



HOL-2401-02-CMP  
**Getting More Out of It!**  
**(Intermediate)**

## Table of contents

Lab Overview - HOL-2401-02-CMP - Aria Operations - Getting More Out of It! (Intermediate)	5
Lab Description.....	5
Lab Guidance .....	5
Module 1 - Extending Your Solution with Management Packs (15 minutes) Basic	7
Introduction .....	7
Log in to Aria Operations.....	7
Reviewing and Installing Management Packs .....	10
Conclusion.....	27
Module 2 - Monitoring and Troubleshooting Kubernetes (15 minutes) Basic	29
Introduction .....	29
Log in to Aria Operations.....	29
Deploying the Management Pack.....	32
Review the Management Pack .....	50
Conclusion.....	54
Module 3 - Advanced Capacity Management (30 minutes) Intermediate	56
Introduction.....	56
Log in to Aria Operations.....	56
Understanding Capacity Settings .....	59
Configure Policy Settings.....	74
Conclusion.....	91
Module 4 - Integrating and Troubleshooting with Logs (30 minutes) Advanced	92
Introduction.....	92
Log in to Aria Operations.....	92
Troubleshooting with Logs Inside of Aria Operations.....	95
Add Aria Operations for Logs Agent on Linux .....	108
Conclusion.....	122
Module 5 - Configuring Costs to Match Your Business Needs (30 minutes)	
Intermediate	124
Introduction .....	124
Log in to Aria Operations.....	124
Costing and Cost Drivers .....	126
Pricing and Calculation.....	144

Showback.....	162
Conclusion.....	171
<b>Module 6 - Customizing Alerts and Leveraging Notifications (15 minutes)</b>	
Basic	173
Introduction.....	173
Log in to Aria Operations.....	173
Using Symptoms and Alerts to Trigger Recommendations and Actions.....	176
Configuring Notifications .....	225
Conclusion.....	248
Module 7 - Creating Views for Better Visibility (15 minutes) Basic	249
Introduction.....	249
Log in to Aria Operations.....	249
Create Simple View showing VM list with Metrics and Properties .....	253
Create a View with Variable Data .....	273
Create a View with Trends .....	295
Create a View that shows VM Growth.....	313
Create a View with Distribution Data .....	336
Create Reports from Views and Dashboards.....	356
Conclusion.....	371
<b>Module 8 - Using Metrics and Metric Charts for Troubleshooting (15 minutes)</b>	
Basic	372
Introduction.....	372
Log in to Aria Operations.....	372
How to use Metrics .....	375
Stacking Charts.....	401
Conclusion.....	413
Module 9 - Advanced Troubleshooting Techniques (15 minutes) Intermediate	415
Introduction .....	415
Log in to Aria Operations.....	415
Introduction to Workbench.....	417
Conclusion.....	437
Module 10 - Save Time by Automating Remediation (15 minutes) Basic	438
Introduction .....	438
Log in to Aria Operations.....	439
Introduction to Automation Central .....	443

Creating a job from a Virtual Machine Rightsizing Report.....	449
Setting Up Recurring jobs.....	454
Conclusion.....	460
Module 12 - Achieve Optimal Performance with Rightsizing (45 minutes)	
Advanced	461
Introduction .....	461
Log in to Aria Operations.....	461
Oversized and Undersized VMs using Rightsizing.....	465
Configure Policy Settings.....	496
Conclusion.....	514
Module 13 - Enabling Chargeback for Your Business (30 minutes) Advanced	515
Introduction .....	515
Log in to Aria Operations.....	515
Rate Cards/Pricing .....	518
Chargeback .....	533
Conclusion.....	548
Module 14 - Plan for Your Future Capacity Needs (30 minutes) Intermediate	549
Introduction .....	549
Log in to Aria Operations.....	549
Optimize Capacity with What-If Scenarios and Costs .....	552
Conclusion.....	586
Module 15 - Application Monitoring (45 minutes) Intermediate	588
Introduction .....	588
Log in to Aria Operations.....	588
Configure Service Discovery .....	591
Configure Telegraf Agent .....	599
Custom Monitoring Using Telegraf Agent .....	606
Conclusion.....	623
Conclusion	625
Learning Path Next Steps! .....	625

## Lab Overview - HOL-2401-02-CMP - Aria Operations - Getting More Out of It! (Intermediate)

### Lab Description

[2]

Explore advanced capacity and cost calculations. Customize alerts and metrics to monitor applications. Explore advanced troubleshooting techniques including automating remediation.

### Lab Guidance

[3]

Welcome! This lab is available for you to repeat as many times as you want. To start somewhere other than the beginning, use the Table of Contents in the upper right-hand corner of the Lab Manual or click on one of the modules below.

- [Module 1 - Extending your Solution with Management Packs](#) (15 minutes) (Basic)
- [Module 2 - Monitoring and Troubleshooting Kubernetes](#) (15 minutes) (Basic)
- [Module 3 - Advanced Capacity Management](#) (30 minutes) (Intermediate)
- [Module 4 - Integrating and Troubleshooting with Logs](#) (30 minutes) (Advanced)
- [Module 5 - Configuring Costs to Match your Business Needs](#) (30 minutes) (Intermediate)
- [Module 6 - Customizing Alerts and Leveraging Notifications](#) (15 minutes) (Basic)
- [Module 7 - Creating Views for Better Visibility](#) (15 minutes) (Basic)
- [Module 8 - Using Metrics and Metric Charts for Troubleshooting](#) (15 minutes) (Basic)
- [Module 9 - Advanced Troubleshooting Techniques](#) (15 minutes) (Intermediate)
- [Module 10 - Save Time by Automating Remediation](#) (15 minutes) (Basic)
- [Module 12 - Achieve Optimal Performance with Rightsizing](#) (45 minutes) (Advanced)
- [Module 13 - Enabling Chargeback for your Business](#) (30 minutes) (Advanced)
- [Module 14 - Plan for your Future Capacity Needs](#) (30 minutes) (Intermediate)
- [Module 15 - Application Monitoring](#) (45 minutes) (Intermediate)

### Lab Captains:

- Module 1 - Ed Bontempo, Staff Solution Engineer, US
- Module 2 - Ed Bontempo, Staff Solution Engineer, US
- Module 3 - Bengt Grønås, Senior Specialist Solution Engineer, Norway
- Module 4 - Bengt Grønås, Senior Specialist Solution Engineer, Norway
- Module 5 - Bengt Grønås, Senior Specialist Solution Engineer, Norway
- Module 6 - Greg Sylvestre, Senior Solution Engineer, US
- Module 7 - Greg Sylvestre, Senior Solution Engineer, US
- Module 8 - Greg Sylvestre, Senior Solution Engineer, US
- Module 9 - Greg Sylvestre, Senior Solution Engineer, US
- Module 10 - William de Marigny, Staff Technical Adoption Manager, US

- Module 12 - Bengt Grønås, Senior Specialist Solution Engineer, Norway
- Module 13 - Bengt Grønås, Senior Specialist Solution Engineer, Norway
- Module 14 - Bengt Grønås, Senior Specialist Solution Engineer, Norway
- Module 15 - Bengt Grønås, Senior Specialist Solution Engineer, Norway

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

<http://docs.hol.vmware.com>

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

<http://docs.hol.vmware.com/announcements/nee-default-language.pdf>

## First time using Hands-on Labs?

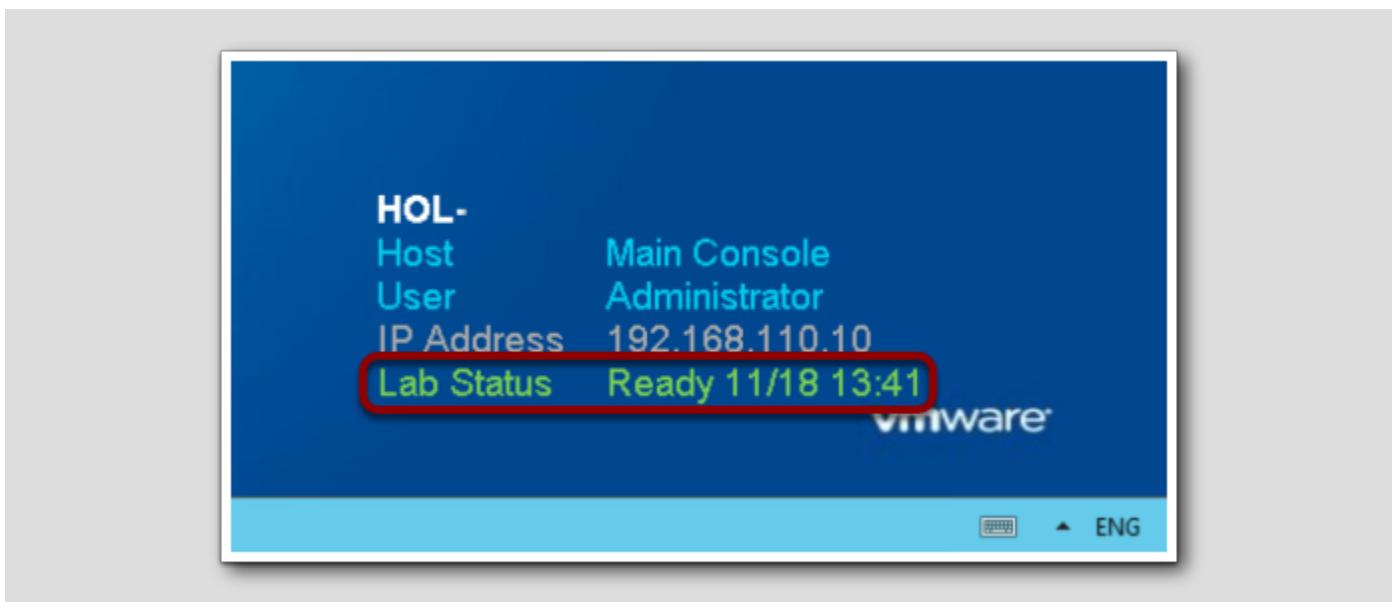
[4]

Welcome! If this is your first time taking a lab review the VMware Learning Platform interface and features before proceeding.

For returning users, feel free to start your lab by clicking next in the manual.

## You are ready....is your lab?

[5]



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 - Extending Your Solution with Management Packs (15 minutes) Basic

### Introduction

[7]

VMware Aria Operations provides monitoring capabilities for vSphere environments in a standard configuration. But a modern enterprise includes several layers of infrastructure, such as compute and storage, as well as multiple applications and cloud resources. Management packs allow you to extend the monitoring capabilities of VMware Aria Operations in order to analyze data from more of your environment. These packs allow you to correlate events across multiple tiers, and they provide Aria Operations with additional visibility and alerting.

In this lesson, we will review some of the available management packs for VMware Aria Operations, install a new management pack, and review new capabilities the management pack provides.

### Management Pack Options

[8]

VMware Aria Operations includes several pre-installed management pack integrations for VMware and public cloud solutions. Some of these management packs are activated by default, but others require activation after deploying Aria Operations. See the [Connecting VMware Aria Operations to Data Sources](#) documentation page for a list of pre-installed management packs.

In addition to the pre-installed management packs, several third-party management packs can be downloaded from the [VMware Marketplace](#).

VMware Aria Operations users are entitled to third-party compute management packs, such as Cisco UCS and Pure Storage FlashArray. Additional third-party management packs can be purchased as part of [VMware Aria Operations for Integrations](#). These management packs provide additional visibility into network solutions, applications and databases, as well as connectors to other monitoring and management solutions.

### Management Pack Documentation

[9]

The [VMware Aria Operations for Integration Documentation](#) includes a list of available management packs, release notes on the latest updates, and links to documentation covering each individual management pack.

The documentation for each management pack includes prerequisites, installation and usage instructions, and information on functionality provided, including dashboards, metrics, alerts, and more.

### Log in to Aria Operations

[10]

We will log in to a live instance of Aria Operations running in this lab.

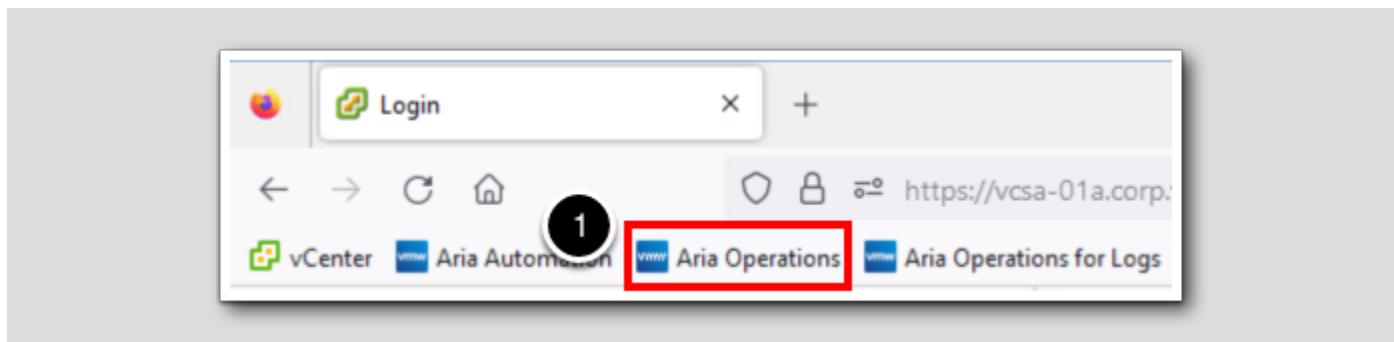
## Open the Firefox Browser from the Windows Task Bar



If the browser is not already open, launch Firefox.

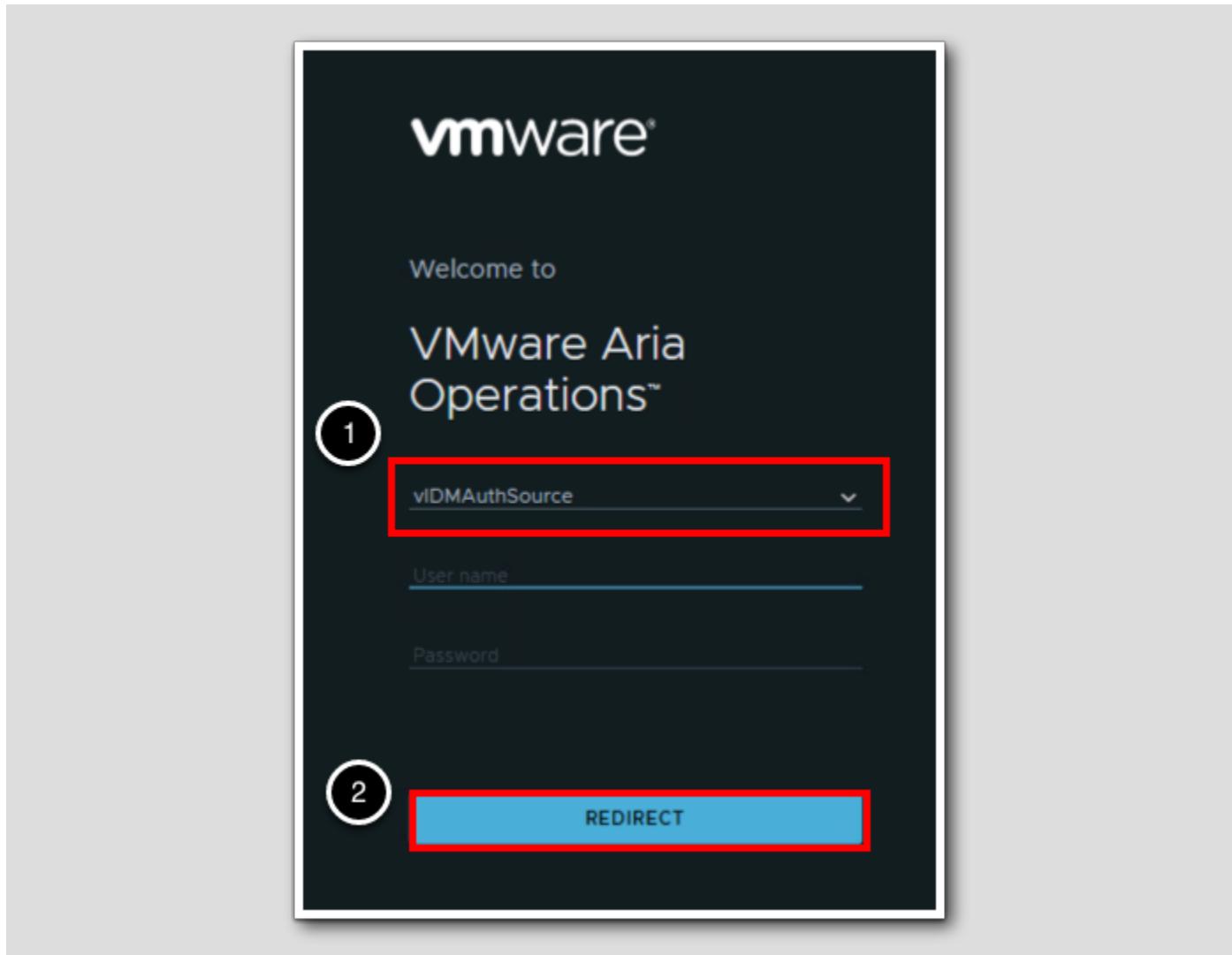
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

## Navigate to Aria Operations



1. Click the Aria Operations bookmark in the bookmarks toolbar.

## Log in to Aria Operations

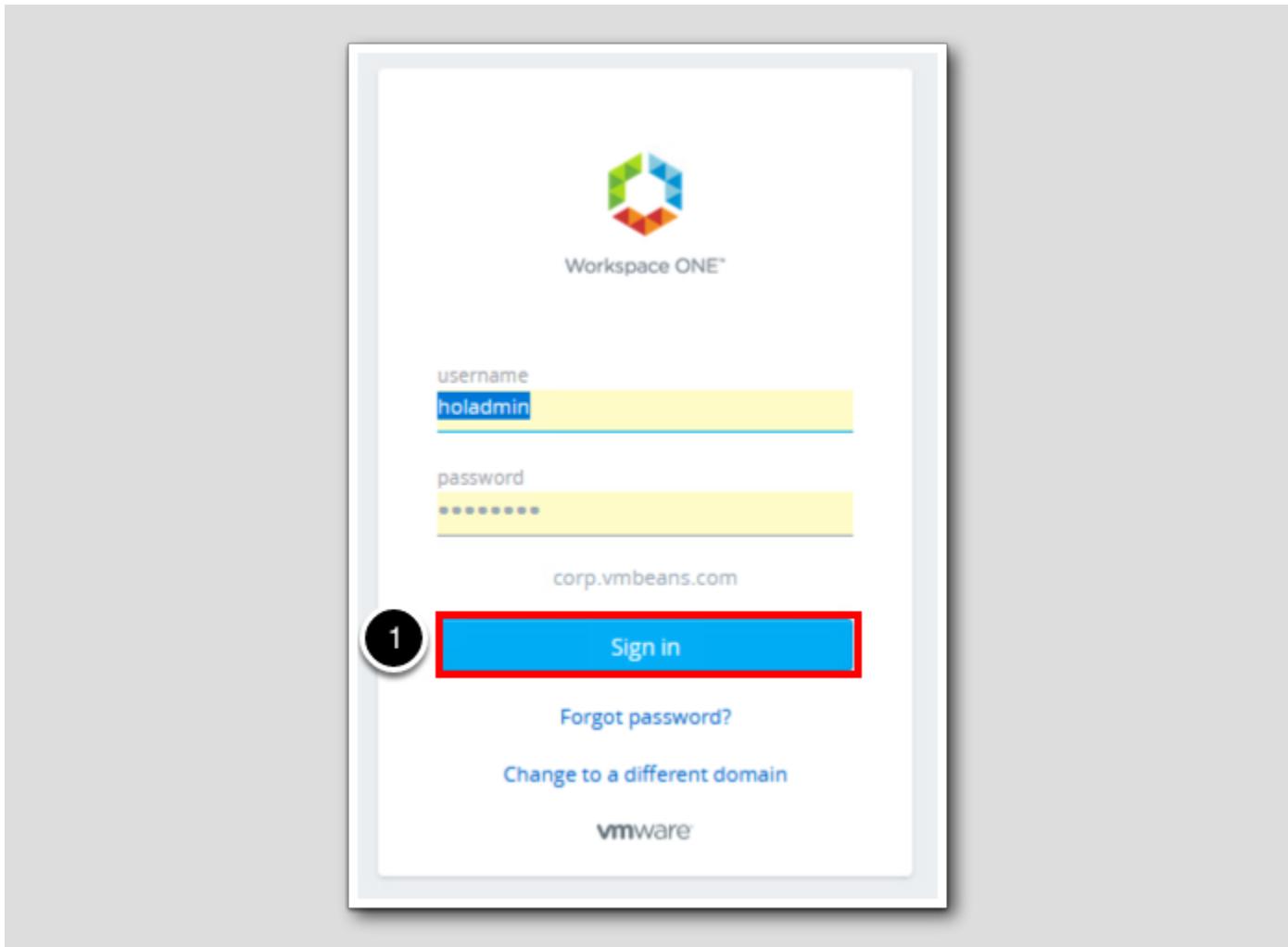


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

vIDMAuthSource may be pre-selected as the default identity source. If it is not, then you will need to select it.

1. Click the drop-down arrow and select vIDMAuthSource if it is not already selected.
2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login



VMware Identity Manager acts as the identity provider for the Active Directory authentication source in this lab.

Credentials for the default user, holadmin, have already been provided.

1. Click Sign in

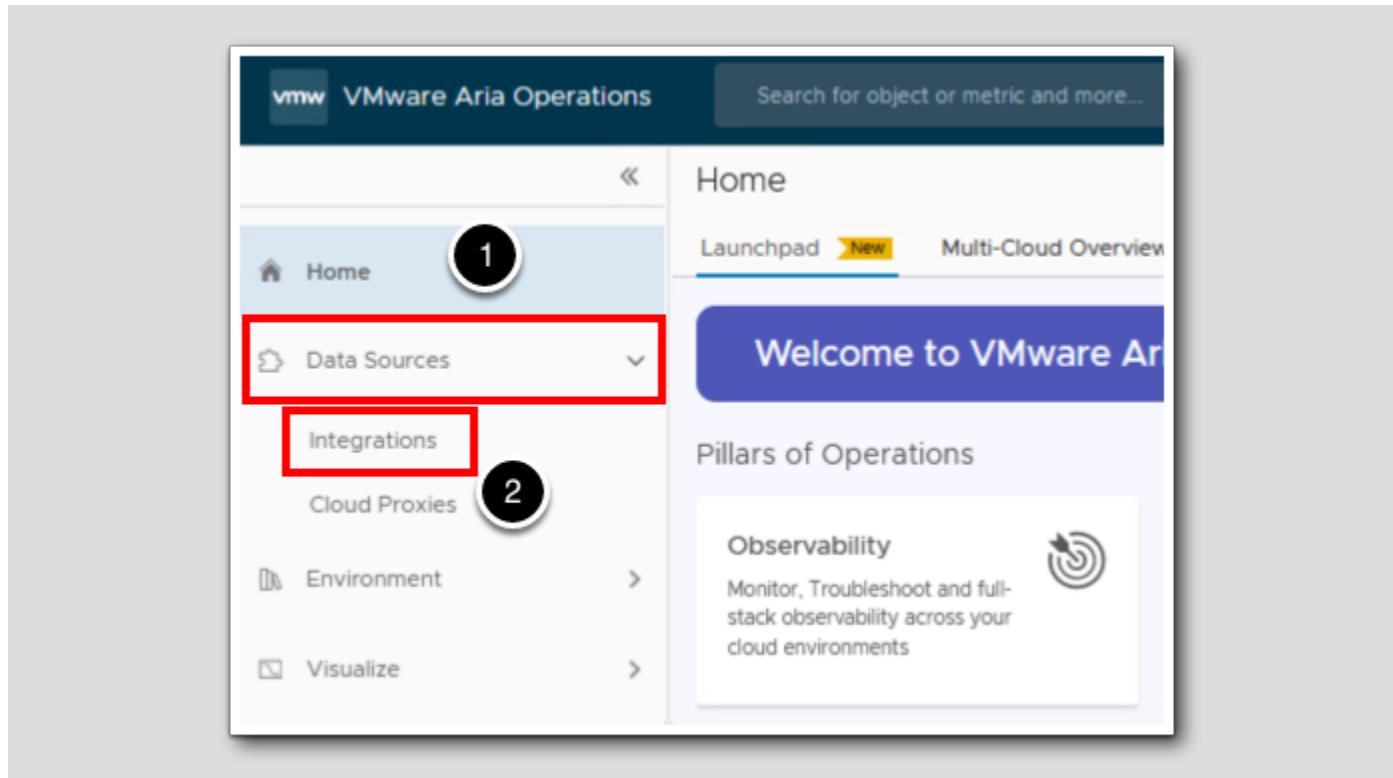
## Reviewing and Installing Management Packs

In this exercise, we will review the pre-installed management packs in our lab environment. Next, we will install one of the available management packs, the Management Pack for Storage Devices, configure it, and review some of the functionality this management pack provides.

The [Management Pack for Storage Devices Guide](#) provides documentation on how to install and configure this management pack,

along with information on provided dashboards, alerts, and metrics.

## Navigate to Integrations Page



1. Click Data Sources in the left navigation menu to open the Data Sources menu.
2. Click Integrations to navigate to the Integrations view.

## View the Repository Tab

The screenshot shows the VMware Aria Operations interface. On the left, there's a navigation sidebar with options like Home, Data Sources, Integrations (which is selected), Cloud Proxies, Environment, Visualize, Troubleshoot, and Optimize. The main area is titled 'Integrations' and shows '26 items'. A red box highlights the 'Repository' tab, which is currently selected. Below it, there are tabs for Accounts and Repository. A circled '1' is next to the Repository tab. A search bar at the top says 'Search for object or metric and more...'. Below the tabs, there are filters for All, SDDC, VMware Cloud, Public Cloud, VMware Aria, Compliance, Other, and Configured. A 'Filter' button is also present. The main content area is titled 'Installed Integrations' and lists several items:

Integration	Version	Accounts	Action
vCenter	8.12.0.21786275	1 account	ADD ACCOUNT
VMware Cloud on AWS	8.12.0.21786259	0 accounts	ADD ACCOUNT
vSAN	8.12.0.21786272	0 accounts	ADD ACCOUNT
VMware Aria Operations for Logs	8.12.0.21786276	1 account	ADD ACCOUNT
VMware Aria Automation	8.12.0.21786245	1 account	ADD ACCOUNT

A red box surrounds the first two items in the list, and a circled '2' is next to the 'Visualize' option in the sidebar. A circled '3' is next to a scroll bar on the right side of the interface.

1. Click **Repository**.
2. The Repository includes all pre-installed integrations. Note that the vCenter integration has 1 account configured for this lab, but the VMware Cloud on AWS integration does not have any configured accounts.
3. Use the  **scrollbar** to scroll down and view additional integrations.

## View Available Integrations

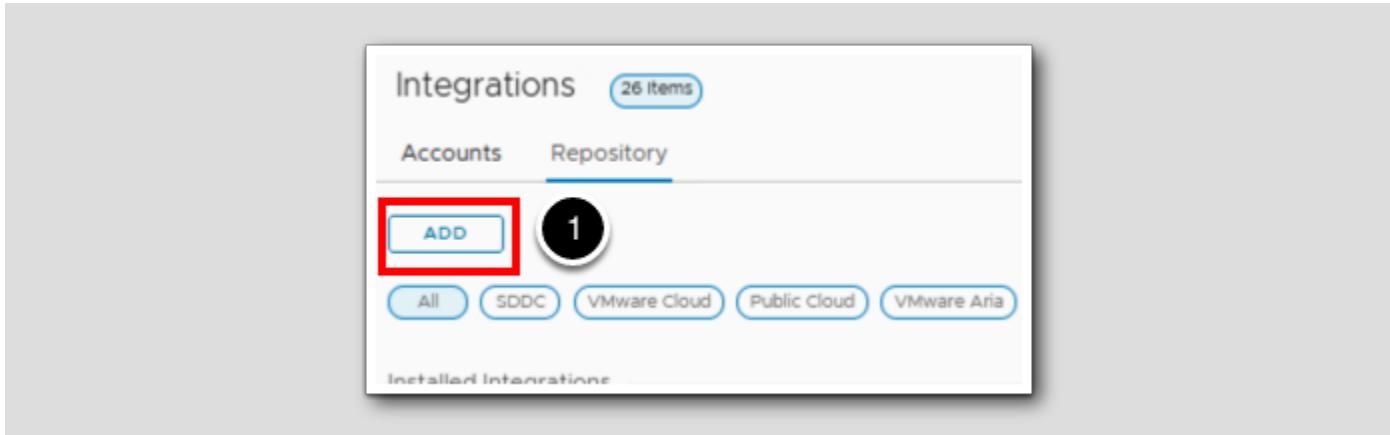
The screenshot shows a grid of six integration cards:

- VMware Infrastructure Health**: Version 8.12.0.21786273. Activation button: ACTIVATE.
- VMware Cloud on Dell EMC**: Version 8.12.0.21786278. Activation button: ACTIVATE.
- VMware Cloud Foundation**: Version 8.12.0.21786255. Activation button: ACTIVATE.
- PCI Compliance**: Version 8.12.0.21786277. Activation button: ACTIVATE.
- Oracle Cloud VMware Solution**: Version 8.12.0.21786248. Activation button: ACTIVATE.
- Microsoft Azure**: Version 8.12.0.21786260. Activation button: ACTIVATE.

The list of available integrations includes additional VMware solutions, public cloud integrations, and compliance templates. These integrations are installed, but not yet activated.

1. Use the scrollbar (not shown) to return to the top of the Repository.

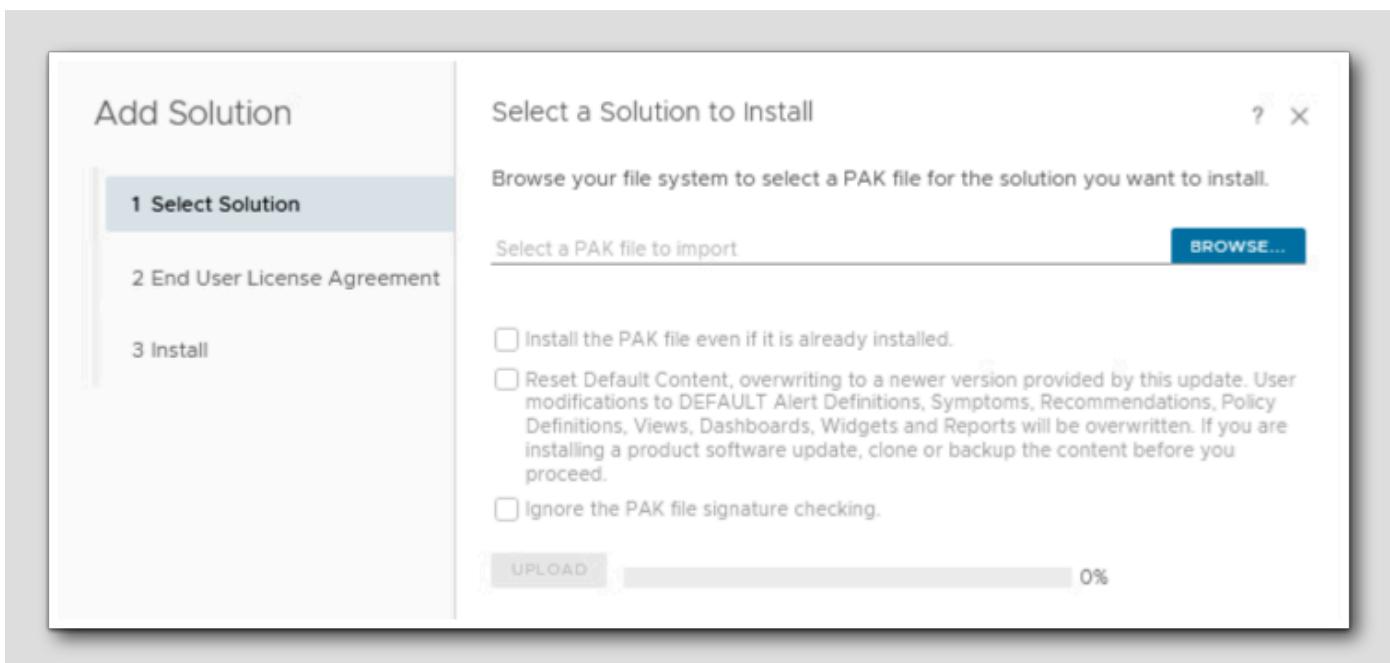
## Add a New Management Pack



The VMware Aria Operations Repository includes several integration options by default. But the list of available integrations does not include management packs for compute, storage, network, or applications. How can we extend VMware Aria Operations beyond these pre-installed integrations? We'll demonstrate that next.

1. Click ADD to add a new management pack to the Repository.

## Add Solution

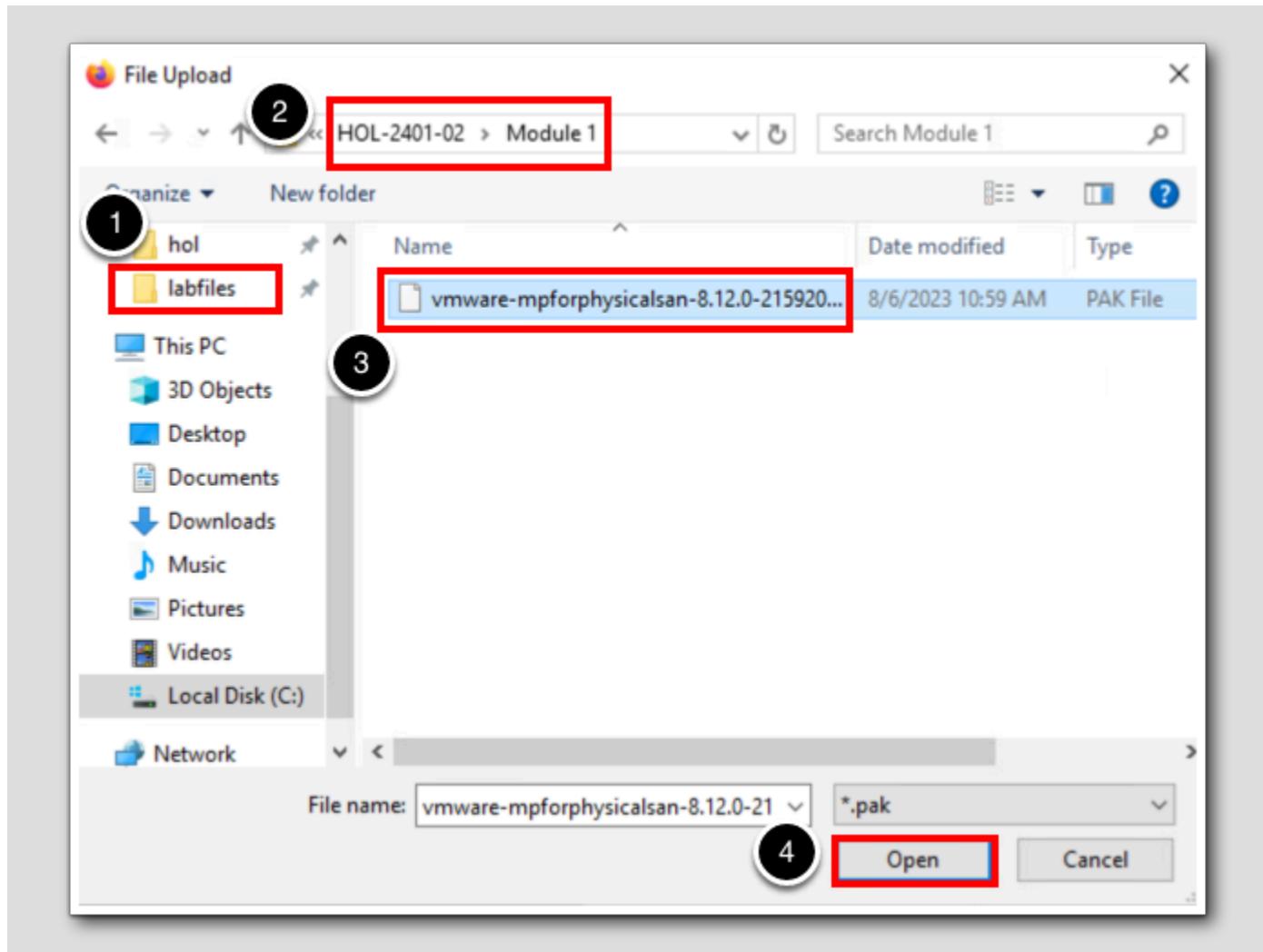


In addition to the pre-installed management packs, several other management packs can be downloaded from the [VMware Marketplace](#). These management packs are provided as .pak files to be imported into VMware Aria Operations. In this lab, we have already downloaded the VMware Aria Operations Management Pack for Storage Devices.

1. Click BROWSE...

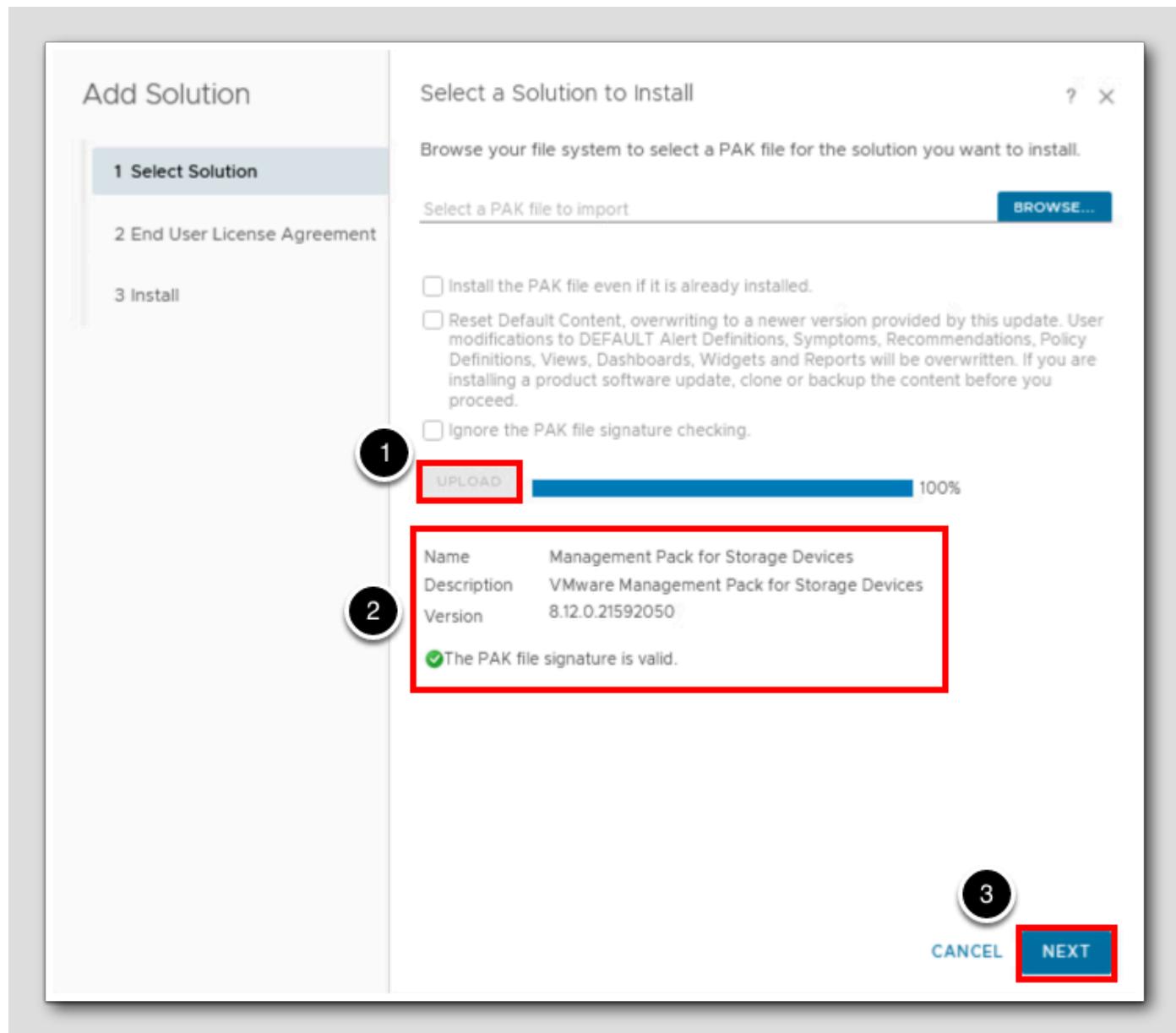
Locate the .pak File

[21]



1. Click the **labfiles** shortcut.
2. Navigate to the **HOL-2401-02** folder, and then to the **Module 1** folder.
3. Click on the **.pak** file in this folder. (Note: if you see 2 or more files in this list, make sure to select the file named "vmware-mpforphysicalsan-8.12...")
4. Click **Open**.

## Install the .pak File



Once the PAK file has been selected, it can be uploaded and verified.

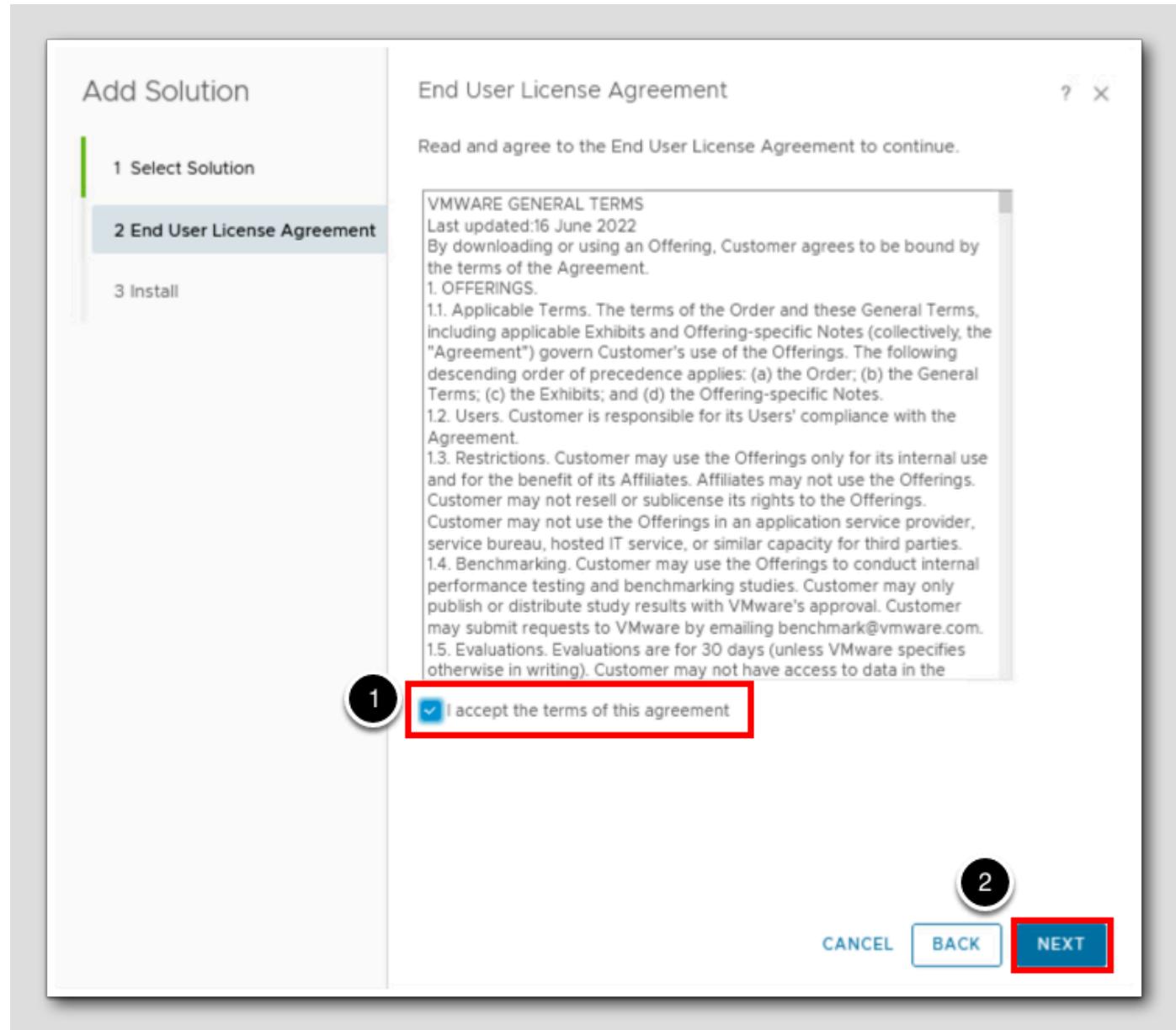
1. Click **UPLOAD** to upload and validate the PAK file. This process will take 1-2 minutes.

NOTE: the options above the UPLOAD button allow for overwriting of already installed PAK files, and to skip signature checking if needed. Since management packs provide additional alerts, symptoms, and more, it is highly recommended to backup existing content if reinstalling a management pack. As with out of the box Aria Operations content, default management content should not be modified directly in order to avoid overwriting customizations when updating management packs.

2. Once the validation is complete, additional detail will be displayed below the upload progress bar including the management pack name, version, and signature validation.

3. Click **NEXT**.

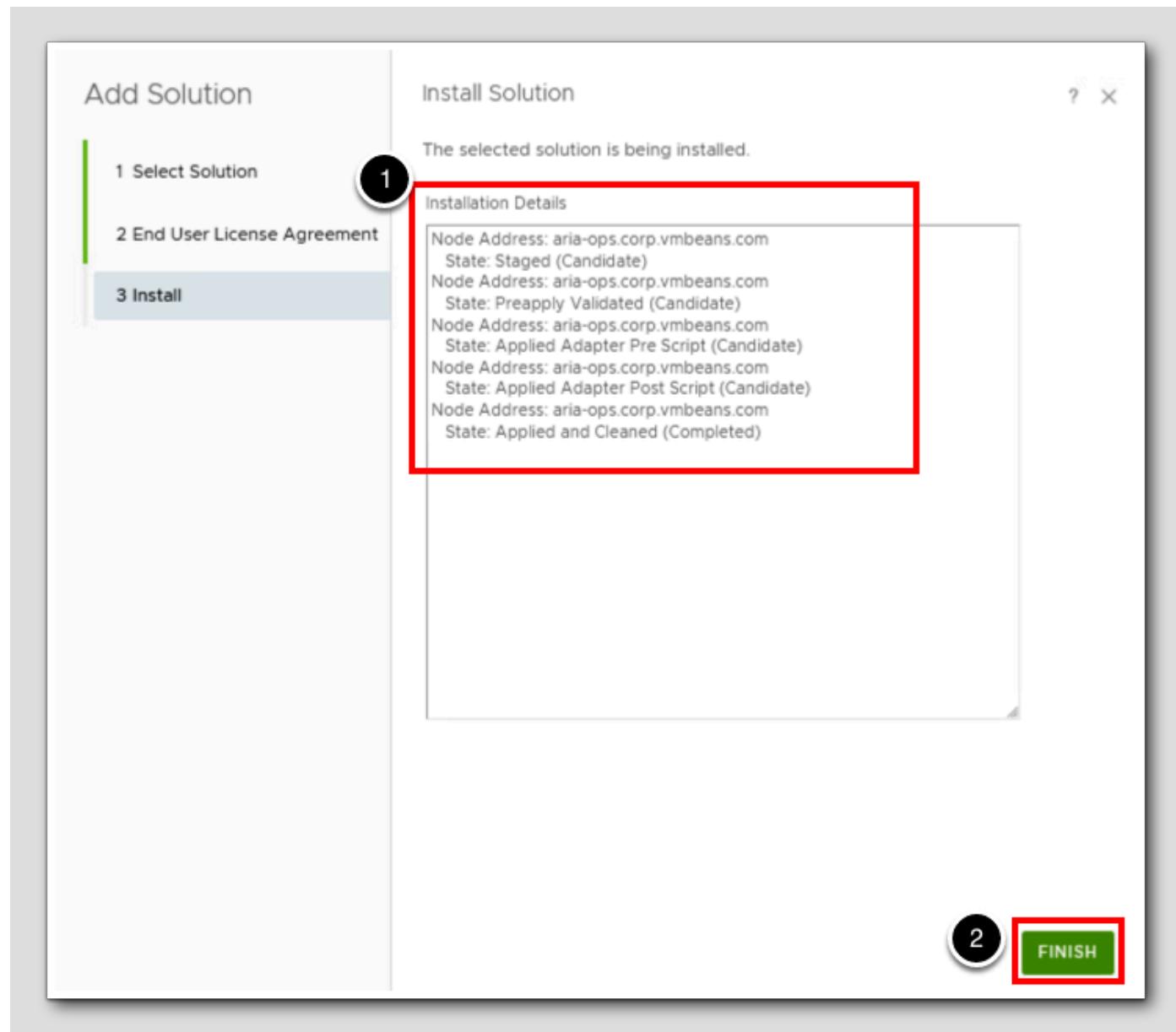
## Review and Accept the End User License Agreement



Review and accept the End User License Agreement before proceeding with the management pack install.

1. Click the checkbox next to I accept the terms of this agreement.
2. Click NEXT to proceed and begin the installation.

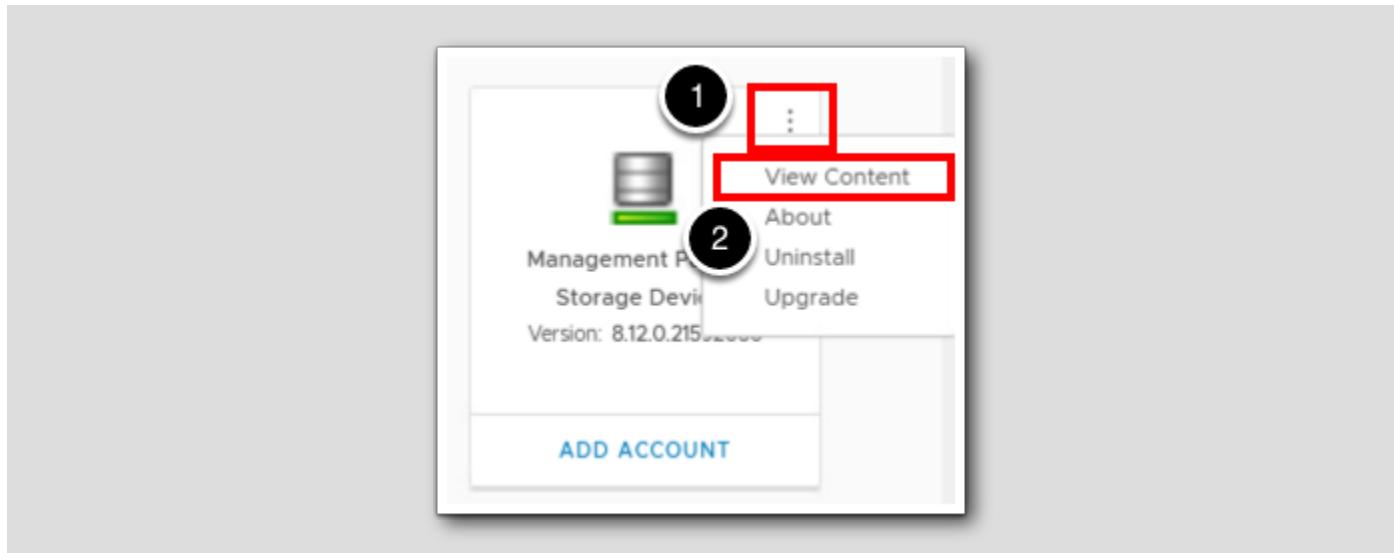
## Complete the Management Pack Installation



The management pack installation will proceed immediately.

1. Review the installation progress. This management pack installation will take 2-3 minutes to complete.
2. Once the installation is complete, click FINISH.

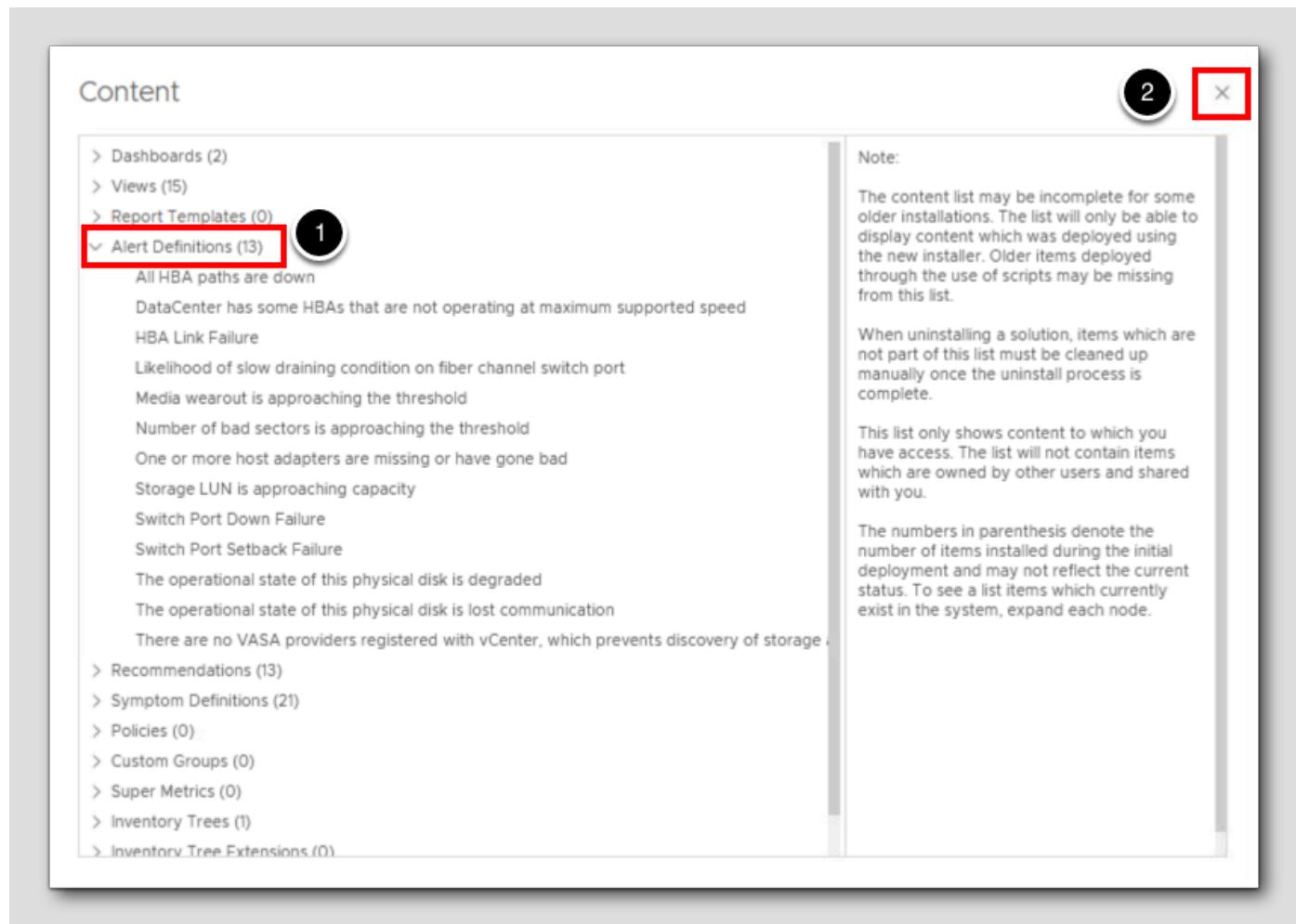
## View Management Pack Content



With the management pack installed, the Management Pack for Storage Devices tile will appear in the Installed Integrations section of the Repository. Now we can view the content provided by this management pack.

1. Click the **three vertical dots** on the Management Pack for Storage Devices tile to open the menu.
2. Select **View Content** from the list.

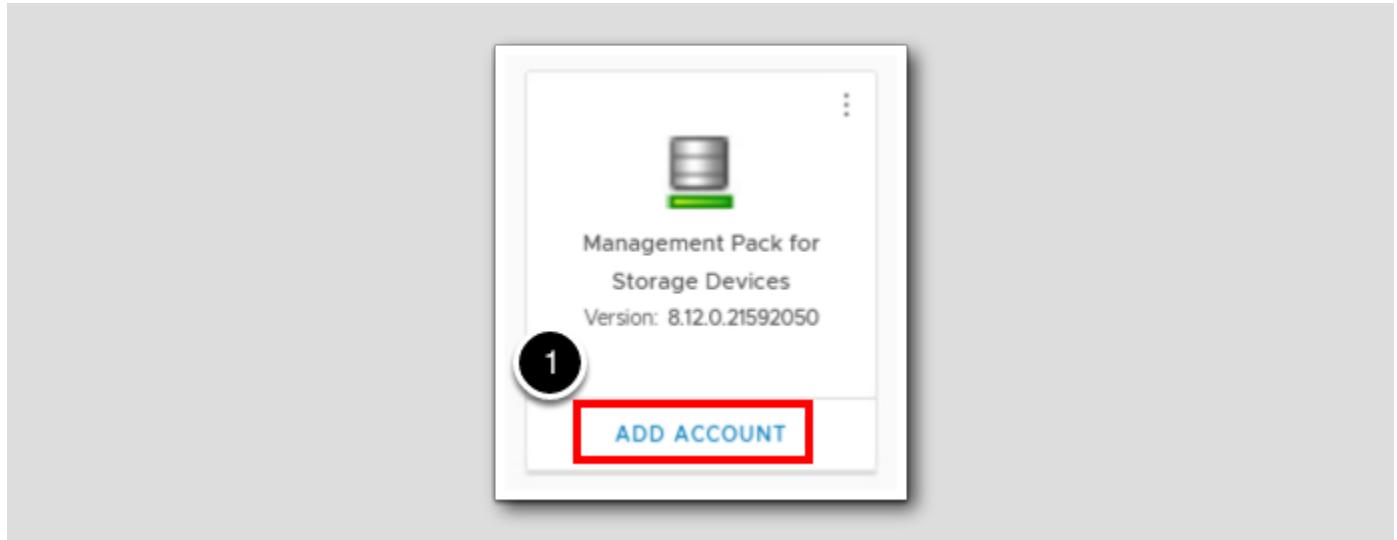
## View Content



The View Content window provides a list of several categories of potential additions provided by this management pack. The Management Pack for Storage Devices does not provide every single type of content, but it does provide a variety of alerts, views, and more.

1. Click one of the **categories** (for example, Alert Definitions) to view the list of provided content. Feel free to review other categories as well.
2. When ready, click the **x** in the upper right to close the View Content window.

## Add Account



With the Management Pack for Storage Devices installed, we will now create an account and begin to collect data from the lab environment.

1. Click ADD ACCOUNT. (Note: it may be necessary to scroll down in order to see the ADD ACCOUNT link.)

## Select Account Type

The screenshot shows a user interface for selecting account types. At the top, there's a breadcrumb navigation: Home / Integrations / Account Types. Below it, a message says "Please select your account type". There are several filter buttons at the top: All, SDDC, VMware Cloud, Public Cloud, VMware Aria, and Other. The "All" button is highlighted. Below the filters are four cards representing different account types:

- vCenter: Represented by a green cross icon.
- VMware Cloud on AWS: Represented by a yellow cube icon inside a blue cloud.
- NSX-T: Represented by a blue and orange circular icon.
- Physical Storage Devices Adapter: Represented by a grey cylinder icon.

A red box surrounds the "Physical Storage Devices Adapter" card. Above this red box, a black circle contains the number "1", indicating the first step in a process.

The list of available account types varies based on which management packs are installed.

1. Click Physical Storage Devices Adapter.

## Configure Account

Add Account - Physical Storage Devices Adapter

[Home](#) / [Integrations](#) / [Account Types](#)

Cloud Account Information

Name **1**

Description

Connect Information

vCenter Server **2**  ⓘ

Credential  **3** + ⚒

Collector / Group

> Advanced Settings

**4** ADD CANCEL

The screenshot shows the 'Add Account' form for a 'Physical Storage Devices Adapter'. The 'Name' field (1) is populated with 'HOL vCenter'. The 'vCenter Server' field (2) is populated with 'vcsa-01a.corp.vmbeans.com'. The 'Credential' field (3) is populated with 'HOL' and includes a '+' icon with a red box around it. The 'ADD' button (4) at the bottom left is highlighted with a red box.

1. For Name, type HOL vCenter.
2. For vCenter Server, type vcsa-01a.corp.vmbeans.com.
3. We will need to create a new credential for this account to use. Click the + to open the Manage Credential window (not shown) and create a credential with the following information:
  - Credential name: HOL
  - vCenter User Name: administrator@vsphere.local
  - vCenter Password: VMware1!
  - Click OK to create the credential (if prompted to save the password in the browser, choose Don't Save.)
4. Click ADD to add the account, and accept the vCenter Server certificate when the Review and Accept Certificate window appears (not shown.)

## Review Account Status

[30]

The screenshot shows the 'Integrations' page with the 'Accounts' tab selected. There are six items listed:

Name	Status	Description
vCenter	1 Account	
Physical Storage Devices Adapter	1 Account	
HOL vCenter	OK	
VMware Aria Automation	1 Account	
VMware Aria Operations Application Management Pack	2 Accounts	

Two specific entries are highlighted with red boxes and numbered circles:

- 1**: The 'vCenter' entry, which has a red box around its expand/collapse icon.
- 2**: The 'HOL vCenter' entry under the 'Physical Storage Devices Adapter' section, which has a red box around its 'Status' column showing 'OK'.

1. Click the > next to Physical Storage Devices Adapter to expand the account list.
2. Verify that the Status of the newly added account is OK.

The Management Pack for Storage Devices is now collecting data from vCenter in the lab. This management pack includes a Fabric Server Adapter as well, but we will not be configuring that adapter in this lab.

## View Provided Alert Definitions

[31]

The screenshot shows the VMware Aria Operations interface. On the left, there is a navigation sidebar with several sections: Troubleshoot, Optimize, Plan (highlighted with a red box), Configure (highlighted with a red box), Policies, and Alerts (highlighted with a red box). Below these are Super Metrics, Applications and Services, Cost Drivers, Custom Profiles, and Configuration Files. The main area is titled "Alert Definitions" and shows a list of symptoms. One symptom is selected, showing its details in a modal dialog. The modal has tabs for "Adapter Type" (Physical) and "Object Type". The "Adapter Type" tab is active, showing fields for Name, Adapter Type (Physical), Object Type, Alert Type, Alert Subtype, Criticality, and Impact. The "Object Type" tab is also visible. There are buttons for "VIEW MORE FILTERS", "CLEAR ALL", and "APPLY". A filter icon (a magnifying glass with a downward arrow) is highlighted with a red box. A numbered callout (3) points to the filter icon, and another callout (4) points to the "Physical" text in the Adapter Type field.

With the Physical Storage Devices Adapter configured, we can view alert definitions provided by the adapter.

1. Click **Configure** on the left navigation menu.
2. Click **Alerts** and select **Alert Definitions** (not shown)
3. Click the **Filter** icon in the filters search bar to open the filter options.
4. For Adapter Type, type **Physical** and press **Enter**.

This will filter the list of alert definitions to those provided by the management pack. We can follow a similar filter process to view provided Symptoms and Recommendations, or view available Views, Dashboards, and other items provided by the management pack elsewhere in Aria Operations.

## Conclusion

[32]

In this module, we reviewed pre-installed Aria Operations management packs and we installed, configured, and reviewed the

Management Pack for Storage Devices. Management packs provide significant extensibility to Aria Operations, allowing for proactive management of a multi-cloud enterprise.

## You've finished the module

[33]

Congratulations on completing the lab module.

For more information on getting started with Aria Operations, see the [VMware Aria Operations: Journey to Success](#) guide at the [VMware Apps & Cloud Management Tech Zone](#).

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the TABLE OF CONTENTS to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 2 - Monitoring and Troubleshooting Kubernetes (15 minutes) Basic

### Introduction

[35]

In Module 1 we reviewed management packs to provide further extensibility for VMware Aria Operations. In this module we will review one management pack in particular - the VMware Aria Operations Management Pack for Kubernetes. We will deploy a required prerequisite, then deploy and configure the management pack itself, and then we will review detail discovered by the management pack.

### VMware Aria Operations Management Pack for Kubernetes

[36]

As with other management packs, the VMware Aria Operations Management Pack for Kubernetes provides alerts, dashboards, and other additional functionality to Aria Operations. In addition, this management pack allows for complete visualization of Kubernetes resources as well as autodiscovery of specific clusters on Tanzu Kubernetes Grid and in Amazon Web Services. Monitoring of other cluster types including Red Hat OpenShift is also supported.

The management pack has its own [documentation](#) providing additional information.

### Log in to Aria Operations

[37]

We will log in to a live instance of Aria Operations running in this lab.

### Open the Firefox Browser from the Windows Task Bar

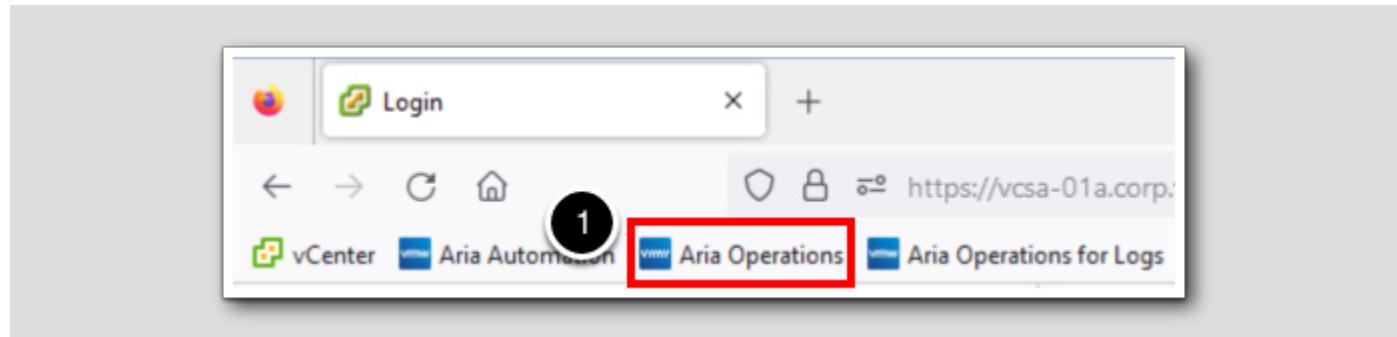
[38]



If the browser is not already open, launch Firefox.

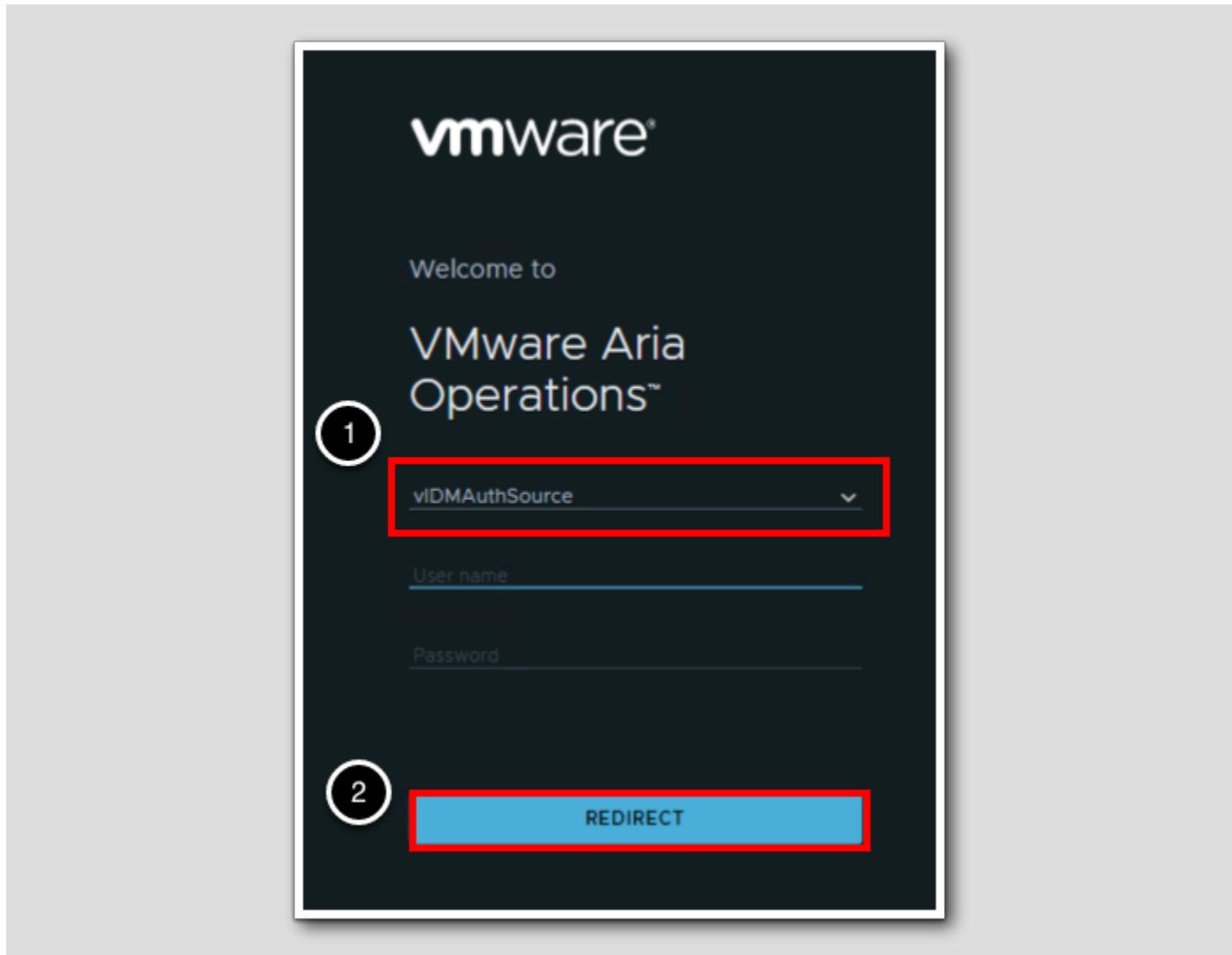
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

## Navigate to Aria Operations



1. Click the Aria Operations bookmark in the bookmarks toolbar.

## Log in to Aria Operations

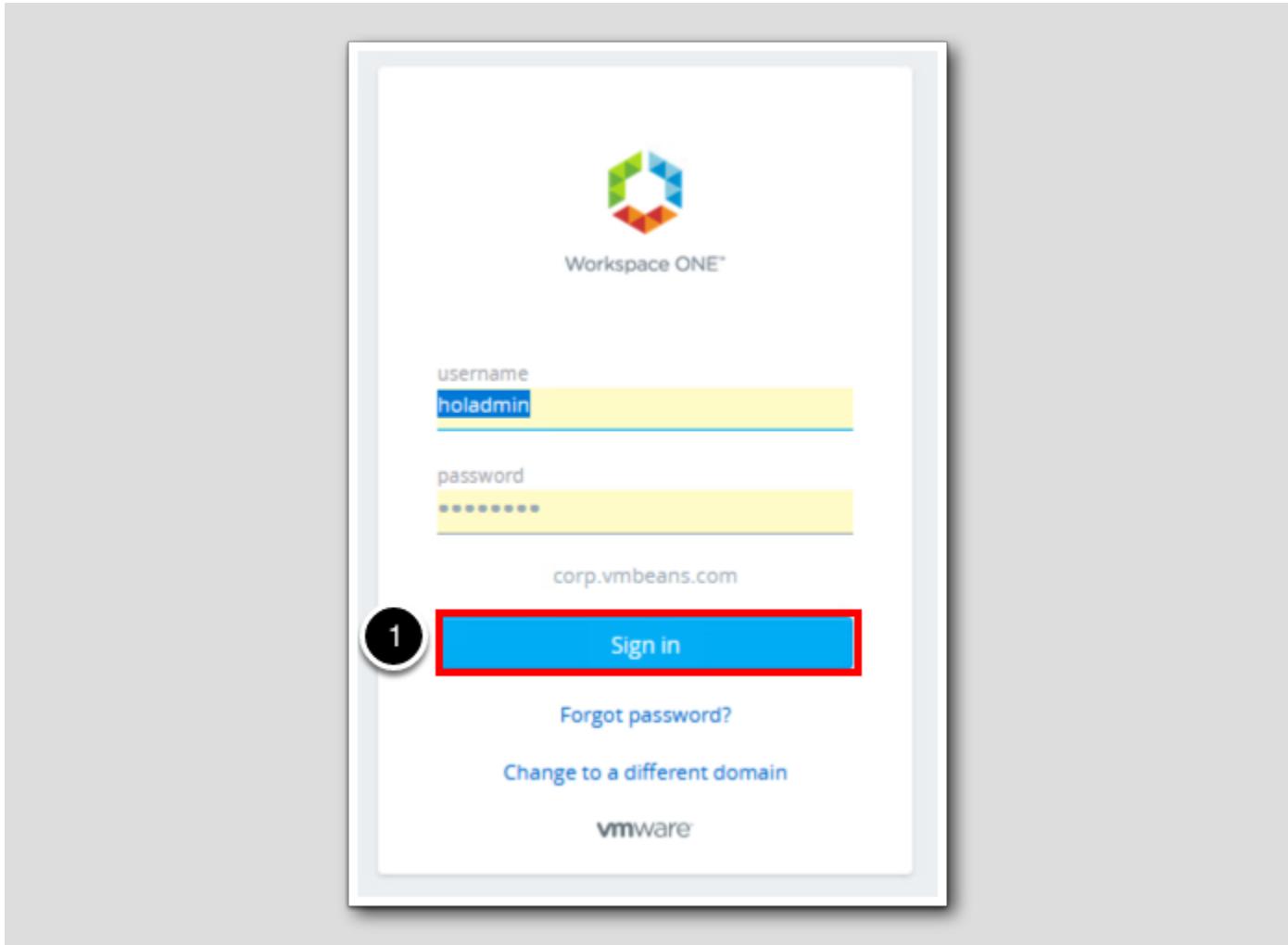


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

vIDMAuthSource may be pre-selected as the default identity source. If it is not, then you will need to select it.

1. Click the drop-down arrow and select vIDMAuthSource if it is not already selected.
2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login



VMware Identity Manager acts as the identity provider for the Active Directory authentication source in this lab.

Credentials for the default user, holadmin, have already been provided.

1. Click Sign in

## Deploying the Management Pack

This lab environment includes a vSphere with Tanzu deployment with one supervisor, one namespace, and one deployed cluster. In this exercise, we will deploy the Management Pack for Kubernetes and configure it to monitor this environment.

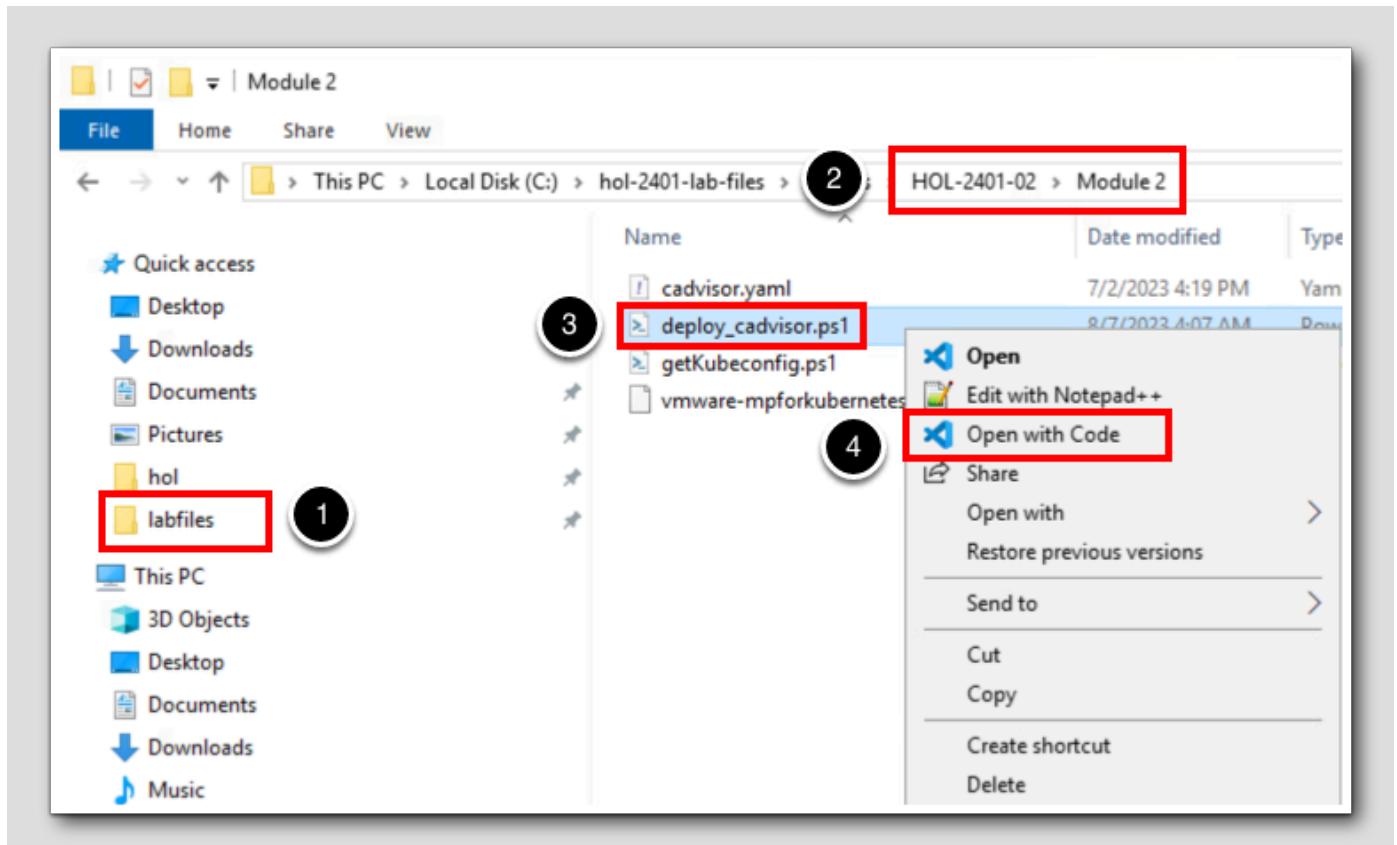
## Prerequisites



The VMware Aria Operations Management Pack for Kubernetes requires either cAdvisor or Prometheus to be running in the environment to be monitored. Both tools provide data and extensibility, but in this exercise we will be using [cAdvisor](#).

1. Click on the File Explorer icon in the Windows task bar to open Explorer.

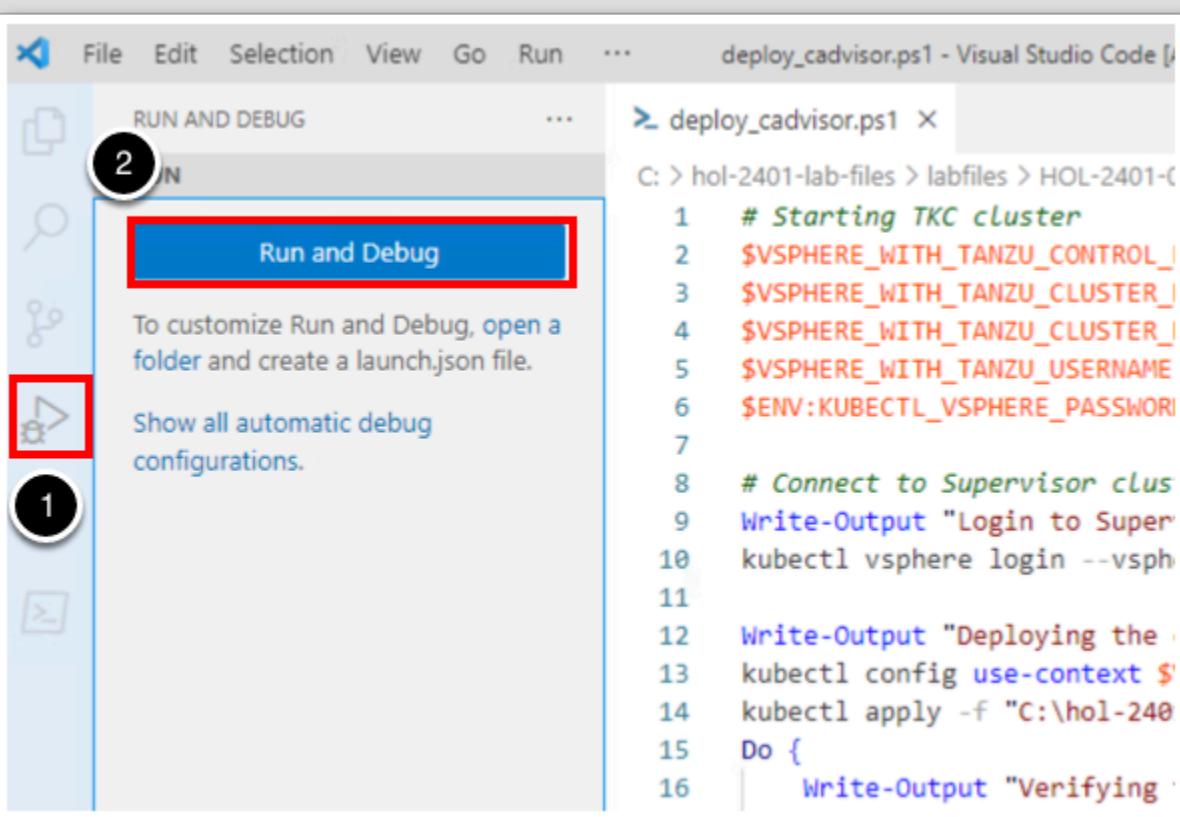
## Open cAdvisor Deployment Script



1. Click on the **labfiles** shortcut.
2. Navigate to the HOL-2401-02 folder, and then to the **Module 2** folder (not shown)
3. Right click on the file **deploy\_cadvisor.ps1**
4. Select **Open with Code** from the menu to open the file in Visual Studio Code.

## Run the Deployment Script

[45]



```

File Edit Selection View Go Run ...
deploy_cadvisor.ps1 - Visual Studio Code [1]

RUN AND DEBUG ...
...
> deploy_cadvisor.ps1 X
C: > hol-2401-lab-files > labfiles > HOL-2401-02 >
1 # Starting TKC cluster
2 $VSPHERE_WITH_TANZU_CONTROL_IP=$VSPHERE_WITH_TANZU_CLUSTER_IP
3 $VSPHERE_WITH_TANZU_CLUSTER_IP=$VSPHERE_WITH_TANZU_CLUSTER_IP
4 $VSPHERE_WITH_TANZU_USERNAME=$VSPHERE_WITH_TANZU_USERNAME
5 $ENV:KUBECTL_VSPHERE_PASSWORD=$VSPHERE_PASSWORD
6
7
8 # Connect to Supervisor cluster
9 Write-Output "Login to Supervisor cluster"
10 kubectl vsphere login --vsphere-cluster=$VSPHERE_WITH_TANZU_CLUSTER_IP
11
12 Write-Output "Deploying the cadvisor management pack"
13 kubectl config use-context $VSPHERE_WITH_TANZU_CONTEXT
14 kubectl apply -f "C:\hol-2401-lab-files\labfiles\Module 2\cadvisor-management-pack\cadvisor-management-pack.yaml"
15 Do {
16     Write-Output "Verifying cadvisor management pack deployment"
17 }

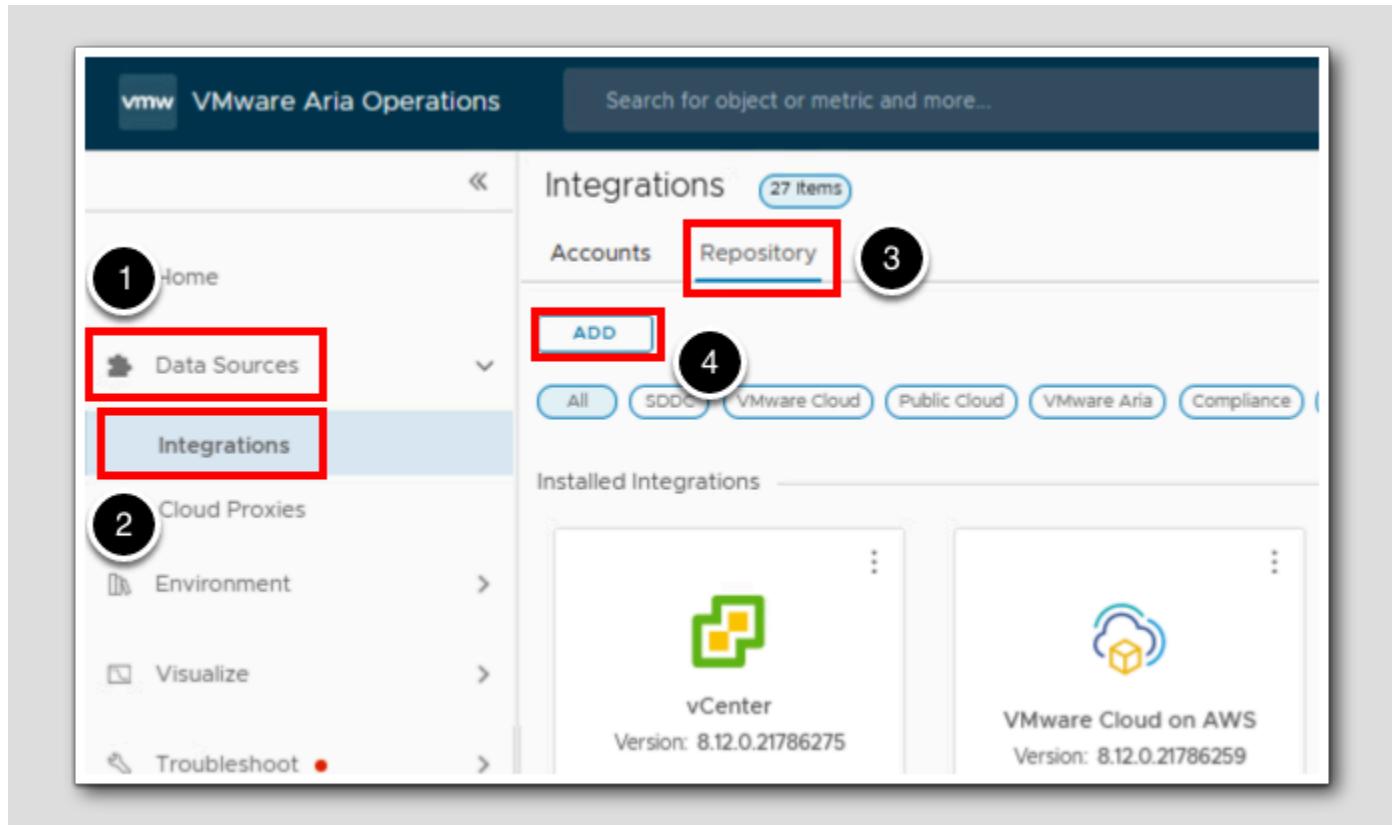
```

1. Click the **Run and Debug** badge in the Activity Bar on the left.
2. Click **Run and Debug** to run the script. A terminal window will open below the script itself with output. The script will take 20-30 seconds to complete.

Now that cadvisor has been deployed, we can proceed with installing the management pack.

3. Click the **Firefox** browser icon in the Windows task bar to return to Firefox (not shown)

## Navigate to Repository

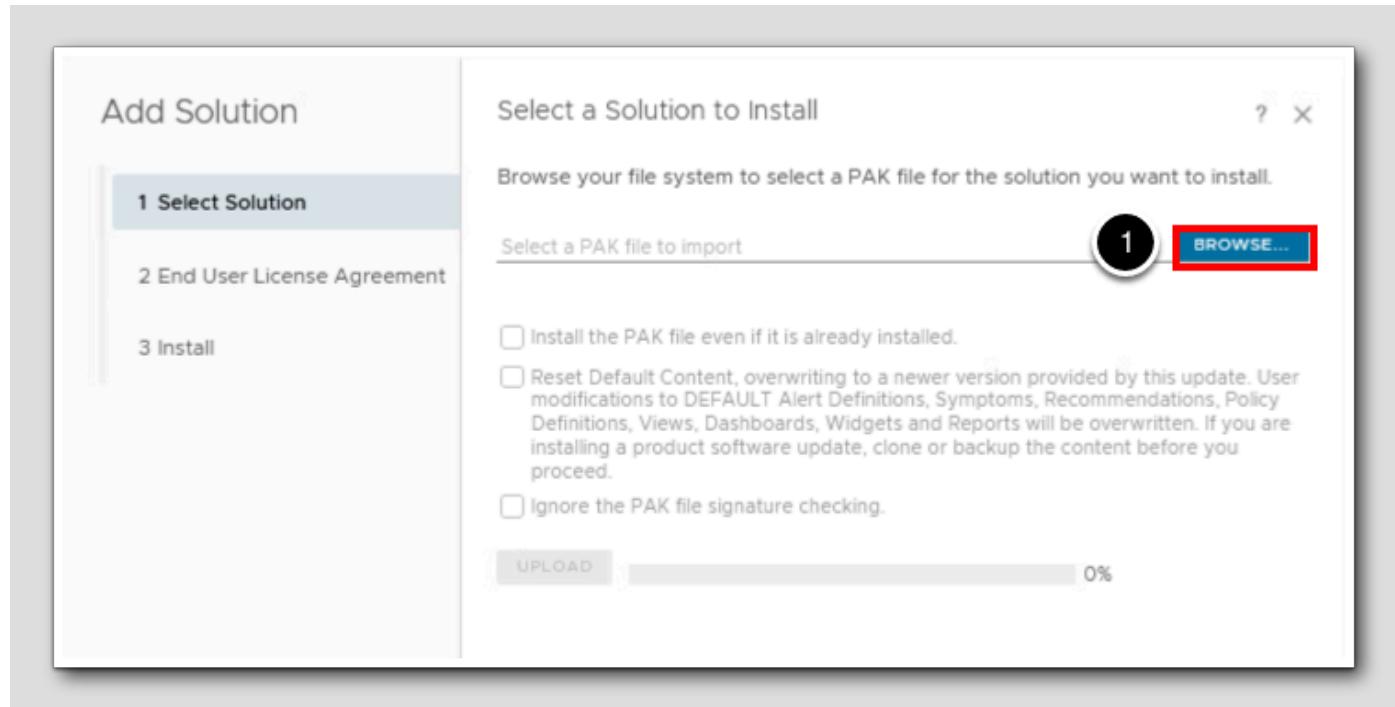


1. In Aria Operations, click Data Sources in the left navigation menu.
2. Click on Integrations.
3. In the Integrations view, click the Repository tab.

The Management Pack for Kubernetes is not installed by default. We will install the management pack now.

4. Click ADD.

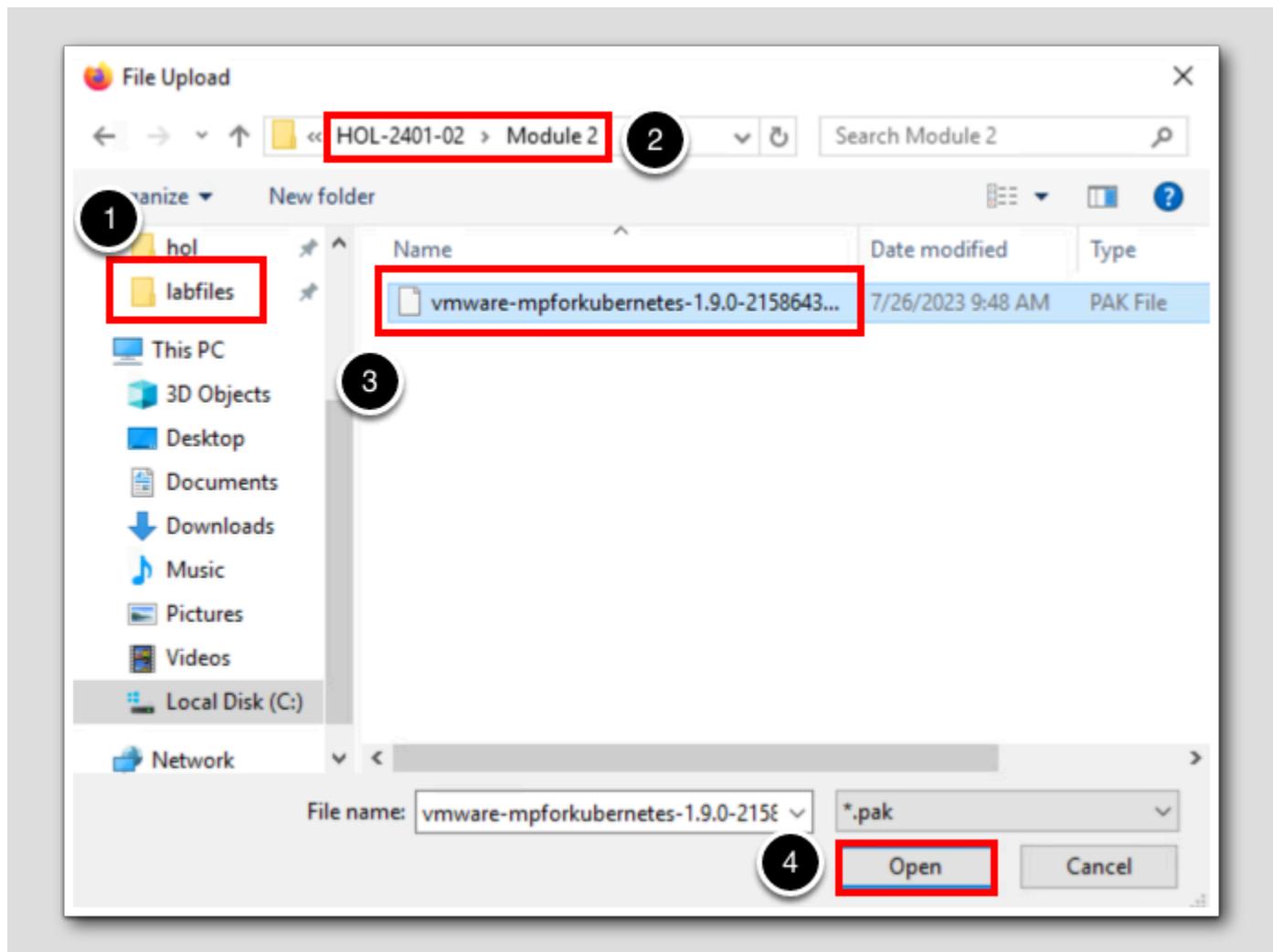
## Add Solution



As with other management paks, the Management Pack for Kubernetes is installed using the Add Solution wizard. This process is covered in more detail in module 1 of this lab.

