluster**
Monitor until Complete

1. Select **Recent Tasks**
2. Click **Running**

Back To **Your Challenge: Create a vSAN Cluster**
Check vSAN state

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Configure** Sub-Menu
3. Select **Services**
4. Verify that **vSAN** is Turned ON and that **Deduplication and Compression**, **Health Service** and **Performance Service** are Enabled

Back To **Your Challenge: Create a vSAN Cluster**
Check vSAN Capacity

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Monitor** Sub-Menu
3. Select **Capacity**
4. Review **Capacity & Deduplication and Compression** Overviews

Back To **Your Challenge: Create a vSAN Cluster**

**Challenge 2 - Hints and Solutions**

Enable vSphere High Availability Hints and Solutions
Enable High Availability (HA)

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Configure** Sub-Menu
3. Select **vSphere Availability**
4. Click **Edit**
Edit Cluster Settings

1. Enable the vSphere HA
2. Click OK

Back To Your Challenge: Enable vSphere High Availability

Challenge 3 - Hints and Solutions

vSAN Health Check Hints and Solutions
Health Check Warning

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Monitor** Sub-Menu
3. Select **Health**
4. Note that there are two **Warning's** present (Hardware Compatibility and vSAN Build Recommendation is expected in our Lab Environment)

Back To **Your Challenge: Utilize vSAN Health Check**
Module 2 - vSAN Day-2 Operations

Appendix - Module 2 Hints and Solutions

This module contains the following lessons:

- Challenge 1 - Scale vSAN Cluster Up and Out
- Challenge 2 - Configure Storage Policies
- Challenge 3 - Monitor vSAN Performance

Hints and Solutions for the first challenge

Note: This section requires Module Switcher Set to 2. If you have not done that, please click .

Challenge 1 - Hints and Solutions

Scale vSAN Cluster Up and Out Hints and Solutions

Confirm vSAN Compute

1. Select the RegionA01-COMP01 Cluster
2. Select the Summary Sub-Menu
3. Note the Total Processors: Quantity

Back To Your Challenge: Scale Out your vSAN Cluster
Confirm vSAN Capacity

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Monitor** Sub-Menu
3. Select **Capacity**
4. Note **Total Capacity** size

Back To **Your Challenge: Scale Out your vSAN Cluster**

**Scale vSAN Cluster Out**

There are a few methods you can use to add esx-04a.corp.local to your existing vSAN Cluster. Perhaps the easiest is to simply drag-and-drop this node into the RegionA01-COMP01 Cluster.
Add Host to Cluster

1. Drag **esx-04a.corp.local** and drop into **RegionA01-COMP01** Cluster

Confirm
1. Confirm that `esx-04a.corp.local` is present in Cluster

Back To **Your Challenge: Scale Out your vSAN Cluster**

**Create Disk Groups and Claim Disks**

![vSphere Client interface](image)

Although it is not required, VMware Best Practice is to configure any newly added Hosts with identical Disk Group composition as the other existing Hosts in the vSAN Cluster.

Our Existing Hosts in the Cluster are configured as follows:

**Disk Group 1:**

- 1x Cache Device (5 GB)
- 2x Capacity Device (10 GB)

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Configure** Sub-Menu
3. Select **Disk Management**
4. Click the **Claim Unused Disks for vSAN** icon
Claim Unused Disks for vSAN

1. In order to more easily see Disk Allocation by Host, change the Group by: filter to Host
2. Note that we are claiming 1 x 5.00 GB Cache Drive and 2 x 10.00 GB Capacity Drives (All Flash)
3. Click OK

Note: During this step, if more than 1 x 5.00 GB Cache drives and more than 2 x 10.00 GB Capacity drives are shown, configure extra drives with "Do not claim" option.

Wait for Disk Group Creation to Complete successfully

1. Select Recent Tasks
2. Monitor progress until **Complete**

Back To *Your Challenge: Scale Out your vSAN Cluster*

**Exit Maintenance Mode**

1. Right-Click **esx-04a.corp.local** -> **Maintenance Mode** - > **Exit Maintenance Mode**

**Monitor until Complete**

1. **Recent Tasks**

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Target</th>
<th>Status</th>
<th>Initiator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exit maintenance mode</td>
<td>esx-04a.corp.local</td>
<td>52%</td>
<td>CORP/Administrator</td>
</tr>
</tbody>
</table>
Confirm vSAN Compute

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Summary** Sub-Menu
3. Note the **Total Processors**: Quantity (Increase from 6 to 8)
Confirm vSAN Capacity

1. Select the RegionA01-COMP01 Cluster
2. Select the Monitor Sub-Menu
3. Select Capacity
4. Note Total Capacity size (increase from ~59GB to ~79GB)

Note: If Total Capacity size is shown greater than 79GB, double check number of disks selected during "Claim Unused Disks for vSAN" step. You should only 1 x 5.00 GB Cache Drive and 2 x 10.00 GB Capacity Drives (All Flash), and other drives should be configured with "Do not claim" option.

