

HOL-2601-09-VCF-L



Monitoring Network and Storage Operations In the Private Cloud Using VCF Operations

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Monitoring Network and Storage Operations In the Private Cloud Using VCF Operations (HOL-2601-09-VCF-L)

Explore intelligent operations management with VMware Cloud Foundation Operations, gaining application-to-storage visibility across physical, virtual, and cloud infrastructures. You'll learn to monitor, discover, and analyze network and storage operations within a VMware Cloud Foundation 9.0 private cloud environment, enhancing your ability to identify and resolve issues and maintain peak performance.

Lab Guidance

Welcome! This lab is available for you to repeat as many times as you want. Use the Table of Contents in the upper right-hand corner of the Lab Manual to jump ahead to any module.

Module	Title	Length	Level
1	Monitor, Discover, and Analyze Networks	45 min	Intermediate
2	Monitor, Discover, and Analyze Storage	30 min	Advanced

Lab Authors:

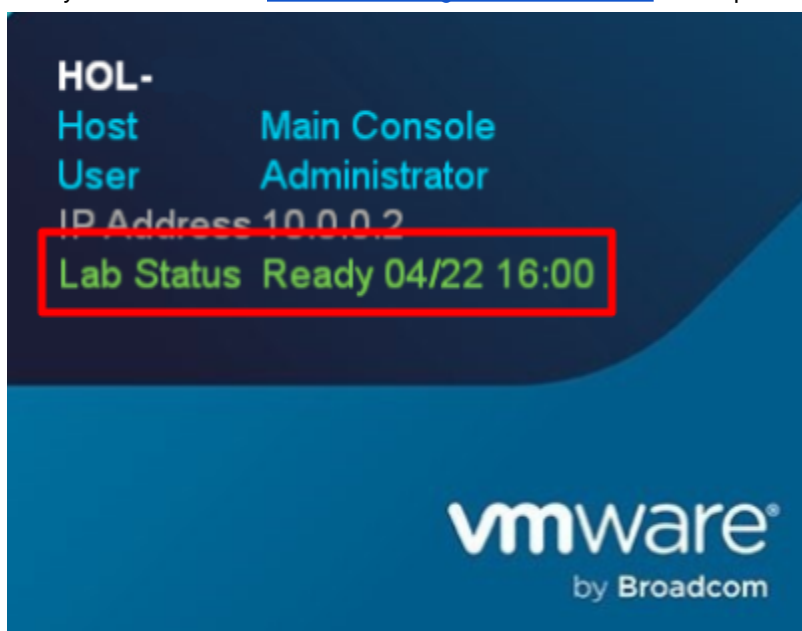
- Module 1 -William De Marigny, Staff Technical Adoption Manager, USA
- Module 2 - Thomas Kopton, Solutions Architect, Deutschland

Lab Principals:

- Christopher Lewis, Lead VCF Specialist Solutions Architect, UK
- Katherine Skilling, Senior Architect, Professional Services, UK

First time using Hands-on Labs?

If this is your first time taking a lab you can review the [VMware Learning Platform interface](#) before proceeding.



The lab console will indicate when your lab has finished all the startup routines and is ready for you to start. If you see anything other than "Ready", please wait for the status to update. If after 5 minutes your lab has not changed to "Ready", please ask for assistance.

Module 1 - Monitor, Discover, and Analyze Networks (45 minutes) Intermediate

Monitor, discover, and analyze networks to improve application performance for highly optimized, available, and scalable network infrastructure across VMware Cloud Foundation. Network Operations in VMware Cloud Foundation brings a level of visibility to your environment that when coupled with application and performance monitoring gives administrators and users unprecedented insights into applications and workloads.

In this module we will examine the new integrations between VMware Cloud Foundation Operations and Network Operations and how users and administrators can interact with the new systems.

Login to VCF Operations

In the following few pages, we will walk through the process for logging in to VCF Operations.

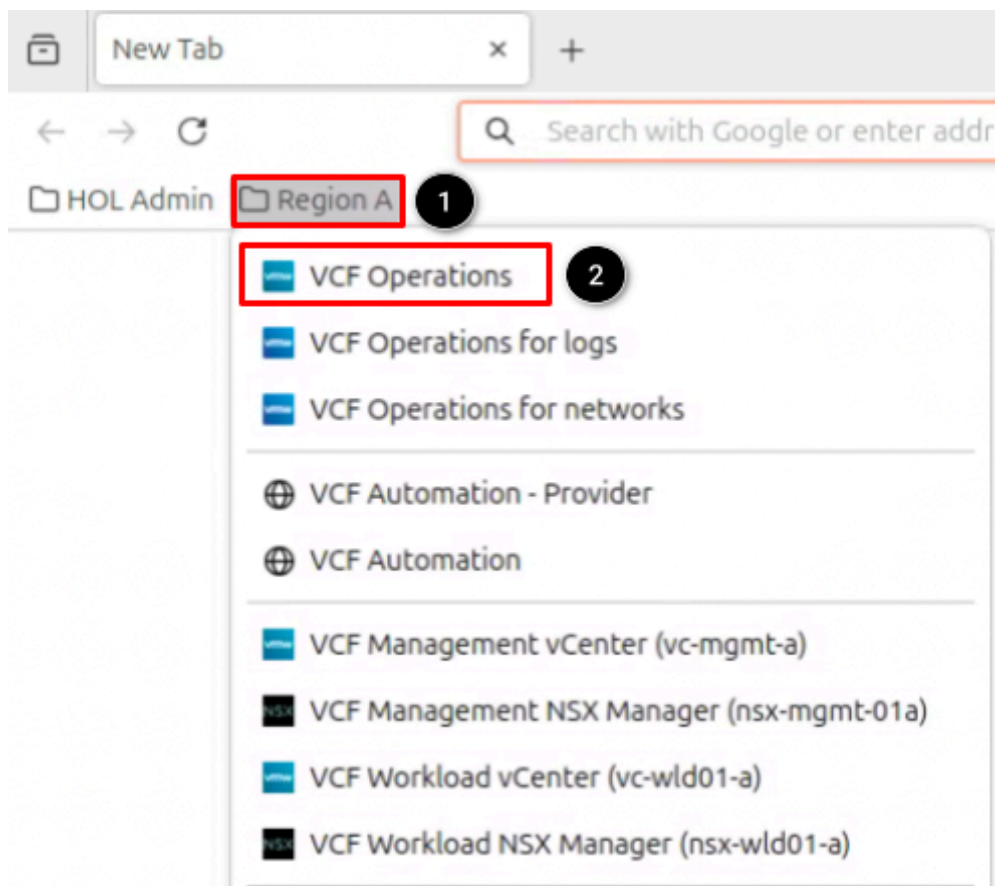
Start Firefox



Open the Firefox Browser from the Linux Task Bar.

1. Click on the Firefox icon to open the browser.

Open VCF Operations Console



Once Firefox has loaded:

1. Click on the **Region A** bookmark folder.
2. Click **VCF Operations**.

Login to VCF Operations Console

VMware Cloud Foundation Operations™

Login Method *
Local Account 1

Username *
admin 2

Password *
..... 3

LOG IN 4

The credentials for **admin** should already be cached in the browser window.

At the VCF Operations login prompt, select the login method and type in the following user and password information:

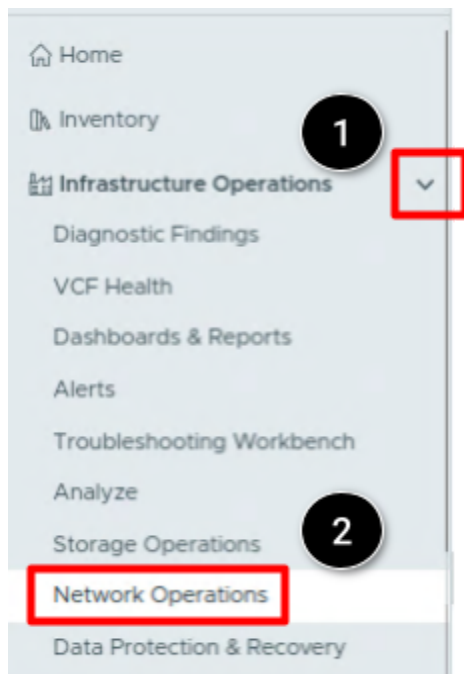
1. At the Login Method dropdown, select **Local Account**.
2. At the username field, type **admin**.
3. At the password field, type **VMware123!VMware123!**
4. Click **LOG IN**.

Introduction to the VCF Operations Network Monitoring Capabilities

With the integration of Network Operations in VMware Cloud Foundation Operations, users and administrators now can view information about their networking from within the Operations console. This integration of Network Operations with Storage Operations, Diagnostic Findings and other import VMware Cloud Foundation infrastructure operations helps to eliminate the need for multiple consoles with the difficult task of correlating data between them this generates.

Let's take a look at the new Interface.

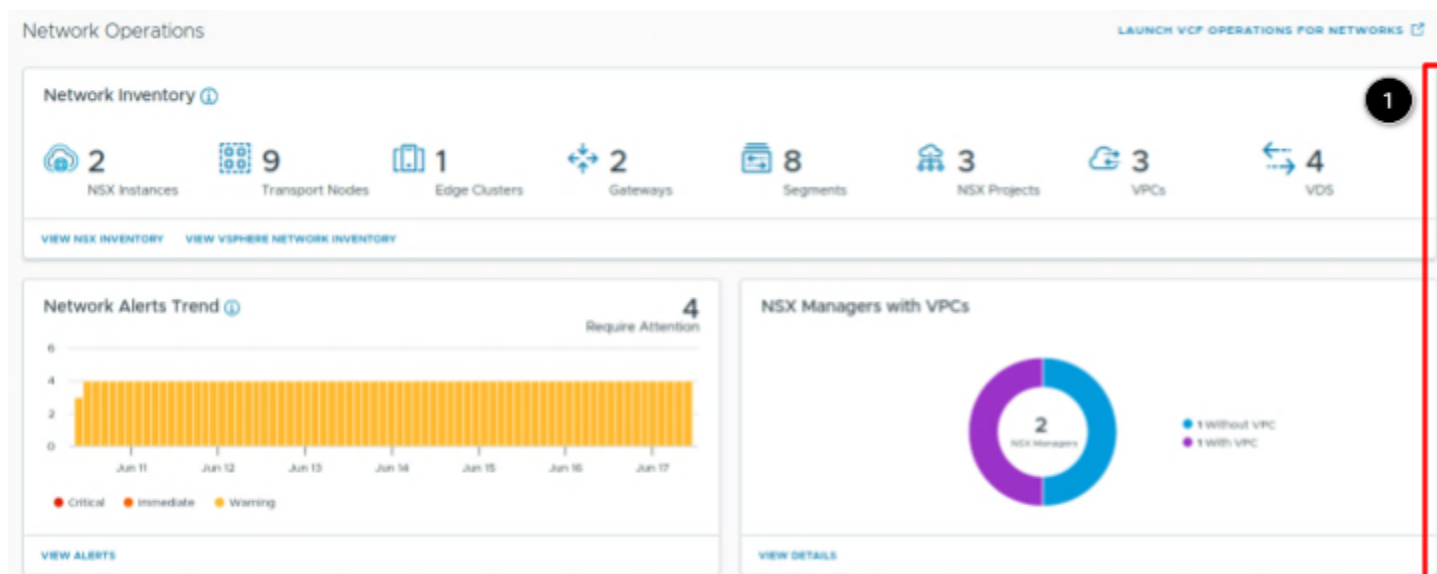
Opening The Network Operations User Interface



Opening Network Operations:

1. Click the carrot to expand the **Infrastructure Operations** menu.
2. Click on **Network Operations**.

View Network Inventory



The new Networking Operations page provides at a glance, the total network inventory of an environment. Information about the number of NSX Instances, Transport Nodes, Edge Clusters, and individual Network components can quickly be viewed.