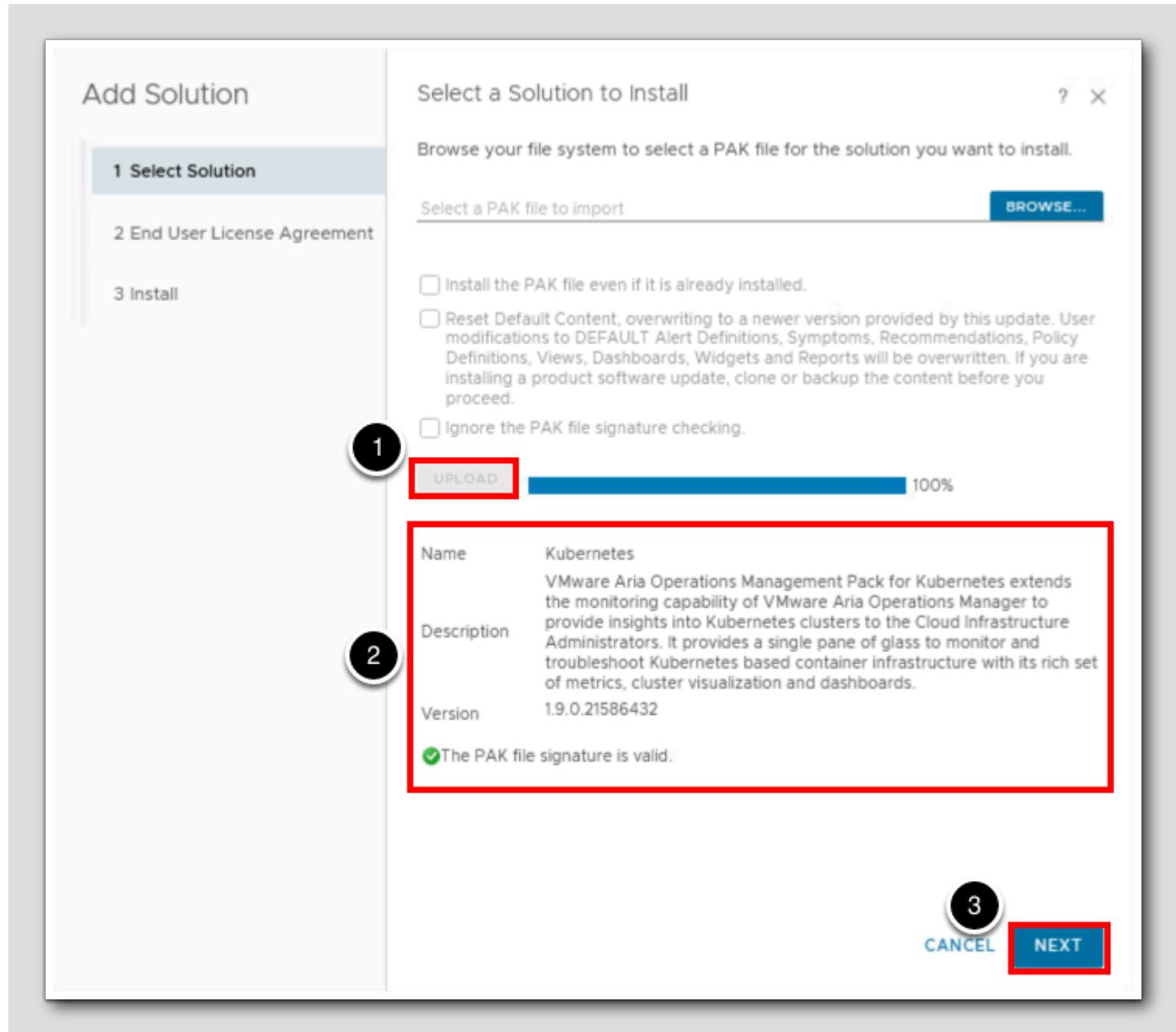
1. Click BROWSE...

## Find and Open PAK File



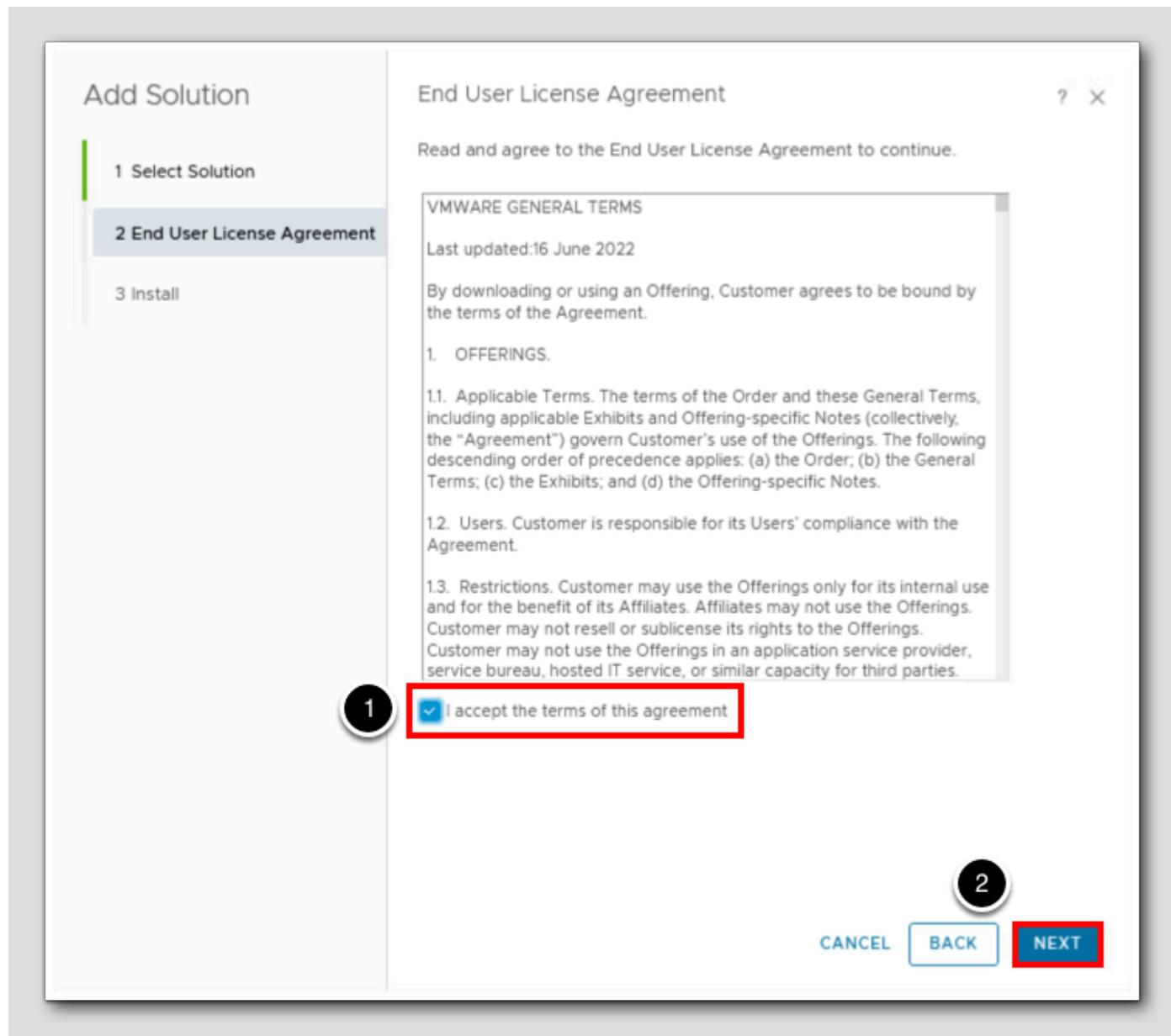
1. Click on the **labfiles** shortcut.
2. Navigate to the **HOL-2401-02** folder, and then to the **Module 2** folder (not shown.)
3. Click on the **vmware-mpforkubernetes** file shown.
4. Click **Open**.

## Upload and Validate Management Pack



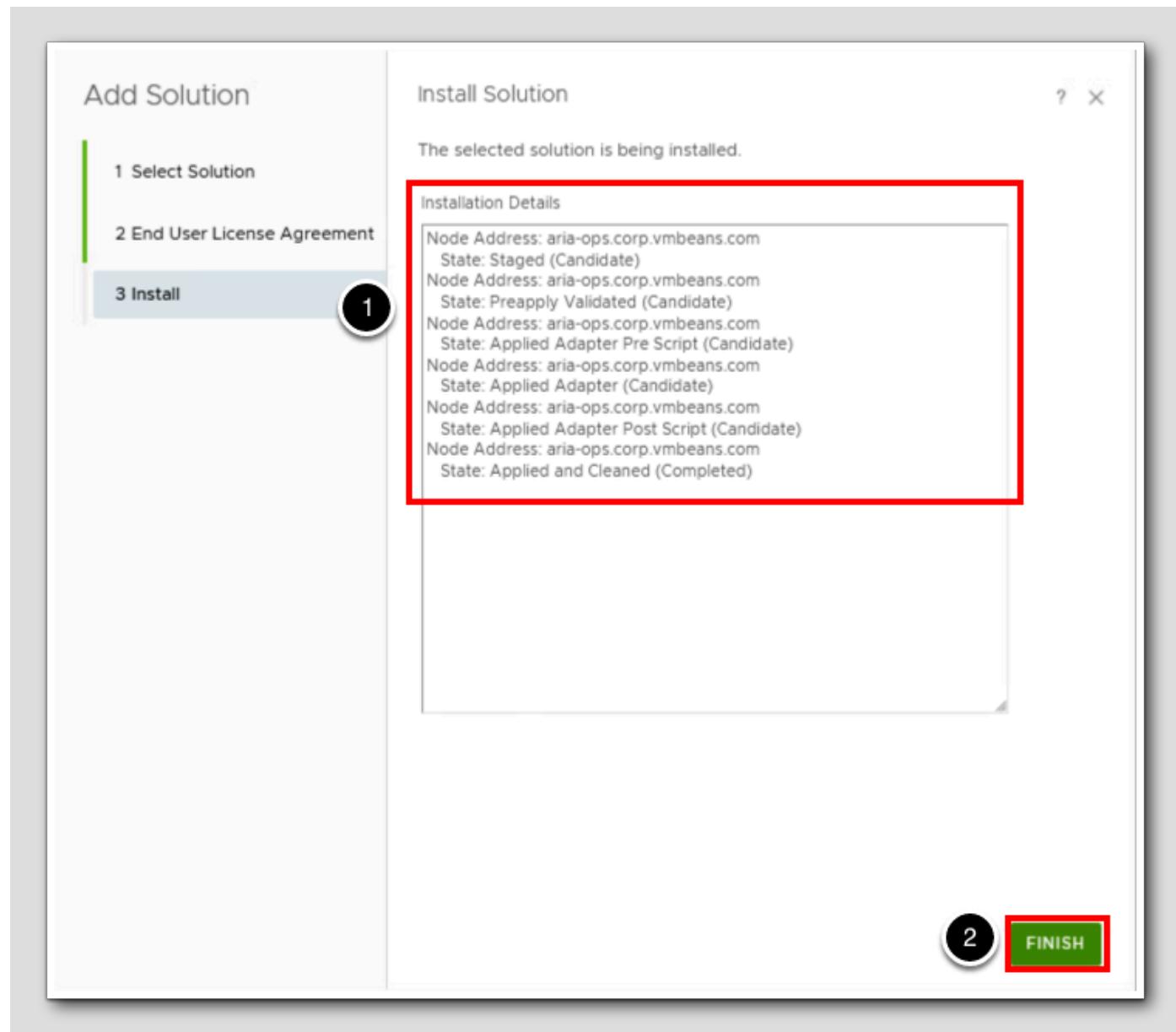
1. Click the UPLOAD button to begin the upload and validation process. This process will take 1-2 minutes to complete.
2. Review the information displayed once the validation is complete.
3. Click NEXT.

## Review and Accept the End User License Agreement



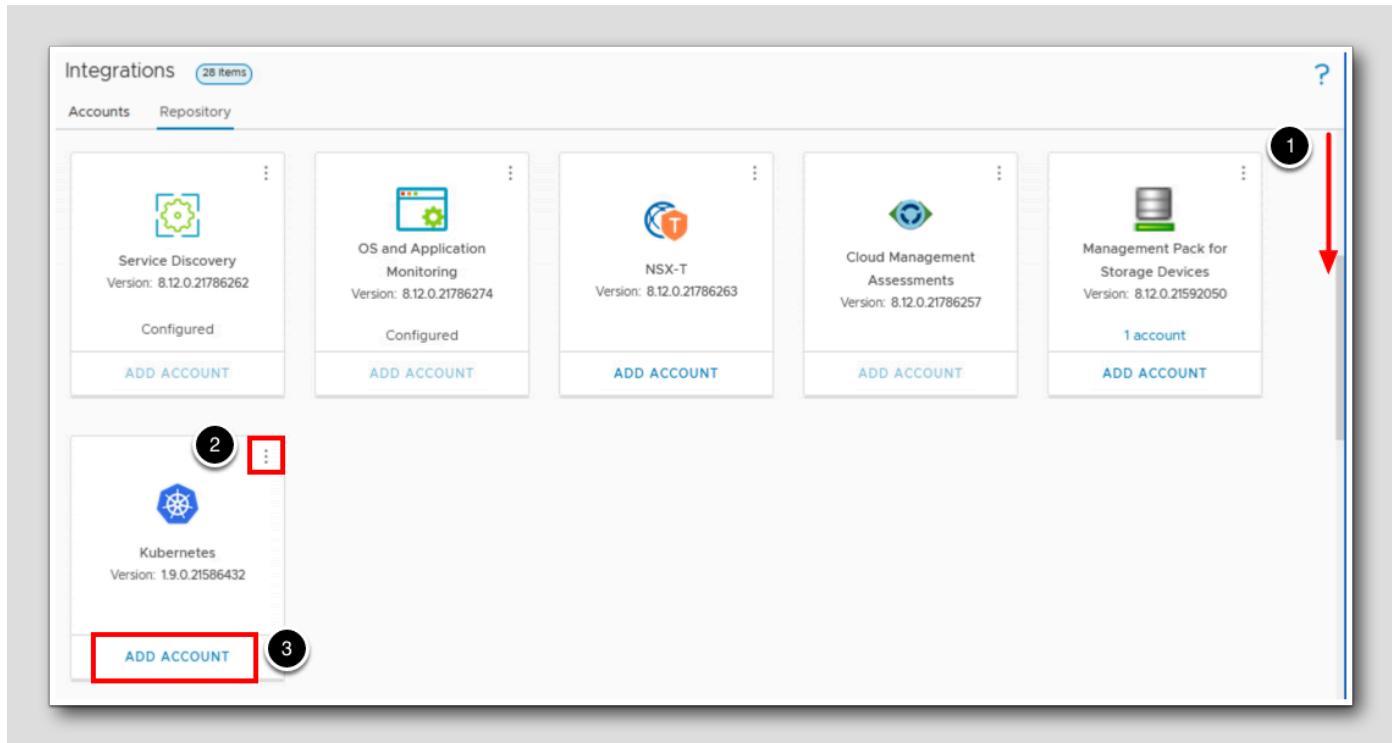
1. Review the End User License agreement, and when complete click the checkbox next to "I accept the terms of this agreement."
2. Click NEXT. This will begin the management pack installation.

## Complete the Management Pack Installation



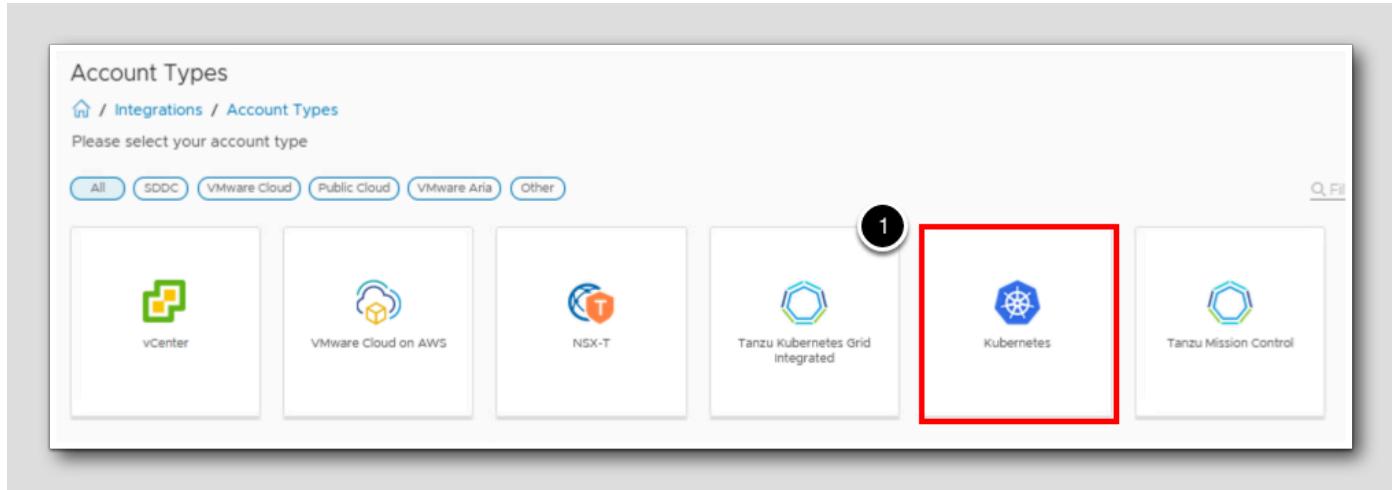
1. The management pack installation will proceed automatically. This installation requires 2-3 minutes to complete.
2. Once the installation is complete, click **FINISH** to close the Add Solution window.

## Add Account



1. Use the **Scrollbar** to scroll down and view the Kubernetes management pack in the Installed Integrations section of the repository.
2. In Module 1 we viewed the content of the installed management pack, but we will not do so in this exercise. If you do want to view the content, click the **3 vertical dots** to open the window and click the **x** to close the window when complete.
3. Click **ADD ACCOUNT**.

## Select Account Type



The management pack provides several account types. In this exercise, we will use the Kubernetes account.

1. Click **Kubernetes**.

## Enter Account Information

Add Account - Kubernetes

[Home](#) / [Integrations](#) / [Account Types](#)

Cloud Account Information

Name	1 HOL TKG
Description	Add a short description for this account

Connect Information

Control Plane URL	2 https://172.16.10.3:6443
Collector Service	3 cAdvisor - DaemonSet
cAdvisor Port (DaemonSet)	4 31194

Credential

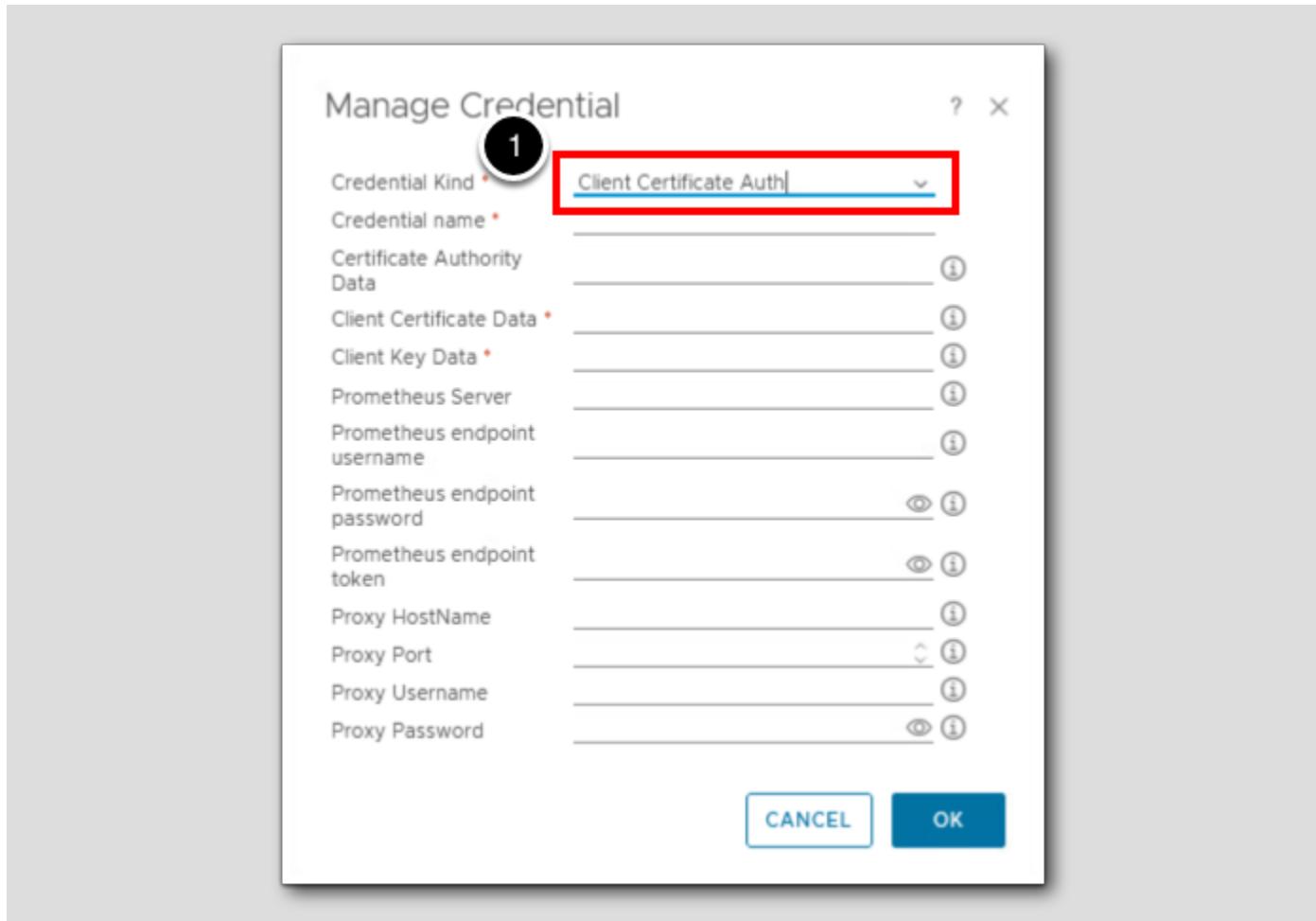
Collector / Group

[VALIDATE CONNECTION](#)

5 

1. For Name, type HOL TKG.
2. For Control Plane URL, type <https://172.16.10.3:6443>
3. For Collector Service, click on the select box and select cAdvisor - DaemonSet
4. For cAdvisor Port, type 31194
5. Click the + next to the Credential list to create a new credential.

## Select Credential Type

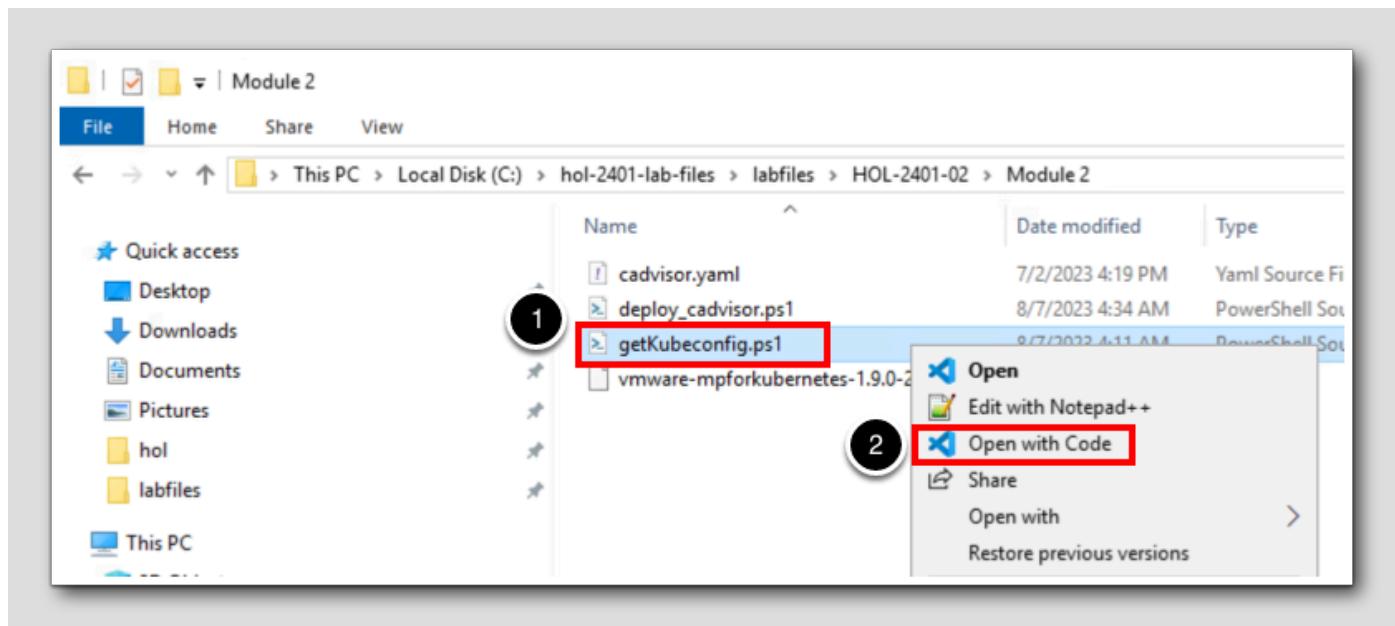


1. Click the select box next to Credential Kind, and change it to Client Certificate Auth.

Note that this adds several more options to the Manage Credential window. This information would normally come from our Kubernetes administrator, but in this exercise we are able to retrieve the information from the deployment ourselves.

2. Click the File Explorer icon in the Windows task bar (not shown) to return to Explorer.

## Open Script



1. Right click on the `getKubeconfig.ps1` file.
2. Select **Open with Code** from the menu to open this file.

Note: if you navigated away from the folder containing these files, click on the `labfiles` shortcut in the Quick access section and then navigate to the `HOL-2401-02` folder, and then to the `Module 2` folder.

## Run Script

The screenshot shows the Visual Studio Code interface. The title bar says "getKubeconfig.ps1 - Visual Studio Code [Administrator]". The left sidebar has several icons, one of which is highlighted with a black circle containing the number "1". Below the sidebar, there's a "RUN AND DEBUG: RUN" section with a "Run and Debug" button, which is also highlighted with a red box. To the right of this section, there are two tabs: "deploy\_cadvisor.ps1" and "getKubeconfig.ps1", with "getKubeconfig.ps1" being the active tab. The main code editor area displays a PowerShell script:

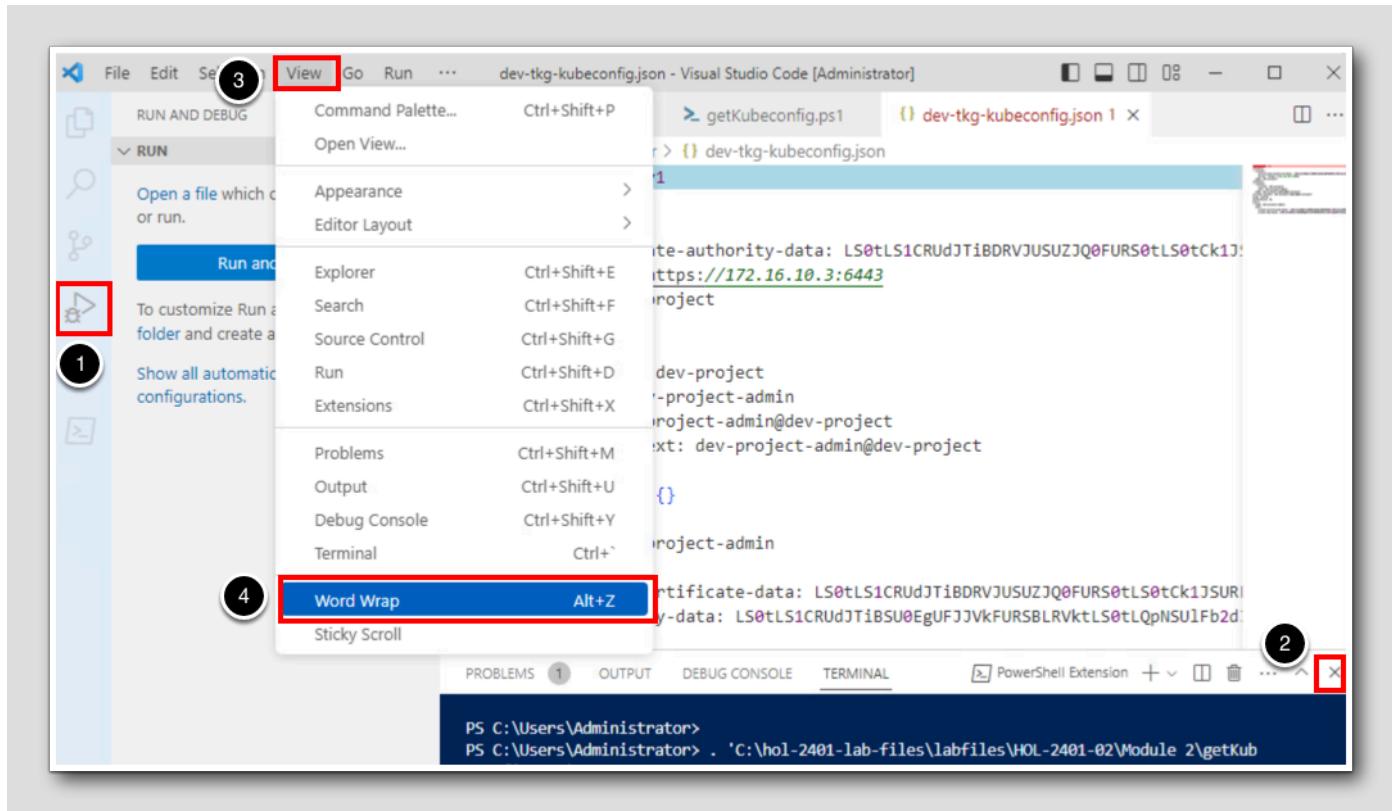
```
C: > hol-2401-lab-files > labfiles > HOL-2401-02 > Module 2 >
1 # Define variables
2 $VSPHERE_WITH_TANZU_CONTROL_PLANE_IP = '1
3 $VSPHERE_WITH_TANZU_CLUSTER_NAMESPACE =
4 $VSPHERE_WITH_TANZU_CLUSTER_NAME = "dev-tp
5 $VSPHERE_WITH_TANZU_USERNAME = 'administr
6 $ENV:KUBECTL_VSPHERE_PASSWORD = 'VMware1!
7
8 # Connect to Supervisor cluster and set context
9 kubectl vsphere login --vsphere-username=$VSPHERE_WITH_TANZU_USERNAME
10 kubectl config use-context rainpole
11
12 # Retrieve kubeconfig secret, decode, and copy to clipboard
13 $Secret = kubectl get secret dev-project-kubeconfig -n tkg-system -o yaml | ConvertFrom-Json
14 [Text.Encoding]::Utf8.GetString([Convert]::FromBase64String($Secret.data['kubeconfig']))
15 C:\Users\Administrator\dev-tkg-kubeconfig
```

This script will retrieve credential information from the TKG supervisor, and open it in Visual Studio Code.

1. Click **Run and Debug** to run the script. The script output will open in a new tab in Code once the script has completed.

Note: if you've closed the Run and Debug menu, click on the Run and Debug badge in the Activity Bar on the left to re-open it.

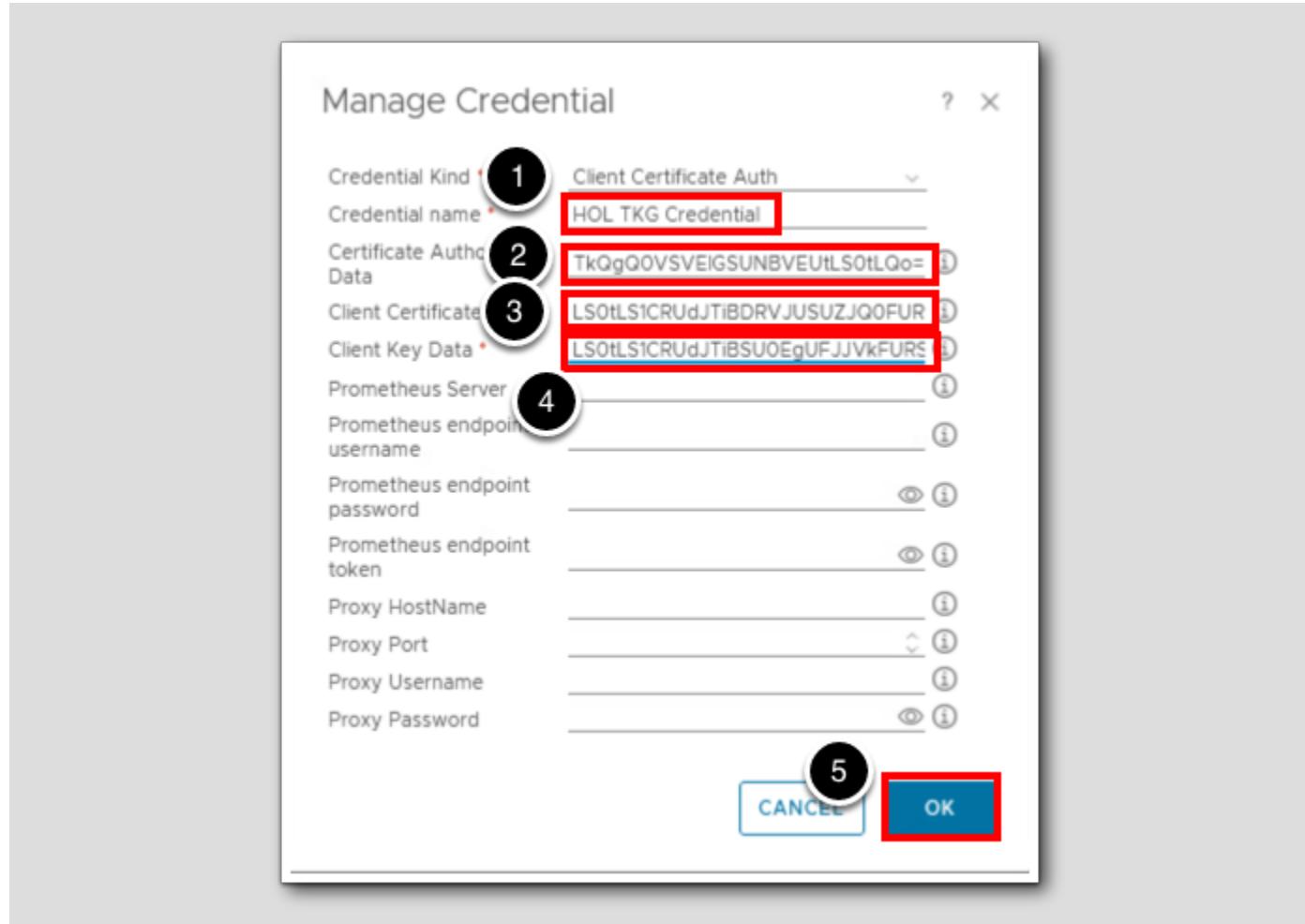
## View Script Output



The script output opens in a new tab in Visual Studio Code. However, it will be difficult to see all of the required values initially.

1. Click the Run and Debug icon in the Activity Bar on the left to close the Run and Debug pane.
2. Click the x in the terminal window on the lower right side to close the terminal.
3. Click on View to open the View menu.
4. Click Word Wrap to enable word wrap for this file.
5. Return to the Firefox browser (not shown) to continue.

## Copy and Paste Credential Info



Now that we have the required credential information, we can create the credential and continue with configuring the account.

Note: for steps 2-4 we will copy the information from the script output file in vscode and paste it into the respective fields. You can copy and paste using **ctrl+c** and **ctrl+v** in this lab.

1. For Credential Name, type **HOL TKG Credential**
2. For the Certificate Authority Data, copy the value from the kubeconfig file **certificate-authority-data** field (line 4) and paste here.
3. For the Client Certificate Data, copy the value from the kubeconfig file **client-certificate-data** field (line 18) and paste here.
4. For the Client Key Data, copy the value from the kubeconfig file **client-key-data** field (line 19) and paste here.
5. Click **OK**

## Complete Configuration and Validate

Add Account - Kubernetes

[Home](#) / [Integrations](#) / [Account Types](#)

Collector Service	cAdvisor - DaemonSet	(i)
cAdvisor Port (DaemonSet)	31194	(i)
Credential	HOL TKG Credential	x v + ⚒
Collector / Group	Default collector group	v
<b>1</b> <b>VALIDATE CONNECTION</b> <b>3</b>		
<b>2</b> Advanced Settings		
Auto-Discover TKG Workload Clusters	Deactivated	(i)
Auto-Delete TKG Workload Clusters	Deactivated	(i)
vCenter Server	vcsa-01a.corp.vmbeans.com	(i)
Java Process Monitoring	Deactivated	(i)
Delete nonexistent objects older than	Use Platform Global Setting	(i)
cAdvisor Install Check	Activated	(i)
<b>ADD</b>	<b>CANCEL</b>	

1. Click on Advanced Settings to open additional settings. Note: it may be necessary to scroll down to view these settings.
2. For vCenter Server, type `vcsa-01a.corp.vmbeans.com`
3. Click **VALIDATE CONNECTION**.
4. When the Review and Accept Certificate window appears, click **ACCEPT** to accept the certificate (not shown.)
5. Click **OK** to close the info window once the validation is complete (not shown.)

## Create Account and View Status

[61]

The screenshot shows the 'Integrations' page with the 'Accounts' tab selected. There are two accounts listed:

- vCenter**: Status is OK (indicated by a green checkmark icon). This account is highlighted with a red box labeled '1'.
- Kubernetes**: Status is OK (indicated by a green checkmark icon). This account is highlighted with a red box labeled '2'.

A refresh icon (a circular arrow) is highlighted with a red box labeled '3' in the top right corner of the header.

Clicking ADD in the previous step (not shown) will create the account and return us to the Accounts tab of the Integrations page. From here, we can verify the status of the configured account.

1. Click the > next to Kubernetes to open the account list.
2. Note the **Status** of the HOL TKG account. The status may initially show as Warning.
3. If the Status is not yet OK, click the Refresh icon in the upper right until the Status updates. This should take less than 30 seconds.

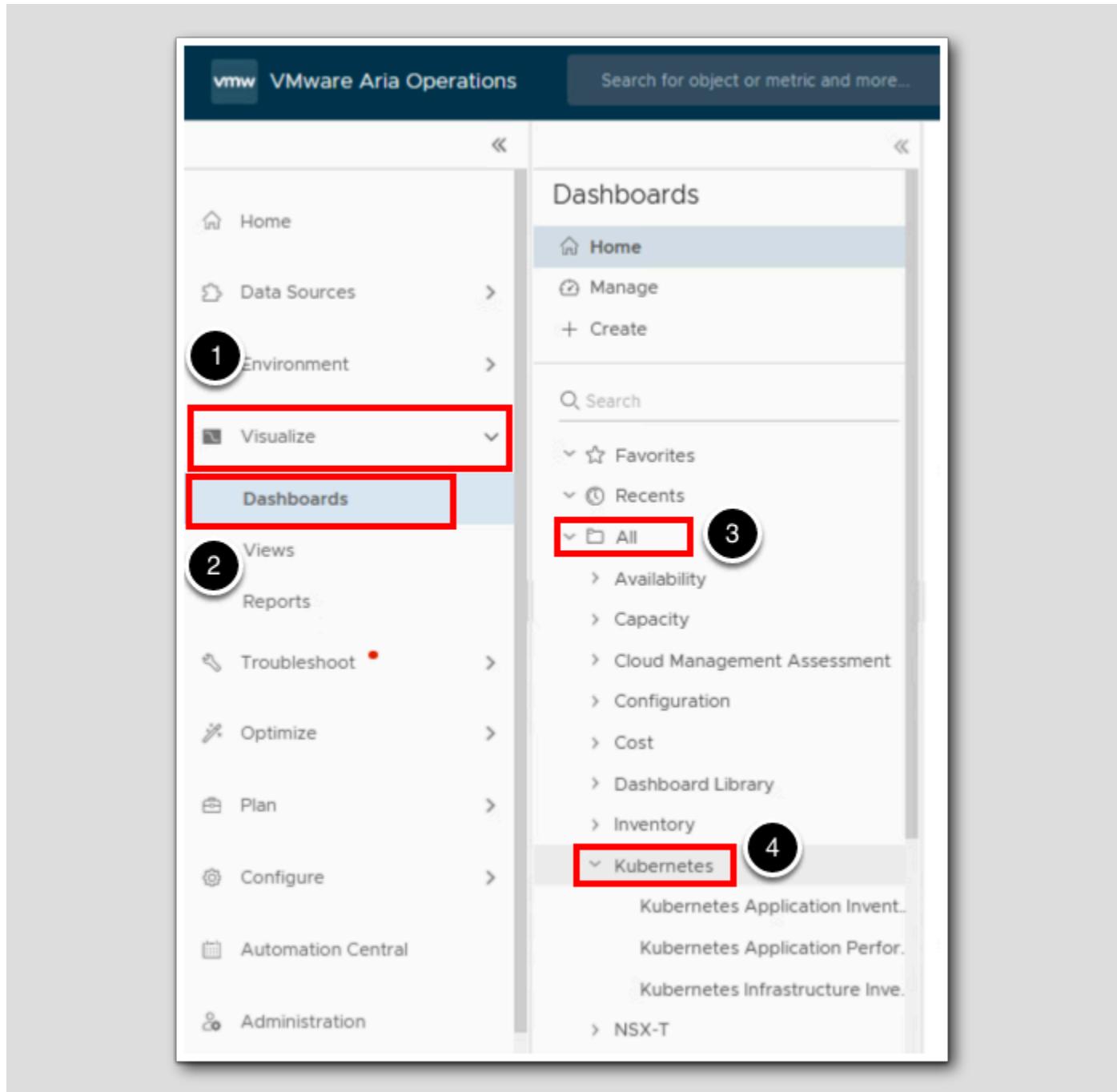
The Management Pack for Kubernetes has been installed in this environment.

## Review the Management Pack

[62]

Now that the VMware Aria Operations Management Pack for Kubernetes has been installed, we will review some of the functionality it provides.

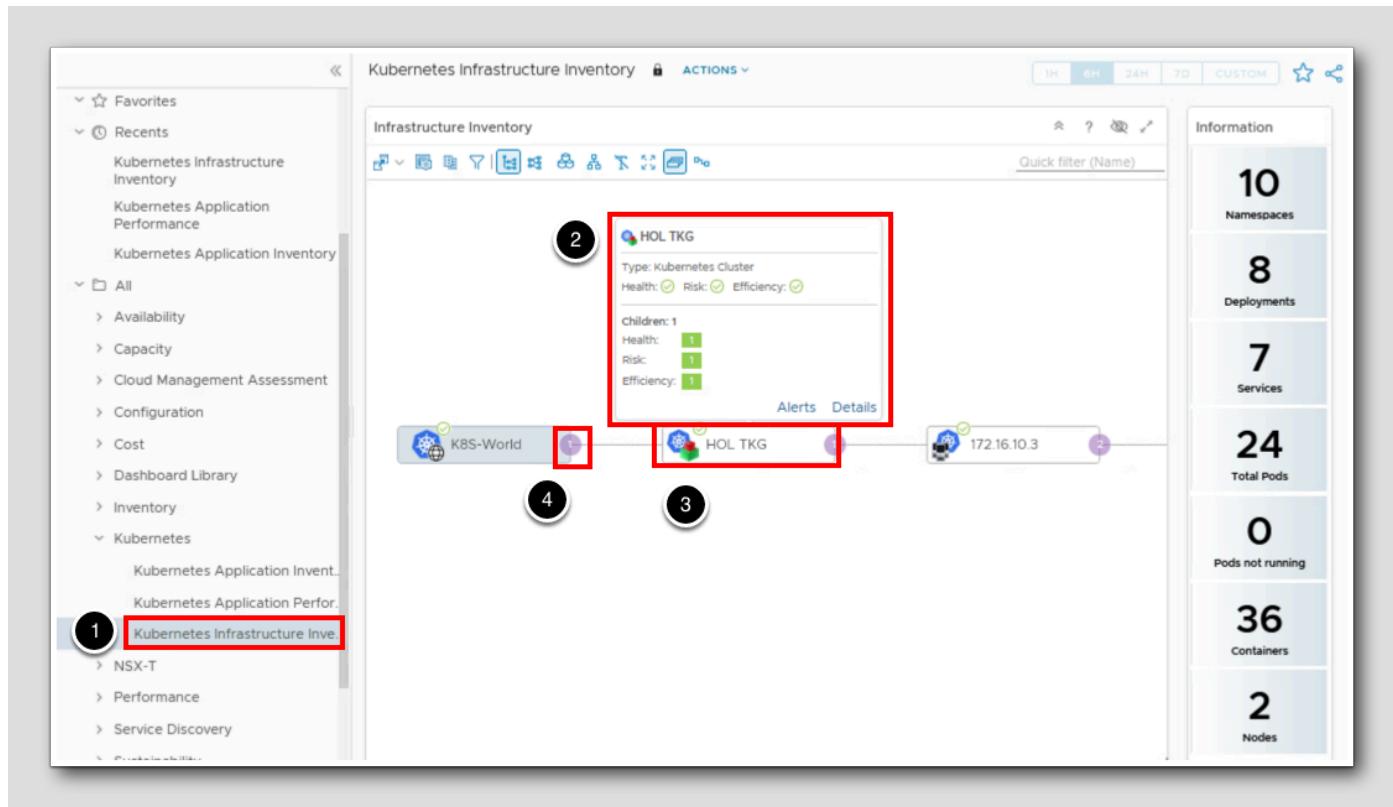
## Navigate to Dashboards



1. Click **Visualize** in the left navigation menu to expand the Visualize category.
2. Click **Dashboards**.
3. In the Dashboards list, click **All** to expand it.
4. Click **Kubernetes** to open the category and see the provided Kubernetes dashboards.

## View Kubernetes Infrastructure Inventory Dashboard

[64]



1. In the Kubernetes dashboard list, click on **Kubernetes Infrastructure Inventory** to open the dashboard.

This dashboard shows a visualization of the Kubernetes environment discovered by Aria Operations.

2. Mouse over any of the objects in this visualization to see a popup showing the overall health of the object.
3. Click on an individual object in the visualization, and the Information view on the right will update accordingly.
4. Click on the purple circles containing numbers to collapse or expand the view.

The other dashboards in this list (Kubernetes Application Inventory and Kubernetes Application Performance) similarly allow for visibility into running pods, namespaces, and workloads.

## Navigate to Object Browser

The screenshot shows the VMware Aria Operations interface. On the left, the navigation menu is open, with 'Environment' (circled 1) and 'Object Browser' (circled 2) selected. Under 'Object Browser', 'Kubernetes' is expanded, showing 'K8 Application' (circled 3) and 'K8 Infrastructure'. 'K8 Infrastructure' is also expanded, showing 'KBS-World' and 'HOL TKG' (circled 4). The main panel displays a 'Cluster View' with metrics: No of Nodes: 2, No of Namespaces: 10, No of Deployments: 8, and No of Pods: 24. Below this is a 'Performance' section with CPU Usage (0.35 Cores) and Memory Usage (2.64 GB) charts.

1. Click on **Environment** in the left navigation menu.
2. Click on **Object Browser**.
3. The Object Browser listing now includes Kubernetes components. Click the > next to Kubernetes to expand this menu, and then click the > next to K8 Infrastructure.
4. Click on **HOL TKG** to open the Summary view for the HOL TKG supervisor.

As with the vSphere environment, we can continue to expand the Kubernetes objects to drill down into the TKG supervisor, then to the deployed Tanzu Kubernetes Cluster, to the control plane and worker nodes for this cluster, and to running pods.

Scroll down to see all of the data provided for this object. We can click on the other objects in the Object Browser inventory to view similar summaries.

## View Provided Alerts

The screenshot shows the VMware Aria Operations interface. On the left, there is a navigation menu with several sections: Troubleshoot, Optimize, Plan (highlighted with a red box and number 1), Configure (highlighted with a red box and number 2), Policies, and Alerts (highlighted with a red box and number 2). Below these are Super Metrics, Applications and Services, Cost Drivers, Custom Profiles, Configuration Files, and Maintenance Schedules. In the center, the title is "Alert Definitions" under the path "VMware / Alerts / Alert Definitions". There is an "ADD" button and a search bar. To the right, a modal window titled "'Adapter Type': kubernetes" is open. It contains fields for Name, Adapter Type (set to "kubernetes" and highlighted with a red box and number 4), Object Type, Alert Type, and other dropdowns for Criticality and Impact. At the bottom of the modal are "VIEW MORE FILTERS", "CLEAR ALL", and "APPLY" buttons. A filter search bar at the top right of the main interface has a magnifying glass icon and a red box around it with number 3.

As with other management packs, the Management Pack for Kubernetes provides alerts in addition to dashboards and object views.

1. Click on **Configure** in the left navigation menu.
2. Click **Alerts** and then click **Alert Definitions** (not shown) to open the alert definitions list.
3. Click the **Filter** icon in the filter search bar.
4. For Adapter Type, type **kubernetes** and press **Enter**.

The listed alerts are provided by the Management Pack for Kubernetes. Feel free to click on any alert to view more detail, including symptoms and recommendations also provided by this management pack.

## Conclusion

In this module, we installed and reviewed the VMware Aria Operations Management Pack for Kubernetes. With the management pack installed, we were able to view some of the additional data that VMware Aria Operations is able to collect and display, and how it correlates to the rest of the environment.

## You've finished the module

Congratulations on completing the lab module.

For more information on getting started with Aria Operations, see the [VMware Aria Operations: Journey to Success](#) guide at the [VMware Apps & Cloud Management Tech Zone](#).

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the **TABLE OF CONTENTS** to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 3 - Advanced Capacity Management (30 minutes) Intermediate

### Introduction

[70]

In Aria Operations, capacity settings play a crucial role in effectively managing and optimizing the utilization of your infrastructure resources which is essential for effective resource management and optimization.

We will provide an understanding of various capacity settings so we can ensure efficient utilization of your infrastructure resources while maintaining high availability and minimizing risks.

At the end of this lab we will have discussed these topics:

- Capacity Models and Algorithms
- Configuring Policy Settings
- Criticality Thresholds
- Allocation Model vs. Demand Model
- Risk Level (Conservative vs. Aggressive)
- HA and Buffers
- Business Hours

Remember, customizing these settings based on your organization's unique requirements is key to achieving optimal results.

### Log in to Aria Operations

[71]

We will log in to a live instance of Aria Operations running in this lab.

### Open the Firefox Browser from the Windows Task Bar

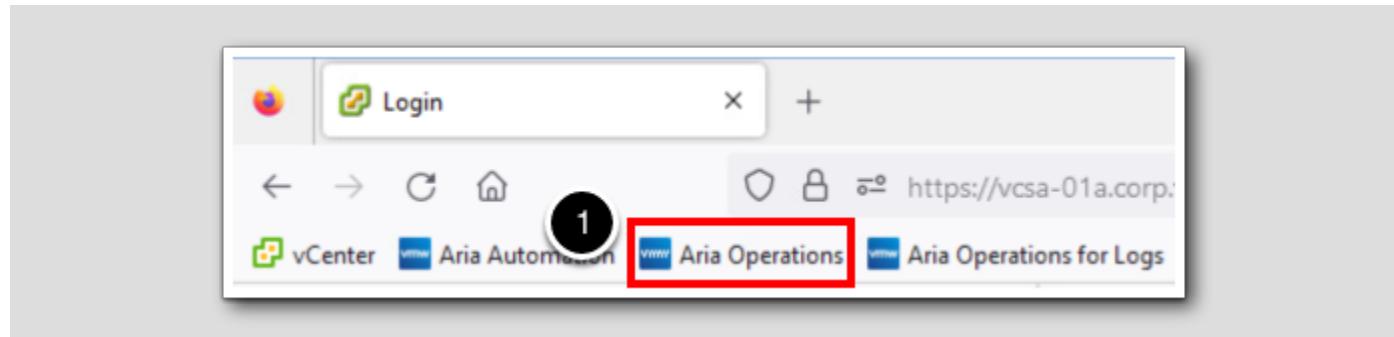
[72]



If the browser is not already open, launch Firefox.

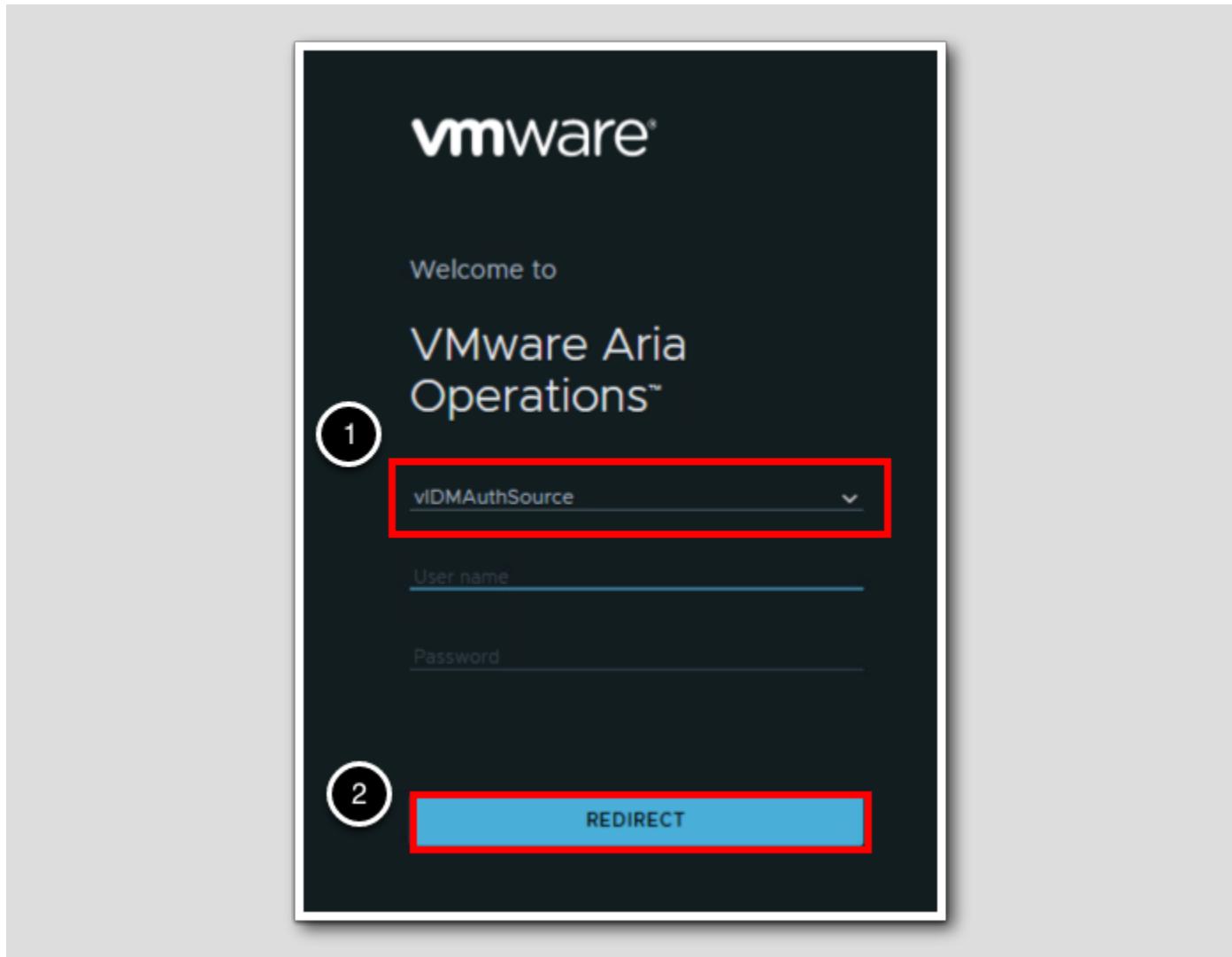
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

## Navigate to Aria Operations



1. Click the **Aria Operations** bookmark in the bookmarks toolbar.

## Log in to Aria Operations

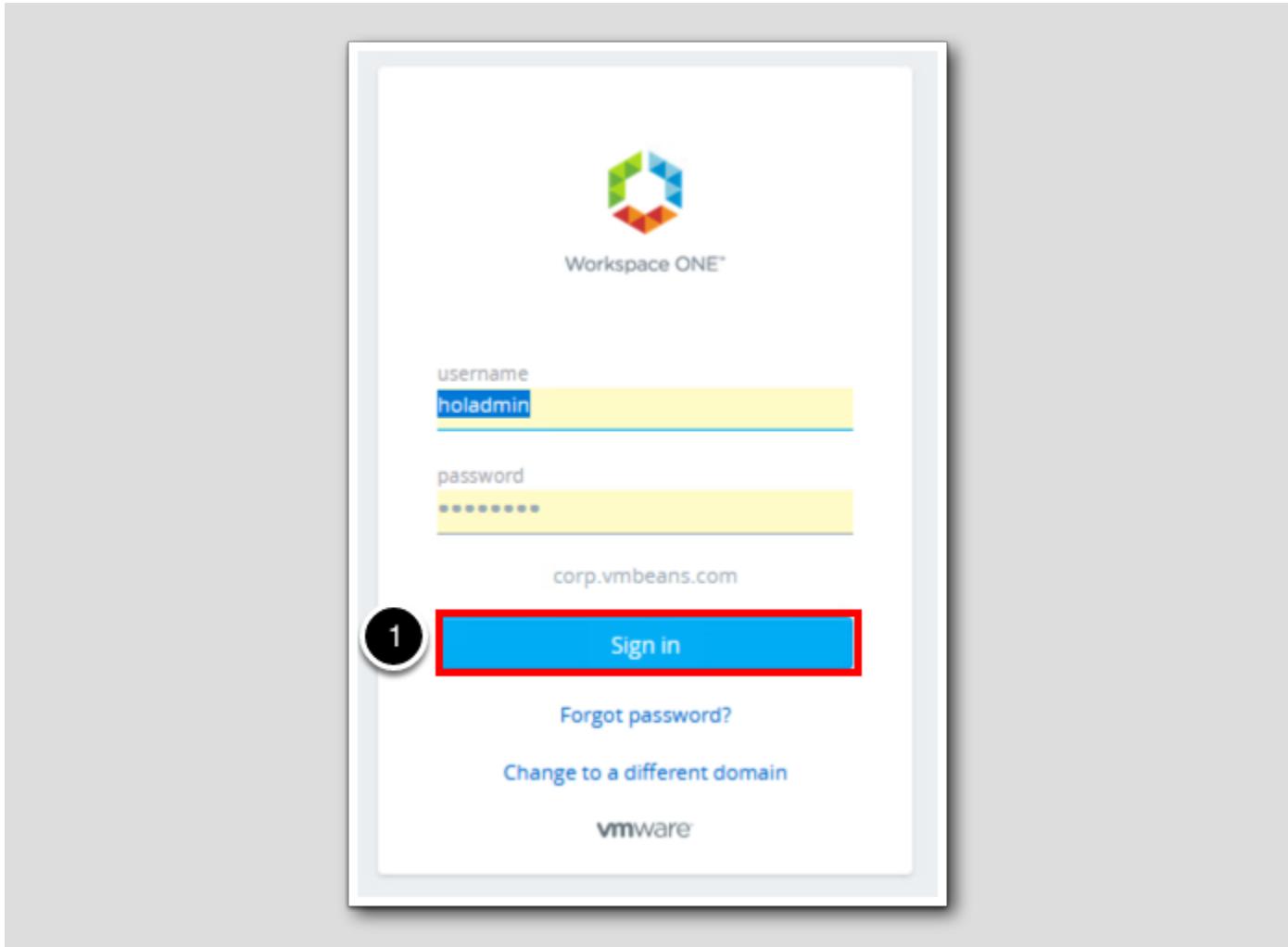


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

vIDMAuthSource may be pre-selected as the default identity source. If it is not, then you will need to select it.

1. Click the drop-down arrow and select vIDMAuthSource if it is not already selected.
2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login



VMware Identity Manager acts as the identity provider for the Active Directory authentication source in this lab. The credentials **holadmin/VMware1!** for the default user, holadmin, have already been provided.

1. Enter **holadmin** into the username field.
2. Into the password field, Enter **VMware1!**
3. Click **Sign in**

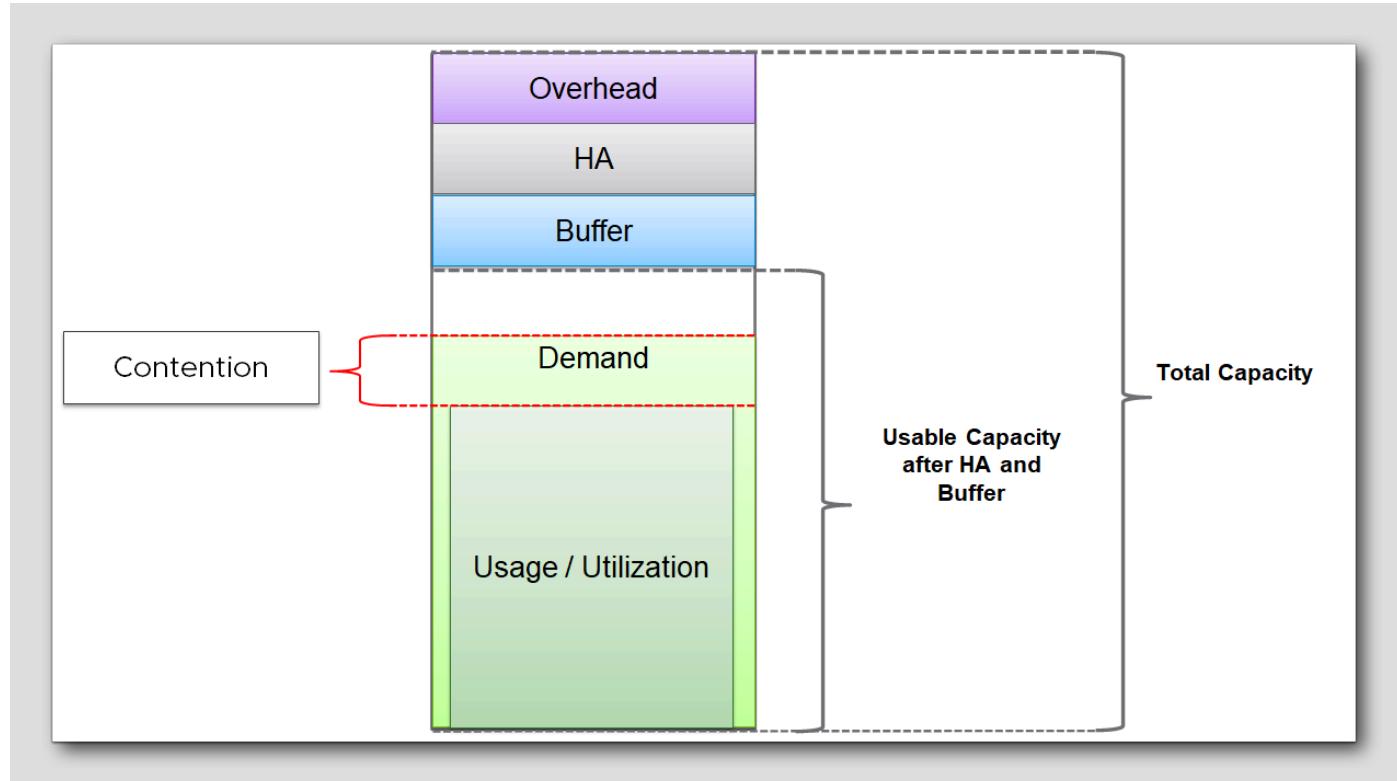
## Understanding Capacity Settings

In this lesson, we'll look at VMware Aria Operations **Capacity Management**. We'll discuss what it is, how the engine works, predictions, and policies. This will include some images and reading to help explain things.

VMware Aria Operations uses an advanced capacity engine to predict resource needs based on industry data, preventing resource deficits.

With Aria Operations, you can view both current and projected capacity across your private cloud, and unlike vCenter's real-time resource view, Aria Operations offers forward-looking analytics for proactive planning.

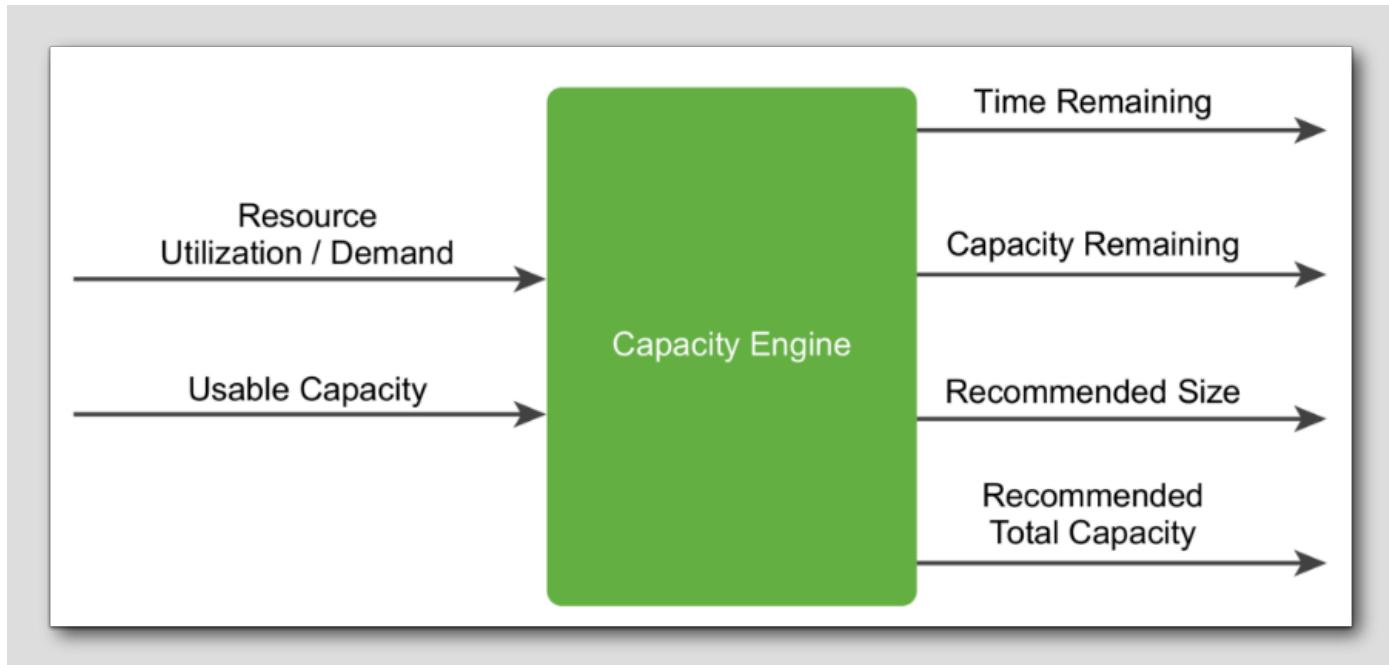
## Aria Operations Capacity Definitions



### Definitions

- Total Capacity: All available resources (CPU, memory, disk space, IOPS) in the environment.
- Usage: Resources presently utilized by VMs and system services.
- Demand: Resources needed by VMs; equals usage unless a resource is constrained.
- Usable Capacity: Total capacity minus a buffer set aside for workload spikes.
- Usable Capacity after HA and Buffer: Usable capacity less resources reserved for HA failover.

## Capacity Engine and Calculations



The capacity engine analyzes historical utilization and projects future workload by using real-time predictive capacity analytics, which is based on an industry-standard statistical analysis model of demand behavior. The image shows how Demand and Usable Capacity are used to estimate certain output metrics.

**Inputs:**

- Demand
- Usable Capacity

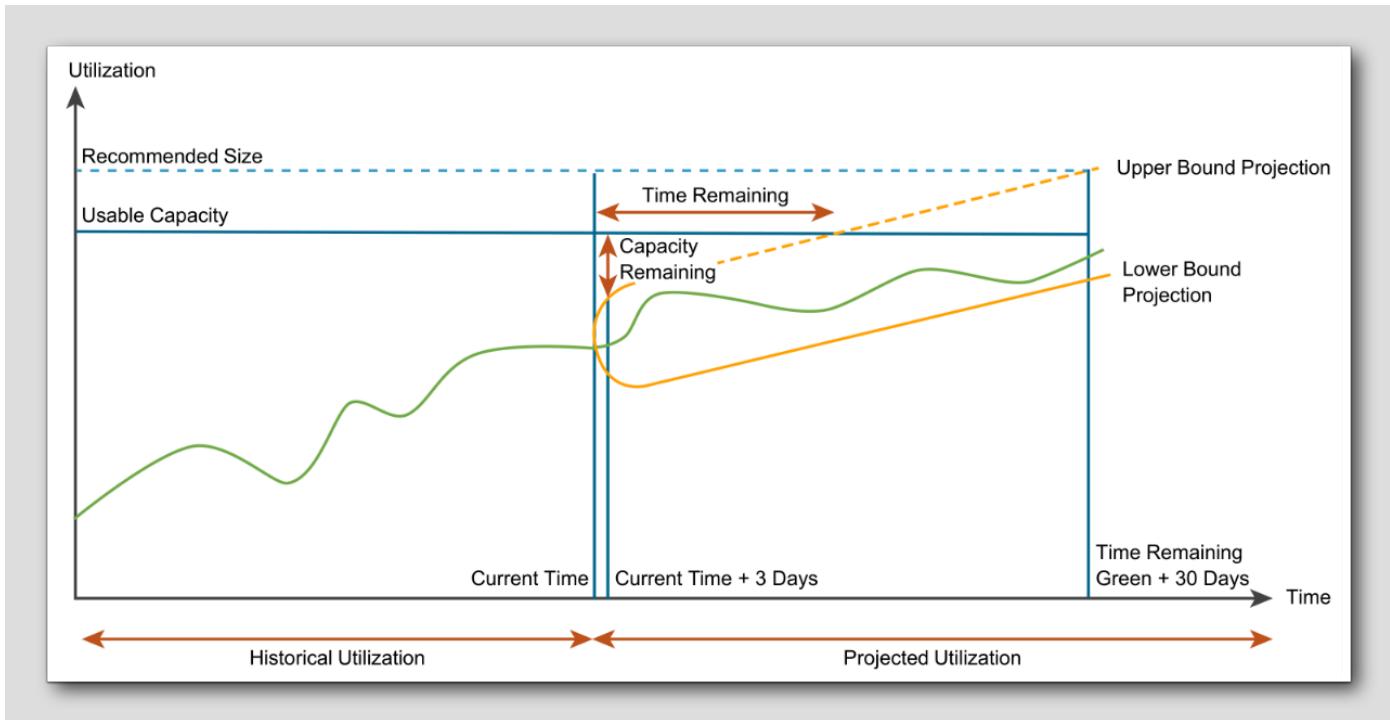
**Outputs:**

- **Time Remaining:** Days until usable capacity threshold is exceeded or estimated time before full utilization.
- **Capacity Remaining:** Available capacity. Difference between current capacity and projected use in the next 3 days. If over 100% used, it's 0
- **Recommended Size:** Optimal resource configuration. Predicted need for 150 days ahead, excluding HA settings. Aria Operations caps this:
  - **Oversized:** Max 50% of current. If 8 vCPUs use only 10% CPU, reclaim just 4 vCPUs, not 7.
  - **Undersized:** Max 100% of current. If 4 vCPUs are always busy, only add 4 vCPUs, not 8.
- **Recommended Total Capacity:** Required future capacity. Predicted need for 150 days ahead, including HA settings.

**Projection**

Metrics helps us with workload management, resource allocation, and capacity planning. The projection window for the capacity engine is 1 year into the future. The engine consumes data points every 5 minutes to ensure real-time calculation of output metrics.

## Projection - Conservative Risk



The figure shows the capacity calculations for a *conservative risk level*.

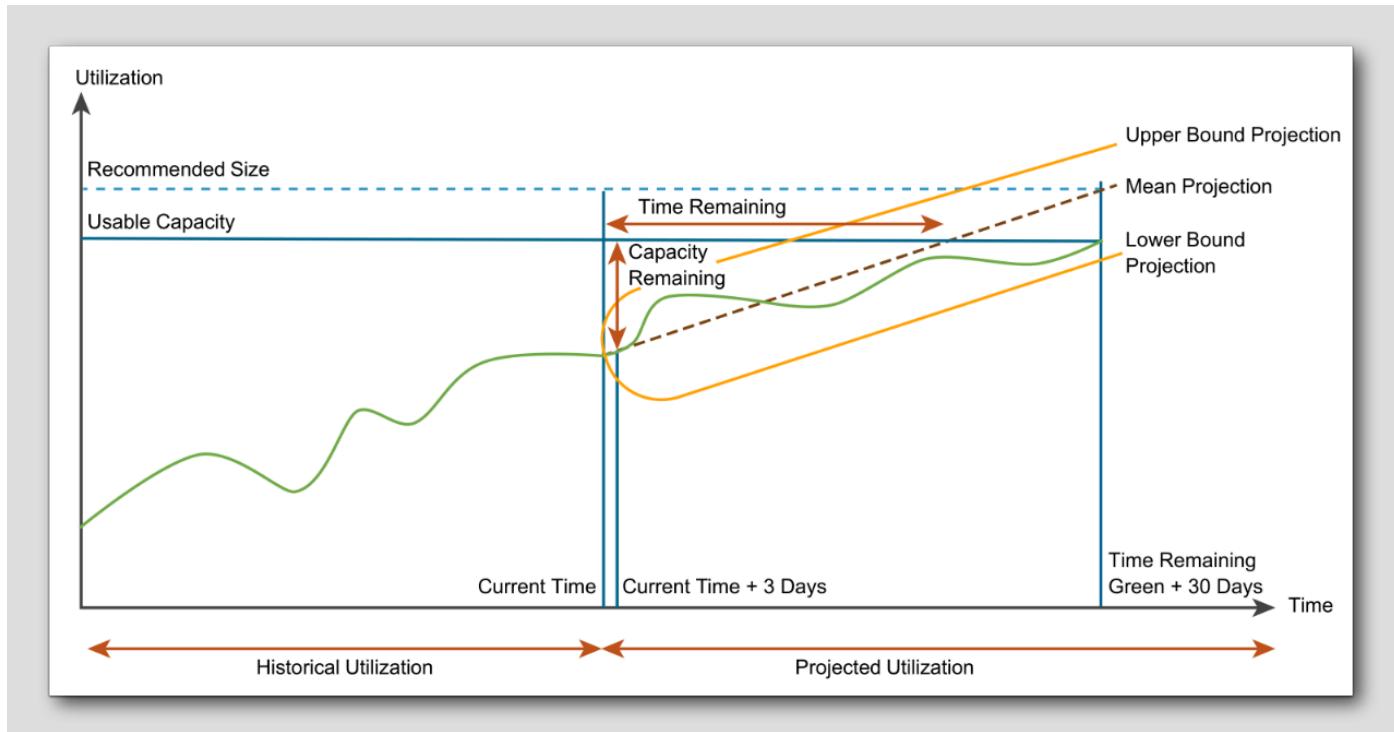
### Conservative Risk Level

In Aria Operations, capacity calculations can be adjusted based on the desired risk level, allowing you to customize the level of conservatism in capacity planning. Capacity calculations at a conservative risk level prioritize stability, ensuring ample resources for future growth and potential spikes in demand. This setting takes a more cautious approach to capacity planning, allowing for more headroom and buffer in resource allocations. It may result in lower consolidation ratios and higher resource overhead.

Conservative risk level settings can also be adjusted typically in the capacity planning or policy settings, where you can specify the desired level of conservatism.

**Upper bound / Lower bound:** Upper bound projection and lower bound projection are concepts used in forecasting and predicting future values or trends. The capacity engine projects the future workload in a range. Capacity calculations are based on the time remaining and risk level. The engine considers the upper bound projection for a conservative risk level and the *mean* of the upper bound projection and lower bound projection for an aggressive risk level.

## Projection - Aggressive risk

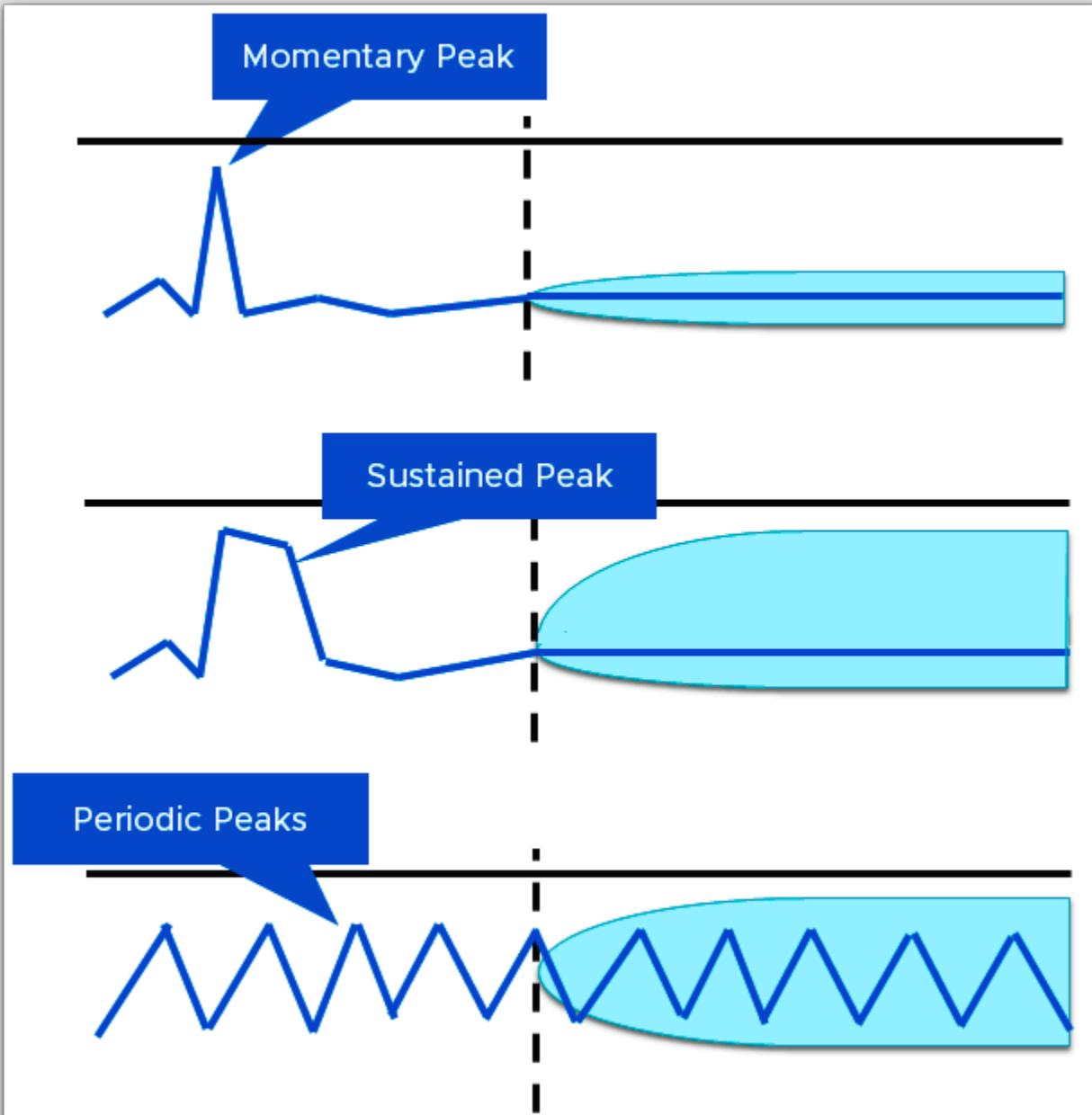


## Aggressive Risk Level:

- Capacity calculations at an aggressive risk level aim to maximize resource utilization and minimize overhead.
- This setting assumes a higher tolerance for risk and allows for more aggressive allocation of resources.
- It may result in higher consolidation ratios and tighter resource utilization.

Aggressive risk level settings can be adjusted typically in the capacity planning or policy settings, where you can specify the desired level of aggressiveness.

## Utilization Peaks



The historical utilization of resources can have peaks, which are periods of maximum utilization. The projection of future workload depends on the types of peaks. According to the frequency of peaks, they can be momentary, sustained, or periodic.

#### Momentary Peaks

Short-lived peaks that are a one-time occurrence. The peaks are not significant enough to require additional capacity, so they do not impact capacity planning and projection.

#### Sustained Peaks

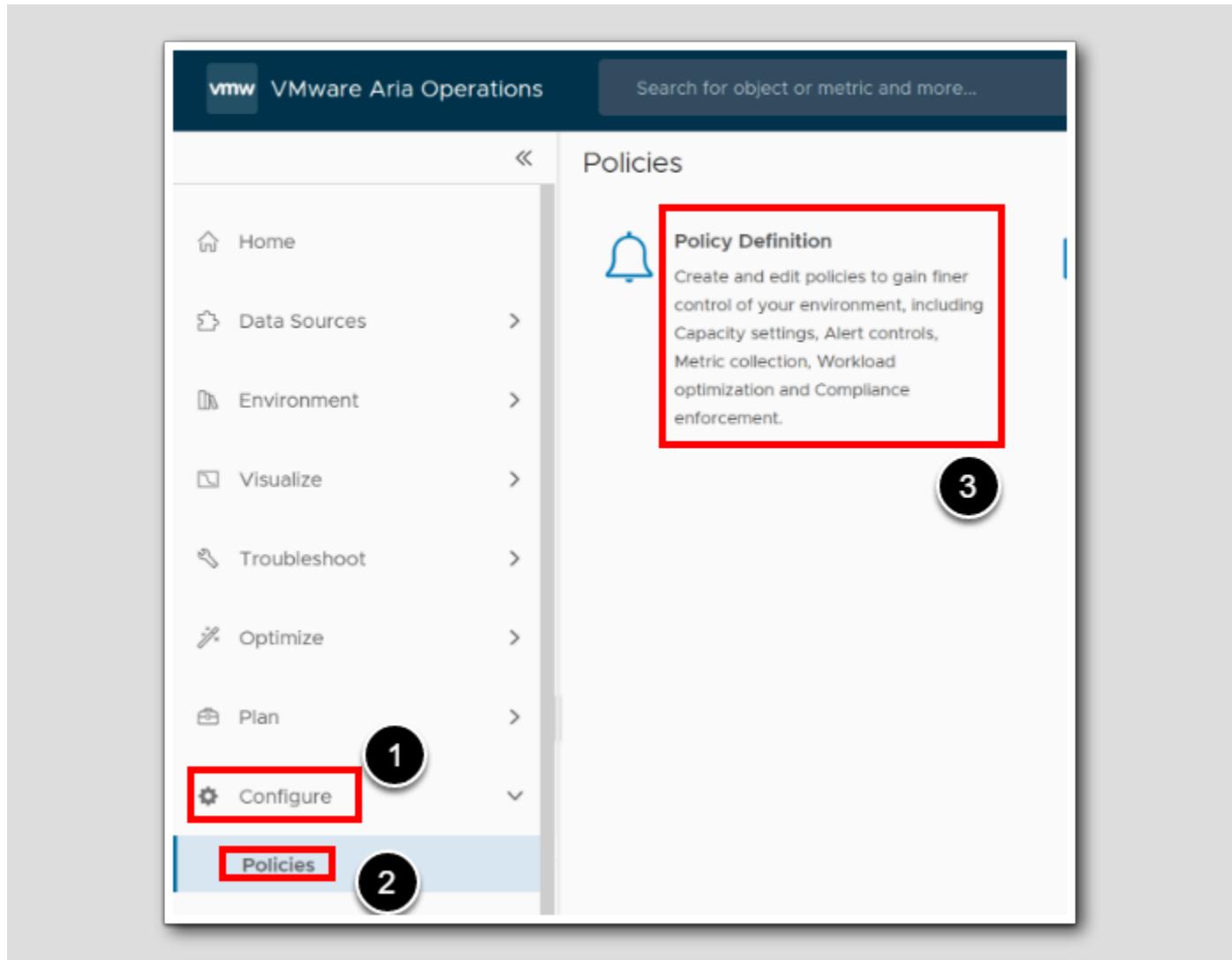
Peaks that last for a longer time and impact projections. If a sustained peak is not periodic, the impact on the projection lessens over time because of exponential decay.

#### Periodic Peaks

Peaks that exhibit cyclical patterns or waves. The peaks can be hourly, daily, weekly, monthly, during the last day of the month, and so on. The capacity engine also detects multiple overlapping cyclical patterns.

Let's see if we can find these settings in the policy...

## Capacity Policy



Let's have a look at the policy

1. Click Configure
2. Click Policies
3. Click Policies Definition

## Edit Policy definition

Name	Status	Priority
Set Default Policy	Inactive	
Import	Inactive	
Export	Inactive	
Reorder Policies	Inactive	
HOL Policy	Inactive	
NSX-T Security Configuration Guide	Inactive	
Policy for Virtual Machines - Risk Profile 1	Inactive	
Policy for Virtual Machines - Risk Profile 2	Inactive	
Policy for Virtual Machines - Risk Profile 3	Inactive	
vSAN Security Configuration Policy	Inactive	
vSphere Security Configuration Guide	Inactive	
<b>vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM)</b>	<b>Active</b>	<b>D</b>

We are going to edit the default policy, but normally you would have multiple policies for multiple purposes.

1. In the policy list, find and highlight the Status Active and Priority Default (D)
2. Click the ellipsis menu
3. Choose Edit

## Go to Capacity

vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM) [Edit]

**Name:** vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM) [🔗](#)

**Description:** - None - [🔗](#)

**Inherit From:** Base Settings

**1**

<b>Metrics and Properties</b>	<b>Alerts and Symptoms</b>	<b>Capacity</b>
Locally defined attributes None	Locally defined alerts 113 Locally defined symptoms None	Locally defined policy elements None

1. Click Capacity

## Expand first section

vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM) [Edit]

**Capacity**

- Time Remaining Calculations
- Business Hours
- Capacity Settings

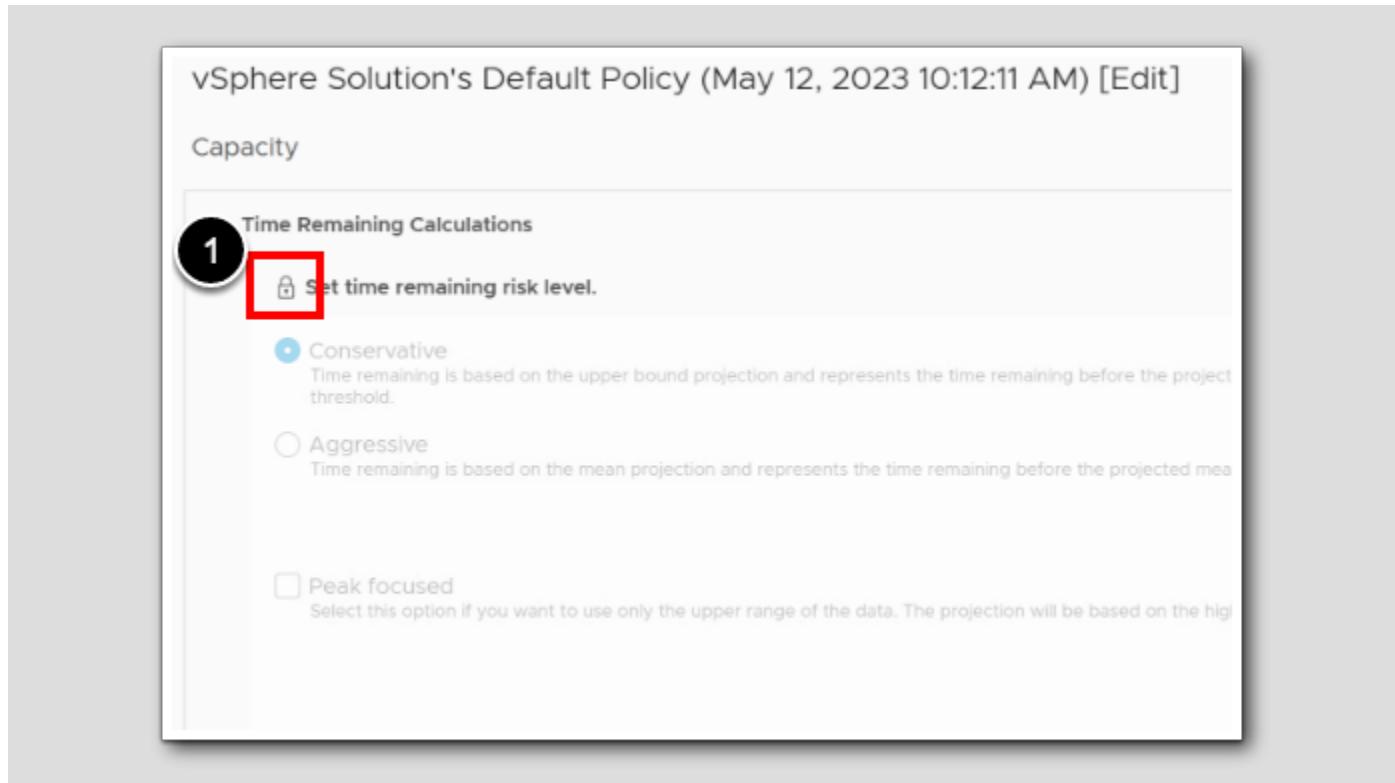
**1**

?

Expand

1. If we scroll to the top, we will see Time Remaining Calculations, Click the Expand Arrows

Open the settings



The capacity settings for host systems, virtual machines, and other object types that you select appears in the workspace.

1. To open the settings, Click on the padlock

## Conservative time remaining

**Capacity**

**Time Remaining Calculations**

Set time remaining risk level.

**1** **Conservative**  
Time remaining is based on the upper bound projection and represents the time remaining before the projected upper bound crosses the usable capacity threshold.

**Aggressive**  
Time remaining is based on the mean projection and represents the time remaining before the projected mean crosses the usable capacity threshold.

**2** **Peak focused**  
Select this option if you want to use only the upper range of the data. The projection will be based on the high utilization points.

**3** **Conservativeness Level**  
Levels: 3

You can set the risk level for the time that is remaining when the forecasted total need of a metric reaches usable capacity.

1. To use the option for production and mission-critical workloads, we select **Conservative**.
  2. Unselect **Peak focused**: Select this option if you want to use only the upper range of the data. The projection will be based on the high utilization points.
  3. Conservativeness Strength \*: You can tune the level of Conservativeness Level from 1-5, with level 1 being the least conservative and level 5 being the most conservative. By default, the level of conservativeness is set to 3.
- Leave the Conservativeness Level at level 3

Rare and momentary peaks may be considered outliers and may not impact the projections even at the most conservative risk level.

\* Conservativeness strength is supported by the Conservative risk level. The Aggressive risk level produces Time Remaining, Capacity Remaining, Recommended Size metrics always based on the mean of the projection.

The upper bound will vary based on the level of conservativeness that you choose. Modifying the level of conservativeness will make the projection bounds narrower or wider. Higher the level, the wider the bounds and more conservative the projections for Time Remaining, Capacity Remaining, and Recommended Size.

## Aggressive Time Remaining

Capacity

Time Remaining Calculations

Set time remaining risk level.

Conservative  
Time remaining is based on the upper bound projection and represents the time remaining before the projected upper bound crosses the usable capacity threshold.

Aggressive  
Time remaining is based on the mean projection and represents the time remaining before the projected mean crosses the usable capacity threshold.

Peak focused  
Select this option if you want to use only the upper range of the data. The projection will be based on the high utilization points.

Now

Historical Utilization  
Aggressive (Mean)  
Usable Capacity  
Projection

Conservativeness Level  
Levels: 3

You can set the risk level for the time that is remaining when the forecasted total need of a metric reaches usable capacity. Let's change from Conservative to Aggressive.

1. For non-critical workloads, select **Aggressive**.
2. Unselect **Peak focused**: Select this option if you want to use only the upper range of the data. The projection will be based on the high utilization points.

Note: The Aggressive risk level produces Time Remaining, Capacity Remaining, Recommended Size metrics always based on the mean of the projection. You see this demonstrated in the little illustration on the right.

## Saving and Exiting

vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM) [Edit]

Capacity

Time Remaining Calculations

Set time remaining risk level.

Conservative  
Time remaining is based on the upper bound projection and represents the time remaining before the projected upper bound crosses the usable capacity threshold.

Aggressive  
Time remaining is based on the mean projection and represents the time remaining before the projected mean crosses the usable capacity threshold.

Peak focused  
Select this option if you want to use only the upper range of the data. The projection will be based on the high utilization points.

Now

Historical Utilization  
Aggressive (Mean)  
Usable Capacity  
Projection

Conservativeness Level

Levels: 3

Business Hours

Capacity Settings

1 Criticality Thresholds

**SAVE** **CANCEL**

A red box highlights the 'SAVE' button at the bottom left of the dialog box.

1. To save and exit, Click SAVE

## Comparing Aria Operations with vCenter

FEATURE	ARIA OPERATIONS	VCENTER SERVER
Buffer	Allows setting up a buffer capacity to handle workload spikes	<i>Not provided</i>
Usable Capacity	Calculated by deducting the buffer and overhead from the total capacity	<i>Not provided</i>
Usable Capacity after HA	Calculated by deducting HA reservations from usable capacity	<i>Not provided</i>
What-If Analysis	Allows modeling various scenarios to predict their impact on capacity	<i>Not available</i>
Usage	Amount of resource that is currently being used by your VMs and other system services.	<i>The Same</i>
Demand	Amount of a resource that your VMs would use if there were <u>no constraints</u> .	<i>The Same</i>
Total Capacity	Total amount of a resource in the environment	<i>The Same</i>
Consumed	Resources allocated and used or recently used	<i>The Same</i>
HA (High Availability)	Deducts resources reserved for HA from usable capacity	Configures and manages HA. Doesn't deduct it from displayed capacity!
Overhead	Overhead is deducted from total capacity to calculate usable capacity	Displays overhead usage. Doesn't deduct it from total capacity!
Utilization	Detailed utilization metrics across various timescales	Real-time utilization data
Contention	Contention metrics, useful for identifying overcommitment issues	Real-time contention data. Lacks historical trend analysis!
Entitlement	Approximated using <b>Demand</b> and <b>Allocated Capacity</b> metrics	Amount of a resource a VM is entitled to, based on shares, reservations, and limits
Active	Approximated using the <b>Workload</b> metric	Amount of a resource a VM is actively using
Granted	Approximated using the <b>Demand</b> metric	Amount of a resource that the host has granted to a VM
Capacity Analytics	Advanced analytics for capacity prediction	Very limited capacity analytics
Policy-Based Management	Allows granular control over capacity management based on policies	Resource allocation managed through shares, reservations, and limits but not at the same granular policy-based level!

The table shows a Comparison of capacity-related features in Aria Operations and vCenter Server

Aria Operations is focused on capacity planning and ensuring you have enough resources to meet your workload needs now and in the future, taking into account buffers for workload spikes and HA failovers. vSphere/vCenter terms are more operationally focused, detailing how resources are allocated and used at a given point in time. While vSphere/vCenter gives you the real-time operational perspective, Aria Operations adds the predictive analytics and capacity planning layer that helps you stay proactive and plan for the future.