Back To Your Challenge: Scale Out your vSAN Cluster
Scale Up - Claim unused disks

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Configure** Sub-Menu
3. Select **Disk Management**
4. Review information and Click **Claim Unused Disks for vSAN**

**Claim Disks**

Claim Unused Disks for vSAN

Select unused disks to be claimed for cache or capacity in the vSAN cluster. Number of capacity disks per host must be equal or greater than the number of cache disks.

1. Change **Group by:** to **Host** view
2. Note that a new Disk Group will be configured for each Host containing **1x Cache Device and 2x Capacity Devices**
3. Use scroll bar to review configuration for all 4 hosts
4. Click **OK**

Monitor Until Complete

1. Expand **Recent Tasks**
2. Monitor until complete

Back To **Your Challenge: Scale Up your vSAN Cluster**

Updated Disk Groups

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Configure** Sub-Menu
3. Select **Disk Management**
4. Select the newly added **Disk Group**
5. Note that each Host now has a 2nd Disk Group and that the newly added Disk Group contains the expected **3x new Devices (1x Cache and 2x Capacity)**
6. Repeat Steps 4-5 for the other Hosts if desired
Back To Your Challenge: Scale Up your vSAN Cluster

Confirm vSAN Capacity

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Monitor** Sub-Menu
3. Select vSAN -> Capacity
4. Note **Total Capacity** size (increase from 79.98 GB to 159.95 GB)

Back To Your Challenge: Scale Up your vSAN Cluster

Challenge 2 - Hints and Solutions

Configure Storage Policies
1. Return to **Home** Tab
2. Click **VM Storage Policies**
Create VM Storage Policy

Name and Description
1. Enter Name = **FTT1-RAID5-IOPSLimit**
2. Click **Next**

**Policy Structure**

1. Select **Enable rule for "vSAN" storage**
2. Click **Next**
vSAN - Availability

1. Change **Failures to tolerate** to **1 failure - RAID 5 (Erasure Coding)**
2. Click **Advanced Policy Rules**
vSAN - Advanced Policy Rules

1. Set **IOPS limit to object** to **50**
2. Click **Next**
1. Note that the **vsanDatastore** shows up as the only datastore compatible with your newly created Policy.
2. Click **Next**
1. Click **Finish**

Back To **Your Challenge: Configure Storage Policies**
Edit VM Storage Policies...

1. Right-click **vSAN-VM_NoisyNeighbor** -> VM Policies -> Edit VM Storage Policies...
1. Change **VM storage policy:** to FTT1-RAID5-IOPSLimit
2. Click on either **VM Home** or **Hard disk 1** (arrow) and note that the **Storage Consumption** will be lower (as the VM is now going to be using RAID5 vs. RAID1 duplicate mirrored replicas)
3. Click **OK**

Back To **Your Challenge: Configure Storage Policies**
1. Select **vSAN-VM_NoisyNeighbor**
2. Select **Configure** Sub-Tab
3. Select **Policies**
4. Click **Hard disk 1** (Note compliance status indicates **Compliant**) and note that **VM Storage Policy** is set as **FTT1-RAID5-IOPSLimit**

Back To **Your Challenge: Configure Storage Policies**
1. Select **RegionA01-COMP01**
2. Select **Monitor** Sub-Tab
3. Select **vSAN -> Virtual Objects**
4. Click on **arrow**
5. Select **Hard disk 1** checkbox for **vSAN-VM_NoisyNeighbor VM**
6. Click on **View Placement Details**

Back To **Your Challenge: Configure Storage Policies**
Physical Disk Placement

1. Note that the Components have been placed in a RAID-5 set thereby using less disk capacity than previous RAID-1 (Mirror) configuration
2. Select Close

Back To Your Challenge: Configure Storage Policies
Check IOPS Limit

1. Select **vSAN-VM_NoisyNeighbor**
2. Select **Monitor** Sub-Tab
3. Select **vSAN -> Performance**
4. Click **Virtual Disks**
5. Note the **IOPS and IOPS Limit** reporting Graph (over time, a red line will be drawn at the 50 line mark to illustrate the limit that you have set via software policy - this will not report immediately in your lab and you can proceed to the next Challenge)