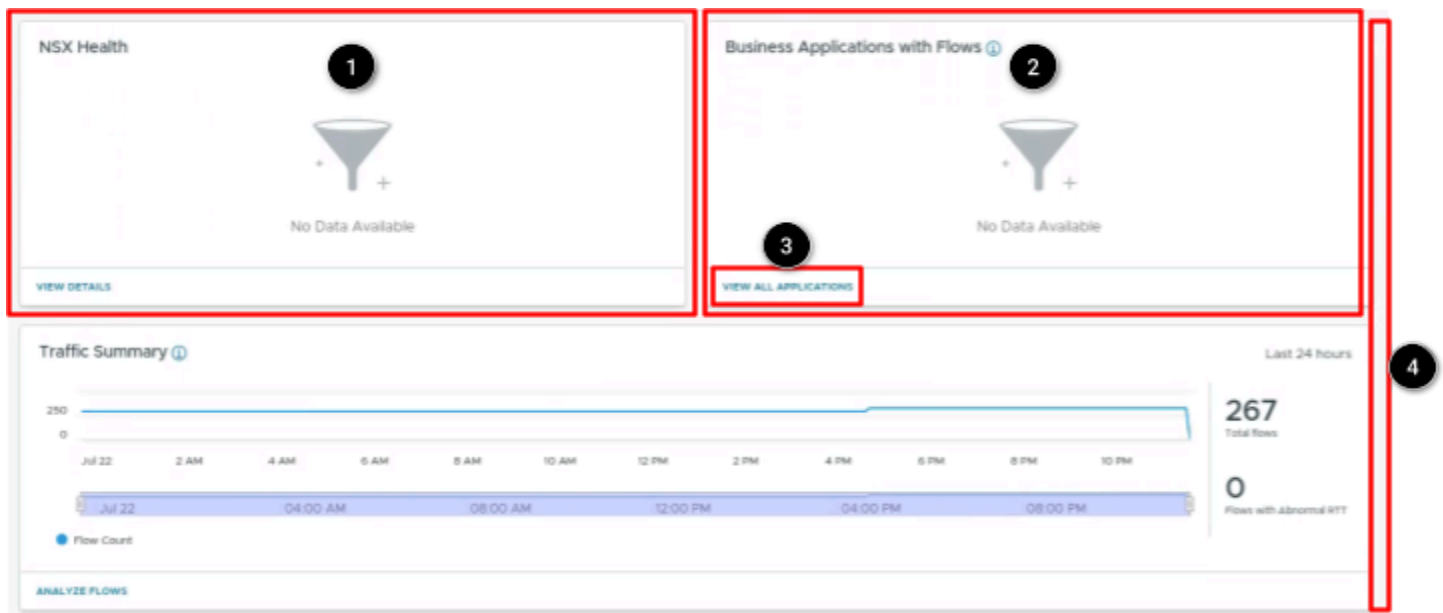
Important updates to previous inventory reports are the inclusion of the NSX Projects and VPC constructs. These play a key role in the new capabilities present in VMware Cloud Foundation.

Further information includes the alert trending with an indication of which alerts require attention and a representation of which NSX Managers have VPC's.

Let's scroll down to view what other information is presented on our landing page.

1. **Scroll down** to view additional information.

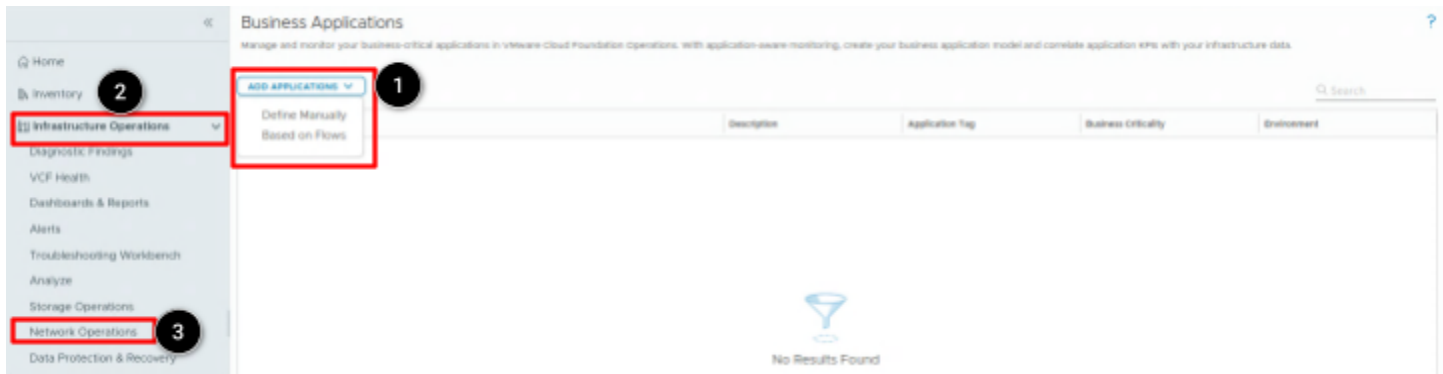
NSX Health, Business Application Flows



Here we can view information regarding our NSX environments health and our defined business applications. Let's take a quick look at these 2 widgets, we'll return to Traffic Summary and Analyze flows later.

1. In the current version of the software used in this lab, the NSX Health widget only populates when there are problems with the NSX components. In an upcoming release, this widget will be modified to indicate the overall health, positive and negative of your NSX environment.
2. Business Applications with Flows is currently not populated, and this is because as part of this lab we do not have Applications defined. We'll briefly look at how they are defined but not spend too much time as it is outside the scope of this lab and module.
3. **Click on View All Applications.**

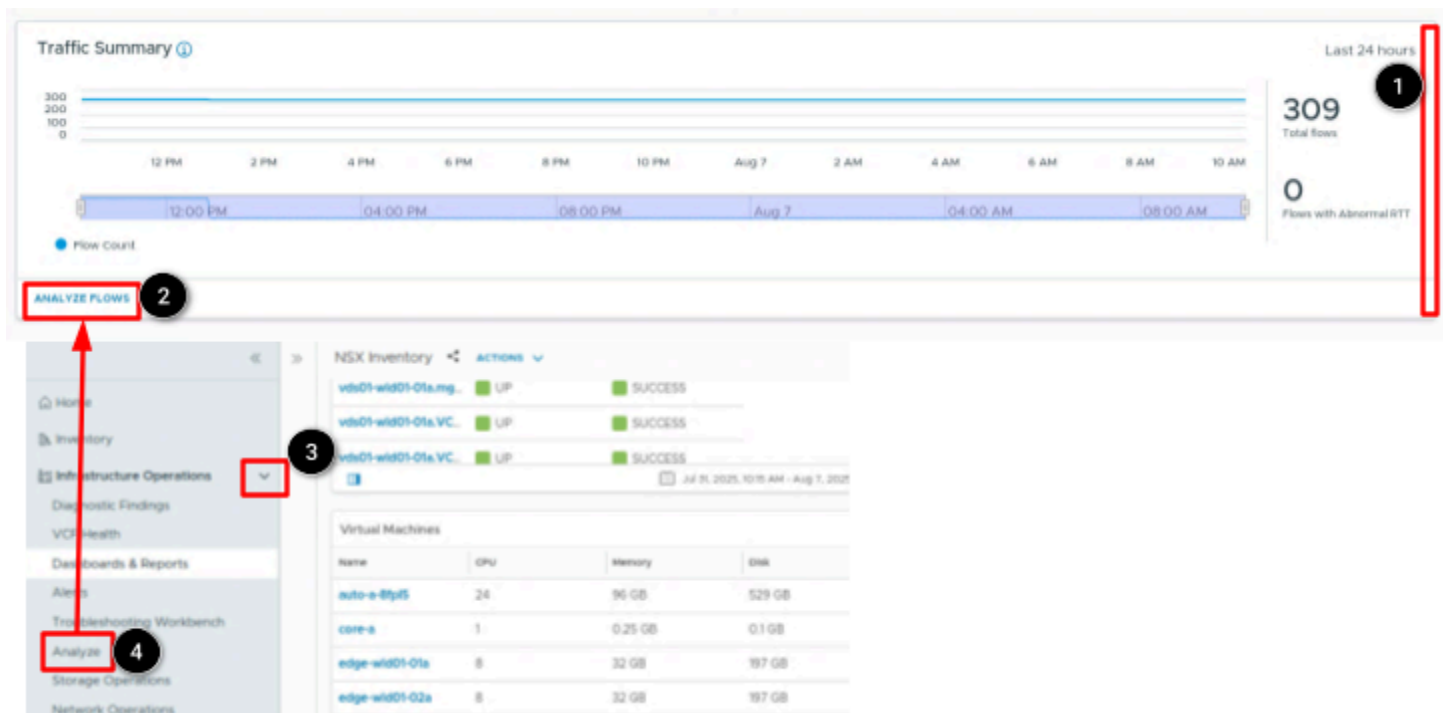
Creating Business Applications



We will spend just a few minutes here as this is outside the scope of the module but it's important to see where these business applications are created.

1. **Click Add Application** and notice we have 2 options
 - a. **Define Manually** - This process allows a user to drag and drop objects into an application definition blueprint
 - b. **Based on Flows** - This process uses the Flow Based Application Function of Cloud Foundation Network Operations to dynamically discover applications by monitoring flows and building applications based on observed flows. It requires a specific deployment sizing which is outside the scope of this lab so we won't explore it here.
2. **Click on Infrastructure Operations** to expand the Menu.
3. **Click on Network Operations**.

Traffic Summary and Flow Analysis



The last widget we're going to investigate in Network Operations is flow analysis. I've combined two different methods for opening the flow analysis to illustrate that both will lead to the same location in VMware Cloud Foundation Operations. Let's pick one of the methods and proceed from there.

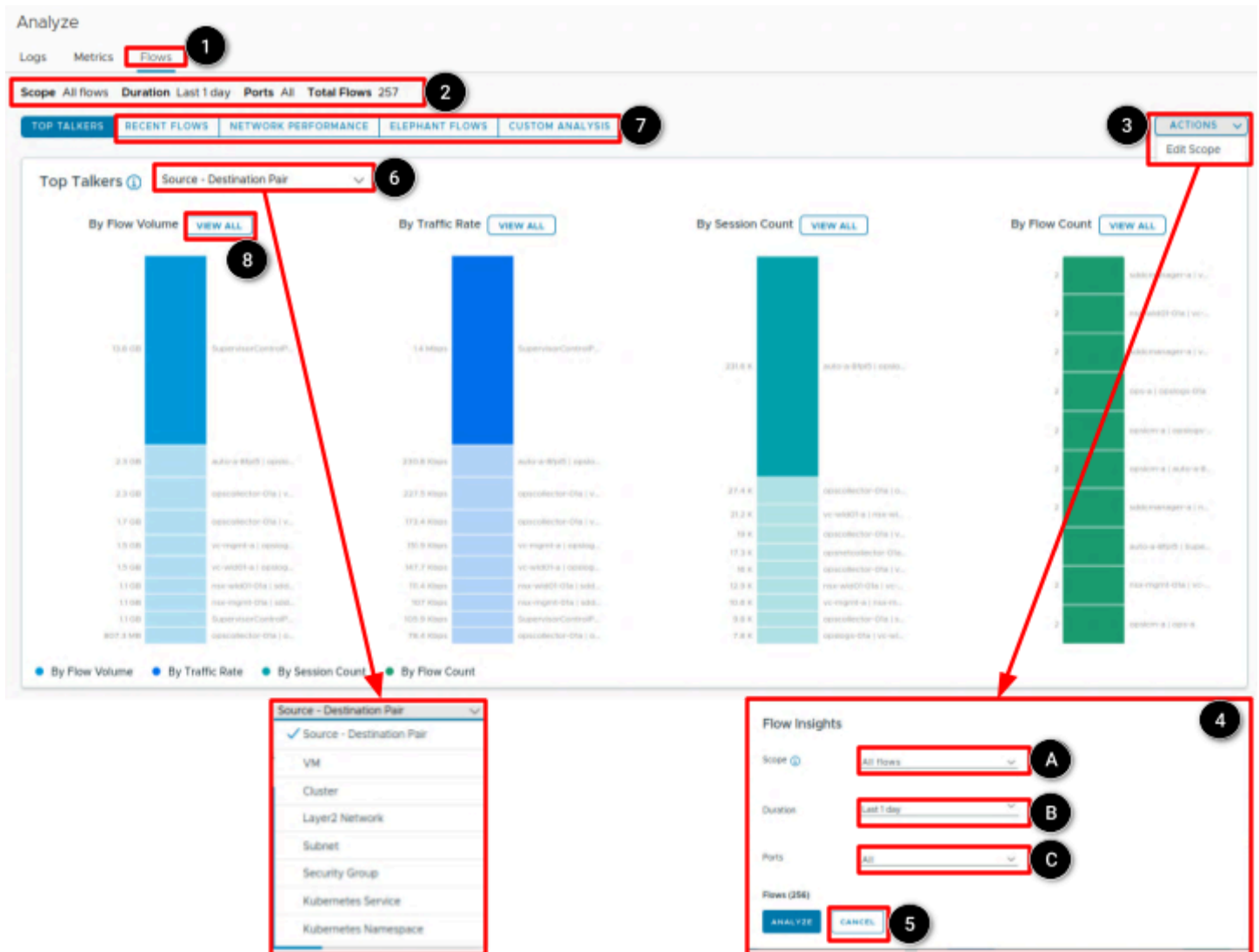
Option 1:

1. If you have returned to the **Network Operations** page, **Scroll down** to the bottom of the page.
2. **Click on Analyze Flows.**

Option 2:

3. **Click the carrot** to expand the **Infrastructure Operations Menu.**
4. **Click on Alayze.**