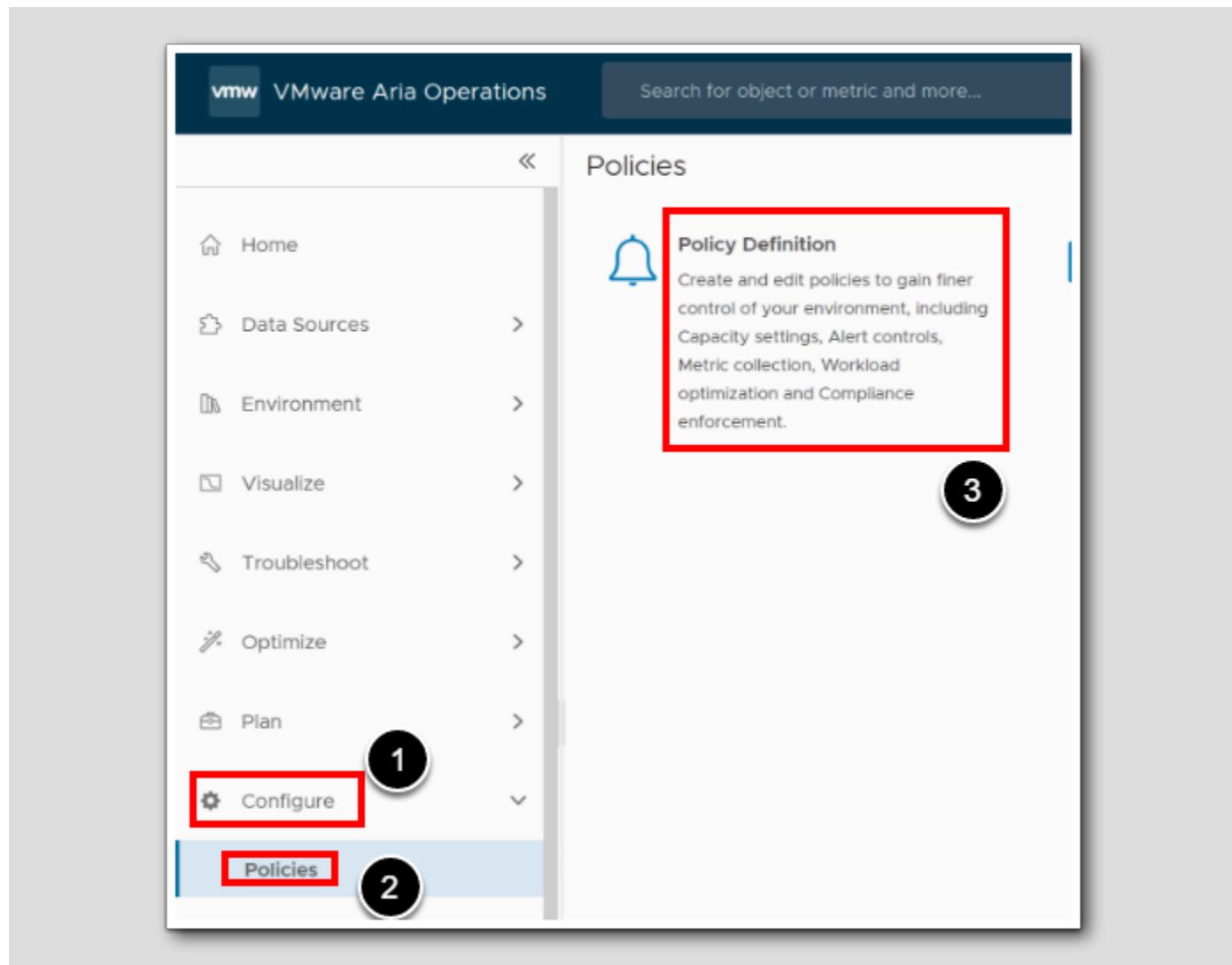
Note: The 'Usage' and 'Demand' terms are conceptually similar in both Aria Operations and vSphere/vCenter, representing the amount of a resource being used and the amount needed by VMs. However, Aria Operations provides additional capacity metrics (Usable Capacity, Usable Capacity after HA and Buffer) that take into account the extra resources needed to handle workload spikes and HA failover, which vSphere/vCenter does not explicitly provide.

Approximations are used for "Active", "Granted", and "Entitlement" in Aria Operations, and they may not exactly match the vSphere calculations due to the differences in how vSphere and Aria Operations calculate and interpret these metrics.

## Configure Policy Settings

During this section we will investigate all the policy settings related to capacity. We have already set the Capacity time remaining calculations to Aggressive, meaning that the time remaining is based on the mean projection and represents the time remaining before the projected mean crosses the *usable capacity* threshold. This can be reviewed in the previous section [Projection - Aggressive risk](#)

## Capacity



1. Click Configure
2. Click Policies
3. Click Policies Definition

## Edit Policy definition

Name	Status	Priority
Set Default Policy	Inactive	
Import	Inactive	
Export	Inactive	
Reorder Policies	Inactive	
HOL Policy	Inactive	
NSX-T Security Configuration Guide	Inactive	
Policy for Virtual Machines - Risk Profile 1	Inactive	
Policy for Virtual Machines - Risk Profile 2	Inactive	
Policy for Virtual Machines - Risk Profile 3	Inactive	
vSAN Security Configuration Policy	Inactive	
vSphere Security Configuration Guide	Inactive	
<b>vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM)</b>	<b>Active</b>	<b>D</b>

We are going to edit the default policy, but normally you would have multiple policies for multiple purposes.

1. In the policy list, find and highlight the Status Active and Priority Default (D)
2. Click the ellipsis menu
3. Choose Edit

## Go to Capacity

vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM) [Edit]

Name: vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM) [🔗](#)

Description: - None - [🔗](#)

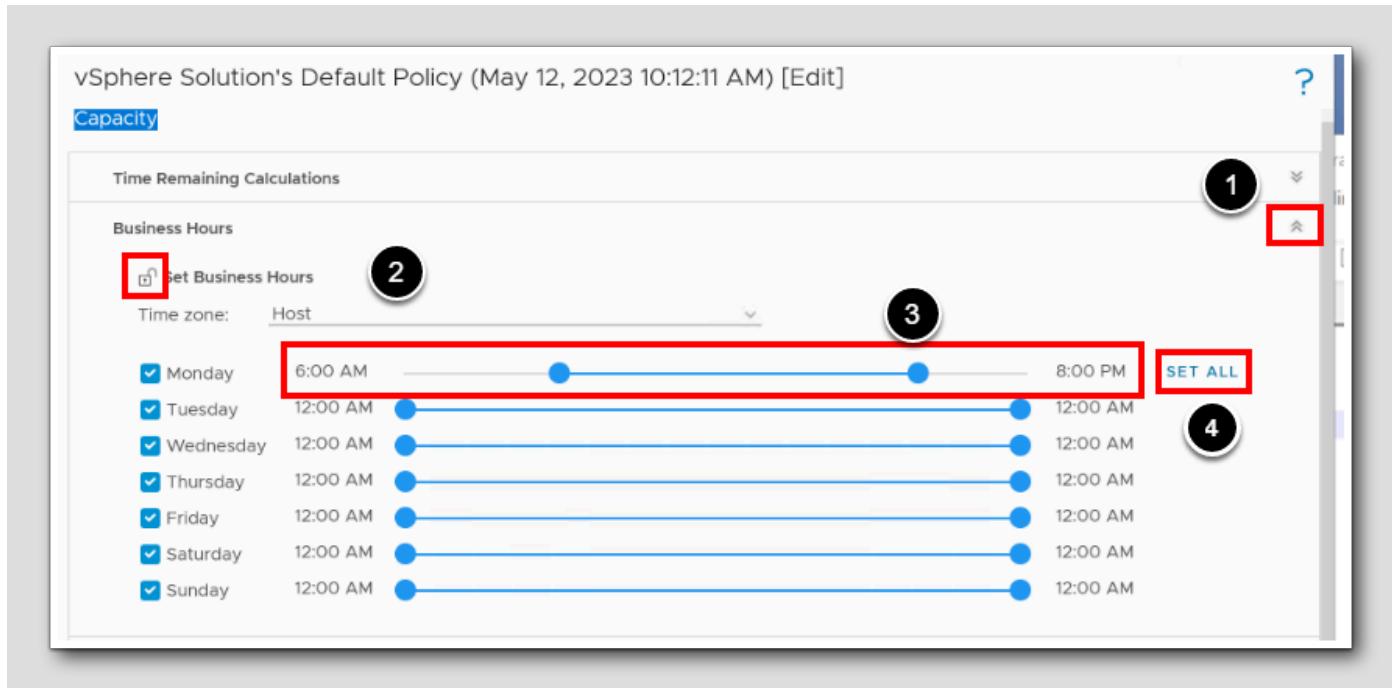
Inherit From: Base Settings

1

Metrics and Properties	Alerts and Symptoms	Capacity
Locally defined attributes None	Locally defined alerts 113 Locally defined symptoms None	Locally defined policy elements None

1. Click Capacity

## Set business hours



## Business Hours Schedule

Note: You can set business hours schedule for VMs and clusters only. After you specify business hours, the capacity forecast for the object will be based on the business hours and not 24 hours.

1. Expand **Business Hours**
2. Unlock business hours by clicking the padlock
3. Under Monday, set the business hours from **6am** (06:00) to **8pm** (20:00)
4. Click **SET ALL**

Configure business hours according to your time zone for enhanced capacity analysis and projections in VMware Aria Operations. Non-business hour activities on VMs, such as OS upgrades or virus scans, can skew perceived idleness. By setting business hours, off-hour metrics can be effectively analyzed for inventory, compliance, and troubleshooting. Analysis and recommendations for reclamation and rightsizing consider only these hours, ignoring post-business hour spikes. Policies allow different objects to have varied business hours, which are reflected in capacity charts.

## Capacity Settings

The screenshot shows the 'Capacity Settings' page in the vSphere Web Client. The left sidebar lists resources under 'vCenter': 'Cluster Compute Resou...', 'Datastore', and 'Datastore Cluster'. A red box labeled '1' highlights the top right corner of the header bar. A red box labeled '2' highlights the 'Allocation Model' section. A red box labeled '3' highlights the 'Capacity Buffer' section. Red arrows point from the numbered boxes to their respective sections.

**Allocation Model** ⓘ  
Set overcommit ratio, to enable Allocation Model

CPU :1  
 Memory :1  
 Disk Space :1 ⓘ

Consider Powered off VMs  
 Activate

**Custom Profile** ⓘ  
Select properties

**Capacity Buffer** ⓘ

CPU

Demand	0 <input type="button" value="▲"/> %
Allocation	0 <input type="button" value="▼"/> %

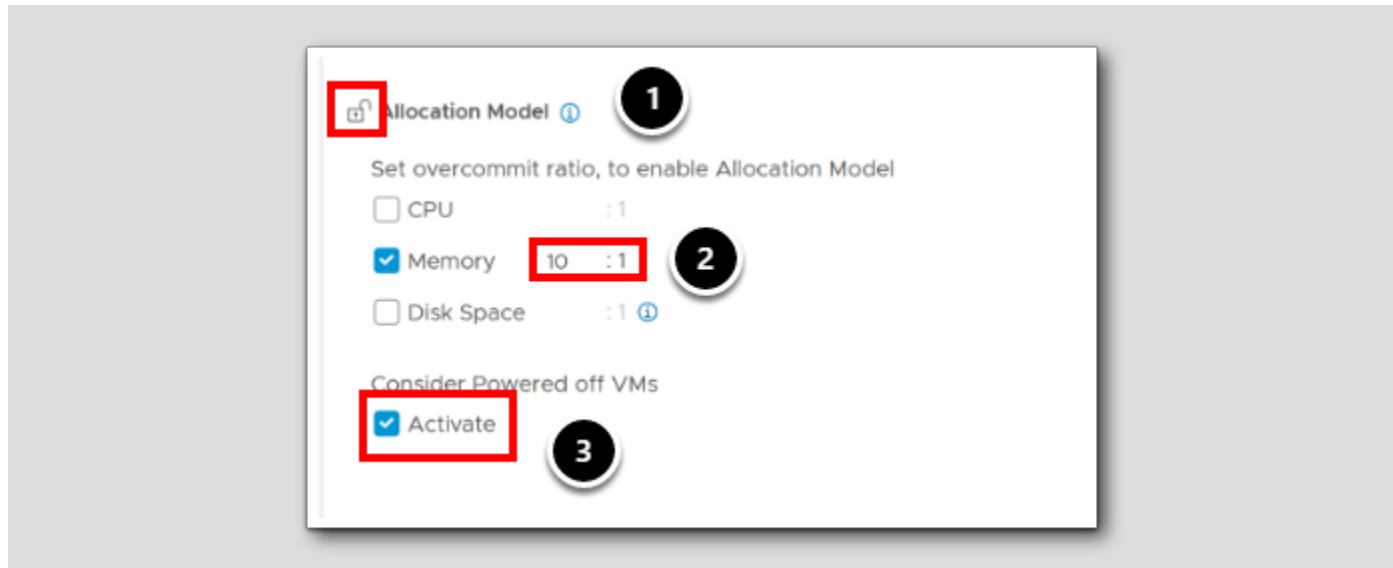
Policy elements include:

- **Allocation Model:** Allocation Model differs to Demand Model as it does not consider Utilization. It's simply based on configured amount (e.g. 4 vCPU, 16 GB virtual RAM, 100 GB virtual Disk) that is allocated to VMs. As a result, Demand Model is still considered when Allocation is enabled. The Allocation Model in vROps incorporates VM-level resource reservations and limits, calculating resource consumption as the maximum of reservation, limit, or actual usage. Although it offers less accurate real-time resource utilization, it is optimally utilized in chargeback/showback scenarios and environments with strict resource reservation settings. Note: **These settings will also apply to What-If Analysis, Committed Projects, and WLP calculations.**
- **Custom Profile:** Custom Profile is a user defined virtual machine profile, to determine the number of virtual machines which will fit within the remaining capacity.
- **Capacity Buffer:** Buffer reduces the usable capacity. In vSphere Cluster, it's applied after High Availability (HA). Use buffer as safety net in capacity. The Capacity Buffer is a reserved resource pool to handle unexpected demand, reducing usable capacity but enhancing reliability. In a vSphere Cluster, it's applied post-High Availability (HA) calculations. It helps mitigate risk during resource surges and aids accurate capacity planning by reflecting a realistic view of available resources. Buffer size should balance between accommodating unexpected demands and not overly reducing usable capacity.

For more information, have a look at [Projection - Conservative Risk](#) from [Module 3 - Advanced Capacity Management](#)

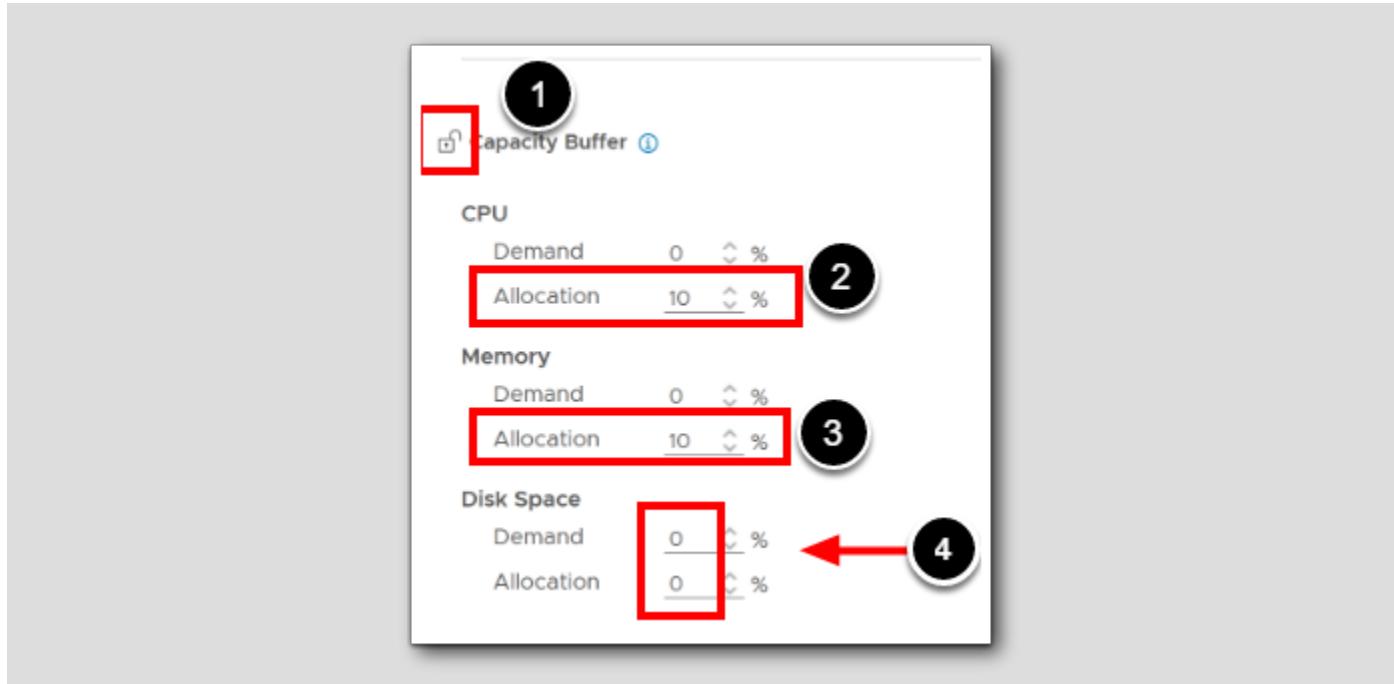
1. Expand Capacity Settings
2. To view the policy elements and settings for the object type (Cluster) so that you can have VMware Aria Operations analyze the object type, Select Cluster Compute Resource.
3. Click the padlock icons on the left of each element to override the settings and change the thresholds for your policy. Unlock Allocation Model and Capacity Buffer

## Allocation Model settings



1. Unlock *Allocation Model* by clicking the padlock
2. For the allocation model settings, set Memory to 10:1
3. Set Consider powered off VMs to Activate

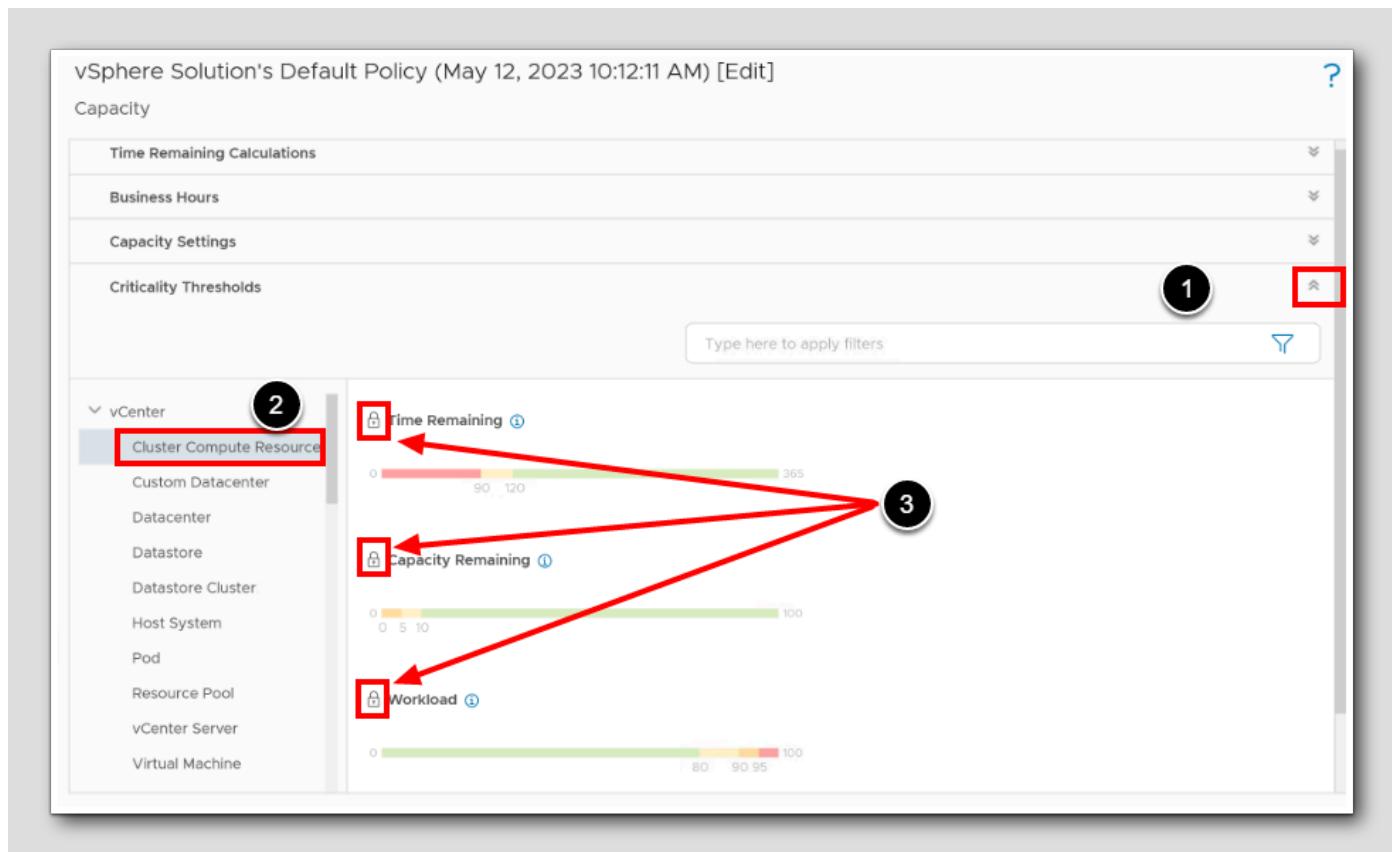
## Capacity Buffer Settings



**Capacity Buffer** is a safety net in capacity to handle unexpected demand enhancing reliability. It helps mitigate risk during resource surges and aids accurate capacity planning by reflecting a realistic view of available resources. Buffer size should balance between accommodating unexpected demands and not overly reducing usable capacity. Let's add a small buffer on CPU Allocation and Memory Allocation.

1. Unlock *Capacity Buffer*, click the padlock
2. Under CPU Allocation add 10%
3. Under Memory Allocation add 10%
4. Whatever disk allocation is set to, do not change it

## Criticality Thresholds



Criticality Thresholds allows us to define when an alert should be triggered for a particular symptom based on the severity of a condition. In the policy settings, we set thresholds for each metric Aria Operations collects. Each metric has five threshold levels: Info, Warning, Immediate, Critical, and Alert. When the value of a particular metric crosses a defined threshold, an alert is triggered. The severity level of the alert corresponds to the severity of the threshold level that the metric has crossed. The criticality thresholds allow you to fine-tune your policies so that you are alerted to potential issues at the right time, allowing you to address them before they have a significant impact on performance.

1. While you still have the policy open in Edit mode, **expand Criticality Thresholds**
2. Select Cluster Compute Resource
3. To unlock and override parent policy settings, click each of the padLocks

#### Threshold levels

- **Info:** This threshold is used for informational purposes and typically does not trigger an alert.
- **Warning:** This threshold is set to a value where the system is still functioning normally, but the value of the metric is moving towards a level where it could impact performance.
- **Immediate:** This threshold level indicates that the system might soon experience performance issues if the metric value continues to rise.
- **Critical:** At this threshold level, the system is likely experiencing performance issues. The issues should be addressed immediately to prevent further degradation of performance.
- **Alert:** This is the highest threshold level. At this level, the system is likely experiencing severe performance issues.

## Setting the Threshold



**Time Remaining** is how many days you have until the utilization projection crosses the usable capacity threshold. It has 2 settings: Conservative and Aggressive.

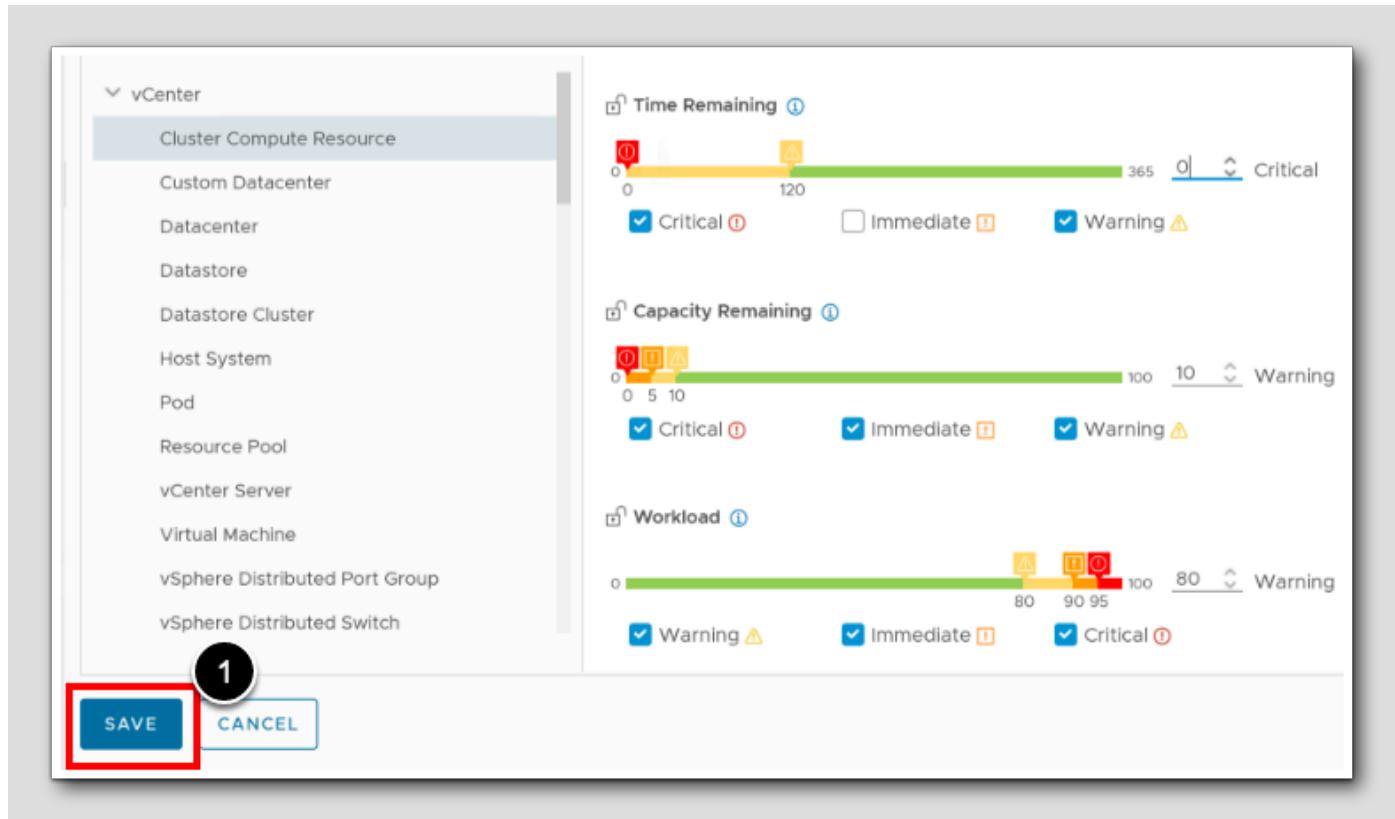
**Capacity Remaining** is the % of usable capacity not consumed.

**Workload** is the immediate % of capacity consumed of the most constrained of several key resource containers. Since workload changes every collection cycle, you can set how many cycles it takes to trigger or clear an alert.

1. Under Time Remaining, Click the red Critical slider
2. Set the value to 0

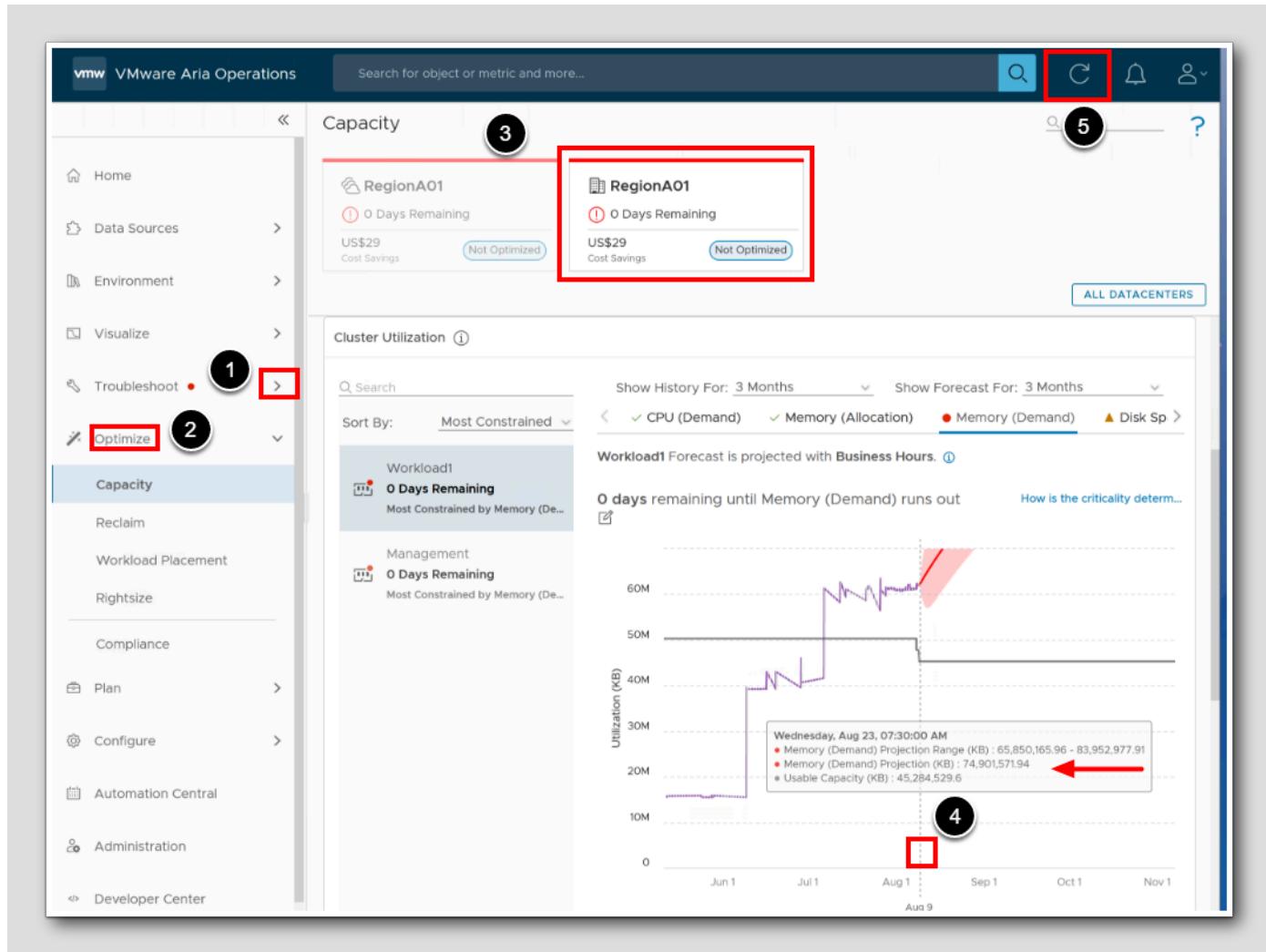
From what we have learned in this module, could we answer this question: What does this mean for the utilization projection and when it crosses the usable capacity threshold? What is this early warning system telling us. Look for this later: \*\*\*\*

## Saving and Exiting



1. To save and exit, Click **SAVE**

## Cluster Utilization



1. Go to the Capacity settings and see what has happened there, click Optimize
2. Click Capacity
3. Select RegionA01

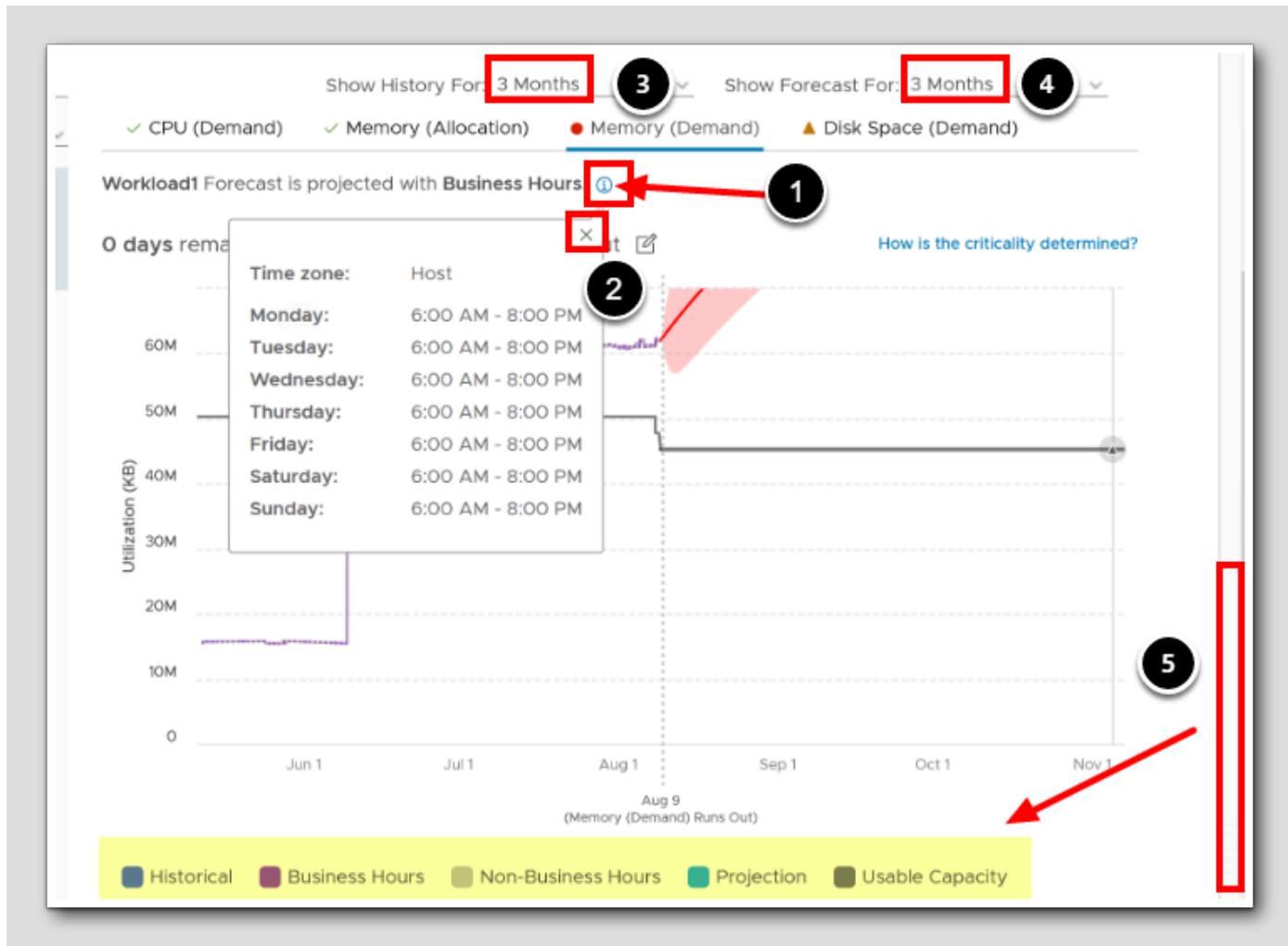
There could be some changes. The Business Hours and that the Risk Level changes needs a collection cycle (a 5 minutes wait). Memory (Demand) is the most constrained.

4. Hover with the mouse over the Usable Capacity line.

Notice the values.

5. Click the refresh button

## Checking the business hours

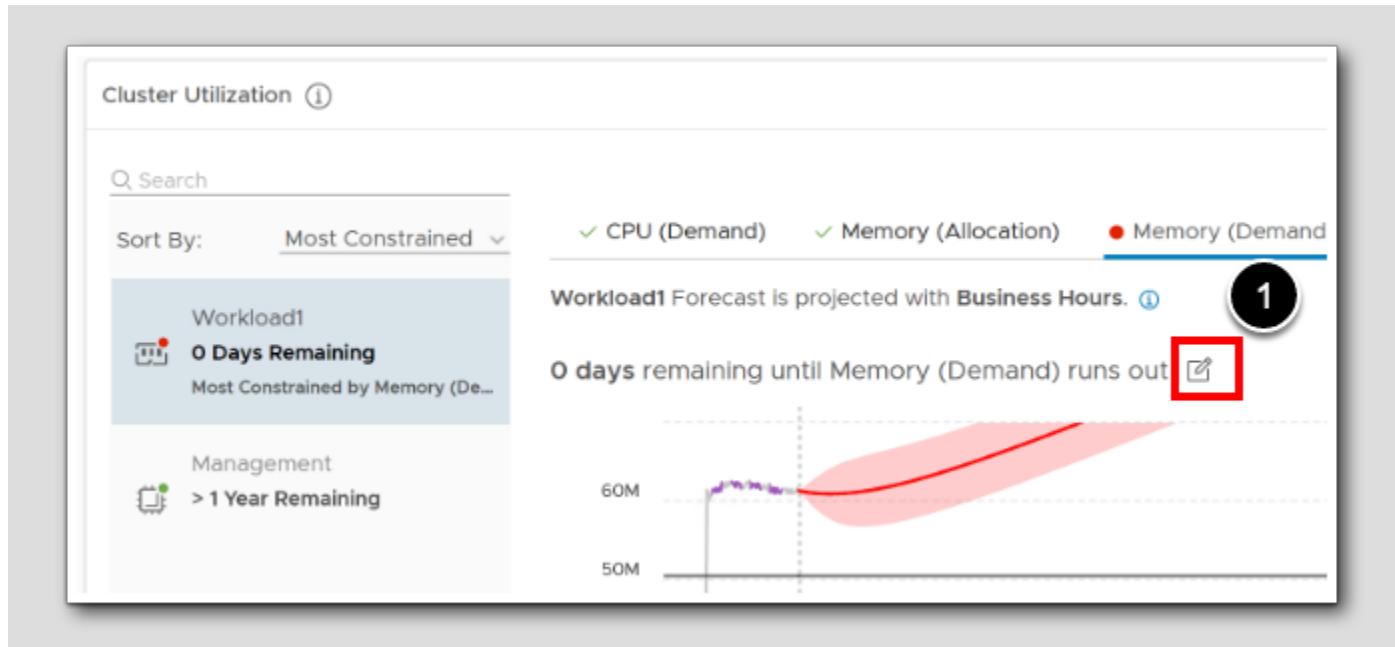


1. Behind business hours, Click the information button (i)

Notice that the previously values entered in our policy for the business hours are shown

2. To close the business hours preview, Click the 'x'
3. To change the period before forecasting begins (does not impact the forecast calculation). Behind Show history for Select 3 months
4. To change the forecast period, behind Show Forecast For select 3 Months.
5. Use the scroll bar to reveal the legend to make it more understandable

Revisit the policy settings



1. Behind the x days remaining until Memory (Demand) runs out, click the Edit Icon

## Direct policy editing

**Cluster Time Remaining Settings**

Affected Policy: vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM)

Criticality Threshold

**⚠ Applying these changes affects all clusters in the policy.**

Set the time remaining thresholds.

Critical Threshold  Days

Warning Threshold  Days

Risk Level

**⚠ Applying these changes affects all objects in the policy.**

Set time remaining risk level.

Conservative  
Time remaining is based on the upper bound projection and represents the time remaining before the projected upper bound crosses the usable capacity threshold.

Aggressive  
Time remaining is based on the mean projection and represents the time remaining before the projected mean crosses the usable capacity threshold.

Peak focused  
Select this option if you want to use only the upper range of the data. The projection will be based on the high utilization points.

Conservativeness Level  
Levels: 1

Allocation Model

**⚠ Applying these changes affects all clusters in the policy.**

Set overcommit ratio, to enable Allocation Model

CPU  Memory  Network  Storage

1 **CANCEL** **SAVE**

From this pop-up page you can edit everything related to the policy directly.

1. Click Cancel to exit

## Conclusion

[106]

Understanding capacity settings in Aria Operations is crucial for effective resource management and optimization. By comprehending capacity models and algorithms, configuring policy settings, setting criticality thresholds, selecting appropriate allocation and demand models, determining risk levels, ensuring high availability and buffers, and considering business hours, you can unlock the full potential of your infrastructure resources while minimizing risks.

Customizing these settings to your organization's unique requirements is key to achieving optimal results.

## You have finished Module 3

[107]

Congratulations on completing the lab module.

If you are looking for additional general information on Aria Operations, try one of these:

- VMware Product Public Page - Aria Operations: <https://www.vmware.com/products/aria-operations.html>
- Aria Operations - Documentation: <https://docs.vmware.com/en/VMware-Aria-Operations/index.html>
- Aria Operations - Optimize Capacity: <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Using-Operations/GUID-62358711-BEA7-4C26-8BB2-8247DDEE03E2.html>

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the TABLE OF CONTENTS to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 4 - Integrating and Troubleshooting with Logs (30 minutes) Advanced

### Introduction

[109]

Aria Operations for Logs is commonly integrated with Aria Operations for centralized log management and analysis, and creates a seamless and robust troubleshooting process. By combining log data with metrics from Aria Operations, we efficiently pinpoint the exact cause of issues, resulting in reduced time-to-resolution.

Additionally, Aria Operations can enable proactive measures through predefined remediation steps based on logs, addressing specific conditions proactively. In this module we will investigate how to troubleshoot with logs within Aria Operations.

We will also learn how to install and configure a linux agent so you can get detailed information from enterprise business applications running on servers with applications for finance, HR, ERP, CRM, mail, web servers, databases, proxy, VPN, authentication, security, backup or simply desktops.

Let's go!

### Log in to Aria Operations

[110]

We will log in to a live instance of Aria Operations running in this lab.

### Open the Firefox Browser from the Windows Task Bar

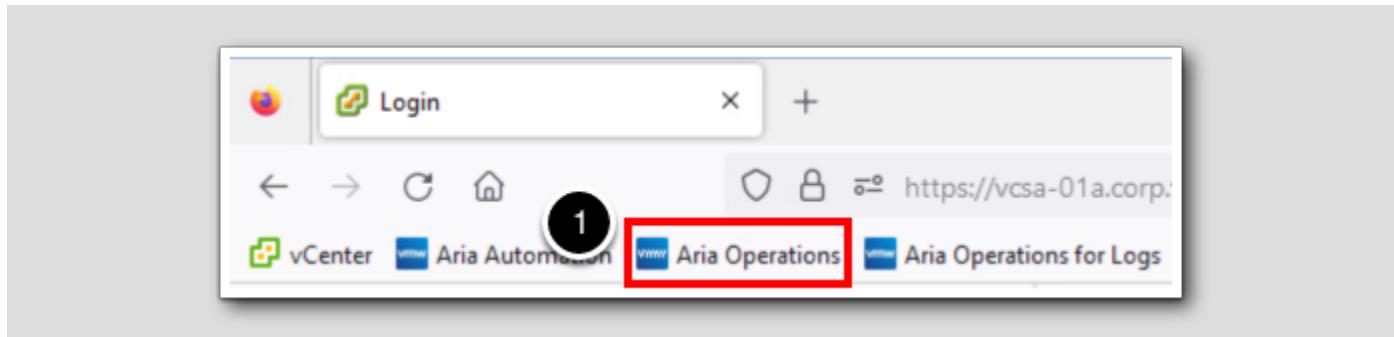
[111]



If the browser is not already open, launch Firefox.

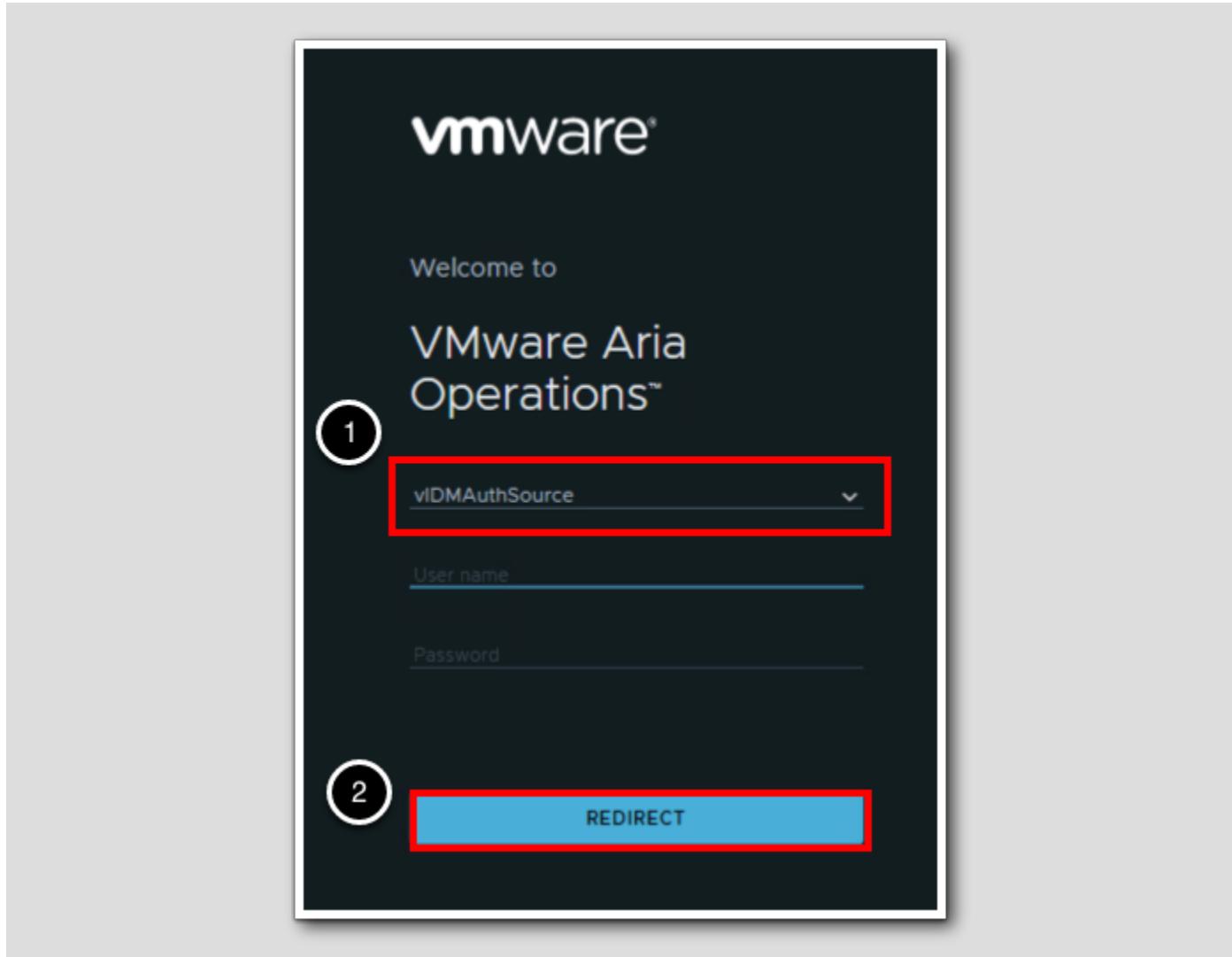
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

## Navigate to Aria Operations



1. Click the **Aria Operations** bookmark in the bookmarks toolbar.

## Log in to Aria Operations

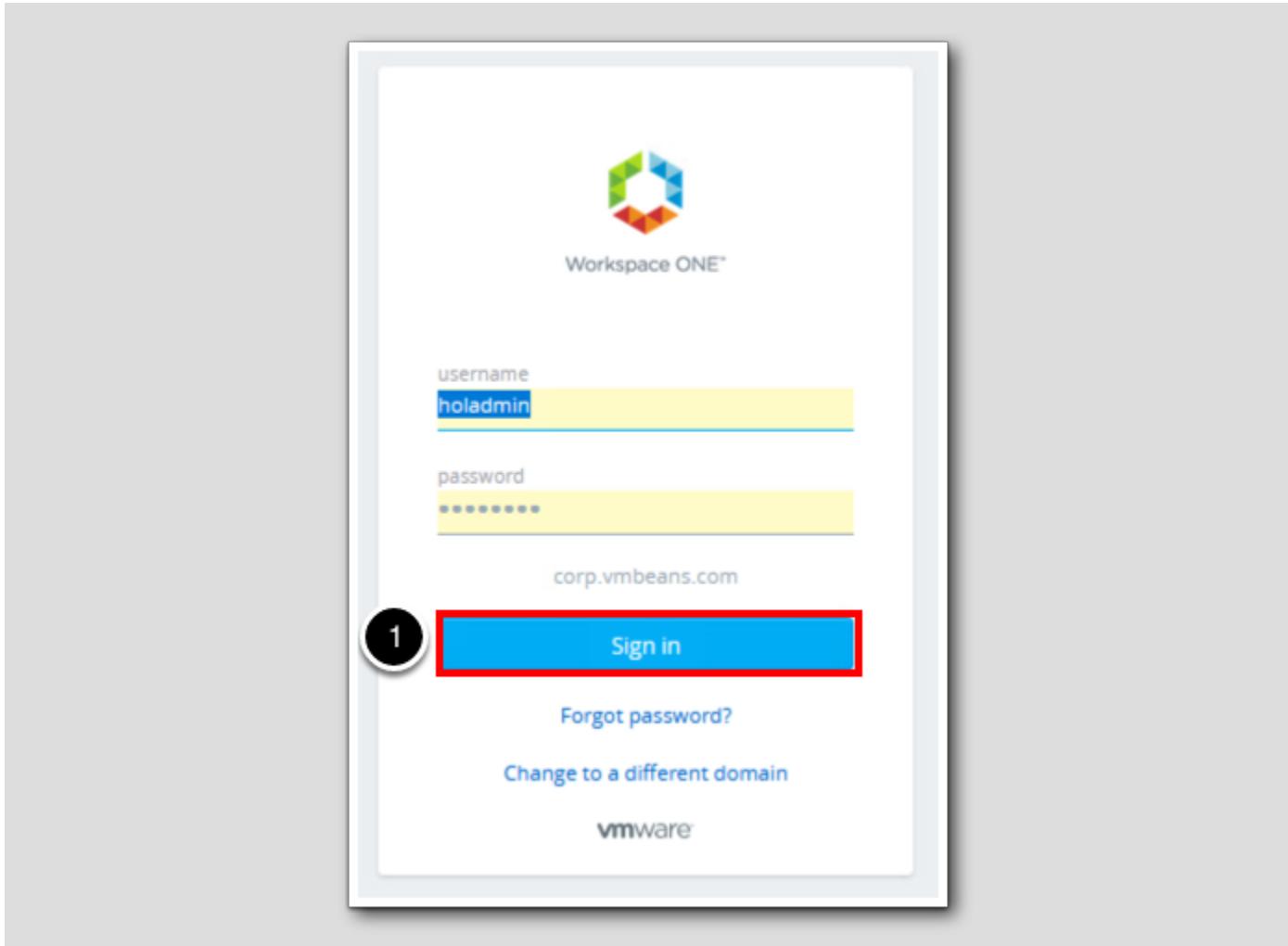


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

vIDMAuthSource may be pre-selected as the default identity source. If it is not, then you will need to select it.

1. Click the drop-down arrow and select vIDMAuthSource if it is not already selected.
2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login



VMware Identity Manager acts as the identity provider for the Active Directory authentication source in this lab.

Credentials for the default user, holadmin, have already been provided.

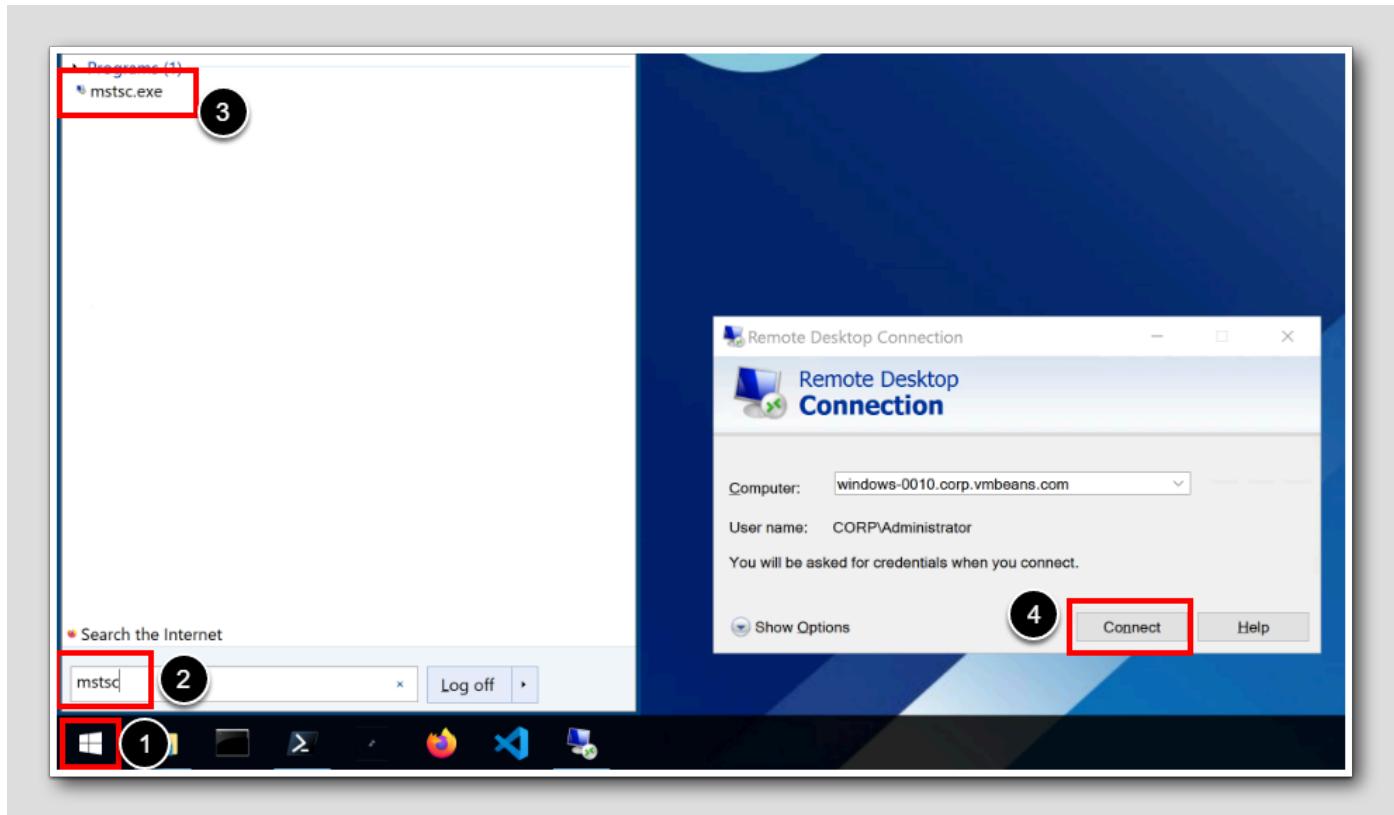
1. Click Sign in

## Troubleshooting with Logs Inside of Aria Operations

Before our session on troubleshooting with logs **within** Aria Operations, we will engage in some activities to generate various log entries that Aria Operations for Logs can discover and analyze.

For this scenario, our focus will be on the communication between the *Financial App* and the *local Tax service*, as well as the *remote bank*, which involves interactions with databases and files.

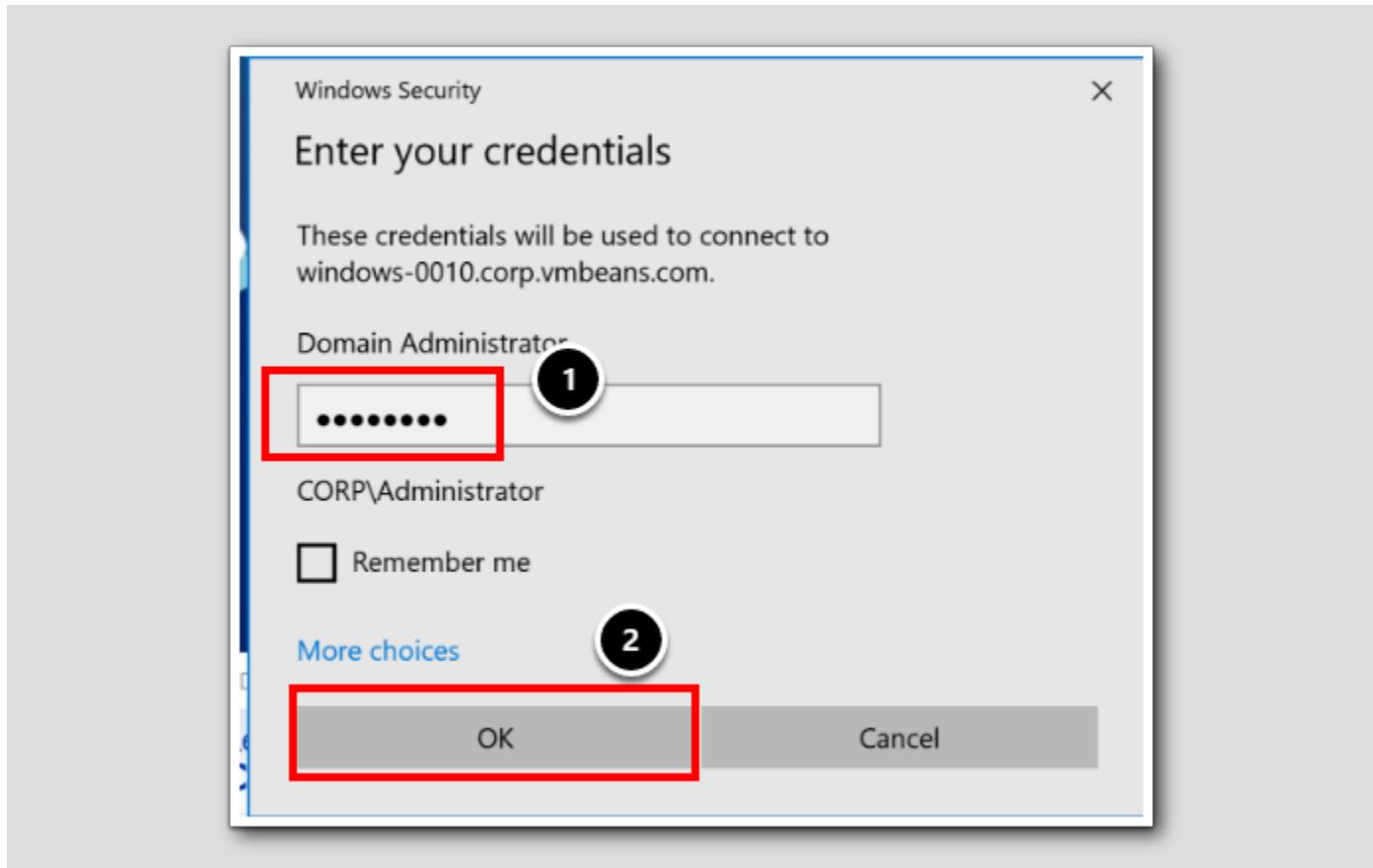
## Preparing the data



Let's proceed with activities on our application server windows-0010 to generate some essential log entries for our investigation within Aria Operations. We will use terminal services console to connect to it, and just run a script.

1. Click the windows start menu.
2. Type **mstsc** Note: "mstsc" is an abbreviation for *Microsoft Terminal Server Console*.
- 3.Under Programs, select **mstsc.exe**.
- 4.When the Microsoft Terminal Server Console starts, we will connect to *windows-0010.corp.vmbeans.com* as user *CORP\ Administrator* click CONNECT.

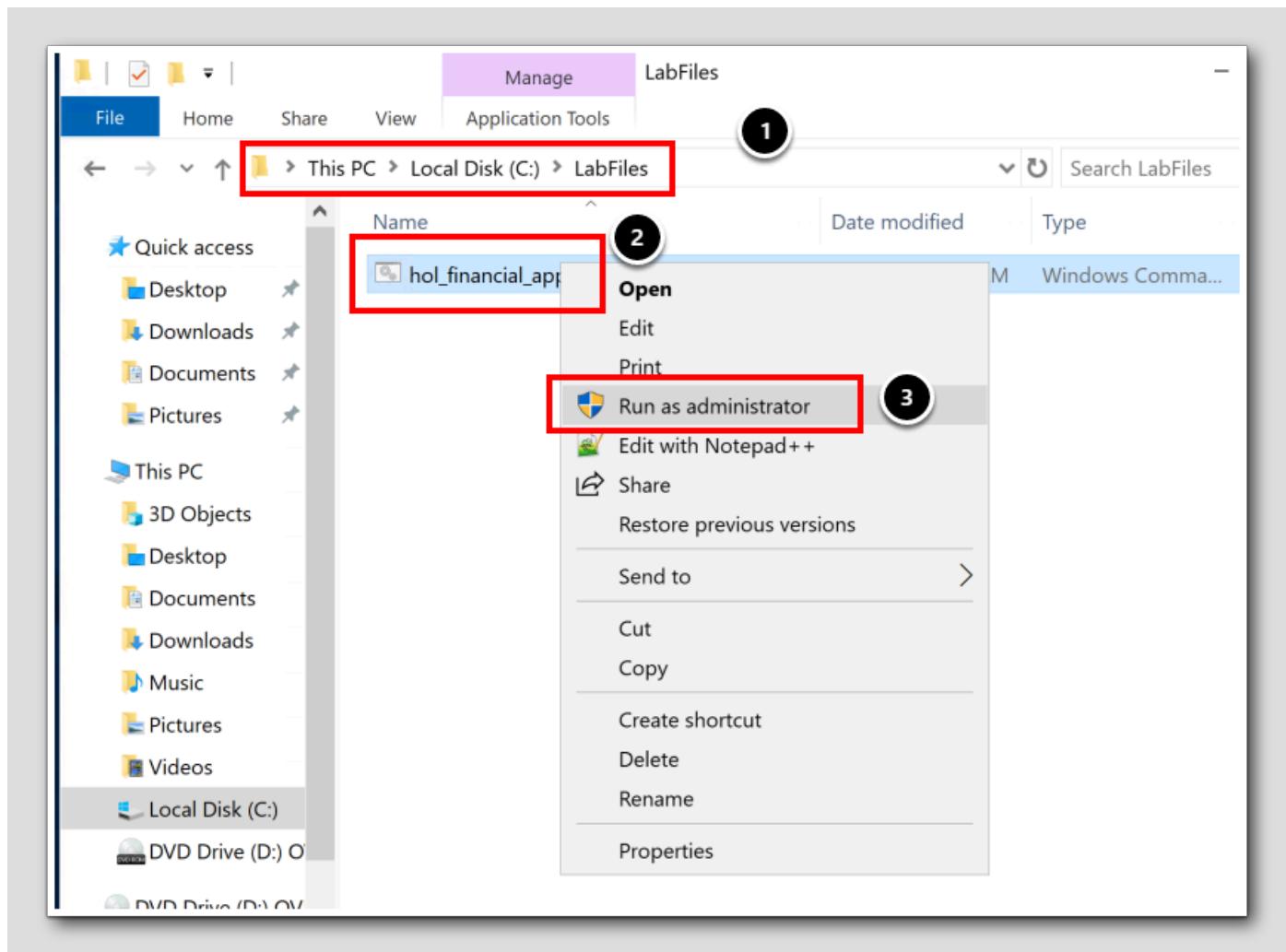
## Windows Security



1. In the Windows Security box for the terminal server console connection to windows-0010, type the password VMware1!
2. Click OK
3. If you get a yellow Certificate Challenge, then click YES (Not shown)

Note: For the next step, make sure that we are logged on *windows-0010* as CORP\Administrator with the password **VMware1!**. The following script needs to be executed on that server.

## Enterprise Financial Application - Script



To imitate artificial log data from a financial application called "The Hands-On Labs Application" and put the various error messages into the Application Event log on the windows server, we will now run a script that will automatically generate log messages coming from our financial app.

1. From within the Terminal Server Console, on windows-0010, navigate to the folder: C:\LabFiles
2. Right-click the file *hol\_financial\_app.cmd*
3. Select Run as administrator

For future reference, here is the entire *hol\_financial\_app.cmd* file content:

```

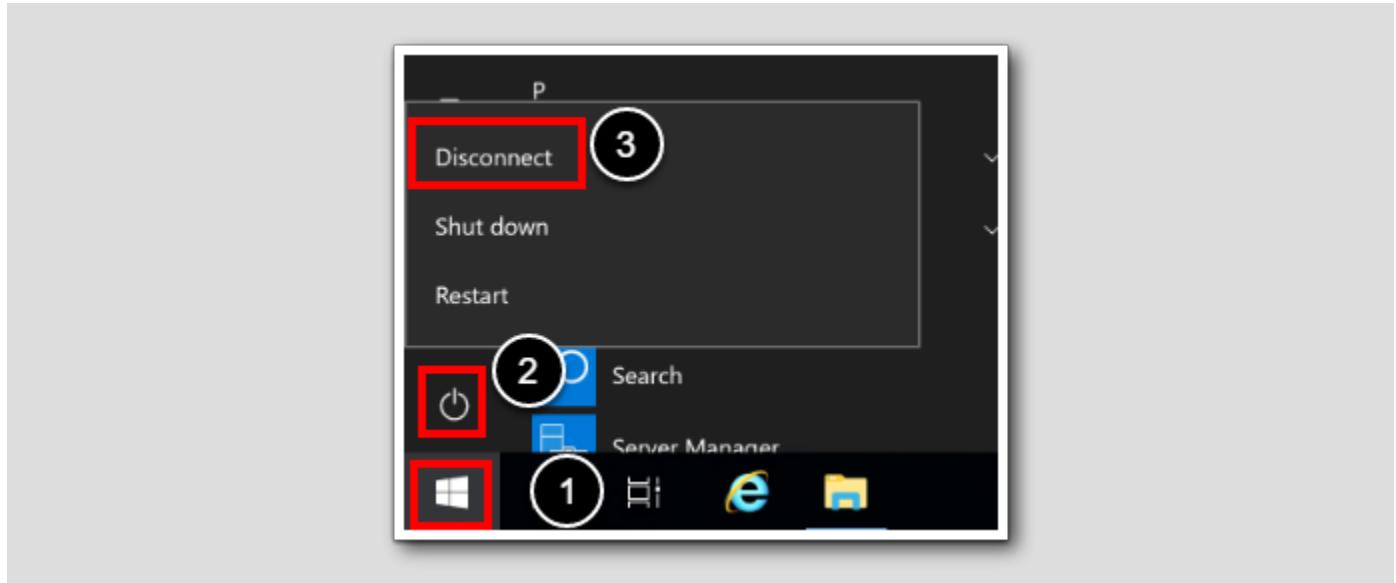
@echo off
setlocal enabledelayedexpansion
:: # Module 4 - Integrating and Troubleshooting with Logs
:: # Setting error messages and source (application) in pseudo-arrays.
set "Error[1]=Could not open Bank File bank_id.txt"
set "Error[2]=Unable to communicate with the main bank server"
set "Error[3]=The main communication service has stopped"
set "Error[4]=Unable to connect to the database bank_transaction.db"
set "Error[5]=Failed to generate the financial report for current Quarter"
set "Error[6]=Balance sheet calculation internal error"
set "Error[7]=Tax calculation service is not responding"
set "Application=The Hands-On Labs Application (Fake HOL Financial app)"
:: # Generating errors in the event log.
for /L %%i in (1,1,10) do (
    :: # Generate two random numbers.
    set /A "randError=!random! %% 7 + 1"
    set /A "randEventID=!random! %% 100 + 1"

    :: # Use 'call' to indirectly reference array element
    call set "errorMessage=%Error[!randError!]%"

    :: # Create the event, including the application name and "ERROR, " in the error message.
    eventcreate /ID !randEventID! /L APPLICATION /T ERROR /SO "!Application!" /D "!Application! ER
)

```

Back to Aria Operations



Now let's disconnect from windows-0010 and return to Aria Operations.

1. From the Terminal Server Console on windows-0010, Windows Toolbar, Click the Windows Start Menu.
2. Click the Power Icon.
3. Click Disconnect.

## Troubleshooting Workbench

The screenshot shows the VMware Aria Operations interface with the 'Troubleshooting Workbench' selected. The left sidebar has a 'Troubleshoot' dropdown (1) with 'Workbench' highlighted (2). The search bar at the top right contains 'windows' (3). Below the search bar, under 'Virtual Machine', the link 'windows-0010' is highlighted with a red box and circled (4).

We know the Windows machine called `windows-0010` is running our financial application server. As an Aria Operations expert, when troubleshooting, we will, as usual, start with the *Troubleshooting Workbench*.

1. Click **Troubleshoot**.
2. Click **Workbench**.
3. In the search field, type **windows**.
4. Under the Virtual Machine search results, click the link to **windows-0010**.

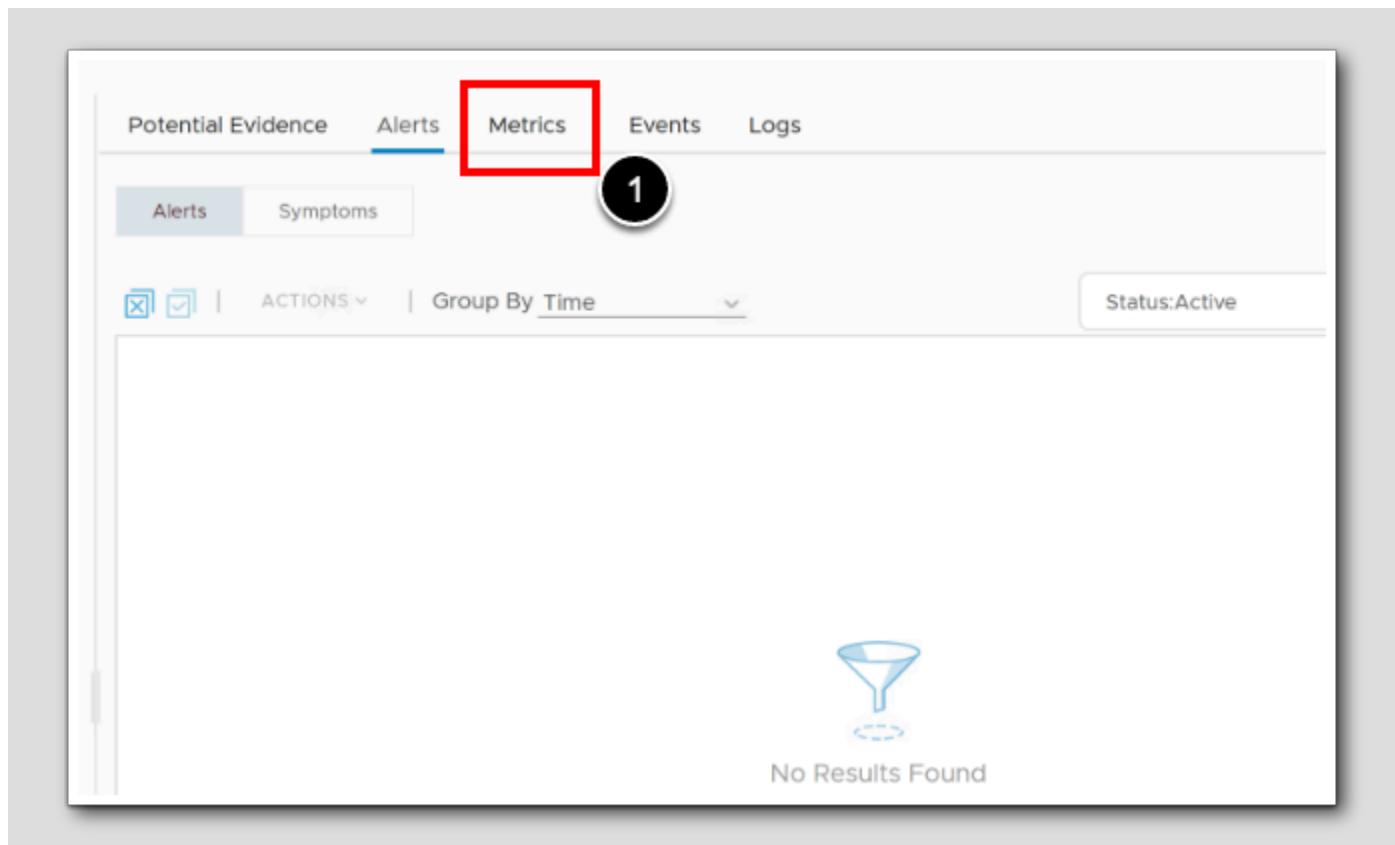
## Aria Operations Forensics

The screenshot shows the Troubleshooting Workbench interface. At the top, there is a navigation bar with tabs: Potential Evidence (highlighted with a red box), Alerts, Metrics, Events, and Logs. A circled '1' is above the Potential Evidence tab. Below the tabs, there is a message: "Select the desired object scope and time range to see potential evidence." Underneath this, there is a "Time Range" dropdown set to "Last 6 hours" and a checkbox for "Hide Consequential Evidence". There are three main sections below: "Events" (highlighted with an orange box), "Property Changes" (highlighted with a blue box), and "Anomalous Metrics". The "Events" section shows a single event for "windows-0010" at 3:25:58 AM: "'Guest Info Tools Status' changed from guestToolsNotRunning to guestToolsRunning". The "Property Changes" section shows a message: "No property changes were found in this time range and scope." The "Anomalous Metrics" section shows a graph for "Memory|Utilization (KB)" for "windows-0010" from Jul 28 to 04:00 AM, with values ranging from 1,500K to 2,500K.

The Troubleshooting Workbench presents three columns with vital forensics info: Events, Property Changes, and Anomalous Metrics. These could be system alerts or notifications, changes to the properties of objects, and highlights of metric data that deviates significantly. From this page, log data is not shown.

1. Let's have a look at possible alerts on this VM (*windows-0010*), Click **Alerts**.

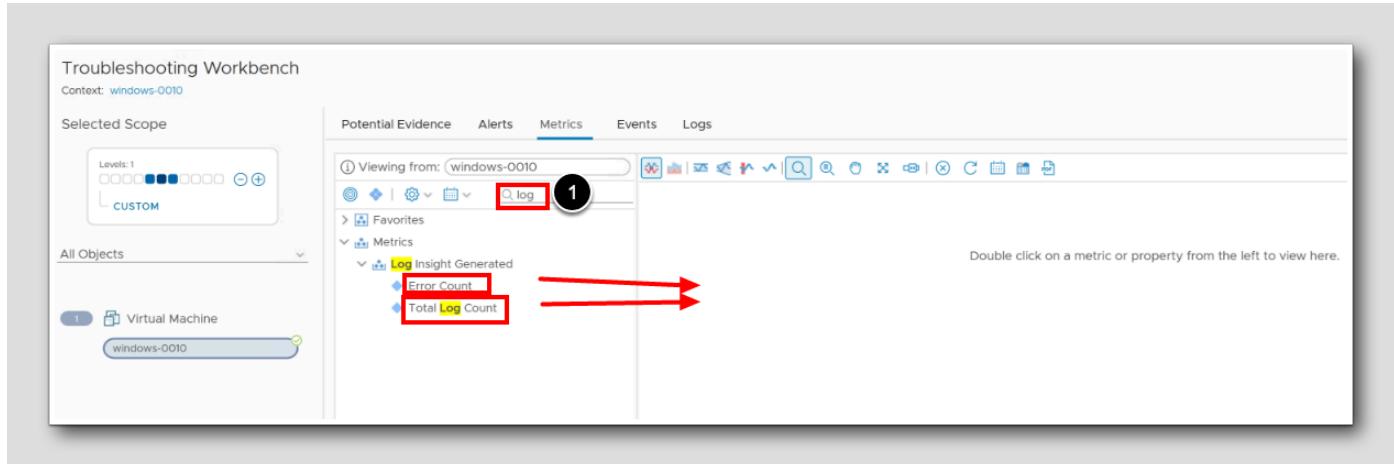
## Alerts



As we can see from the image, there are no interesting alerts. If anything should show up here, we would have to add a notification from the logging system, *Aria Operations for Logs*, and send the alert to Aria Operations.

1. Click **Metrics**.

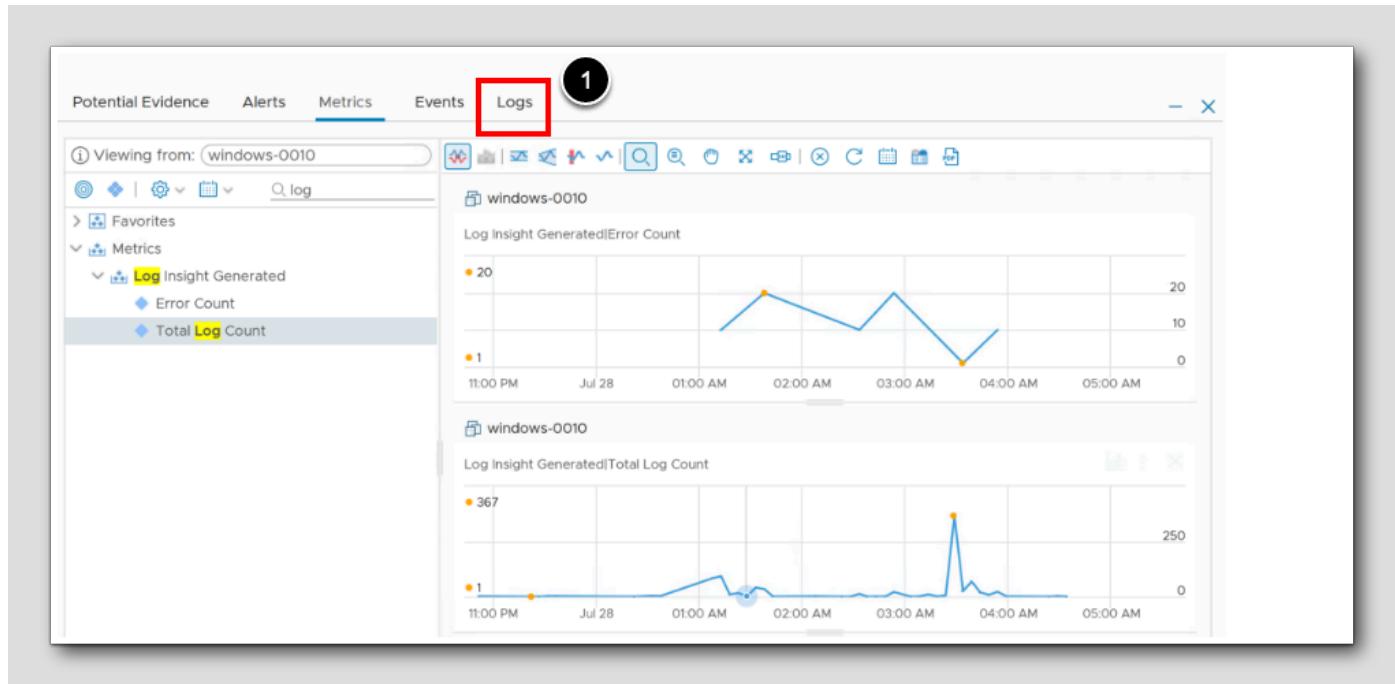
## Aria Operation for Logs metrics



Aria Operations for Logs used to be called *vRealize Log Insight*, or just *Log Insight* for short.

1. To find metrics from the logging tool, go to the metrics search field and type log.
2. We need to double-click on a metric or a property from the left side to view the metrics.  
double-click on Error Count.
3. Next, double-click on Total Log Count.

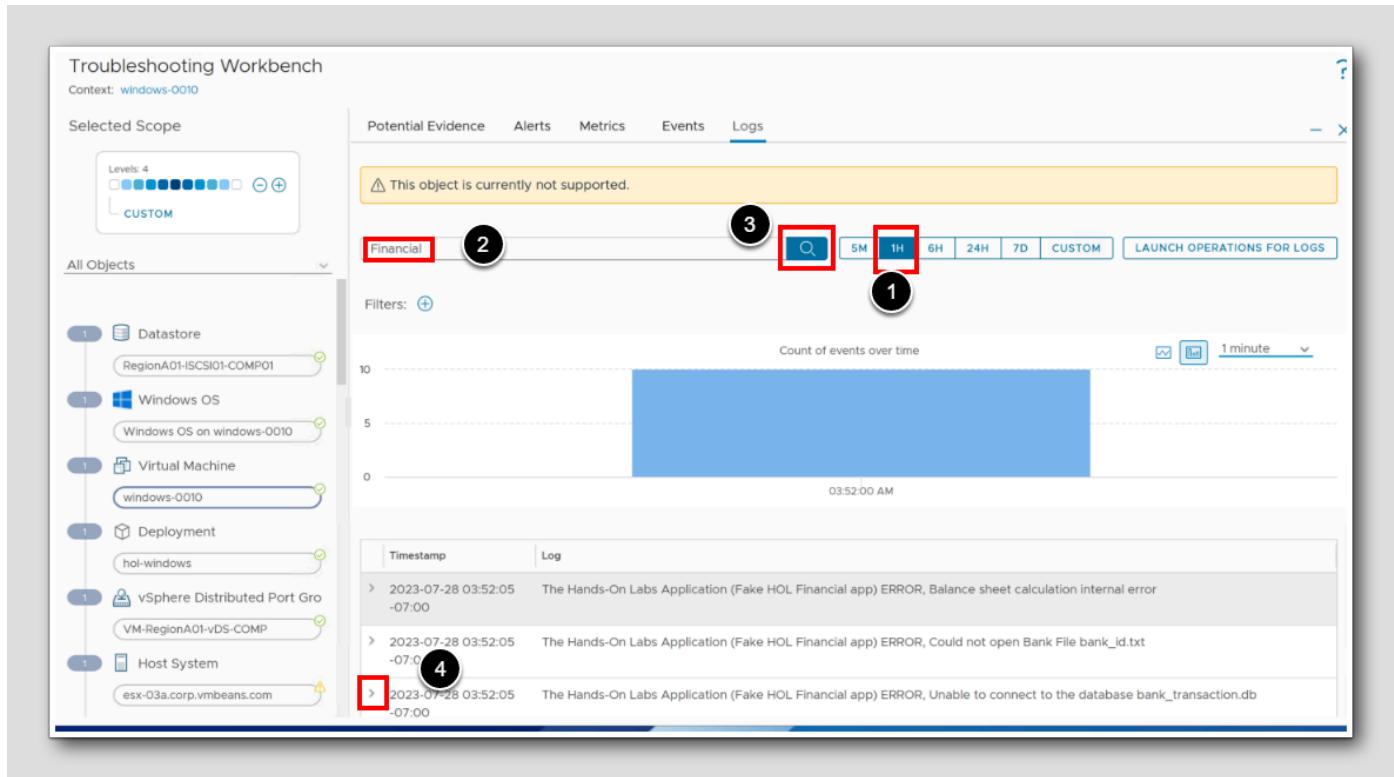
## Viewing log counts



While reviewing the *Total Log Count*, we see that something is going on. If we see any anomalies about the logging, it is worth while to troubleshoot with logs. That is exactly what we intend to do! For now, we remember that there were no interesting events coming from the first forensic dashboard, so we will just skip it.

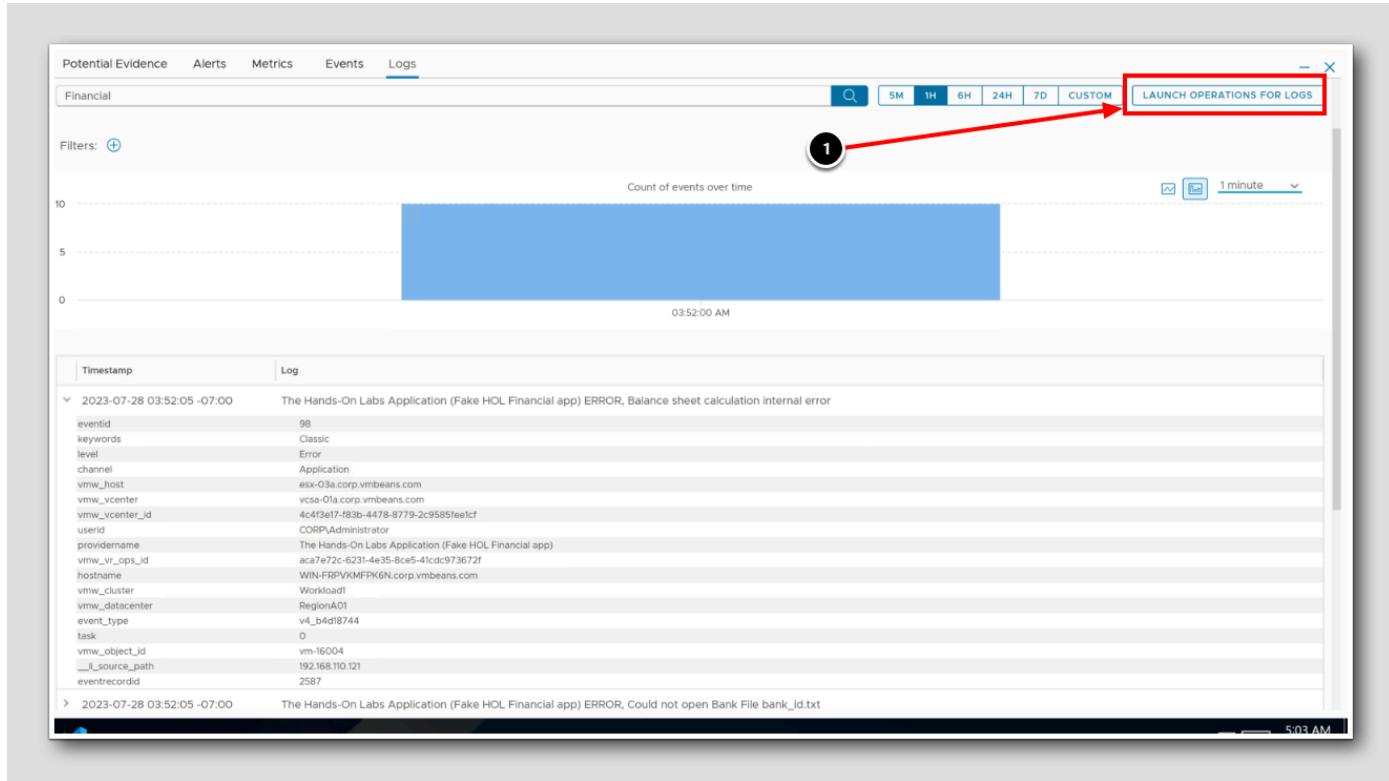
1. Click Logs.

## Financial App logging



1. It could be more than 5 minutes since we did Start the script, so click on 1H (one hour).
  2. Please review the multitude of events coming from the event logs on windows-0010. As the volume of results can be somewhat overwhelming, it is necessary to apply filtering. In the search field enter Financial.
  3. Click the Search Icon.
  4. We see the data coming in from our artificial financial application.
- Expand one of the errors (could differ from the image) by clicking the '>'.

## Log Details



In the top bar chart, observe the count of events over time. There should be 10 events, which implies that we ran the script. Each additional time we ran the script would add 10 more events.

From the bottom pane, we see the details, such as the source log channel (Application, System, or Security), the provider name, the source IP address and more.

If we wanted to investigate our logs even further, the best tool for doing so is of course Aria Operations for Logs.

1. The tool can be launched directly from here by clicking LAUNCH OPERATIONS FOR LOGS

## Final thoughts

[127]

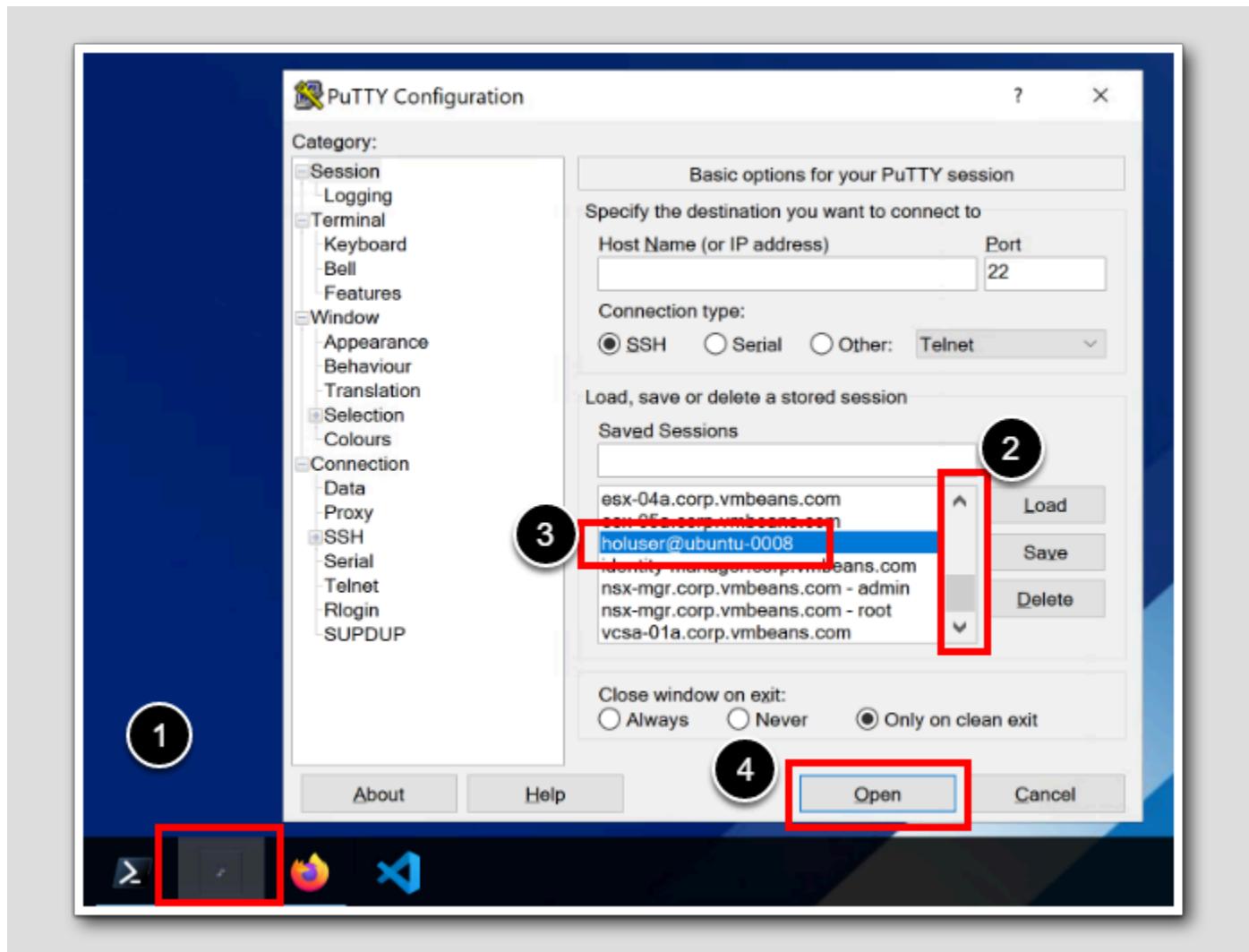
So far, we've explored troubleshooting with logs from within Aria Operations without launching Aria Operations for Logs, streamlining troubleshooting for better insights, and problem resolution.

This method is useful when investigating issues logged in event logs or application logs on various operating systems. This particular example focused on Windows logs, but the approach can be adapted to other scenarios as well.

## Add Aria Operations for Logs Agent on Linux

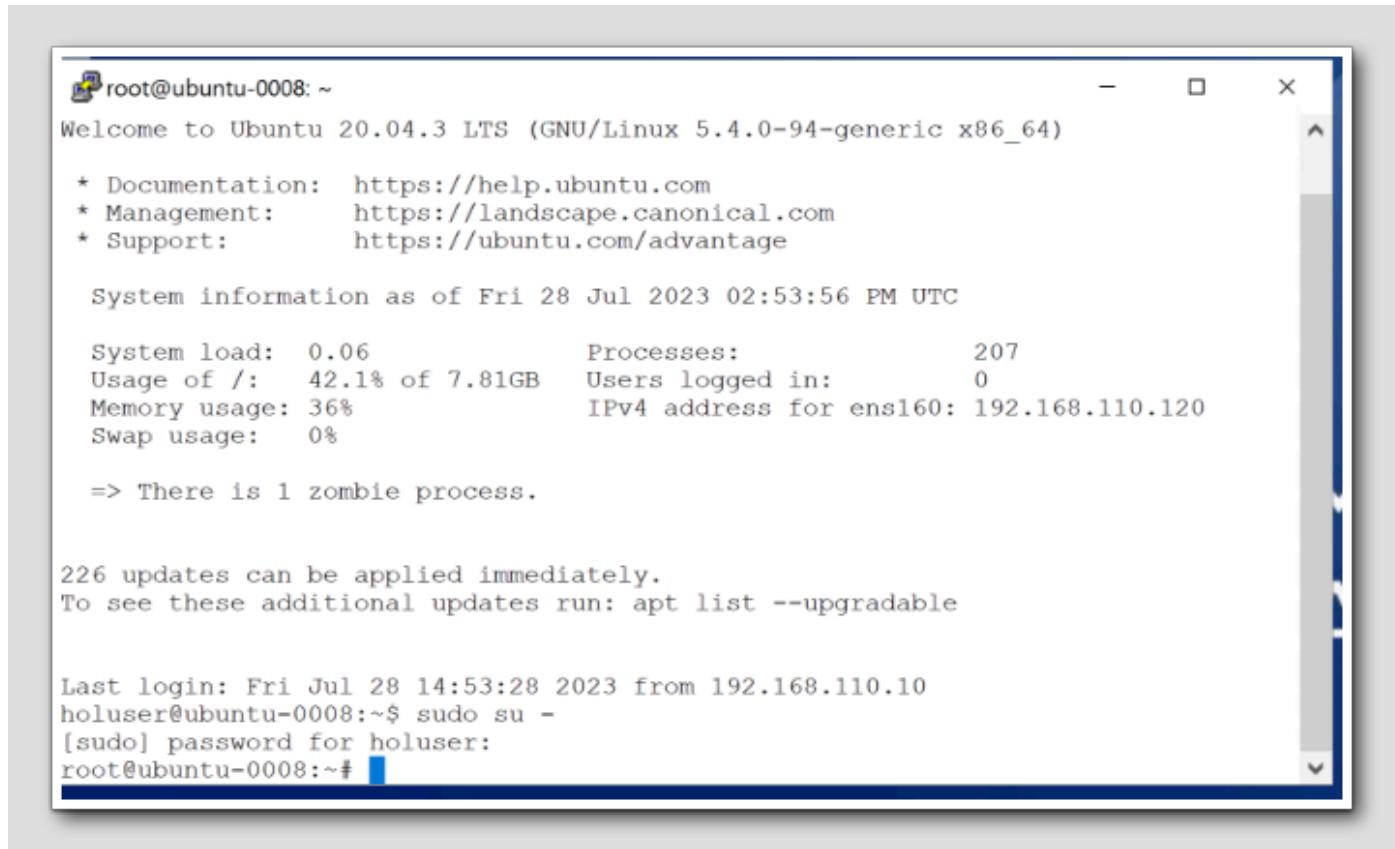
In this part of the module, we will show how to both install and configure the Aria Operation for Logs agent inside the operating system on a Linux virtual machine.

### Putty Log on



1. From the Windows Task Bar, click the PuTTY shortcut to open PuTTY.
2. Scroll down to the bottom of the list of saved sessions.
3. Select **holuser@ubuntu-0008**.
4. Click **Open**.