Back To **Your Challenge: Configure Storage Policies**

**Challenge 3 - Hints and Solutions**

Monitor vSAN Performance
vSAN Cluster Performance Metrics

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Monitor** Sub-Menu
3. Select **vSAN -> Performance**
4. Note the **vSAN related Performance** selections
5. Scroll-down to see all of the available **Metrics**

Back To **Your Challenge: Monitor vSAN Performance**
vSAN Individual Host Performance Metrics

1. Select the **esx-01a.corp.local** Host
2. Select the **Monitor** Sub-Menu
3. Select **vSAN -> Performance**
4. Note the **vSAN related Performance** selections
5. Scroll-down to see all of the available **Metrics**

Back To **Your Challenge: Monitor vSAN Performance**
Virtual Machine Performance Metrics

1. Select the vSAN-VM-NoisyNeighbor Virtual Machine
2. Select the Monitor Sub-Menu
3. Select Performance
4. Note the vSAN related Performance selections
5. Scroll-down to see all of the available Metrics

Back To Your Challenge: Monitor vSAN Performance
Module 3 - vSAN Troubleshooting

Appendix - Module 3 Hints and Solutions

This module contains the following lessons:

- Challenge 1 - Troubleshoot vSAN Network
- Challenge 2 - Troubleshoot vSAN Disk

**Note:** This section requires Module Switcher Set to 3. If you have not done that, please click [this link].

**Challenge 1 - Hints and Solutions**

Troubleshoot vSAN Network

**vSAN Training Tool**

![vSAN Training Tool Image]

Inject a new scenario, assuming the cluster is currently in perfect health and has been returned to the default configuration. Your assignment will be to identify the issue that was injected and resolve it and restore the cluster to full health. Use random scenarios by default, and only if you want to repeat a particular scenario, use the input box to ask for a specific scenario.

(You are recommended to use a fresh environment and don’t use it for other purpose since the injection error may break the testbed)

Pressing the button will trigger a task which can be watched in the vSphere Web Client. Once it completes successfully, the scenario has been created and your assignment starts. Please don’t take any actions before then. Also don’t change any settings unrelated to the assignment, as it may break the training software.

(Cluster Name: RegionA01-COMP01)

(Now we have scenario 1-8)

Scenario ID (leave blank for random): 11

Submit 2 1
1. Enter the Scenario ID: 1
2. Click submit

Back To Your Challenge: Troubleshoot vSAN Network

Scenario: ID = 1

(Note): Customer says 'I have no clue, can you take a look?'

A task was triggered which can be watched in the vSphere Web Client. Once it completes successfully, the scenario has been created and your assignment starts. Please DON'T take any actions before then. Also DON'T change any settings unrelated to the assignment, as it may break the training software.

**Please wait and confirm that vSAN Training Inject Failure task has been completed!**

If you cannot fix the problem, click 'Clear Scenario' button to restore the environment.

Clear Scenario

Once you have completed the assignment, click 'Back' to return to the main page, from which you can launch the next assignment.

Back

• Review Instructions
Monitor vSAN Training Inject Failure Task

Our Training Tool disables updates to the Recent Tasks tab to prevent revealing details of the failure type that is being injected; however, you can still monitor the parent progress of the Failure Injection Task itself.

1. Select **Recent Tasks**
2. Note the status of **vSAN Training Inject Failure** task

Back To [Your Challenge: Troubleshoot vSAN Network](#)
vSAN Health Check

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Monitor** Sub-Menu
3. Select **vSAN -> Health**
4. (If there are no Errors present, select **Retest**)
5. Expand Network and click **All hosts have a vSAN vmknic configured**
6. Note which **Host** in your Cluster has no vSAN vmknic Present (not shown)

Back To **Your Challenge: Troubleshoot vSAN Network**
1. Select ESXi Host with vSAN Network Issue (Screenshot may not match -- use Host result indicated via previous Health Check)
2. Select **Configure**
3. Select **Networking -> VMkernel adapters**
4. Select **vmk3 vsAN-RegionA01...**
5. Click **Pencil** edit icon
1. Enable vSAN Checkbox
2. Click OK

Back To Your Challenge: Troubleshoot vSAN Network
vSAN Health Check

1. Select the RegionA01-COMP01 Cluster
2. Select the Monitor Sub-Menu
3. Select vSAN -> Health
4. (If necessary, click Retest)
5. Validate that the Network Health check is now in a Passed state

Back To Your Challenge: Troubleshoot vSAN Network

Challenge 2 - Hints and Solutions

Troubleshoot vSAN Disk
vSAN Training Tool

1. Enter the Scenario ID: 8
2. Click submit

Back To Your Challenge: Troubleshoot vSAN Disk
Scenario: ID = 8

[Note]: Customer says "I have no clue, can you take a look?"
Note: This scenario may not be resolved fully by user, please click 'Clear Scenario' below and then follow the fix steps. The key assignment is to explain the issue and know the resolve process

A task was triggered which can be watched in the vSphere Web Client. Once it completes successfully, the scenario has been created and your assignment starts. Please DON'T take any actions before then. Also DON'T change any settings unrelated to the assignment, as it may break the training software.