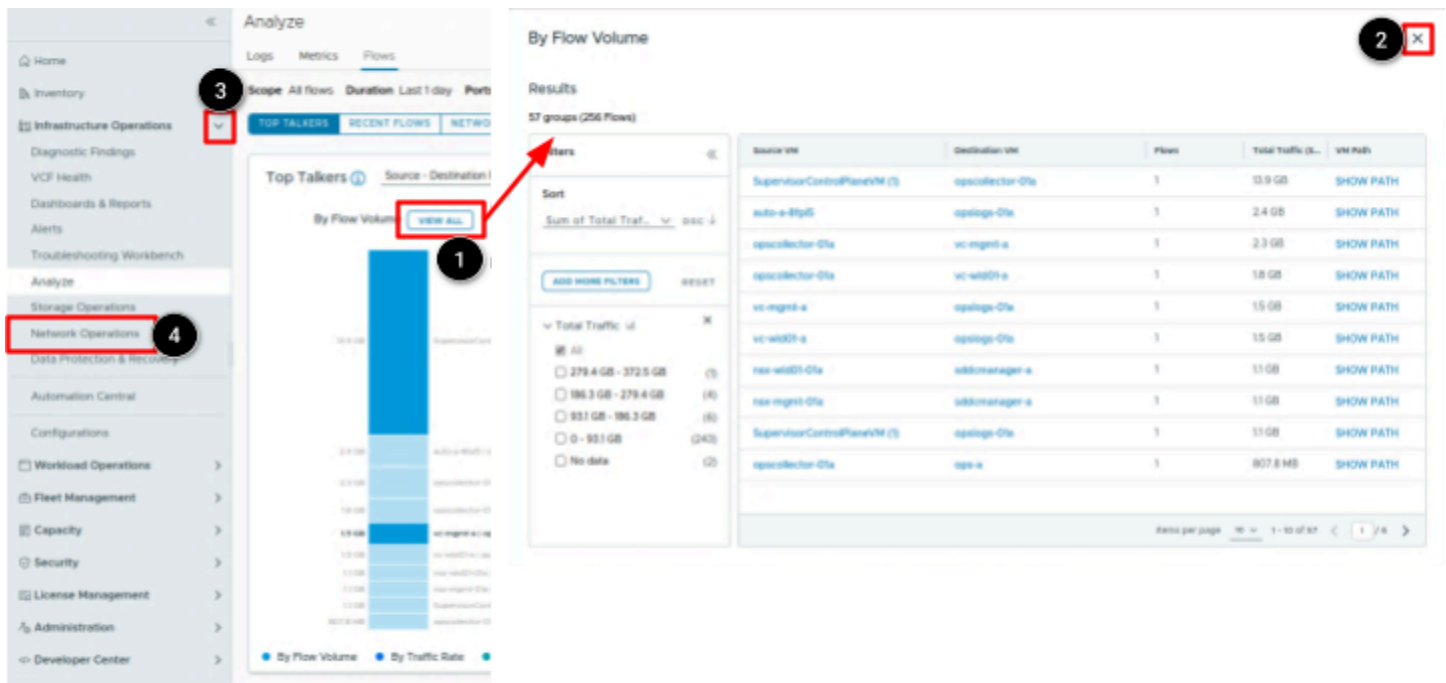
Analyze Flows - Top Talkers



The flow analysis portion is not a new feature but this is the first time it has been directly exposed in the VMware Cloud Foundation Operations user interface. Previously, to view this information you needed to launch into the vRealize Network Insight or Network Operations application. While all of the functionality has not been imported into Cloud Foundations Operations, many of the most important functions have. Let's take a look at how this functions.

1. Ensure we're looking at the Analyze flows area by **clicking Flows**.
2. Here we see the **current scope** of our analysis, this is the default listing but we can edit this.
3. **Click the drop-down** on Actions and select **Edit Scope**.
4. Here we are presented with options to change our Analysis scope
 - a. Our scope determines the flows to analyze. Feel free to click the dropdown to see our options.
 - b. The duration determines the time range for analysis. Feel free to click the dropdown to see our options.
 - c. The ports determine the Ports to analyze, by default 'All' is selected. Feel free to click the dropdown to see our options.
5. **Click Cancel**.
6. Here we have the ability to alter our Flows similar to what we did in Step 4 when we viewed the Scope. This can be done without altering the time range or ports which Step 4 required us to confirm.
7. We've viewed the Top Talkers but we have additional Analysis options including Recent Flows, Network Performance, Elephant Flows and Custom Analysis. The Small brick size deployed in this lab does not allow us to reliably display the information here so we will not investigate these options more.
8. Finally if we wish to view all the flows under a given organizational stack, in this case 'Flow Volume' we can **click View All**.

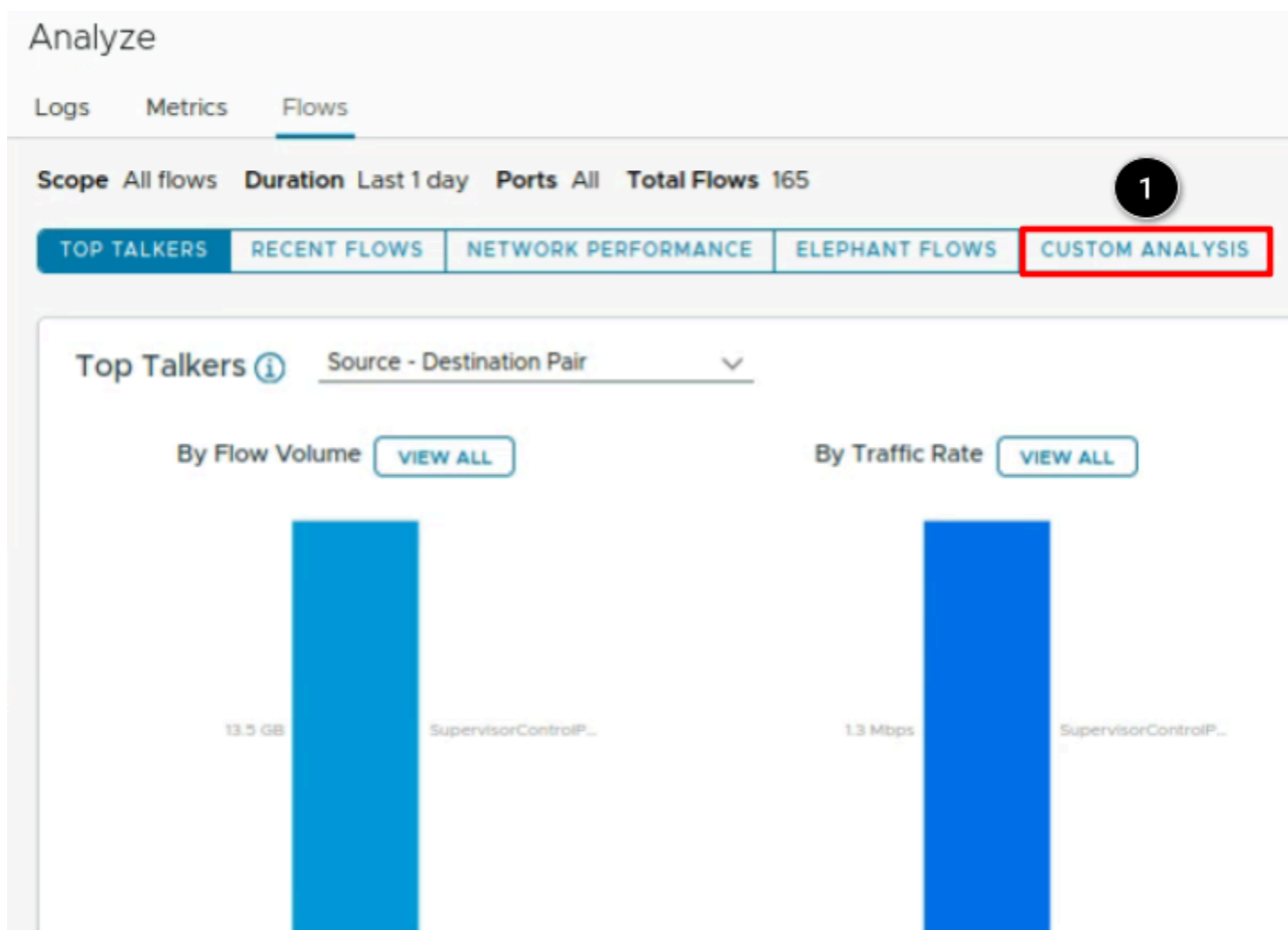
Viewing All Flows



I've combined two different screens here to help illustrate the flow of information when we wish to view all the flows under a specific category, in this case, by Flow Volume.

1. Once you've **clicked View All**, from the previous steps instructions you are presented with a larger window to explore the flows. Feel free to explore the views..
2. When ready, **Click the X**.

Custom Analysis



In VCF Operations 9, Custom Analysis in network flows empowers users to create tailored views of network traffic data. This functionality allows administrators to analyze specific scenarios by filtering and visualizing network flow metrics to identify outlier entities, enabling focused troubleshooting and performance optimization efforts.

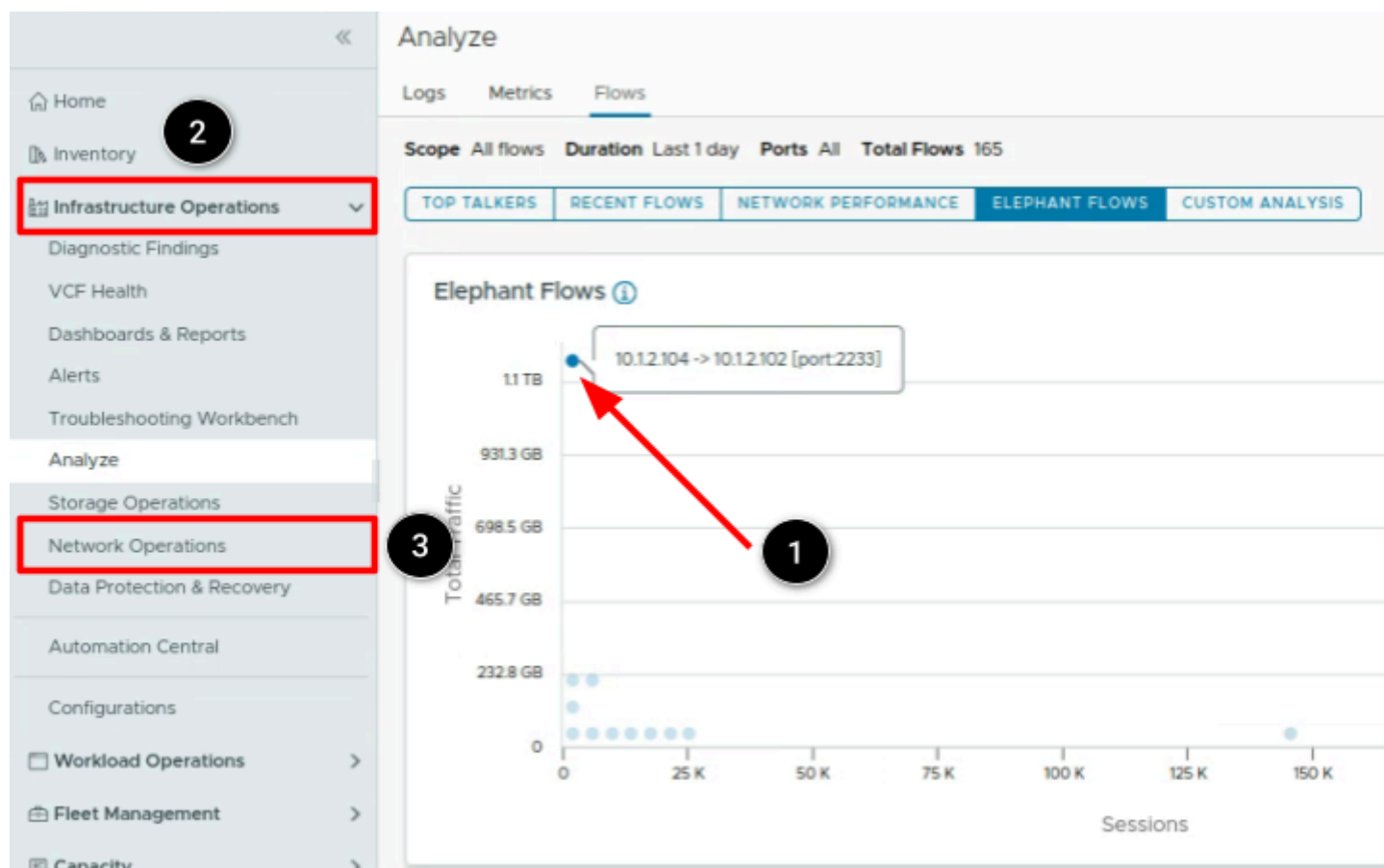
1. Click on **CUSTOM ANALYSIS**.

Identify Outlier VMs



1. Select **VM** from the list of possible **Outliers** object types.
2. Set **Based on** to **Total Traffic**.
3. And **Traffic Rate**.
4. **Hover** over the most significant **Outlier VM** to see its name, in our case in the Lab it is the VCF Operations Collector VM.
5. Click on **ELEPHANT FLOWS**.