## Become Administrator



```
root@ubuntu-0008: ~
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-94-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Fri 28 Jul 2023 02:53:56 PM UTC

System load: 0.06           Processes:          207
Usage of /: 42.1% of 7.81GB  Users logged in:      0
Memory usage: 36%           IPv4 address for ens160: 192.168.110.120
Swap usage:  0%

=> There is 1 zombie process.

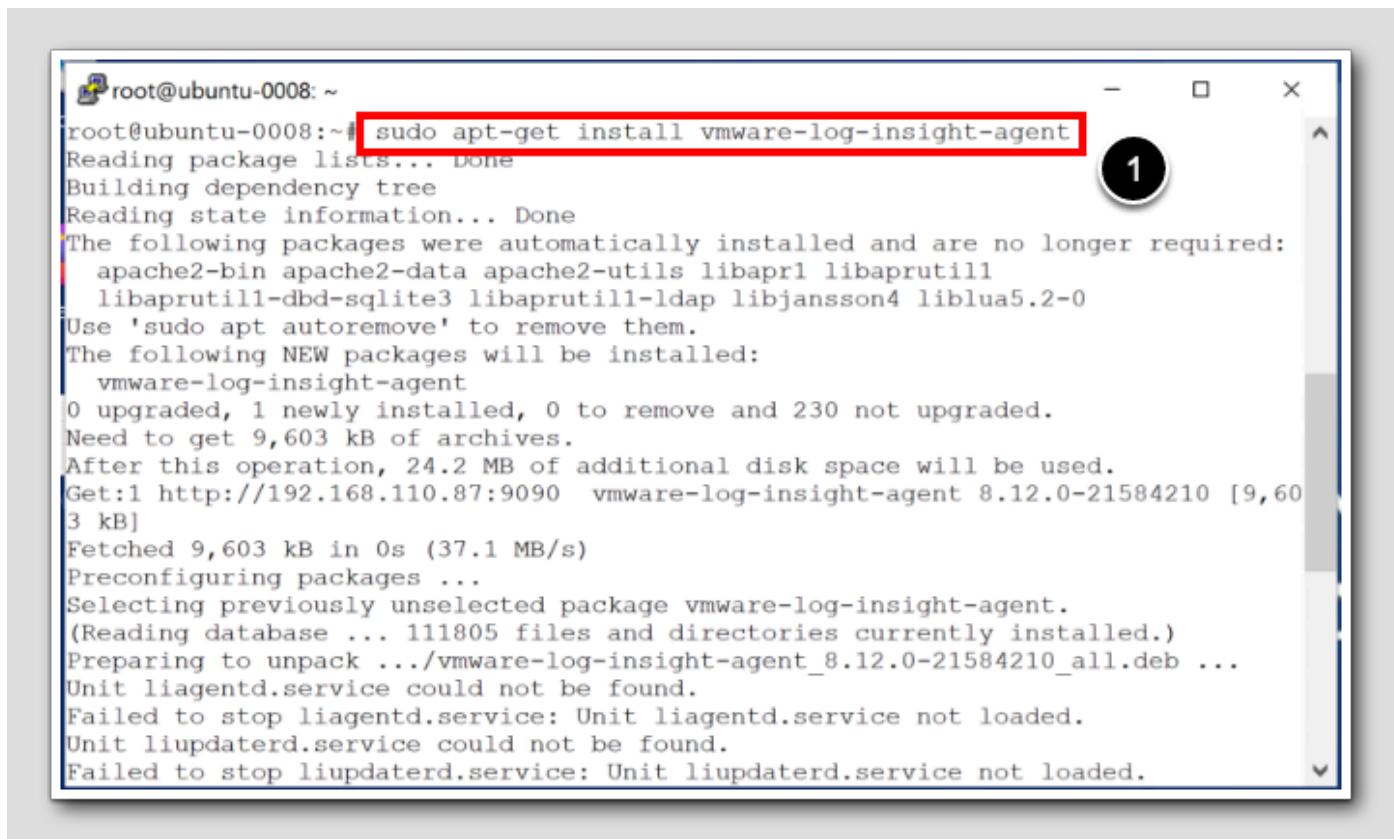
226 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Last login: Fri Jul 28 14:53:28 2023 from 192.168.110.10
holuser@ubuntu-0008:~$ sudo su -
[sudo] password for holuser:
root@ubuntu-0008:~#
```

We will perform the rest of the commands as *root*.

1. Type `sudo su -` and press ENTER
2. When prompted `[sudo] password for holuser:` type `VMware1!` and press ENTER

## Installing the agent on Ubuntu



```
root@ubuntu-0008: ~
root@ubuntu-0008:~# sudo apt-get install vmware-log-insight-agent
Reading package lists... done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  apache2-bin apache2-data apache2-utils libapr1 libaprutil1
  libaprutil1-dbd-sqlite3 libaprutil1-ldap libjansson4 liblua5.2-0
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  vmware-log-insight-agent
0 upgraded, 1 newly installed, 0 to remove and 230 not upgraded.
Need to get 9,603 kB of archives.
After this operation, 24.2 MB of additional disk space will be used.
Get:1 http://192.168.110.87:9090  vmware-log-insight-agent 8.12.0-21584210 [9,603 kB]
Fetched 9,603 kB in 0s (37.1 MB/s)
Preconfiguring packages ...
Selecting previously unselected package vmware-log-insight-agent.
(Reading database ... 111805 files and directories currently installed.)
Preparing to unpack .../vmware-log-insight-agent_8.12.0-21584210_all.deb ...
Unit liagentd.service could not be found.
Failed to stop liagentd.service: Unit liagentd.service not loaded.
Unit liupdatederd.service could not be found.
Failed to stop liupdatederd.service: Unit liupdatederd.service not loaded.
```

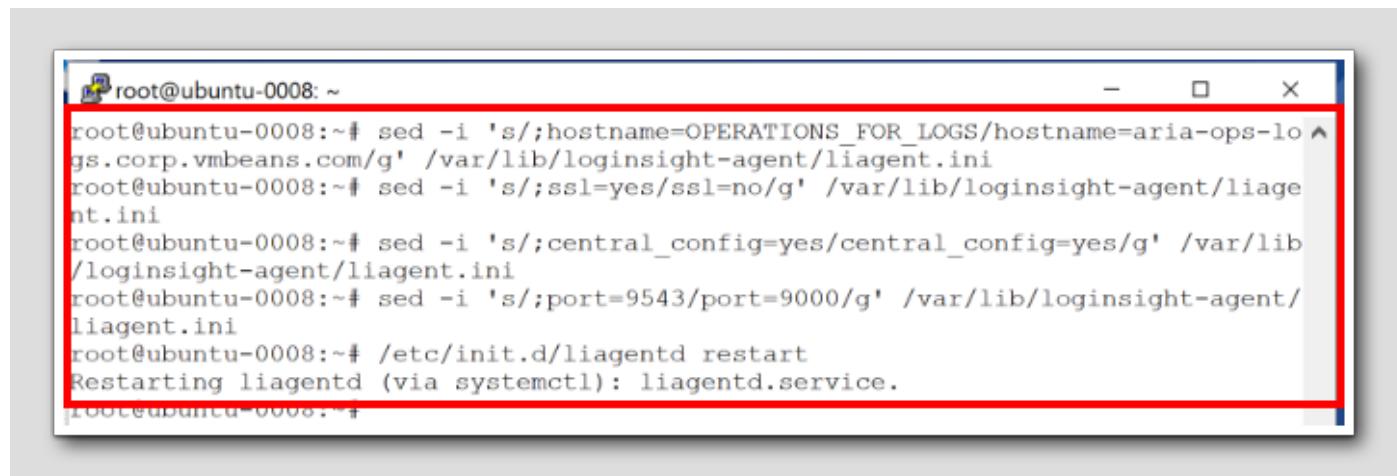
We are going to install the Aria Operation for Logs Agent inside the Operating system on this Ubuntu virtual machine. Then we will configure the right parameters to make it communicate well with our Aria Operations for Logs Server. We are not going to use our favorite editor 'vi' to edit these files, but use some nifty commands to perform actions on the file automatically.

1. In the putty window, type **sudo apt-get install vmware-log-insight-agent** and press ENTER.

Note: When the install finished the installation script will tell us to edit the configuration file */etc/liagent.ini*.

The */etc/liagent.ini* is a linked file to */var/lib/loginsight-agent/liagent.ini*.

## Configure liagent.ini



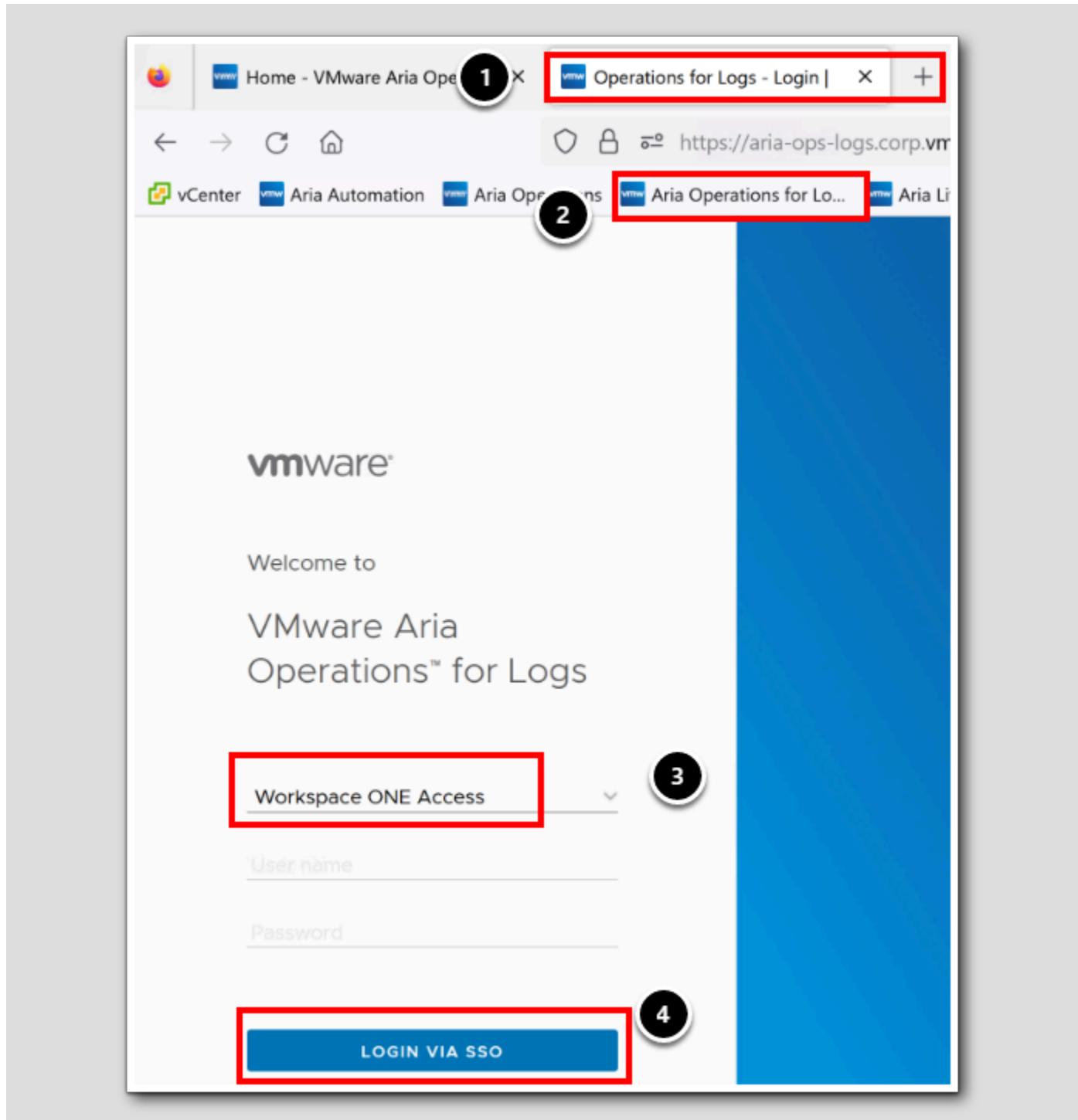
```
root@ubuntu-0008:~# sed -i 's/;hostname=OPERATIONS_FOR_LOGS/hostname=aria-ops-logs.corp.vmbeans.com/g' /var/lib/loginsight-agent/liagent.ini
root@ubuntu-0008:~# sed -i 's/;ssl=yes/ssl=no/g' /var/lib/loginsight-agent/liagent.ini
root@ubuntu-0008:~# sed -i 's/;central_config=yes/central_config=yes/g' /var/lib/loginsight-agent/liagent.ini
root@ubuntu-0008:~# sed -i 's/;port=9543/port=9000/g' /var/lib/loginsight-agent/liagent.ini
root@ubuntu-0008:~# /etc/init.d/liagentd restart
Restarting liagentd (via systemctl): liagentd.service.
root@ubuntu-0008:~#
```

After installation, we need to configure the agent to communicate with our Aria Operation for Logs server. Typically, this involves specifying the server's hostname and the port for sending logs. We are also specifying that we're not using SSL in our lab, and that we would like a central configuration.

Type or copy/paste each of these lines of code, and then press ENTER after each line of code:

```
sed -i 's/;hostname=OPERATIONS_FOR_LOGS/hostname=aria-ops-logs.corp.vmbeans.com/g' /var/lib/loginsight-agent/liagent.ini
sed -i 's/;ssl=yes/ssl=no/g' /var/lib/loginsight-agent/liagent.ini
sed -i 's/;central_config=yes/central_config=yes/g' /var/lib/loginsight-agent/liagent.ini
sed -i 's/;port=9543/port=9000/g' /var/lib/loginsight-agent/liagent.ini
/etc/init.d/liagentd restart
```

## Starting Aria Operations for Logs



Installing a Linux OS agent can be done manually or as part of an automated deployment process for example when using Aria Automation.

1. In FireFox, open up a new Tab '+'.
2. On the firefox toolbar, click Aria Operations for Logs.
3. Choose Workspace ONE Access.
4. Click LOGIN VIA SSO.

## Workspace ONE

[134]



If you are prompted for credentials...

1. In username, type **holadmin**
2. in password type **VMware1!**
3. Click **Sign In**

## Agents Configuration

The screenshot shows the VMware Aria Operations for Logs web interface. The top navigation bar is dark blue with the VMware logo and the title "VMware Aria Operations for Logs". Below the navigation bar is a light gray header area with a back arrow, a search bar containing "Agents", and a red box labeled "1" highlighting the search bar.

The main content area has a left sidebar with several menu items: Dashboards, Explore Logs, Log Sources, Alerts, Reports, Content Packs, Integration, Log Management, Management (which is expanded), System Monitor, Usage Reports, Cluster, Access Control, Hosts, Agents (which is highlighted with a red box and labeled "3"), and Export. A red box labeled "2" highlights the "Management" item in the sidebar.

The main content area displays a table titled "All Agents" with two rows of data:

IP Address	Hostname	Version	OS	Last Seen
192.168.110.121	WIN-FRPVCKMFPK6N.corp.vmbeans.com	8.12.0.21584210	Microsoft Windows Server 2019 Standard	Less than a minute ago
192.168.110.120	ubuntu-0008.corp.vmbeans.com	8.12.0.21584210	Ubuntu 20.04.3 LTS	Less than a minute ago

Below the table, there is a link to "Download VMware Aria Operations for Logs Agent Version 8.12.0".

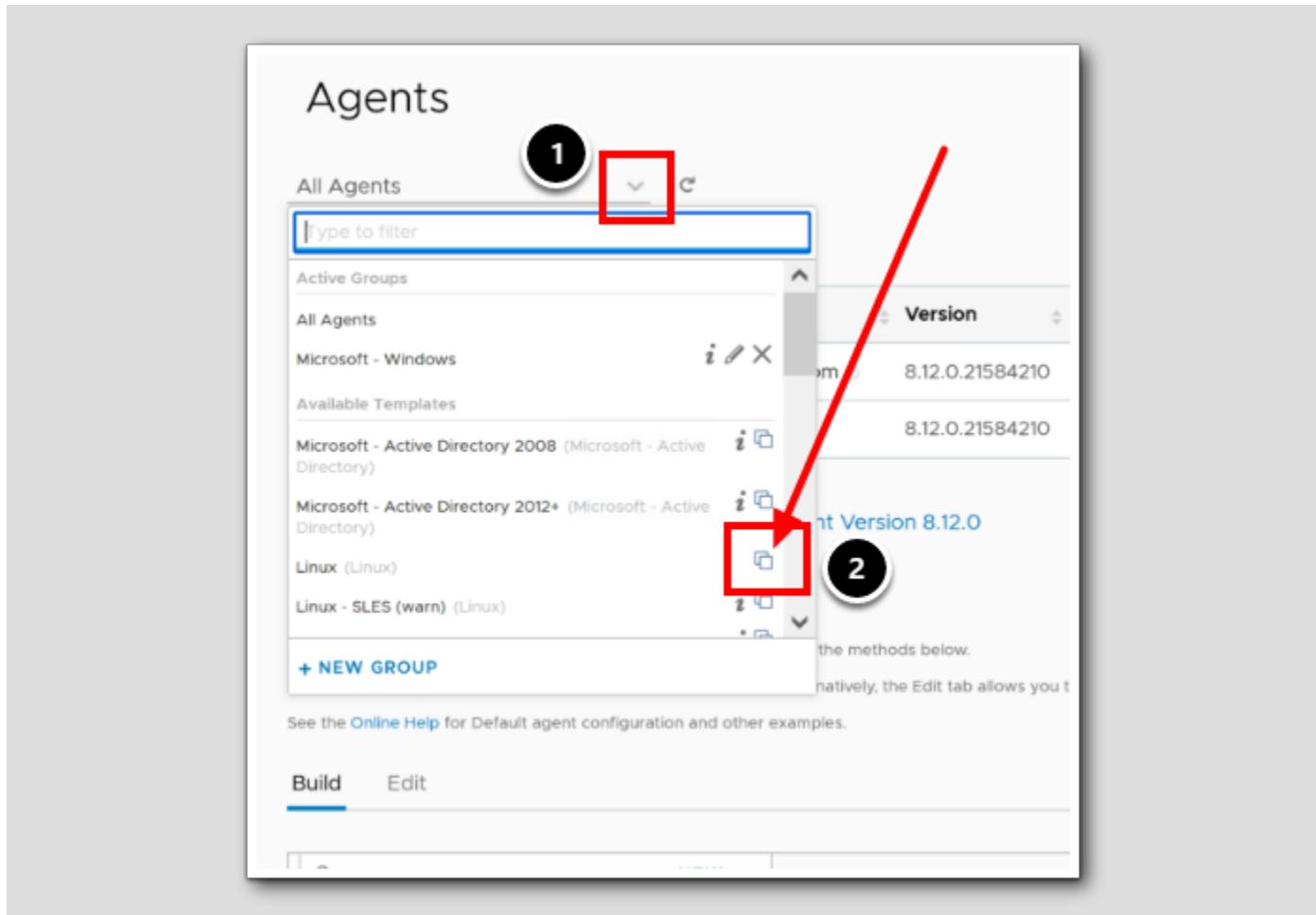
The bottom section is titled "Agent Configuration" and contains a note about centrally managing agent group configurations. It includes tabs for "Build" (which is selected) and "Edit". On the right, there is a table with three rows: Servers, General, and Common, each with a "NEW..." button.

Once the agent is connected to the Aria Operations for Logs server, the next step is to configure log filtering. This ensures that we're monitoring only the relevant logs. This is crucial to avoid overwhelming the Log Insight server with unnecessary data. Aria Operations for Logs uses the concept of "Content Packs" that define parsing rules for different log sources. Aria Operations for Logs' filtering capabilities is used to specify which logs should be forwarded from the agent to the server. This can be based on log levels, keywords, or any other relevant criteria.

1. In Aria Operation for Logs, Expand the left menu Click the '>'.
2. Click **Management**.
3. Click **Agents**.

Note: We see a list of All OS and Application Agents, both Linux and Windows that are running out on the Operative systems.

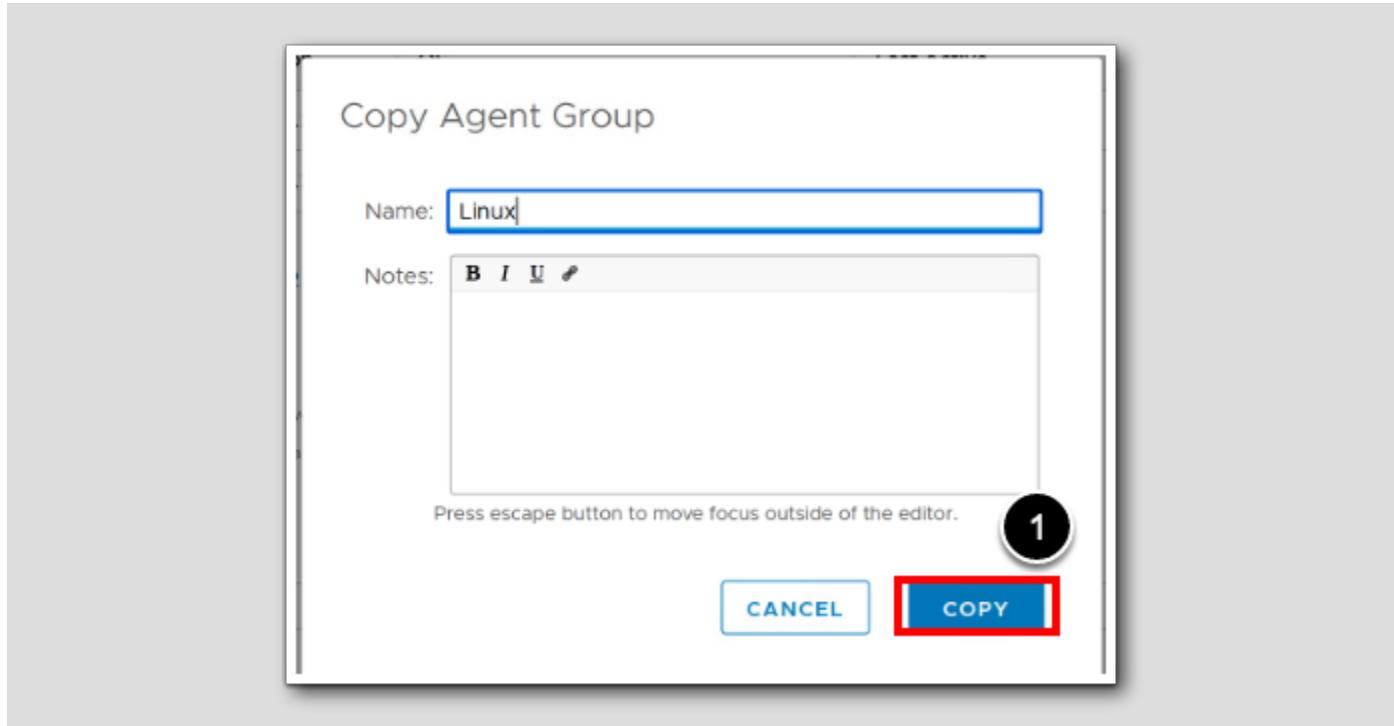
## Find the Linux Template



Aria Operation for Logs is already configured to receive the Windows Logs. We will now configure Aria Operation for Logs to also receive Logs from Linux; in particular, an Ubuntu server called ubuntu-0008. The installed Linux Content Pack comes with templates that we copy. We will have multiple servers and want to manage them collectively, and therefore we are utilizing *agent groups*. This helps us streamline log management and filtering for our future set of servers.

1. To expand our agents scope and find an available template, click the All Agents drop-down.
2. From the drop-down menu, under Available Templates, besides Linux (Linux), click the Copy Template icon.

## Copy the Agent Group



We could have changed the name on our Linux agent group, but we'll leave it as-is for now.

1. Click COPY.

## Filter Linux Agents

The screenshot shows the 'Agents' section of a management interface. At the top, there's a dropdown menu set to 'Linux (Not Saved)' with a refresh button (labeled 4) next to it. Below the dropdown, a note says 'Use filters to select which agents receive the Agent Configuration below.' There are three filter fields: 'OS' (labeled 1), 'starts with' (labeled 2), and 'Ubuntu' (labeled 3). An 'EXPORT' button is located below the filters. A table below the filters shows one agent entry:

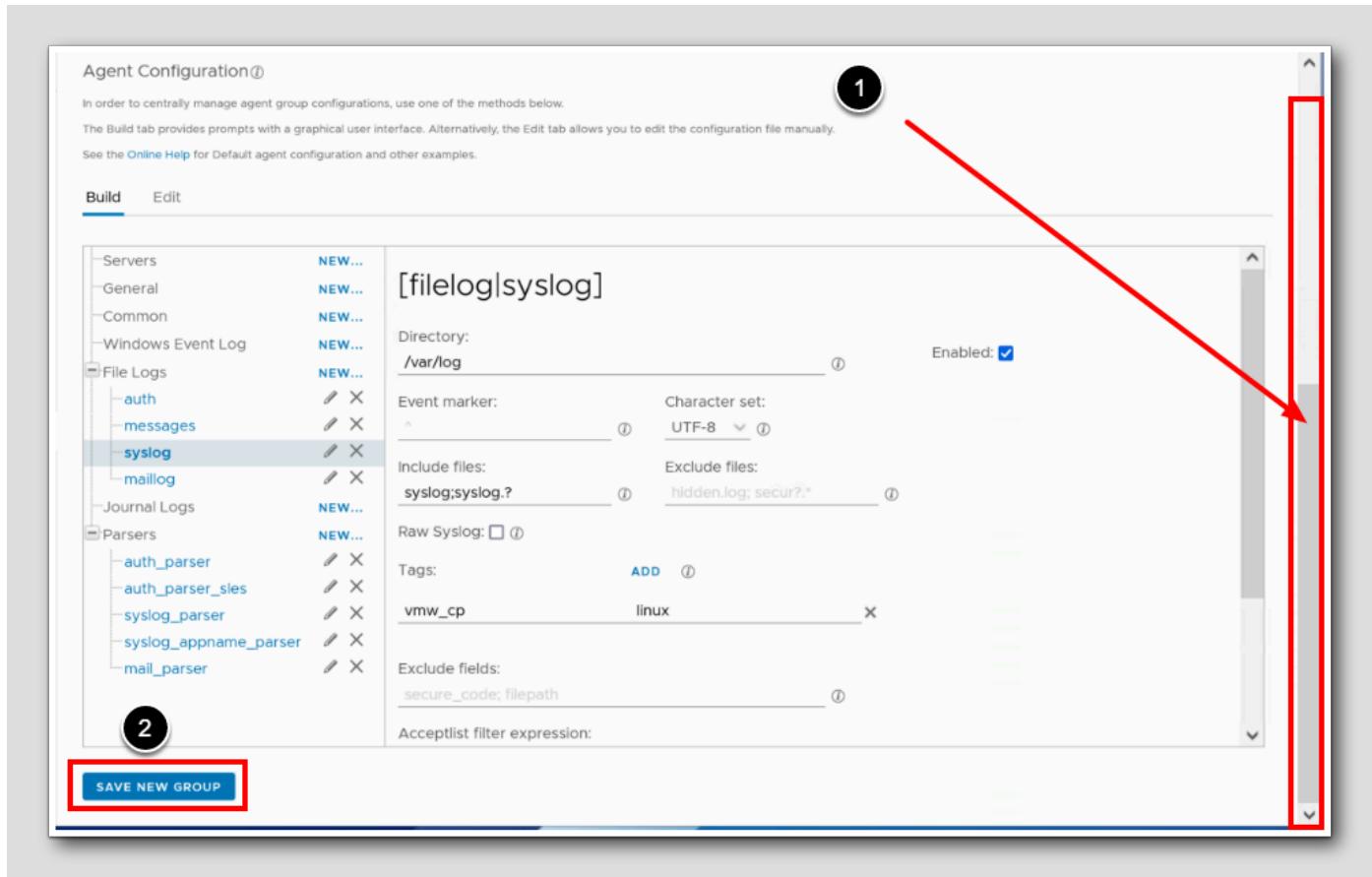
IP Address	Hostname	Version	OS	Last Active
192.168.110.120	ubuntu-0008.corp.vmbeans.com	8.12.0.21584210	Ubuntu 20.04.3 LTS	Less than 1 minute ago

Once the Linux template is copied, we need to specify the servers by adding a filter to limit the results to only servers with OS names starting with '*Ubuntu*'.

1. From the filter section, change IP Address to OS.
2. Change matches to starts with.
3. Type Ubuntu and press ENTER.
4. Click the refresh button.

Observe that at the time of writing, there was just one server that had the Linux Client installed and with its OS starting with '*Ubuntu*'.

Save



1. Scroll to the bottom of the page.

2. Click **SAVE NEW GROUP**.

## View incoming data

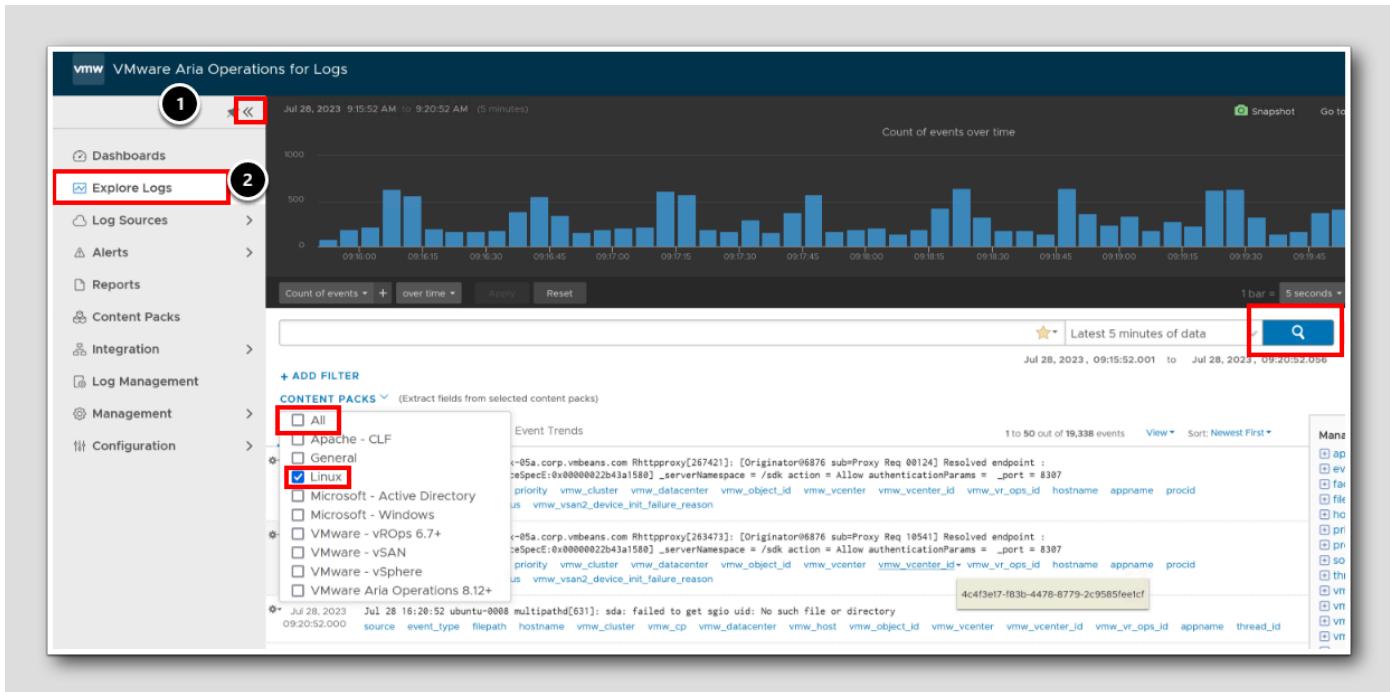
The screenshot shows a table of agents with the following data:

IP Address	Hostname	Version	OS	Last Active	Events Sent	Events Received
192.168.110.120	ubuntu-0008.corp.vmbeans.com	8.12.0.21584210	Ubuntu 20.04.3 LTS	Less than 1 minute ago	24	0.4
192.168.110.121	WIN-FRPVKMFPK6N.corp.vmbeans.com	8.12.0.21584210	Microsoft Windows Server 2019 Standard	Less than 1 minute ago	536	0

1. Scroll to the very top of the page.
2. In the drop-down menu. Choose All Agents.
3. Click the refresh button.

The Events Sent Column should start to populate (highlighted)

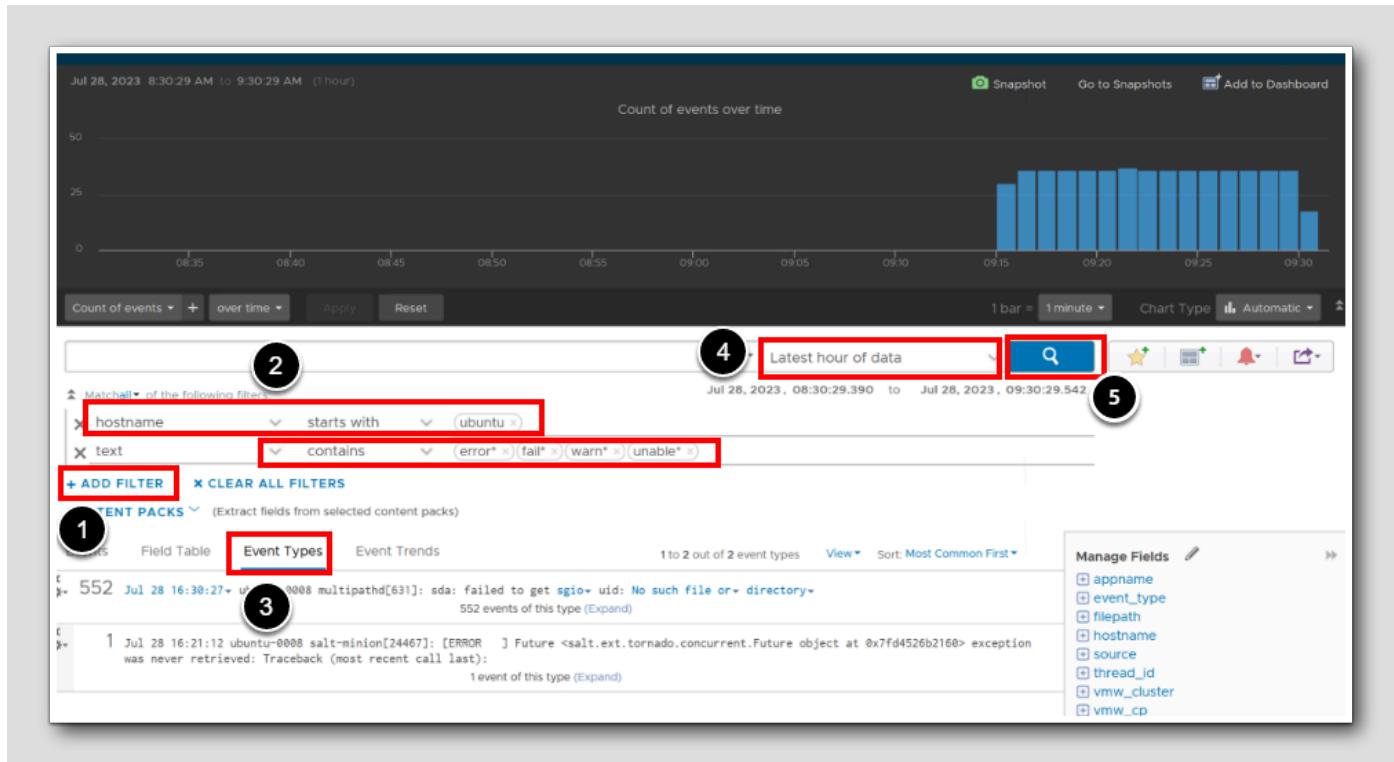
See incoming log lines



1. To Expand the left menu, Click '>>'.
2. In the Aria Operations for Logs UI, click **Explore Logs**.
3. In the CONTENT PACKS drop-down, deselect All.
4. In the CONTENT PACKS drop-down, select Linux.
5. Click the Search Icon.

What we have done now is to single out messages coming in via the Linux Content pack

## Validating the search



While the screen capture is elaborately annotated, these final steps are an important exercise in using filters to identify data sources, and to isolate references to errors, warnings, etc., within log originating from the syslog or application log files on a server. Thank you for the patience and attention on these last steps to success..

1. Click + ADD FILTER twice.
2. For the first filter:
  - Change **text** to **hostname**
  - Change **contains** to **starts with**
  - In the text field, type ‘ubuntu’ (all lowercase) and press <Enter>”
3. For the second filter:
  - Leave the **text** selection unchanged
  - Change **does not contain** to **contains**
  - In the text field, type ‘error\*’ (all lowercase) and press <Enter>”
  - In the text field, type ‘fail\*’ (all lowercase) and press <Enter>”
  - In the text field, type ‘warn\*’ (all lowercase) and press <Enter>”
  - In the text field, type ‘unable\*’ (all lowercase) and press <Enter>”
4. Select **Latest Hour of Data**.
5. Click the **Search** button.
6. Lastly click **Event Types**.

Observe we are receiving data from *ubuntu-0008* server, and that there are several types of events coming from the server.

Note: Since this is a lab environment, the image and data will differ.

## Closing comments

[143]

To enhance our ability to respond promptly to issues, we could configure alerts and notifications within Aria Operations for Logs to stay informed about critical events or anomalies in our log data. Alternatively, we could send *Aria Operation for Logs (Log Insight)* alerts to Aria Operations, which we walked through in the previous lesson [Troubleshooting Workbench](#).

## Conclusion

[144]

The integration of Aria Operations for Logs with Aria Operations for centralized log management and analysis establishes a seamless and robust troubleshooting process. By combining log data with metrics from Aria Operations, we can efficiently identify the precise root cause of issues, leading to a reduction in time-to-resolution.

- In our investigation, we have demonstrated how we can significantly shorten the quest for Meantime to Resolution (MTTR) and find the root cause of errors by extending troubleshooting with logs from within Aria Operations, without the need to launch Aria Operations for Logs separately.
- Additionally, we explored the installation and configuration of the Aria Operations for Logs OS and Application Agent on

Linux. This ensures that the system is equipped to take advantage of the powerful log management and analysis features provided by Aria Operations.

## You've finished Module 4

[145]

Congratulations on completing the lab module.

If you are looking for additional general information on Aria Operations, try one of these:

- VMware Product Public Page - Aria Operations: <https://www.vmware.com/products/aria-operations.html>
- Aria Operations - Documentation: <https://docs.vmware.com/en/VMware-Aria-Operations/index.html>
- Aria Operations - Logs Integration: <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Configuring-Operations/GUID-33DAA688-CED8-4D24-8359-1FC1CEDD1191.html>

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the TABLE OF CONTENTS to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 5 - Configuring Costs to Match Your Business Needs (30 minutes) Intermediate

### Introduction

[147]

This module focuses on configuring cost settings in Aria Operations to align with your organization's specific requirements.

By completing this module, you will have a comprehensive understanding of how to configure cost settings in Aria Operations to match your organization's needs. You will be equipped with the knowledge to track expenses, calculate costs, and analyze cost data effectively, enabling better cost management and decision-making within your IT environment.

### Log in to Aria Operations

[148]

We will log in to a live instance of Aria Operations running in this lab.

#### Open the Firefox Browser from the Windows Task Bar

[149]

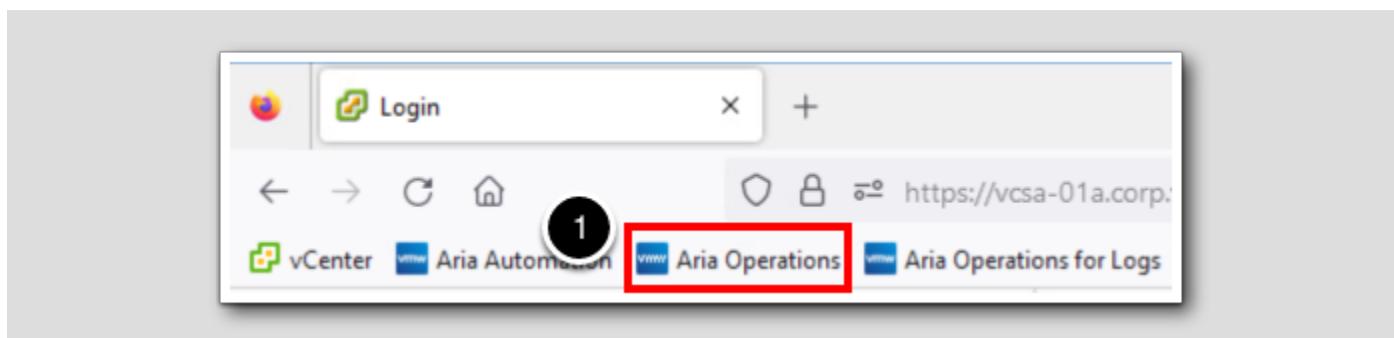


If the browser is not already open, launch Firefox.

1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

### Navigate to Aria Operations

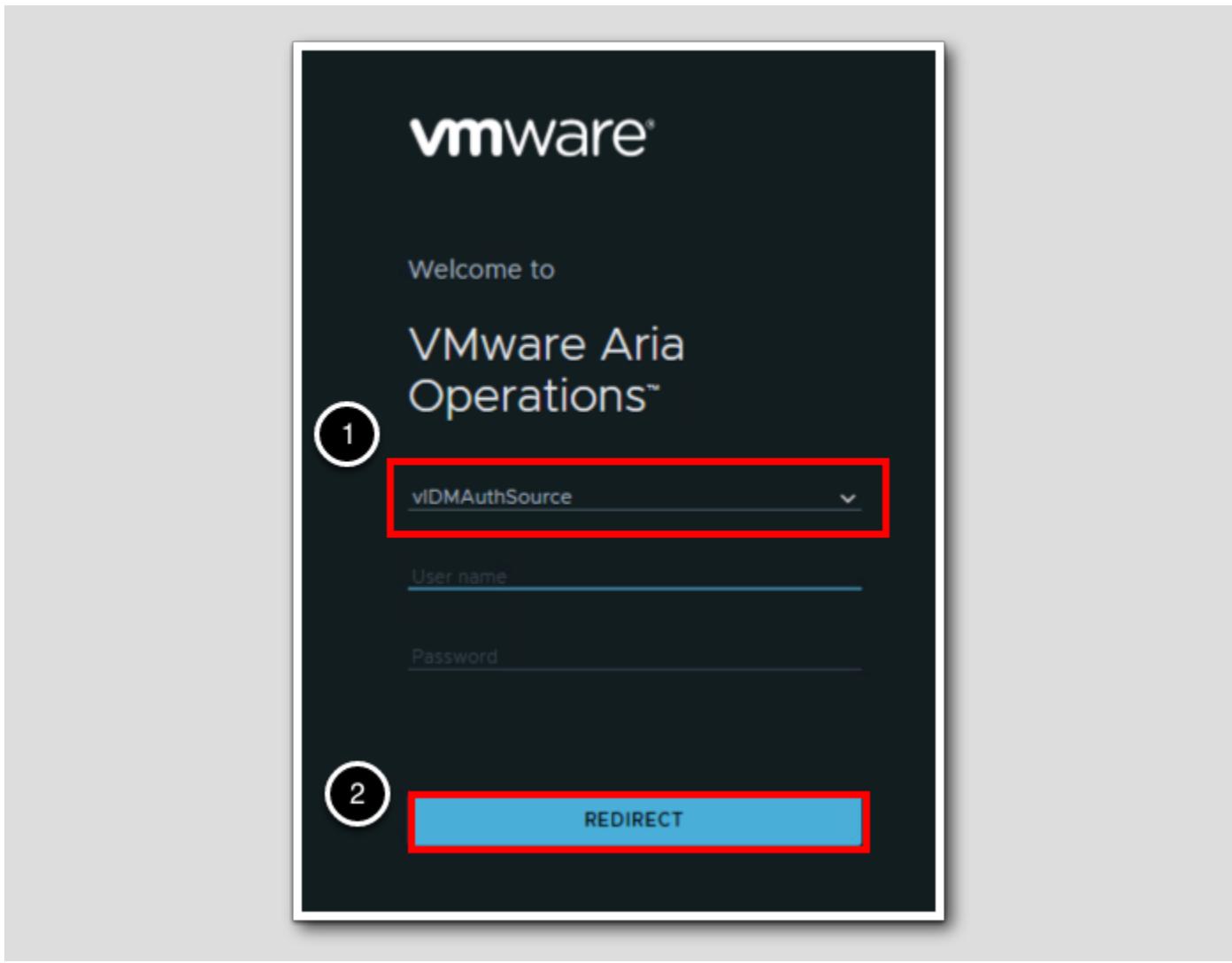
[150]



1. Click the Aria Operations bookmark in the bookmarks toolbar.

## Log in to Aria Operations

[151]



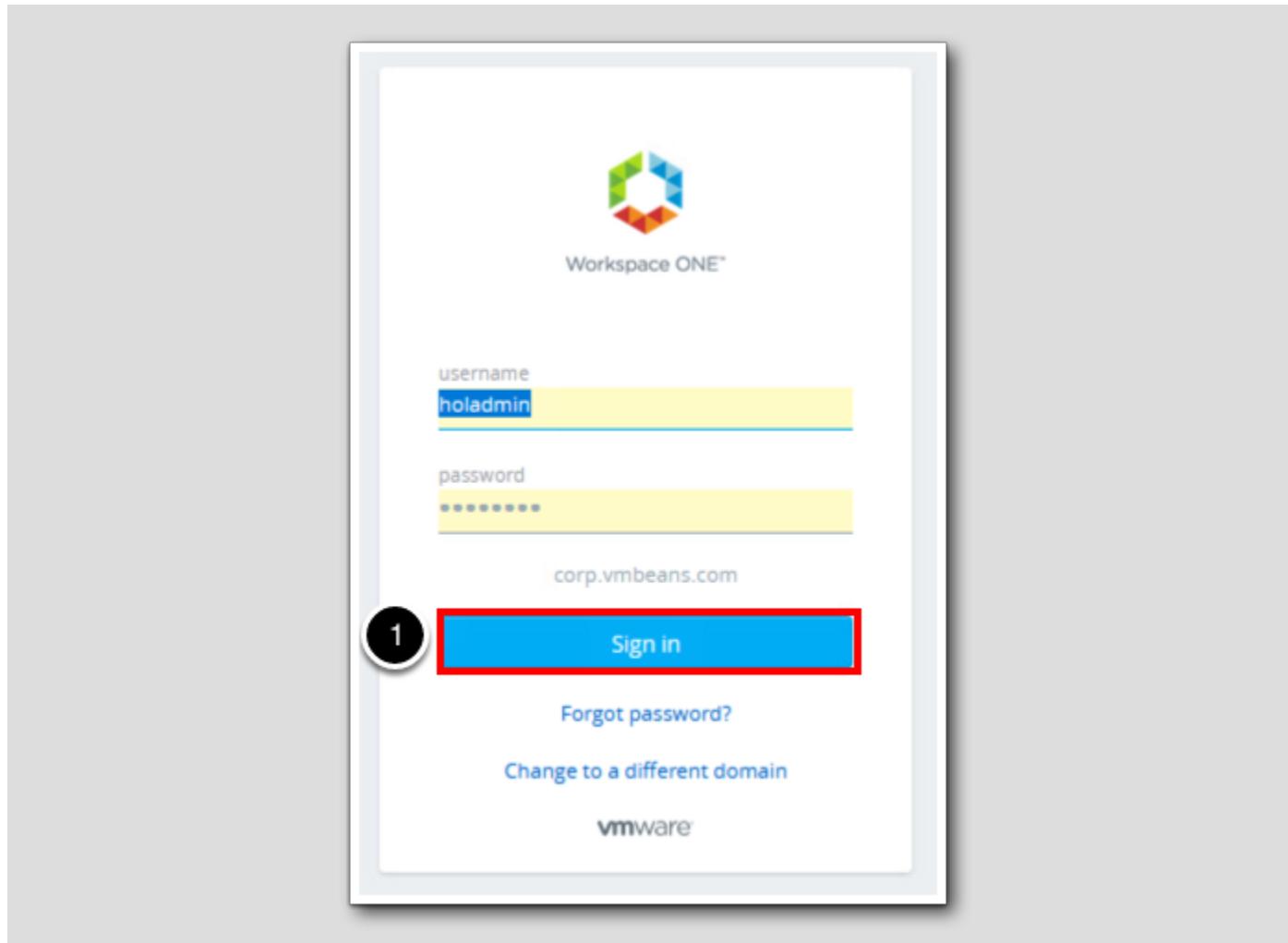
Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

vIDMAuthSource may be pre-selected as the default identity source. If it is not, then you will need to select it.

1. Click the drop-down arrow and select vIDMAuthSource if it is not already selected.
2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login

[152]



VMware Identity Manager acts as the identity provider for the Active Directory authentication source in this lab.

Credentials for the default user, holadmin, have already been provided.

1. Click Sign in

## Costing and Cost Drivers

[153]

We will focus on reviewing and customizing cost driver settings within Aria Operations.

- Reviewing Cost Driver Settings: Explore cost driver settings related to server hardware, network resources, and labor.
- Customizing Cost Calculation Settings: We will learn how to customize cost calculations by editing the cost drivers

Note: SDDC costing is out-of-the box with VMware Aria Operations. There is no integration required with the old vRealize Business for Cloud.

The screenshot shows the 'Cost Drivers' page in VMware Aria Operations. The 'Labor' section is selected. A yellow box highlights the 'Summary' section, which displays 'US\$107.0' as the 'Total Monthly Cost'. A red arrow points to this value.

Review the Summary Total Monthly Cost for Labor (\$107)

1. Scroll up
2. Click << Back To Cost Drivers

The screenshot shows the 'Cost Drivers' page in VMware Aria Operations. The 'Labor' section is selected. A yellow box highlights the 'Summary' section, which displays 'US\$107.0' as the 'Total Monthly Cost'. A red arrow points to this value.

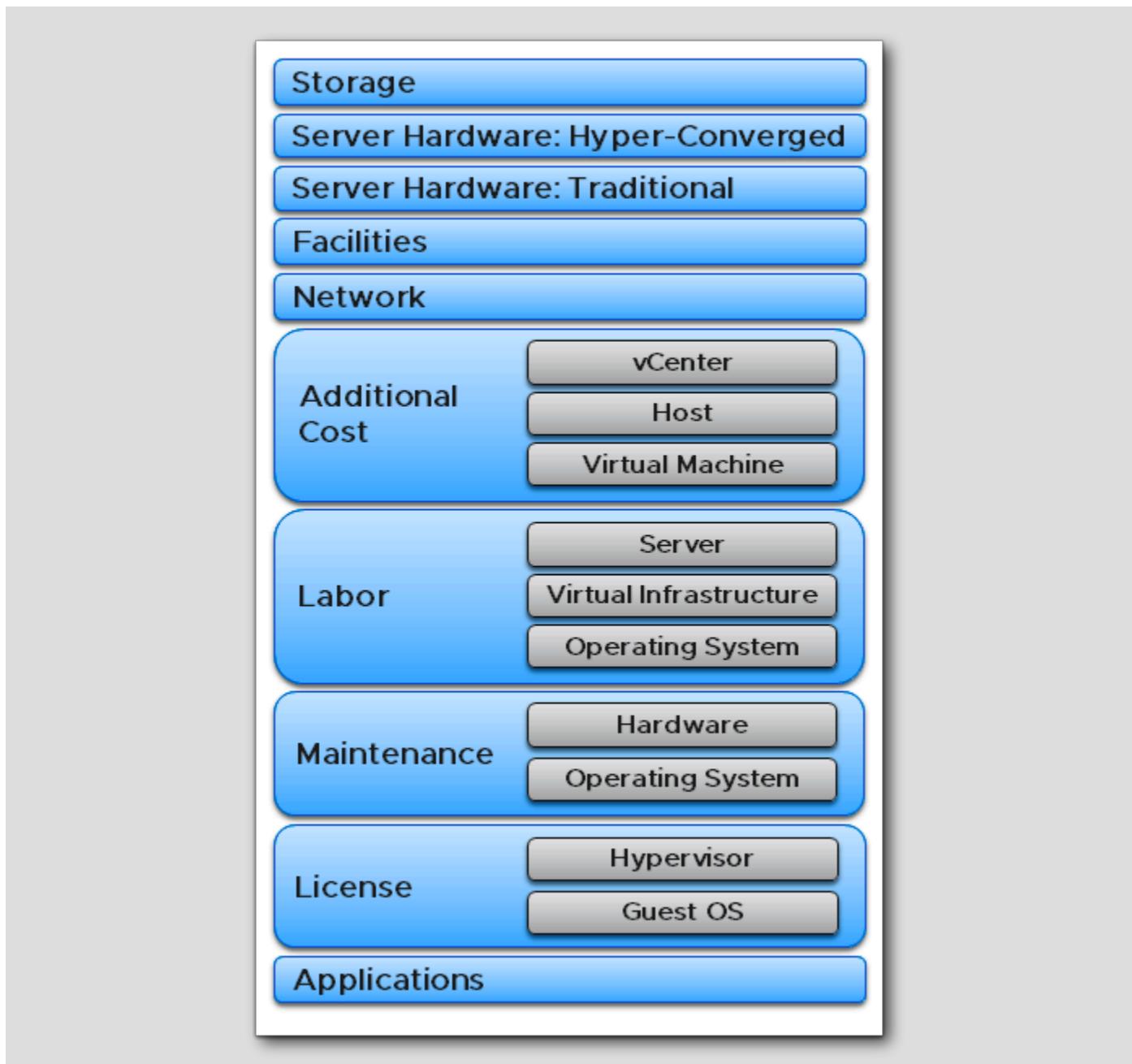
## Launching cost

The screenshot shows the VMware Aria Operations interface. On the left, a sidebar lists navigation options: Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, and Configure. The 'Home' option is highlighted with a red box and a circled '1'. In the center, under 'Pillars of Operations', there are three cards: 'Observability' (monitoring), 'Capacity' (optimization), and 'Cost'. The 'Cost' card is highlighted with a red box and a circled '2'. Below these are sections for 'Applications' and 'Business Applications'.

1. If you're not on the home page, click Home

2. Click Cost

## About Cost Drivers

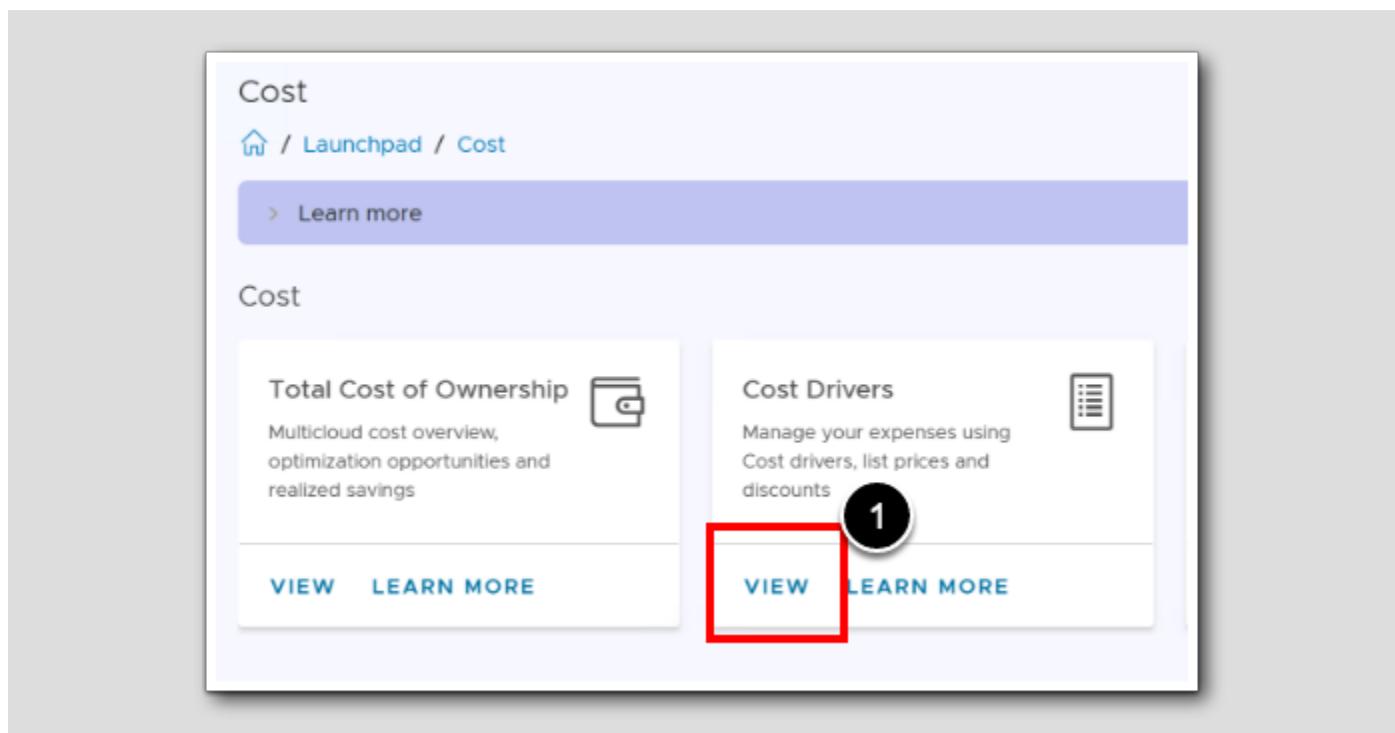


**Cost Drivers:** Cost Drivers are the aspect that contributes to the expense of your business operations. Cost drivers provide a link between a pool of costs. Cost Drivers help you with expense management. There are various cost drivers such as Server Hardware, Maintenance Contracts, Facilities like real estate, Power and Cooling, Network, Storage, Labour and even licenses like OS, VMware software, SQL Server etc. You can set a total cost for the License, Labor, Network, Maintenance, and facilities cost drivers in VMware Aria Operations.

**Cost Reference Database:** According to the industry standard, VMware Aria Operations maintains a reference cost for these cost drivers, meaning that Cost Drivers are populated by default using the Cost Reference Database that ships with Aria Operations. If we modify the reference cost of cost drivers in VMware Aria Operations, we override the values in the reference database.

## Launching the Cost Drivers

[156]



1. In the Cost page, launch the Cost drivers by clicking View

## Hardware Monthly expense

The screenshot shows the 'Cost Drivers' section of the VMware Aria Operations interface. The 'Cost Drivers' tab is selected. The page describes cost drivers as expense types used to calculate the cost of vSphere On-Prem/VMware Cloud Foundation/VMC On AWS cloud. It includes sections for Infrastructure Type (set to vCenter), export/import buttons, and a datacenter selection dropdown (All Datacenters). The main table lists cost drivers:

Private Cloud Cost Driver	Comparison with industry benchmark	Industry Benchmark	Monthly Expense
<input type="checkbox"/> Server Hardware : Traditional	0.00%		US\$492.0
<input type="checkbox"/> Server Hardware : Hyper-Converged	Not Applicable		US\$0.0

A red box highlights the 'Server Hardware : Traditional' row, and a black circle with the number '1' is placed over it. A red arrow points from the 'Monthly Expense' value of 'US\$492.0' to the right.

Review the monthly expense for the Private Cloud Cost Driver for *Server Hardware: Traditional*

1. To review the details, click *Server Hardware: Traditional*

**Cost Drivers** SETTINGS

Cost Drivers Cluster Cost Cloud Providers Pricing

<< Back To Cost Drivers

## Server Hardware : Traditional

You can view the total cost of servers such as tower, blade or desktop that are associated with all your vCenter Server instances. The amortized cost of each server hardware is calculated based upon depreciation years and model defined in Cost Settings. Please refer to Storage tab to enter cost per GB, for datastores.

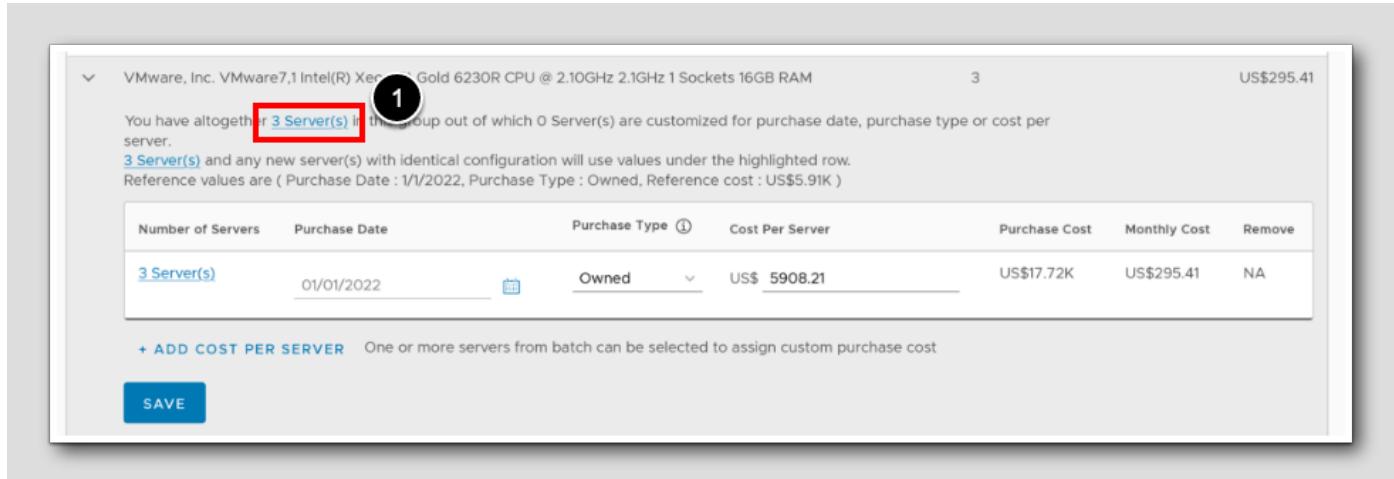
Edit Mode  Edit for All Datacenters **1**  Edit for specific Datacenter

Server Group Description	No. of Servers	Monthly Cost
VMware, Inc. VMware7,1 Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz 2.1GHz 1 Sockets 42GB RAM	1	US\$98.47
VMware, Inc. VMware7,1 Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz 2.1GHz 1 Sockets 16GB RAM	3	US\$295.41
VMware, Inc. VMware7,1 Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz 2.1GHz 1 Sockets 52GB RAM	1	US\$98.47
<b>Total</b>		<b>US\$492.35</b>

The summary shows that we have 5 servers costing US\$ 492,-/month. The server details and Monthly cost is per server type. Observe the number of each server type.

1. We will Edit the settings for all datacenters
2. Click ">" to expand

## Review the costs per server



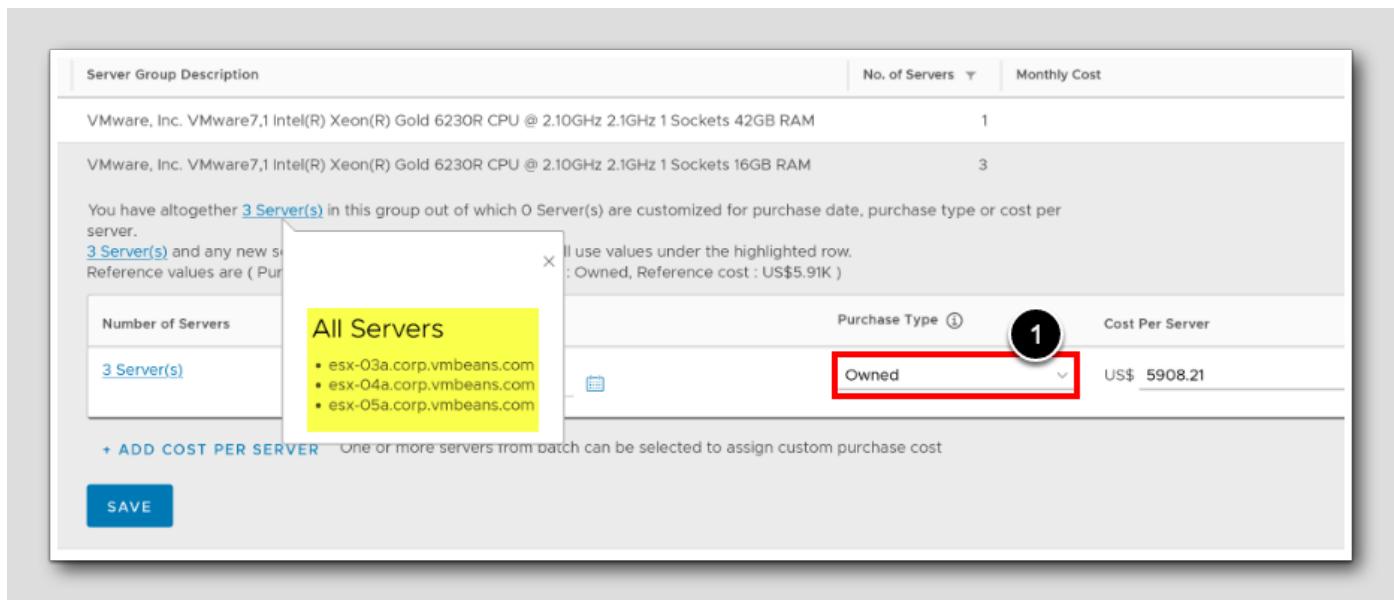
The screenshot shows a table with the following data:

Number of Servers	Purchase Date	Purchase Type	Cost Per Server	Purchase Cost	Monthly Cost	Remove
<a href="#">3 Server(s)</a>	01/01/2022	Owned	US\$ 5908.21	US\$17.72K	US\$295.41	NA

Below the table, there is a note: "+ ADD COST PER SERVER One or more servers from batch can be selected to assign custom purchase cost". A blue "SAVE" button is at the bottom.

- As you can see we have 3 servers of identical configuration. Click on either of the links [3 Server\(s\)](#)

## Reviewing which servers



The screenshot shows a table with the following data:

Server Group Description	No. of Servers	Monthly Cost
VMware, Inc. VMware7,1 Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz 2.1GHz 1 Sockets 42GB RAM	1	
VMware, Inc. VMware7,1 Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz 2.1GHz 1 Sockets 16GB RAM	3	

You have altogether [3 Server\(s\)](#) in this group out of which 0 Server(s) are customized for purchase date, purchase type or cost per server. [3 Server\(s\)](#) and any new servers will use values under the highlighted row. Reference values are ( Purchase Date : 1/1/2022, Purchase Type : Owned, Reference cost : US\$5.91K ).

Below the table, there is a note: "+ ADD COST PER SERVER One or more servers from batch can be selected to assign custom purchase cost". A blue "SAVE" button is at the bottom.

The 3 servers in this group with identical configuration in our domain corp.vmbeans.com are esx-03a, esx-04a, and esx-05a.

- Click the Purchase type Owned

## Get back to all Cost Drivers

**Cost Drivers** SETTINGS

Cost Drivers Cluster Cost Cloud Providers Pricing

<< Back To Cost Drivers 2

1

## Server Hardware : Traditional

You can view the total cost of servers such as tower, blade or desktop that are associated with all your vCenter Server instances. The amortized cost of each server hardware is calculated based upon depreciation years and model defined in Cost Settings. Please refer to Storage tab to enter cost per GB, for datastores.

Edit Mode  Edit for All Datacenters  Edit for specific Datacenter

Summary	
US\$492.0	5
Server Hardware Cost by Server Configuration	Total Number of Servers

Server Group Description	No. of Servers	Monthly Cost
VMware, Inc. VMware7,1 Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz 2.1GHz 1 Sockets 42GB RAM	1	US\$98.47
VMware, Inc. VMware7,1 Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz 2.1GHz 1 Sockets 16GB RAM	3	US\$295.41

You have altogether [3 Server\(s\)](#) in this group out of which 0 Server(s) are customized for purchase date, purchase type or cost per server.  
[3 Server\(s\)](#) and any new server(s) with identical configuration will use values under the highlighted row.  
Reference values are ( Purchase Date : 1/1/2022, Purchase Type : Owned, Reference cost : US\$5.91K )

Number of Servers	Purchase Date	Owned Leased	Cost Per Server	Purchase Cost	Monthly Cost	Remove
<a href="#">3 Server(s)</a>	01/01/2022	<a href="#">Owned</a>	US\$ 5908.21	US\$17.72K	US\$295.41	NA

The Server Hardware cost driver tracks all the expenses for purchasing of hardware servers that are part of vCenter Servers. You see the server cost based on CPU age and server cost details. Observe that we can have leased servers, not just owned servers.

Note: We could have selected an individual server from the server group and specified the unique cost for each individual server

1. Scroll to the top
2. Click << Back To Cost Drivers

## Launch Network Cost Driver Settings

The screenshot shows a table titled 'Cost Drivers' with columns for 'Cost Driver', 'benchmark', 'Industry Benchmark', and 'Monthly Expense'. The table lists several cost drivers: Server Hardware (Traditional), Server Hardware (Hyper-Converged), Storage, License, Applications, Maintenance, Labor, and Network. The 'Network' row is highlighted with a red box and a circled '2'. A vertical red box highlights the rightmost column. A circled '1' is placed over the '1' in 'US\$0.0' under the Applications row.

Cost Driver	benchmark	Industry Benchmark	Monthly Expense
Server Hardware : Traditional	0.00%		US\$492.0
Server Hardware : Hyper-Converged	Not Applicable		US\$0.0
Storage	0.00%		US\$83.0
License	0.00%		US\$320.0
Applications	Not Applicable		US\$0.0
Maintenance	0.00%		US\$250.0
Labor	0.00%		US\$85.0
Network	0.00%		US\$900.0

1. In the Cost Drivers page scroll down to the bottom
2. Click Network

## Changing 10 Gbit costs

The screenshot shows the 'Cost Drivers' section of a software application. At the top, there are tabs for 'Cost Drivers', 'Cluster Cost', 'Cloud Providers', and 'Pricing'. Below the tabs, a 'Summary' box displays 'US\$900.0' as the 'Total Monthly Cost', which is highlighted with a yellow background and a red arrow pointing to it. The main area contains a table of NIC types and their costs:

NIC Type	Cost	(Reference Cost : US\$90, Count : 10)
1 Gigabit NIC	US\$ 45	(Reference Cost : US\$45, Count : 0)
10 Gigabit NIC	US\$ 250	(Reference Cost : US\$90, Count : 10)
25 Gigabit NIC	US\$ 135	(Reference Cost : US\$135, Count : 0)
40 Gigabit NIC	US\$ 180	(Reference Cost : US\$180, Count : 0)
100 Gigabit NIC	US\$ 225	(Reference Cost : US\$225, Count : 0)

Below the table, there are two radio button options: one for editing individual servers and another for entering monthly expenses for associated clouds. The 'Edit the total monthly cost per Network Interface Controller' option is selected. A red circle labeled '1' is placed over the '10 Gigabit NIC' row, and another red circle labeled '2' is placed over the 'SAVE' button at the bottom left.

Observe that we have ten 10 Gigabit NICs and the Total Monthly Cost is \$900

At the moment, Maybe as suggested, a 10 Gigabit NIC can cost a reasonable price of \$90. But in our organization, our gigantic gigabit switches are the best of breed so it is necessary to use high-end premium NICs with top-notch features for professional use and businesses. These are super expensive at \$250 each.

1. Change the price from 90 to 250
2. Click Save

After the change

2

Network

You can view the total cost of physical network infrastructure that includes internet bandwidth, which is estimated by count and type of network ports on the ESXi Servers.

Edit Mode  Edit for All  
 Datacenters  
 Edit for specific Datacenter

1

Summary  
US\$2.5K  
Total Monthly Cost

EDIT FOR INDIVIDUAL SERVERS

Edit the total monthly cost per Network Interface Controller

Network Interface Controller	Cost	Reference Cost	Count
1 Gigabit NIC	US\$ 45	(Reference Cost : US\$45, Count : 0 )	
10 Gigabit NIC	US\$ 250	(Reference Cost : US\$90, Count : 10 )	

Notice that our ten 10 Gigabit NICs cost \$250/each and we have a Summary of US\$2.5K as Total Monthly Cost

1. Scroll up
2. Click << Back To Cost Drivers

## Network Cost Driver Result



1. Again Scroll down (*scrollbar not visible*)

Notice the "drift" from the reference value. For Network, we cost 177.78% more than the reference value because of our fancy NICs.

2. Click Labor

## Changing Labor Values

**Cost Drivers**   **Cluster Cost**   **Cloud Providers**   **Pricing**

Enter detailed cost of labor

Category	Calculated By	Total Monthly Cost
Operating System	Hourly Rate	
Monthly hours of labor per Linux Instance	hours <input type="text" value="0.08"/>	(Reference value: 0.04)
Labor hourly rate	US\$ <input type="text" value="40"/>	(Reference Cost: US\$35.12)
Monthly hours of labor per Windows Desktop Instance	hours <input type="text" value="0.02"/>	(Reference value: 0.04)
Labor hourly rate	US\$ <input type="text" value="35.12"/>	(Reference Cost: US\$35.12)
Monthly hours of labor per Windows Server Instance	hours <input type="text" value="0.02"/>	(Reference value: 0.04)
Labor hourly rate	US\$ <input type="text" value="35.12"/>	(Reference Cost: US\$35.12)
Servers	Hourly Rate	
<b>EDIT FOR INDIVIDUAL SERVERS</b>		
Monthly hours of labor per server	hours <input type="text" value="0.08"/>	(Reference value: 0.08)
Labor hourly rate	US\$ <input type="text" value="35.12"/>	(Reference Cost: US\$35.12)
Virtual Infrastructure/ VM	Hourly Rate	
Monthly hours of labor per VM	hours <input type="text" value="0.03"/>	(Reference value: 0.04)
Labor hourly rate	US\$ <input type="text" value="45"/>	(Reference Cost: US\$49.4)
<input type="radio"/> Enter total monthly labor cost for servers, virtual infrastructure and operating system		
Total Monthly Cost	US\$ <input type="text" value="0"/>	
<b>SAVE</b>		7

Within our organization, we possess a group of individuals who specialize in hardware management and boast exceptional proficiency in vSphere, surpassing the capabilities of VI Admins. Among our pool of employees, there is an abundance of expertise in the Windows operating system; however, we face a significant deficit in Linux knowledge. Consequently, our administrators frequently resort to online searches for resolving Ubuntu-related queries. The scarcity of Linux knowledge within our organization results in higher labor costs associated with Linux expertise. In contrast, expenses related to other areas remain comparatively lower. This discrepancy arises due to the need for additional time and resources allocated by our administrators to research and resolve Ubuntu-related issues, resulting in increased expenses.

1. Change the Monthly hours of labor per Linux Instance from 0.04 to 0.08
2. Change the Linux Labor hourly rate to 40
3. Change the Monthly hours of labor per Windows Desktop Instance from 0.04 to 0.02
4. Change the Monthly hours of labor per Windows Server Instance from 0.04 to 0.02
5. Change the Monthly hours of labor per VM from 0.04 to 0.03
6. Change the Virtual Infrastructure/ VM Labor hourly rate from 49.4 to 45
7. Click Save

## Review Summary

[167]

## Advantageous hardware acquisition

The screenshot shows the 'Cost Drivers' section of the VMware Cost Management Platform. The 'Cost Drivers' tab is selected. A note at the top states: 'Cost Drivers are the expense types used by the VMware platform. This is the sum of cost drivers. Changes that are made to Cost Drivers are reflected in the VMware platform via the Cost Calculation Status tab.' Below this, the 'Infrastructure Type' is set to 'vCenter'. There are 'EXPORT' and 'IMPORT' buttons. The main list contains three items:

Cost Driver	Comparison with industry benchmark
<input type="checkbox"/> Private Cloud Cost Driver	1
<input type="checkbox"/> Server Hardware : Traditional	0.00%
<input type="checkbox"/> Server Hardware : Hyper-Converged	Not Applicable

Our company has recently secured a highly favorable hardware acquisition deal, obtaining servers at a significantly reduced cost. Based on our procurement purchase order, it appears that the price paid for each server was approximately 15% lower than the prevailing market price. In line with this, our finance department has requested that these cost savings be accurately recorded in our cost database. Consequently, it is necessary for us to update the current pricing information with the new values reflecting the revised and reduced costs.

1. To Enter new values click **Server Hardware : Traditional**

Entering 15% less

[\*\*<< Back To Cost Drivers\*\*](#)

## 4 Server Hardware : Traditional

You can view the total cost of servers such as tower, blade or desktop that are associated with all your vCenter Server instances. The amortized cost of each server. Please refer to Storage tab to enter cost per GB, for datastores.

**Edit Mode**

- Edit for All Datacenters
- Edit for specific Datacenter

**Summary**

**US\$419.0**

Server Hardware Cost by Server Configuration

**5**

Total Number of Servers

Server Group Description	No. of Servers
➤ VMware, Inc. VMware7,1 Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz 2.1GHz 1 Sockets 42GB RAM	
➤ VMware, Inc. VMware7,1 Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz 2.1GHz 1 Sockets 16GB RAM	
➤ VMware, Inc. VMware7,1 Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz 2.1GHz 1 Sockets 52GB RAM	

You have altogether **1 Server(s)** in this group out of which 0 Server(s) are customized for purchase date, purchase type or cost per server.

**1 Server(s)** and any new server(s) with identical configuration will use values under the highlighted row.  
Reference values are ( Purchase Date : 1/1/2022, Purchase Type : Owned, Reference cost : US\$5.91K )

Number of Servers	Purchase Date	Purchase Type	Cost Per Server
<b>1 Server(s)</b>	01/01/2022	Owned	<b>US\$ 5022</b>

**+ ADD COST PER SERVER** One or more servers from batch can be selected to assign custom purchase cost

**SAVE** **3**

In our environment our default Purchase cost pr server is \$5908.21 each.

15% of \$5908.21 is approx. \$ 886,2315, and If we subtract the 15% from the original price we get an approximate Cost Per Server: \$5022,- which will be our new Cost per server value.

1. For each of the three server group descriptions, click the ">" to expand

2. Change the Cost Per server to 5022

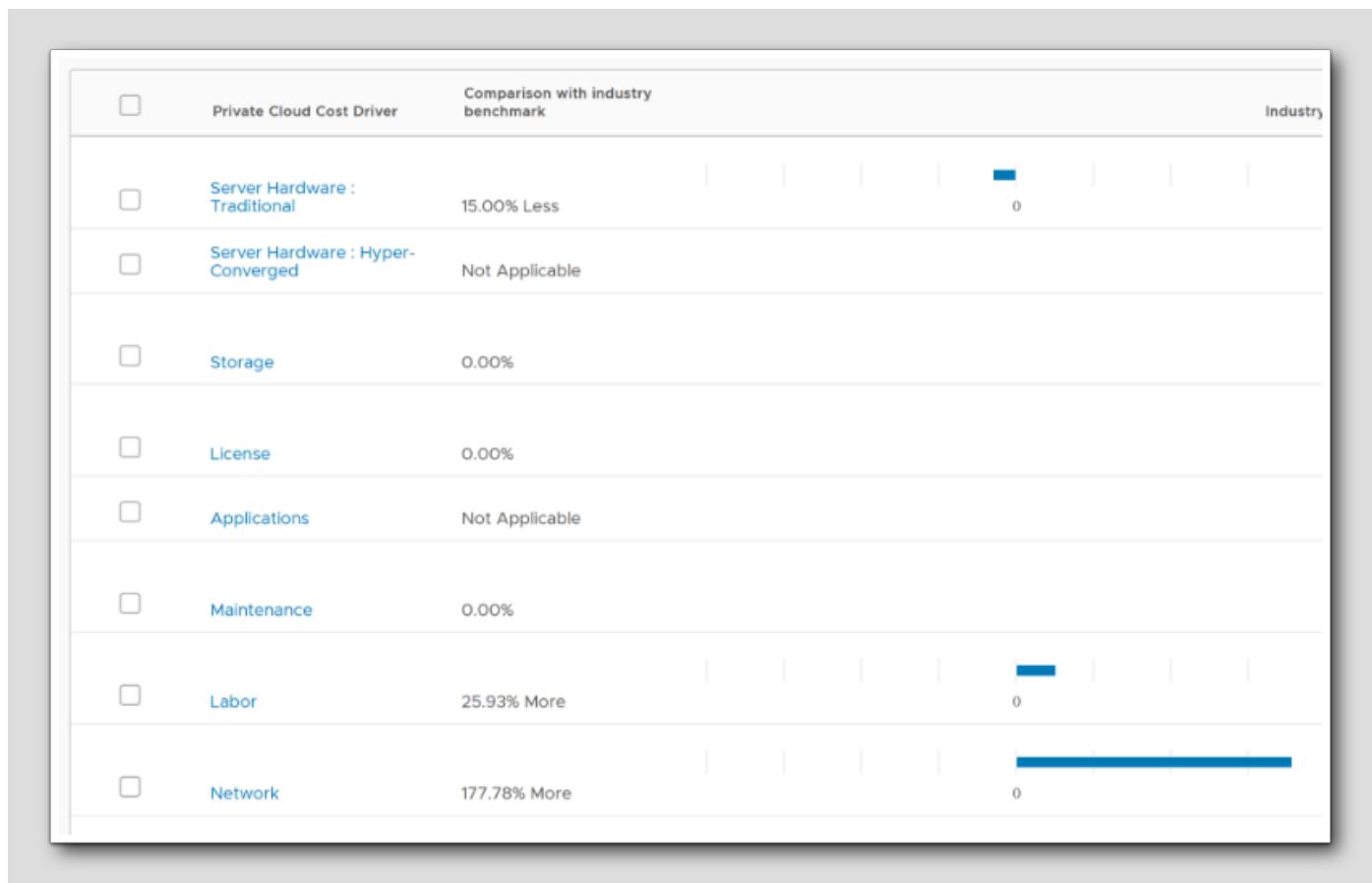
3. Click Save

Note: Do this for all three!

4. When you have done all three, click << Back To Cost Drivers

## Cost Summary

[170]



As you can see from the summary, our hardware now costs 15% less than the industry standard, and our Labor costs and network costs are higher than the reference value.

## Pricing and Calculation

[171]

## Financial Accounting Model: Depreciation

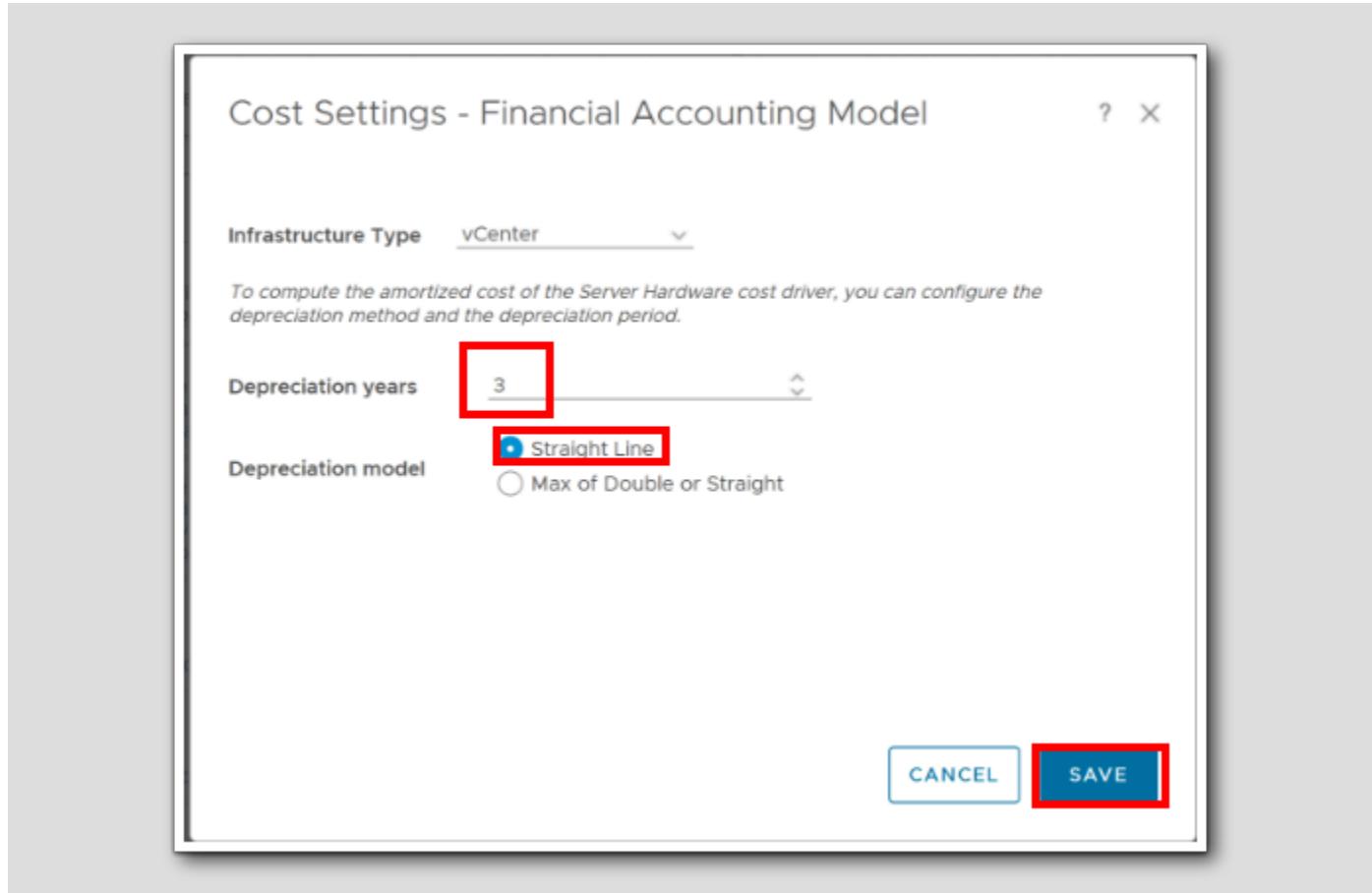
[172]

The screenshot shows the 'Cost Drivers' section of the VMware Aria Operations interface. At the top, there's a navigation bar with tabs: 'Cost Drivers' (which is active and underlined), 'Cluster Cost', 'Cloud Providers', and 'Pricing'. Above the tabs, there's a 'SETTINGS' button with a red box around it and a circled '1' to its right, indicating a note or step. Below the tabs, there's a brief description of what cost drivers are. Underneath, there's a dropdown for 'Infrastructure Type' set to 'vCenter'. At the bottom of the main area, there are 'EXPORT' and 'IMPORT' buttons. In the lower half of the screen, there's a table-like structure with one row visible. This row contains a checkbox, the text 'Private Cloud Cost Driver', and a link labeled 'Comparison with industry benchmark'.

Depreciation is like splitting the cost of a pricey item, like a server, over the years it's used. Instead of saying we spent all the money in year one, we spread the cost over its lifespan. Each year, we "use up" some of the server's value. It's like slicing a cake over several days, so everyone gets a piece when they want it. This gives a better picture of yearly expenses, reflecting when we're actually using the server.

1. To edit these values, on top, Click SETTINGS

## Updating Cost Settings

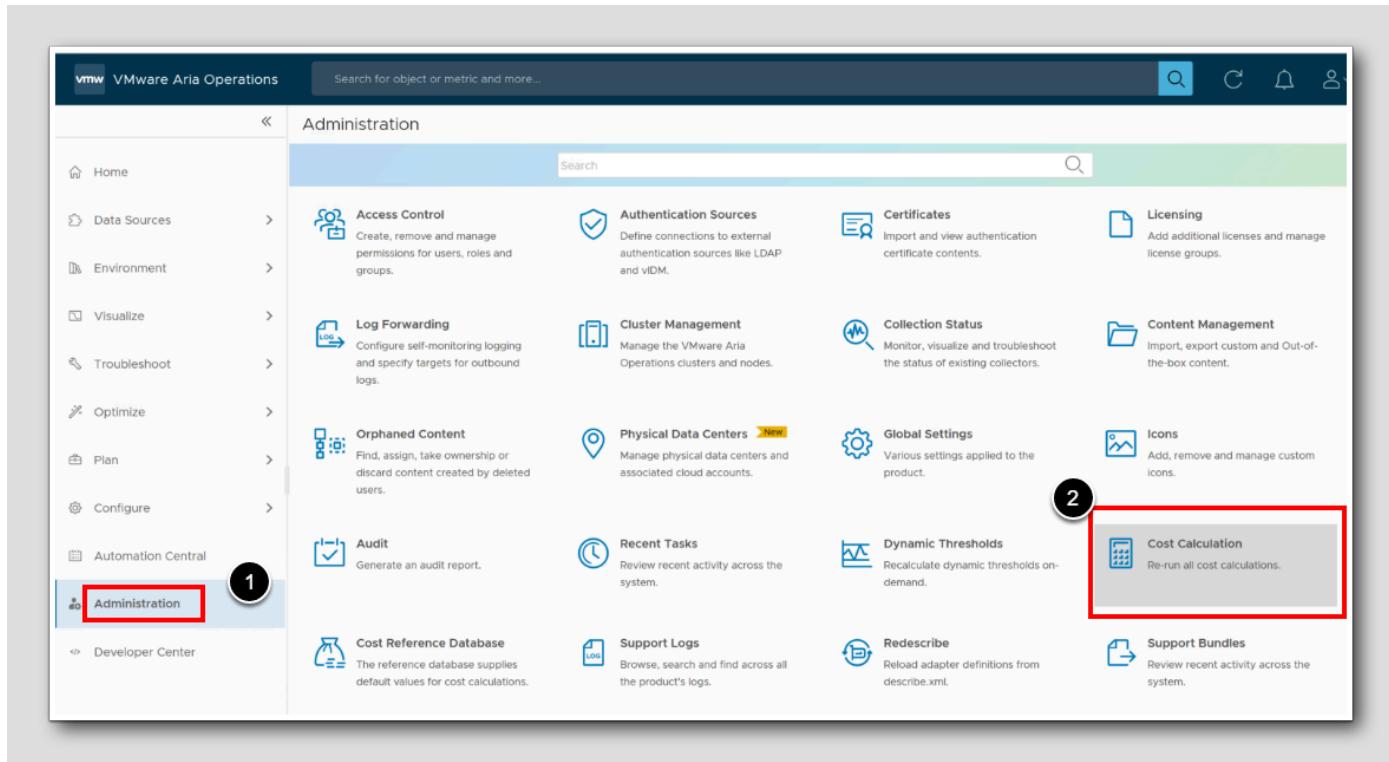


We buy a server for \$6,000. We expect it to last for 3 years, and after that, it will have no resale value (salvage value) meaning that after 3 years, the server's book value is \$0, which matches its expected resale value. Using the straight-line depreciation method, we calculate the annual depreciation:

$$\begin{aligned} & (\text{Cost of Server} - \text{Salvage Value}) / \text{Useful Life in Years} \\ &= (\$6,000 - \$0) / 3 \\ &= \$3,333 \text{ per year} \end{aligned}$$

1. Change the Depreciation Years to 3
2. For the Depreciation model, Choose Straight Line
3. Click Save

## Cost Calculation

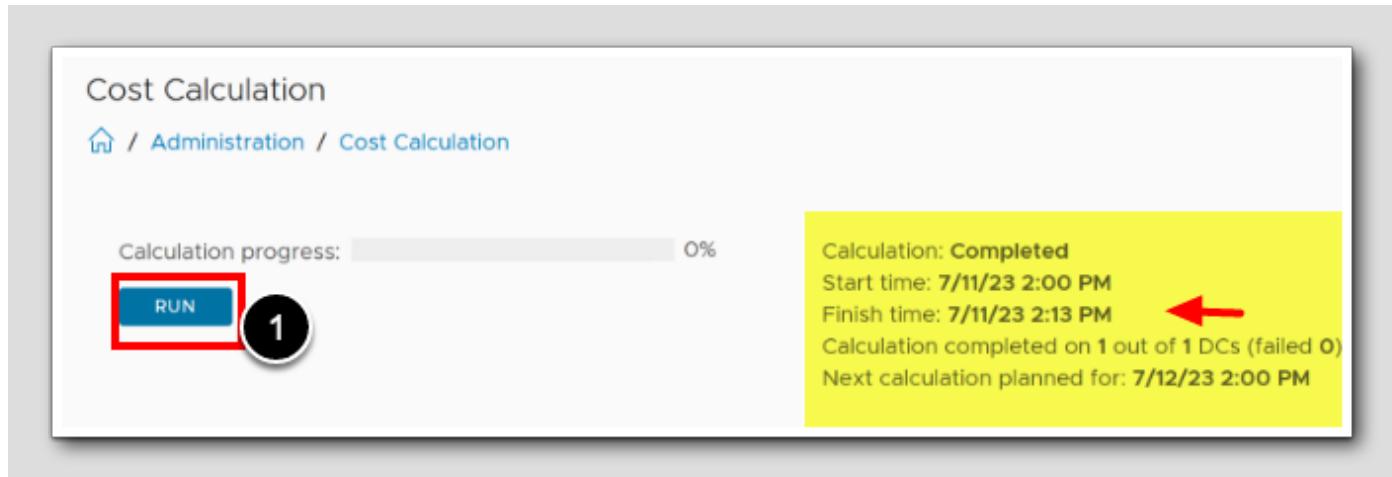


Sometimes it is necessary to run a manual cost calculation to see the impact of changes immediately, rather than waiting for the next automatic calculation cycle. For example when we have updated the cost settings, Changes in Pricing and / or If you need to generate a report or dashboard immediately. Aria Operations runs these calculations periodically in an automated fashion but manual calculations gives you flexibility and control over your cost analysis process.

1. Click Administration
2. Click Cost Calculation

## Running a manual Cost Calculation

[175]

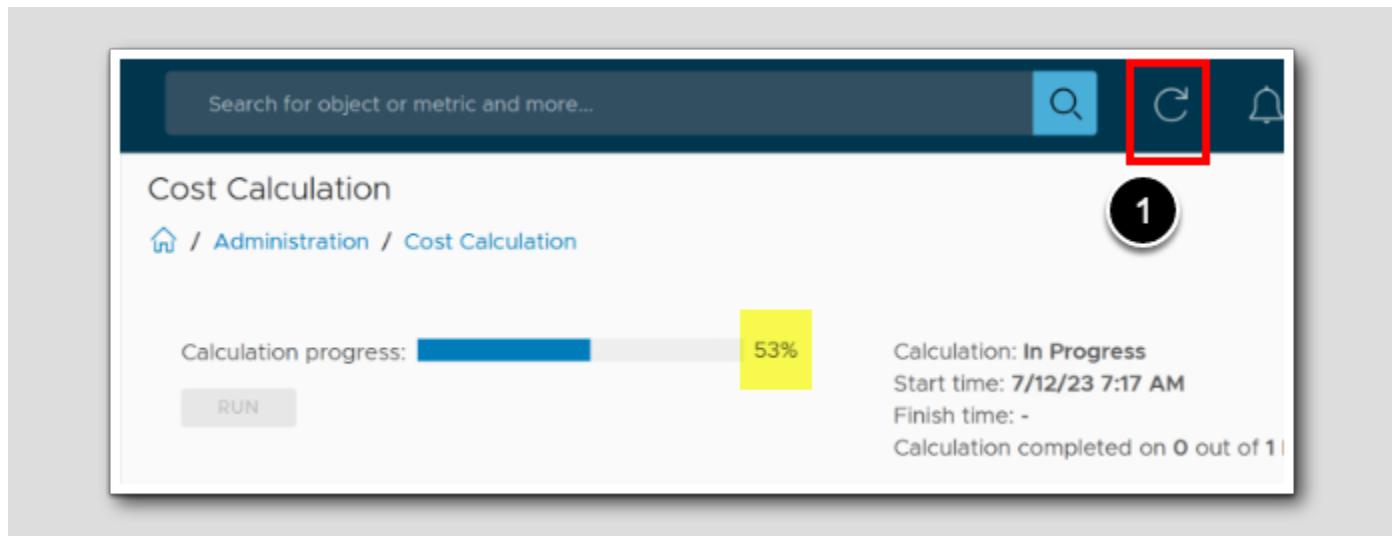


Notice when the cost calculation had a last automatic run. Notice that the cost calculation took approximately 13 minutes to run. In normal production cases, this means it's coffee time.