**Please wait and confirm that 'vSAN Training Inject Failure' task has been completed!**

If you cannot fix the problem, click 'Clear Scenario' button to restore the environment.

Clear Scenario

Once you have completed the assignment, click 'Back' to return to the main page, from which you can launch the next assignment.

Back
Monitor vSAN Training Inject Failure Task

Our Training Tool disables updates to the Recent Tasks tab to prevent revealing details of the failure type that is being injected; however, you can still monitor the parent progress of the Failure Injection Task itself.

1. Select **Tasks**
2. Note the status of **vSAN Training Inject Failure** task

**Note:** It may take several minutes for the Failure Injection Task to complete.

Back To **Your Challenge: Troubleshoot vSAN Disk**
vSAN Health Check

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Monitor** Sub-Menu
3. Select **vSAN -> Health**
4. (If there are no Errors present, select **Retest**)
5. Expand **Physical Disk** and select **Operation health**
6. Note that **esx-02a.corp.local** has a simulated disk failures

Back To **Your Challenge: Troubleshoot vSAN Disk**
Clear Scenario Instructions

When you selected 'Clear Scenario' the vSAN Training tool reversed the simulated failed devices. In order to clear the condition in vSphere, you will need to rescan Storage Adapters for the impacted Host.

1. In **Injection Tool** web browser window, click on **Clear Scenario** link
2. Ignore everything other than the highlighted information (unplugging the disk and waiting for vSAN Training Inject Failure does not apply)

Back To **Your Challenge: Troubleshoot vSAN Disk**
Rescan Storage

1. Select ESXi Host with vSAN Disk Issue (will not be the same Host each time - use result indicated via Health Check)
2. Select **Configure**
3. Select **Storage Adapters**
4. Select **Rescan Storage...** icon

**Rescan Storage, cont.**

1. Leave checkboxes enabled and click **OK**
Monitor Progress

1. Expand **Recent Tasks**
2. Monitor Progress until **Complete**

Back To **Your Challenge: Troubleshoot vSAN Disk**

### vSAN Health Check

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Monitor** Sub-Menu
3. Select **vSAN -> Health**
4. (If necessary, click **Retest**)
5. Validate that the **Physical Disk** Health check is now in a Passed state
Note: It might take several minutes after the Storage Rescan operation for the Health Test to return Passed status again.

Reset Host Error

1. Select the esx-02a.corp.local host (will not be the same Host each time - use result indicated via Health Check)
2. Select Summary
3. Click Reset To Green

Back To Your Challenge: Troubleshoot vSAN Disk
Module 4 - vSAN Troubleshooting (Advanced)
Appendix - Module 4 Hints and Solutions

This module contains the following lessons:

- Challenge 1 - Troubleshoot vSAN Configuration
- Challenge 2 - Troubleshoot vSAN Services
- Challenge 3 - Troubleshoot vSAN Virtual Machines

**Note:** This section requires Module Switcher Set to 4. If you have not done that, please click here.

**Challenge 1 - Hints and Solutions**

**Troubleshoot vSAN Configuration**

**vSAN Training Tool**

![vSAN Training Tool Image]

Inject a new scenario, assuming the cluster is currently in perfect health and has been returned to the default configuration. Your assignment will be to identify the issue that was injected and resolve it and restore the cluster to full health.

Use random scenarios by default, and only if you want to repeat a particular scenario use the input box to ask for a specific scenario.

(You are recommended to use a fresh environment and don’t use it for other purpose since the injection error may break the testbed)

Pressing the button will trigger a task which can be watched in the vSphere Web Client. Once it completes successfully, the scenario has been created and your assignment starts. Please don’t take any actions before then. Also don’t change any settings unrelated to the assignment, as it may break the training software.

1. Enter the Scenario ID: 2
2. Click submit
**Back To Your Challenge: Troubleshoot vSAN Configuration**

**Scenario: ID = 2**

[Note]: Customer says "I have no clue, can you take a look?"

A task was triggered which can be watched in the vSphere Web Client.
Once it completes successfully, the scenario has been created and your assignment starts.
Please DON'T take any actions before then. Also DON'T change any settings unrelated to the assignment, as it may break the training software.

**Please wait and confirm that 'vSAN Training Inject Failure' task has been completed!**

If you can not fix the problem, click 'Clear Scenario' button to restore the environment.