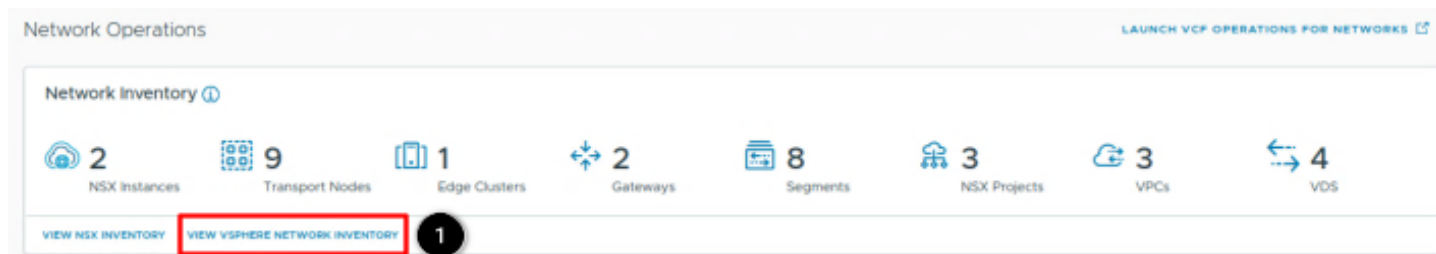
Elephant Flows



In VCF Operations 9, elephant flows are large, long-lived network connections that can significantly impact network performance and resource utilization. The network flow analysis capabilities allow administrators to identify these "elephant" flows, which might include activities like data replication or backups, that can consume disproportionate amounts of bandwidth and potentially cause issues like increased latency or packet drops for other applications.

1. **Hoover** with the mouse over the most significant Elephant Flow to see the details of that connection, like **source** and **destination IP** address and the destination **port**.
2. Expand **Infrastructure Operations**.
3. Click on **Network Operations**.

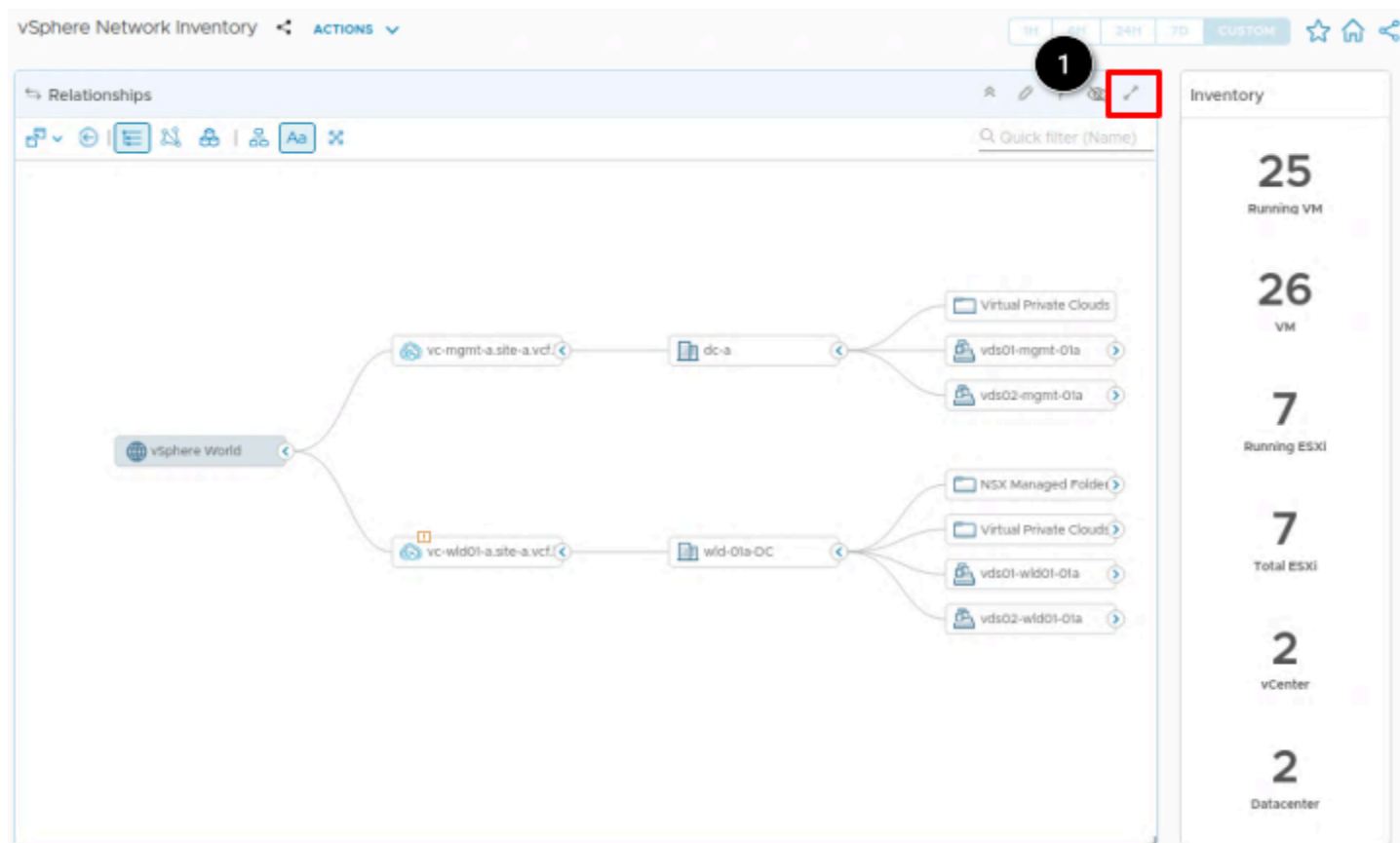
vSphere Network Inventory



VMware Cloud Foundation Operations brings together the complete network infrastructure in your on-premise cloud environment by allowing you to manage and monitor traditional vSphere networking and NSX networking. Let's click on one of the quick links from our screen here and examine the vSphere Network Inventory.

1. Click the **View vSphere Network Inventory** link.

vSphere Network Inventory

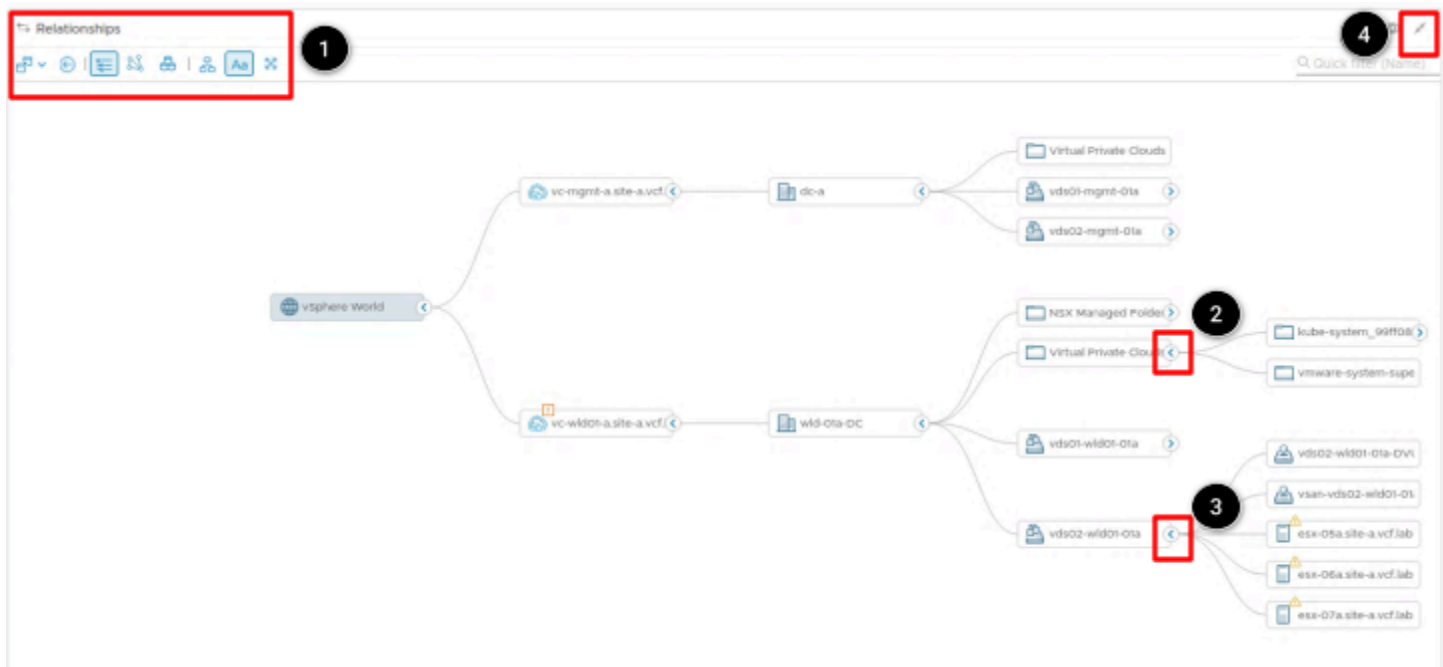


The vSphere Network Inventory dashboard is an interactive visual representation of the networking within an environment. Information presented here covers both VMware Cloud Foundation enabled environments and legacy VMware vSphere environments not yet migrated or converted to Cloud Foundation environments.

Let's expand some of the graphical representations but first, let's fully expand our view so we can see everything more clearly.

1. Click the **Maximize** button.

Changing Relationships



The current representation is a tree view of the current networking inventory in our VMware environment. There are other options that can be viewed by selecting the icons in the upper left corner of the graphical representation. While we won't explore the different views, you may explore them in your own time to find the view that best suits your needs.

Being a tree representation, expanding the carrots shows the object relationship, in this case the entities that correspond to the organizing folder or object. As we expand the parent object, we're presented with child objects we can click on for additional information, dashboards and their corresponding child objects (if any.)

1. **Examine** the **relationship** display options by hovering over each icon.
2. **Click** the **carrot** to expand the object relationship for **Virtual Private Clouds**.
3. **Click** the **carrot** to expand the object relationship for **vds02-wld01-01a**.
4. **Click** on the **Minimize** button to shrink down our display view.
5. **Scroll down** on the right hand side to see additional information (not shown).

Distributed vSwitch Inventory

Distributed vSwitches				
Name	Used Ports	No of Ports	ESXi	Capability(NIC Teaming Policy)
vds01-mgmt-01a	33	41	4	loadbalance_ip, loadbalance_srcmac, loadbalance_srcid, failover_explicit, loadbalance_loadb...
vds01-wld01-01a	25	30	3	loadbalance_ip, loadbalance_srcmac, loadbalance_srcid, failover_explicit, loadbalance_loadb...
vds02-mgmt-01a	8	8	4	loadbalance_ip, loadbalance_srcmac, loadbalance_srcid, failover_explicit, loadbalance_loadb...
vds02-wld01-01a	9	14	3	loadbalance_ip, loadbalance_srcmac, loadbalance_srcid, failover_explicit, loadbalance_loadb...

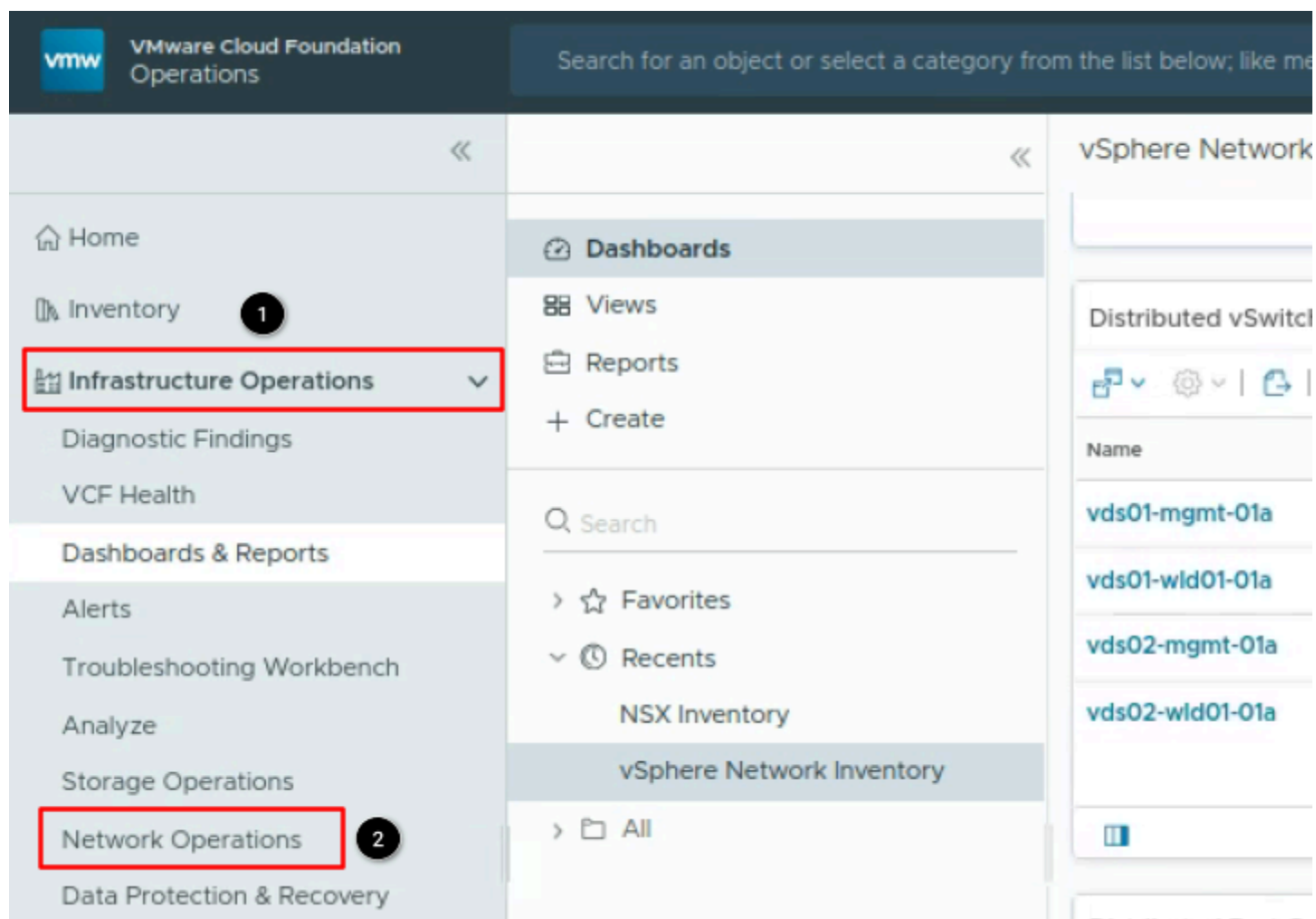
Distributed Port Groups			
Name	Active Uplinks	No of Ports	Used Ports
cluster-mgmt-01a-D...	-	8	8
cluster-mgmt-01a-D...	-	8	8
kubernetes-cluster-1...	-	2	2
mgmt-vds01-mgmt-...	uplink2, uplink1	8	8
mgmt-vds01-wld01-...	uplink2, uplink1	5	5
mgmt-vds01-wld01-...	uplink2, uplink1	2	2
VCF-edge_edgecl-w...	uplink1	2	2

Properties of selected Port Group	
VLAN Override Allowed?:	false
Block Override Allowed?:	false
Live Port Moving Allowed?:	false
Netflow Override Allowed?:	false
Resource Pool Moving Override Allowed?:	false
Port Config Reset at Disconnect:	false
Security Override Allowed?:	false
Shaping Override Allowed?:	false
Uplink Teaming Override Allowed?:	false

Here we see the distributed virtual switches and their corresponding configuration, number of connected ports and ESXi hosts. While this is not new data, its location has been centralized and updated to be easier to locate when working with Network Operations.