1. To run a Cost Calculation manually, Click RUN

## Cost calculation results

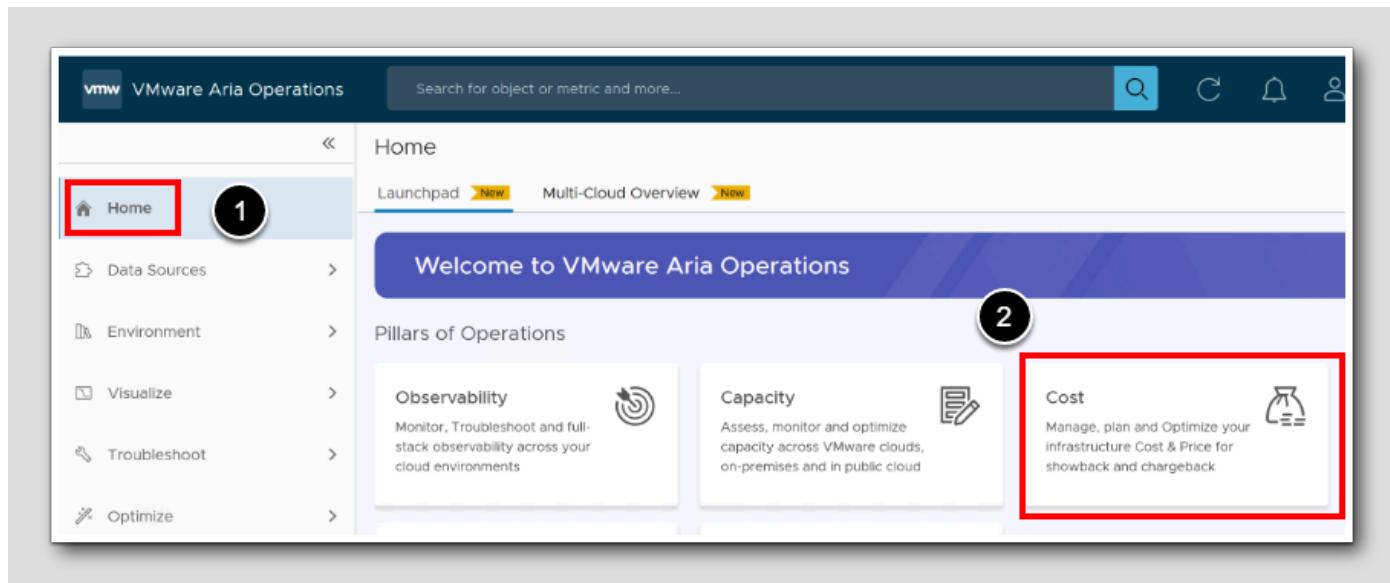
[176]



1. To refresh the progress of the calculation, click the refresh button on top

Note: You don't have to wait for it to finish, unless you need more coffee or a BIO break, so let's move on..

Start from home



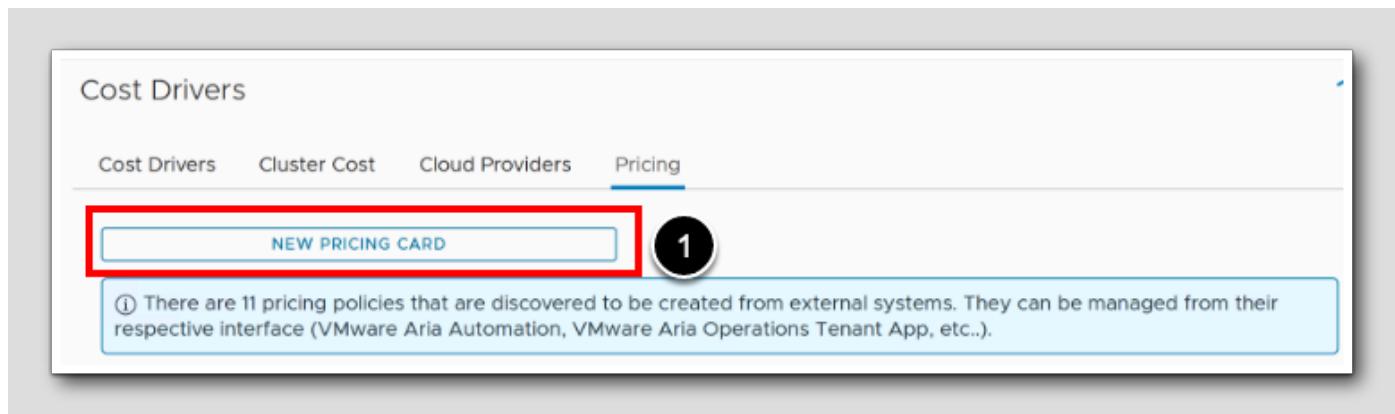
1. Click Home
2. Click Cost

## Price Rate Card

The screenshot shows the 'Cost' section of the VMware Launchpad. At the top, there is a purple header bar with a 'Learn more' button. Below it, under the 'Cost' heading, are two main cards: 'Total Cost of Ownership' and 'Cost Drivers'. The 'Total Cost of Ownership' card includes a sub-section for 'Rate Card'. A red box highlights the 'Rate Card' section, and a black circle with the number '1' is positioned above it, indicating the first step in a process. The 'Rate Card' section contains the following text: 'Define rate cards to chargeback your tenants or application teams'. Below this text are 'VIEW' and 'LEARN MORE' buttons.

1. On the Cost page under the Price heading, click VIEW on the Rate Card

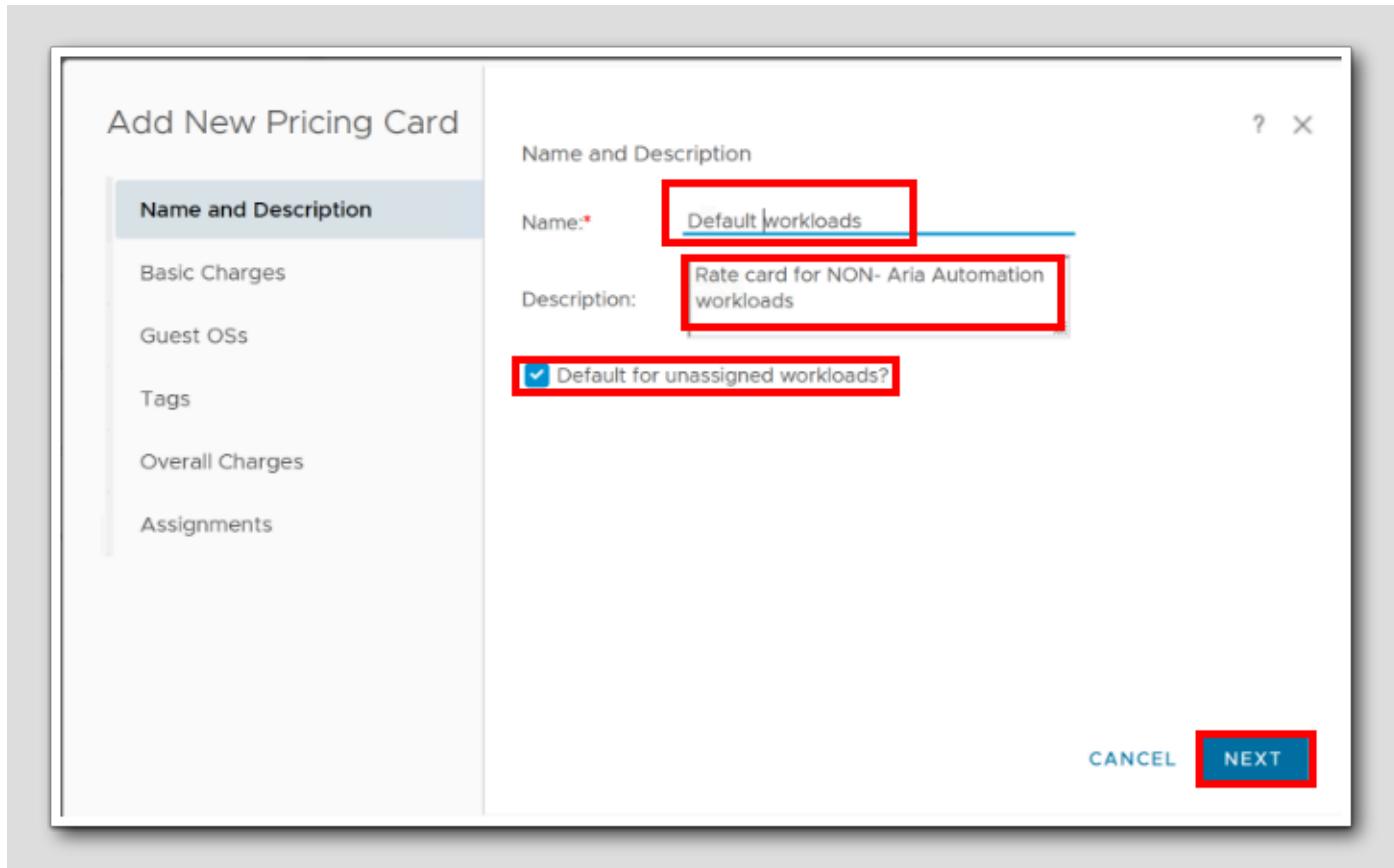
## New Pricing card



A rate card is a document that outlines the pricing structure of the company services we offer. The purpose of a rate card is to provide "clients" or "consumers" with a clear understanding of the costs associated with specific services. By adding a Price Card we can produce a Provider-Price, that will be the Consumer-Cost.

1. To get started, Click **NEW PRICING CARD**

## Pricing, Name and Description

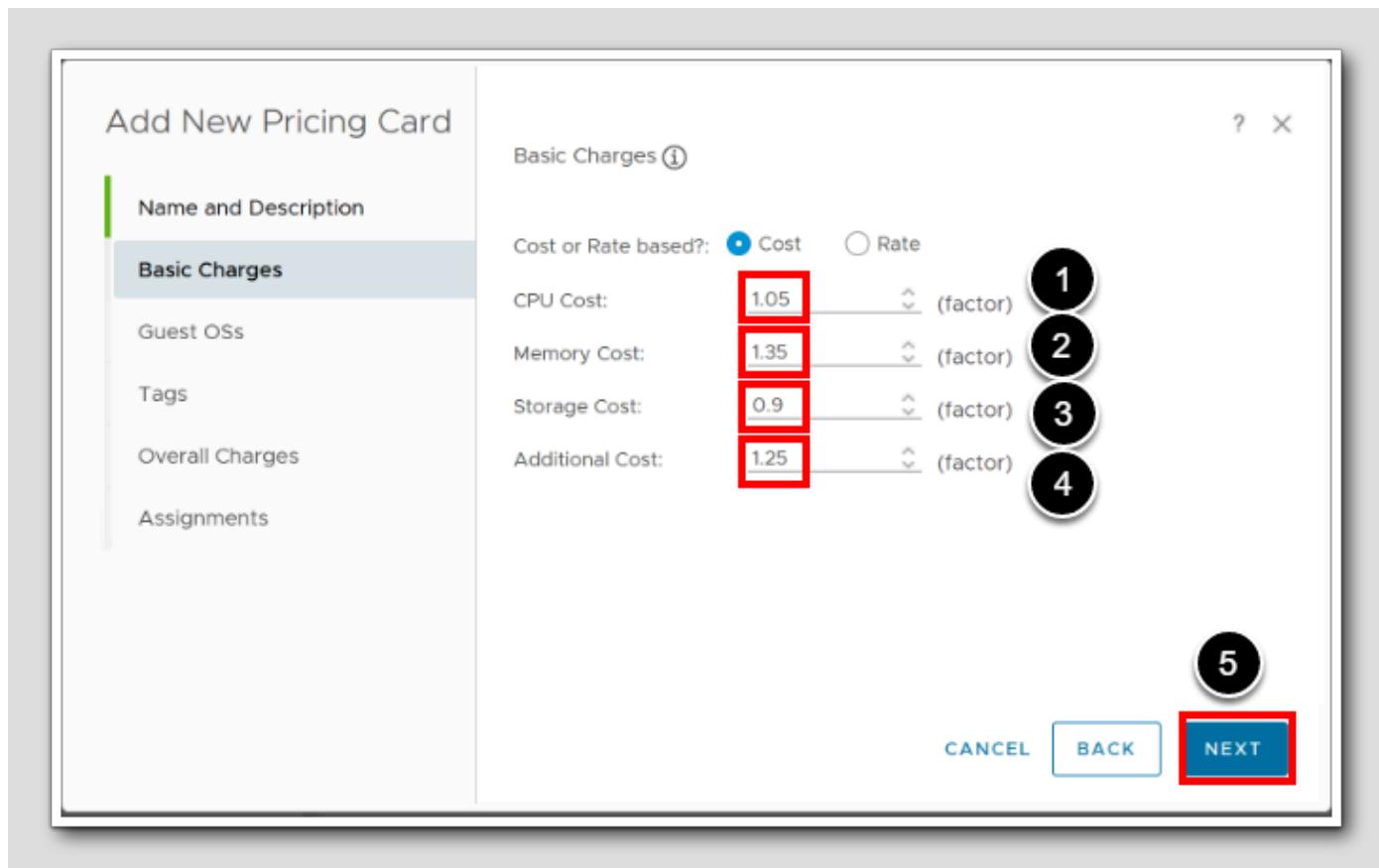


The pricing card can be cost-based or rate-based. We will customize the cost-based pricing card as per our requirement. Then we will assign the pricing card to our vCenter rather than to our Clusters, but maybe companies would have another pricing strategy in real life.

1. Enter the Name: Default Workloads
2. Enter a Description: Rate card for NON- Aria Automation workloads
3. Select Default for Unassigned Workloads
4. Click Next

Note: This Default pricing card will apply to all vCenter resources which do not have a direct cost policy assigned to them.

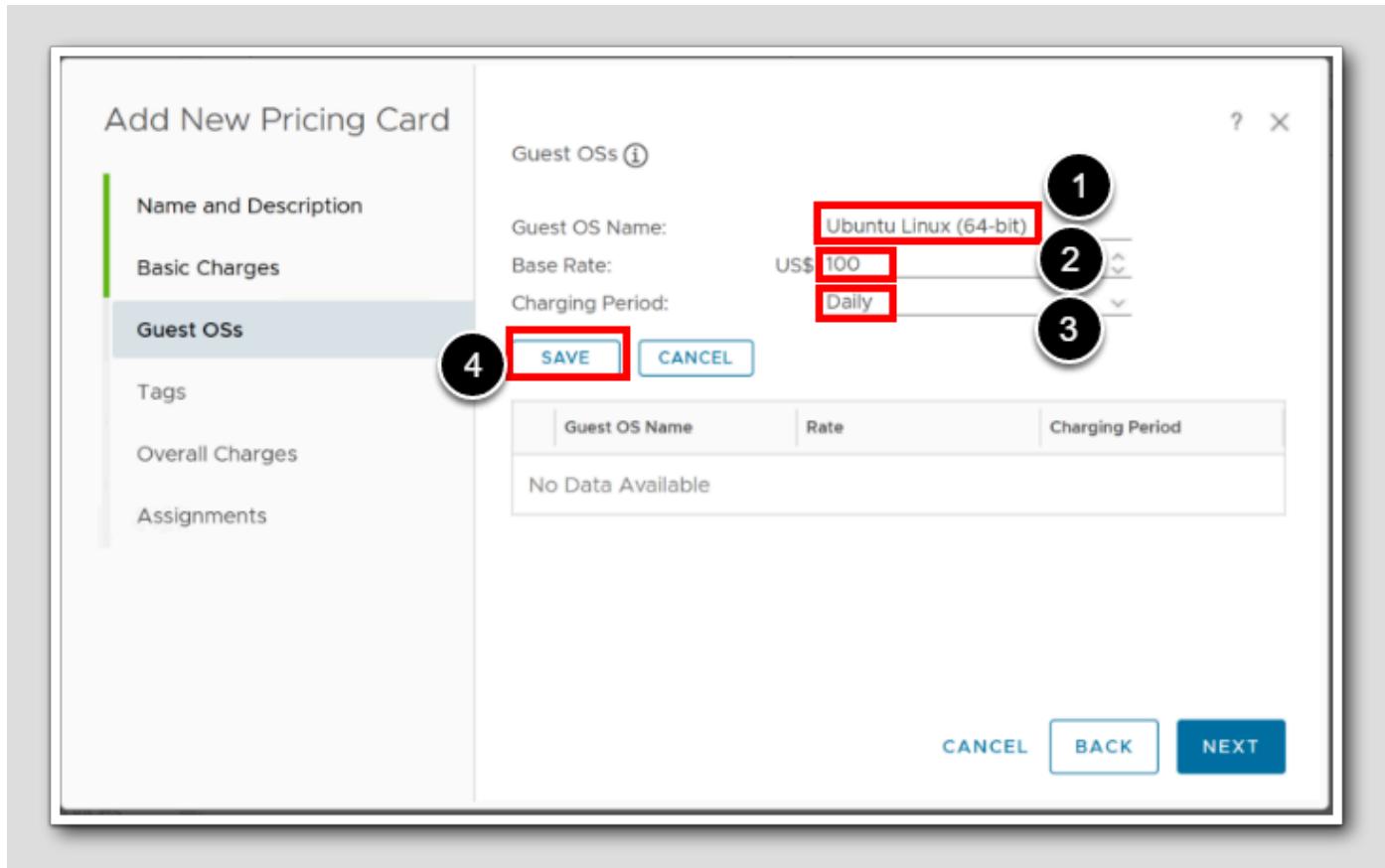
## Pricing, Basic Charges



NOTE: The factor entered here is multiplied with the cost calculated as a derivative of cost drivers.

1. CPU costs are fair, so we will add a factor: 1.05
2. Our Company got really high memory costs, so we will add a factor: 1.35
3. Our storage costs are very low, so we will add a factor: 0.9
4. Any Additional Cost, such as DRaaS (Disaster Recover as a Service) gives a factor: 1.25
5. Click **Next**

## Pricing, Adding Linux Expenses

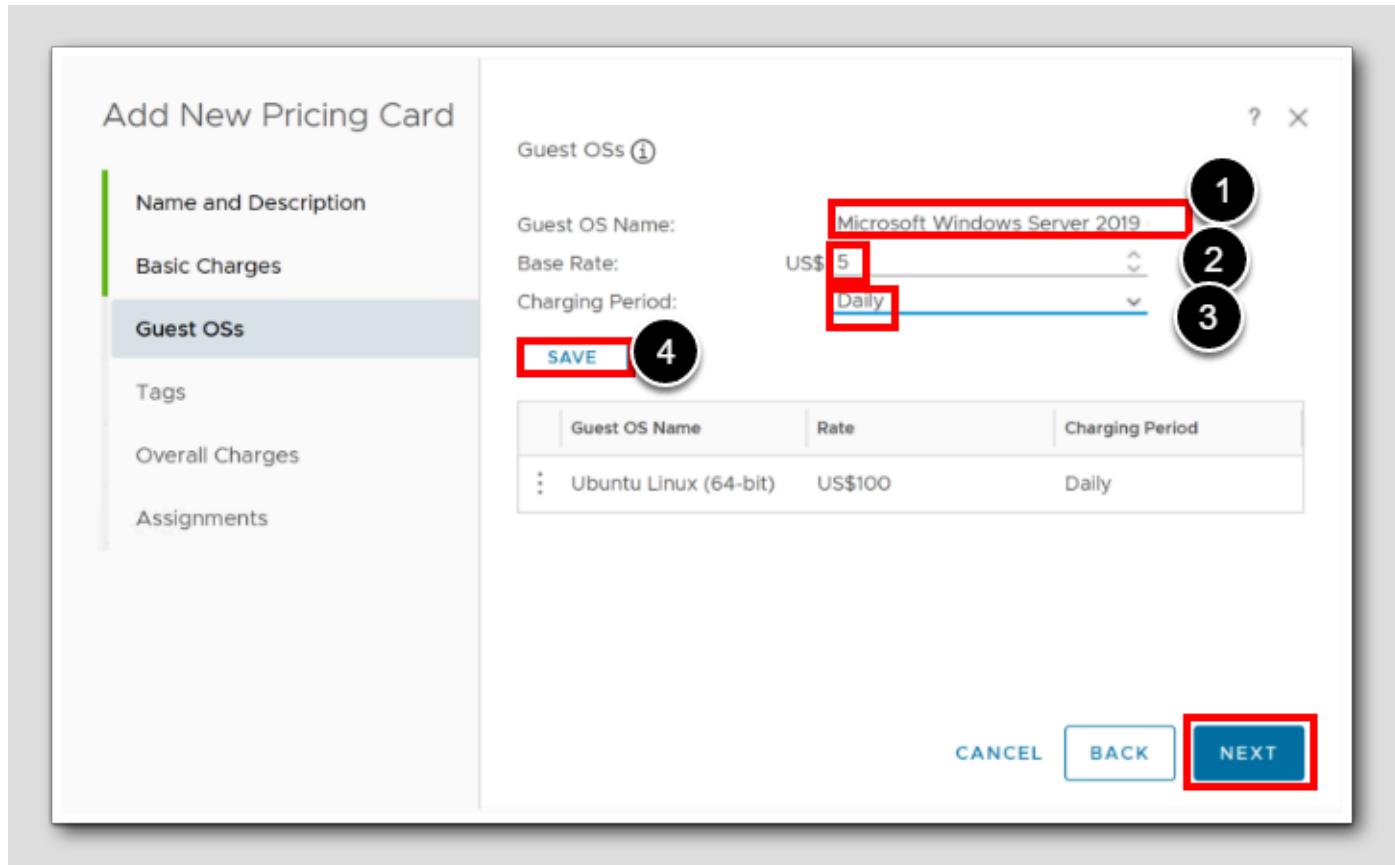


The scarcity of Linux knowledge within our organization results in higher costs associated with Linux expertise due to the need for additional time and resources allocated by our administrators to research and resolve Ubuntu-related issues, resulting in increased expenses (assumed \$100/day)

Currently we have just two OS types, "Microsoft Windows Server 2019 (64-bit)" and "Ubuntu Linux (64-bit)"

1. Enter the exact Guest OS Name **Ubuntu Linux (64-bit)**
2. Enter Base Rate: **100**
3. Enter Charging Period: **Daily**
4. Click **Save**

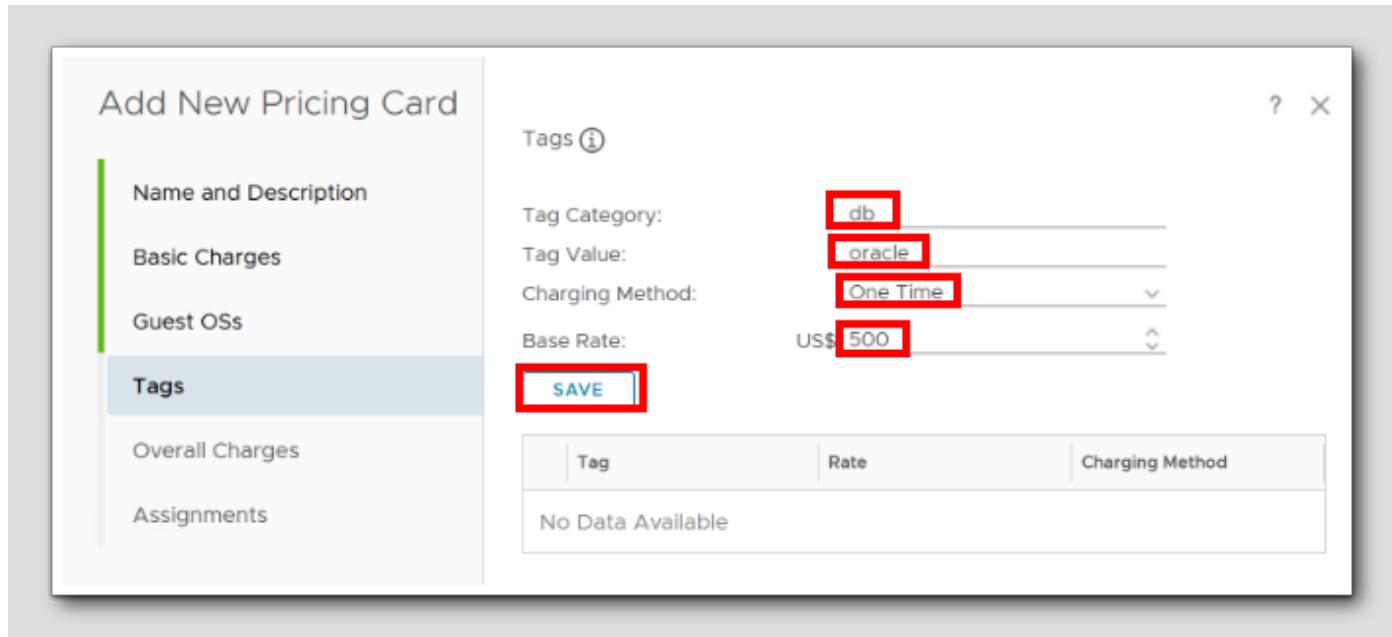
## Pricing, Adding Windows expenses



The abundance of Windows knowledge within our organization results in a rather low costs associated with Windows expertise resulting in lower expenses (assumed \$5/day)

1. Enter the exact Guest OS Name **Microsoft Windows Server 2019 (64-bit)**
2. Enter Base Rate: 5
3. Enter Charging Period: Daily
4. Click Save
5. Click NEXT

## Pricing, Tags

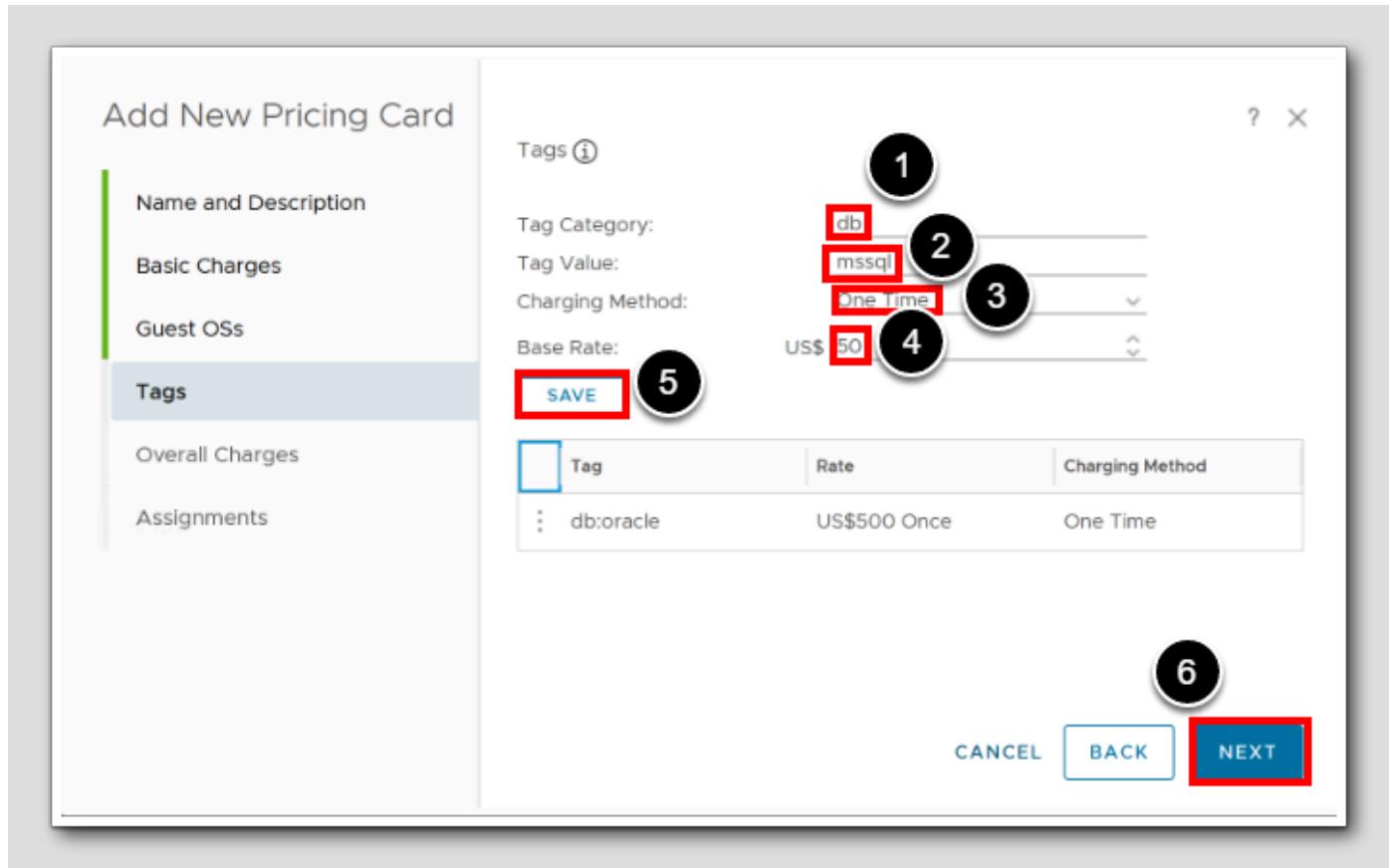


Some of our VMs are tagged with "oracle" or "mssql" under a tag category "db" to indicate that a rather expensive database is running on top of the VM, resulting in a higher expense for installation, meaning a one-time expense. For Oracle this expense is \$500 and for MSSQL it is \$100

1. Under Tag Category, Type db
2. Tag value, type oracle
3. Charging method, Choose One Time
4. Base Rate type 500
5. Click SAVE

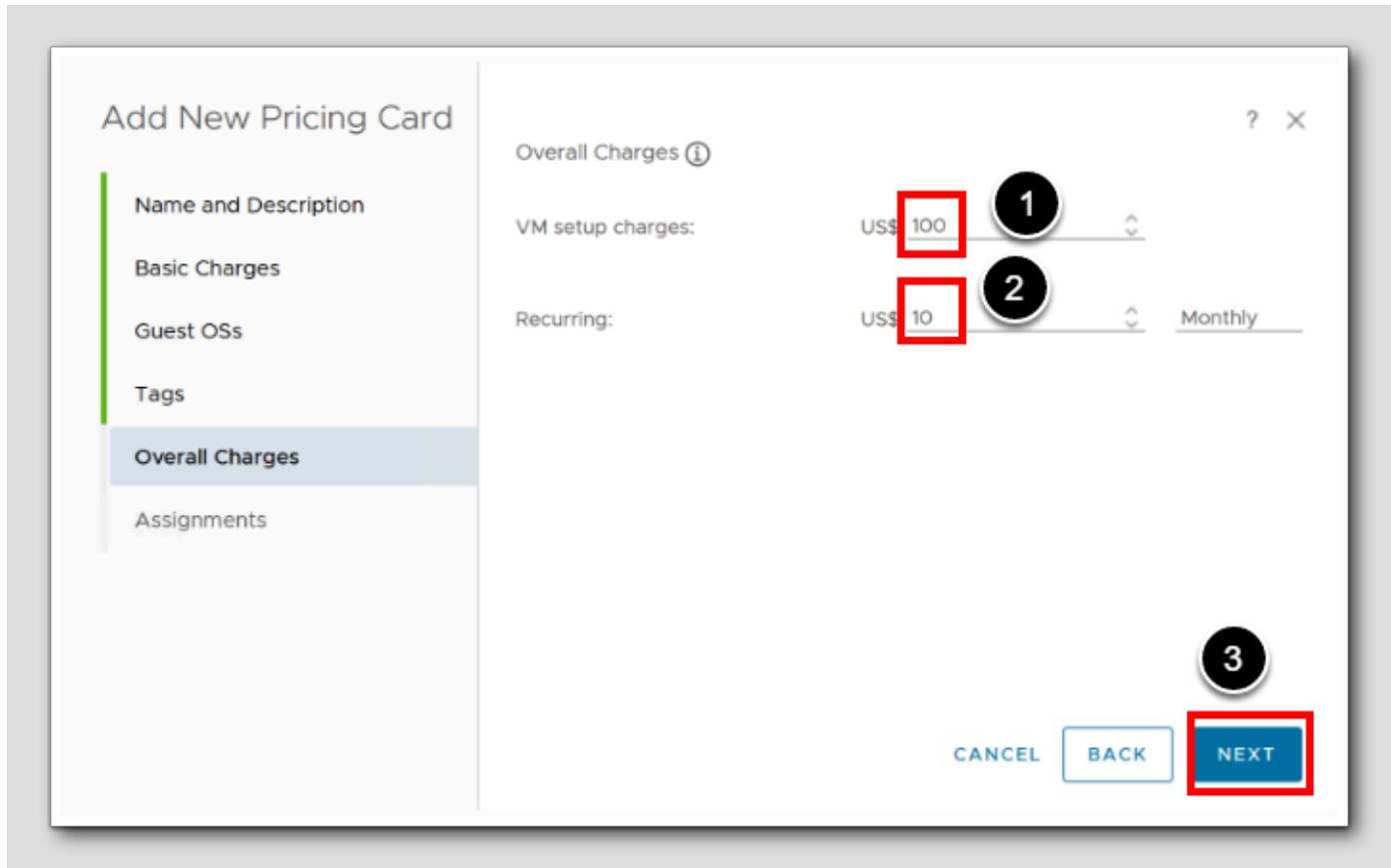
Note: actually no VMs are tagged in vSphere, but in the future they will be tagged in vSphere by the application owners

## Pricing, MSSQL Tag



1. Under Tag Category, Type db
2. Tag value, type mssql
3. Charging method, Choose One Time
4. Base Rate type 50
5. Click SAVE
6. Click NEXT

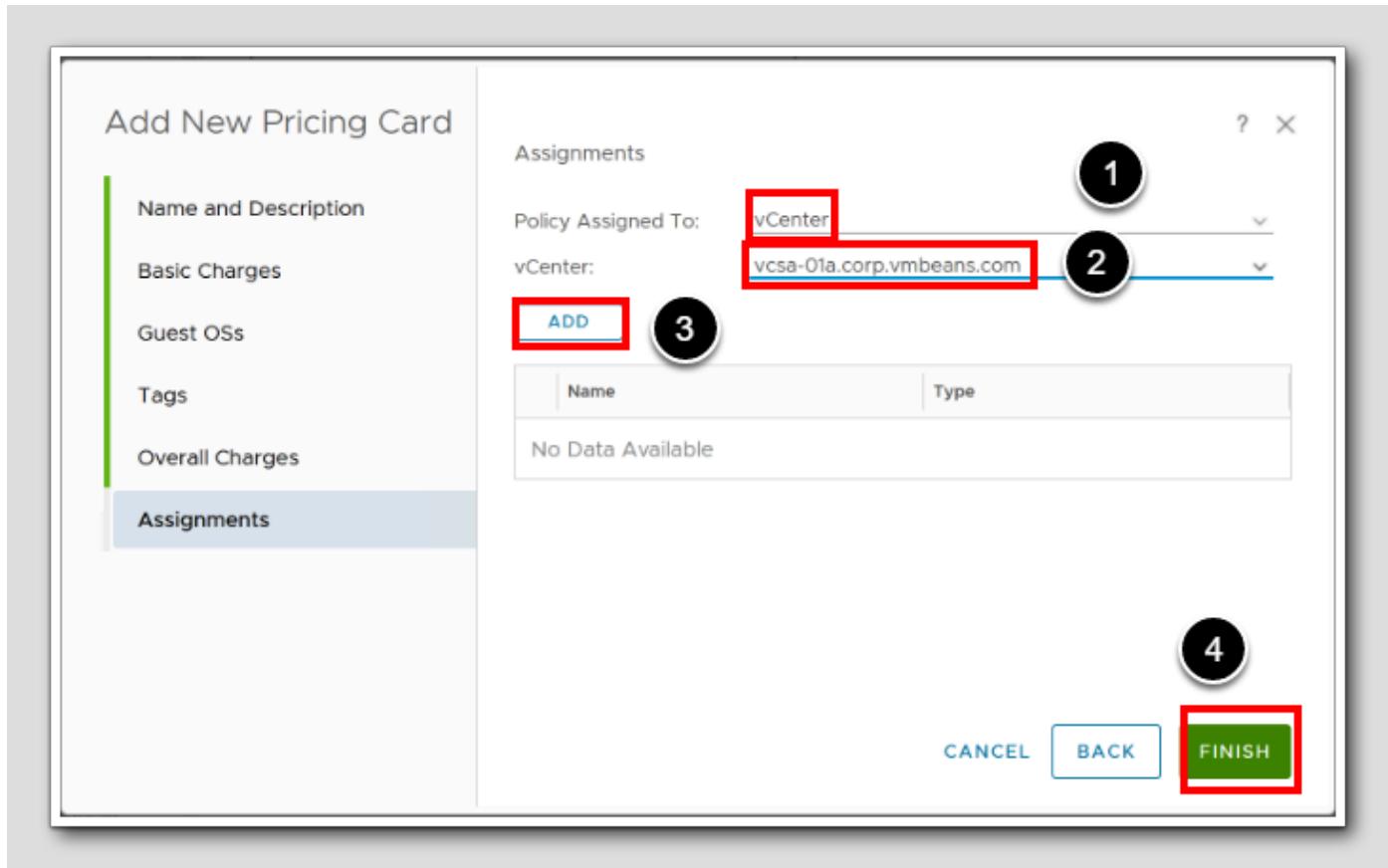
## Pricing, flat charges



These Overall Charges are flat charges that are applied to all VMs that match this policy. We charge \$100 extra to set up a VM, and a little extra \$10 monthly.

1. Under VM Setup charges, type 100
- 2.Under Recurring type 10
- 3.Click **Next**

## Pricing, Assignments



Almost Done! We can assign the new pricing card to vCenters and Clusters. We will assign our pricing to anything in our vCenter.

1. Under Policy Assigned to, select vCenter
2. Select the vCenter we want to apply the pricing card vcsa-01a.corp.vmbeans.com
3. Click ADD
4. Click FINISH

## Pricing Card Result

The screenshot shows the 'Cost Drivers' interface with the 'Pricing' tab selected. A tooltip is displayed, stating: 'There are 11 pricing policies that are discovered to be created from external systems. They can be managed from their respective interface (VMware Aria Automation, VMware Aria Operations Tenant App, etc.).' A red arrow points from the text in the tooltip to the 'NEW PRICING CARD' button.

Cost Drivers   Cluster Cost   Cloud Providers   **Pricing**

**NEW PRICING CARD**

① There are 11 pricing policies that are discovered to be created from external systems. They can be managed from their respective interface (VMware Aria Automation, VMware Aria Operations Tenant App, etc.).

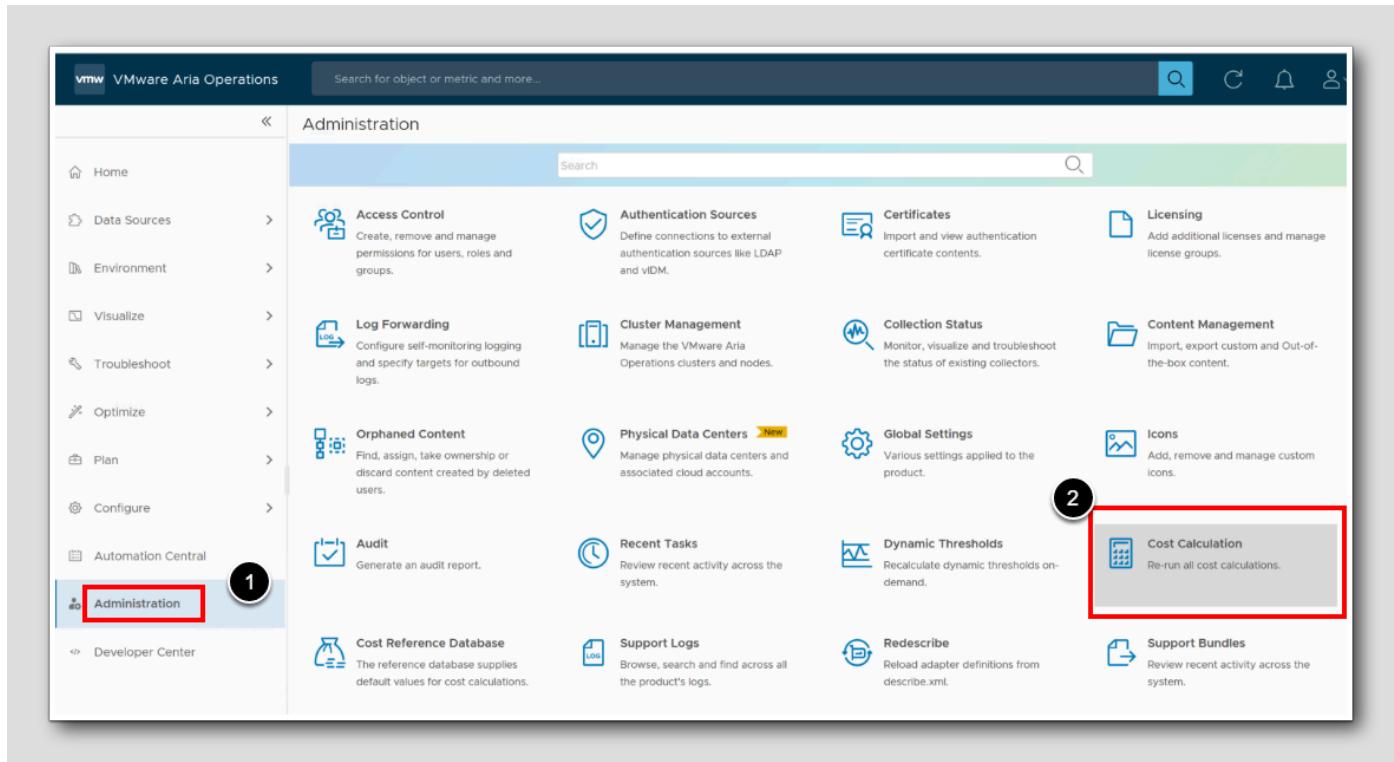
Default workloads (Default)

Description	Rate card for NON- Ar...
Workloads	1
Policy	Cost Based

**EDIT** **DELETE**

Notice that there are pricing policies other than our policy coming from workloads deployed by Aria Automation. These Pricing cards or Rate cards for those workloads are all handled by Aria Automation.

## Cost Calculation



**Changes in Pricing means it is necessary to run a new manual cost calculation to see the impact of changes immediately, rather than waiting for the next automatic calculation cycle.**

1. Click Administration
2. Click Cost Calculation

## Running a manual Cost Calculation

The screenshot shows the 'Cost Calculation' page. At the top left is the breadcrumb navigation: Home / Administration / Cost Calculation. Below it, the title 'Cost Calculation' is displayed. On the left, there's a 'RUN' button with a red border and a circled '1' indicating it's the first step. To its right, the 'Calculation progress:' bar is at 0%. On the right, the status is 'Completed' with details: Start time: 7/11/23 2:00 PM, Finish time: 7/11/23 2:13 PM, Calculation completed on 1 out of 1 DCs (failed 0), and Next calculation planned for: 7/12/23 2:00 PM.

1. To run a new manual Cost Calculation, Click RUN

## Cost calculation results

The screenshot shows the 'Cost Calculation' page. At the top left is the breadcrumb navigation: Home / Administration / Cost Calculation. Below it, the title 'Cost Calculation' is displayed. On the left, there's a 'RUN' button. To its right, the 'Calculation progress:' bar is at 53%, with a yellow highlight over the progress area. On the right, the status is 'In Progress' with details: Start time: 7/12/23 7:17 AM, Finish time: -, and Calculation completed on 0 out of 1.

1. To refresh the progress of the calculation, click the refresh button on top

Note: You don't have to wait for it to finish, let's move on..

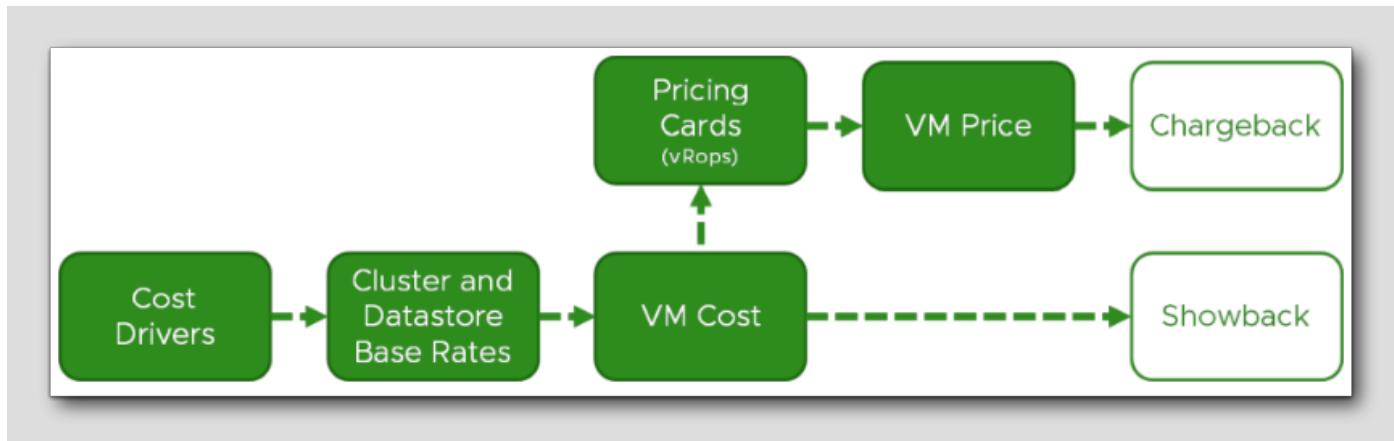
## Showback

Showback offers a transparent representation of resource usage costs, enabling stakeholders to understand and optimize their IT investments.

Showback as a mechanism allows us to give god visibility of the usage and costs of resources and services utilized by various departments, business units or projects. Showback is not Chargeback or billing, so we use it to promote responsibility and accountability.

With Showback we demystify resource consumption, and it gives us awareness around the use of IT resources.

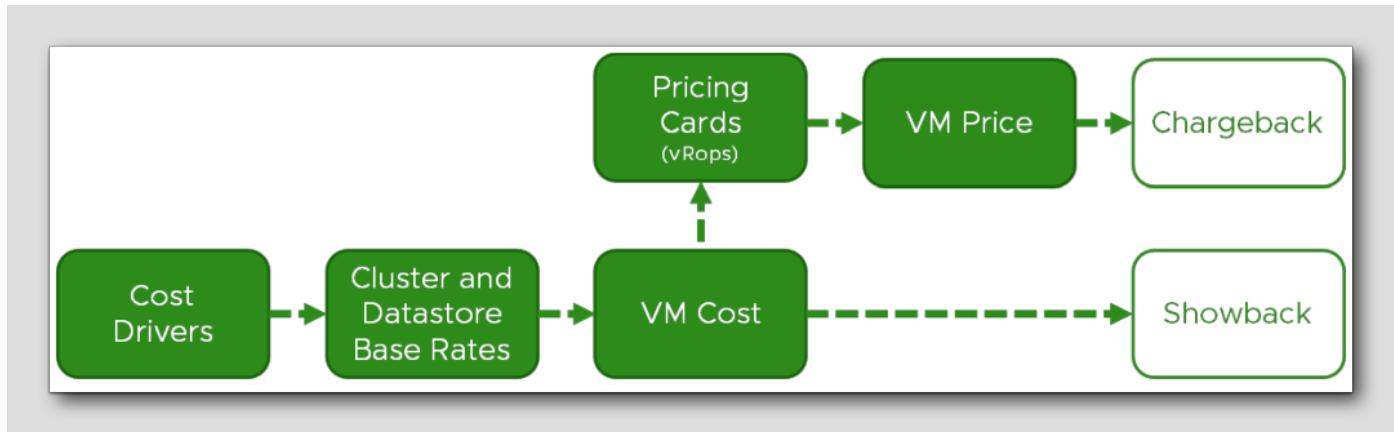
## Cost and Showback



Quantifying costs and implementing showback practices are vital in cloud-based IT environments. Continuously analyzing running VM costs and implementing showback practices optimize resource allocation, improve cost-efficiency, and promote transparency in cloud-based IT environments.

1. **Cost Analysis:** Cost refers to expenses incurred in running VMs within the cloud, particularly in IaaS (Infrastructure as a Service.) Costs can be based on utilization or allocation of resources.
2. **Showback:** Reveals VM costs to enhance transparency and accountability. It provides cost visibility, fosters transparency and accountability, and facilitates informed decision-making.

## Price and Chargeback



Accurately determining prices and implementing chargeback processes are crucial for billing customers based on their virtual machine (VM) usage.

**Price:** Price represents the amount charged to customers for utilizing a VM. The price of a VM most often differ from its actual operational costs, as additional charges or profit margins (up-charge) is included. Price considerations are often specific to VMs, and customers are typically billed on a monthly basis.

**Chargeback:** Involves generating a bill for customers based on the determined price for their VM usage. The bill should include a breakdown of the charges associated with each VM, reflecting the price per month.

## Go to Cost

The screenshot shows the VMware Aria Operations home page. On the left, there is a navigation sidebar with links like 'Home', 'Data Sources', 'Environment', 'Visualize', 'Troubleshoot', and 'Optimize'. The main area has a blue header bar with the text 'Welcome to VMware Aria Operations'. Below the header, there are three main pillars: 'Observability' (with a target icon), 'Capacity' (with a clipboard icon), and 'Cost'. The 'Cost' pillar is highlighted with a red box and a circled '1' above it. The 'Cost' pillar description says: 'Manage, plan and Optimize your infrastructure Cost & Price for showback and chargeback'. There is also a 'Manage, plan and Optimiz...' button at the bottom of the pillar.

1. From the Home page Click Cost

## Start Showback

[196]

The screenshot shows the VMware Cost page. At the top, there's a navigation bar with 'Cost' and a breadcrumb trail: Home / Launchpad / Cost. Below this is a 'Learn more' button. The main content area is titled 'Cost' and contains several sections:

- Total Cost of Ownership**: Multicloud cost overview, optimization opportunities and realized savings. Buttons: **VIEW** **LEARN MORE**.
- Cost Drivers**: Manage your expenses using Cost drivers, list prices and discounts. Buttons: **VIEW** **LEARN MORE**.
- Cost Analysis**: Analyse cost and price metrics for your objects, groups, applications, tenants etc. Buttons: **VIEW** **LEARN MORE**.
- Cost Optimization**: Get quantified Cost op recommendations and savings. Buttons: **VIEW** **LEARN MORE**.

Below these is a 'Price' section:

- Rate Card**: Define rate cards to chargeback your tenants or application teams. Buttons: **VIEW** **LEARN MORE**.

Under the 'Showback/Chargeback' heading, there are four options:

- Showback - Virtual Machine Cost** (highlighted with a red box and circled '1'): Buttons: **VIEW** **LEARN MORE**.
- Showback - Container Cost**
- Chargeback**
- ROI Analysis**

1. From the Cost page, under the Showback/Chargeback heading, Click Showback - Virtual Machine Cost

## Find the right object

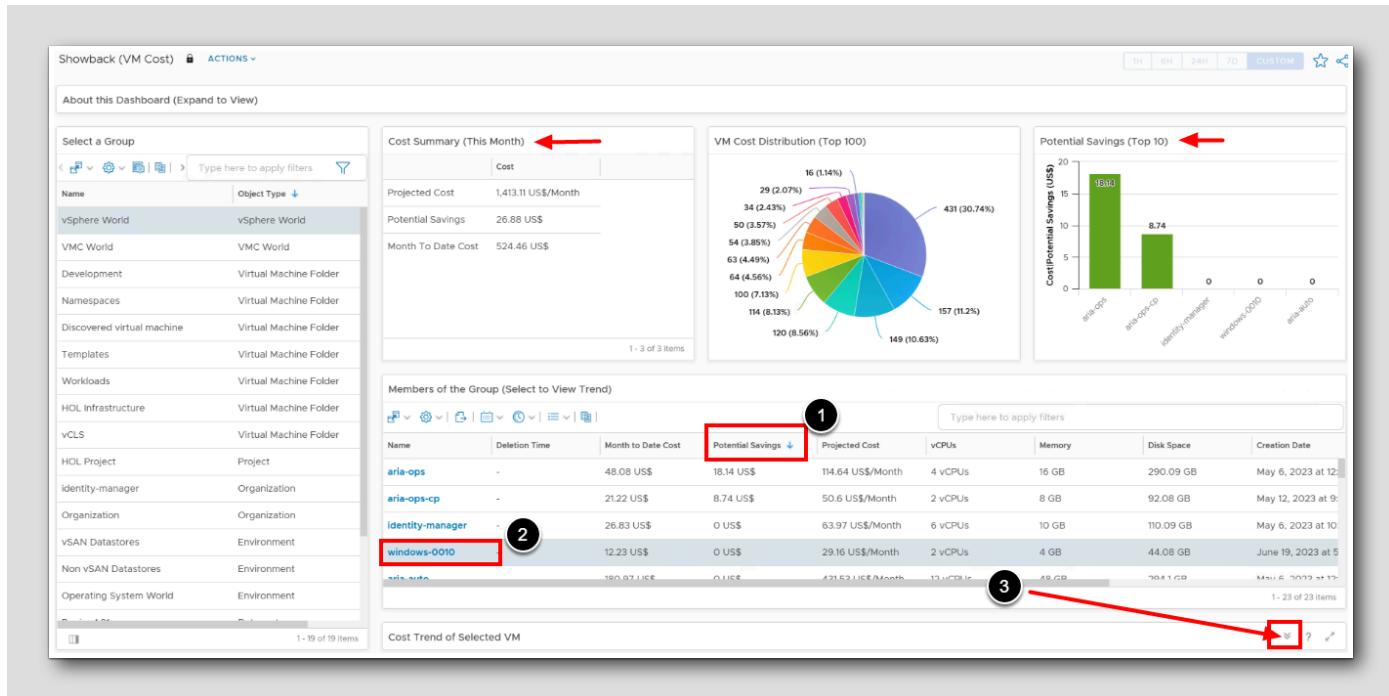
The screenshot shows the VMware Aria Operations interface. On the left, there's a sidebar with various navigation options like Home, Data Sources, Environment, Visualize, Dashboards, Views, Reports, Troubleshoot, and Optimize. The 'Dashboards' option is currently selected and highlighted in blue. In the center, under the 'Dashboards' heading, there are links for Home, Manage, Create, Search, Favorites, Recents, and All. To the right, there's a detailed view of the 'Showback (VM Cost)' dashboard. At the top of this view, there are two collapse icons (step 1) and a search bar. Below the search bar, there's a 'Select a Group' section with a search input field and a table listing groups. The first row in the table, 'vSphere World', is highlighted with a red box (step 3). The table also lists other groups like VMC World, Development, Namespaces, Discovered virtual machine, Templates, Workloads, and HOL Infrastructure.

Name	Object Type
vSphere World	vSphere
VMC World	VMC World
Development	Virtual Machine
Namespaces	Virtual Machine
Discovered virtual machine	Virtual Machine
Templates	Virtual Machine
Workloads	Virtual Machine
HOL Infrastructure	Virtual Machine

Let's make things more visible and take a closer look by selecting all objects in vSphere from the Group Selection list

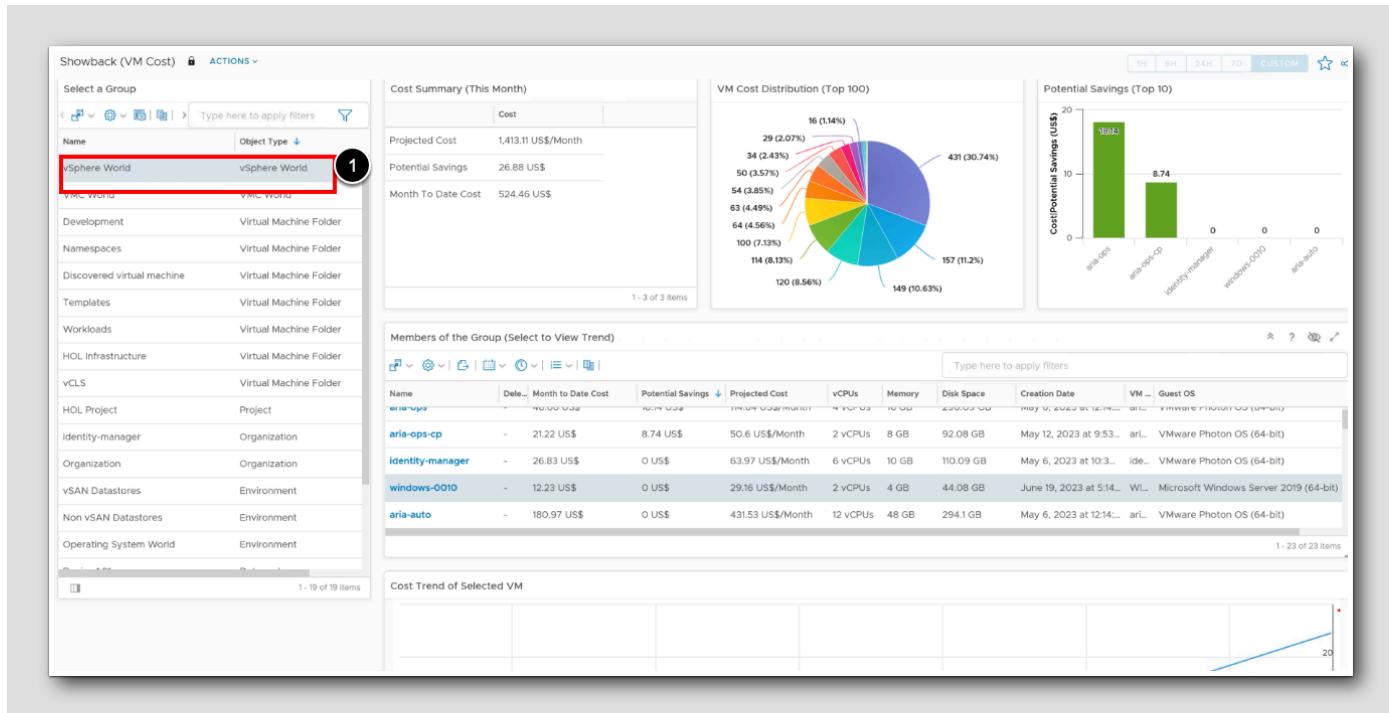
1. Click the Collapse Icon <<
2. Click the Collapse Icon <<
3. Select vSphere World

## Showback, expand cost trend



1. Sort on Potential Savings (descending) by clicking the header Potential Savings (maybe twice)
2. Select the server windows-0010
3. Click the downwards expand Icon

## Showback Dashboard details



### How to Use the Dashboard

1. Select an object in the Select a Group widget to view the cost of the group. If not already selected, just Select vSphere World

Another Example: Try selecting the Workload1 Cluster, to observe the difference

- Cost Summary (This Month) shows the month to date cost, potential savings, and projected cost.
- VM Cost Distribution (Top 100) shows the most expensive VMs.
- Potential Savings (Top 10) shows the VMs ranked by their potential savings.
- Members of the Group (Select to View Trend) shows the cost and configuration of each VM.
- Cost Trend of Selected VM windows-0010 shows the trend of the VMs cost over time.

When we navigate the dashboard we can leverage the provided information to gain insights into the cost breakdown, potential savings, and trends related to the VMs in the selected group.

The "Showback (VM Cost)" dashboard is a pre-built tool designed to track and analyze virtual machine (VM) costs. It offers an overview of the costs associated with VMs in a group, allowing for quick assessment. To enhance cost accuracy, the cost drivers can be edited, although customization options are only available in the Advanced or Enterprise edition of VMware Aria Operations. This dashboard provides comprehensive information on VM costs, including total costs, cost distribution by resource groups or subscriptions, cost trends over time, top VM costs, and analyses based on VM size. Its purpose is to help identify areas of high costs, optimize spending, and enable informed decision-making to enhance cost efficiency and resource allocation.

## Cost Summary

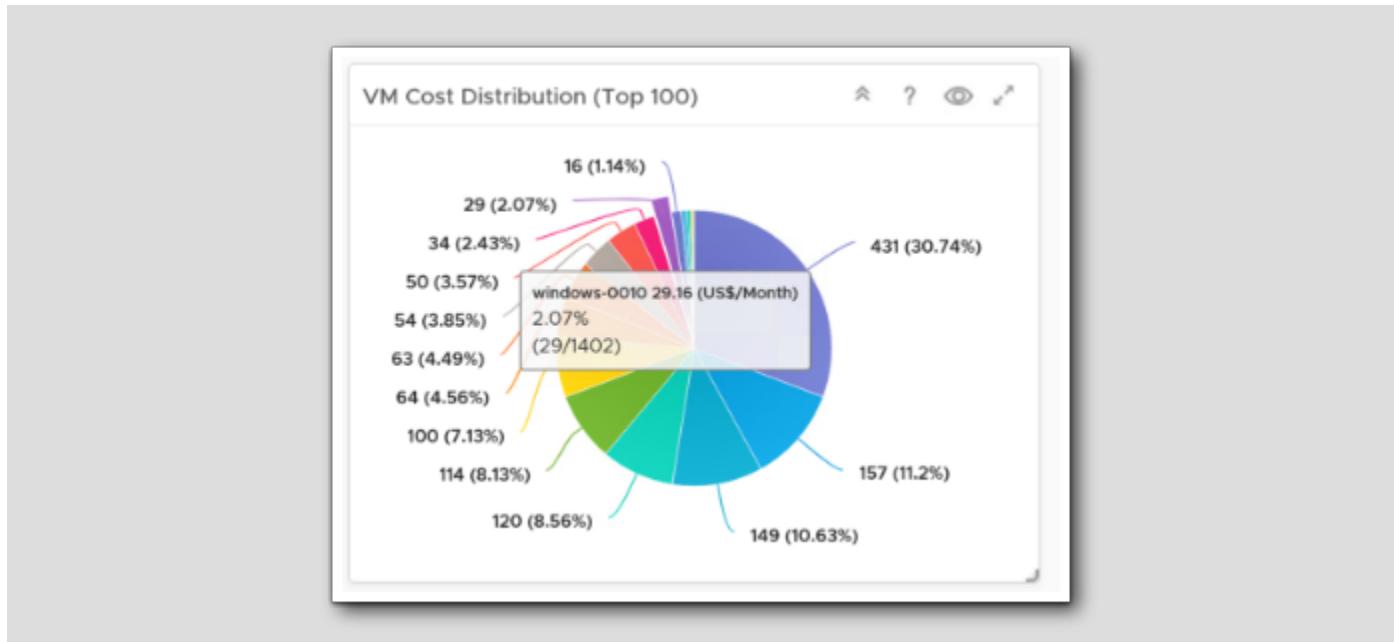
The screenshot shows a summary table titled "Cost Summary (This Month)" with a single column labeled "Cost". The table contains three rows of data:

Cost	
Projected Cost	1,413.11 US\$/Month
Potential Savings	26.88 US\$
Month To Date Cost	524.46 US\$

At the bottom right of the table, it says "1 - 3 of 3 items".

**Cost Summary (This Month):** In this section, you will find a summary of the cost associated with the selected group for the current month. It provides an overview of the month-to-date cost, potential savings, and projected cost for the group. This summary gives you a quick snapshot of the financial aspects of the selected group.

## VM Cost Distribution



VM Cost Distribution (Top 100): This section provides a breakdown of the top 100 most expensive VMs within the selected group. It helps you identify the VMs that are incurring the highest costs. By analyzing this information, you can focus on optimizing the resources and configurations of these high-cost VMs to reduce expenses. Hovering over, or clicking each "piece of the cake" gives you an overview over that specific object, in the image we have clicked windows-0010.

## Potential Savings

[202]



Potential Savings (Top 10): The "Potential Savings (Top 10)" section lists the VMs ranked by their potential for cost savings. It highlights the VMs that have the highest potential for optimization and cost reduction. By focusing on these VMs, you can identify opportunities to improve efficiency, right-size resources, or explore alternative cost-effective solutions.

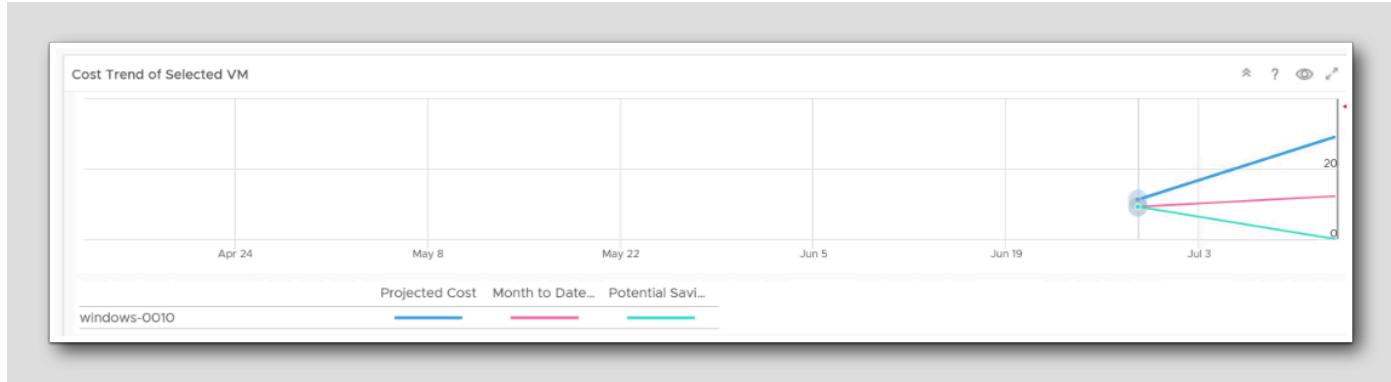
## Members detailed breakdown

[203]

Members of the Group (Select to View Trend)										
Name	Delete	Month to Date Cost	Potential Savings	Projected Cost	vCPUs	Memory	Disk Space	Creation Date	VM ID	Guest OS
aria-ops	-	40.00 US\$	10.14 US\$	114.04 US\$/Month	4 vCPUs	10 GB	270.07 GB	May 6, 2023 at 12:14...	ari...	VMware Photon OS (64-bit)
aria-ops-cp	-	21.22 US\$	8.74 US\$	50.6 US\$/Month	2 vCPUs	8 GB	92.08 GB	May 12, 2023 at 9:53...	ari...	VMware Photon OS (64-bit)
identity-manager	-	26.83 US\$	0 US\$	63.97 US\$/Month	6 vCPUs	10 GB	110.09 GB	May 6, 2023 at 10:3...	ide...	VMware Photon OS (64-bit)
windows-0010	-	12.23 US\$	0 US\$	29.16 US\$/M...	63.97 US\$/Month	4 GB	44.08 GB	June 19, 2023 at 5:14...	Wl...	Microsoft Windows Server 2019 (64-bit)
aria-auto	-	180.97 US\$	0 US\$	431.53 US\$/Month	12 vCPUs	48 GB	294.1 GB	May 6, 2023 at 12:14...	ari...	VMware Photon OS (64-bit)

Members of the Group (Select to View Trend): In this section, you can view a detailed breakdown of each VM within the selected group. It displays the cost and configuration information of individual VMs. You can click on a specific member to access more information about its cost trend and performance over time, which is the next widget. Notice we've selected windows-0010

## Cost Trend



**Cost Trend of Selected VM:** This section displays the cost trend over time for the selected VM. It helps you visualize how the cost of a specific VM within the group has changed over a selected time period. By monitoring the cost trend, you can identify any unusual spikes, patterns, or anomalies in the cost behavior of the VM, enabling you to take appropriate actions if needed.

## Closing Comments

By utilizing these widgets effectively and following the outlined steps, we can effectively navigate the dashboard and gain comprehensive insights into the cost breakdown, potential savings, and trends related to the VMs within our selected group(s).

## Conclusion

By completing this module, we gain the technical knowledge and skills to configure and customize cost settings in Aria Operations to match our business needs accurately. This empowers our organization to effectively track expenses, optimize resource usage, and make informed cost management decisions within our IT environments.

## You've finished Module 5

Congratulations on completing the lab module.

If you are looking for additional general information on Aria Operations, try one of these:

- VMware Product Public Page - Aria Operations: <https://www.vmware.com/products/aria-operations.html>
- Aria Operations - Documentation: <https://docs.vmware.com/en/VMware-Aria-Operations/index.html>
- Aria Operations - Cost Overview: <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Configuring-Operations/GUID-79297017-77F1-40C3-930A-90CE5C388362.html>

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the **TABLE OF CONTENTS** to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 6 - Customizing Alerts and Leveraging Notifications (15 minutes) Basic

### Introduction

[209]

Upon completing this lab, you will be able to:

- Understand Alerts, Symptoms, Recommendations and Actions
- Build a custom Alert Definition
- Simulate issues in the environment to demonstrate how to customize the alerts
- Utilize the different ways alerts can be used based on the critical nature or other characteristics of the monitored infrastructure

### Log in to Aria Operations

[210]

To begin this exercise, we will log in to Aria Operations. If you are not currently logged into any instance of Aria Operations, continue to the next page, but if you are already logged into Aria Operations, click [here](#) to skip ahead.

### Open the Firefox Browser from Windows Quick Launch Task Bar

[211]

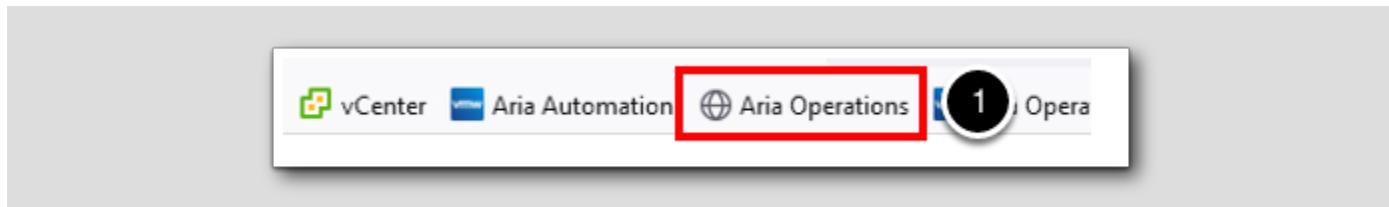


If your browser isn't already open, launch Firefox

1. Click the Firefox icon on the Windows Quick Launch Task Bar

### Launch Aria Operations

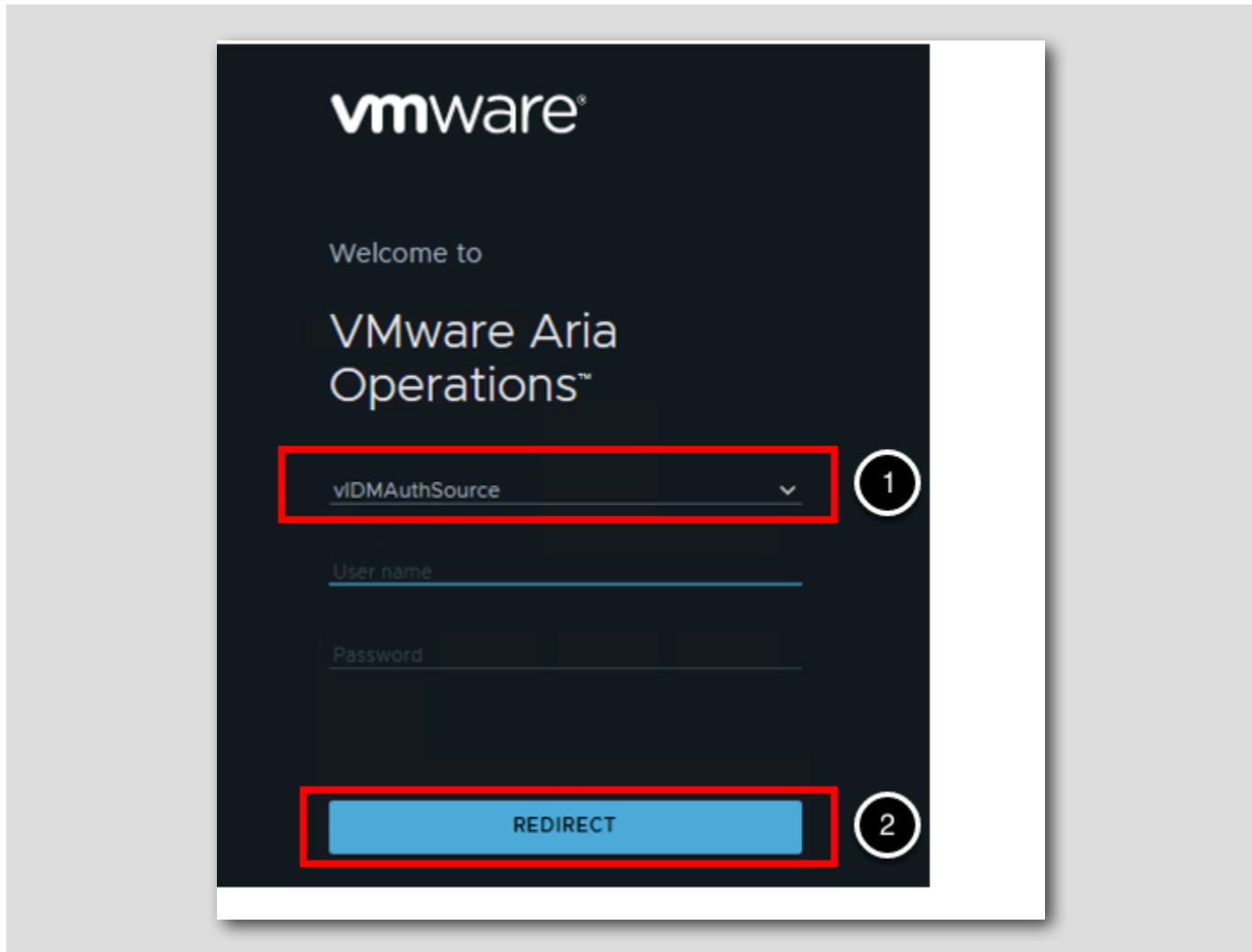
[212]



The browser Bookmarks Bar has links to the different applications that are running in the lab.

1. Click the Aria Operations Bookmark

## Log in to Aria Operations

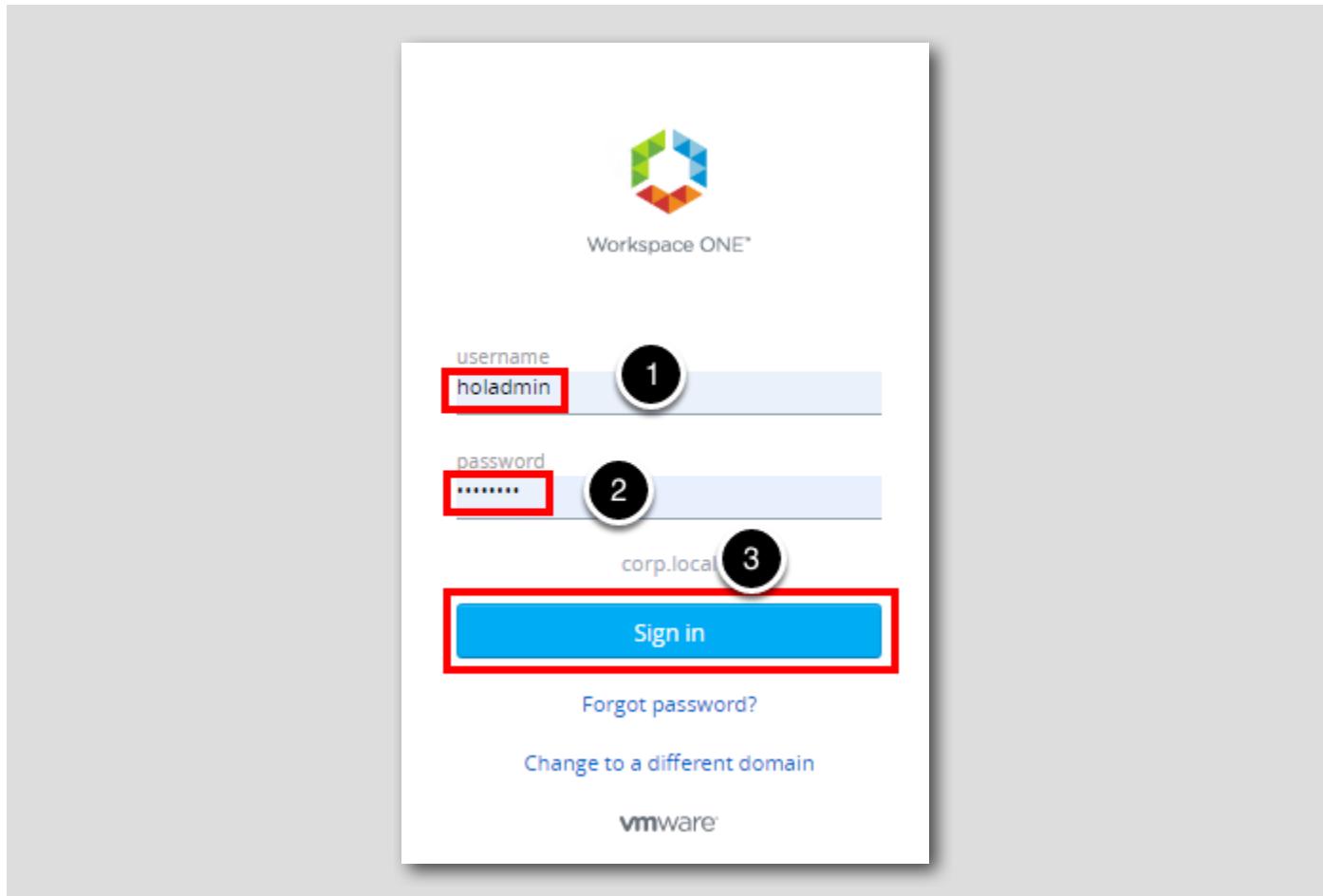


Aria Operations is integrated with VMware Identity Manager which we will use for user authentication in this lab.

vIDMAAuthSource (VMware Identity Manager) should be pre-selected as the identity source. However, if it is not you will choose it.

1. Click the drop-down arrow if vIDMAAuthSource is not selected.
2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login



At the Workspace ONE login screen, use these credentials:

1. username: **holadmin**
2. password: **VMware1!**
3. Click **Sign in**

## Aria Operations Home Screen

You should be at the Aria Operations Home screen and ready to start the module.

## Using Symptoms and Alerts to Trigger Recommendations and Actions

Aria Operations Alerts are similar to rules used for years in monitoring critical IT resources. However, previous rule-based systems tended to be static and difficult to build, deploy, and maintain. Aria Operations leverages built-in analytics and pre-defined content to provide a dynamic, effective, and scalable approach for identifying and resolving issues in your environment.

For this lesson, we will start by creating a Symptom Definition. Symptom Definitions enable Aria Operations to identify problems with objects in your environment. These Symptom Definitions will then trigger Alerts when conditions qualify as problems. In this scenario, the condition to monitor is the high CPU workload on the virtual machine "ubuntu-0008". Creating one or more of the Symptoms enables them to be added to an Alert Definition. When a symptom is triggered, vRealize Operations will then issue an alert. In this lesson, we'll go through this in more detail and we'll also show how you can automate certain actions to occur when an alert is triggered.

in vRealize Operations.

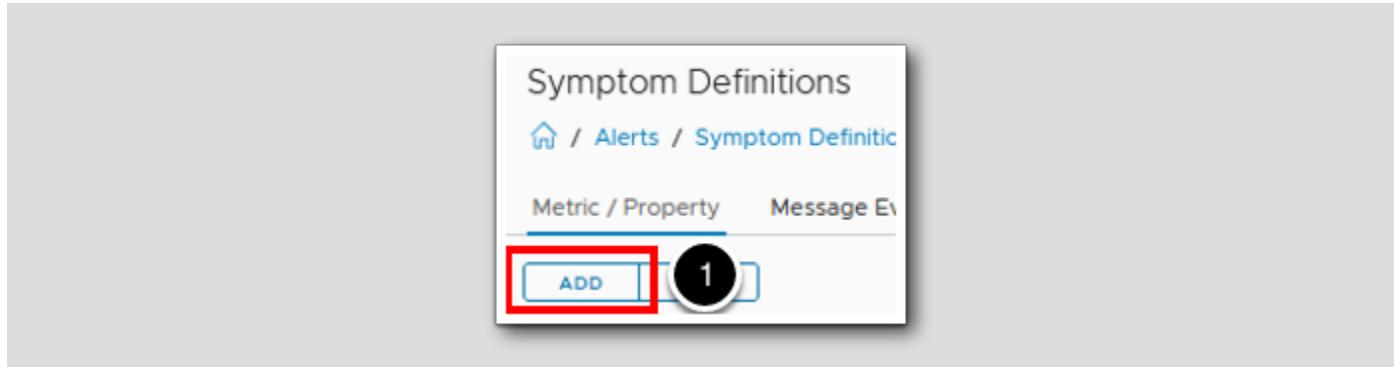
## Creating Custom Alerts

The screenshot shows the VMware Aria Operations web interface. The left sidebar has a tree view with nodes like Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure (which is expanded, indicated by a chevron icon), Policies, and Alerts (which is highlighted with a red box and numbered 2). The main content area is titled 'Alerts'. It contains several sections: 'Alert Definitions' (with a brief description), 'Outbound Settings' (with a brief description), 'Symptom Definitions' (which is highlighted with a red box and numbered 3, and has a callout bubble pointing to it), and 'Payload Templates' (with a brief description). A mouse cursor is visible near the 'Outbound Settings' section.

Symptom Definitions evaluate conditions in your environment that, if the conditions become true, trigger a symptom and can result in a generated alert. You can add symptom definitions that are based on metrics or super metrics, properties, message events, fault events, or metric events. You can create a symptom definition as you create an alert definition or as an individual item in the appropriate symptom definition list.

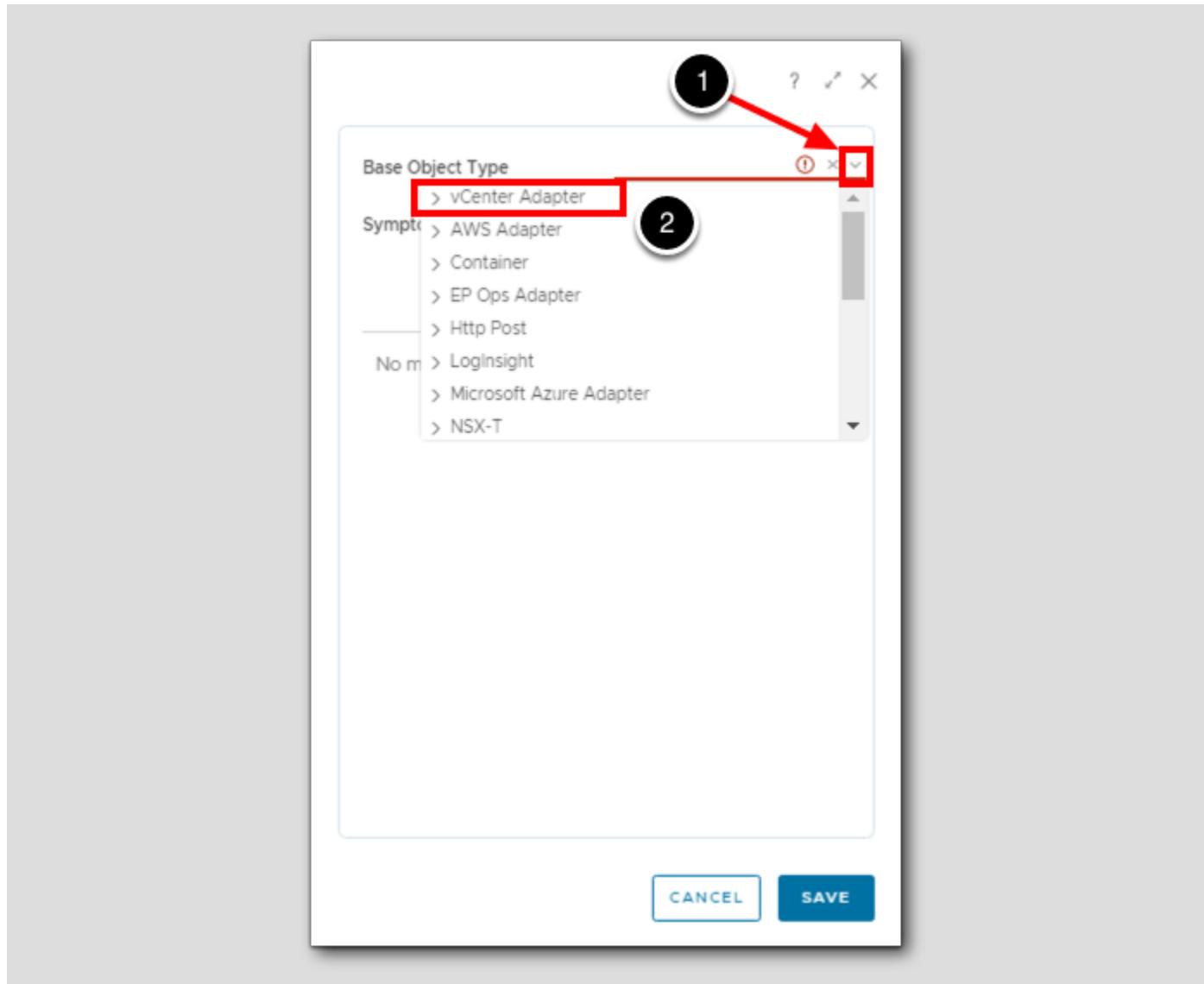
1. Click the chevron to expand Configuration if needed to show the configuration options.
2. Click Alerts
3. Click on the Symptom Definitions box .

## Add a Symptom Definition



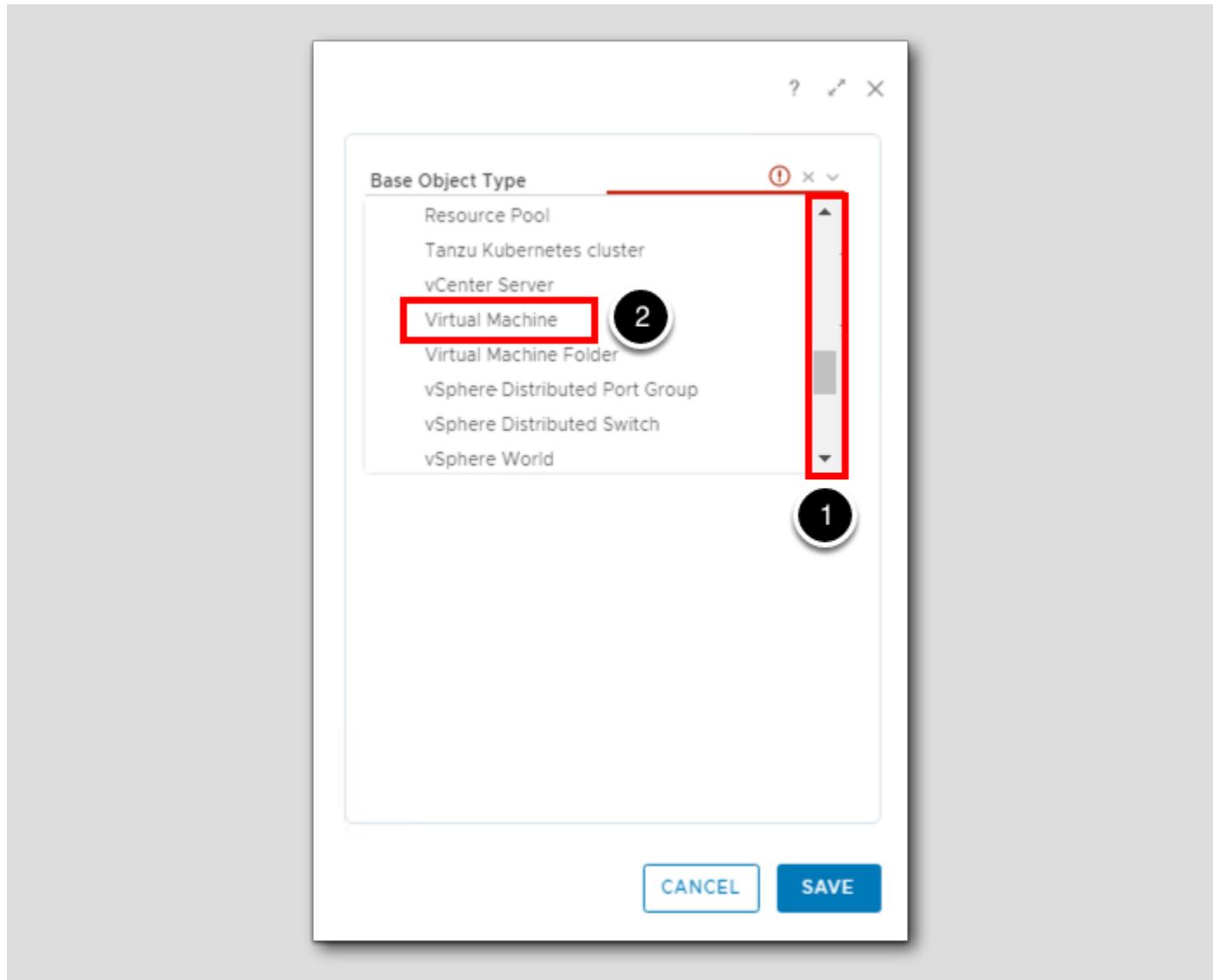
1. Click ADD to create a new Symptom Definition.

## Select vCenter Object



1. Click the chevron to show the list of Base Object Types.
2. Click **vCenter Adapter** which should be the first item in the drop-down list.

## Select Virtual Machine



1. Scroll down until you see Virtual Machine.
2. Select Virtual Machine.

## CPU Usage Definition

Add Symptom Definition

Virtual Machine : CPU|Usage (%)

Static Threshold

Name: High CPU (3) If Metric > 90 (4) trigger: Critical (5)

Advanced Settings (6) Wait Cycle: 1 (7) Cancel Cycle: 2 (8)

Evaluate on instanced metrics

Select Specific Object: cpulusage (1)

CPU

Usage (%) (2)

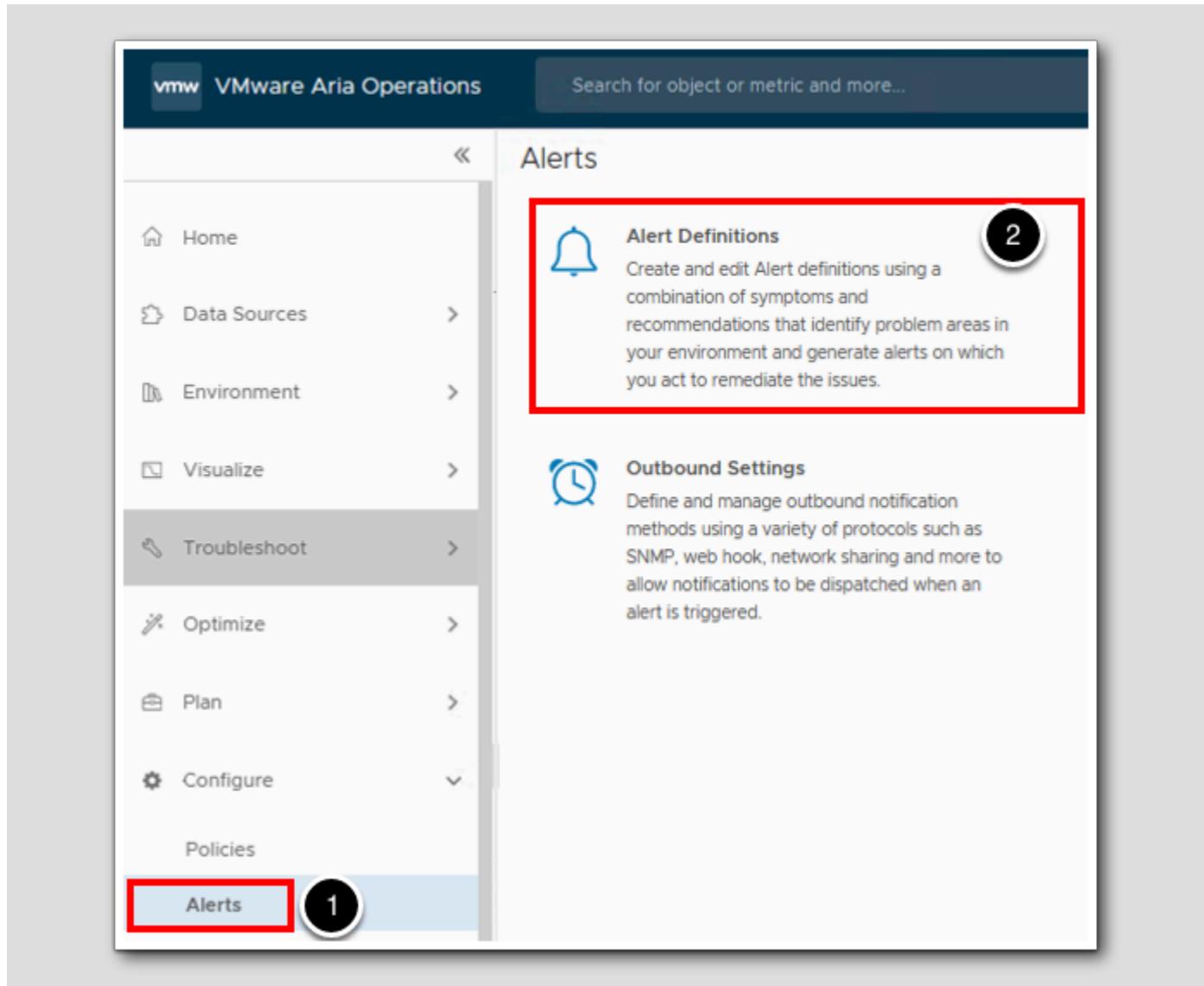
Drop here or double click to create new symptom definition (9)

SAVE CANCEL

Configure the Symptom Definition with the following parameters.

1. Type a metric filter of **CPU|USAGE** and hit Enter.
2. Double-click **Usage (%)**.
3. Type **High CPU** for the symptom name.
4. Type **90** as the value the symptom must exceed to be triggered.
5. Set the definition to **Critical**.
6. Click to expand the **Advanced** section.
7. Modify the **Wait Cycle** to 1.
  - The Wait Cycle field shows that the trigger condition should remain true for this number of collection cycles before the symptom is triggered. This means that the symptom is triggered in the same collection cycle when the condition became true.
8. Modify the **Cancel Cycle** to 2.
  - The Cancel Cycle field shows that the symptom after the trigger condition is false for this number of collection cycles, after which the symptom is canceled. This means that the symptom is canceled in the same cycle when the condition becomes false.
9. Click **SAVE**.

## Alert Definition

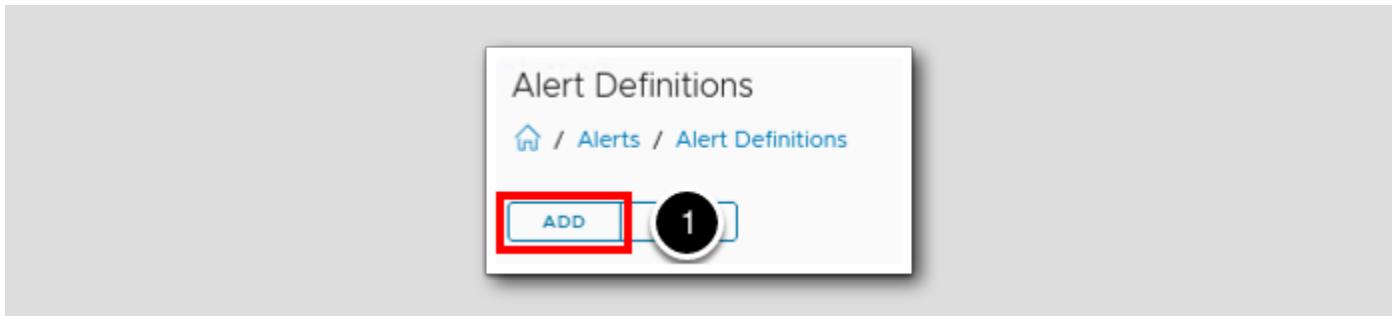


An alert definition is comprised of one or more symptom definitions, and the alert definition is associated with a set of recommendations and actions that help you resolve the problem. Alert definitions include triggering symptom definitions and actionable recommendations. You create the alert definitions so that the generated alerts tell you about problems in the monitored environment. You can then respond to the alerts with effective solutions that are provided in the recommendations.