Clear Scenario

Once you have completed the assignment, click 'Back' to return to the main page,
from which you can launch the next assignment.

Back
Monitor vSAN Training Inject Failure Task

1. Select **Recent Tasks**
2. Note the status of **vSAN Training Inject Failure** task

Back To **Your Challenge: Troubleshoot vSAN Configuration**
vSAN Health Check

1. Select the **RegionA01-COMP01** Cluster
2. Select the **Monitor** Sub-Menu
3. Select **vSAN -> Health**
4. (If there are no Errors present, select **Retest**)
5. Expand **Cluster** and select **Advanced vSAN configuration in sync**
6. Note that **Host** that has a different **VSAN.ClomRepairDelay** value set than the other Host(s).

The vSAN advanced setting VSAN.ClomRepairDelay specifies the amount of time vSAN waits before rebuilding a disk object after a host is either in a failed state (absent failures) or in Maintenance Mode. By default, the repair delay value is set to 60 minutes; this means that in the event of a host failure, VSAN waits 60 minutes before rebuilding any disk objects located on that particular host.

Back To **Your Challenge: Troubleshoot vSAN Configuration**
Advanced System Settings

1. Select the impacted Host from the previous Health Check step
2. Select the **Configure** Sub-Menu
3. Select **Advanced System Settings**
4. Click **Edit**
Edit Advanced System Settings

1. Type `VSAN.clomrepair` in search field
2. Enter Value of 60
3. Click OK

Back To Your Challenge: Troubleshoot vSAN Configuration
vSAN Health Check

1. Select the RegionA01-COMP01 Cluster
2. Select the Monitor Sub-Menu
3. Select vSAN -> Health
4. (If necessary, click Retest)
5. Validate that the Cluster Health check is now in a Passed state

Back To Your Challenge: Troubleshoot vSAN Configuration

Challenge 2 - Hints and Solutions

Troubleshoot vSAN Services
vSAN Training Tool

1. Enter the Scenario ID: 3
2. Click **submit**

Back To **Your Challenge: Troubleshoot vSAN Services**
Scenario: ID = 3

A task was triggered which can be watched in the vSphere Web Client. Once it completes successfully, the scenario has been created and your assignment starts. Please DON'T take any actions before then. Also DON'T change any settings unrelated to the assignment, as it may break the training software.

**Please wait and confirm that 'vSAN Training Inject Failure' task has been completed!!**

If you can not fix the problem, click 'Clear Scenario' button to restore the environment.

Clear Scenario

Once you have completed the assignment, click 'Back' to return to the main page, from which you can launch the next assignment.

Back
Monitor vSAN Training Inject Failure Task

1. Select **Recent Tasks**
2. Note the status of **vSAN Training Inject Failure** task

Back To **Your Challenge: Troubleshoot vSAN Services**
1. Select the RegionA01-COMP01 Cluster
2. Select the Monitor Sub-Menu
3. Select vSAN
4. Select Health
5. (If there are no Errors present, select Retest)
6. Expand Cluster and select vSAN CLOMD liveness
7. Note that Host that is reporting an Abnormal state and Cannot connect to clomd process Error

CLOMD (Cluster Level Object Manager Daemon) plays a key role in the operation of a vSAN cluster. It runs on every ESXi host and is responsible for new object creation, initiating repair of existing objects after failures, all types of data moves and evacuations (For example: Enter Maintenance Mode, Evacuate data on disk removal from vSAN), maintaining balance and thus triggering rebalancing, implementing policy changes, etc).

Back To Your Challenge: Troubleshoot vSAN Services
Click the **Putty** shortcut on the taskbar

**Putty Configuration**

1. Double-click the **Host** that returned **Abnormal** status in the previous Health Check Step
Check clomd Status

1. Type the following command to check clomd status: `/etc/init.d/clomd status`
2. Note that the **clomd is not running**

Back To **Your Challenge: Troubleshoot vSAN Services**

Start clomd Service

1. Type the following command to start the clomd service: `/etc/init.d/clomd start`

Back To **Your Challenge: Troubleshoot vSAN Services**
vSAN Health Check

1. Select the RegionA01-COMP01 Cluster
2. Select the Monitor Sub-Menu
3. Select vSAN -> Health
4. (If necessary, click Retest)
5. Validate that the Cluster Health check is now in a Passed state

Back To Your Challenge: Troubleshoot vSAN Services

Challenge 3 - Hints and Solutions

Troubleshoot vSAN Virtual Machines
vSAN Training Tool

1. Enter the Scenario ID: 5
2. Click submit

Back To Your Challenge: Troubleshoot vSAN Virtual Machines
Scenario: ID = 5

[Note]: Customer says "VM creation started failing. It worked fine yesterday."