1. **DO NOT CLICK** on the blue highlighted name of a Distributed Port Group, instead **click** somewhere in the **row** of one of the Distributed Port Groups to see the properties of the selected Port Group.

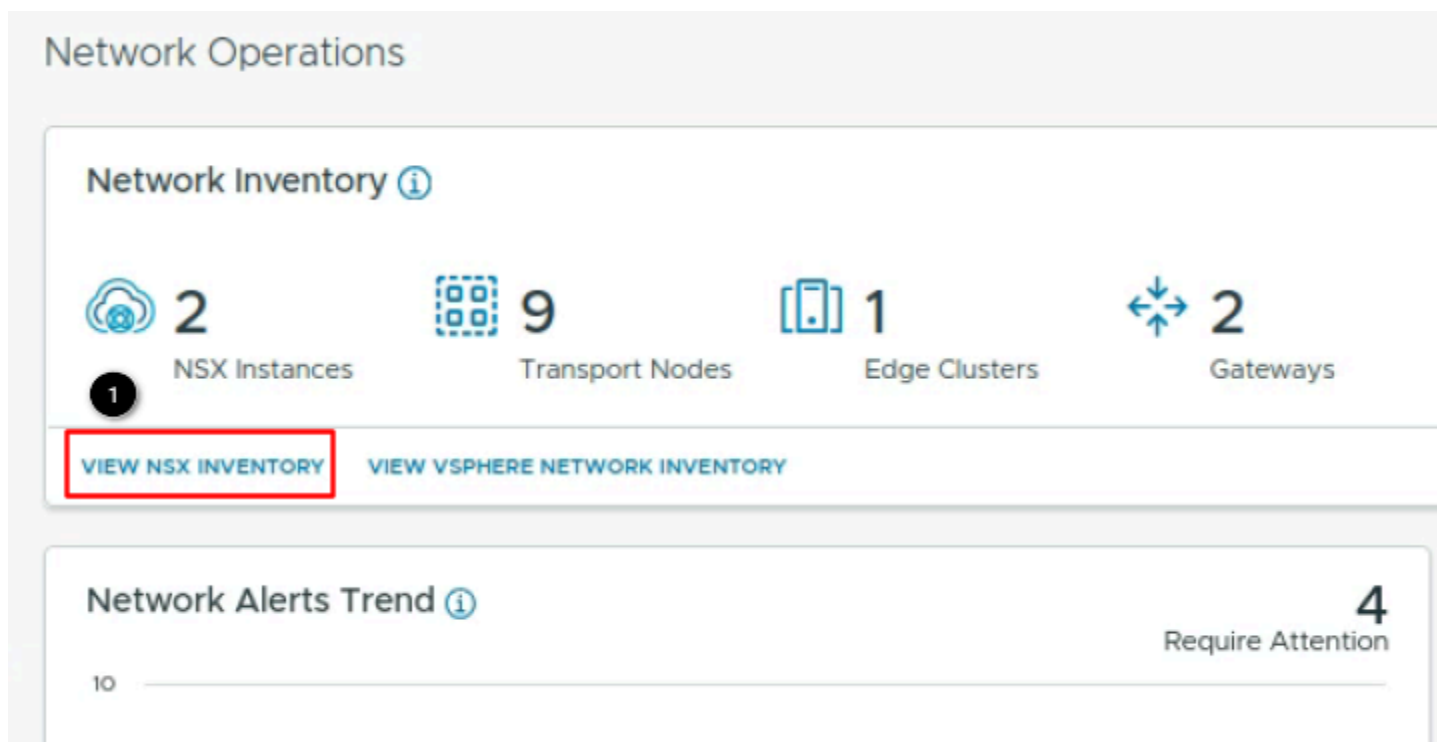
Back to Network Operations



Now that we've briefly explored the vSphere networking, let's return to our Network operations section and take a look at the NSX Inventory area.

1. If not still visible, **expand** the **Infrastructure Operations** menu.
2. Click on **Network Operations**.

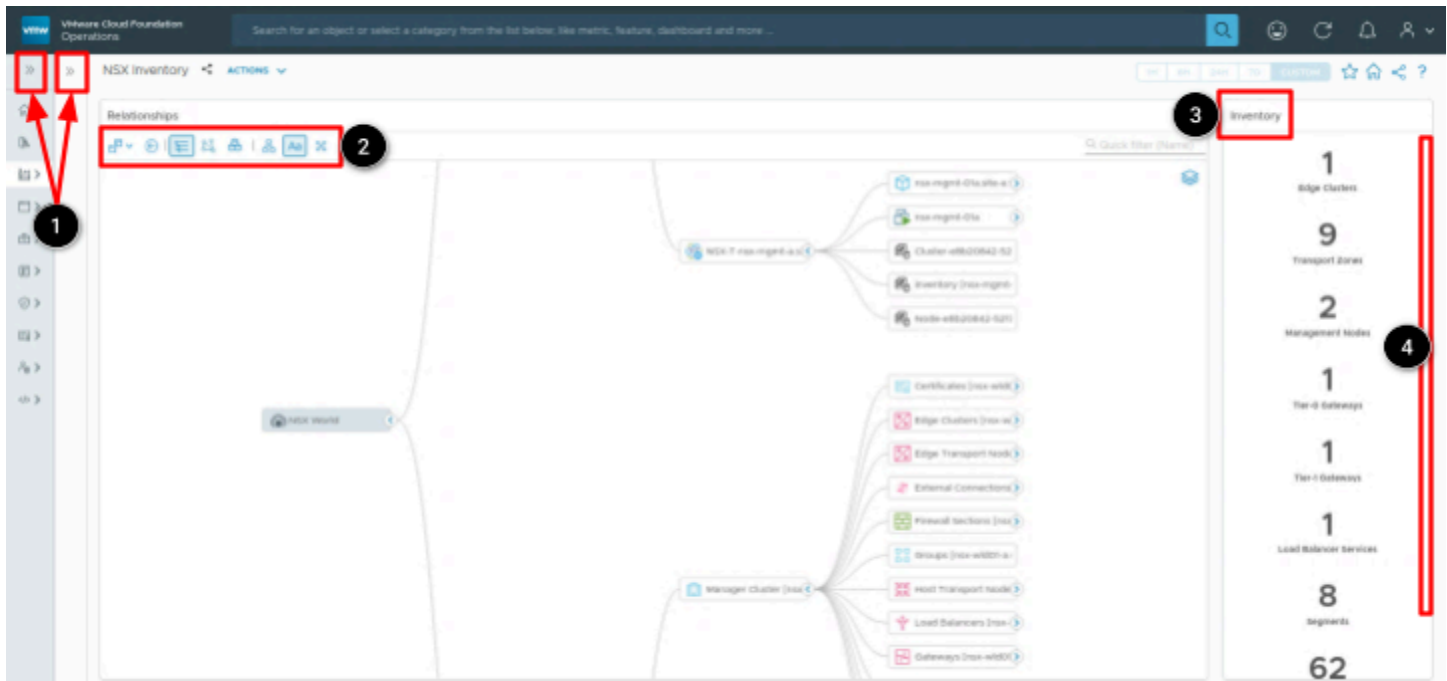
NSX Inventory



As in the previous section with vSphere Inventory, we're now going to examine the NSX Inventory in our environment.

1. Click on **VIEW NSX INVENTORY**.

View NSX Inventory



VMware Cloud Foundation Operations presents us with a relationship map consisting of all the NSX components in our lab environment. This map is interactable allowing us to zoom in and out on objects gathering information. Let's examine some of the components on our screen and explain what they are.

1. To give us maximum visibility, **click** on the **double carrot** to shrink the left two panes.
2. The relationship map has controls that let us change how information is displayed, from Left to Right the controls are:
 - a. Dashboard Navigation - allows the user to change to different dashboards (disabled for our lab)
 - b. Back to Initial Object - resets view back to the Root object
 - c. View Tree - Display Objects and Information in a Tree format
 - d. View Graph - Display Objects and Information in a graph format
 - e. Applications - Display Applications (if created)
 - f. Vertical/Horizontal - Changes the display orientation
 - g. Show Text - Changes the display of the object Text (name, object type, etc) to enabled or disabled
 - h. Fit to View - fits the view to your screen size
3. The current NSX Inventory is displayed broken down by object type.
4. Scroll Bar (depending on screen size) to view additional Inventory objects

NSX Managers and Gateways

The screenshot displays the NSX Inventory interface with several numbered callouts (1-5) and red boxes highlighting specific elements:

- 1:** A red box highlights the double-carrot icon in the Relationships window header, used to minimize the window.
- 2:** A red box highlights the double-carrot icon in the Inventory window header, used to minimize the window.
- 3:** A red box highlights the 'NSX Management Nodes' widget title.
- 4:** A red box highlights the 'NSX Tier 0 Gateways' widget title.
- 5:** A red box highlights the 'NSX Tier 1 Gateways' widget title.

The 'NSX Management Nodes' table shows the following data:

Name	Management Plane Connectivity Status	Node Version	UP Time
nsx-mgmt-01a.site-a.vcf.lab	CONNECTED	9.0.0.0.24733065	3.9 Day(s)
nsx-wid01-01a.site-a.vcf.lab	CONNECTED	9.0.0.0.24733065	3.9 Day(s)

The 'NSX Tier 0 Gateways' table shows the following data:

Name	Load Balancer Service Ena...	L2VPN Enabled	IPSEC VPN Enabled	DNS Enabled
T0-wid-a	false	true	false	false

The 'NSX Tier 1 Gateways' table shows the following data:

Name	Firewall Enabled	Firewall Rule Count Size	Load Balancer Enabled	Load Balancers Count
T1-wid-a	false	1	false	0

The NSX Inventory screen provides a plethora of information that we could spend hours enumerating so we will try and keep things at a high level as we work through the widgets. One important note is that should you wish to explore any of the individual widgets or inventory listings feel free to.

1. Minimize the Relationships window by clicking the double carrot.
2. Minimize the Inventory window by clicking the double carrot.
3. NSX Management Nodes - Here we see information regarding the NSX Manager nodes in our lab. Information includes the management plane connectivity status, software version and the uptime of the nodes.
4. T0 Gateway information is displayed including the name, utilized features and status. Use the below scroll bar to view all the current noted updates regarding the T0 in our lab
5. T1 Gateway information is displayed including the name, utilized features and status. Use the below scroll bar to view all the current noted updates regarding the T1 in our lab

NSX Load Balancers, Edge Clusters and Transport Zones

The screenshot displays five widgets from the VMware NSX Inventory interface, each with a red box and a circled number:

- 1**: A red vertical line on the right side of the image.
- 2**: **NSX Load Balancer Services** widget showing a table with columns 'Name' and 'LB Service Operational S...'. It lists 'clusterip-7a53b667...' with a green 'UP' status.
- 3**: **NSX Load Balancer Virtual Servers** widget showing a table with columns 'Name' and 'LB Virtual Server Operati...'. It lists several virtual servers like 'capi-controller-man...', 'capi-kubeadm-boot...', 'capi-kubeadm-contr...', and 'capi-webhook-servi...' all with green 'UP' status.
- 4**: **NSX Load Balancer Pools** widget showing a table with columns 'Name' and 'Load Balancer Pool Status'. It lists 'capi-controller-man...' with a green 'UP' status.
- 5**: **NSX Edge Clusters** widget showing a table with columns 'Name', 'Edge Node Count', 'Cluster Member Type', 'Protection', and 'System Owned'. It lists 'edgecl-wid-a' with 2 edge nodes, type 'EDGE_NODE', protection 'NOT_PROTECTED', and system owned 'FALSE'.
- 6**: **NSX Transport Zones** widget showing a table with columns 'Name', 'Created User', and 'Created Time'. It lists several transport zones like 'nsx-overlay-transpo...', 'nsx-vlan-transportz...', and 'nsx-vlan-tz.security1...'.