To create Alert Definitions:

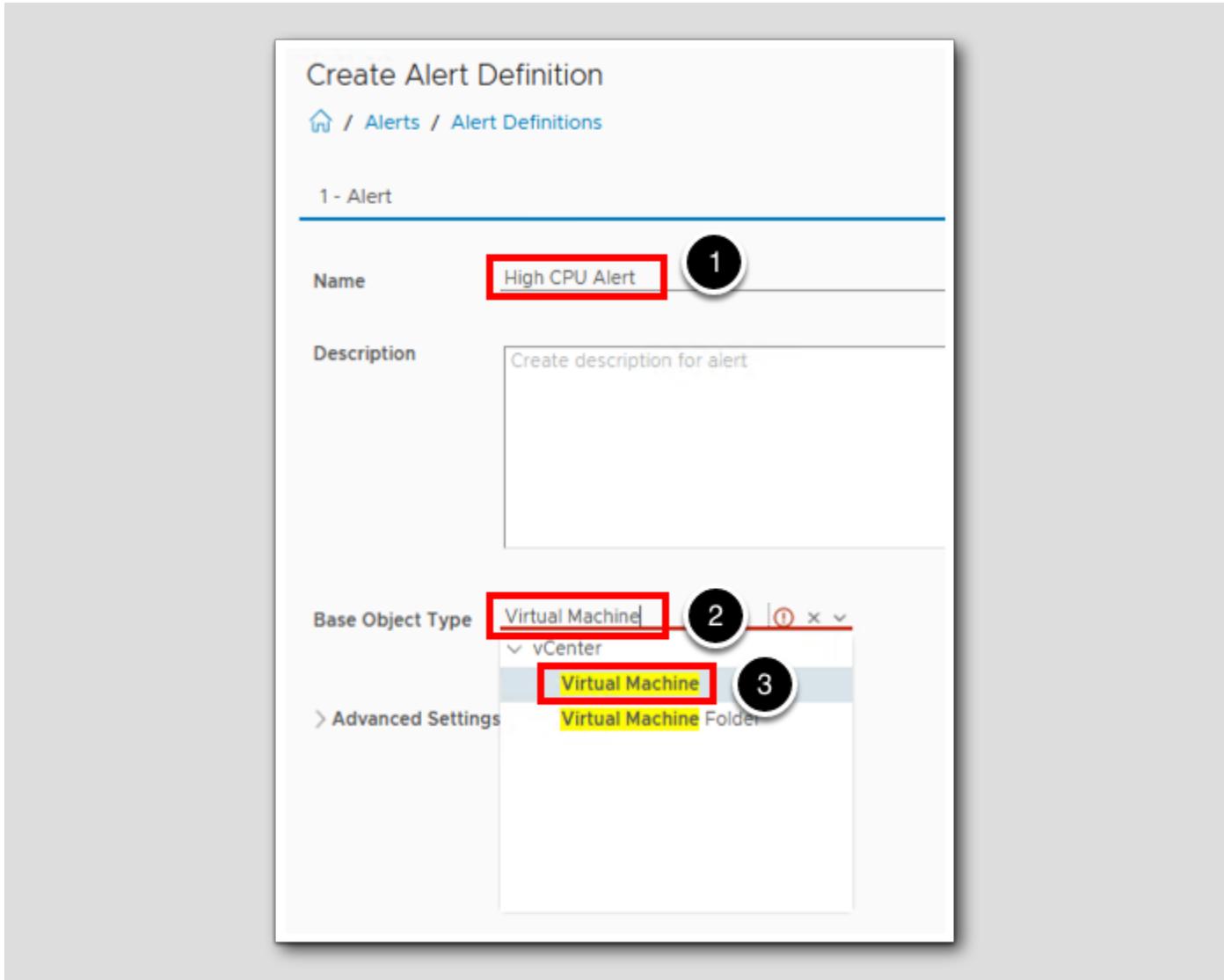
1. Click **Alerts** to go back to the Alerts Main Page.
2. Click **Alert Definitions**.

## Add Alert Definition



1. Click **ADD** to create a new Alert Definition.

## Alert Name and Base Object Type

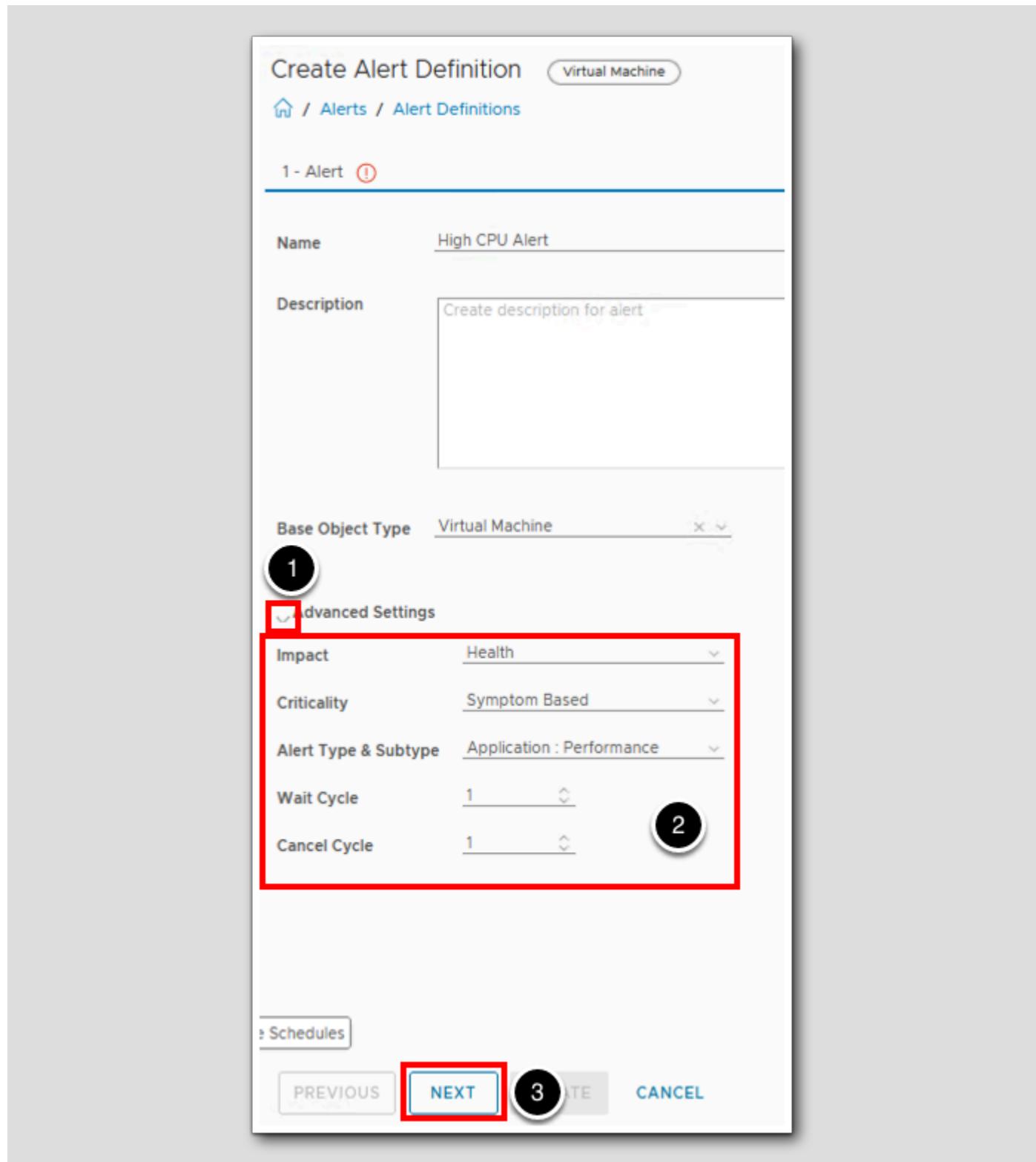


This time we will use the find function to get our desired Base Object Type.

1. Type **High CPU Alert** for the alert name.
2. Click in the Base Object Type search field and type **Virtual Machine**.
3. Click **Virtual Machine**.

## Alert Impact Settings

[225]



## Alert Impact

Alert Impact settings and their definitions are shown below. These settings determine how your alert will be classified and triggered.  
Note: The default settings will be used in this scenario.

- The **Impact** field will categorize the alert as a health, risk, or efficiency problem
- The **Criticality** field shows how serious the problem is

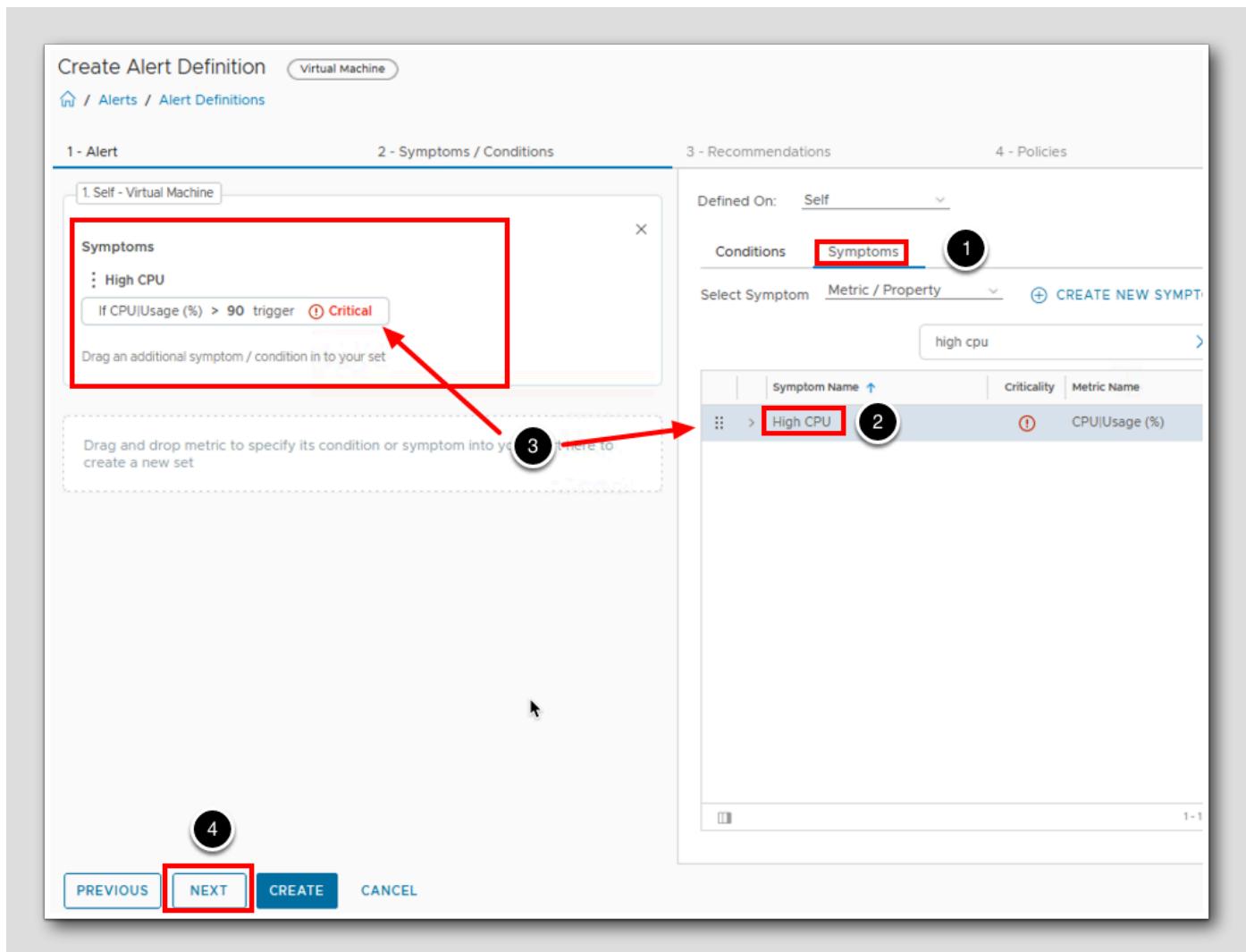
For Criticality, you can select one of the following values:

- Info (informational purposes only; does not affect badge colors)
- Warning (lowest level; displays yellow)
- Immediate (medium level; displays orange)
- Critical (highest level; displays red)
- The **Alert Type** and **Subtype** fields can be used to classify the alert; an example would be using these fields' information to route the alert to the appropriate personnel in your organization

Finally, choose settings for your cycle, which are data collection intervals.

- **Wait Cycle** indicates how many cycles should pass before triggering the alert
  - **Cancel Cycle** indicates how many cycles without symptoms should pass before the alert is canceled
1. Click the **chevron** to show the Advanced Settings.
  2. Review the **Alert Impact** Settings. We will be using the default settings, so no changes are needed.
  3. Click **NEXT**.

## Add Symptom to Alert Definition



1. Click Symptoms to filter the Symptom Definitions to what we created in a previous step.
2. Type **High CPU** in the filter field and press the Enter key.
3. Drag High CPU to the Symptom Definition section on the left to the workspace as shown above.
4. Click NEXT.

## Add Recommendation

The screenshot shows a user interface for creating an alert definition. At the top, there's a breadcrumb navigation: Home / Alerts / Alert Definitions. Below that, a title 'Create Alert Definition' with a 'Virtual Machine' filter. A horizontal navigation bar at the top right includes tabs: 1 - Alert (highlighted with a blue underline), 2 - Symptoms / Conditions, 3 - Recommendations, and 4 - Policies (with a circled '1'). The main area has a placeholder 'Drag a recommendation into your alert and order them by priority.' On the right, there's a section titled 'Add Recommendation' with a 'Create New Recommendation' button (which is highlighted with a red box). Below this, another placeholder 'Drag recommendations into sets to define your alert.' and a 'Type here' input field.

Recommendations are the remediation options that you provide to your users to resolve the problems that the generated alert indicates. Now, we will define a new Recommendation for our custom alert based on our organization's policies.

1. Click + Create New Recommendation.

## Custom Recommendation

Create Alert Definition Virtual Machine

[Home](#) / [Alerts](#) / [Alert Definitions](#)

1 - Alert      2 - Symptoms / Conditions      3 - Recommendations

**Create New Recommendation**

Add a description and select an action to your new recommendation.

Description (Optional)

For Production Virtual Machines, please assess the trend and add CPU Resources if trend is high. All development machines are shut down and the developer is notified.

Action (Optional)

Adapter Type

3 vCenter X ▼

2

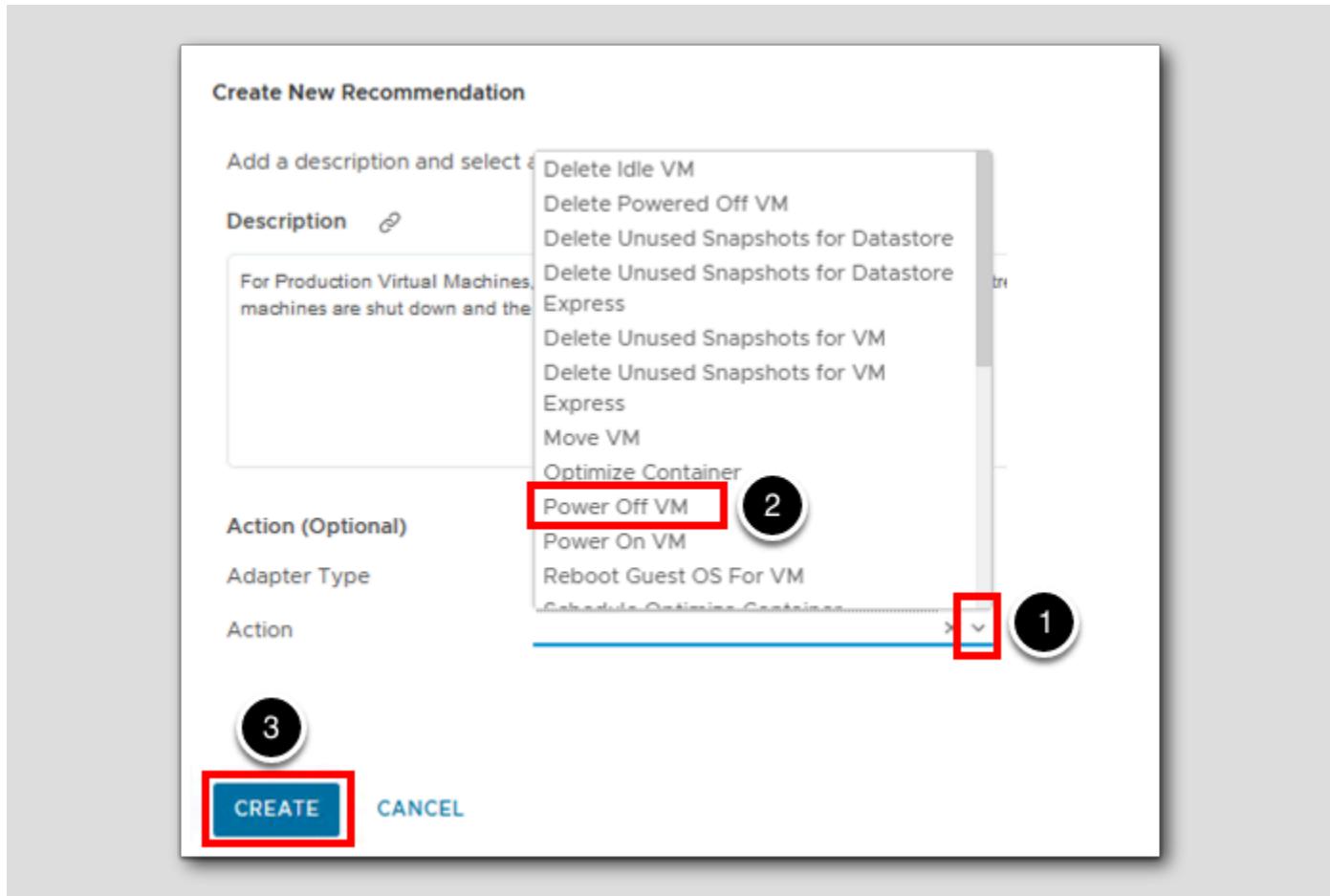
Action

vCenter  
Service Discovery Adapter  
VMware Aria Automation  
VMware Aria Operations Application  
Management Pack

For Production Virtual Machines, please assess the trend and add CPU Resources if trend is high.  
All development machines are shut down and the developer is notified.

1. Paste the text shown above into the Recommendation Text area.
2. Click **Adapter Type** to show the adapter type options.
3. From the list shown, select **vCenter Adapter**.

## Set Recommendation Action



Actions are accessible in several places inside of vRealize Operations. They can link to recommendations for the user to execute after review, or they can be fully automated to execute when the alert is triggered.

1. Click the down arrow on the Action Menu to show the action options.
2. Select Power Off VM.
3. Click CREATE.

## Save New Alert Definition

**Create Alert Definition** Virtual Machine ?

[Home](#) / [Alerts](#) / [Alert Definitions](#)

1 - Alert      2 - Symptoms / Conditions      3 - Recommendations      4 - Policies

Drag a recommendation into your alert and order them by priority.

**Add Recommendation** Create New Recommendation

Drag recommendations into sets to define your alert.

Description	Action	Defined By	Modified By
For Production Virtual Machines, please assess the trend and add CPU Resources if trend is high. All development machines are shut down and the developer is notified.	Power ...	User	holadmin@c...

1 - 1 of 1 items

Drop recommendation here

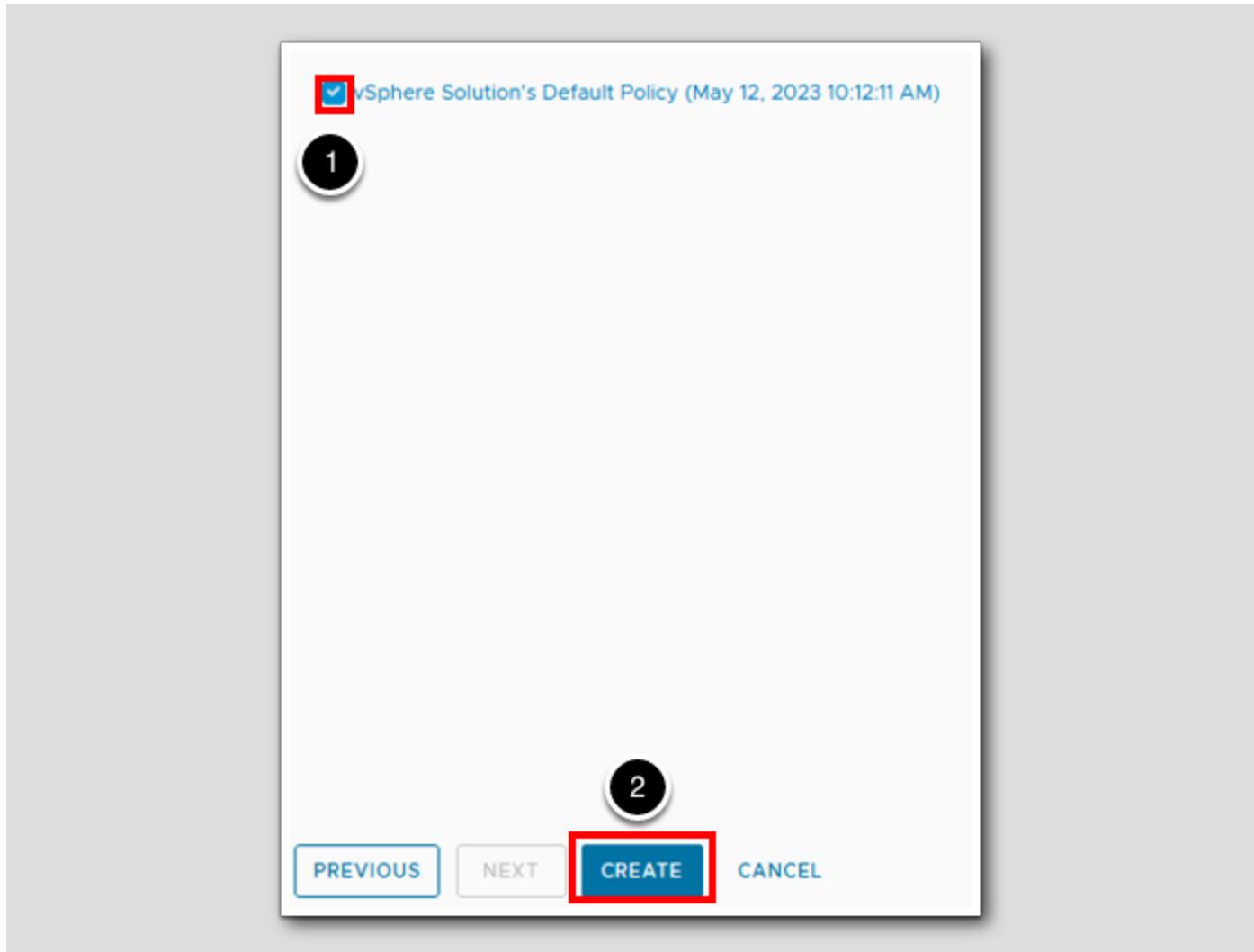
2

3

PREVIOUS NEXT CREATE CANCEL

1. Type **production** in the filter field and hit Enter.
2. Drag your newly created custom recommendation onto the Alert Definition.
3. Click **NEXT** to go to the Policies tab.

## Set Effective Policy



1. Click the checkbox to select vSphere Solution's Default Policy.
2. Click CREATE to create the new Alert Definition.

## Alert List

The screenshot shows the 'Alert Definitions' page in a management interface. At the top, there is a search bar with the text 'High CPU' (circled in red) and a magnifying glass icon. Below the search bar is a table with columns: Name, Adapter Type, Object Type, Alert Type, Alert Subtype, Criticality, Impact, Defined By, Last Modified, and Modified By. Two rows are visible: 'Fully-automated DRS-enabled cluster ha...' and 'High CPU Alert'. The 'High CPU Alert' row is highlighted with a red box and circled with a number '2'. The 'High CPU' search term is also circled in red.

Verify that the Alert exists.

1. Type **High CPU** in the Alert Definitions quick filter and then press the Enter key to reduce the Alert Definition list.
2. We can verify that our new **High CPU Alert** has been created.

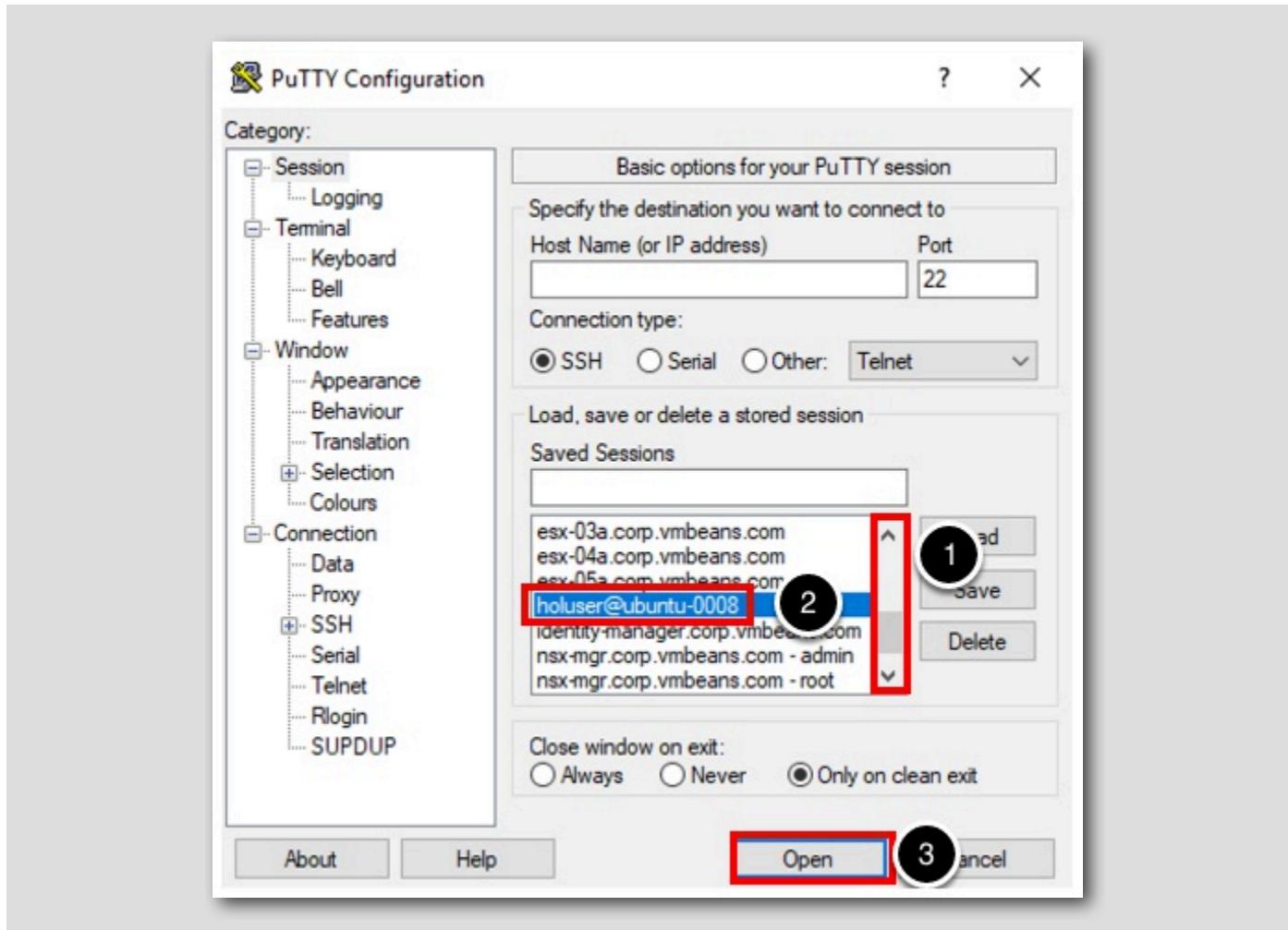
Now that our symptoms and alert has been configured, we're ready to test it out!

## PuTTY to ubuntu-0008 VM



1. Click on the PuTTY icon in System tray.

## Start PuTTY Session



1. Scroll down on the right hand side of Saved Sessions
2. Click on holuser@ubuntu-0008.
3. Click Open to start the PuTTY session.

## Run CPU Load

The screenshot shows a terminal window titled "holuser@ubuntu-0008: ~". The window displays the following text:

```
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-94-generic x86_64)

* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage

System information as of Fri 23 Jun 2023 02:15:08 PM UTC

System load: 0.8          Processes: 202
Usage of /: 37.5% of 7.81GB  Users logged in: 0
Memory usage: 23%          IPv4 address for ens160: 192.168.110.120
Swap usage: 0%

239 updates can be applied immediately.
180 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your
Internet connection or proxy settings

Last login: Fri Jun 23 13:58:10 2023 from 192.168.110.120
holuser@ubuntu-0008:~$ cat /dev/zero > /dev/null
```

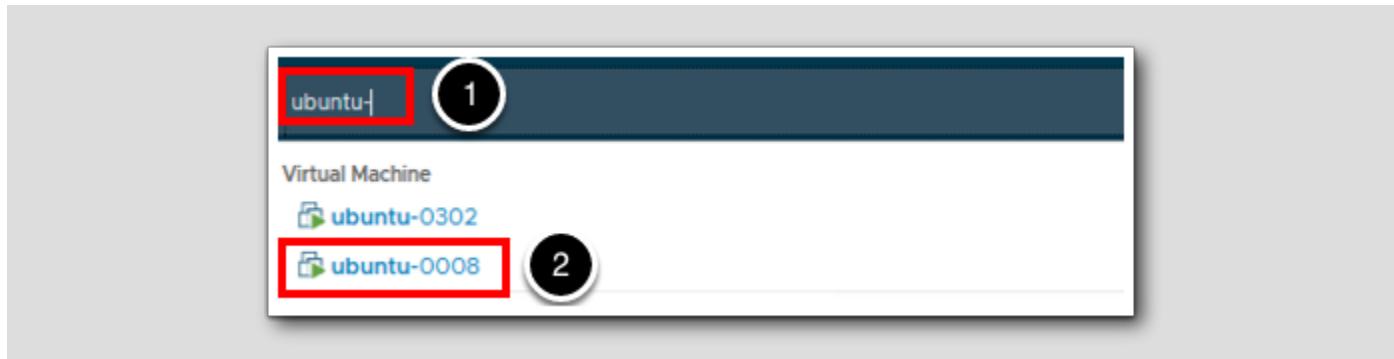
A red box highlights the command "cat /dev/zero > /dev/null". A small circular icon with the number "1" is positioned next to the command.

We will now redirect dev/zero to dev/null to generate CPU load so that we can see the impact on the VM in vRealize Operations.

1. Type **cat /dev/zero > /dev/null** and press the Enter key to start the CPU load.

Leave this putty window open, we'll come back to this later in the lesson.

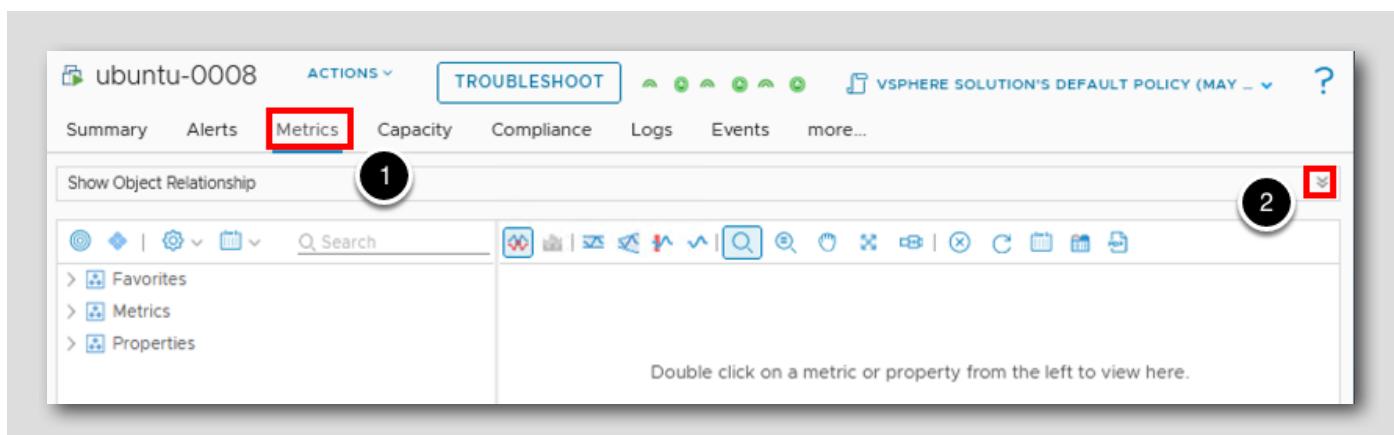
## Return to vRealize Operations and Search for VM



Back in Aria Operations we now need to search for the ubuntu-0008 VM

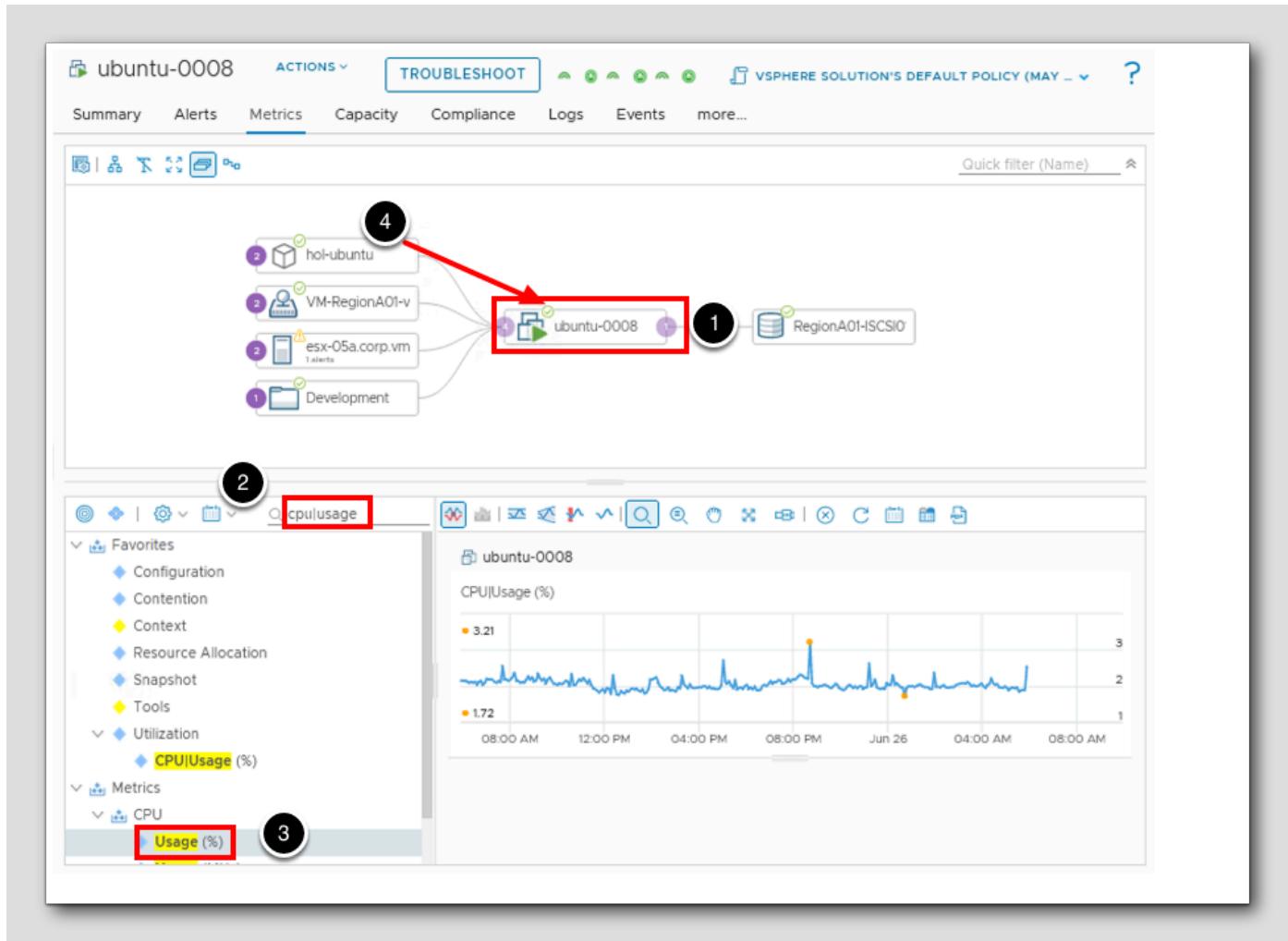
1. In the Search Bar type ubuntu-
2. Click on **ubuntu-0008**.

## Metrics and Object Relationships



1. Click **Metrics** to open the Metrics tab.
2. If the Object relationship window is not already visible, Click the chevrons to show the object relationships for the VM **ubuntu-0008**.

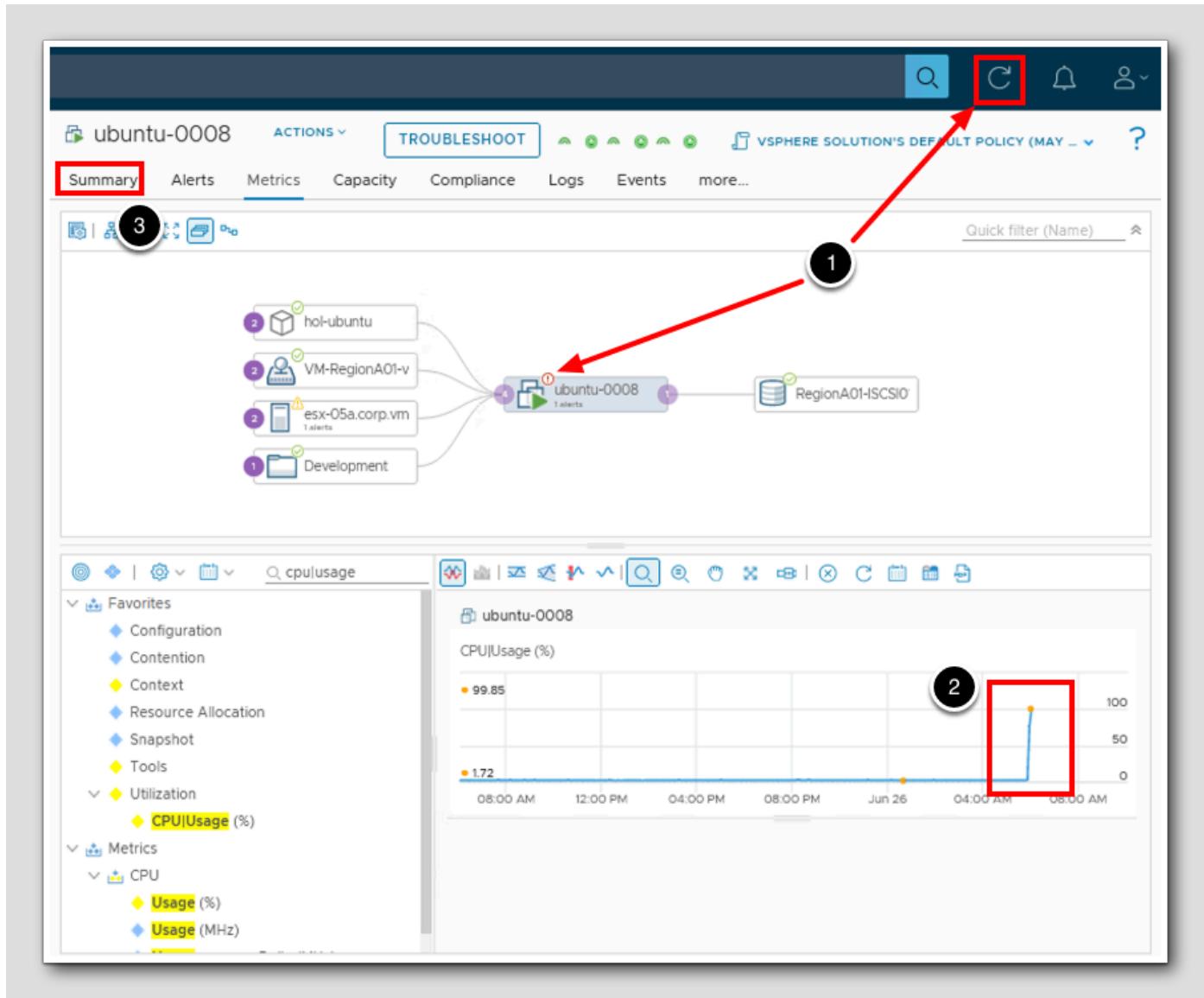
## Metrics Graphs



Set up the CPU graphs by completing the following:

1. Click **ubuntu-0008** so we can explore the Metrics on this object.
2. Type **cpu|usage** in the quick filter and then press the Enter key.
3. Double-click **Usage (%)** under Metrics / CPU to create a chart on the lower right hand side of the window.
4. In our example, the color of the VM Health badge will turn red once the alert we configured has been activated due to the high CPU Usage. However, the color can be green, yellow, orange, or red, depending on the status of the object and the severity of the alert.

## Refresh Metric Graphs



1. If the VM Health Badge is not yet red, then we may need to click Refresh.

- The graph will eventually show the increase in CPU usage on the Metric chart. Once CPU usage is above 90%, an alert will be generated. (NOTE: It may take a few minutes for the VM Health Badge to turn red).

2. Notice the increased CPU usage on the graph.

3. Click **Summary** to move to the Summary page.

## Summary Page

The screenshot shows the VMware vSphere Client interface for a virtual machine named "ubuntu-0008". The "Alerts" tab is currently selected, indicated by a red box around the tab name. The "Active Alerts" section displays a single critical alert (Self: 1, All: 1). Other alert levels shown are Immediate, Warning, and Info. The interface also includes sections for "Utilization", "Performance", and "Capacity Remaining".

Alert Type	Self	All
Critical	1	1
Immediate	0	0
Warning	0	0
Info	0	0

As shown here, we can see quite a bit of information about this particular object that we've selected.

1. Click Summary.
2. Notice under Active Alerts, we can see that we have active Critical Alerts.
3. Click Alerts here to open the Alerts Tab.

## View Critical Alerts

The screenshot shows the vSphere web interface for VM **ubuntu-0008**. The **Alerts** tab is selected. A red box highlights the first alert in the list, which is a **High CPU Alert**. Another red box highlights the **High CPU Alert** text itself. A circled number **1** is placed over the chevron icon next to the time filter, and a circled number **2** is placed over the **High CPU Alert** link.

Criticality	Alert	Created On	Status	Alert Type	Alert Subtype	Importance
■	<a href="#">High CPU Alert</a>	6:04 AM	!	Application	Performance	Very High (100%)

In the Alerts Tab, we see all of the alerts related to this vm **ubuntu-0008**.

1. Click the chevron beside 1 Hour to open the most recent alerts for the VM **ubuntu-0008**.
2. Click **High CPU Alert** in the Alert column for more details about the alert.

Note: You may see additional alerts for this VM as there are other alerts active within our environment. If it does not show as Critical, you may need to hit Refresh in the top right corner.

## Alert Details

The screenshot shows the vSphere web client interface for a virtual machine named "ubuntu-0008". The "Metrics" tab is selected, and the "Alerts" tab is highlighted with a red box. A callout bubble labeled "1" points to the "POWER OFF VM" button, which is located within a red box highlighting the "Alert Details" section of the alert card. The alert card displays a "High CPU Alert" with the message: "For Production Virtual Machines, please assess the trend and add CPU Resources if trend is high. All development machines are shut down and the developer is notified." The "Alert Basis" section shows "1. Self - Virtual Machine". The "Symptoms" section lists a critical symptom: "The Critical symptom High CPU has been observed on ubuntu-0008 (Self) Usage (%) 99.845 > Threshold (%) 90". The "Notes" section is collapsed.

From this Alerts screen we can see details about the alert.

1. We can see our Recommendation text we entered earlier, and again we see the POWER OFF VM action button where we could manually kick off the action we configured earlier which was to shut down the VM.
2. Click Symptoms.

## Alert Symptom Details

The screenshot shows the vSphere web interface for a virtual machine named "ubuntu-0008". The "Symptoms" tab is active. A red box highlights the first item in the list: "① High CPU". A black circle with the number "1" is placed over this highlighted item. The main pane displays the following details:

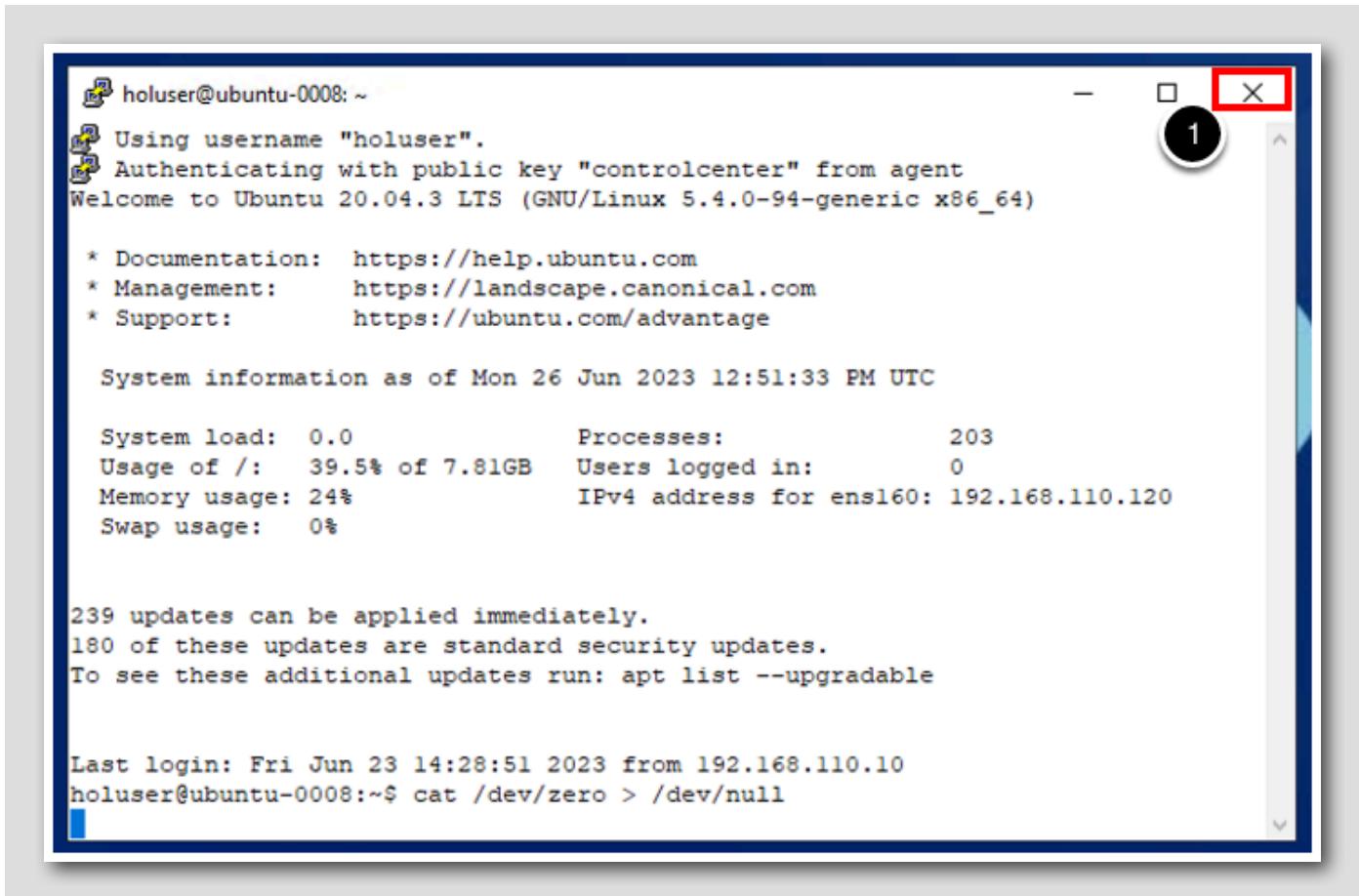
- Symptom:** ① High CPU
- Created On:** 6:02:03 AM
- Information:** Usage (%) 99.845 > Threshold (%) 90

Below this, a chart titled "ubuntu-0008 - CPU|Usage (%)" shows the CPU usage percentage over time. The x-axis represents time from 01:00 AM to 07:00 AM. The y-axis represents CPU usage from 0% to 100%. The usage is near 0% until approximately 6:00 AM, where it rises sharply to 100% and remains there until 7:00 AM.

1. Click on the High CPU Symptom.

From here we can see the CPU chart and we see the timing and details of this alert. We will now stop the CPU load so that we can complete some additional configuration to enable the automation of our configured recommendation for this High CPU alert.

## Stop CPU Load



The screenshot shows a PuTTY terminal window titled "holuser@ubuntu-0008: ~". The session is connected to an Ubuntu 20.04.3 LTS host. The terminal displays the following output:

```
Using username "holuser".
Authenticating with public key "controlcenter" from agent
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-94-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

 System information as of Mon 26 Jun 2023 12:51:33 PM UTC

 System load:  0.0          Processes:           203
 Usage of /:   39.5% of 7.81GB  Users logged in:      0
 Memory usage: 24%          IPv4 address for ens160: 192.168.110.120
 Swap usage:   0%

239 updates can be applied immediately.
180 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Last login: Fri Jun 23 14:28:51 2023 from 192.168.110.10
holuser@ubuntu-0008:~$ cat /dev/zero > /dev/null
```

We've seen how we can manually create Alerts and Recommended Actions based on Symptom Definitions. Now let's end this part of the lesson and look at how we can automate these Recommended Actions by using the vRealize Operations Policies.

Return to your open PuTTY window. Closing this PuTTY session will end the CPU load command, and the alert will clear.

1. Click the X in the upper-right corner to close the PuTTY session.
2. Click OK in the PuTTY Exit Confirmation Pop-up Window (*Not Shown*).

## Fully Automated Actions

The screenshot shows the VMware Aria Operations interface. On the left, there is a navigation menu with the following items:

- Visualize
- Troubleshoot
- Optimize
- Plan
- Configure (highlighted with a red box)
- Policies
- Alerts
- Super Metrics
- Applications and Services
- Cost Drivers
- Custom Profiles
- Configuration Files
- Maintenance Schedules
- Automation Central
- Administration
- Developer Center

Numbered callouts indicate specific actions:

- A red box highlights the "Policies" item in the navigation menu.
- A red box highlights the "Configure" item in the navigation menu.
- A red box highlights the "Object Browser" icon in the top right corner of the main pane.

The main pane is titled "Object Browser" and contains a search bar at the top. Below the search bar is a tree view of objects under "Environment (All Objects)". The tree includes:

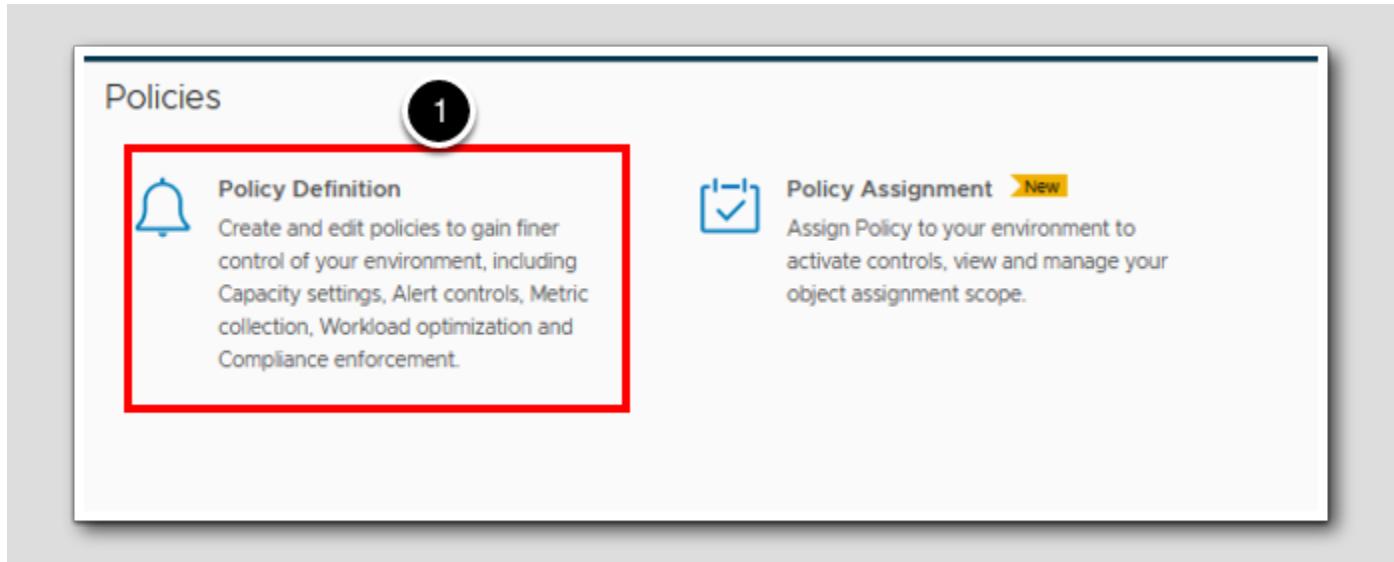
- Datastore
- Virtual Machine
  - ubuntu-0006 (highlighted with a green checkmark)
- Function
- vSphere Distributed Port Group
- User
- Automation World
- Cluster Compute Resource
- vCenter Server
- Cloud Account
- Virtual Machine Folder
- Universe
- vSphere World
- vSphere Distributed Switch
- Automation Cluster World
- Deployment
- VMware Aria Automation
- Datacenter
- Blueprint
- Cloud Zone

Here, we will create a custom policy for test VMs to enable the system to act based on the VM's policy assignment. In this case, we will automatically power off test VMs that spike CPU usage to prevent them from causing resource constraints in the virtual environment. By using the HOL Policy, all settings in that policy will be applied if they are not explicitly set in our new policy.

1. Scroll down on the left hand menu
2. Click the chevron to expand Configuration if needed to show the configuration options.
3. Click Policies.

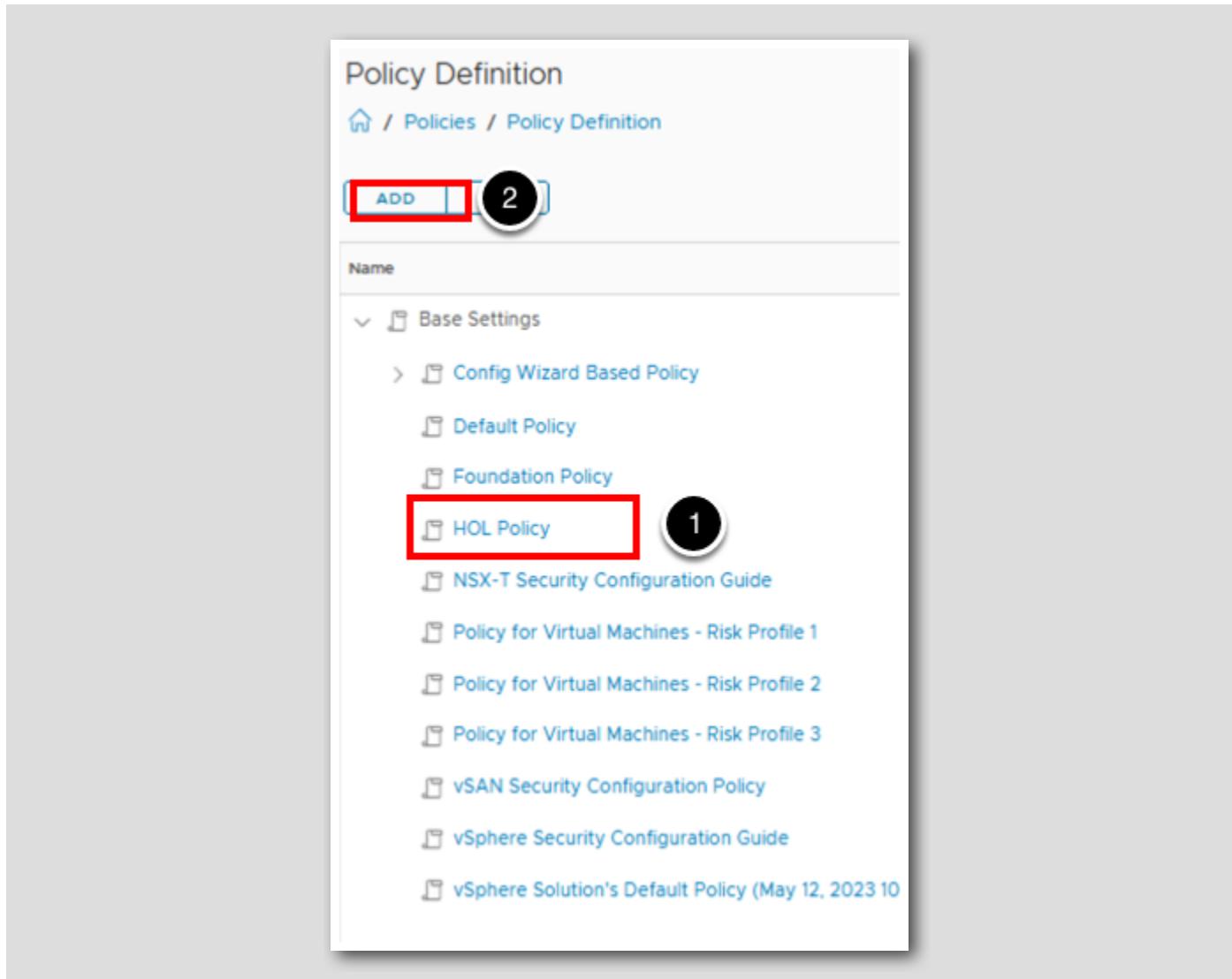
## Policy Definition

[246]



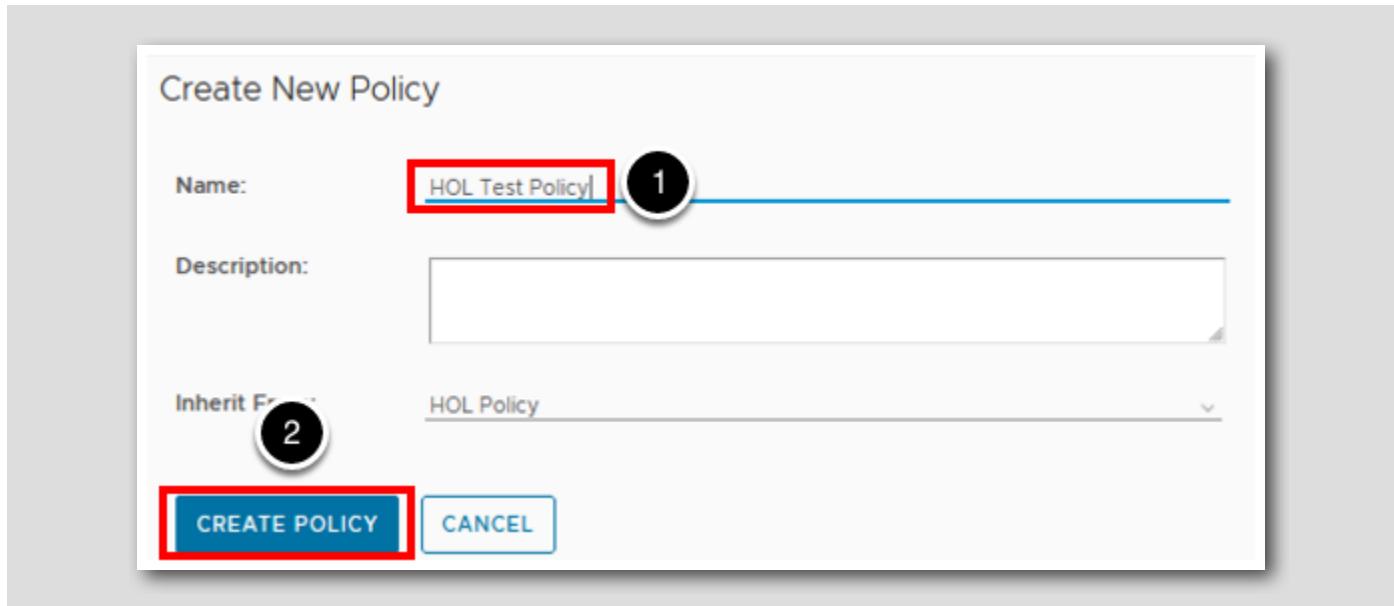
1. Click Policy Definition.

## Add Policy



1. Click HOL Policy to highlight, this will enable this selected policy to be our beginning baseline.
2. Click ADD to create a new policy.

## Name the Policy



1. Enter **HOL Test Policy** in the Name field
2. Select CREATE POLICY.

## Policy Alerts and Symptoms

The screenshot shows the 'HOL Test Policy [Create]' interface. At the top, there are fields for 'Name' (HOL Test Policy), 'Description' (- None -), and 'Inherit From' (HOL Policy). Below these are six categories represented by cards:

- Metrics and Properties**: Shows 'Locally defined attributes' as 'None'.
- Alerts and Symptoms**: This card is highlighted with a red border and has a circled '1' above it. It contains 'Locally defined alerts' and 'Locally defined symptoms', both listed as 'None'.
- Capacity**: Shows 'Locally defined policy elements' as 'None'.
- Compliance**: Shows 'Locally defined policy elements' as 'None'.
- Workload Automation**: Shows 'Locally defined policy elements' as 'None'.
- Groups and Objects**: Shows 'Associated custom groups' and 'Directly assigned objects', both listed as 'None'.

After creating the policy, we can now edit this Policy.

1. Select Alerts and Symptoms to edit this new policy.

## Edit Alert Definition Settings

The screenshot shows the 'Edit Alert Definition Settings' interface for the 'HOL Test Policy [Create]'. At the top, there is a search bar with the text 'high cpu' highlighted. Below the search bar, there are tabs for 'Alert Definitions' and 'Symptom Definitions', with 'Alert Definitions' being the active tab. A 'Select Object Type:' dropdown is shown, with 'vCenter' selected. Under 'vCenter', there are options for 'Cluster Compute Resource' and 'Virtual Machine'. In the main area, a table lists alert definitions. One row is selected, labeled '2', and its details are shown in a modal dialog. The 'State' column for this row has a dropdown menu open, showing options: 'Activated' (selected), 'Deactivated', and 'Inherited'. Red arrows point from the 'Activated' option in the list to the 'Activated' option in the dropdown and to the 'Activated' checkmark in the table cell. A callout bubble points to the 'Activated' option in the dropdown. A red box highlights the 'Activated' option in the dropdown. A red box also highlights the 'SAVE' button at the bottom left of the interface. Numbered circles (1, 2, 3, 4) are overlaid on the interface to indicate specific steps: 1 points to the search bar, 2 points to the selected alert definition, 3 points to the dropdown menu, and 4 points to the 'SAVE' button.

Alert Definition	State	Automate	Symptoms / Conditions	Criticality
Fully-automated DRS-enabled cluster has high CPU workl...	Activated (Inherited)	Not Applicable	5	!
<b>High CPU Alert</b>	<b>Activated</b>	Activated	1	!

The policy allows us to set the action to be run at the time of an alert.

1. Type **high cpu** in the filter box and hit **Enter**.
2. In the Alert Definitions Window, select our **High CPU Alert**
3. Click on **Activated** (with the green checkmark to the left of it) in the drop-down list under the **State** and **Automate** columns.  
Note that the action we assign in the alert is linked in the policy.
4. Click **SAVE**.

Confirm Alert was defined in the New Policy

The screenshot shows the 'HOL Test Policy [Create]' configuration screen. It includes the following details:

- Name:** HOL Test Policy
- Description:** - None -
- Inherit From:** HOL Policy

The screen is divided into four main sections:

- Metrics and Properties**: Contains a chart icon and a note that says "Locally defined attributes" and "None".
- Alerts and Symptoms**: Contains a clock icon. A red box highlights the "Locally defined alerts" count, which is "1". A black circle with the number "1" is positioned next to the count. Below it, it says "Locally defined symptoms" and "None".
- Compliance**: Contains a magnifying glass icon.
- Workload Automation**: Contains a gear icon.

1. Now we can confirm that our new Policy "HOL Test Policy" was created, and under Alerts and Symptom we can see that we do have 1 Locally defined alert.

## Add VM to Test Group

The screenshot shows the VMware Aria Operations interface. The left sidebar has a red box around 'Custom Groups' under 'Applications'. Step 1 (circle 1) points to the 'Custom Groups' link. Step 2 (circle 2) points to the dropdown arrow next to 'Environment'. Step 3 (circle 3) points to the 'Custom Groups' link in the dropdown. Step 4 (circle 4) points to the 'ADD' button at the top right of the main pane.

Custom Groups GROUP TYPES

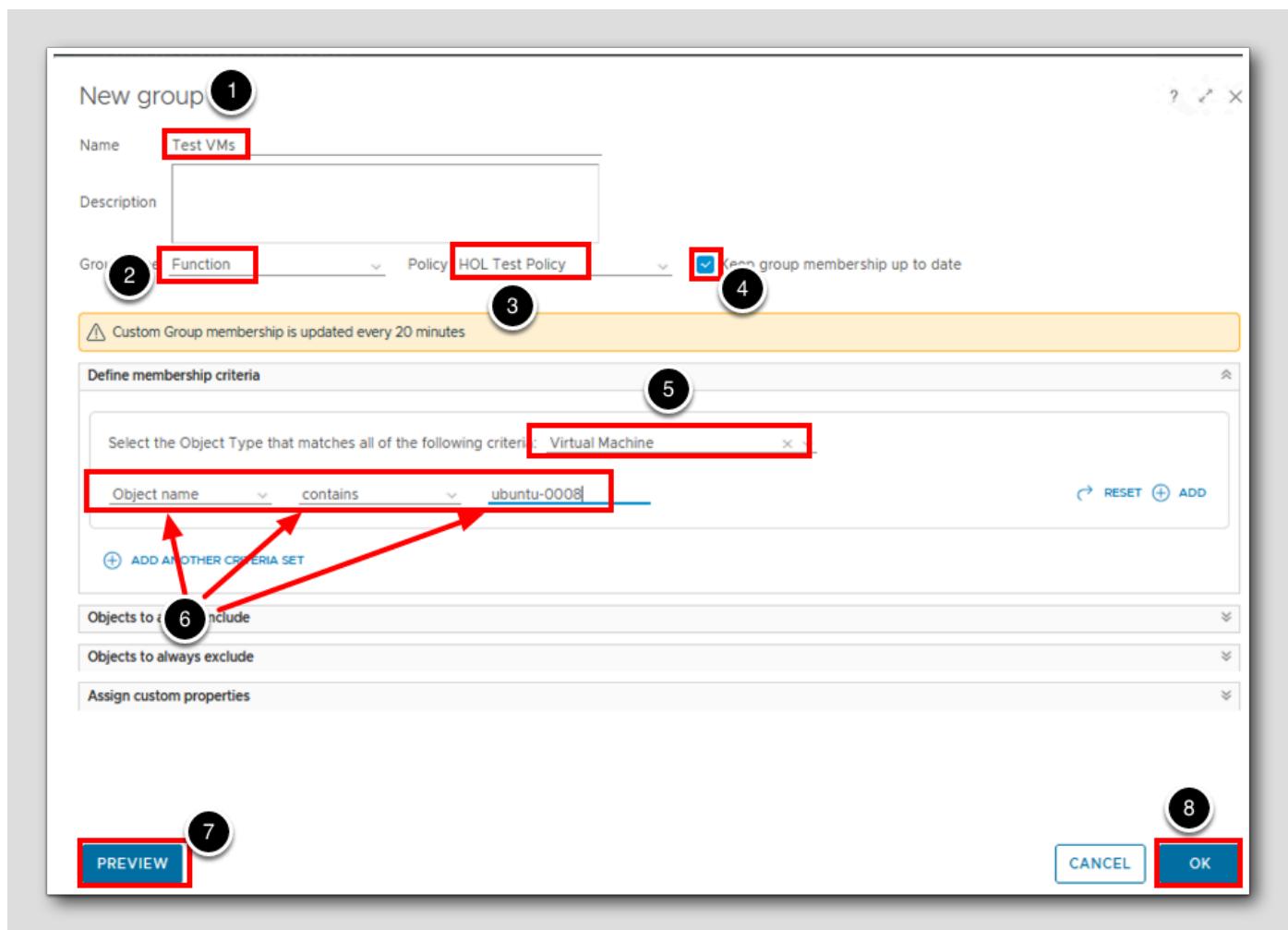
Name
VMware Private Cloud
VMC World
Non vSAN Datastores
vSAN World
vSphere Private World
vSphere World
vRealize Operations Manager Self Monitoring
Google Cloud VMware Engine
NSXT World
Operating System World
vSAN Datastores
Test VM's
VMware Cloud on Dell EMC
Universe

We will now create a new group for test VMs and apply our HOL Test Policy to it. In this lab, we only have one test VM, but we will be able to configure the group to add additional machines dynamically and apply our policy.

1. Scroll up on the left hand menu bar.
2. Expand Environment.
3. Click Custom Groups.
4. Click ADD to create a new group.

## Define the New Group

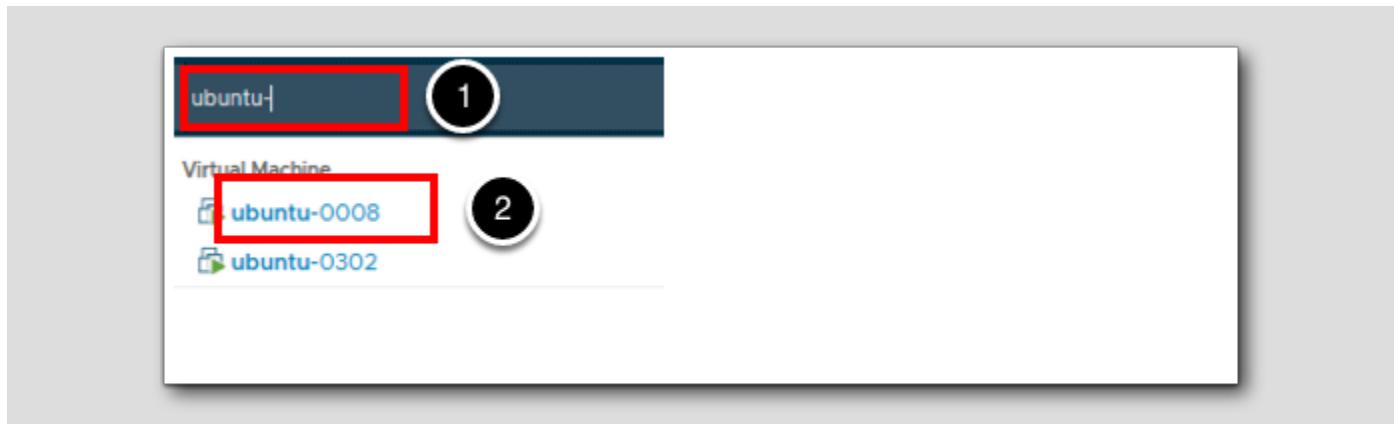
[253]



1. Enter **Test VMs** in the Name field.
2. Select **Function** for Group Type.
3. Select **HOL Test Policy**.
4. Click the check box to select **Keep group membership up to date**.
5. Select **Virtual Machine** under the vCenter Adapter for object type.
6. Under Object Name, select **contains** and then enter **ubuntu-0008** for the selection criteria.
7. Click **PREVIEW** to preview the machines that fit this search criteria and make sure only the VM **ubuntu-0008** shows up in the list.
  - Click **CLOSE** on the Preview Screen (not shown above).
8. Click **OK**.

## Check Policy

[254]

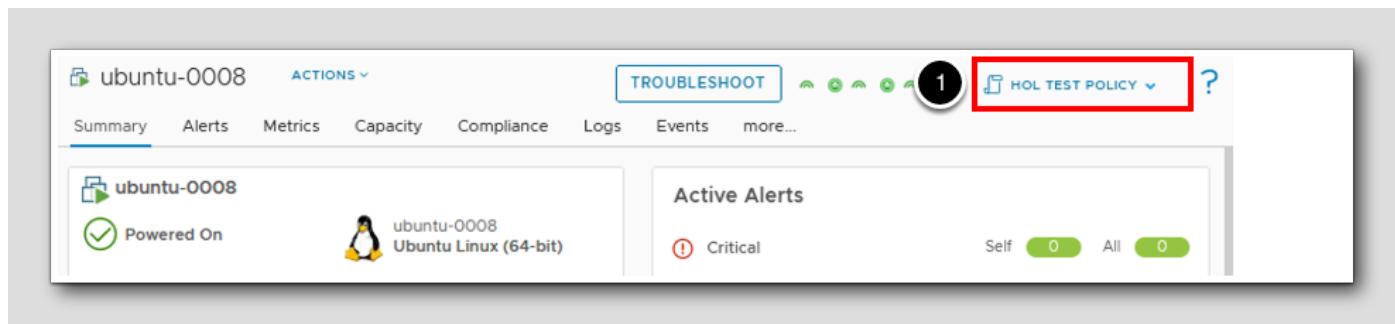


Verify our critical VM has the newly assigned policy.

1. Click in the Search Bar and enter **ubuntu-**
2. Click the VM **ubuntu-0008**.

## Confirm HOL Test Policy

[255]



1. Verify that HOL TEST POLICY is now assigned to this VM.

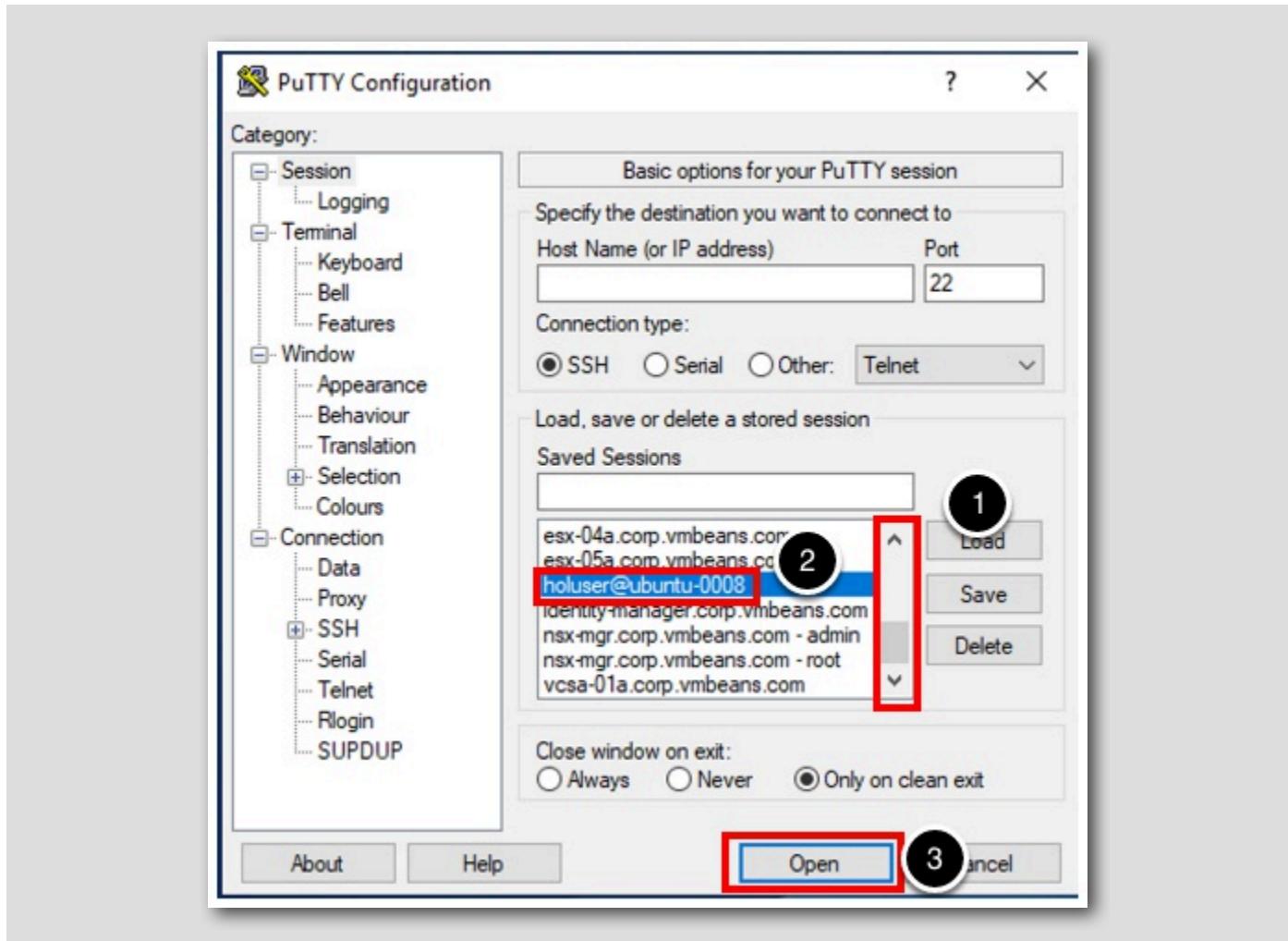
## Open PuTTY Session

[256]



1. Click on PuTTY icon in System tray to view the PuTTY Configuration options.

## Open PuTTY Session



1. Scroll down on the right of Saved Sessions
2. Click on holuser@ubuntu-0008.
3. Click Open to start the PuTTY session.

## Run CPU Load

The screenshot shows a PuTTY terminal window titled "holuser@ubuntu-0008: ~". The window displays the following text:

```
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-94-generic x86_64)

* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage

System information as of Fri 23 Jun 2023 02:28:50 PM UTC

System load: 0.0          Processes: 204
Usage of /: 37.5% of 7.81GB  Users logged in: 0
Memory usage: 23%          IPv4 address for ens160: 192.168.110.120
Swap usage: 0%           

239 updates can be applied immediately.
180 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your
Internet connection or proxy settings

Last login: Fri Jun 23 14:15:09 2023 from 192.168.1.10
holuser@ubuntu-0008:~$ cat /dev/zero > /dev/null
```

The command `cat /dev/zero > /dev/null` is highlighted with a red box.

Redirect dev/zero to dev/null to generate CPU load again; this will trigger the alert and show how it behaves with the new policy.

1. Type `cat /dev/zero > /dev/null` and press the Enter key to start the CPU load.

Again, leave this PuTTY window open.

## Check for the Alert

The screenshot shows the 'All Alerts' interface in vRealize Operations. The left sidebar has 'Troubleshoot' expanded, with 'Alerts' selected (Step 1). A red box highlights 'Alerts'. Step 2 shows a red box around the '1 Hour' button in the top navigation bar. Step 3 highlights the '1 Hour' dropdown. Step 4 highlights the 'High CPU Alert' row in the main table, which includes columns for Criticality (Red), Alert (High CPU Alert), Triggered On (Ubuntu-0008), Created On (6:44 AM), Status (Green), Alert Type (Application), Alert Subtype (Performance), and Importance (Very High (100%)).

Let the CPU load command run for a couple minutes, and then return to vRealize Operations and check the alerts from the Alerts screen.

Note, you may need to hit refresh in the upper right hand corner. The High CPU Alert will not show until the next collection cycle runs.

1. Click the chevron to expand **Troubleshoot** if needed to show the Troubleshoot options.
2. Click **Alerts**. (NOTE: It may take a few minutes for the Alert to show up).
3. Click the chevron beside **1 Hour** to show the most recent alerts.
4. Notice we do see our **High CPU Alert** has been triggered because of High CPU Usage.

We looked at the alert previously, so now we'll check the recent tasks and check the status of the action.

## Recent Task List

The screenshot shows the VMware Aria Operations interface. On the left, there is a navigation sidebar with the following items:

- Home
- Data Sources
- Environment
- Visualize
- Troubleshoot
- Optimize
- Plan
- Configure
- Automation Central
- Administration** (highlighted with a red box and numbered 1)
- Developer Center

The main content area is titled "Administration". It contains several management options:

- Access Control**: Create, remove and manage permissions for users, roles and groups.
- Authentication Sources**: Define connections to external authentication sources like LDAP and vIDM.
- Log Forwarding**: Configure self-monitoring logging and specify targets for outbound logs.
- Cluster Management**: Manage the VMware Aria Operations clusters and nodes.
- Orphaned Content**: Find, assign, take ownership or discard content created by deleted users.
- Physical Data Centers NEW**: Manage physical data centers and associated cloud accounts.
- Audit**: Generate an audit report. (Numbered 2)
- Cost Reference Database**: The reference database supplies default values for cost calculations.
- Recent Tasks**: Review recent activity across the system. (Numbered 2, highlighted with a red box)
- Support Logs**: Browse, search and find across all the product's logs.

1. Click Administration.

2. Click Recent Tasks.

## Inspect Power Off VM Task

The screenshot shows the 'Recent Tasks' interface in the vSphere Client. At the top, there are buttons for 'EDIT PROPERTIES' and '...'. A dropdown menu is open, showing 'Status: All'. Below this is a table with columns: Task, Status, Started Time, Completed Time, Automated, and Object Name. The first row in the table is highlighted with a red box and circled with a black circle containing the number 1. This row represents a completed task named 'Power Off VM' for an object named 'ubuntu-0008', which was completed at 6:45 AM after starting at 6:44 AM.

1. Click the Power Off VM task. Additional details regarding the completed operations are displayed now at the bottom of the screen.

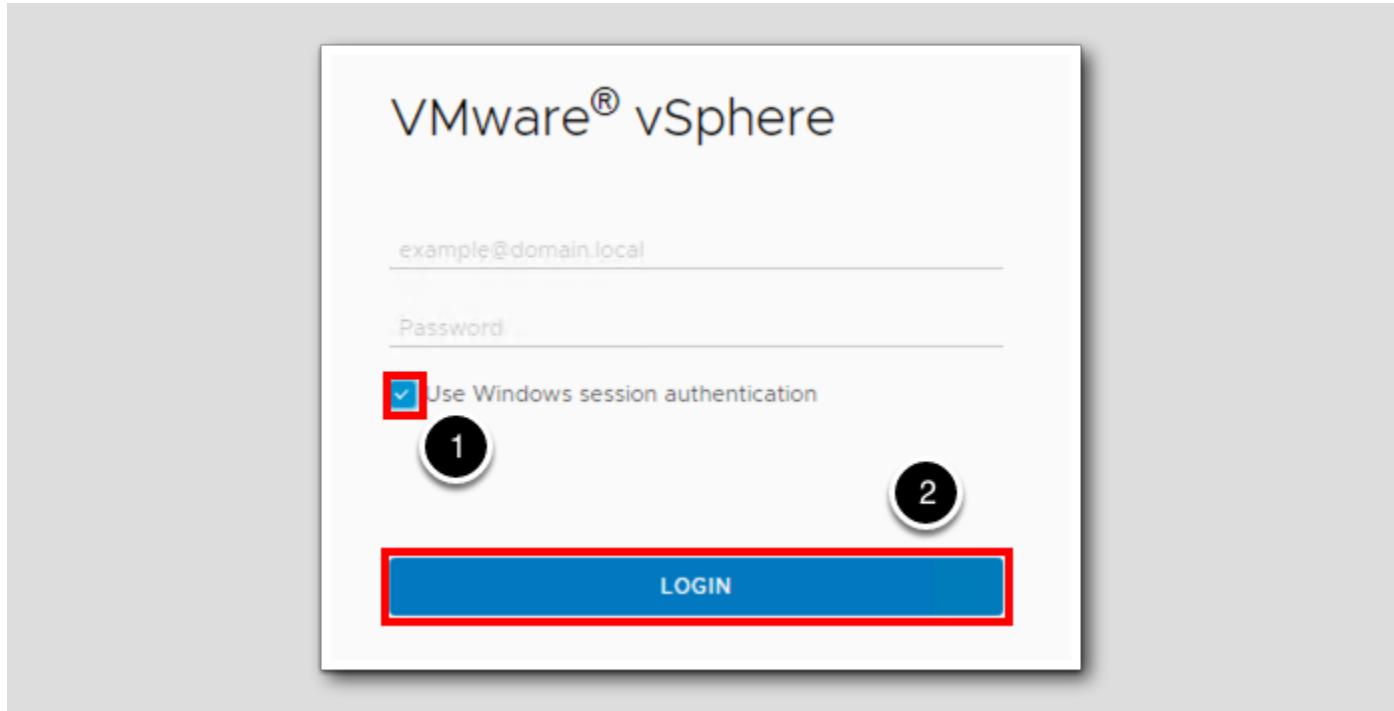
Let's take a look at the VM in the vSphere Client to ensure that the action has turned off our ubuntu-0008 VM.

## Open vSphere Client - Open a new Browser Tab

The screenshot shows a web browser window with the title 'Recent Tasks - VMware Aria Operations'. The address bar contains a '+'. Below the address bar is a bookmarks bar with several items: 'vCenter' (highlighted with a red box and circled with a black circle containing the number 2), 'Automation', 'Aria Operations', and 'Aria Operations'. The 'vCenter' link is the one being targeted for selection.

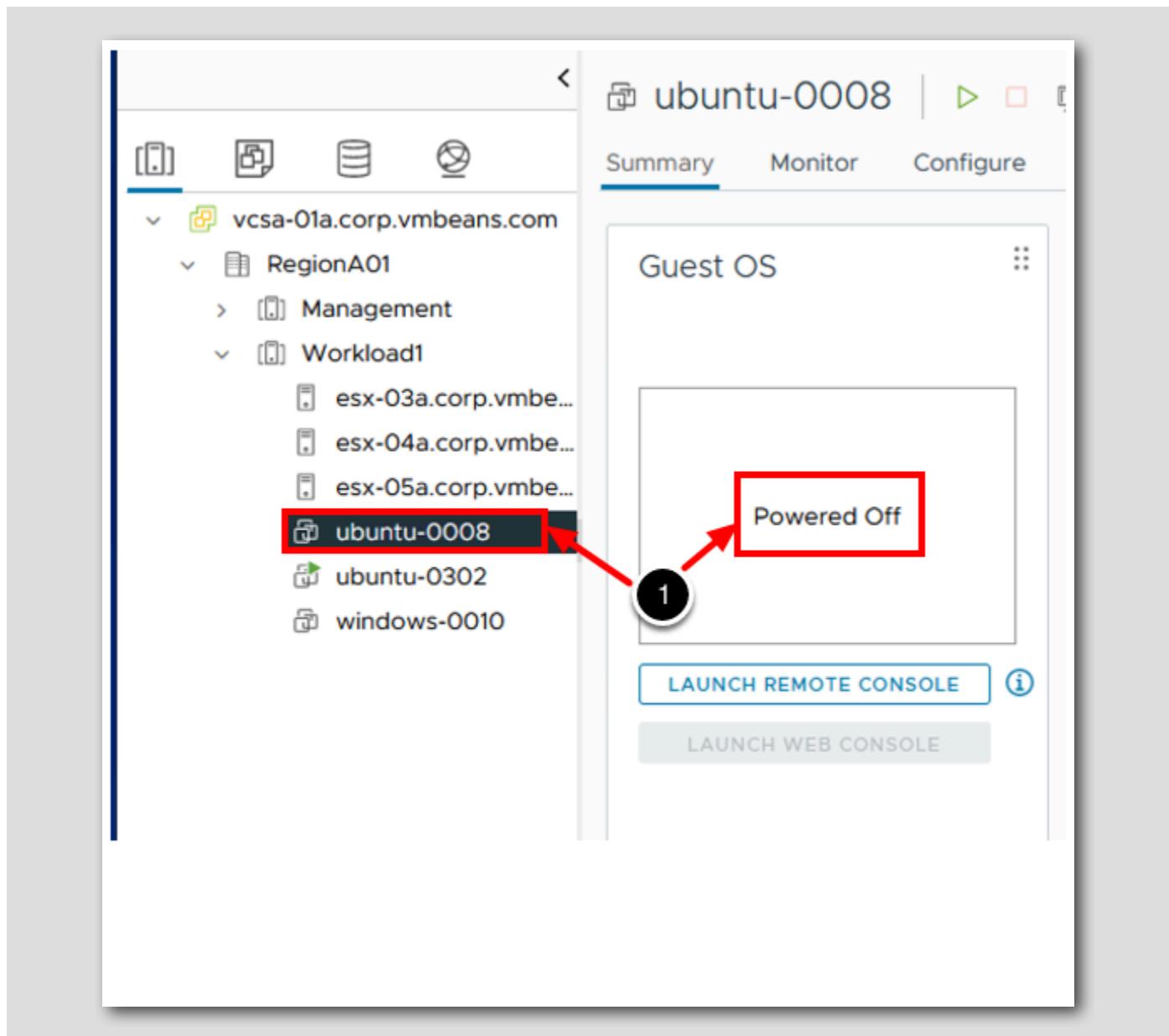
1. Click the + to open a new Firefox Tab.
2. Click on the vCenter link in the bookmarks bar.

## Login to vCenter



1. Click the checkbox to select Use Windows session authentication.
2. Click LOGIN.

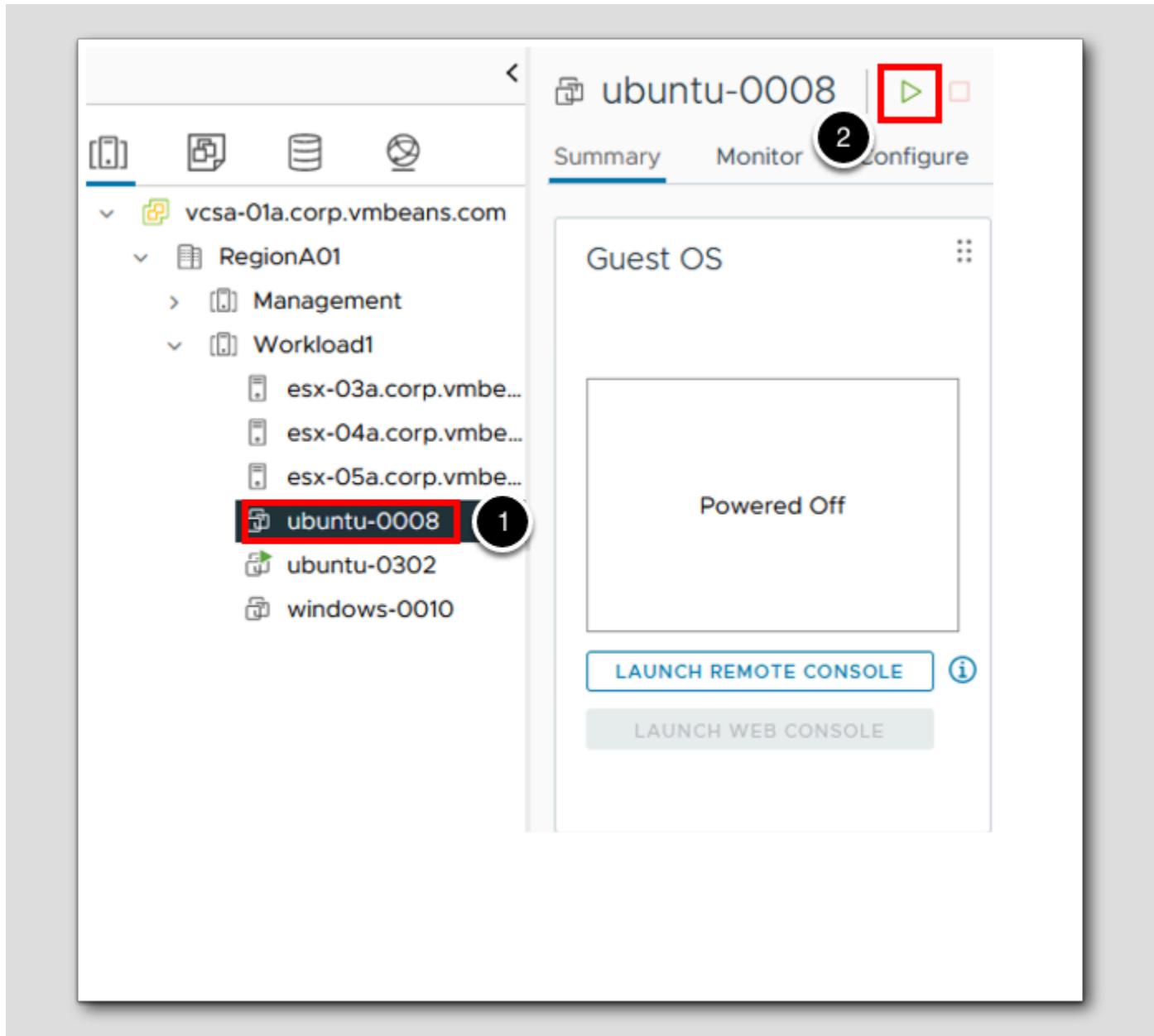
## Check the VM Status



1. In vCenter we can see that the **ubuntu-0008** VM has indeed been turned off by our automated action in vRealize Operations.

Automating actions in vRealize Operations is a key part of creating a Self Driving Datacenter!