A task was triggered which can be watched in the vSphere Web Client. Once it completes successfully, the scenario has been created and your assignment starts. Please DON'T take any actions before then. Also DON'T change any settings unrelated to the assignment, as it may break the training software.

**Please wait and confirm that 'vSAN Training Inject Failure' task has been completed!**

If you can not fix the problem, click 'Clear Scenario' button to restore the environment.

Clear Scenario

Once you have completed the assignment, click 'Back' to return to the main page, from which you can launch the next assignment.

Back
Monitor vSAN Training Inject Failure Task

1. Select Recent Tasks
2. Note the status of vSAN Training Inject Failure task

Back To Your Challenge: Troubleshoot vSAN Virtual Machines
Attempt Virtual Machine Build

1. Right-click the RegionA01-COMP01 Cluster and select New Virtual Machine
Select Creation Type

New Virtual Machine

1. Select **create a new virtual machine**
2. Click **Next**
Select a name and folder

1. Enter Name: **vSAN-VM**
2. Select **RegionA01**
3. Click **Next**
Select a compute resource

New Virtual Machine

1. Click on the RegionA01-COMP01 Cluster
2. Select any host in the cluster
3. Click Next
Attempt to select the vSAN Datastore (aka something is wrong)!!

1. Change VM storage policy to: **vSAN Default Storage Policy**
2. Note that the vsanDatastore is showing up as **Incompatible**
3. Examine the **Compatibility error** for more details
4. Click **Cancel**

Back To **Your Challenge: Troubleshoot vSAN Virtual Machines**
Examine the Default vSAN Storage Policy

1. Select **vSphere Client** to go to Home Menu
2. Select **VM Storage Policies**
Review the Default vSAN Storage Policy Rules

1. Select **VM Storage Policies**
2. Select **vSAN Default Storage Policy**
3. Review **Rules** section

Observe that Failures to tolerate is set to 2 failures - RAID 1 (Mirroring). Such configuration requires at least 5 Fault Domains contributing to storage, but our lab environment, contains only 4 ESXi hosts.

Note: Formula to calculate the number of Hosts required (where Number of Failures to Tolerate = ‘n’), is 2n+1

(e.g. if Failures to Tolerate desired is 2 then 2*(2) +1 = 5 Hosts required)

Back To **Your Challenge: Troubleshoot vSAN Virtual Machines**
Update Default vSAN Storage Policy

1. Click **Edit Settings** (pencil) icon
1. Click Next
Edit VM Storage Policy - Policy Structure

1. Click **Next**
1. Change **Failures to tolerate** to **1 failure - RAID 1 (Mirroring)**
2. Click **Next**
Edit VM Storage Policy - Storage Compatibility

1. Click **Next**
1. **Click Finish**

Back To **Your Challenge: Troubleshoot vSAN Virtual Machines**
Module 5 - vSAN Network Re-Configuration

Appendix - Module 5 Hints and Solutions

This module contains the following lessons:

- Challenge 1 - vSAN Network Re-Configuration - reconfigure IP addresses for vSAN's network interfaces

**Note:** This section requires Module Switcher Set to 5. If you have not done that, please click .

Hints and Solutions for the first challenge

Challenge 1 - Hints and Solutions

vSAN Network Re-Configuration Hints and Solutions

Examine Hosts' Connections to a Distributed Switch

1. Select Networking
2. Select the RegionA01-vDS-COMP01 Distributed Switch
3. Select the Hosts Sub-Menu
4. Note the host connection State is listed as Connected and Status is listed as Normal

Back To Your Challenge: vSAN Network Re-Configuration
Examine Hosts' VMkernel adapters and configuration

1. Select **Hosts and Clusters**
2. Select any host in the **RegionA01-COMP01** Cluster (such as esx-01a.corp.local)
3. Select the **Configure** Sub-Menu
4. Select **VMkernel Adapters**
5. Select **vmk3** Device interface
6. Review **Enabled Services** under **Port Properties** and **IPv4 address**
7. Repeat steps 2 through 6 on other hosts, if desired

Back To **Your Challenge: vSAN Network Re-Configuration**
Examine VM placement

1. Select RegionA01-COMP01 Cluster
2. Select the Monitor Sub-Menu
3. Select Virtual Objects
4. Select vSAN-VM-RAID5 VM checkbox
5. Click View Placement Details
Observe Physical Placement of the Components

1. Observe that components for VSAN-VM-RAID5 VM are placed across all 4 hosts present in the Cluster
2. Click Close

Back To Your Challenge: vSAN Network Re-Configuration
Create New Distributed Port Group

1. Select **Networking**
2. Right click on **RegionA01-vDS-COMP01** switch
3. Select the Distributed Port Group -> New Distributed Port Group ...
Creating Distributed Port Group - Select Name and Location

1. Enter PortGroup Name as vSAN-RegionA02-vDS-COMP
2. Click Next
Creating Distributed Port Group - Configure Settings

New Distributed Port Group

1. Select name and location
2. Configure settings
3. Ready to complete

Configure settings
Set general properties of the new port group.