Continuing our exploration of the VMware NSX Inventory, Scrolling down to the next set of widgets we see information pertaining to the NSX Load Balancer, NSX Edge Clusters and NSX Transport Zones. One important note is that the NSX Load Balancer referenced here is **NOT** the NSX Advanced Load Balancer, or AVI depending on how you know it. These are the 'legacy' load balancers deployed and managed and controlled by NSX directly.

As before, should you wish to explore any of the individual widgets or inventory listings feel free to.

1. Scroll down until you see the NSX Load Balancer Services widget as pictured above
2. As NSX can host multiple Load Balancer services across multi T1's, the status of each is indicated here
3. The status of the NSX Load Balancer Virtual Servers is displayed allowing for quick viewing of the state of your Virtual Servers
4. The status of the NSX Load Balancer Pools are displayed allowing for quick viewing of the state of your pools.
5. The status of the NSX Edge Clusters are displayed allowing for quick viewing of the state of your Edge Clusters
6. Finally we have the NSX Transport Zones without our cloud environment, while the information presented here is limited, you can click through any transport zone to find more information

NSX Edge and Host Transport Nodes and NSX Segments

The screenshot displays the NSX Inventory interface with three main widgets:

- NSX Edge Transport Nodes (2):** A table listing edge nodes with columns for Name, Management Connectivity, Controller Connectivity, and Host Node Deployment Status. Two nodes are shown, both with 'UP' status and 'NODE_READY' deployment status.
- NSX Host Transport Nodes (3):** A table listing host nodes with columns for Name, Management Connectivity, Controller Connectivity, and Host Node Deployment Status. Seven nodes are shown, all with 'UP' status and 'INSTALL_SUCCESSFUL' deployment status.
- NSX Segments (4):** A table listing network segments with columns for Name, Admin State, and Switch State. Six segments are shown, all with 'UP' admin state and 'SUCCESS' switch state.

The NSX Groups widget on the right shows a message: "The view cannot be rendered for the specified Object."

The status of our NSX host and edge transport nodes can be of critical importance when troubleshooting connectivity problems. Verifying that Hosts and Edges have management and controller connectivity is an important first step. Pairing this with NSX segments and their switch state gives administrators a quick view into the health of their NSX environment.

As before, should you wish to explore any of the individual widgets or inventory listings feel free to.

1. Scroll down until you see NSX and Host Transport Nodes and NSX Segments
2. Explore the NSX Edge Transport Nodes and the display of each nodes status
3. Explore the NSX Host Transport Nodes and the display of each nodes status
4. Explore the NSX Segments and the information that is displayed for each segment

Note We do not have any NSX group created in the lab, but you may create some sample groups to see how the information is displayed in the NSX Groups window pictured above.

Virtual Machines and Firewalls

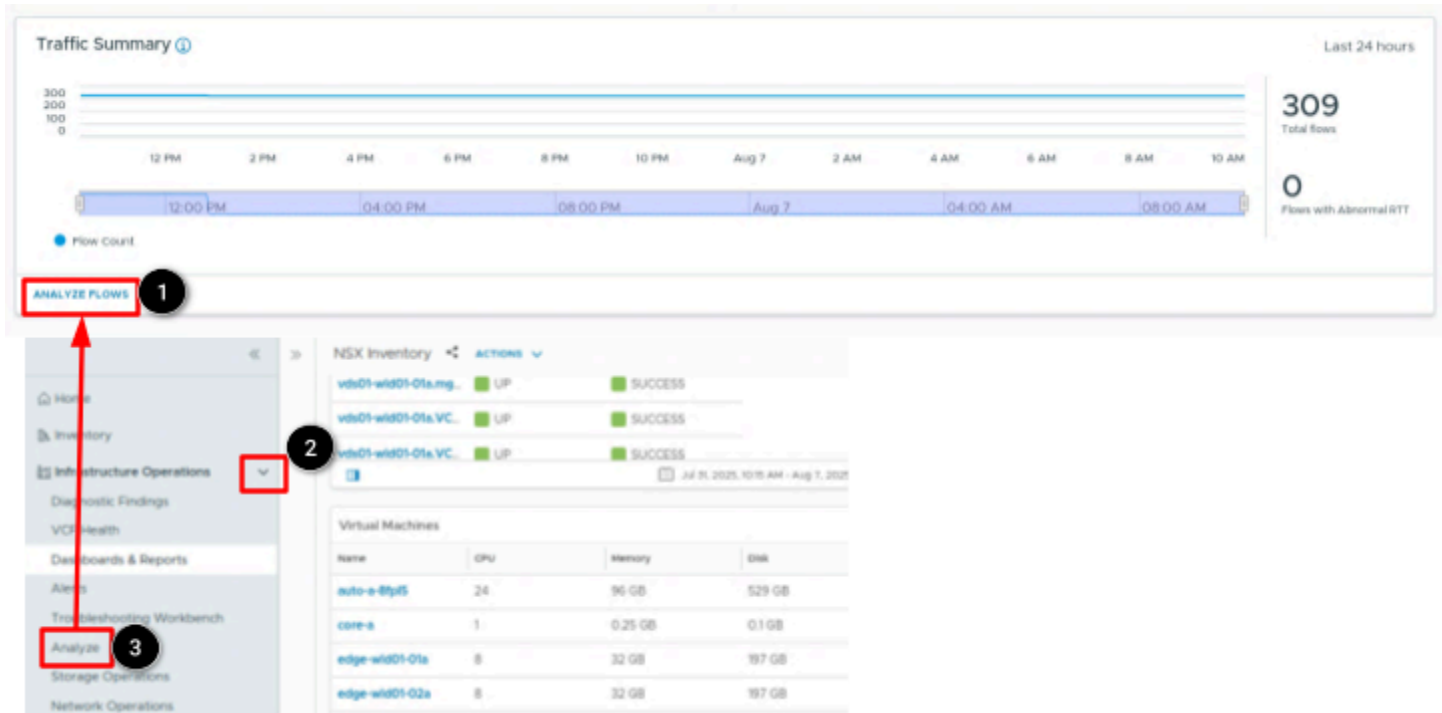
Name	CPU	Memory	Disk	Guest OS from Tools	Guest OS from vCenter	SDM	VMEK	Creation Date	HW Version
hol-snapshot-001	1	4 GB	40 GB	Ubuntu	Ubuntu Linux (64-bit)	0	1	June 9, 2025 at 6:25...	vmx-22
offn-01a	4	12 GB	186 GB	VMware Photon OS ...	VMware Photon OS ...	0	4	June 14, 2025 at 4:0...	vmx-13

Name	Firewall Rule Count	Firewall Stateful
Policy_Default_Intra-tier0-12d56669-12c...	1	true
Policy_Default_Intra-tier1-3493609f-2844...	1	true

Name	Firewall Rules Count	Firewall Stateful
Default Layer2 Section	1	false
Default Layer2 Section	1	false
Default Layer3 Section	3	true
Default Layer3 Section	3	true
Default Malicious IP Block Rules	2	true
Default Malicious IP Block Rules	2	true

Finally we come to what could be one of the most important areas of the Inventory, the state and configuration of Virtual Machines, Gateway firewall policies and NSX Firewall security policies. This information can be viewed in greater detail by clicking through each object but from a high level overview, the information provided is useful for quick reference and troubleshooting.

1. Scroll down until you see the Virtual Machine and Firewall Policies widgets
2. Explore the information provided about each Virtual Machine in the NSX environment
3. View the gateway firewall policies and if they are stateful or stateless as well as the number of rules under the policy
4. View the Firewall policy (DFW) and view their stateful or stateless configuration and the number of rules under the policy



Conclusion

The new Network Operations dashboard gives administrators a quick overview of key information for both NSX and non-NSX networks. Showing objects and health relationships as well as network flows and traffic patterns. It serves as the primary starting point for monitoring and diagnosing network-related issues. In later modules, we will enable business applications with flows and network traffic summaries as well as overall NSX health summaries.

From here you can:

- Take this quick survey to provide feedback about your experience with VCF 9.0
- Continue with the next lab module.
- Click [vlp:table-of-contents]Show Table of Contents] to jump to any module or lesson in this lab.
- End your lab and return in the future.

Module 2 - Monitor, Discover, and Analyze Storage (30 minutes) Intermediate

Monitor, discover, and analyze the storage in your VMware Cloud Foundation environment using the new Storage Operations functions. Providing a high level overview of the health and performance of your storage environment, Storage Operations brings the modern private cloud storage system into VMware Cloud Foundation.

In this module we will examine the new integrations between VMware Cloud Foundation Operations and Storage Operations and how users and administrators can interact with the new systems.

Login to VCF Operations

In the following few pages, we will walk through the process for logging in to VCF Operations.

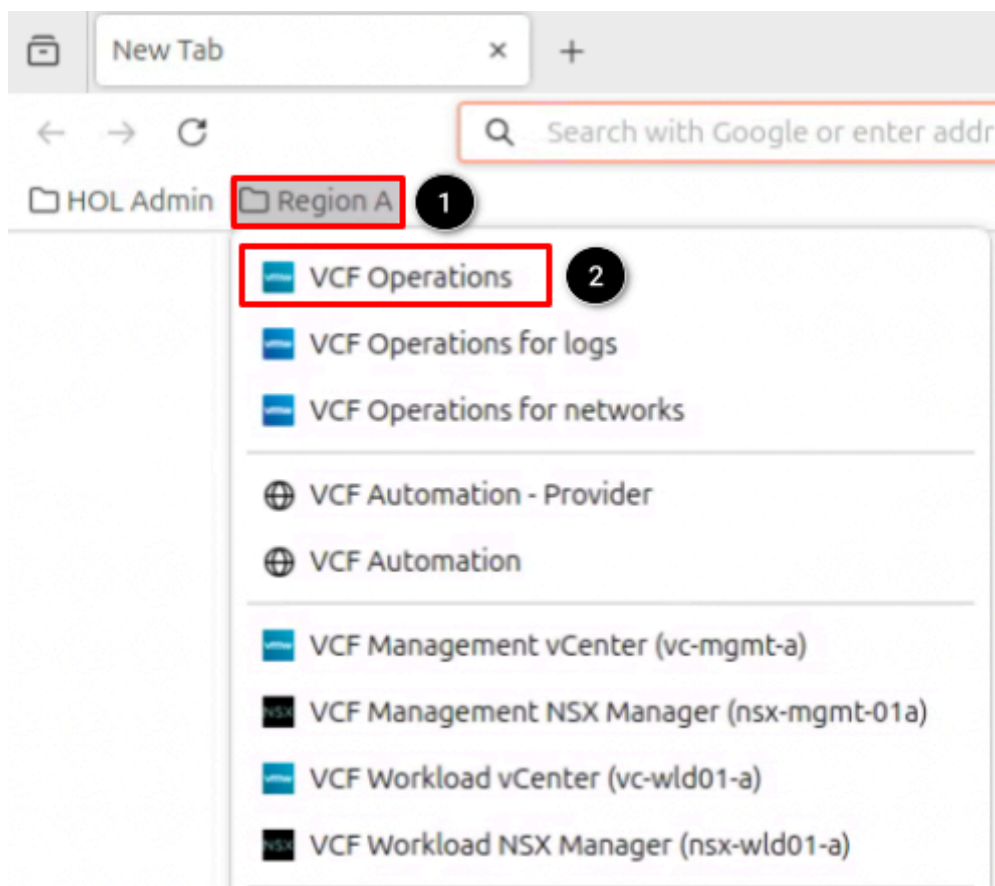
Start Firefox



Open the Firefox Browser from the Linux Task Bar.

2. Click on the Firefox icon to open the browser.

Open VCF Operations Console



Once Firefox has loaded:

3. Click on the **Region A** bookmark folder.
4. Click **VCF Operations**.

Login to VCF Operations Console

VMware Cloud Foundation Operations™

Login Method *
 1

Username *
 2

Password *
 3

4

The credentials for **admin** should already be cached in the browser window.