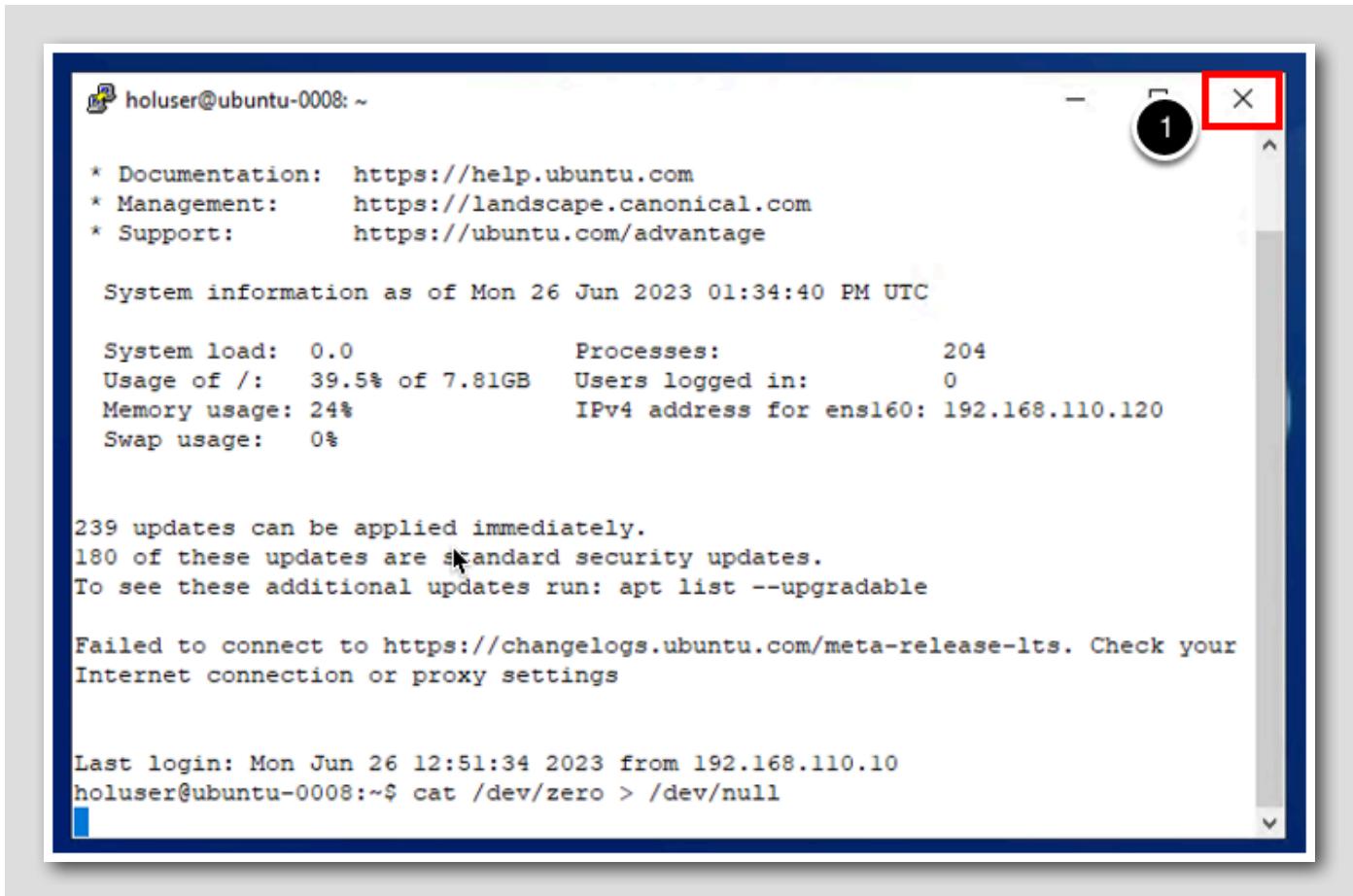
Restart the ubuntu-0008 VM



Let's restart the ubuntu-0008 VM as it will be needed in later lessons.

1. Click the VM ubuntu-0008.
2. Click the green start icon at the top of the VM summary page (or right-click and select Power On).

## Stop CPU Load



The screenshot shows a PuTTY terminal window with a red box highlighting the close button (X) in the top right corner. The window title is "holuser@ubuntu-0008: ~". The terminal output includes:

```
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage

System information as of Mon 26 Jun 2023 01:34:40 PM UTC

System load: 0.0          Processes: 204
Usage of /: 39.5% of 7.81GB  Users logged in: 0
Memory usage: 24%          IPv4 address for ensl60: 192.168.110.120
Swap usage: 0%

239 updates can be applied immediately.
180 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your
Internet connection or proxy settings

Last login: Mon Jun 26 12:51:34 2023 from 192.168.110.10
holuser@ubuntu-0008:~$ cat /dev/zero > /dev/null
```

Return to your open PuTTY window. Closing this PuTTY session will end the CPU load command.

1. Click the X in the upper-right corner to close the PuTTY session.
2. Click OK in the PuTTY Exit Confirmation Pop-up Window (*Not Shown*).

## Configuring Notifications

In this lesson we will create an Email Notification triggered on the High CPU Alert created in the last section.

The screenshot shows the VMware Aria Operations interface. On the left, there's a navigation sidebar with various options like Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure (which has a dropdown arrow), Policies, Alerts (which is highlighted with a red border and has a black circle with '2' over it), and Super Metrics. The main content area is titled 'Alerts' and contains sections for Alert Definitions, Symptom Definitions, Notifications (which is also highlighted with a red border and has a black circle with '3' over it), Outbound Settings, and Payload Telemetry. There's also a search bar at the top.

From the Home screen

1. Expand Configure.
2. Click on Alerts.
3. Click on Notifications.

**VMware Aria Operations**

Search for object or metric and more...

**Alerts**

- Home
- Data Sources
- Environment
- Visualize
- Troubleshoot
- Optimize
- Plan
- Configure (1)
- Policies (2)
- Alerts (highlighted)
- Super Metrics

**Alert Definitions**  
Create and edit Alert definitions using a combination of symptoms and recommendations that identify problem areas in your environment and generate alerts on which you act to remediate the issues.

**Notifications**  
Define and modify notification settings to send out messages and custom payloads when an alert is triggered.

**Symptom Definitions**  
Create and edit descriptions of situations which are NOT normal within your environment. Use these symptoms in your Alert definitions.

**Outbound Settings**  
Define and manage outbound notification methods using a variety of protocols such as SNMP, web hook, network sharing and more to allow notifications to be dispatched when an alert is triggered.

**Recommendations**  
Create and edit recommendations that provide you with information and steps to take when problems that indicate potential issues are detected.

**Payload Editor**  
Custom outbound notification editor for creating custom payloads.

## Adding a Notification

[268]

**Notifications**

1 / Notifications

**ADD** ...

1. Click ADD.

## 1 - Notification

[269]

## Notifications

Home / Alerts / Notifications

1 - Notification      2 - Define Criteria

Name **HOL Email Notification** (1)

Description Create description for notification

Notification Status **ON**

PREVIOUS **NEXT** (2) CREATE CANCEL

The screenshot shows a step-by-step wizard for creating a notification. Step 1, 'Notification', is completed, with the name 'HOL Email Notification' entered. Step 2, 'Define Criteria', is the next step. The 'NEXT' button is highlighted with a red box and a circled '2'.

1. In the Name field type HOL Email Notification.
2. Click NEXT.

## Define Criteria

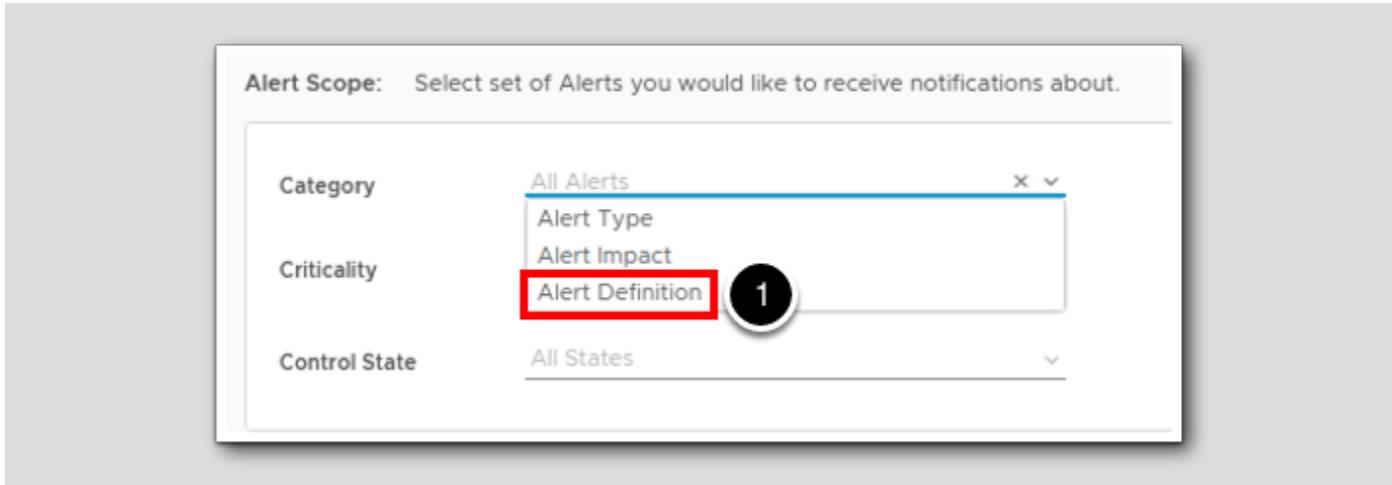
[270]

The screenshot shows the 'Notifications' interface in VMware. The top navigation bar includes 'Home / Alerts / Notifications'. Below it, three tabs are visible: '1 - Notification' (selected), '2 - Define Criteria' (current step), and '3 - Set Outbound Method'. The main content area is titled 'Object Scope: Select set of Objects you would like to receive notifications about.' A 'Criteria' dropdown is open, with its first item, 'Object Type', highlighted by a red box and circled with a black number '1'. To the right of the dropdown is a search input field containing 'virtual', also highlighted with a red box and circled with a black number '2'. A list of object types is displayed, with 'Virtual Machine' highlighted with a red box and circled with a black number '3'. A red arrow points from the 'Virtual Machine' entry in the list back to the 'Object Type' input field. Below the dropdown, a message states 'The alert triggers on ANY of the selected object types:' followed by a list box containing 'Virtual Machine' with a red 'X' button. At the bottom, an 'Alert Scope' section is partially visible.

1. In the Criteria drop down select Object Type.
2. In the Search field start typing virtual machine.
3. Select Virtual Machine.

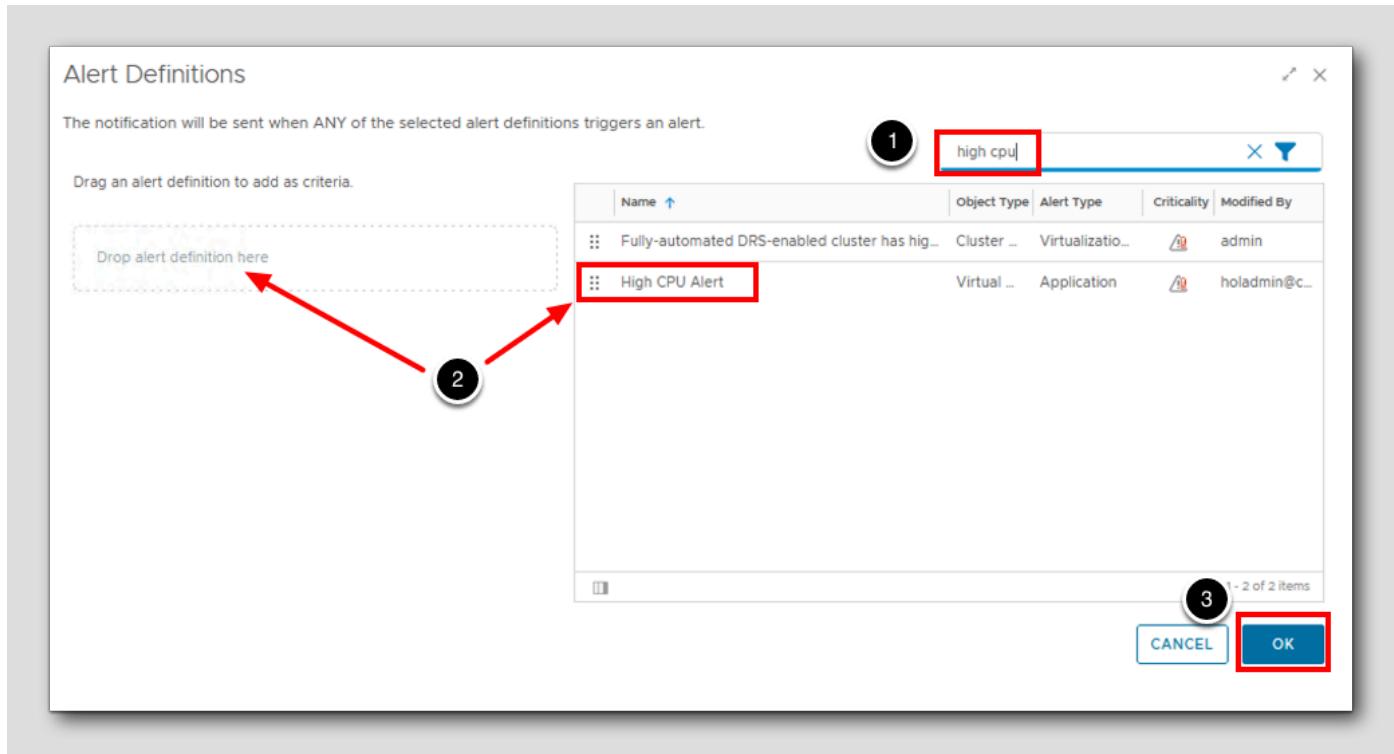
Notice Virtual Machine populates under the Criteria section.

## Category



1. Under Alert Scope: expand Category and select Alert Definition.

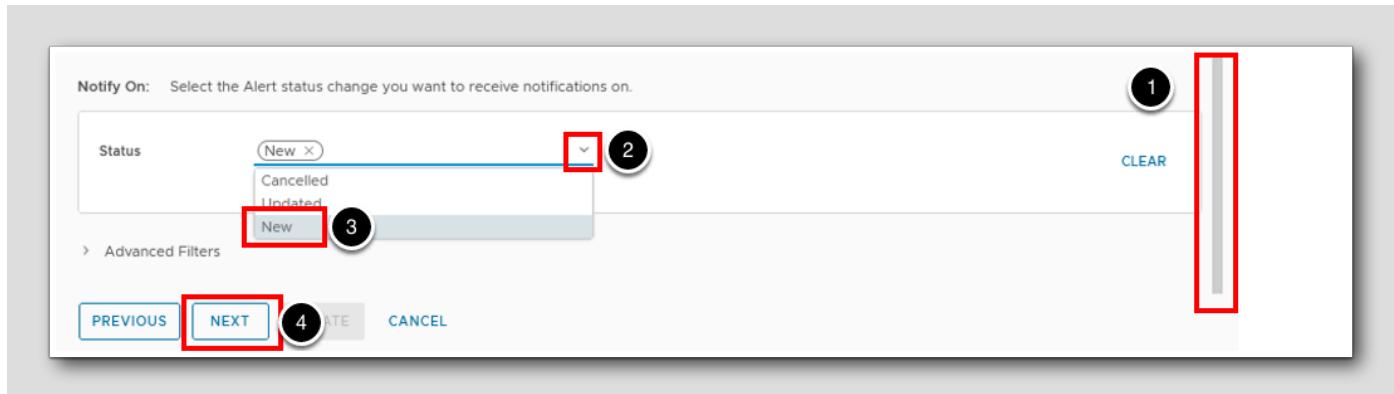
## High CPU Alert



Here we will use the High CPU Alert created in the previous module.

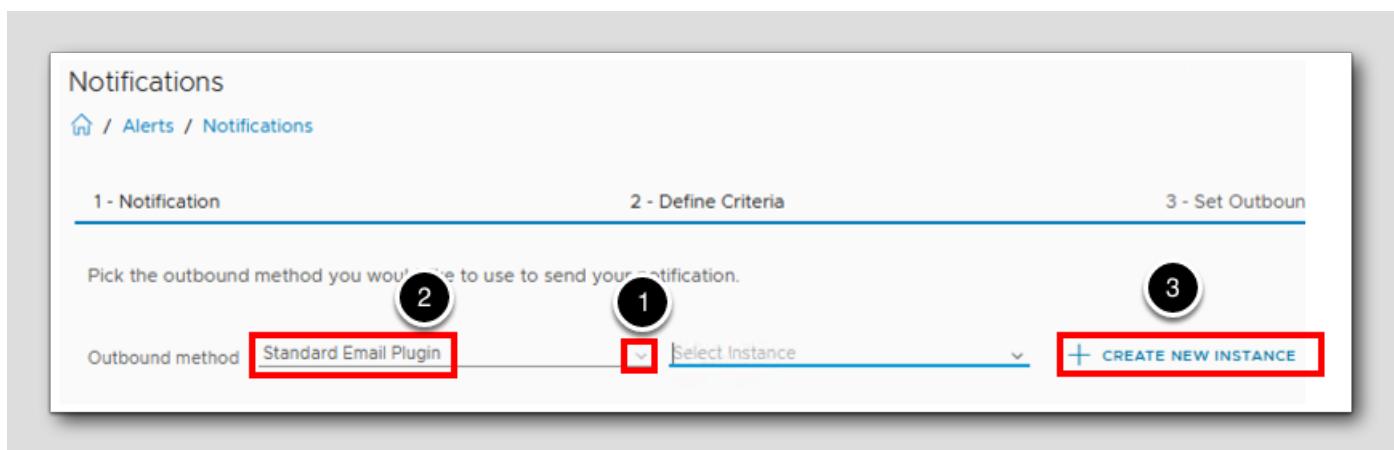
1. In the search bar, type high cpu and hit Enter.
2. Drag and drop the High CPU Alert alert definition into the Drop alert definition here box.
3. Click OK.

## Status New Only



1. Scroll down to the bottom on the right hand side.
2. Expand Status.
3. Click New to ensure only new alert notifications are sent.
4. Click NEXT.

## Set Outbound Method



We need to create an Outbound Instance for the Notifications to use. In this lab we will create a Standard Email Plugin method.

1. Expand the Outbound method dropdown.
2. Click Standard Email Plugin.
3. Click CREATE NEW INSTANCE.

## Notifications

Notifications

Home / Alerts / Notifications

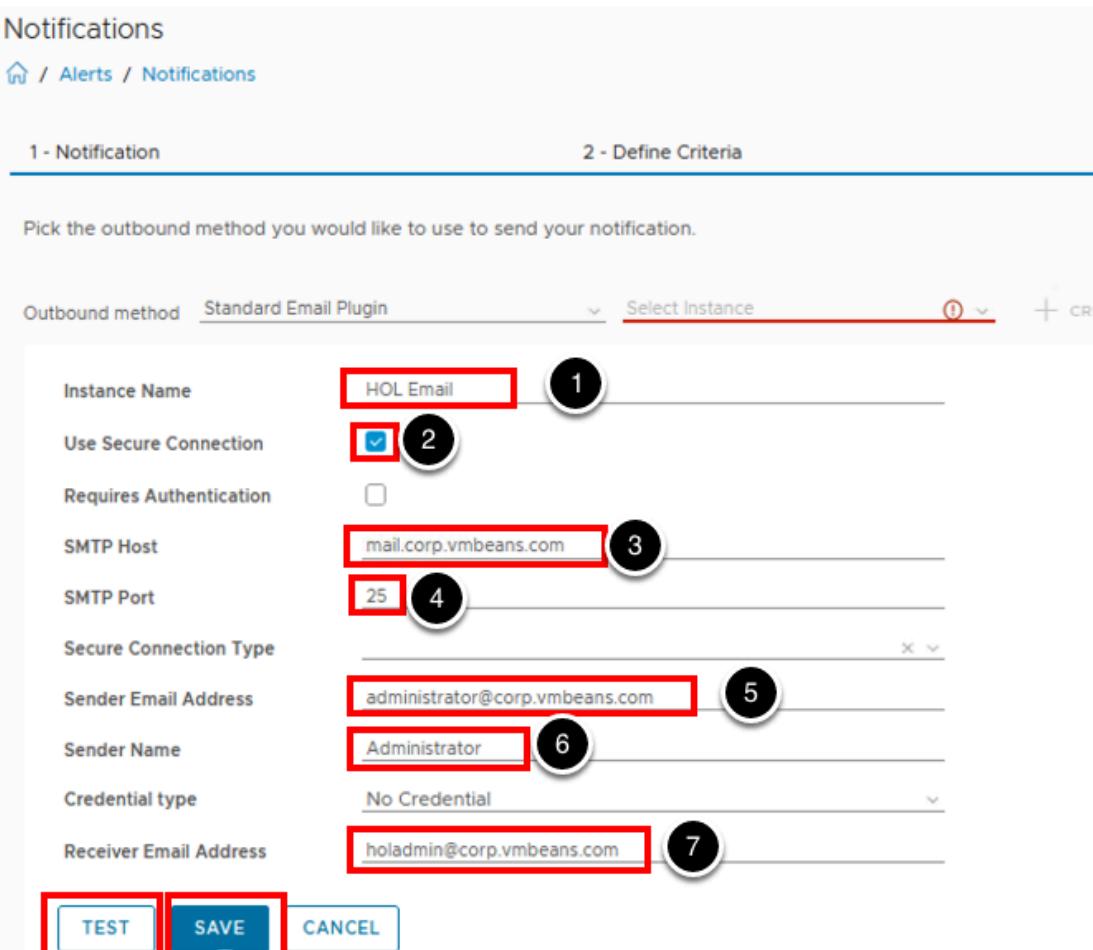
1 - Notification      2 - Define Criteria      3 - Set Outbound

Pick the outbound method you would like to use to send your notification.

Outbound method: Standard Email Plugin      Select Instance: [HOL Email](#) (1)      CREATE NEW INSTANCE

Instance Name: HOL Email (1)  
Use Secure Connection:  (2)  
Requires Authentication:   
SMTP Host: mail.corp.vmbeans.com (3)  
SMTP Port: 25 (4)  
Secure Connection Type: (5)  
Sender Email Address: administrator@corp.vmbeans.com (5)  
Sender Name: Administrator (6)  
Credential type: No Credential  
Receiver Email Address: holadmin@corp.vmbeans.com (7)  
TEST (8)      SAVE (9)      CANCEL

PREVIOUS      NEXT      CREATE      CANCEL



Populate the Standard Email Plugin fields.

1. Instance Name - HOL Email
2. Check Use Secure Connection
3. SMTP Host - mail.corp.vmbeans.com
4. SMTP Port - 25
5. Sender Email Address - administrator@corp.vmbeans.com
6. Sender Name - Administrator
7. Receiver Email Address - holadmin@corp.vmbeans.com
8. Click TEST and ensure you get a Test connection successful response (Not Shown).
9. If the TEST is successful, click SAVE. If the TEST fails, verify the above information has been entered correctly and re-test.

## Notifications (Continued)

The screenshot shows a web-based application interface for creating a notification. At the top, there's a navigation bar with a house icon, 'Alerts', and 'Notifications'. Below the navigation, three tabs are visible: '1 - Notification' (underlined), '2 - Define Criteria', and '3 - Set Outbound'. A sub-instruction below the tabs says 'Pick the outbound method you would like to use to send your notification.' Underneath, there are two dropdown menus: 'Outbound method' set to 'Standard Email Plugin' and 'HOL Email' (selected). To the right of these dropdowns is a blue '+' button labeled 'CREATE NEW INSTANCE'. At the bottom of the screen, there are four buttons: 'PREVIOUS', 'NEXT' (which is highlighted with a red box), 'CREATE', and 'CANCEL'.

1. Click NEXT.

## Payload Template

Notifications

[/ Alerts / Notifications](#)

1 - Notification      2 - Define Criteria      3 - Set Outbound Method      4 - Select Payload

Pick a payload template to include in the notification. The template includes additional content about the alert or object which will reflect in the notification.

Payload Template: Default Email Template

**1**

Default Email Template

Description for Default Email Template

**Payload Details**

New Alert    Updated Alert    Canceled Alert

**Subject**

[VMware Aria Operations] new alert Type:\${ALERT\_TYPE}, Sub-Type:\${ALERT\_SUBTYPE}, State:\${ALERT\_CRITICALITY}, Object Type:\${RESOURCE\_KIND}, Name:\${RESOURCE\_NAME}

**Body**

New alert was generated at \${CREATE\_TIME}:  
Info:\${RESOURCE\_NAME} \${RESOURCE\_KIND} is acting abnormally since \${CREATE\_TIME} and was last updated at \${UPDATE\_TIME}

Alert Definition Name: \${ALERT\_DEFINITION}  
Alert Definition Description: \${ALERT\_DEFINITION\_DESCRIPTION}  
Object Name : \${RESOURCE\_NAME}  
Object Type : \${RESOURCE\_KIND}  
Alert Impact: \${ALERT\_IMPACT}  
Alert State : \${ALERT\_CRITICALITY}  
Alert Type : \${ALERT\_TYPE}

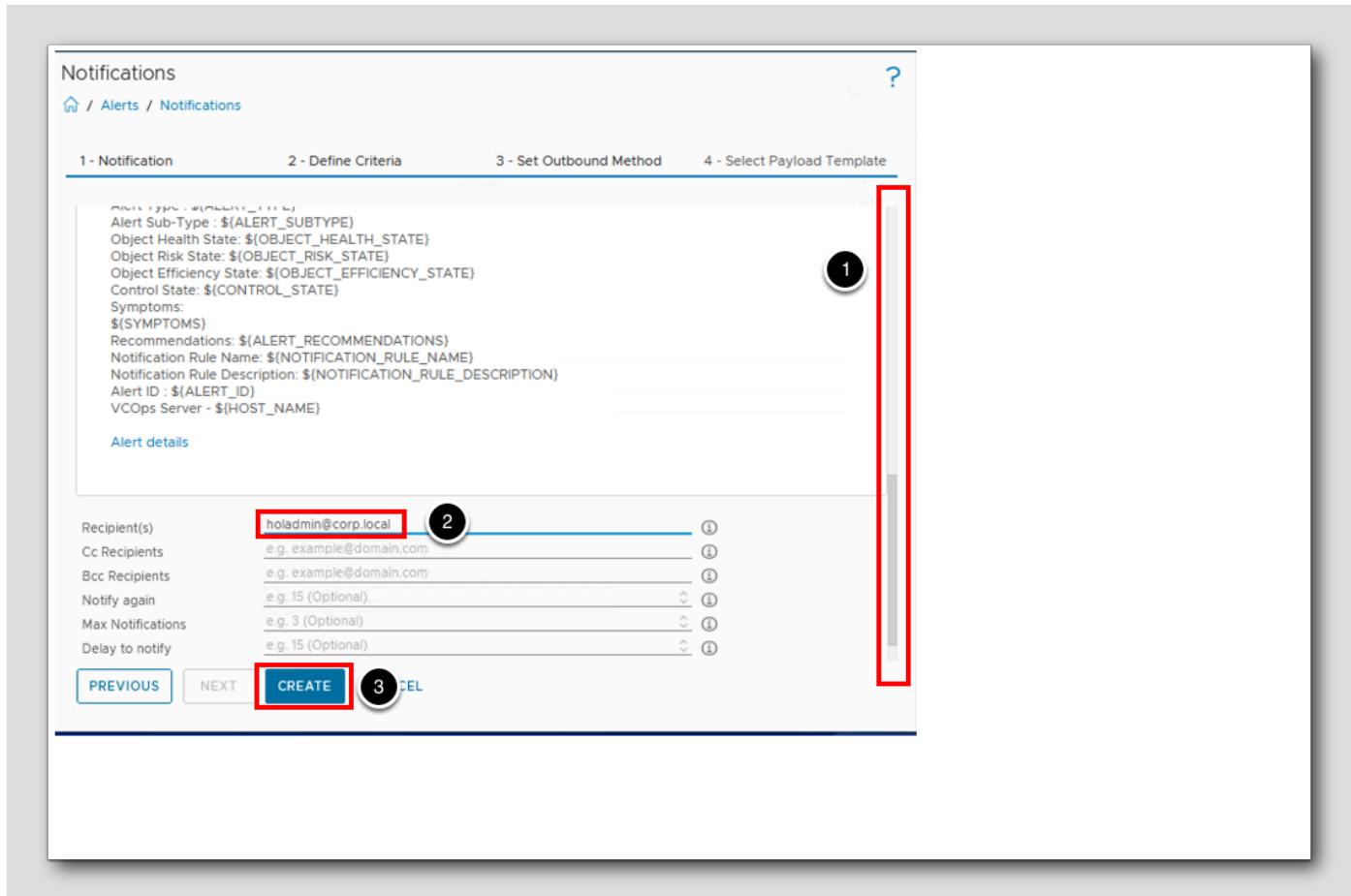
**PREVIOUS**   **NEXT**   **CREATE**   **CANCEL**

Lastly we select the Email Template that will be sent. For this lab we will use the Default Email Template.

1. Expand the Default Email Template. Notice the format and fields that are used to build the Notification message.

## Recipients

[278]



1. Scroll down to the bottom on the right side of the window.
2. In the Recipient(s) field type **holadmin@corp.local**.
3. Click **CREATE**.

## PuTTY to ubuntu-0008 VM

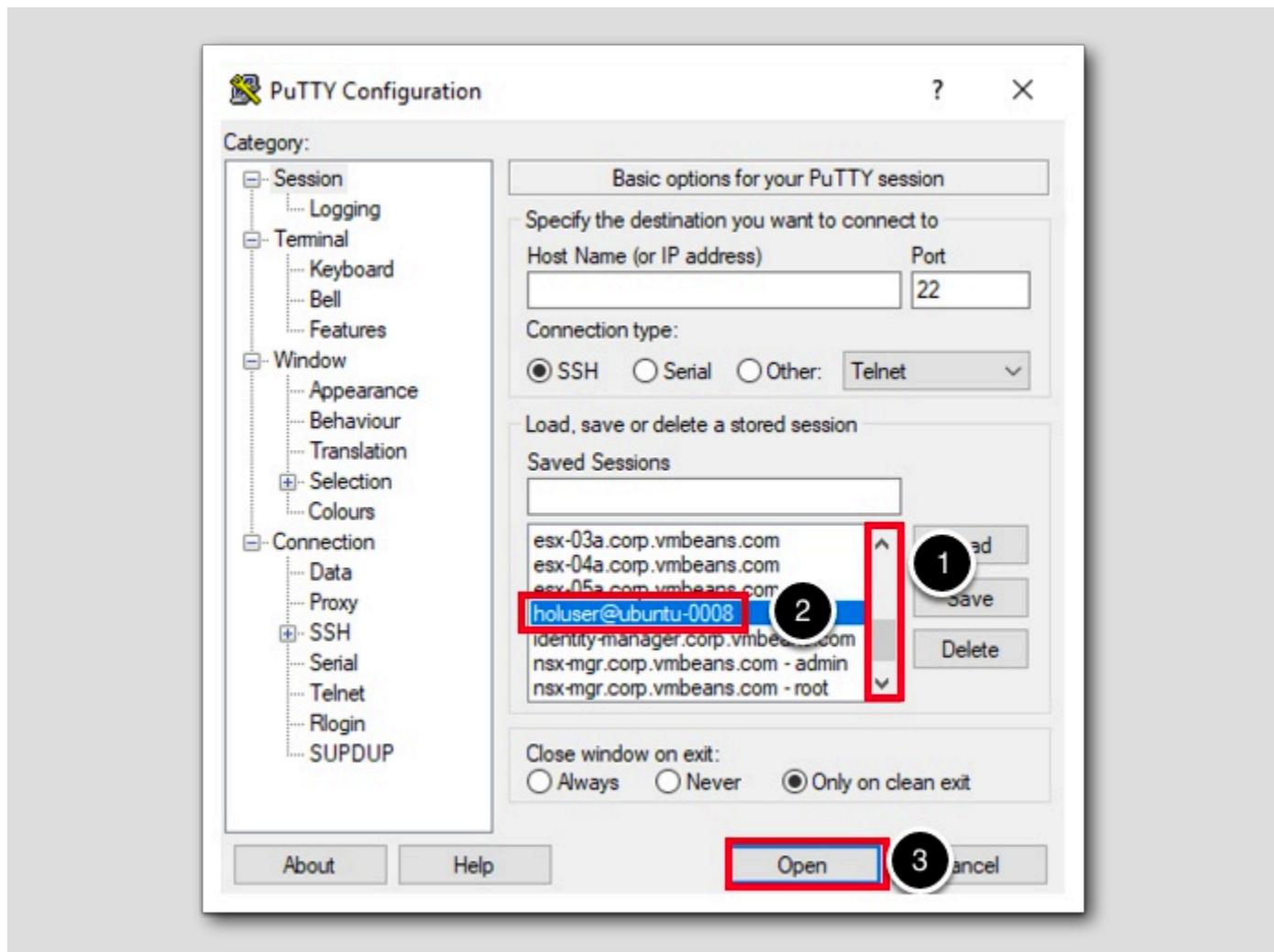
[279]



1. Click on the PuTTY icon in System tray.

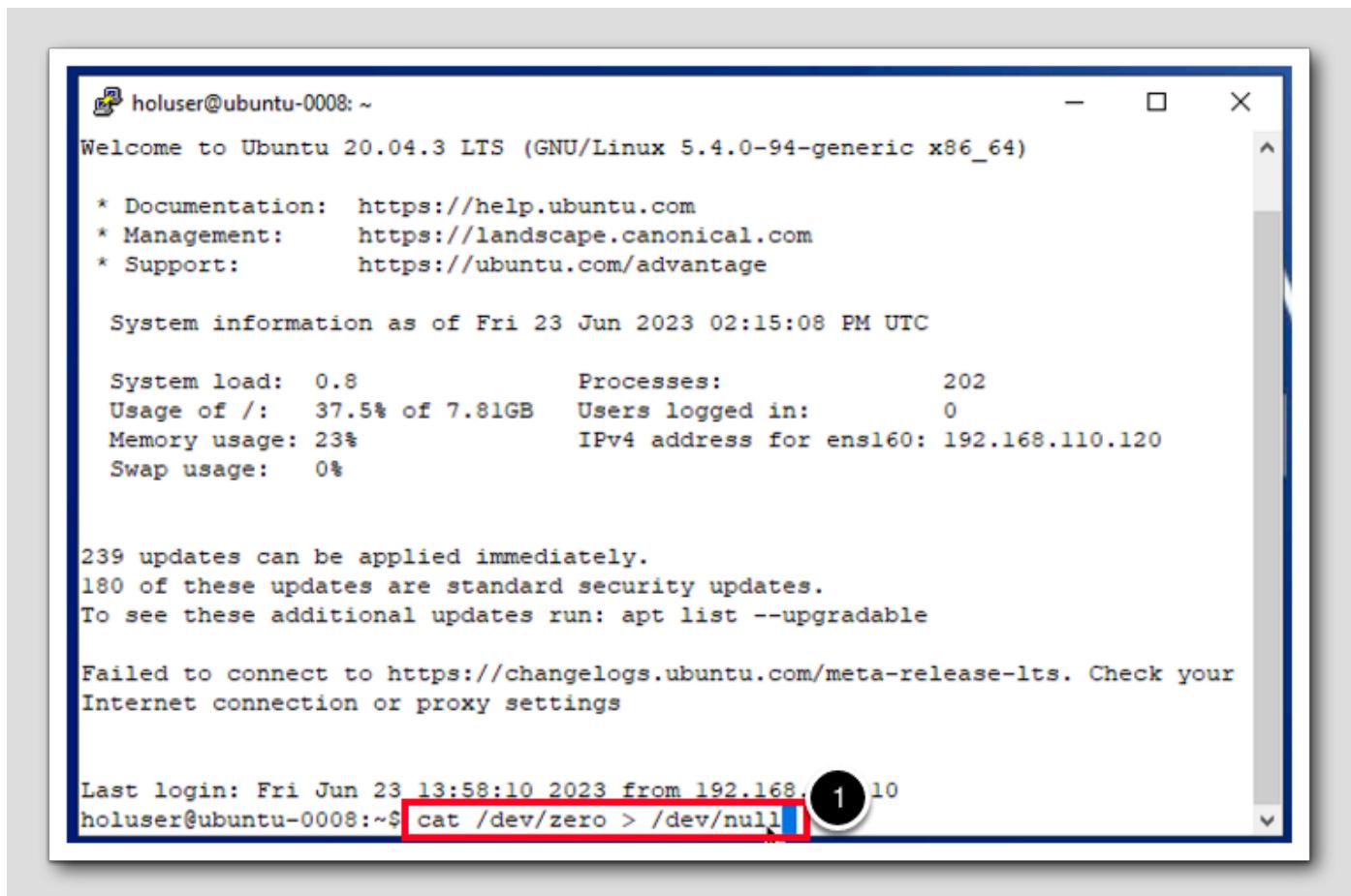
## Start PuTTY Session

[280]



1. Scroll down on the right hand side of Saved Sessions
2. Click on holuser@ubuntu-0008.
3. Click Open to start thePuTTYsession.

## Run CPU Load



The screenshot shows a PuTTY terminal window titled "holuser@ubuntu-0008: ~". The window displays the following text:

```
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-94-generic x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

 System information as of Fri 23 Jun 2023 02:15:08 PM UTC

 System load: 0.8          Processes: 202
 Usage of /: 37.5% of 7.81GB Users logged in: 0
 Memory usage: 23%         IPv4 address for ens160: 192.168.110.120
 Swap usage: 0%

239 updates can be applied immediately.
180 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your
Internet connection or proxy settings

Last login: Fri Jun 23 13:58:10 2023 from 192.168.110.120
holuser@ubuntu-0008:~$ cat /dev/zero > /dev/null
```

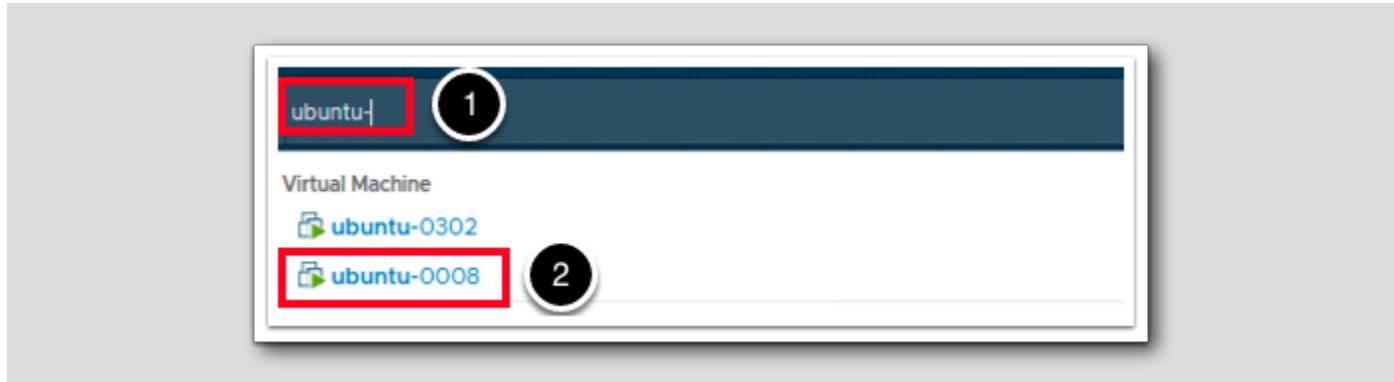
A red box highlights the command "cat /dev/zero > /dev/null". A circular callout with the number "1" is positioned above the command line.

We will now redirect dev/zero to dev/null to generate CPU load so that we can see the impact on the VM in Aria Operations.

1. Type `cat /dev/zero > /dev/null` and press the `Enter` key to start the CPU load.

Leave this putty window open, we'll come back to this later in the lesson.

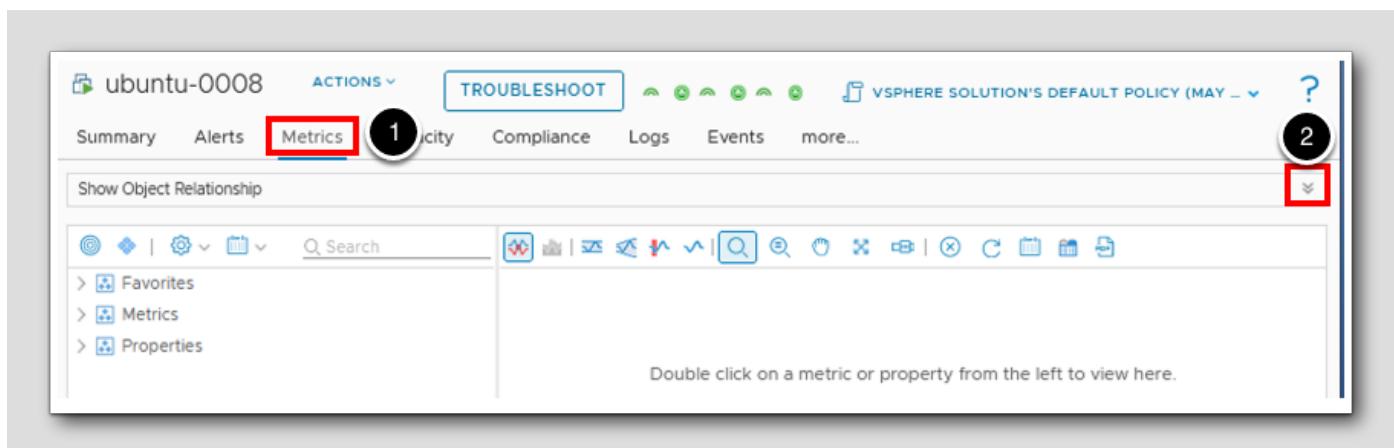
## Return to vRealize Operations and Search for VM



Back in Aria Operations we now need to search for the ubuntu-0008 VM

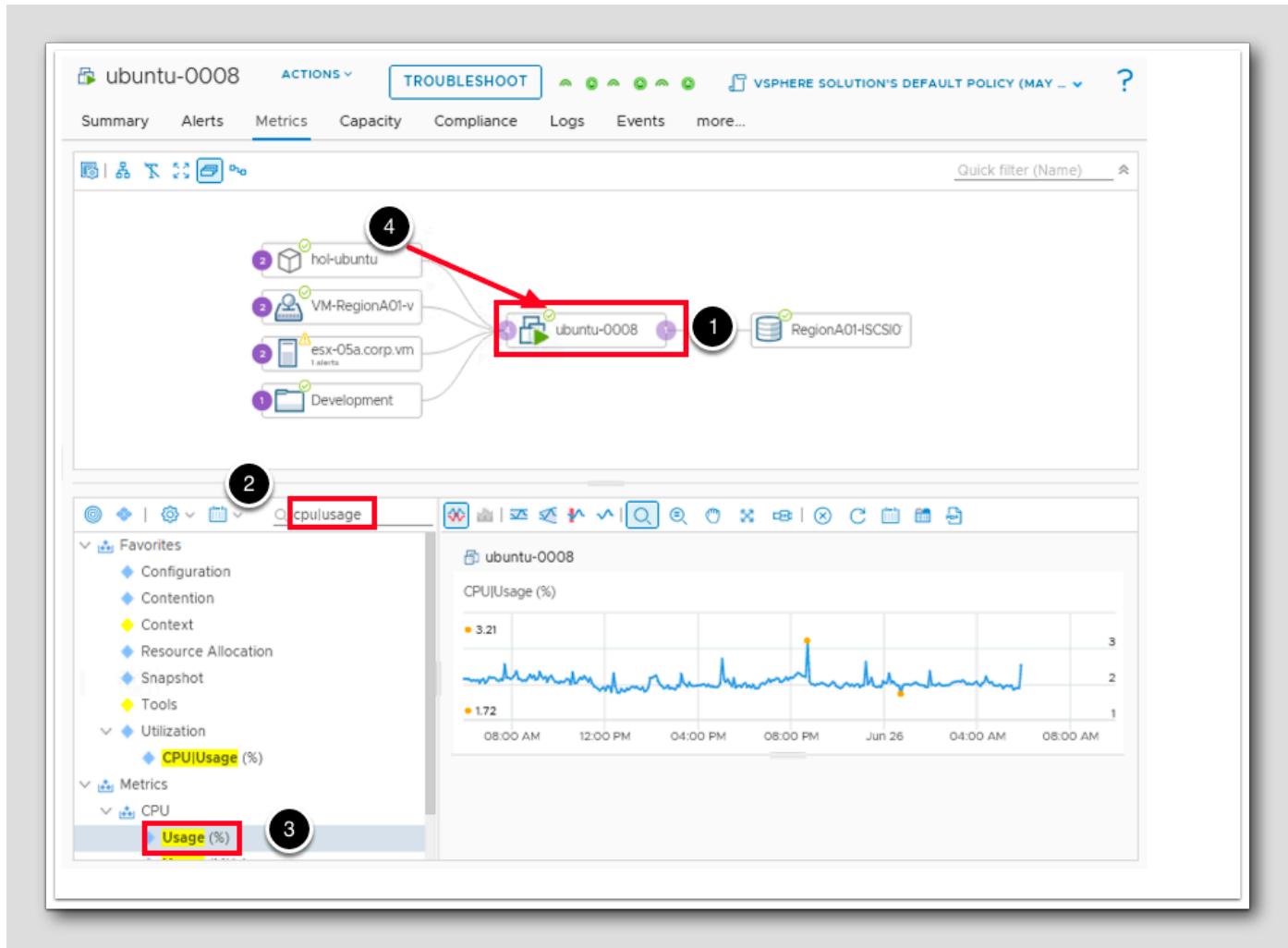
1. In the Search Bar type ubuntu-
2. Click on **ubuntu-0008**.

## Metrics and Object Relationships



1. Click **Metrics** to open the Metrics tab.
2. If the Object relationship window is not already visible, Click the chevrons to show the object relationships for the VM **ubuntu-0008**.

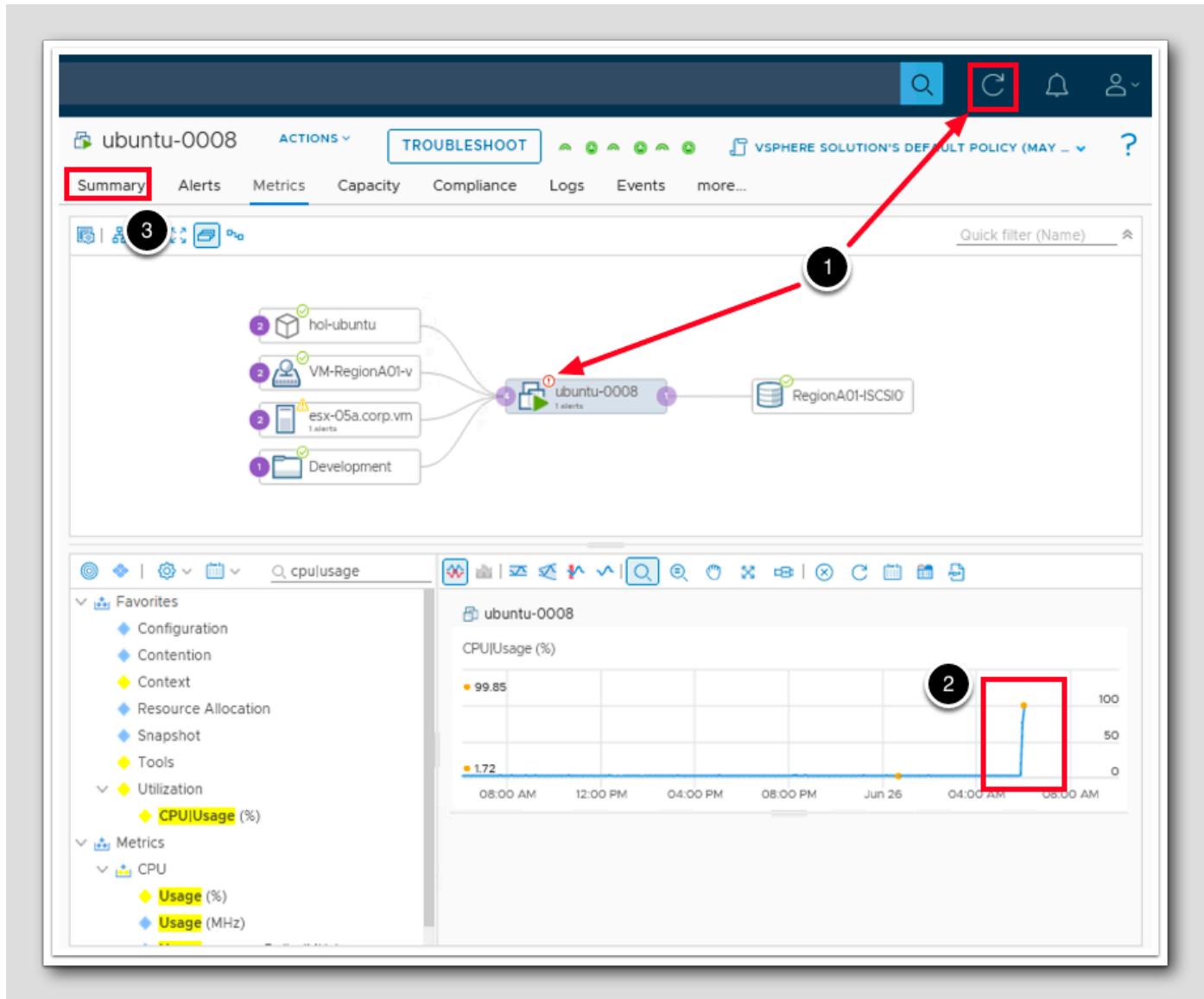
## Using Symptoms and Alerts to Trigger Recommendations and Actions



Set up the CPU graphs by completing the following:

1. Click **ubuntu-0008** so we can explore the Metrics on this object.
2. Type **cpu|usage** in the quick filter and then press the **Enter** key.
3. Double-click **Usage (%)** under Metrics / CPU to create a chart on the lower right hand side of the window.
4. In our example, the color of the VM Health badge will turn red once the alert we configured has been activated due to the high CPU Usage. However, the color can be green, yellow, orange, or red, depending on the status of the object and the severity of the alert.

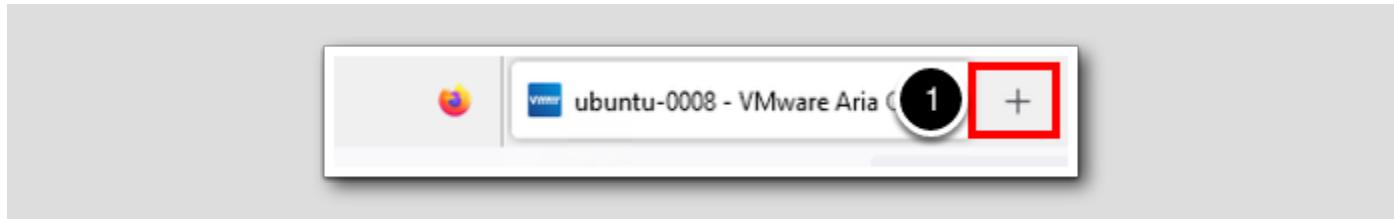
## Refresh Metric Graphs



1. If the VM Health Badge is not yet red, then we may need to click Refresh.
  - The graph will eventually show the increase in CPU usage on the Metric chart. Once CPU usage is above 90%, an alert will be generated. (NOTE: It may take a few minutes for the VM Health Badge to turn red).
2. Notice the increased CPU usage on the graph.

## Checking for the Alert Email

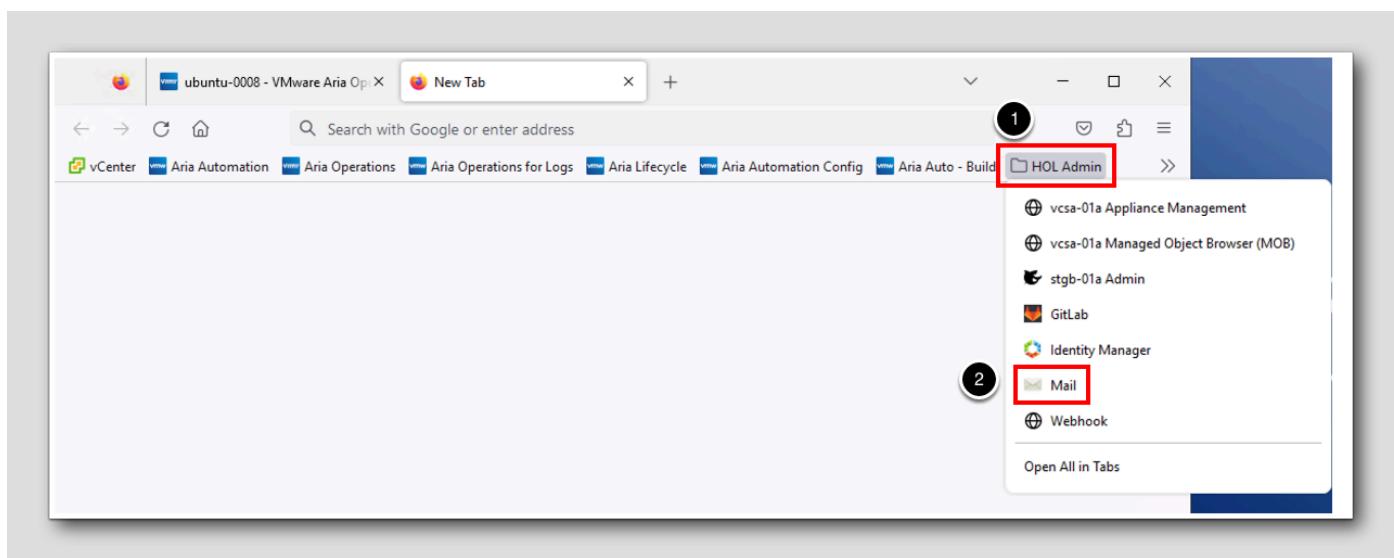
Please ensure the alert has triggered from the step above



Open a new Firefox tab

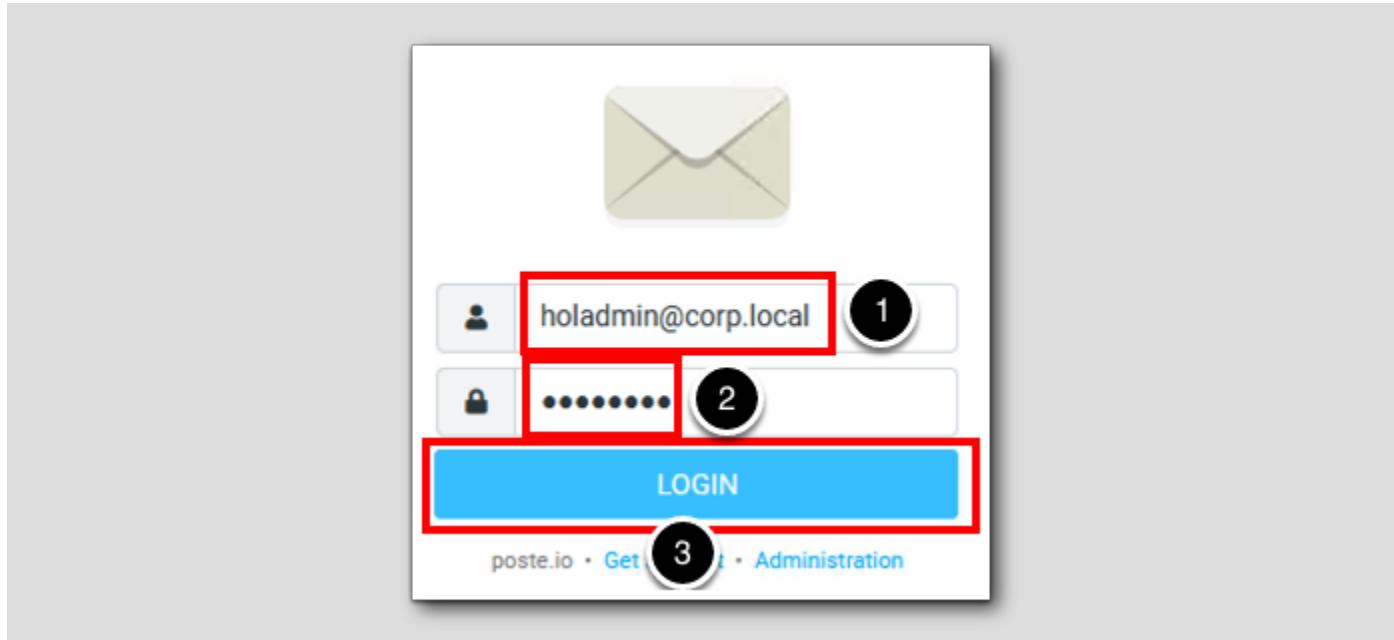
1. Click the + add new tab

## HOL Admin Mail



1. Click on the HOL Admin bookmarks folder
2. Click Mail.

## HOL Admin Login



1. Type holadmin@corp.local for the user name
2. Type VMware1! for the password
3. Click LOGIN.

Click **Don't save** on the Save login for vmbeans.com (Not Shown).

## Verify Email Notification Sent

The screenshot shows an email client interface with the following details:

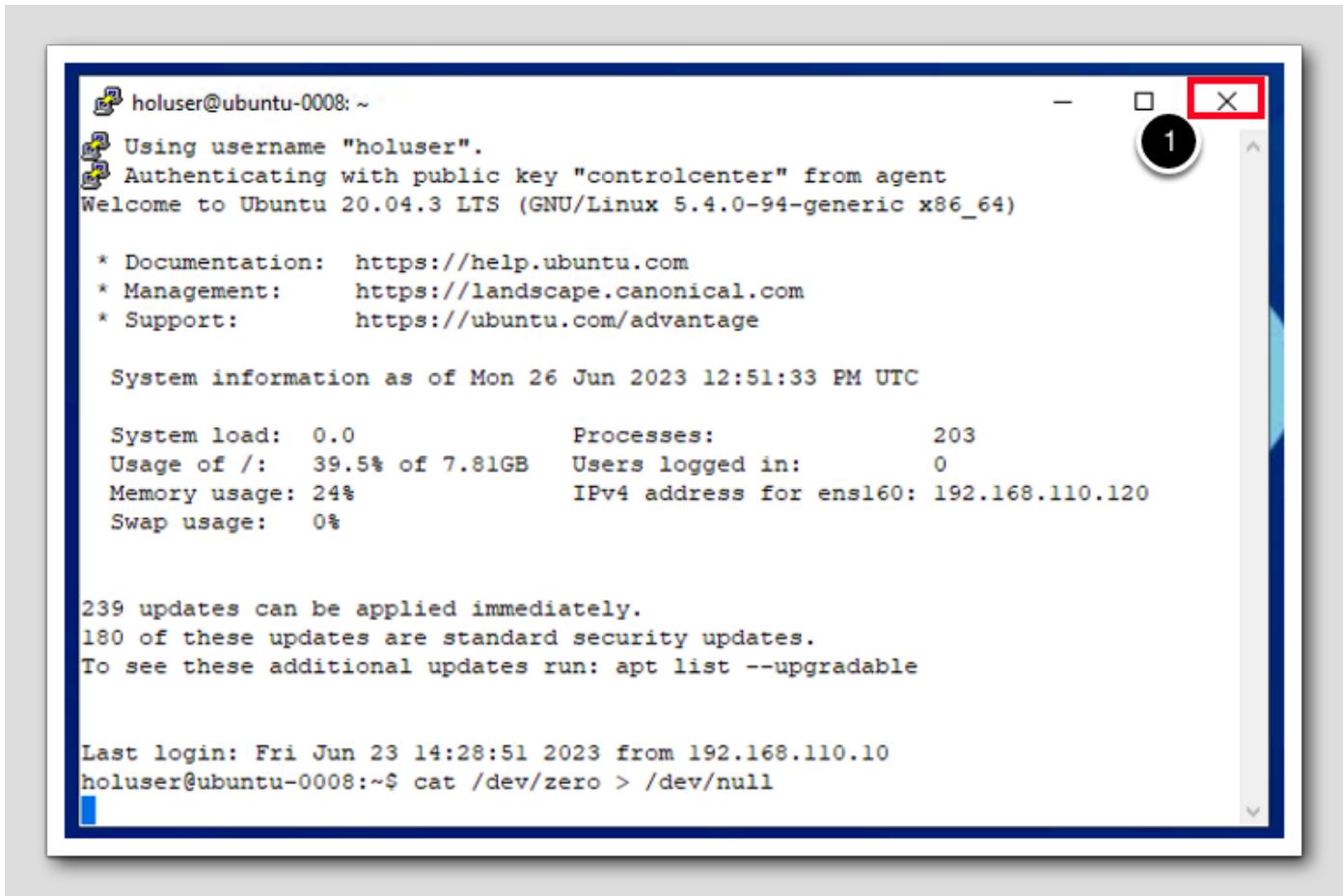
- From:** Administrator
- To:** holadmin@corp.local
- Subject:** [VMware Aria Operations] new alert Type:Application, Sub-Type:Performance, State:critical, Object Type:VirtualMachine, Name:ubuntu-0008
- Date:** 2023-07-07 09:18
- Message Content:**
  - New alert was generated at Fri Jul 07 16:18:45 UTC 2023: Info:ubuntu-0008 VirtualMachine is acting abnormally since Fri Jul 07 16:18:45 UTC 2023 and was last updated at Fri Jul 07 16:18:45 UTC 2023
  - Alert Definition Name: High CPU Alert
  - Alert Definition Description:
  - Object Name : ubuntu-0008
  - Object Type : VirtualMachine
  - Alert Impact: health
  - Alert State : critical
  - Alert Type : Application
  - Alert Sub-Type : Performance
  - Object Health State: 4.0
  - Object Risk State: 1.0
  - Object Efficiency State: 1.0
  - Control State: Open
  - Symptoms:
  - SYMPTOM SET - self
  - Symptoms -

Symptom Name	Object Name	Object ID	Metric	Message Info
High CPU	ubuntu-0008	ca492859-bd5c-4b0d-a772-583516c5ce1b	CPUUsage	98.961 > 90.0

  - Recommendations:
    - For Production Virtual Machines, please assess the trend and add CPU Resources if trend is high.

Notice the format of the email in contrast of the layout in the Payload Template step above.

## Stop CPU Load



The screenshot shows a PuTTY terminal window with a red box highlighting the close button (X) in the top right corner. The terminal displays the following output:

```
holuser@ubuntu-0008: ~
Using username "holuser".
Authenticating with public key "controlcenter" from agent
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-94-generic x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

 System information as of Mon 26 Jun 2023 12:51:33 PM UTC

 System load: 0.0          Processes: 203
 Usage of /: 39.5% of 7.81GB  Users logged in: 0
 Memory usage: 24%          IPv4 address for ens160: 192.168.110.120
 Swap usage: 0%

239 updates can be applied immediately.
180 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Last login: Fri Jun 23 14:28:51 2023 from 192.168.110.10
holuser@ubuntu-0008:~$ cat /dev/zero > /dev/null
```

Return to your open PuTTY window. Closing this PuTTY session will end the CPU load command, and the alert will clear.

1. Click the X in the upper-right corner to close the PuTTY session.
2. Click OK in the PuTTY Exit Confirmation Pop-up Window (*Not Shown*).

## Lesson End

This concludes the Notifications Lesson.

Thank You.

## Conclusion

Self-driving operations by Aria Operations automates and simplifies IT operations management and provides unified visibility from applications to infrastructure across physical, virtual and cloud environments. We hope in this module you learned how to create custom Alerts and Notifications to fine tune Aria Operations to what is important to your infrastructure.

### You've finished Module 6

Congratulations on completing the lab module.

If you are looking for additional general information on Aria Operations 8.4, try one of these:

- **VMware Product Public Page -Aria Operations:** <https://www.vmware.com/products/aria-operations.html>
- **Aria Operations 8.12 - Release Notes:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/rn/vmware-aria-operations-812-release-notes/index.html>
- **Aria Operations - Documentation:** <https://docs.vmware.com/en/VMware-Aria-Operations/index.html>
- **VMware Cloud Management Blog - What's New in Aria Operations 8.12 and Cloud:** <https://blogs.vmware.com/management/2023/04/whats-new-in-vmware-aria-operations-8-12.html>

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the TABLE OF CONTENTS to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 7 - Creating Views for Better Visibility (15 minutes) Basic

### Introduction

[295]

Reports and Dashboards are the key to understanding and visualizing the environment that is being monitored. The key component of a Report or a Dashboard is a View. A View helps you interpret data (such as metrics, properties, policies and symptoms) from a number of perspectives. Those perspectives can be transformed to highlight how the data has historically changed (trend) or how the data may look in the future (forecast) built on the historical trend. In this module we will walk through the creation of custom views in Aria Operations. Successfully creating custom views will ensure we can use Aria Operations to track what is important/critical to the monitoring of our VMware Cloud Infrastructure.

The following lessons are within this Module:

- Create Customized View
- Simple View showing VM list with Metrics and Properties
- Create a View with Variable data
- Create a View with Trends
- Create a View with Distribution data
- Create Reports from Views and Dashboards

### Log in to Aria Operations

[296]

To begin this exercise, we will log in to Aria Operations. If you are not currently logged into any instance of Aria Operations, continue to the next page, but if you are already logged into Aria Operations, click [here](#) to skip ahead.

### Open the Firefox Browser from Windows Quick Launch Task Bar

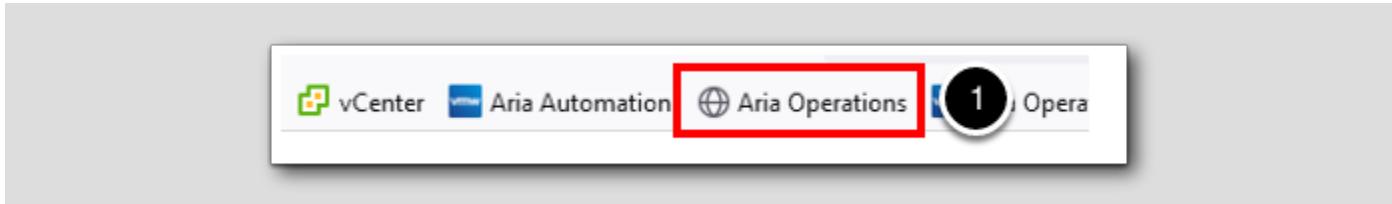
[297]



If your browser isn't already open, launch Firefox

1. Click the Firefox icon on the Windows Quick Launch Task Bar

## Launch Aria Operations



The browser Bookmarks Bar has links to the different applications that are running in the lab.

1. Click the Aria Operations Bookmark

## Log in to Aria Operations

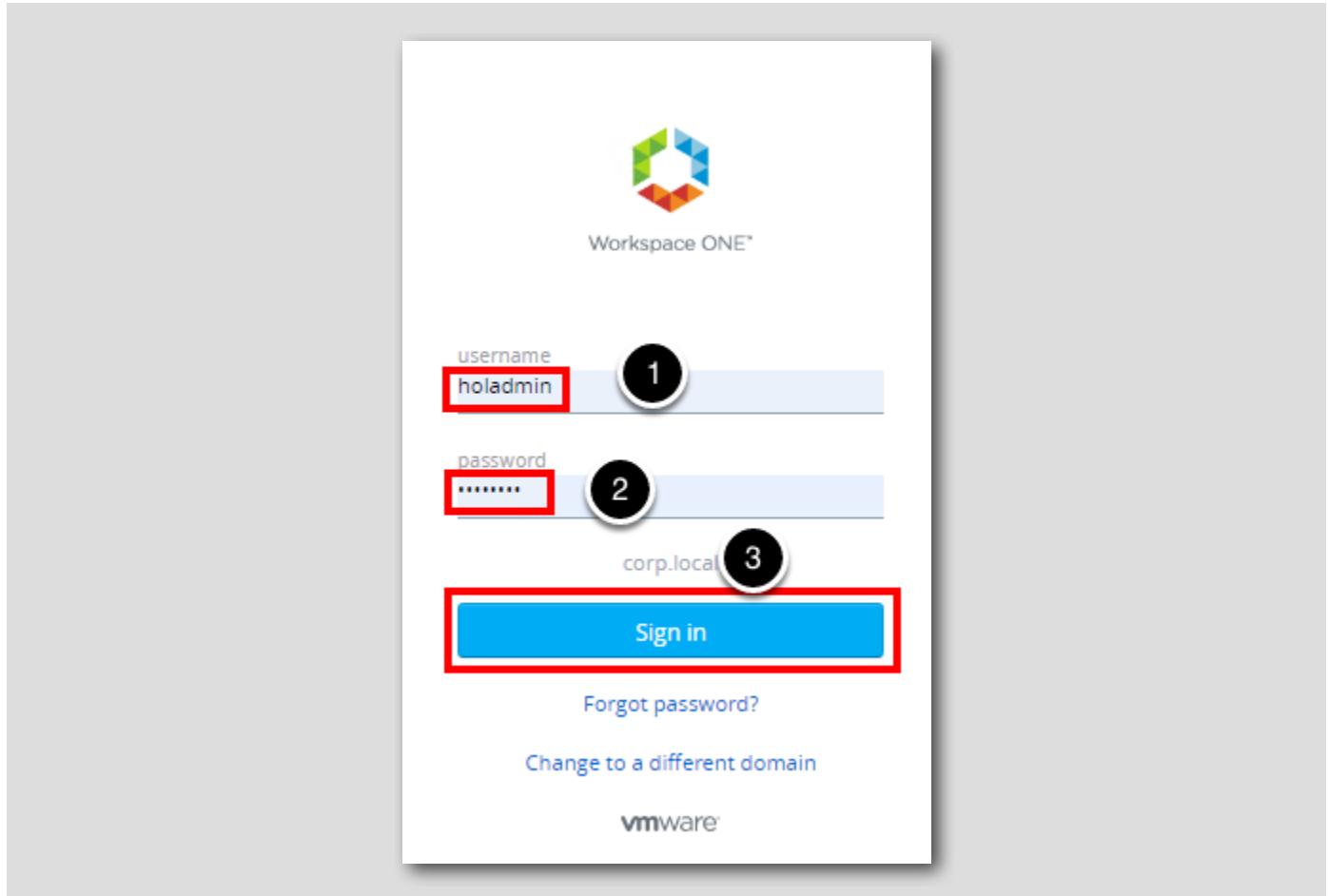


Aria Operations is integrated with VMware Identity Manager which we will use for user authentication in this lab.

vIDMAAuthSource (VMware Identity Manager) should be pre-selected as the identity source. However, if it is not selected you will choose it.

1. Click the drop-down arrow if vIDMAAuthSource is not selected.
2. Click REDIRECT to be taken to the authentication page.

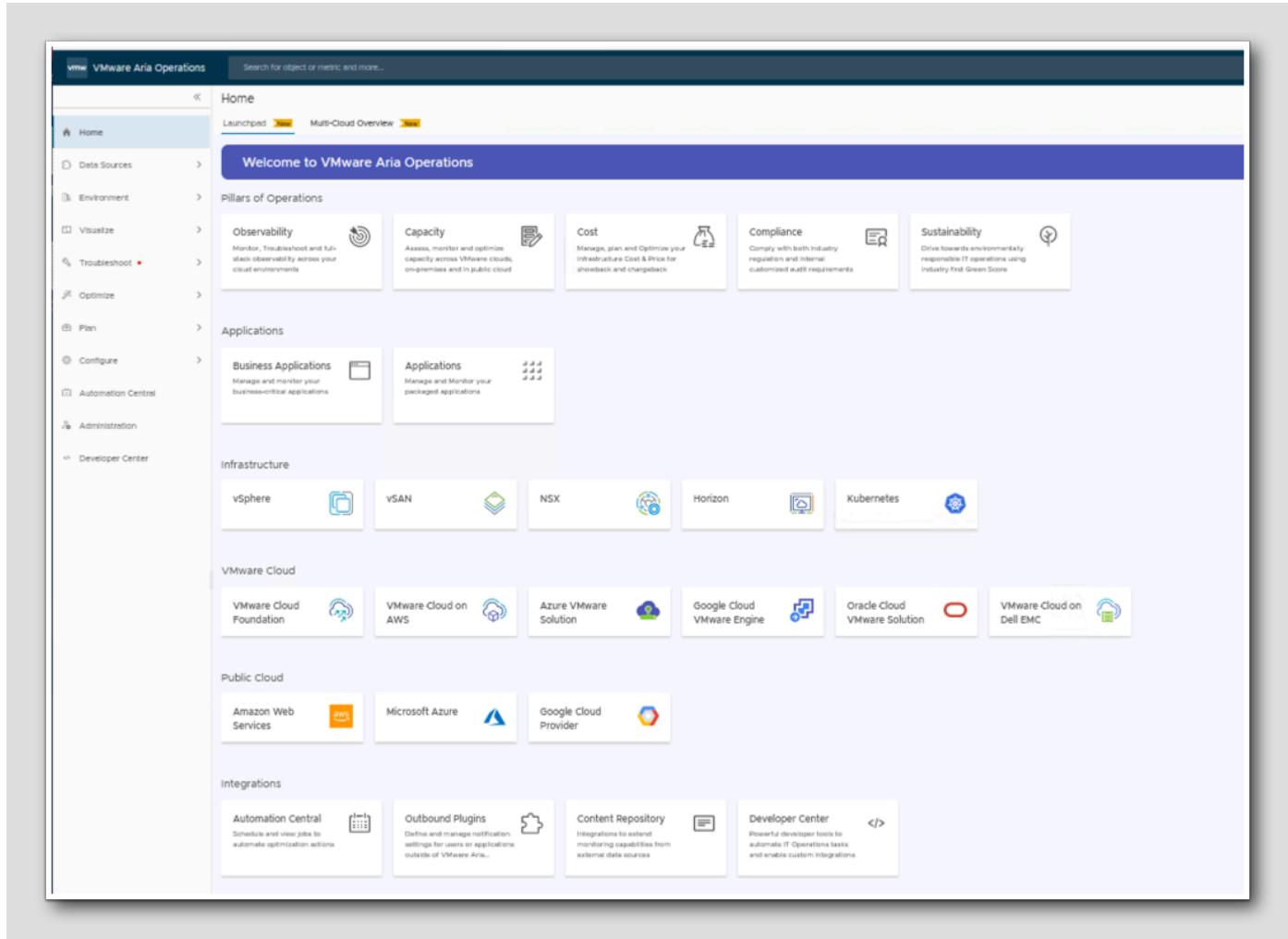
## VMware Identity Manager Login



At the Workspace ONE login screen, use these credentials:

1. username: **holadmin**
2. password: **VMware1!**
3. Click **Sign in**

## Aria Operations Home Screen



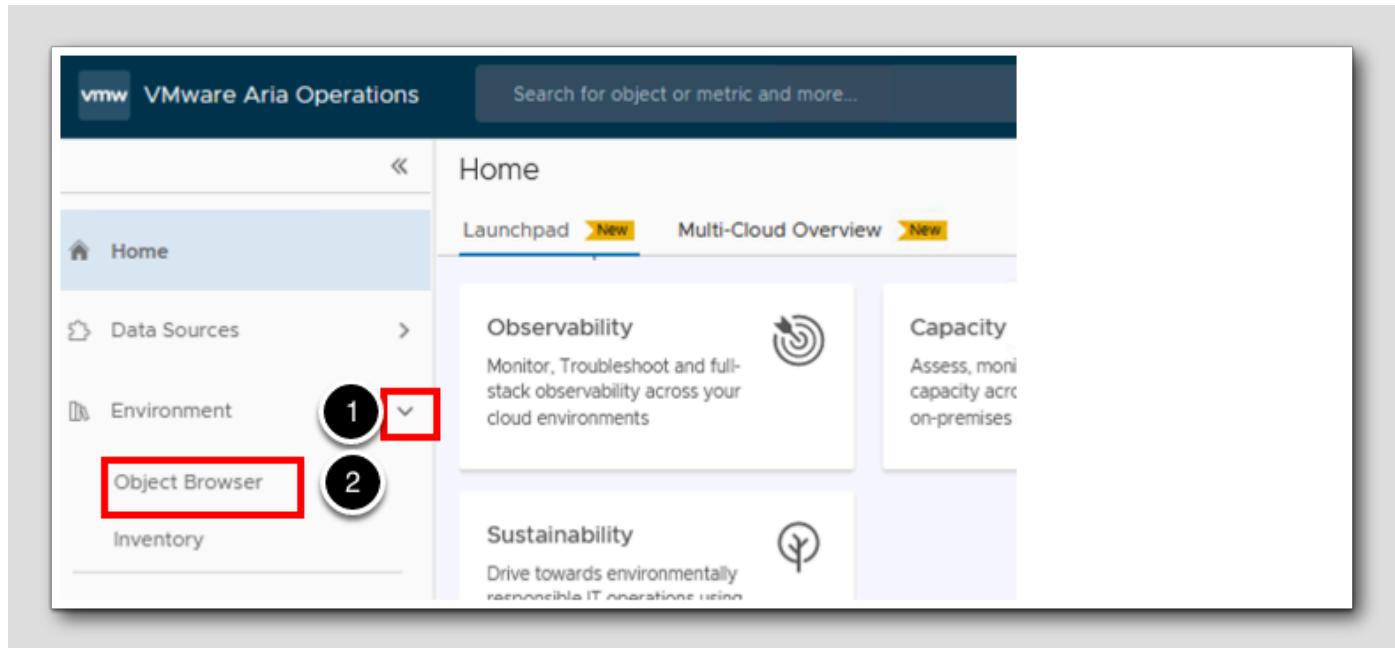
You should be at the Aria Operations Home screen and ready to start the module.

## Create Simple View showing VM list with Metrics and Properties

In this lesson, we will create a view. A view can be used in dashboards and reports. A view is also viewable as its own content in the Details section of the Aria Operations interface.

The view for this lesson is a starting point and intended to be a simple example to create. It will contain some basic metrics and properties for virtual machines.

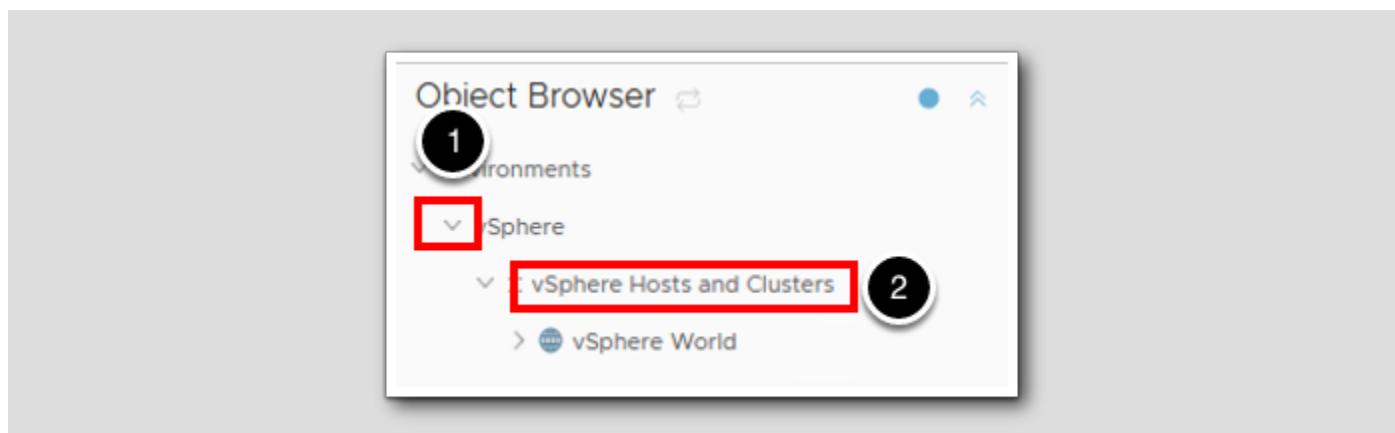
## Go to Environment



1. Click on the > next to Environment to show the drop-down options.

2. Click Object Browser

## Hosts and Clusters



1. Click on the > next to vSphere to show the drop-down options.
2. Click on vSphere Hosts and Clusters

## Expand vSphere World

[305]

The screenshot shows the vSphere Web Client interface. On the left, the Object Browser displays a tree structure under Environments > vSphere > vSphere Hosts and Clusters. A red box labeled '1' highlights the 'vSphere World' item under 'vSphere Hosts and Clusters'. Another red box labeled '2' highlights the 'vcsa-01a.corp.vmbeans.com' host entry. On the right, a summary card for 'vcsa-01a.corp.vmbeans.com' is displayed, showing statistics: Cluster: 2, ESXi Host: 5, Virtual Machine: 11, and Datastore: 7. At the top right, a navigation bar includes tabs for Summary, Alerts, Metrics, Capacity, Compliance, Logs, Events, and a button labeled 'more...' which is also highlighted with a red box and labeled '3'.

1. Expand vSphere World.
2. Select vcsa-01a.corp.vmbeans.com.
3. Click on more...

## Create a View

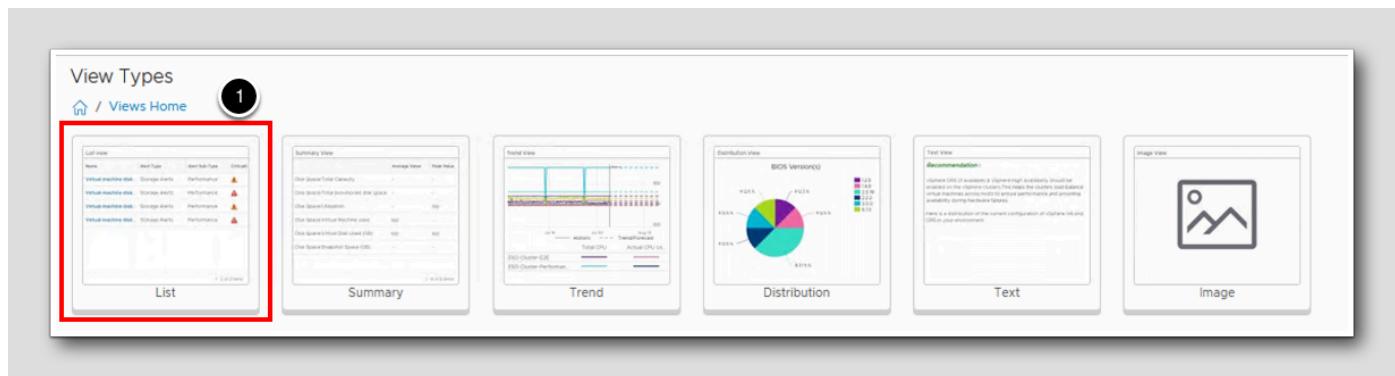
[306]

The screenshot shows the 'Details' tab selected in the vSphere Web Client. A red box labeled '1' highlights the 'Details' tab. Below it, a toolbar has an 'ADD' button highlighted with a red box and labeled '2'. The main area displays a table with a single row: 'Admission Control Enabled?' (checkbox checked), 'Distribution' (Type), and 'vSphere Clu' (Description). The table has columns for Name, Type, and Description.

1. Click on **Details**.

2. Click **ADD** to create a new view.

## View Types



There are six different types of Views you can create. List, Summary, Trend, Distribution, Text and Image. In this exercise we will be creating a List View.

1. Click **List**.

**View Name**

[308]

**Create View**

1 - Name & Configuration      2 - Data      3 - Ti

**Name**  1

**Description**

2 **Settings**

**Items per page**  ▼

**Top result count**  ▼

**Show Objects**  ▼

**Show Object Creation Date**

**Make the view available for**

Dashboards through the View widget

Report template creation and modification

Details tab in the environment

**Hide the view for the selected Object Types**  X ▼

3

**PREVIOUS** **NEXT** **CREATE** **CANCEL**

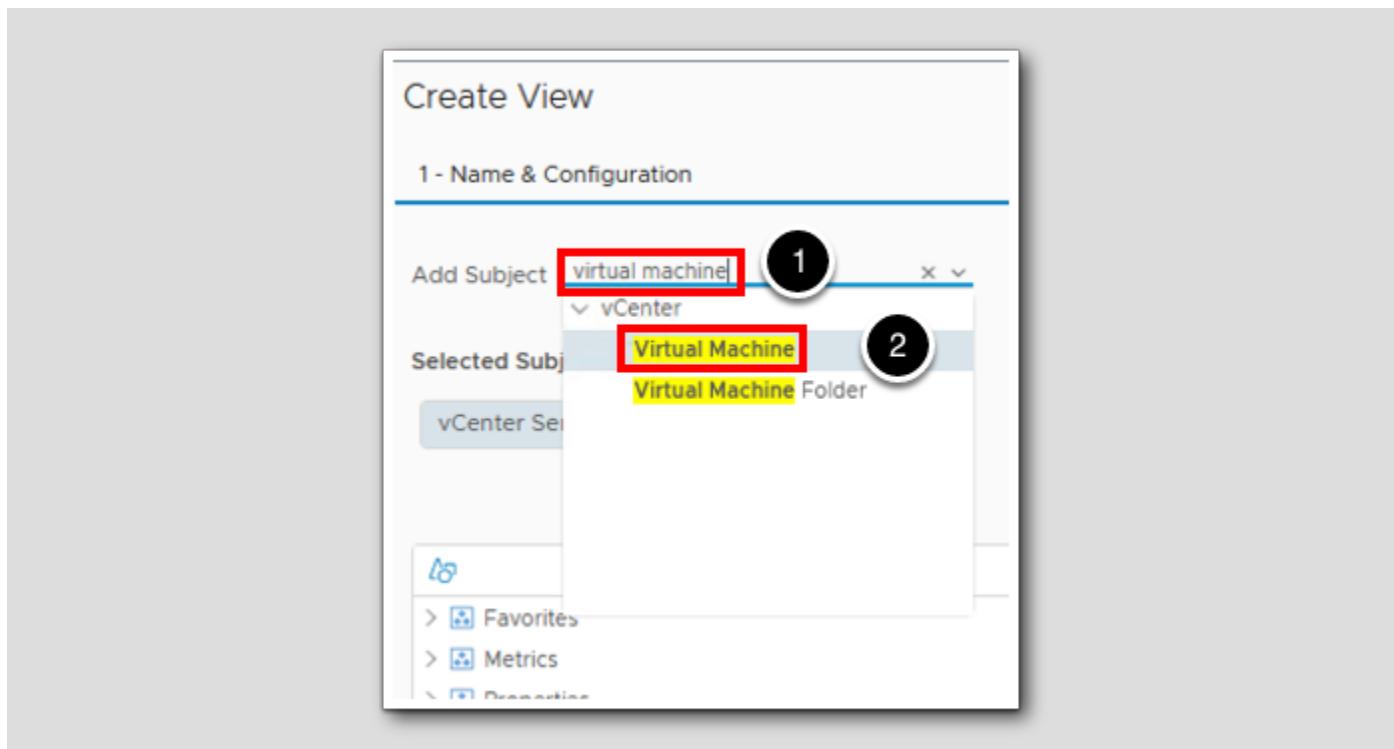
The view creation wizard starts. Create a view with the following:

#### Name and Description

1. Enter the name Demo - Simple List of VMs with Metrics and Properties.
2. Click on the > next to **Settings** to show the additional settings possible. Leave default values for now.
3. Click **Next**.

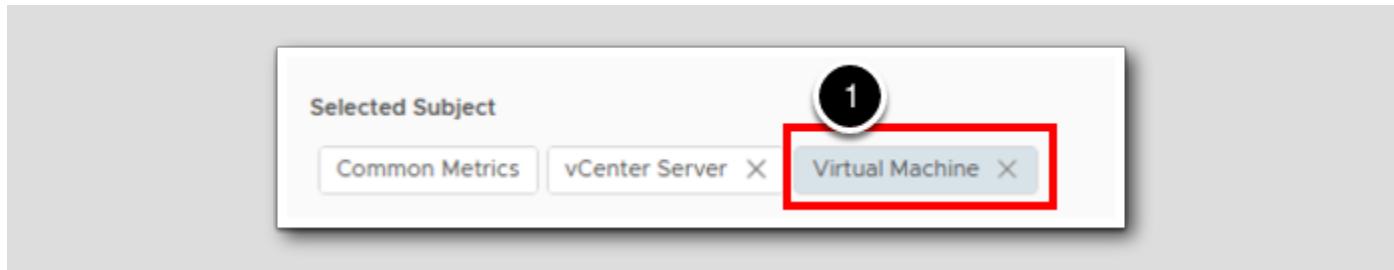
#### Subjects

[309]



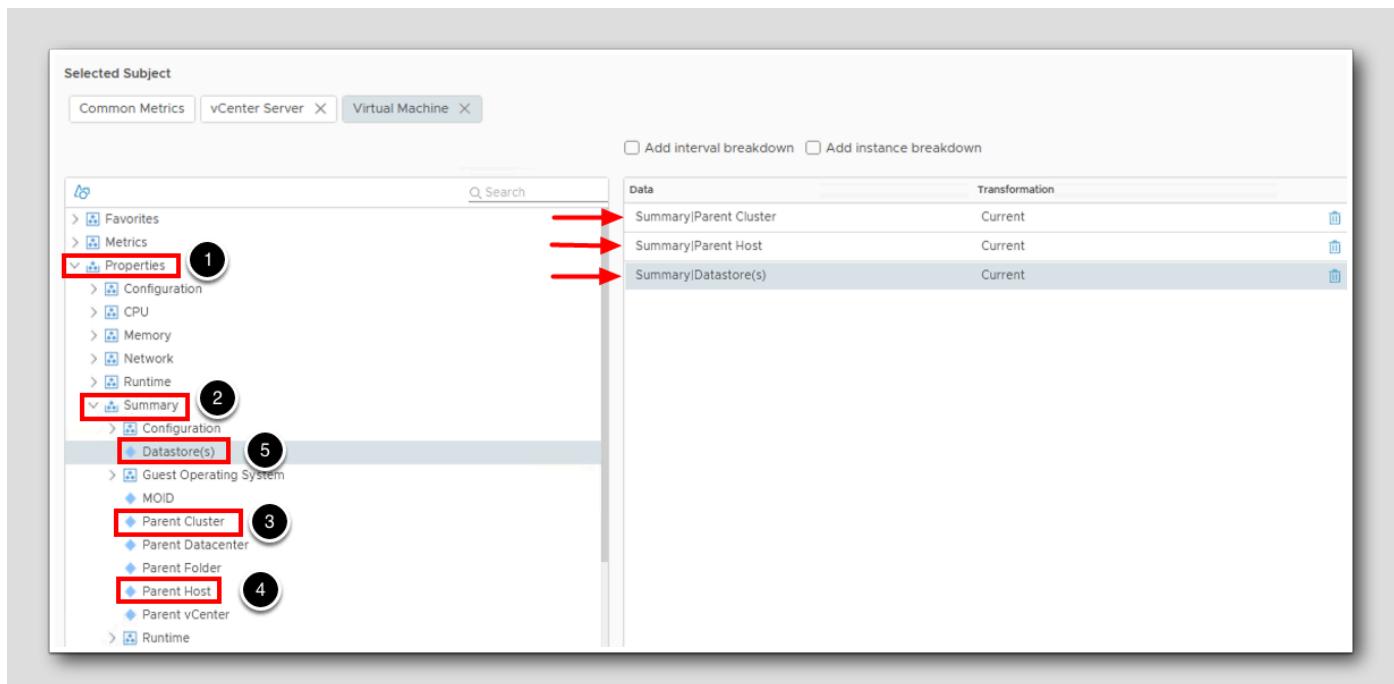
1. In the Add Subject line, enter virtual machine (Begin typing and the list will populate with matched options).
2. Click on Virtual Machine.

## Select Virtual Machine



1. Under Selected Subject, click Virtual Machine.

## Selected Properties



1. Expand Properties.
2. Expand Summary (Note: you may need to scroll down to see Summary).
3. Double-click on Parent Cluster (drag and drop the data to the center will work also).
4. Double-click on Parent Host.
5. Double-click on Datastore(s).

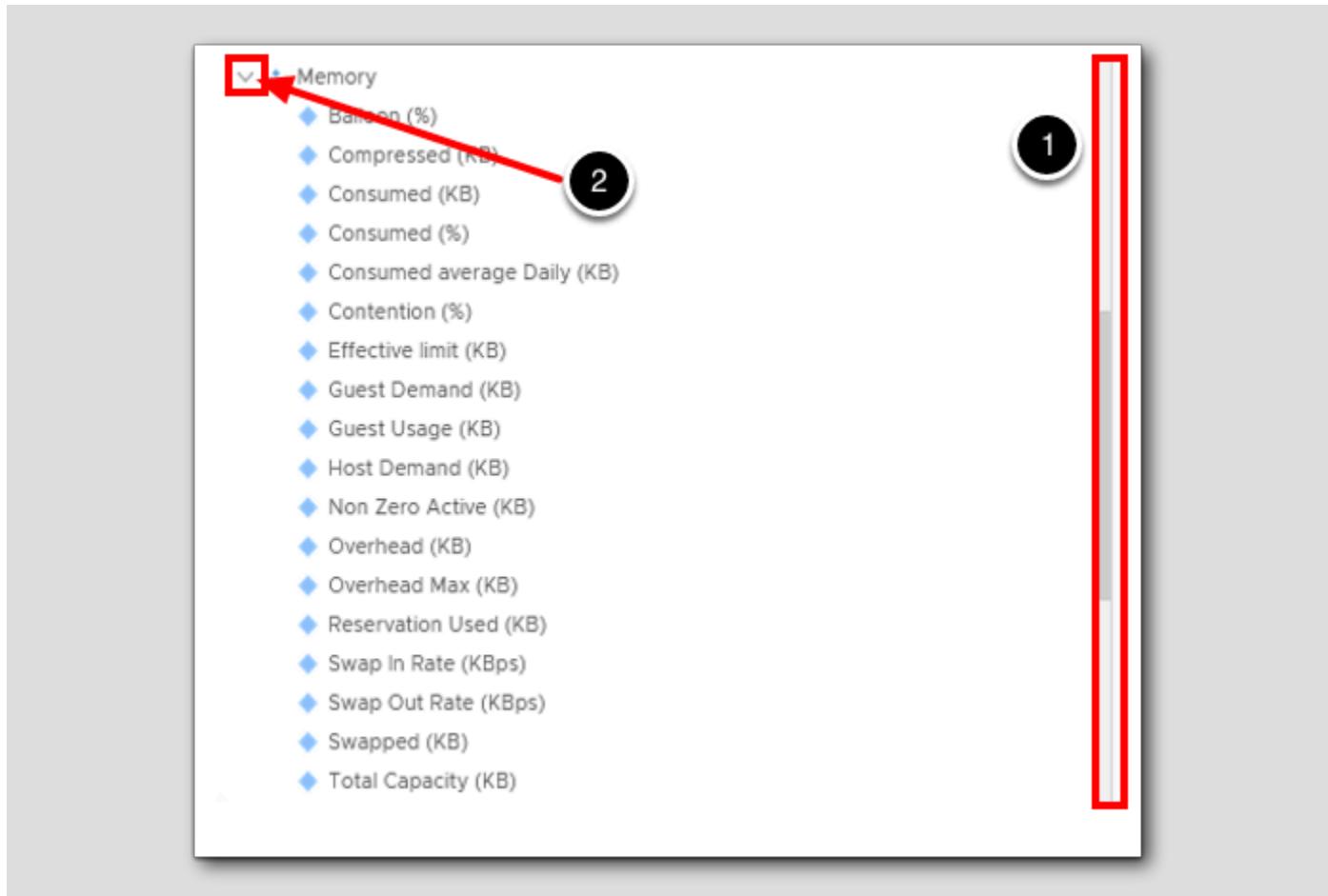
## Data - Metrics

Data	Transformation
Summary Parent Cluster	Current
Summary Parent Host	Current
Summary Datastore(s)	Current
Configuration Hardware Number of CPUs (vCPUs)	Current

We've been working with Virtual Machine Properties, now we need to select Virtual Machine metrics.

1. Expand **Metrics**.
2. Expand **Configuration**.
3. Expand **Hardware**.
4. Double-click on **Number of CPUs (vCPUs)** (drag and drop the data to the center will work also).