- Port binding: Static binding
- Port allocation: Elastic
- Number of ports: 8
- Network resource pool: (default)

VLAN
- VLAN type: None

Advanced
- Customize default policies configuration

1. Click Next
Creating Distributed Port Group - Ready to Complete

<table>
<thead>
<tr>
<th>New Distributed Port Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready to complete</td>
</tr>
<tr>
<td>Review the changes before proceeding.</td>
</tr>
<tr>
<td>Distributed port group name</td>
</tr>
<tr>
<td>Port binding</td>
</tr>
<tr>
<td>Number of ports</td>
</tr>
<tr>
<td>Port allocation</td>
</tr>
<tr>
<td>Network resource pool</td>
</tr>
<tr>
<td>VLAN ID</td>
</tr>
</tbody>
</table>

1. Click **Finish**

Back To **Your Challenge: vSAN Network Re-Configuration**
Connect ESXi Hosts to New Port Group

1. Select **Networking**
2. Right click on **vSAN-RegionA02-vDS-COMP**
3. Select **Add VMkernel Adapters...**
Add VMkernel Adapters - Select Hosts

1. Click on **plus (+) sign** to attach hosts
Add VMkernel Adapters - Select Hosts

1. Select hosts 1 through 4 by clicking on check boxes next to host names
2. Click OK
1. Confirm that all 4 hosts are listed and click Next
Add VMkernel Adapters - Configure VMkernel Adapter

1. Select **vSAN** check box in the Available Services
2. click **Next**
Add VMkernel Adapters - IPv4 Settings

1. Select **Use static IPv4 settings**
2. Enter the following **IP address** and **netmask** in Networking settings
   1. esx-01a.corp.local - IP: **10.10.10.1** - Netmask: **255.255.255.0**
   2. esx-02a.corp.local - IP: **10.10.10.2** - Netmask: **255.255.255.0**
   3. esx-03a.corp.local - IP: **10.10.10.3** - Netmask: **255.255.255.0**
   4. esx-04a.corp.local - IP: **10.10.10.4** - Netmask: **255.255.255.0**
3. Click **Next**
1. Confirm all information and click **Finish**

Back To **Your Challenge: vSAN Network Re-Configuration**
Add VMkernel Adapters - Ready to Complete

1. Select **Recent Tasks**
2. Note the status of **Update vSAN Configuration** tasks

Back To **Your Challenge: vSAN Network Re-Configuration**

Validate connected status

1. Select **Networking**
2. Select **vSAN-RegionA02-vDS-COMP** portgroup
3. Note the **state** and **status** of ESXi hosts 1 through 4

**Back To** *Your Challenge: vSAN Network Re-Configuration*

**Validate added vSAN network interfaces**

1. Select **Hosts and Clusters**
2. Select **esx-01a.corp.local**
3. Select **Configure**
4. Select **VMkernel Adapters**
5. Select **vmk4**
6. Review **VMkernel network adapter: vmk4** properties and validate that **Enabled Services, IPv4 address, Subnet Mask** values are set as expected.
7. Repeat Steps 2 through 4 on other ESXi hosts as desired.

Back To **Your Challenge: vSAN Network Re-Configuration**

**Validate added vSAN network interfaces**

1. Select **Hosts and Clusters**
2. Select **RegionA01-COMP01 Cluster**
3. Select the **Monitor** Sub-Menu
4. Select **vSAN -> Health**
5. Click on **Retest** button
6. Select **Network**
7. Select **All hosts have matching subnets**
8. Review and confirm that all ESXi hosts are connected to both 10.10.10.0/24 and 192.168.130.0/24 subnets

Back To **Your Challenge: vSAN Network Re-Configuration**

### Validate added vSAN network interfaces

1. Select **Hosts and Clusters**
2. Select **RegionA01-COMP01** Cluster
3. Select the **Monitor** Sub-Menu
4. Select **vSAN -> Health**
5. Select **vSAN: Basic (unicast) connectivity check**
6. Select **Ping Results**
7. Review and confirm that all ESXi hosts are able to communicate over both **vmk3** and **vmk4** network device interfaces