At the VCF Operations login prompt, select the login method and type in the following user and password information:

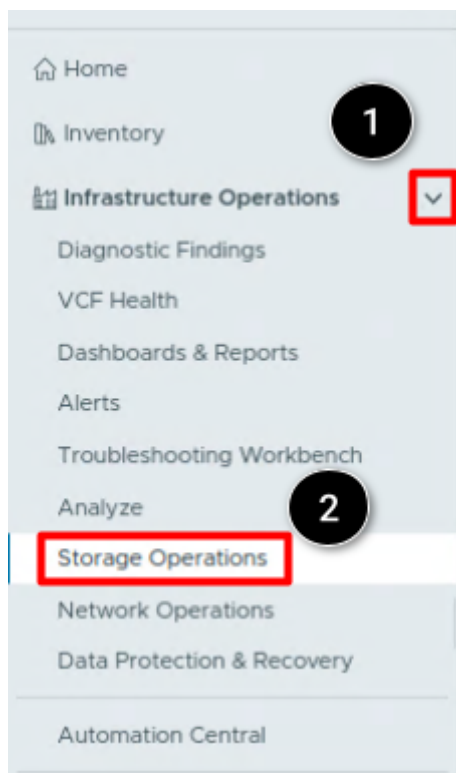
5. At the Login Method dropdown, select **Local Account**.
6. At the username field, type **admin**.
7. At the password field, type **VMware123!VMware123!**
8. Click **LOG IN**.

Introduction to the VCF Operations Storage

In VMware Cloud Foundation 9 the health, performance and monitoring of your storage can be done under the Storage operations section within infrastructure Operations. From here, administrators are able to quickly identify potential problems within their environments.

Let's take a look.

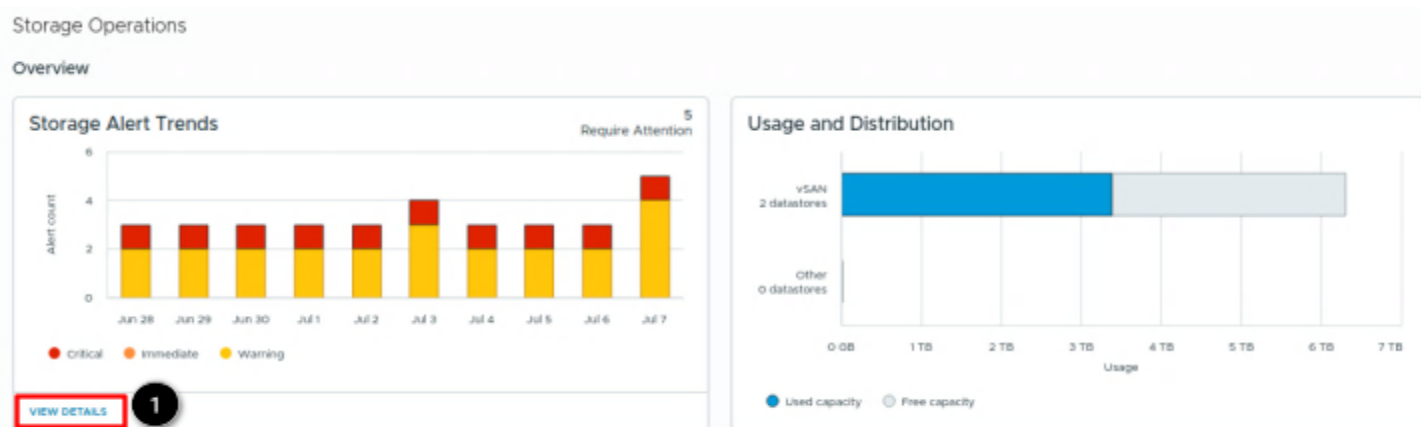
Opening The Storage Operations User Interface.



Accessing the Storage Operations menu is a simple task with VMware Cloud Foundation Operations

1. Click on the **Carrot** to expand **Infrastructure operations**.
2. Click on **Storage Operations**.

Exploring the Storage Operations Interface



We'll start by exploring the Storage Alert Trends and the Usage Distribution graph but let's quickly examine the Usage and Distribution graph first.

In this image, we can clearly see information pertaining to both vSAN and non-vSAN storage broken down by datastore. Rather than break out individual datastores, the data is summarized up to provide utilized and free capacity.

Let's next focus on the Storage Alert Trends and its summary of alerts in your storage environment. Alerts are broken down by category (Critical, Immediate and Warning) and sorted by the last 10 days. Hovering over any of the colored bars indicates the number of each type of alert on a particular day. Let's explore a bit more of these alerts by clicking on the view details section.

1. Click on **View Details**.

Exploring Storage Alerts

The screenshot displays the 'All Alerts' section in the VMware vSphere interface. The 'Intelligent Alerts' tab is selected, indicated by a red box and a circled '3'. A filter is applied, showing 'Alert Type: Storage Status: Active', highlighted with a red box and a circled '2'. In the left-hand alert list, the first alert, 'After one additional host failure, vSAN...', is selected, marked with a red box and a circled '1'. The main panel shows the details for this alert, including its description, start and update times, and a recommendation to consult VMware KB 2108743. The alert basis is identified as 'vSAN Cluster', and the symptoms section notes a critical error related to vSAN component limits and disk space.

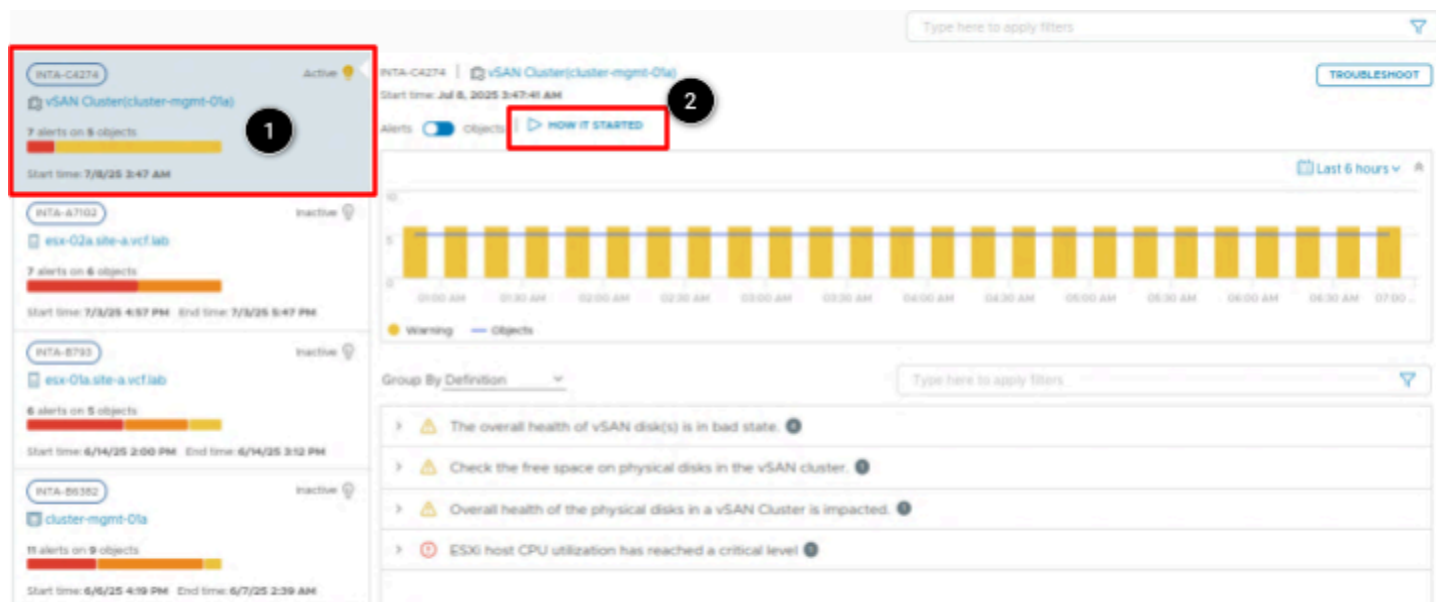
We've now left the Storage Operations area of VMware Cloud Foundation Operations and landed in the alerts section of VCF Operations. While not covered as part of this lab, we'll briefly go over what we can see here before returning to Storage Operations.

In this **Alerts** tab, we can see that a filter ("**Alert Type**":Storage Status:Active) was automatically applied for storage alerts that are currently active. These alerts correspond to alert counts we saw on the previous screen but here you have the ability to click on each to locate more information and possible remediation steps.

Let's take a look at the Intelligent Alerts next.

1. **Select** one of the active **alerts** to inspect the alert details.
2. In the filter you can see the automatically applied "**Alert Type**":Storage Status:Active statement.
3. **Click** on **Intelligent Alerts**.

Exploring Intelligent Alerts



Intelligent alerts are a new feature that we'll explore in other labs and modules but let's take a quick look. From here we can view active and past alerts and get a sense for the sequence of events that occurred with our alerts. Oftentimes a series of alerts are triggered by previous events, this helps visualize the timeline which greatly eases operations determining what happened. Let's take a quick look at a storage example.

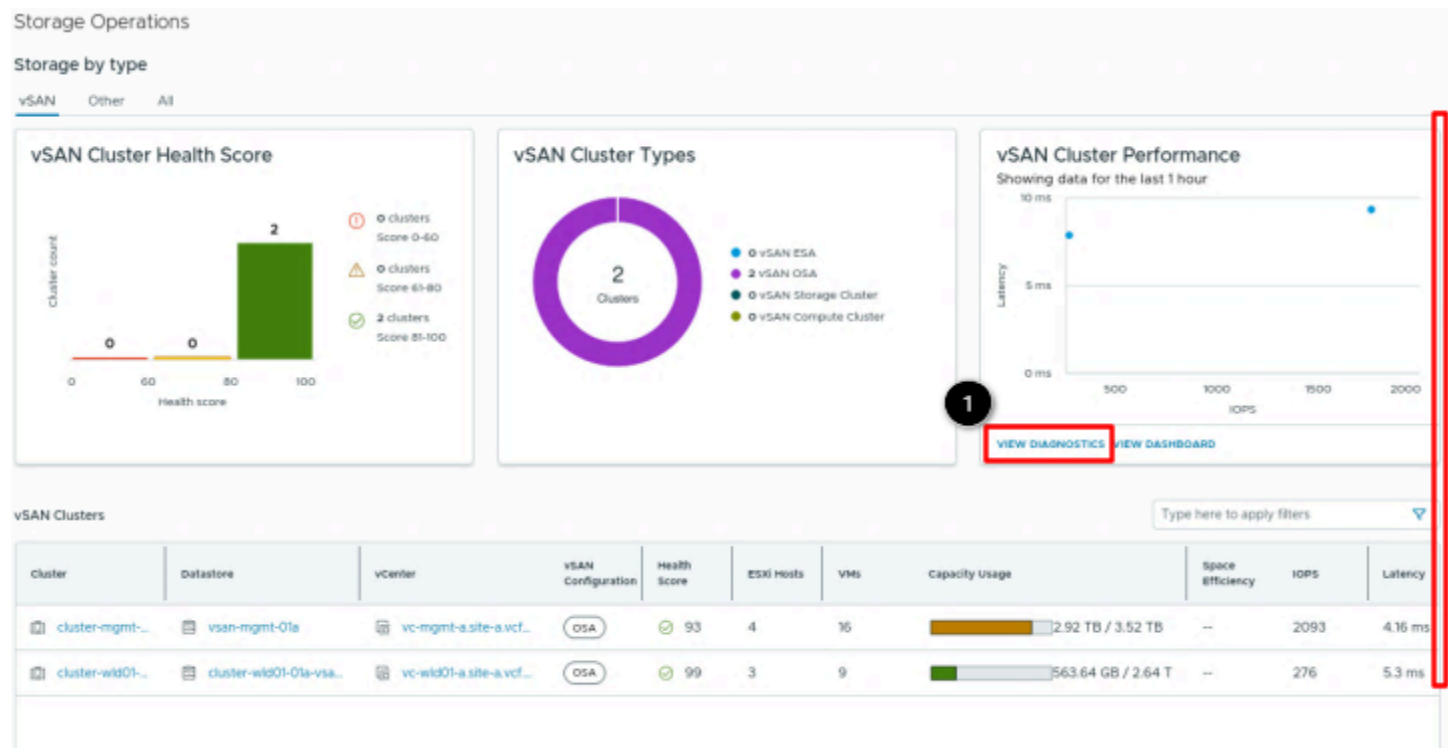
1. **Click** on the active alert for our **vSAN cluster** (please note that the screenshot might differ from what you see in the lab).
2. **Click** on the **How It Started** tab.

Navigate Back to Storage Operations

The screenshot displays the VMware Cloud Foundation Operations interface. On the left sidebar, the 'Infrastructure Operations' menu item is highlighted with a red box and a circled '1'. Below it, the 'Storage Operations' menu item is also highlighted with a red box and a circled '2'. The main content area shows the 'All Alerts' section with tabs for 'Alerts', 'Administrative Alerts', and 'Intelligent Alerts'. An alert for 'vSAN Cluster(cluster-mgmt-01a)' is visible, showing '7 alerts on 5 objects' and a progress bar. The alert is labeled 'INTA-C7311' and 'Active'.

1. If not still visible, expand the **Infrastructure Operations** menu.
2. Click on **Storage Operations**.

Continue Exploring Storage Operations.



Once you have returned to the Storage operations, we need to scroll down to view the remaining portions of our operations window. I've outlined the scroll bar for you in this picture. Scroll down until you see all the remaining data presentations as above.

Here we see several important pieces of information including a representation of our vSAN Cluster Health Score. Of importance here is that this section outlines different storage types we may have. In our lab we only have vSAN so we won't click on 'Other' or 'All' but in your environment additional storage types such as FibreChannel, NFS and iSCSI may be present.