Back To **Your Challenge: vSAN Network Re-Configuration**
Update vSAN's IP address on vmk3 interface on esx-01a host

1. Select **Hosts and Clusters**
2. Select **esx-01a.corp.local** Host
3. Select the **Configure** Sub-Menu
4. Select **VMkernel adapters**
5. Select **vmk3** network interface
6. Click on **Edit** (pencil)
1. Select IPv4 settings
vmk3 - Edit Settings - IPv4 settings

1. Change IPv4 address from 192.168.130.51 to 192.168.222.51
2. Change Default gateway from 192.168.130.1 to 192.168.222.1
3. Click OK

Back To Your Challenge: vSAN Network Re-Configuration
Examine the impact of networking changes

1. Select **Hosts and Clusters**
2. Select **RegionA01-COMP01 Cluster**
3. Select the **Monitor** Sub-Menu
4. Select **vSAN -> Health**
5. Click on the **Retest** button
6. Select **Network**
7. Review Warning and Alarms for All hosts have matching subnet, vSAN: Basic (unicast) connectivity check, and vSAN: MTU check health checks
8. Click on All hosts have matching subnet and note that esx-01a's IP subnet has been updated

Back To **Your Challenge: vSAN Network Re-Configuration**
Validate added vSAN network interfaces

1. Select **Hosts and Clusters**
2. Select **RegionA01-COMP01** Cluster
3. Select the **Monitor** Sub-Menu
4. Select **vSAN -> Health**
5. Select **vSAN: Basic (unicast) connectivity check**
6. Select **Ping Results**
7. Review and confirm that all ESXi hosts are able to communicate over both **vmk3** and **vmk4** network device interfaces

Back To **Your Challenge: vSAN Network Re-Configuration**
Update vSAN's IP address on vmk3 interface on esx-02a / esx-03a / esx-04a hosts

Note: The following steps have to be repeated for all ESXi hosts in the cluster (i.e. esx-02a.corp.local, esx-03a.corp.local, and esx-04a.corp.local)

esx-02a.corp.local is used as an example:

1. Select Hosts and Clusters
2. Select esx-02a.corp.local Host
3. Select the Configure Sub-Menu
4. Select VMkernel adapters
5. Select vmk3 network interface
6. Click on Edit (pencil)
1. Select **IPv4 settings**
vmk3 - Edit Settings - IPv4 settings

Note: Change IP address as indicated below:

- For esx-02a.corp.local, change IP address from 192.168.130.52 to 192.168.222.52
- For esx-03a.corp.local, change IP address from 192.168.130.53 to 192.168.222.53
- For esx-04a.corp.local, change IP address from 192.168.130.54 to 192.168.222.54

1. Change IPv4 address from 192.168.130.5x to 192.168.222.5x
2. Change Default gateway from 192.168.130.1 to 192.168.222.1
3. Click OK
4. Repeat above steps for all ESXi hosts (esx-02a.corp.local, esx-03a.corp.local, and esx-04a.corp.local)

Back To Your Challenge: vSAN Network Re-Configuration
Review changes to vSAN Health state after vSAN interface IP changes

1. Select Hosts and Clusters
2. Select RegionA01-COMP01 Cluster
3. Select the Monitor Sub-Menu
4. Select vSAN -> Health
5. Click on Retest button
6. Select Network
7. Confirm that all Warning and Alarms for All hosts have matching subnet, vSAN: Basic (unicast) connectivity check, and vSAN: MTU check health checks are showing Green status
8. Select All hosts have matching subnet and confirm that all hosts have identical vSAN subnets assigned

Back To Your Challenge: vSAN Network Re-Configuration
Check environment for any HA warnings

Note: If any hosts show a warning (yellow triangle), reconfigure vSphere HA

1. Select **Hosts and Clusters**
2. Select **ESXi host** with a warning sign
3. Select the **Summary** Sub-Menu and review warning message. If the message reports **vSphere HA agent on host cannot reach some management network addresses of other hosts** or similar, continue with the next step.

Back To **Your Challenge: vSAN Network Re-Configuration**
Reconfigure environment for vSphere HA

1. Right click on **ESXi host** with a warning sign
2. Select **Reconfigure for vSphere HA**

Back To  **Your Challenge: vSAN Network Re-Configuration**
Wait for Reconfiguration Task to complete

1. Select Recent Tasks
2. Wait for Reconfigure vSphere HA host task Select **Reconfigure for vSphere HA**

Back To **Your Challenge: vSAN Network Re-Configuration**
Conclusion

Thank you for participating in the VMware Hands-on Labs. Be sure to visit http://hol.vmware.com/ to continue your lab experience online.

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