The VMware vSAN Cluster Health Score in VCF Operations offers a quick overview of your vSAN clusters' health. It consolidates the status of various components, services, and configurations into a single score. A high score signifies a healthy cluster, while a low score indicates potential issues affecting stability, performance, or availability.

The score is calculated by evaluating numerous health checks and metrics across categories like:

- **Hardware Health:** Disk groups, controllers, and network adapters.
- **Networking Health:** Connectivity, multicast/unicast, and jumbo frame configuration.
- **vSAN Object Health:** Object compliance, accessibility, and component states.
- **Performance Metrics:** Latency, throughput, and IOPS.
- **Capacity and Utilization:** Free space and disk usage.
- **Configuration and Best Practices:** vSAN version compatibility, consistent drivers/firmware, and time synchronization.

Failed or warning health checks negatively impact the score. This dynamic score updates in real-time; a decrease triggers alerts, allowing administrators to diagnose and resolve issues to improve the score.

Next to that we have a representation of the vSAN cluster types giving us information about the number of ESA and OSA clusters as well as vSAN storage and compute clusters.

Next we have a graph showing the performance of our vSAN clusters with measurements for both Latency and IOPS. We'll explore this

a bit more shortly but finally, we have the vSAN Cluster overview. This display on the bottom of our screen gives us much of the same information as in other areas of the dashboard but also includes Host and VM counts, Capacity usage and space efficiency when deduplication is in use.

Let's take a look at one of the newer features, the vSAN diagnostic analysis.

1. Click **View Diagnostics** under the vSAN Cluster Performance widget.

Diagnostic Benchmarks.

Run New Diagnostics

Storage Operations **3** Performance Diagnostics / Run New Diagnostics

All fields marked with * are required.

Diagnostic goal *

Benchmark goal

Select a target vSAN cluster **2**

☐ Troubleshooting (production cluster) ☒ Benchmarking and Optimizing (new cluster) **1**

Maximize IOPS **2**

Minimize latency

Maximize IOPS

Maximize throughput

Cluster	VM count	Datacenter	vCenter
cluster-mgmt-01a	16	dc-a	vc-mgmt-a.site-a.vcf.lab
cluster-wid01-01a	9	wid-01a-DC	vc-wid01-a.site-a.vcf.lab

Manage Columns

Time Range * LAST 24 HOURS 07/09/2025 07:50 - 07/10/2025 07:50

RUN NEW DIAGNOSTICS CANCEL

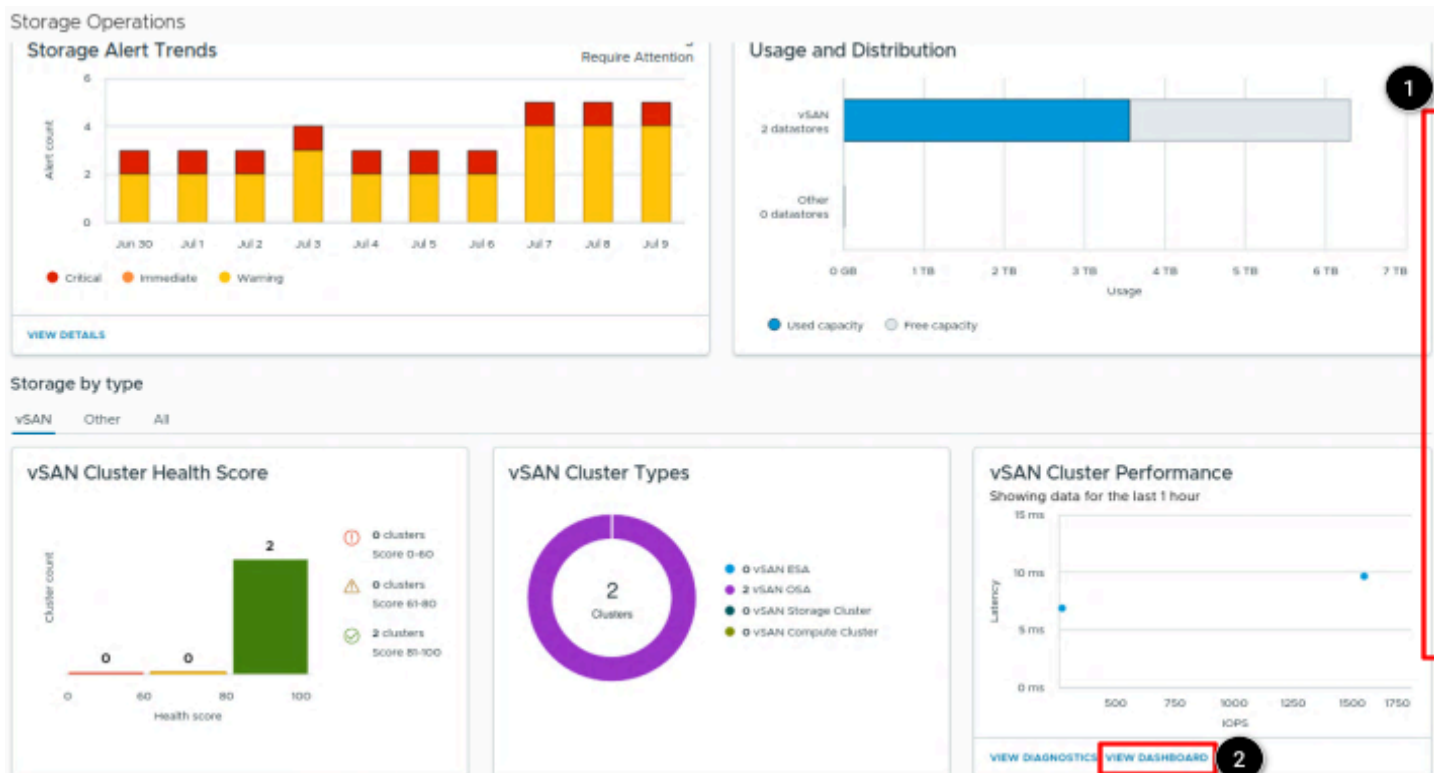
From building a new cluster and running benchmarks, to diagnosing an existing cluster the vSAN Diagnostics area can assist operators in tuning and remediating potential problems. Let's first examine what a user would do when building a new cluster and trying to optimize performance.

While we won't be performing the actual diagnostics due to the nature of this lab environment, we nonetheless can walk through the motions so you can see the different options available. Users may select different goals from Minimizing latency, Maximizing IOPs or maximizing throughput and run the benchmarks on specific vSAN clusters. Let's examine the user interface.

1. Click the **RUN NEW DIAGNOSTICS** button (not shown here).
2. Click the **radio-button** for **Benchmarking and Optimization**.
3. Click the **dropdown** to view the different **benchmark goals**.
4. Click **Storage Operations**.

****Note** We did not explore the Troubleshooting diagnostic as that will be covered in another lab and module but you may explore the feature if you wish ******

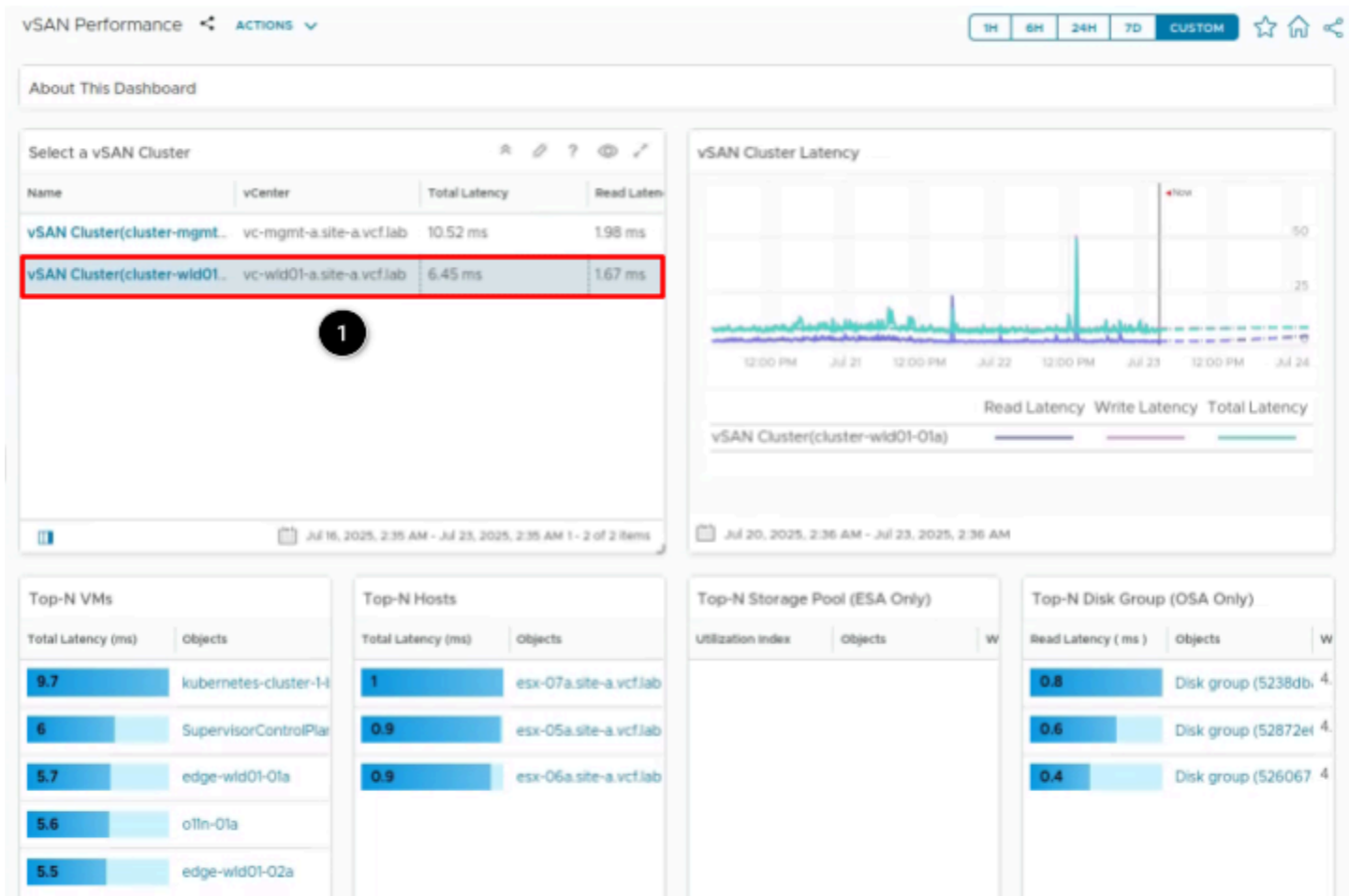
vSAN Cluster Performance Dashboards



Let's explore vSAN Cluster Performance Dashboards now, as these will give us great in-depth information about our storage environment.

1. **Scroll** down until you see the full vSAN Cluster Performance widget.
2. **Click** on **View Dashboards**.

Explore Cluster Performance Dashboards.



The vSAN Performance Dashboard, an integral component of VMware Cloud Foundation Operations, serves as a critical tool for gaining visibility into the operational dynamics and performance characteristics of your vSAN cluster. This dashboard is designed to present a holistic and granular view of various performance metrics, giving administrators the data necessary for informed decision-making and proactive management.

At its core, the dashboard delivers detailed insights into key performance indicators (KPIs) that are fundamental to assessing storage system health and efficiency. These KPIs include latency, IOPS (Input/Output Operations Per Second), and throughput. Latency measurements reveal the time taken for storage operations to complete, directly impacting application responsiveness. IOPS quantifies the number of read and write operations that the vSAN cluster can handle per second, indicating its processing capacity. Throughput, expressed in megabytes or gigabytes per second, showcases the volume of data being read from or written to the storage. By meticulously tracking these metrics, administrators are equipped to swiftly identify and address potential bottlenecks or instances of performance degradation before they impact end-user experience.

The power of this dashboard lies in its comprehensive visualization capabilities. Through intuitive graphs, charts, and real-time data feeds, users can effortlessly observe trends, pinpoint anomalies, and correlate performance issues with specific workloads or infrastructure components. This visual representation facilitates a rapid assessment of the overall health and operational efficiency of the vSAN storage environment. For instance, a sudden spike in latency coupled with a drop in IOPS could immediately signal an underlying resource contention or an issue with a particular disk group.

Let's take a look at one of our vSAN clusters.

1. To populate the widgets with data **click** on the **vSAN Cluster for management row (do not click on the blue cluster name itself**, click somewhere else in the row, since clicking on the blue cluster name will take you to the details page of the cluster, if you did, simply click on the back button in the browser).

****Note** Feel free to explore the dashboard and the metrics provided as we will cover this in another module. ******

Conclusion

The new Storage Operations capability gives administrators a quick overview of key information for both vSAN and non-vSAN storage networks. With the ability to visualize and monitor performance, perform benchmarking and troubleshooting and find administrative configuration mistakes, administrators are given a strong set of tools to keep their environments in peak performance.

From here you can:

- Take this quick survey to provide feedback about your experience with VCF 9.0
- Click [vlp:table-of-contents]Show Table of Contents] to jump to any module or lesson in this lab.
- End your lab and return in the future.

End of Lab Manual (07/10)

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