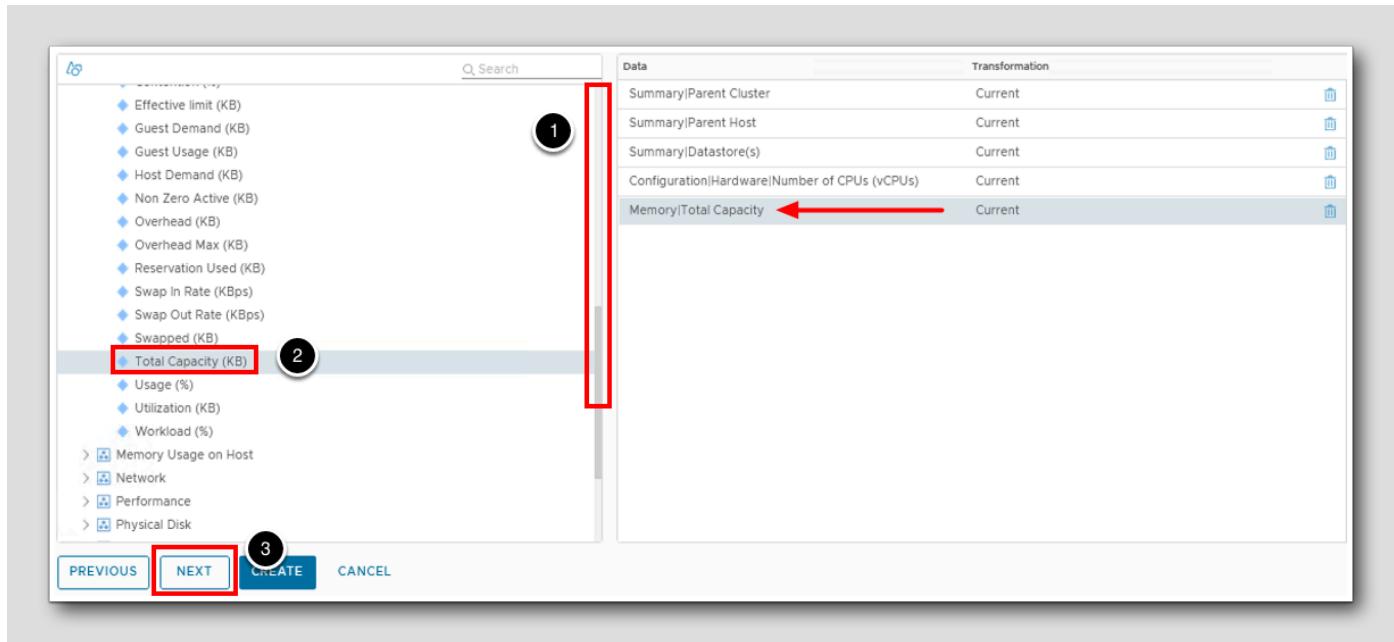
## Memory Metrics



Scroll down and Expand Memory

1. Scroll down until you see the **Memory** category item.
2. Expand the **Memory** category by clicking the chevron.

## Total Capacity



1. Scroll down to until you see the **Total Capacity (KB)** item.
2. Double-click on **Total Capacity (KB)** to add it to the view.
3. Click **Next**.

## Time Settings

[315]

## Create View

1 - Name & Configuration      2 - Data

---

Time Range Mode:  Basic  Advanced

Currently selected date range: From Jun 5, 2023 2:32:39 PM to 2:32:39 PM

Relative Date Range  
Last  Days

Specific Date Range  
Start on:  to

Absolute Date Range  
Prior

---

1

PREVIOUS NEXT CREATE CANCEL

Time Settings is where you specify the desired Date Range for your custom View. You can choose Relative, Specific or Absolute Date Ranges. For this exercise we will leave the default **Relative Date Range of Last 7 Days**.

1. Click **NEXT**.

## Filter

Create View

1 - Name & Configuration      2 - Data

vCenter Server filter 

Select the Object Type that matches all of the following criteria: vCenter Server  

Metrics  Pick a metric Current  --Select--  Metric value

 ADD ANOTHER CRITERIA SET

Virtual Machine filter 

Select the Object Type that matches all of the following criteria: Virtual Machine  

Metrics  Pick a metric Current  --Select--  Metric value

 ADD ANOTHER CRITERIA SET

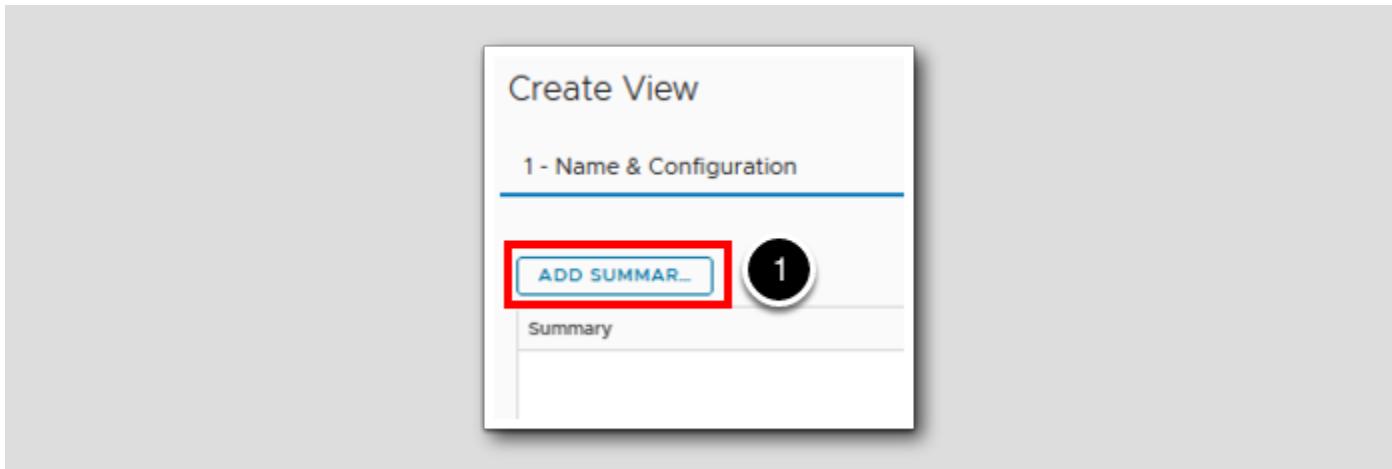
1

PREVIOUS  CREATE CANCEL

Notice there is a filter for the Subjects we added, vCenter Server and Virtual Machine. It is possible to filter your View results based on Metrics or Properties within each Subject. A popular example of this would be to filter out any Powered Off Virtual Machines. We will not add any filters for this exercise.

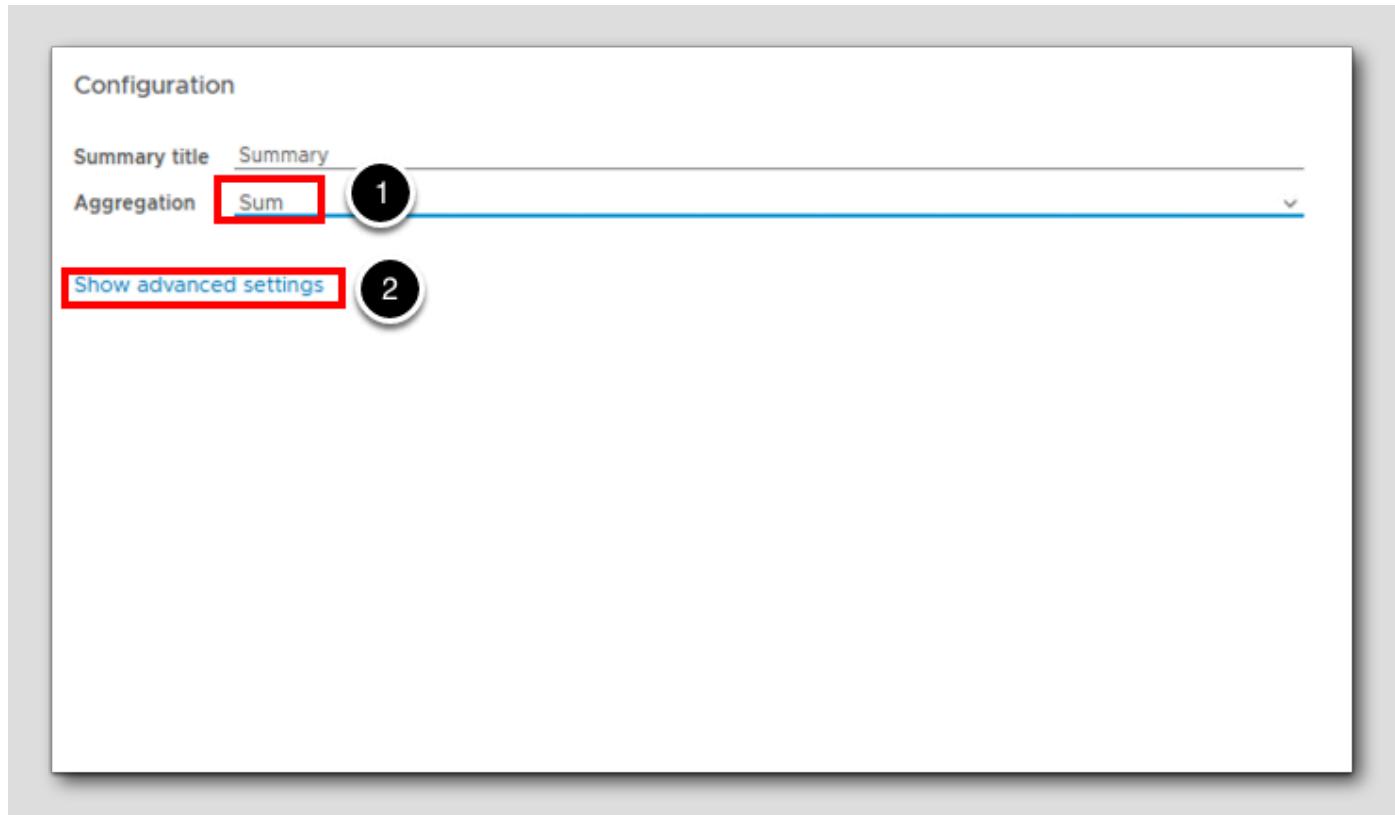
1. Click Next.

## Summary

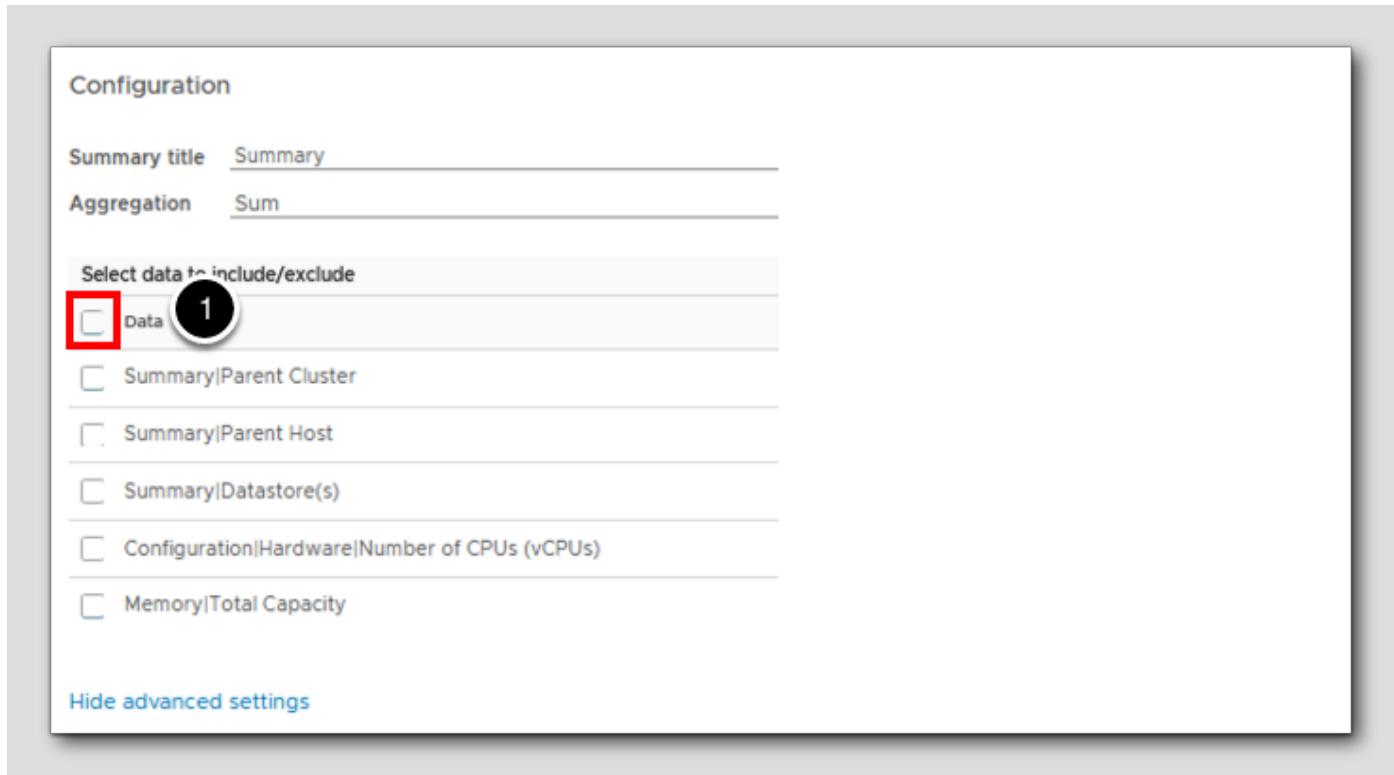


1. Click Add Summary.

## Aggregation



1. Change **aggregation** to **Sum** by using the drop-down menu.
2. Click **show advanced settings**.

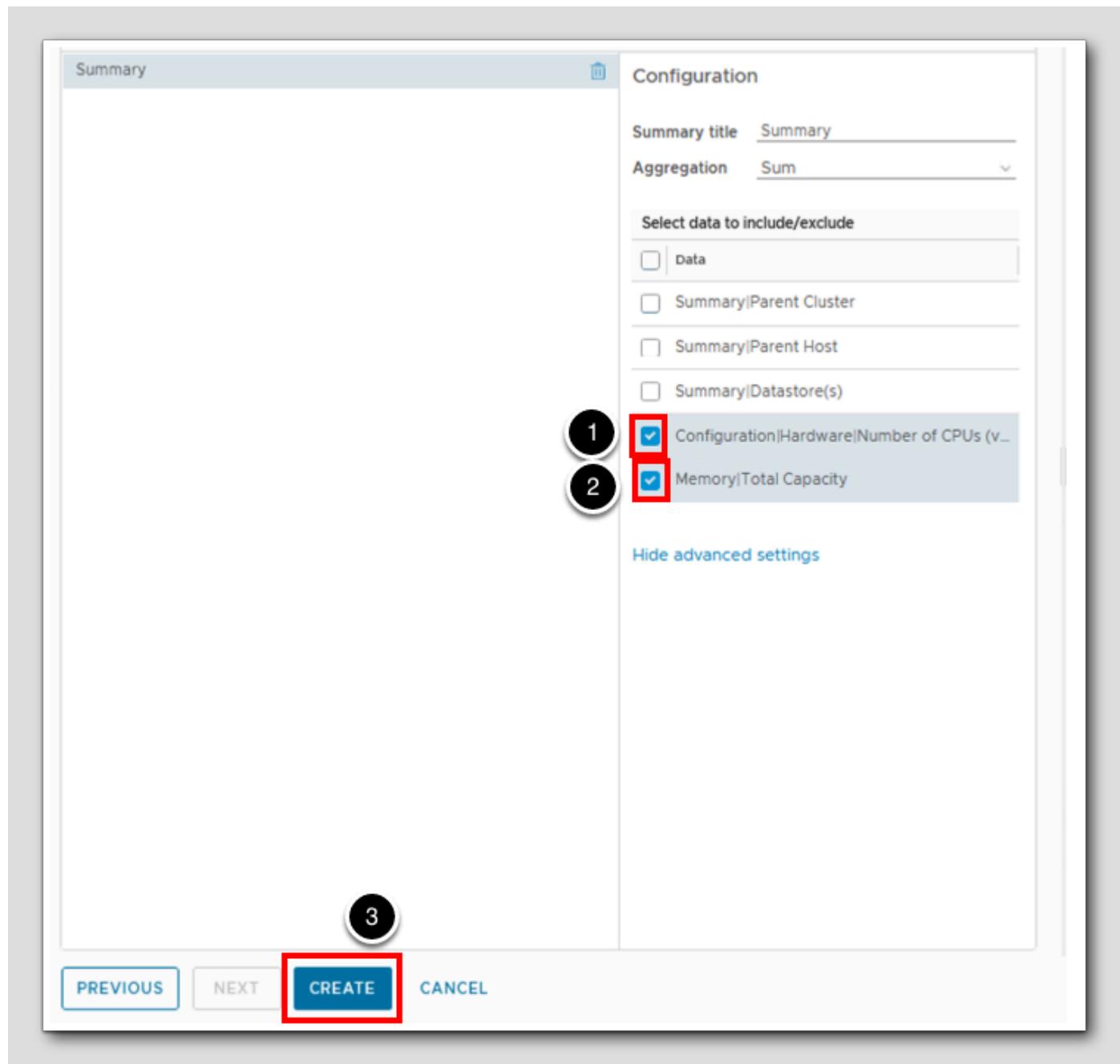
**Clear All**

1. Deselect all by clearing the check box next to Data.

Clicking the box will toggle 'Select all' and 'De-select All'.

Make sure your screen matches the image. Nothing should be selected at this point.

## Selected Sum



1. Select Configuration|Hardware|Number of CPU(s) (vCPUs).
2. Select Memory|Total Capacity.
3. Click CREATE.

## Viewing the data

The screenshot shows the vSphere Web Client interface with two main sections:

- Datastore Utilization Summary:** A table view with columns: Name, Type, Description, Subject, Last Modified, and Modified By. One item is selected: "Demo - Simple List of VMs with Metrics and Properties".

Name	Type	Description	Subject	Last Modified	Modified By
DATASTORE UTILIZATION SUMMARY	LIST	LIST OF ALL THE DATASTORES WITH AVAILABILITY	DATASTORE	6/16/23 10:35 AM	ADMIN
DATASTORE: CAPACITY	LIST	LISTS THE SUMMARY OF DIFFERENT STORES	DATASTORE	6/16/23 10:35 AM	ADMIN
DATASTORES WITH WASTED DISK SPACES	LIST	FOLLOWING DATASTORES HAVE WASTED DISK SPACES	DATASTORE	6/16/23 10:35 AM	ADMIN
DC COST LIST	LIST	DARWIN	DATACENTER	6/16/23 10:35 AM	ADMIN
Demo - Simple List of VMs with Metrics and Properties	LIST		vCenter Server	1:03 PM	holadmin
				251 - 300 of 606 items	

  
- Demo - Simple List of VMs with Metrics and Properties:** A table view with columns: Name, Summary|Parent Cluster, Summary|Parent Host, Summary|Datastore(s), Configuration|Hardware|..., and Memory|Total Capacity.

Name	Summary Parent Cluster	Summary Parent Host	Summary Datastore(s)	Configuration Hardware ...	Memory Total Capacity
aria-auto	Management	esx-01a.corp.vmbe...	esx-01a_LOCAL	12 vCPUs	48 GB
aria-auto-config	Management	esx-02a.corp.vmbe...	esx-02a_LOCAL	4 vCPUs	8 GB
aria-ops	Management	esx-02a.corp.vmbe...	esx-02a_LOCAL	4 vCPUs	16 GB
aria-ops-cp	Management	esx-02a.corp.vmbe...	esx-02a_LOCAL	2 vCPUs	8 GB
aria-ops-logs	Management	esx-02a.corp.vmbe...	esx-02a_LOCAL	4 vCPUs	8 GB
identity-manager	Management	esx-02a.corp.vmbe...	local2_esx-02a	6 vCPUs	10 GB
linux-dev-0010	Workload1	esx-03a.corp.vmbe...	RegionA01-ISCSI01-C...	1 vCPUs	1 GB
linux-dev-0011	Workload1	esx-04a.corp.vmbe...	RegionA01-ISCSI01-C...	1 vCPUs	1 GB
SupervisorControlPI...	Workload1	esx-05a.corp.vmbe...	esx-05a_LOCAL	2 vCPUs	8 GB

After clicking Save you will be in the view area again. The view we just created will be selected.

You should see the three properties and two metrics we selected. At this point, your view is created and saved.

## View the Sums

Name	Summary Parent Cluster	Summary Parent Host	Summary Datastore(s)	Configuration Hardware...	Memory Total Capacity
<a href="#">ubuntu20</a>	Workload1	esx-04a.corp.vmbe...	RegionA01-ISCSI01-C...	1 vCPUs	1 GB
<a href="#">ubuntu22</a>	Workload1	esx-04a.corp.vmbe...	RegionA01-ISCSI01-C...	1 vCPUs	1 GB
<a href="#">vCLS-6c061569-00</a>	Management	esx-01a.corp.vmbe...	RegionA01-ISCSI01-C...	1 vCPUs	128 MB
<a href="#">vCLS-c9a991fe-65c</a>	Management	esx-02a.corp.vmbe...	RegionA01-ISCSI01-C...	1 vCPUs	128 MB
<a href="#">vcsa-01a.corp.vmbe</a>	-	-	-	-	-
<a href="#">windows-0008</a>	Workload1	esx-04a.corp.vmbe...	RegionA01-ISCSI01-C...	2 vCPUs	4 GB
<a href="#">windows2019</a>	Workload1	esx-03a.corp.vmbe...	RegionA01-ISCSI01-C...	2 vCPUs	4 GB
<b>Summary</b>	-	-	-	42 vCPUs	110.25 GB

Scroll Down (not shown) to the bottom of the results to see the summary for the total vCPUs and Total Memory.

The sum is for all the Virtual Machines contained in the view.

Because we used Virtual Machines as our subject matter, the view can be utilized for a single VM or anything that contains Virtual Machines like Hosts, Groups, Clusters, Datacenters, Applications, etc.

Feel free to navigate to a Host or any object that contains virtual machines to see the flexibility of a View.

## Lesson End

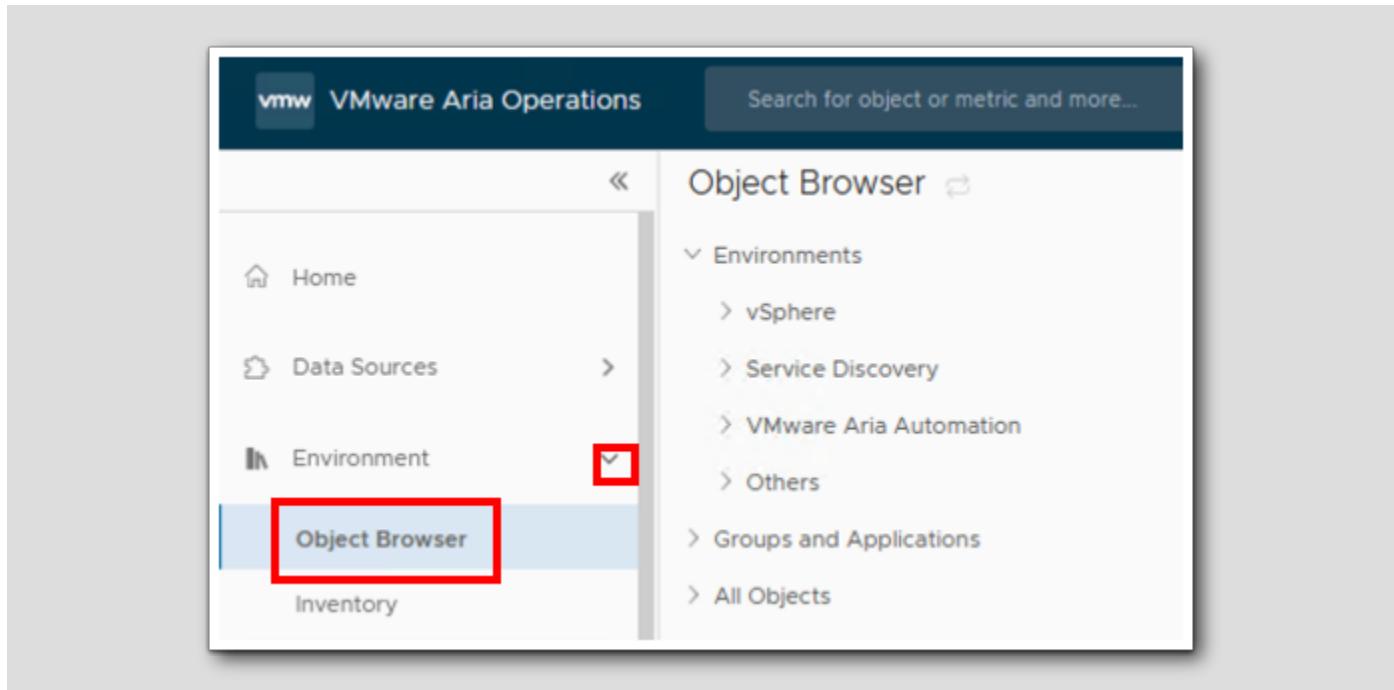
This completes the Simple View creation. In the next lesson, we will show how to create a view with variable data.

## Create a View with Variable Data

In this lesson, we are going to create a custom view. The view will concentrate on Virtual Machine data but can be applied to any resource collected in Aria Operations.

Views can be used within reports and dashboards. They also allow Users to see data within Aria Operations.

## Open Object Browser



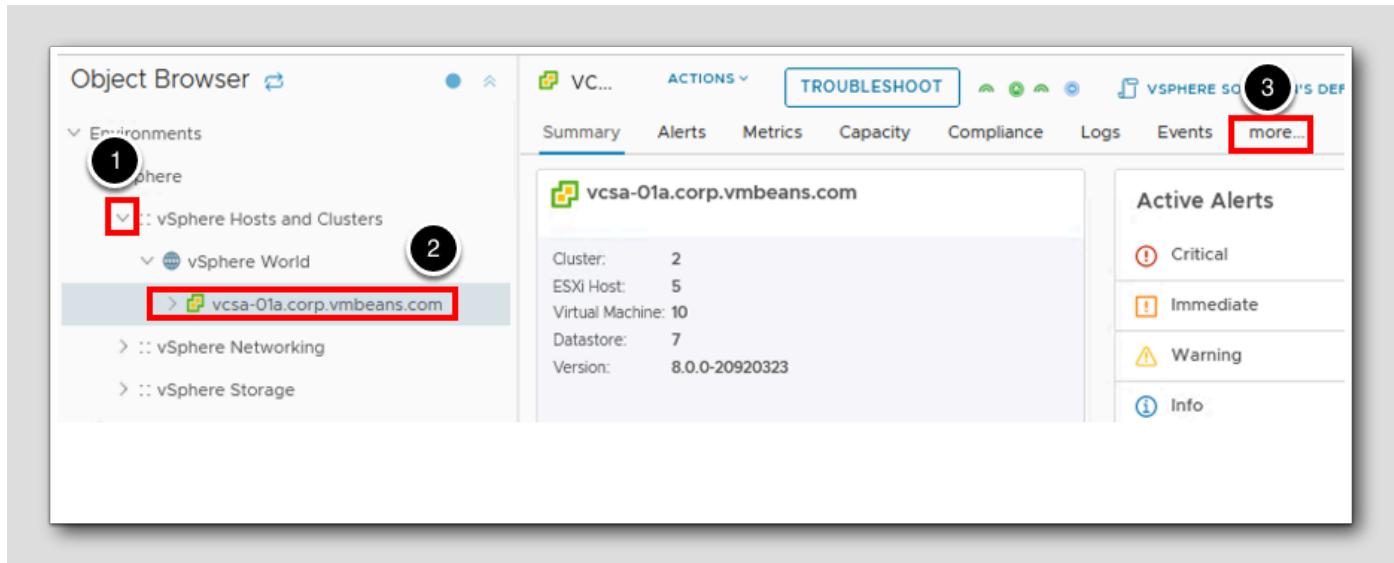
1. Expand Environment.
2. Click on Object Browser.

## Hosts and Clusters



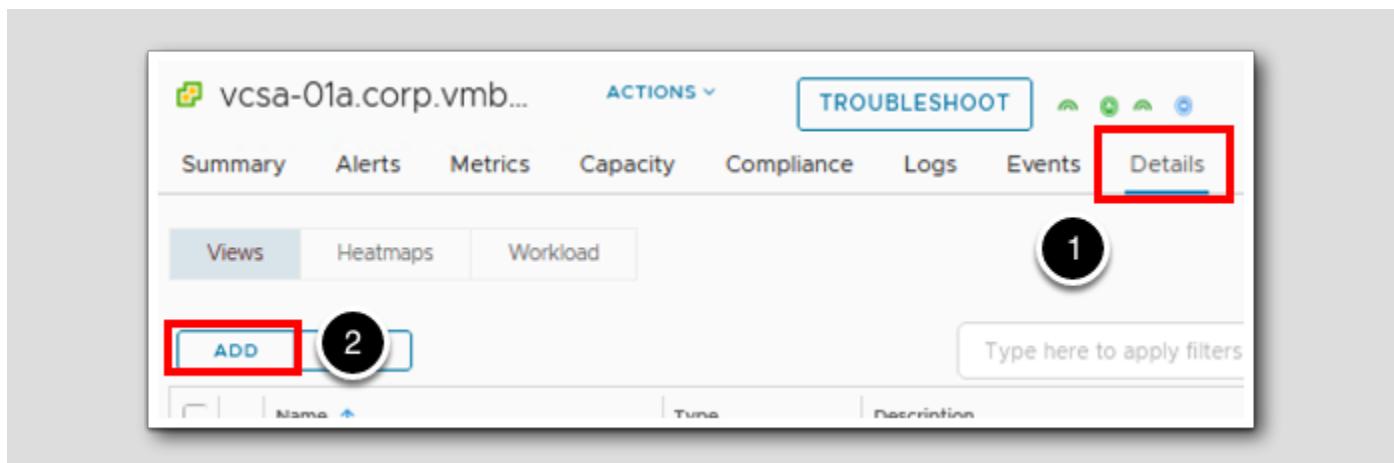
1. Expand vSphere Environment if needed.
2. Click on vSphere Hosts and clusters.

## Select a vCenter Server



1. Expand vSphere World.
2. Select vCenter Server Private Cloud.
3. Click on more...

## Create a View



1. Click on Details.

2. Click the ADD to create a new view.

## View Type

[329]

The screenshot shows a user interface titled "View Types" with a navigation bar at the top. Below the navigation bar, there are six cards representing different view types:

- List**: A card with a red border and a circled "1" above it, indicating it is the selected view type. It displays a table with columns: Alert Name, Alert Type, Alert Sub-Type, and Count. The table contains four rows: "Virtual machine disk - Storage Array - Performance" (Count: 4), "Virtual machine disk - Storage Array - Performance" (Count: 3), "Virtual machine disk - Storage Array - Performance" (Count: 3), and "Virtual machine disk - Storage Array - Performance" (Count: 3).
- Summary**: A card showing a summary view with fields like "One Space Total Capacity" (Average Value: 1000, Real Value: 1000), "One Space Total provisioned disk space" (Average Value: 1000, Real Value: 1000), "One Space Free" (Average Value: 1000, Real Value: 1000), and "One Space Maximum Machine used" (Average Value: 1000, Real Value: 1000).
- Trend**: A card showing a line chart with data points for "Total CPU" and "Actual CPU Use".
- Distribution**: A card showing a pie chart titled "BIOS Version(s)" with segments: 90% (Unknown), 9% (P000), and 1% (P001).
- Text**: A card with a green header "Recommendation" and a message about updating ESXi hosts.
- Image**: A card showing a placeholder icon for an image.

1. Click on List for the View Type.

**View Name**

[330]

**Create View**

1 - Name & Configuration      2 - Data

**Name**  1

**Description**

**Settings**

Items per page: 50

Top result count:

Show Objects: Existing

Show Object Creation Date:

Make the view available for:

Dashboards through the View widget  
 Report template creation and modification  
 Details tab in the environment

Hide the view for the selected Object Types:

2

NEXT PREVIOUS CREATE CANCEL

Create a view with the following data:

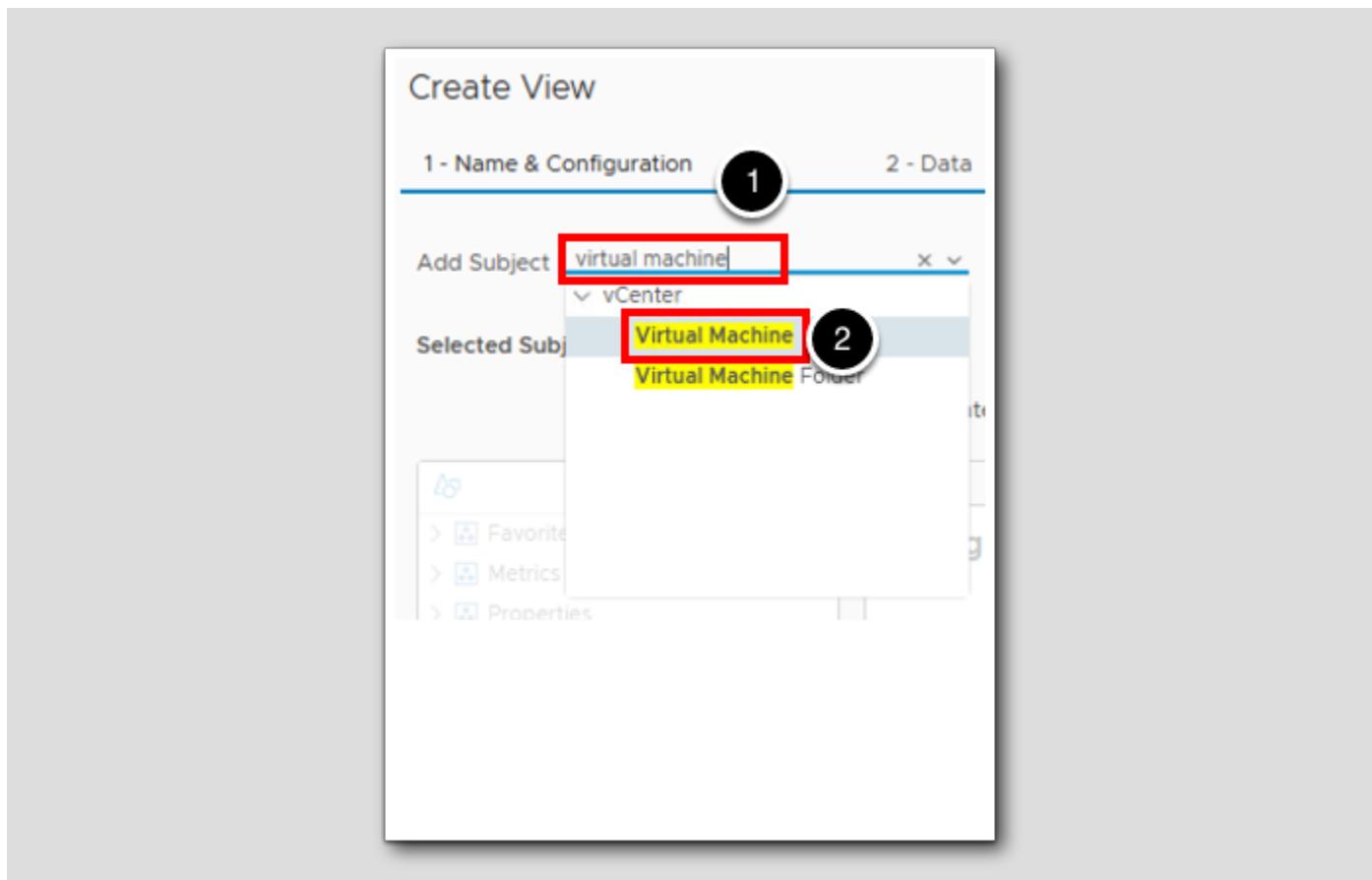
Section 1. Name & Configuration.

1. Enter Demo - Variable Data.
2. Click NEXT.

Note the fields under Settings that are available.

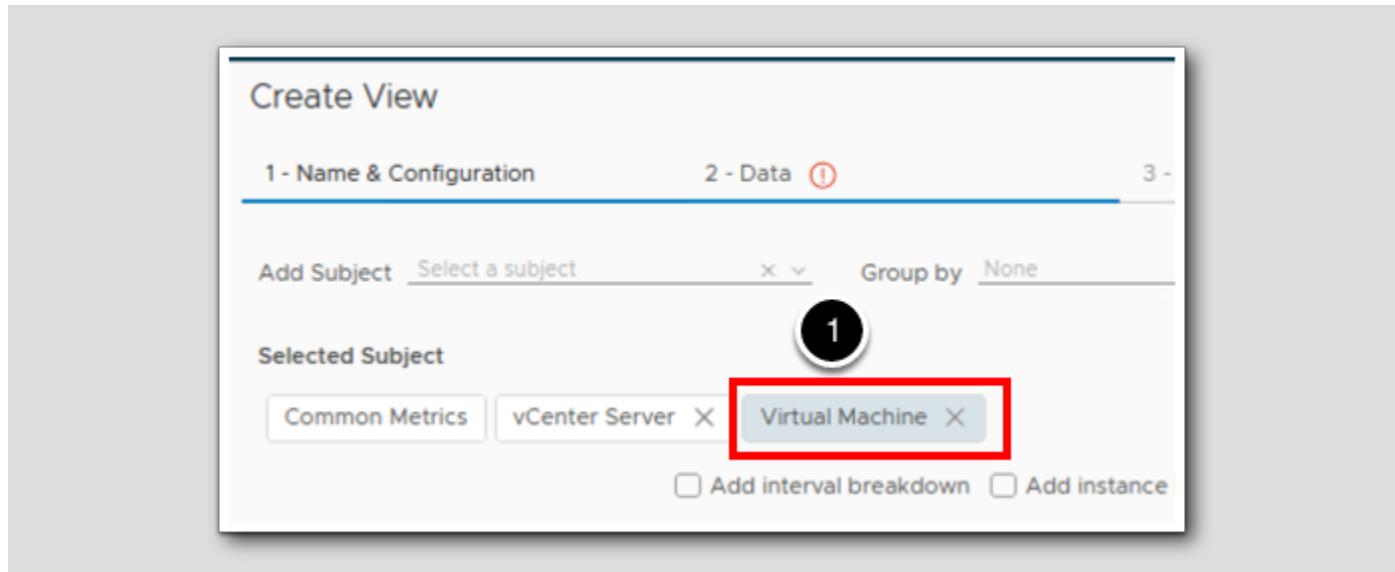
## Subjects - Virtual Machine

[331]



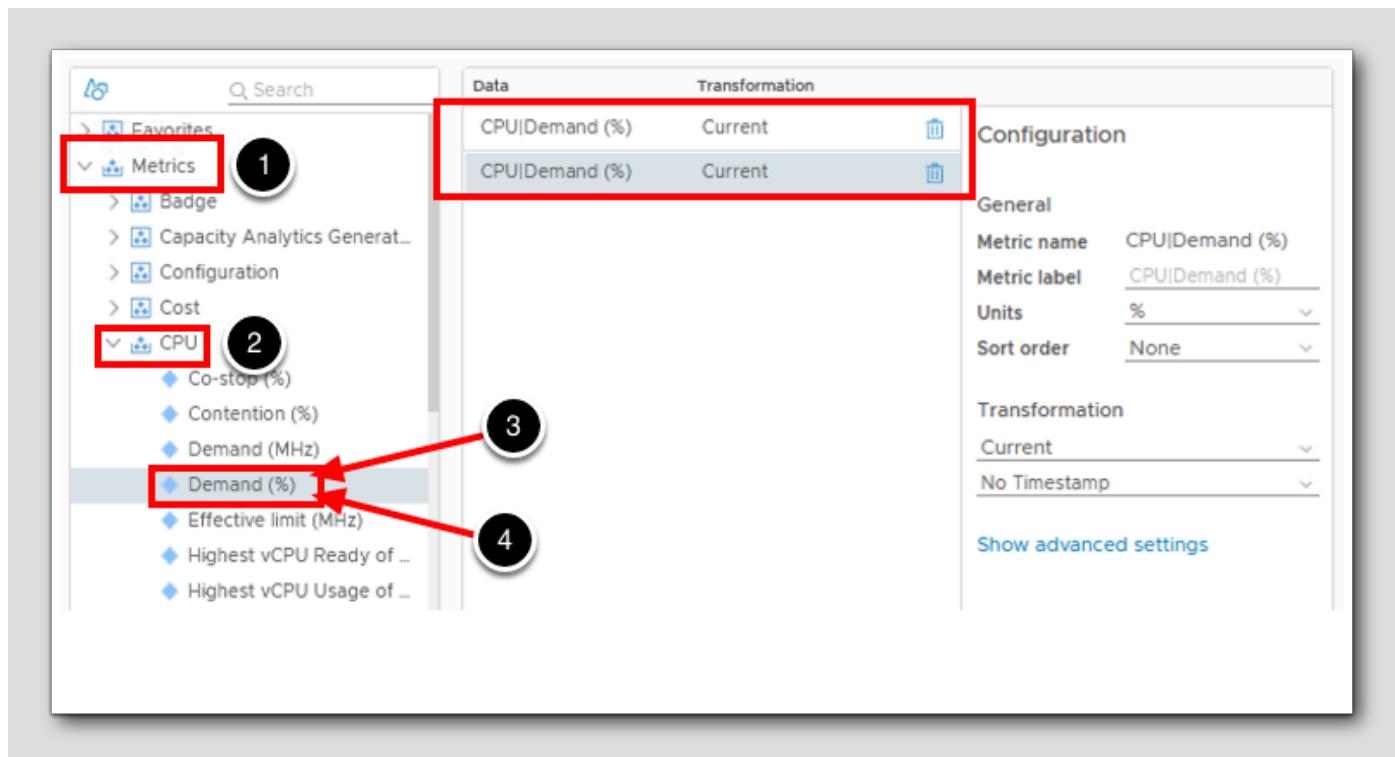
1. In the Add Subject field, begin typing **virtual machine** (Start typing virtual and the list will show available resources that match).
2. Click on **Virtual Machine**.

## Select Virtual Machine



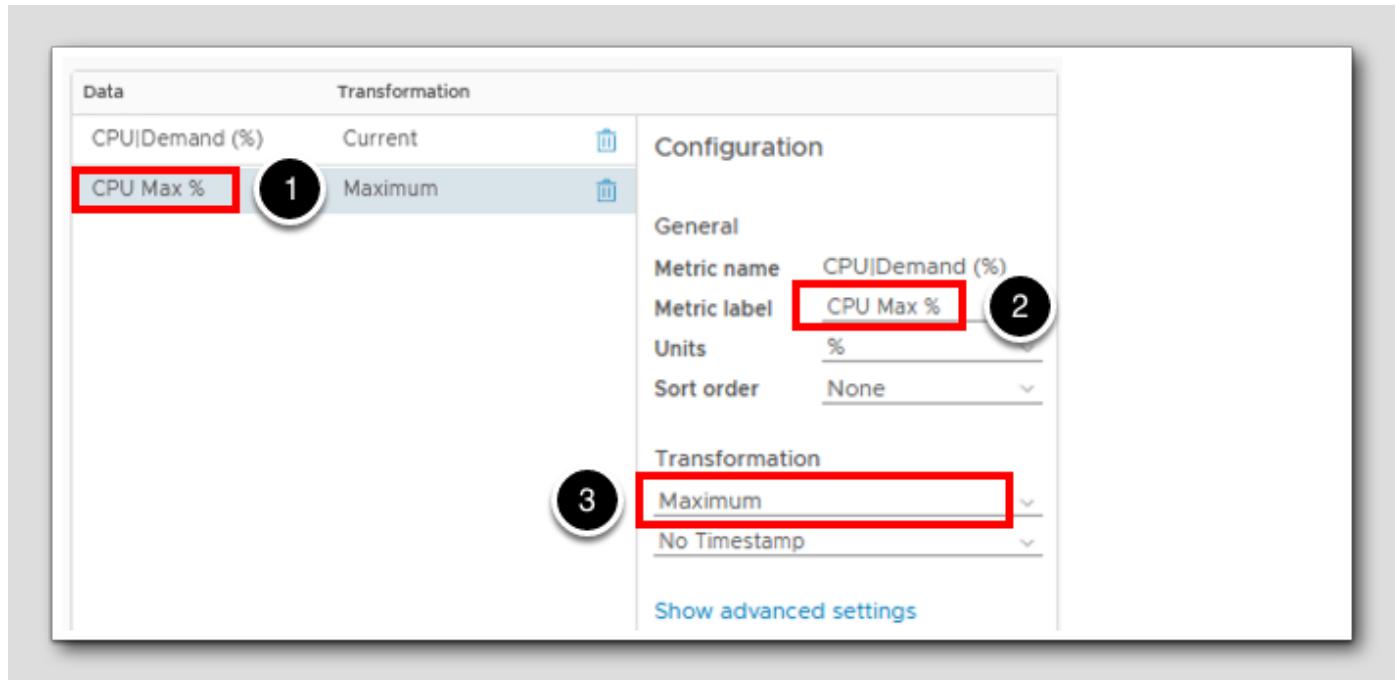
1. Select Virtual Machine.

## Data Metrics



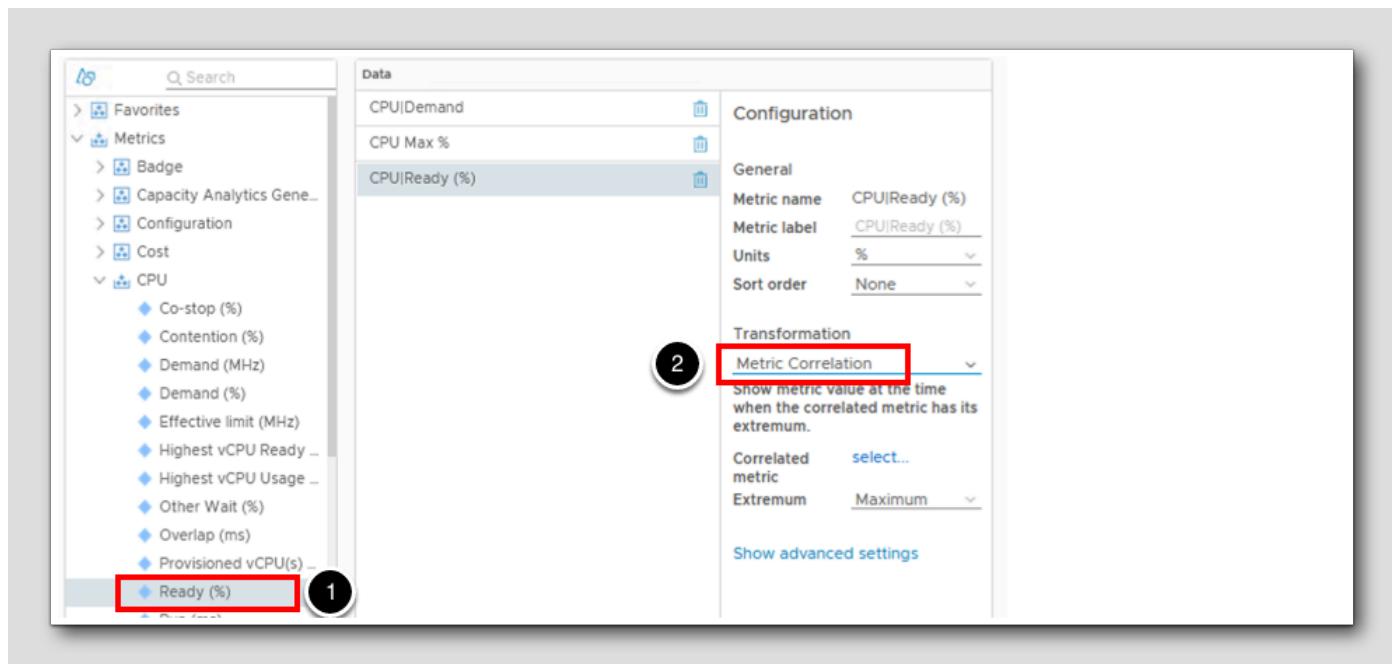
1. Expand Metrics.
2. Expand CPU.
3. Double-Click Demand (%).
4. Double-Click Demand (%) again (It will be in the list on the right two times).

## Metric Transformation



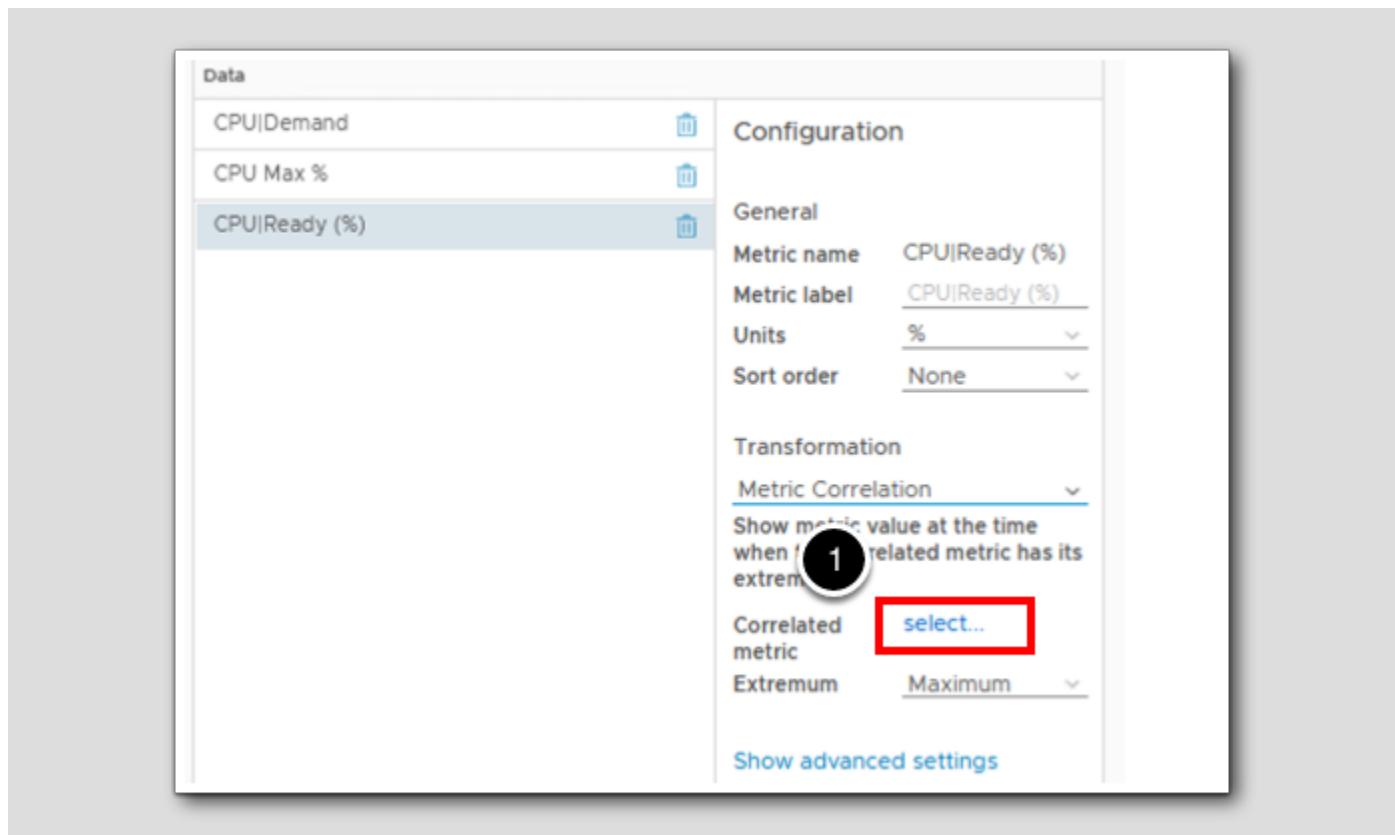
1. After Demand (%) is in the list a second time, select the second instance with a single click.
  - The screenshot was taken after the changes were made to the Metric label. The Data column will reflect what you type into the Metric label.
2. For Metric label: Enter "CPU Max %" (This will be our column header name in the final view).
3. For Transformation, Select Maximum in the drop down list.

## CPU Ready



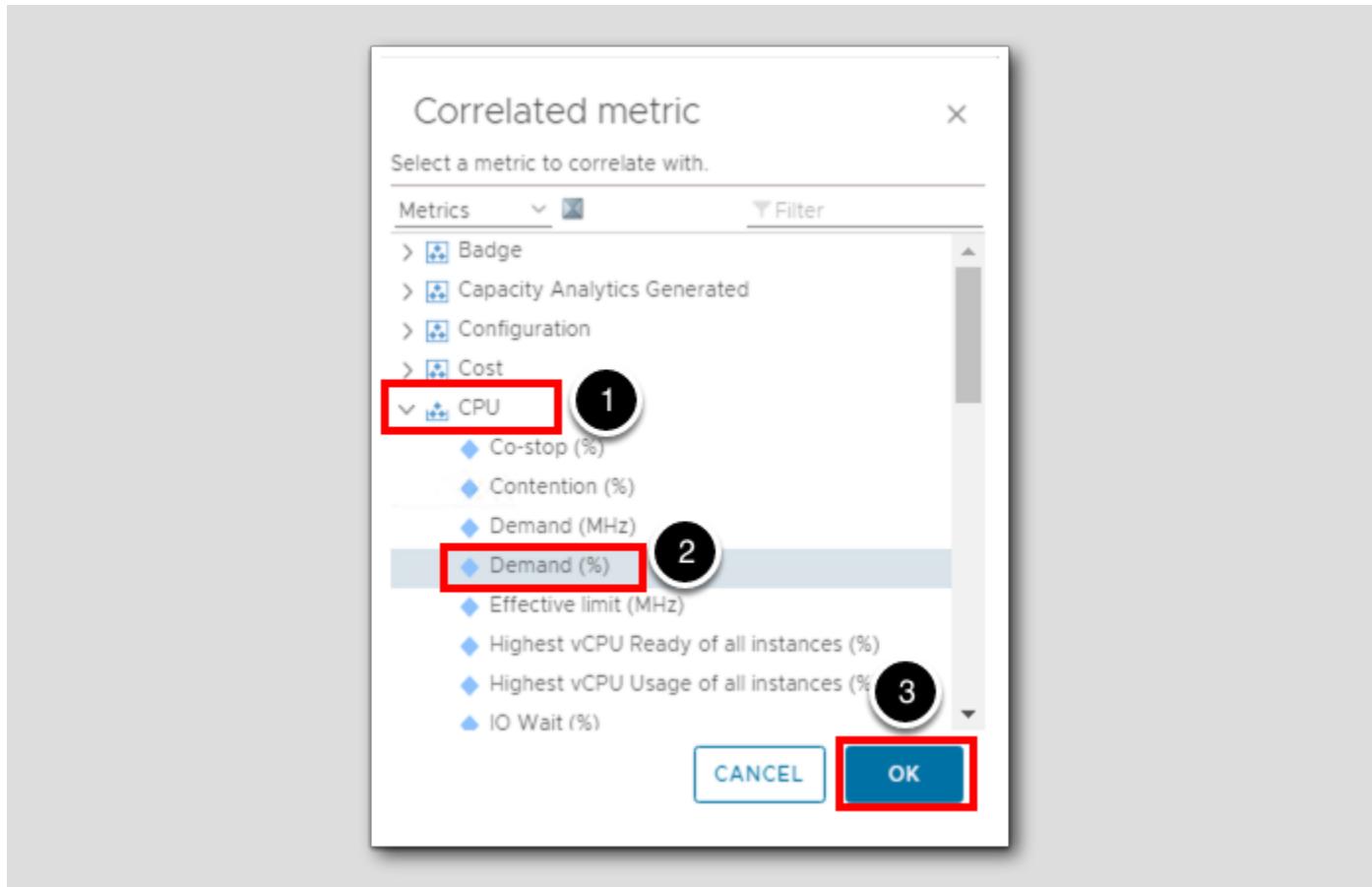
1. Double click Ready (%).
2. Change Transformation to Metric Correlation in the drop down list.

## Correlation



1. Click **select...** beside Correlated Metric.

## Correlated Metric



In the pop-up window:

1. Expand CPU
2. Select Demand (%)
3. Click OK

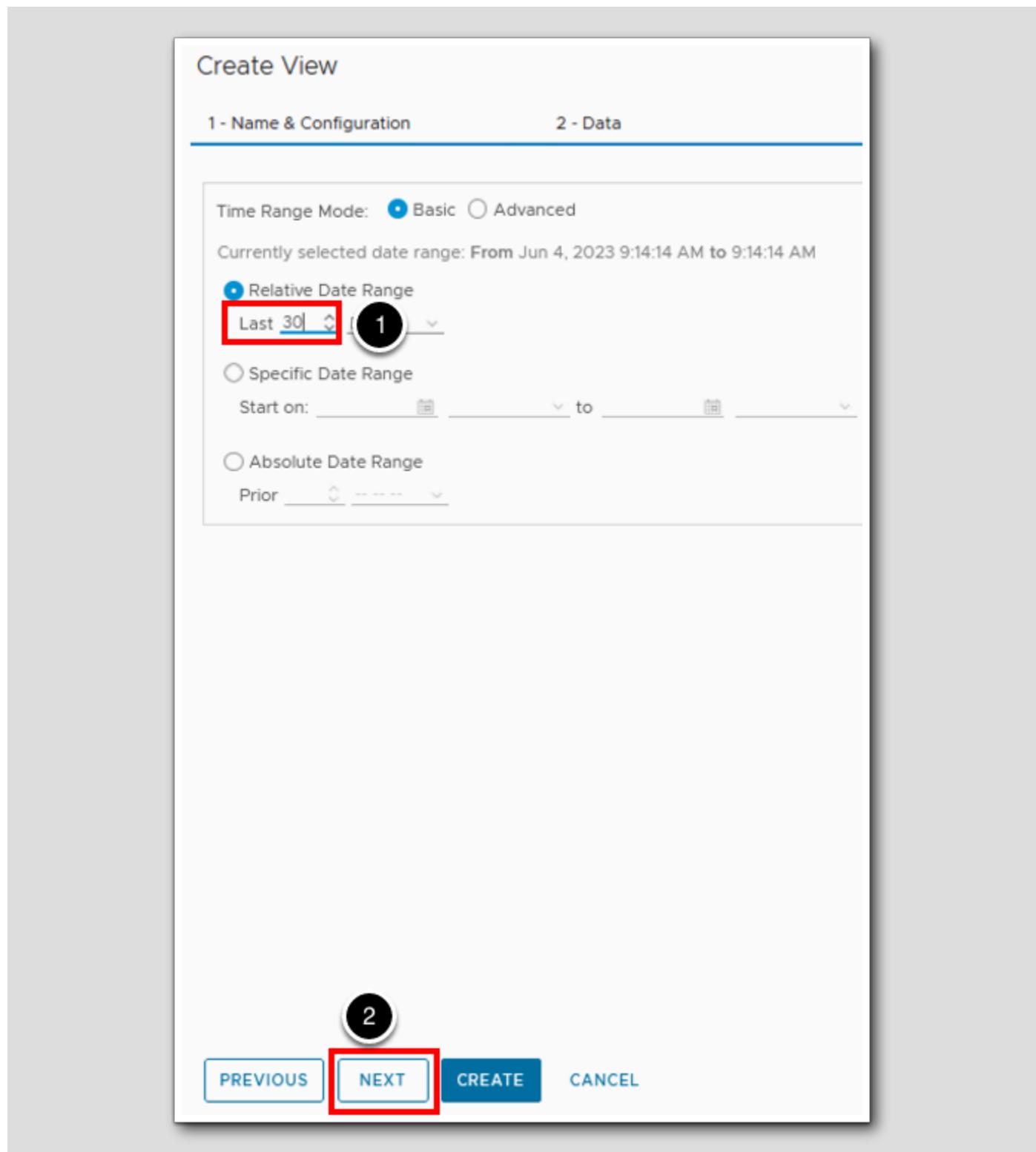
With this correlation, we are going to see the value of CPU Ready (%) when the CPU Demand (%) is at a maximum.

## Time Settings

1

1. Click NEXT to go to Time Settings.

## Number of Days



1. Set the Relative Date Range to the Last 30 Days.
2. Click NEXT.

## Filter

[340]

vCenter Server filter

**REMOVE CRITERIA**

Select the Object Type that matches all of the following criteria: vCenter Server

Metrics Pick a metric Current --Select-- Metric value

Or

**REMOVE CRITERIA**

Select the Object Type that matches all of the following criteria: vCenter Server

Metrics Pick a metric Current --Select-- Metric value

**ADD ANOTHER CRITERIA SET**

Virtual Machine filter

Select the Object Type that matches the following criteria: Virtual Machine

1 Properties 2 Pick a property Current --Select-- Property value

**ADD ANOTHER CRITERIA SET**

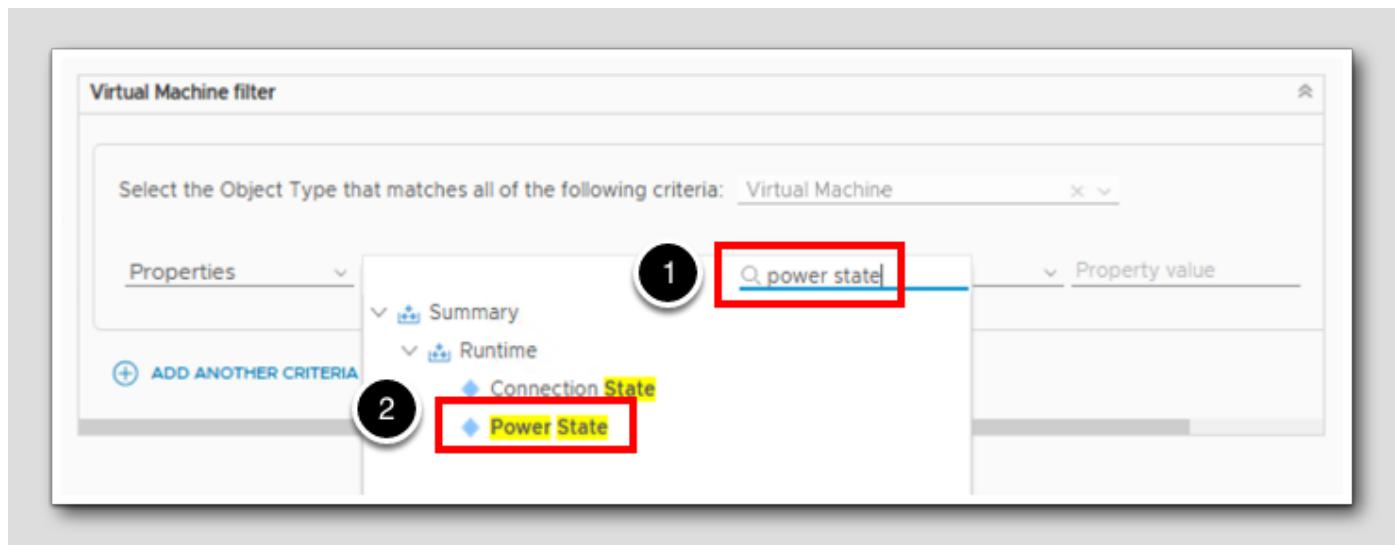
PREVIOUS NEXT CREATE CANCEL

Make sure you are in the Virtual Machine filter box.

1. Change Metrics to Properties.
2. Click into the Pick a property field.

## Power State

[341]



1. In the Search Bar type power state.
2. Double click on Power State.

**Create View**

1 - Name & Configuration      2 - Data      3 - Time Settings      4 -

---

**vCenter Server filter**

(-) REMOVE CRITERIA

Select the Object Type that matches all of the following criteria: vCenter Server

Metrics Pick a metric Current --Select-- Metric value

Or

(-) REMOVE CRITERIA

Select the Object Type that matches all of the following criteria: vCenter Server

Metrics Pick a metric Current --Select-- Metric value

(+) ADD ANOTHER CRITERIA SET

---

**Virtual Machine filter**

Select the Object Type that matches all of the following criteria: Virtual Machine

Properties Property|Runtime|Power State Current is Property value Powered Off

(+) ADD ANOTHER CRITERIA SET

1      2      3  
4      5

PREVIOUS      NEXT      CREATE      CANCEL

1. Select **Current**.
2. Select: **is**
3. Click into the property value field. You should see the available options of **Powered On** and **Powered Off**.
4. Select: **Powered On** from Property Value Menu.
5. Click **CREATE**.

## View Results

The screenshot shows the vRealize Operations Management Cloud interface. The top navigation bar includes 'vcsa-01a.corp.vmb...', 'ACTIONS ▾', 'TROUBLESHOOT' (button), and several status icons. Below the navigation is a horizontal menu with tabs: Summary, Alerts, Metrics, Capacity, Compliance, Logs, Events, and Detail (which is underlined). Underneath the menu is a 'Views' card with three tabs: Views (selected), Heatmaps, and Workload. Below the card is an 'ADD' button and a '...' button. To the right is a search bar with placeholder text 'Type here to apply f...'. The main content area displays a list of views:

	Name	Type	Description
<input type="checkbox"/>	Datastore Utilization Summary	List	List of all the Datastores with A...
<input type="checkbox"/>	Datastore: Capacity	List	Lists the summary of different s...
<input type="checkbox"/>	Datastores with Wasted Disk Space	List	Following datastores have wast...
<input type="checkbox"/>	DC cost List	List	Darwin
<input checked="" type="checkbox"/>	Demo - Variable Data	List	

Below this is a section titled 'Demo - Variable Data' containing a table of host metrics:

Name	CPU Demand (%)	CPU Max %	CPU Ready (%) (at CPU...
aria-auto	25.03 %	70.69 %	0.72 %
aria-auto-config	5.95 %	36.51 %	2.19 %
aria-ops	9.59 %	83.04 %	19.16 %
aria-ops-cp	6.45 %	94.11 %	20.08 %
aria-ops-logs	12.76 %	71.87 %	13.95 %
identity-manager	4.87 %	31.68 %	5.54 %
ubuntu-0008	2.07 %	10.58 %	0.17 %
windows-0010	7.82 %	31.61 %	0.52 %

We now have a view that shows us the last CPU Demand collected for each Powered ON Virtual Machine. We also show the Maximum CPU Demand as a percentage for the last 30 days. The last value in our view shows us what the Ready % was when the demand was at maximum during the same 30 day period.

This is a very powerful feature of the product. While we are showing the ready % when the CPU is highly demanded, you may wish to see what disk latency looks like when network transmissions are high. You can correlate any two metrics that are being collected in vRealize Operations.

## Lesson End

[343]

This completes this lesson. In the next lesson, we will create a view with trended data.

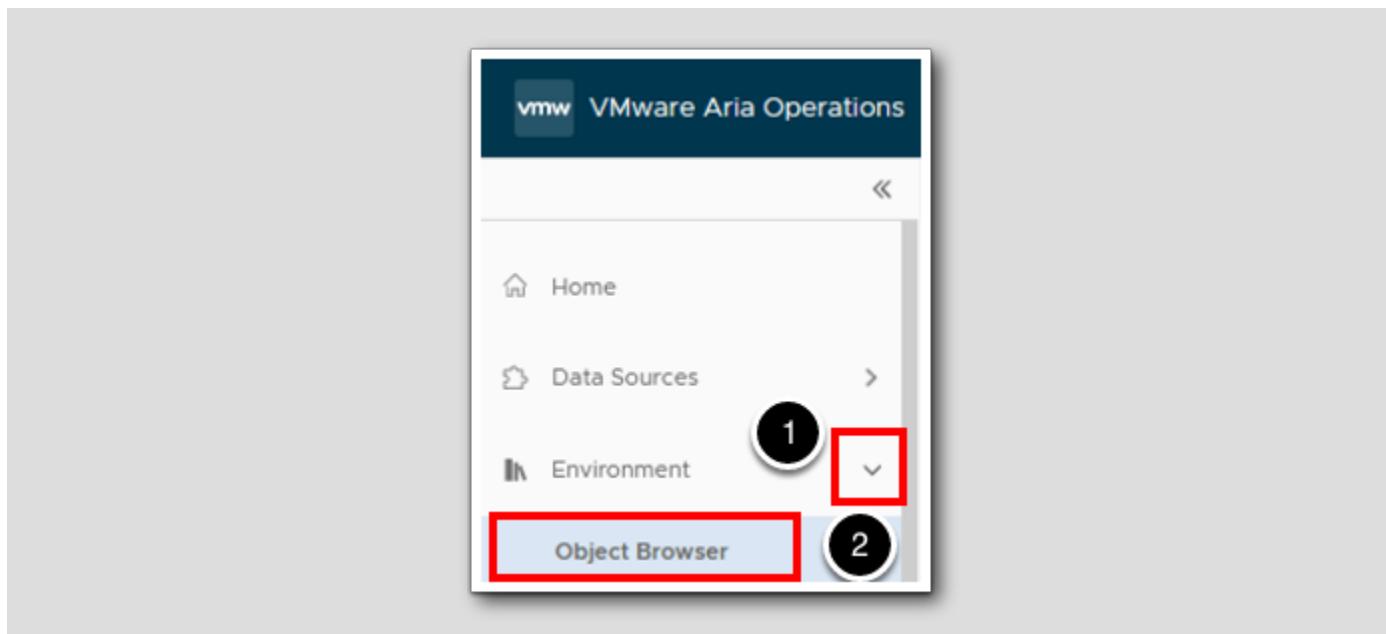
## Create a View with Trends

[344]

In this lesson, we continue the concept of creating custom views. This time, we will create a view with data that is trended over a period of time.

### Go to Environment

[345]



1. Expand Environment.
2. Click on Object Browser

## Hosts and Clusters

The screenshot shows the vSphere Object Browser interface. On the left, the Object Browser tree is visible with the following structure:

- Environments
- vSphere
  - :: vSphere Hosts and Clusters (highlighted with a red box and numbered 1)
  - vSphere World (highlighted with a red box and numbered 2)
  - vcsa-01a.corp.vmbeans.com (highlighted with a red box and numbered 3)
  - :: vSphere Networking

On the right, the details for the selected host, vcsa-01a.corp.vmbeans.com, are displayed in a card format:

vcsa-01a.corp.vmbeans.com	
Summary	
Cluster:	2
ESXi Host:	5
Virtual Machine:	19
Datastore:	7
Version:	8.0.0-20920323

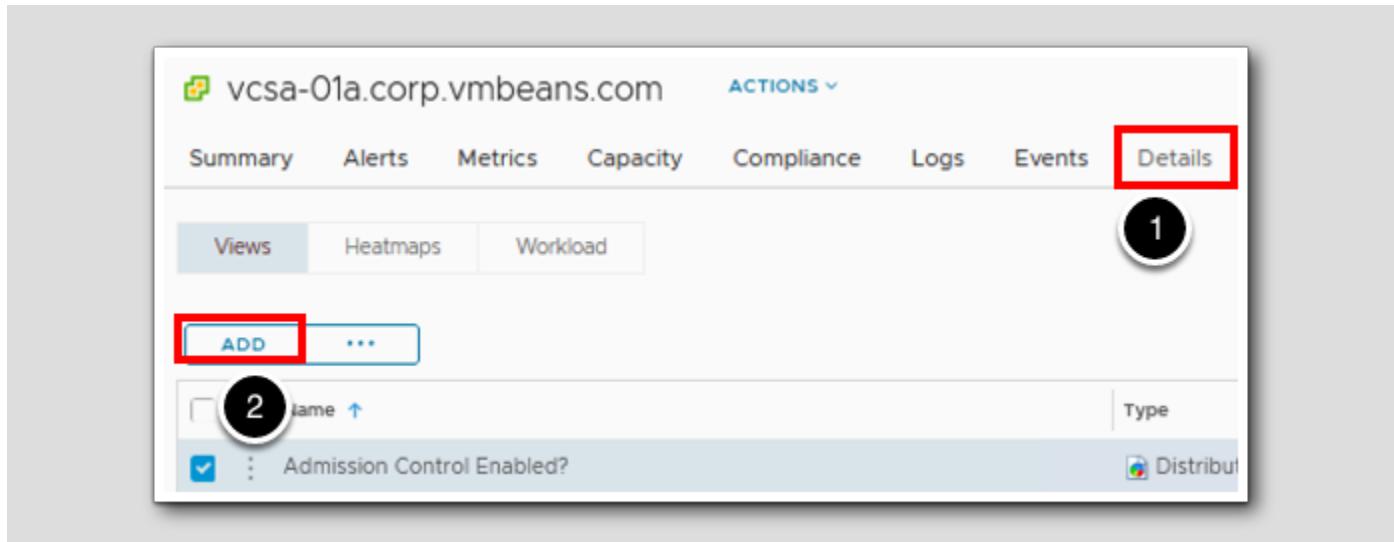
1. Click on vSphere Hosts and Clusters.
2. Expand vSphere World.
3. Click on vcsa-01a.corp.vmbeans.com.

## Expand the Categories

The screenshot shows the host summary card for vcsa-01a.corp.vmbeans.com. At the top right, there is a "more..." button, which is highlighted with a red box and numbered 1.

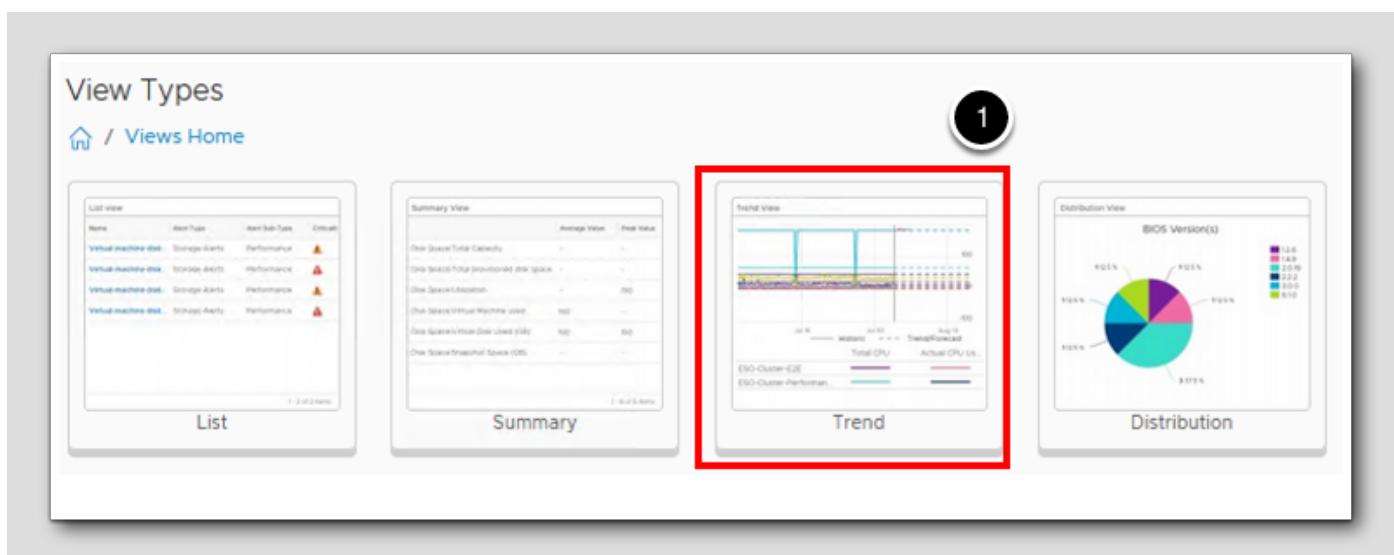
1. Click on more...

## Create a View



1. Click on Details.
2. Click ADD to create a new view.

## View Types



1. Click on Trend as the type of view we are creating.



**View Name**

[350]

**Create View**

1 - Name & Configuration      2 - Data

**Name**  1

**Description**

**Settings** 2

Items per page: 50

Top result count:

Show Objects: Existing

Show Object Creation Date:

Make the view available for:

- Dashboards through the View widget
- Report template creation and modification
- Details tab in the environment

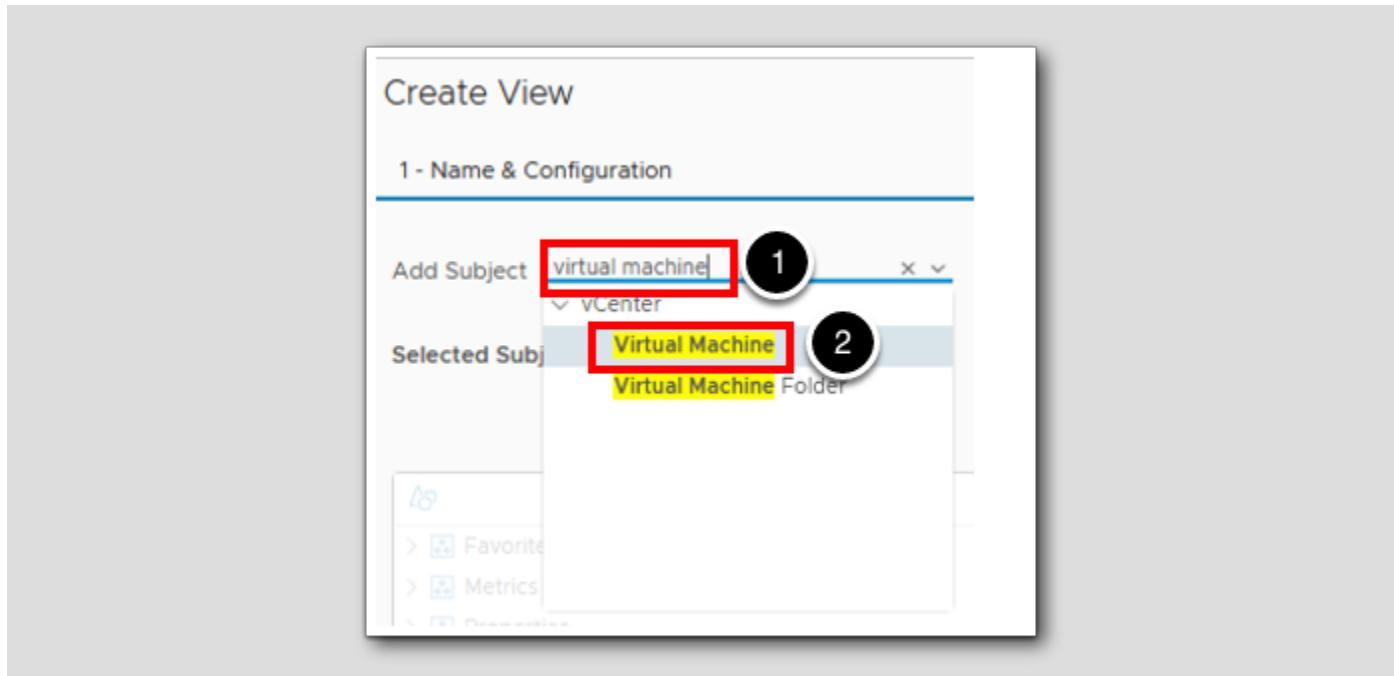
Hide the view for the selected Object Types:

**PREVIOUS** NEXT CREATE **CANCEL** 3

1. Enter the name **Demo - Trend View**.
2. Expand **Settings** to note what can be customized. For this lesson we will leave the defaults.
3. Click **NEXT**.

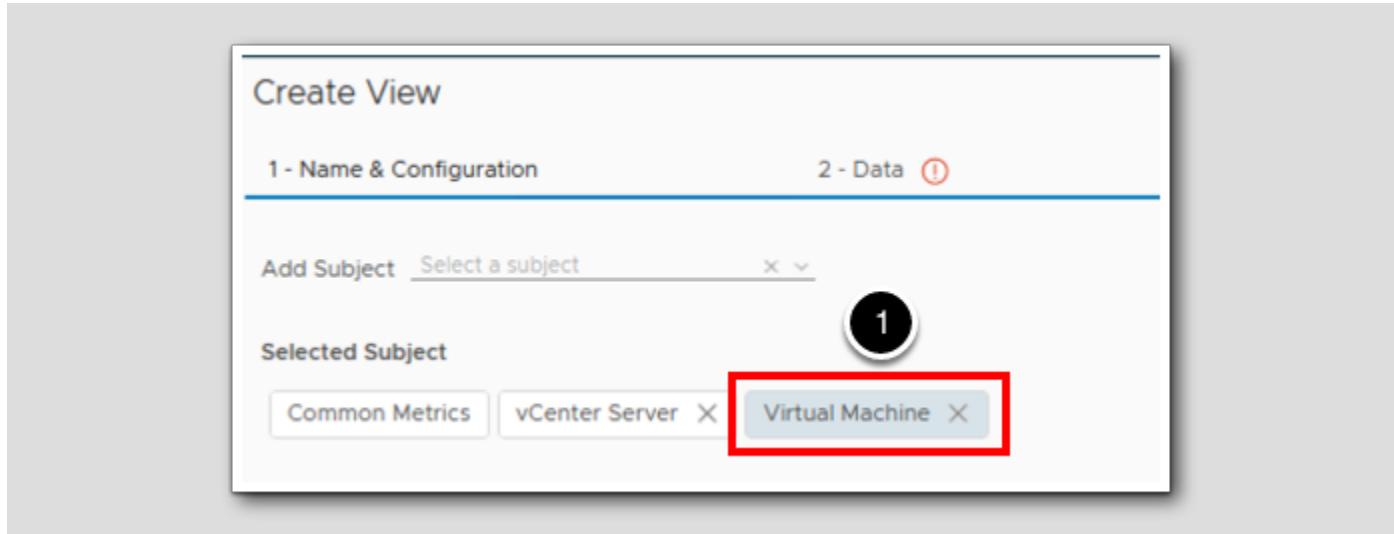
## Data

[351]



1. Click on Add Subject.
2. Type virtual machine in the search field and a filtered list will appear.
3. Click on Virtual Machine.

## Select Virtual Machine



1. Select Virtual Machine.

Select metric

[353]

**Create View**

1 - Name & Configuration      2 - Data

Add Subject  X ▼

**Selected Subject**

Common Metrics vCenter Server X Virtual Machine X

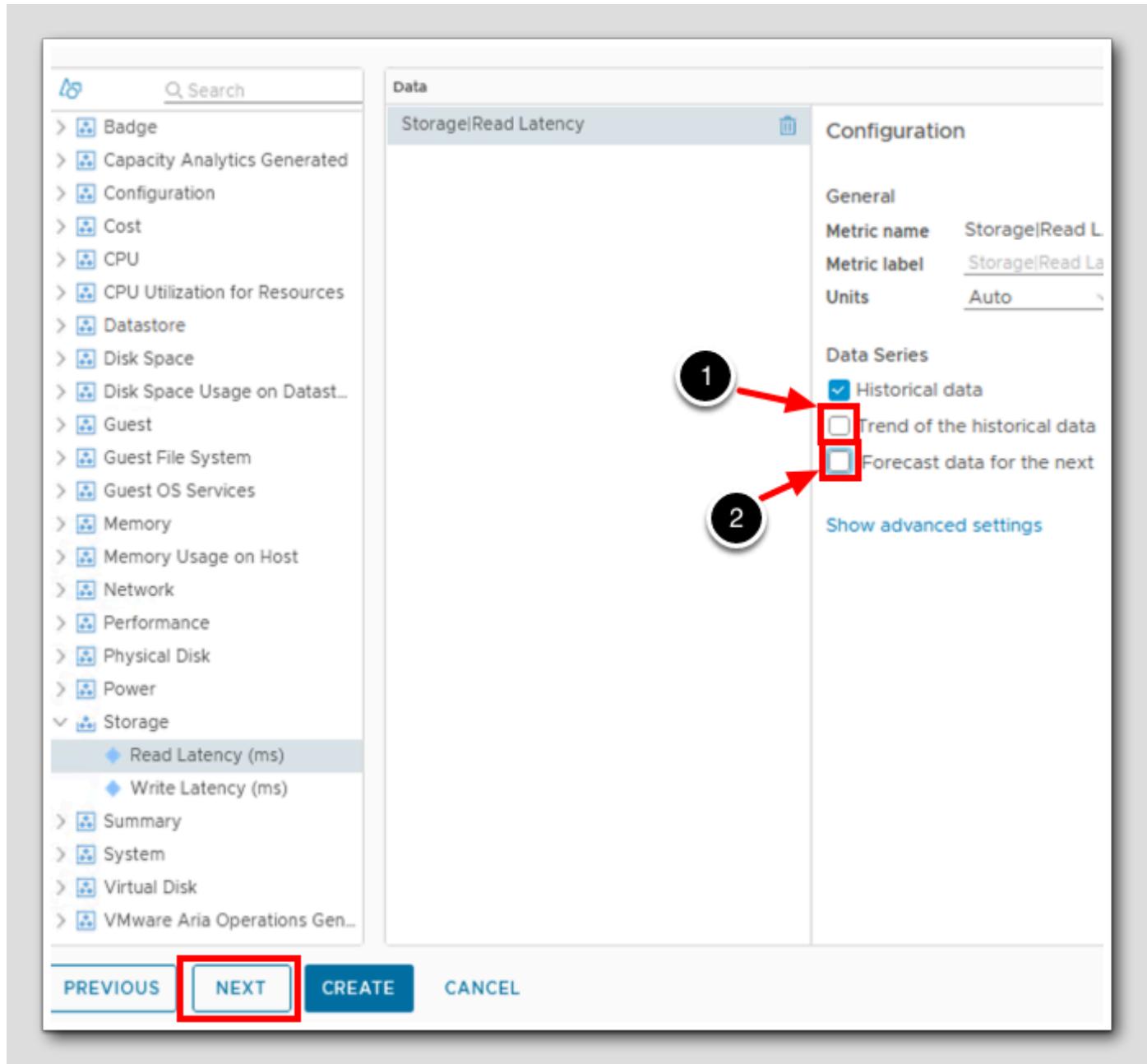
**Data**

Storage|Read Latency

1 Physical Disk  
Power  
2 Storage  
Read Latency (ms)  
Write Latency (ms)  
Summary  
System  
Virtual Disk  
VMware Aria Operations Gen...

1. Expand Storage.
2. Double click on **Read Latency (ms)**.

## Trend the Data



1. Uncheck Trend of the historical data.
2. Uncheck Forecast data for the next.
3. Click NEXT.

Time Range

[355]

## Create View

### 1 - Name & Configuration

Time Range Mode:  Basic  Advanced

Currently selected date range: Jun 10, 2023 10:05:19 AM to 10:05:19 AM

Relative Date Range Last 30 Days 1

Specific Date Range  
Start on:  to

Absolute Date Range  
Prior

2

PREVIOUS NEXT CREATE CANCEL

1. Change the Relative Date Range to Last 30 Days.
2. Click **NEXT**.



## Create View

1 - Name & Configuration      2 - Data

---

**Virtual Machine filter**

Select the Object Type that matches all of the following criteria:  ✖️

+ ADD ANOTHER CRITERIA SET

1

PREVIOUS NEXT CREATE CANCEL

In the Filter section you have the ability to filter in or out objects based on a certain criteria i.e. only include powered on virtual machines. For this lesson we will not use the Filter function.

1. Click CREATE.

## Summary

[357]



You now have a view that shows selected virtual machines read latency trended over the last 30 days. While we unchecked the forecast data option, leaving it checked would have trended the forecast of the selected metrics for up to a year.

## Lesson End

[358]

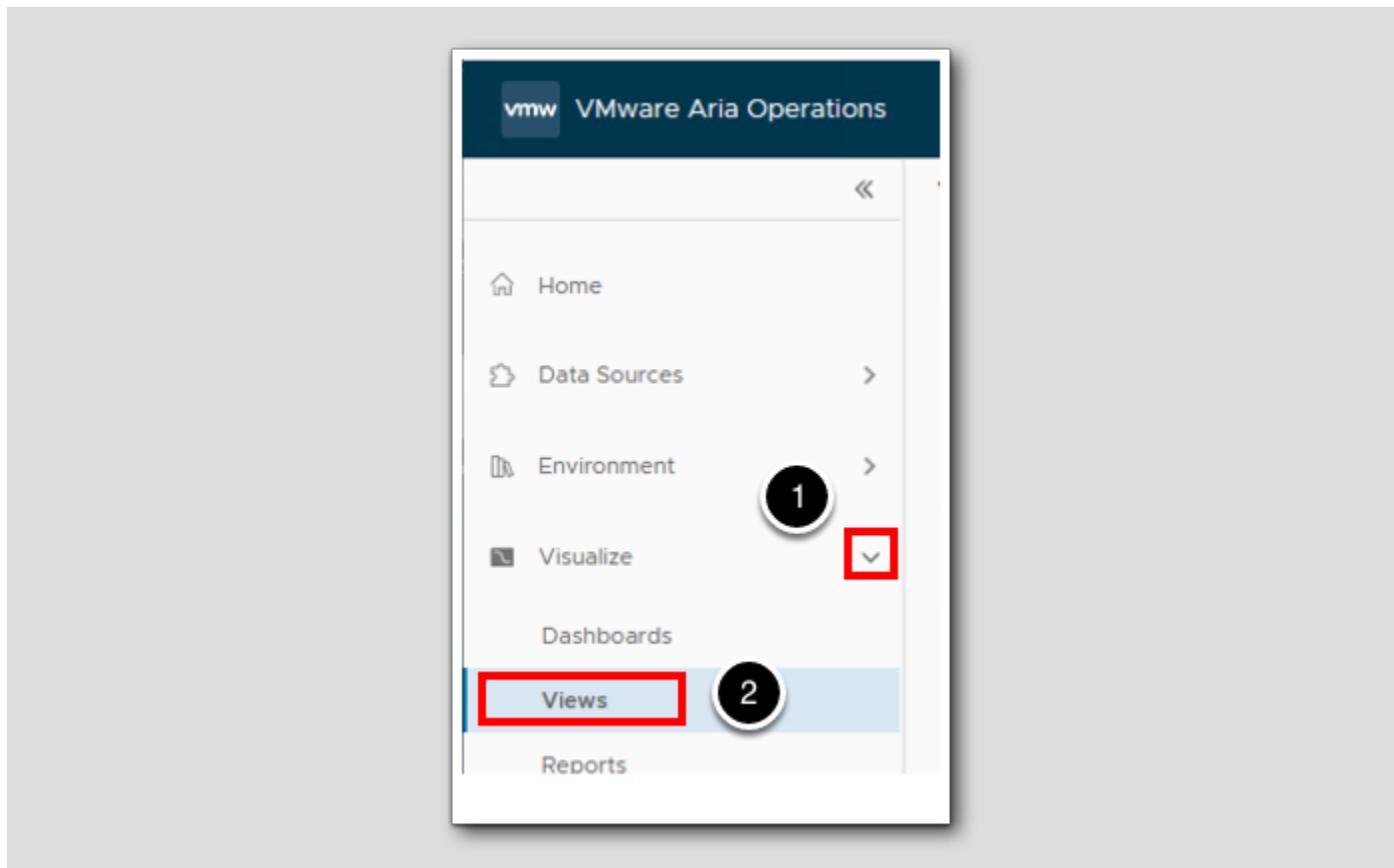
You have completed this lesson. The next lesson will show how to create a view with distribution data.

## Create a View that shows VM Growth

If you've completed the previous lessons in this module, we have created various views. In this lesson, we continue creating custom views with data transformation. With data transformation, we can represent the maximum value as well as expressions to show datacenter VM growth.

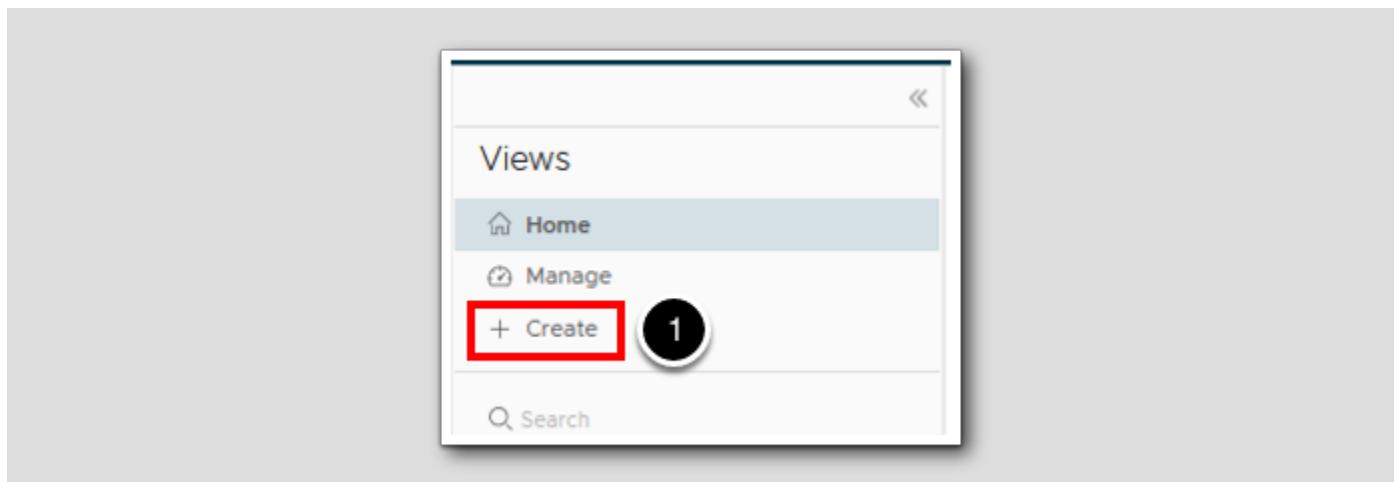
1. Notice in the Preview source: section that RegionA01 is pre-populated.

## Go to Views



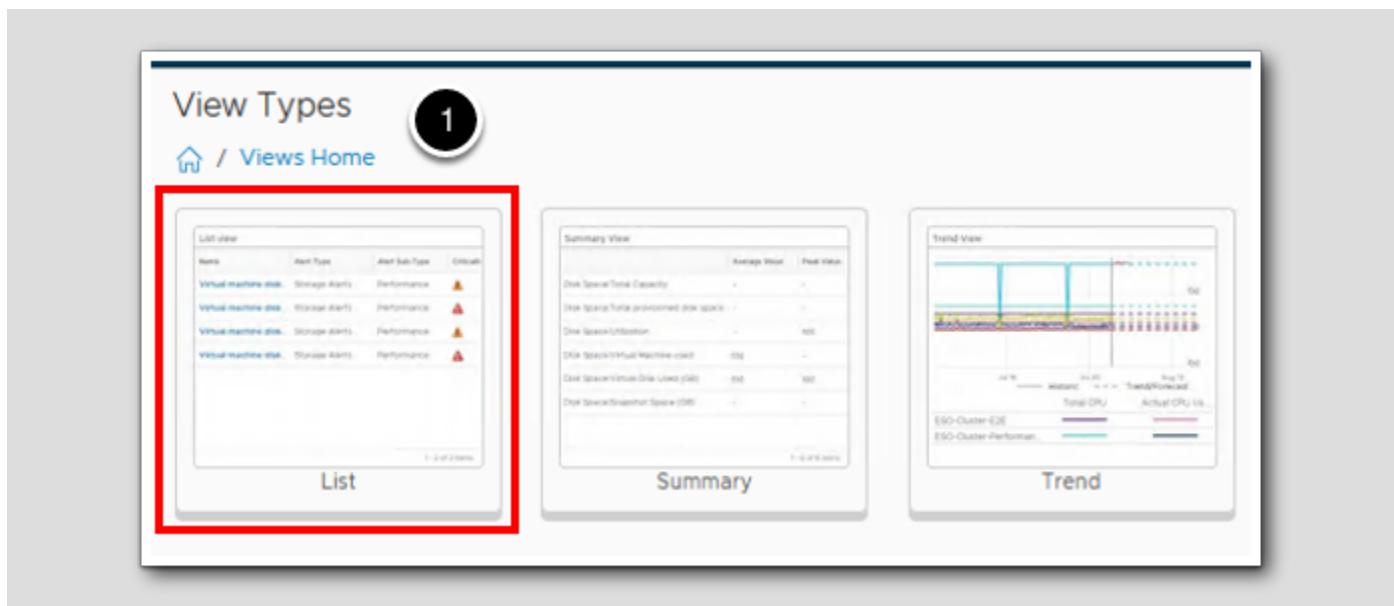
1. Expand Visualize.
2. Click on Views.

## Create a New View



1. Click + Create.

## Create a List View



1. Select List.

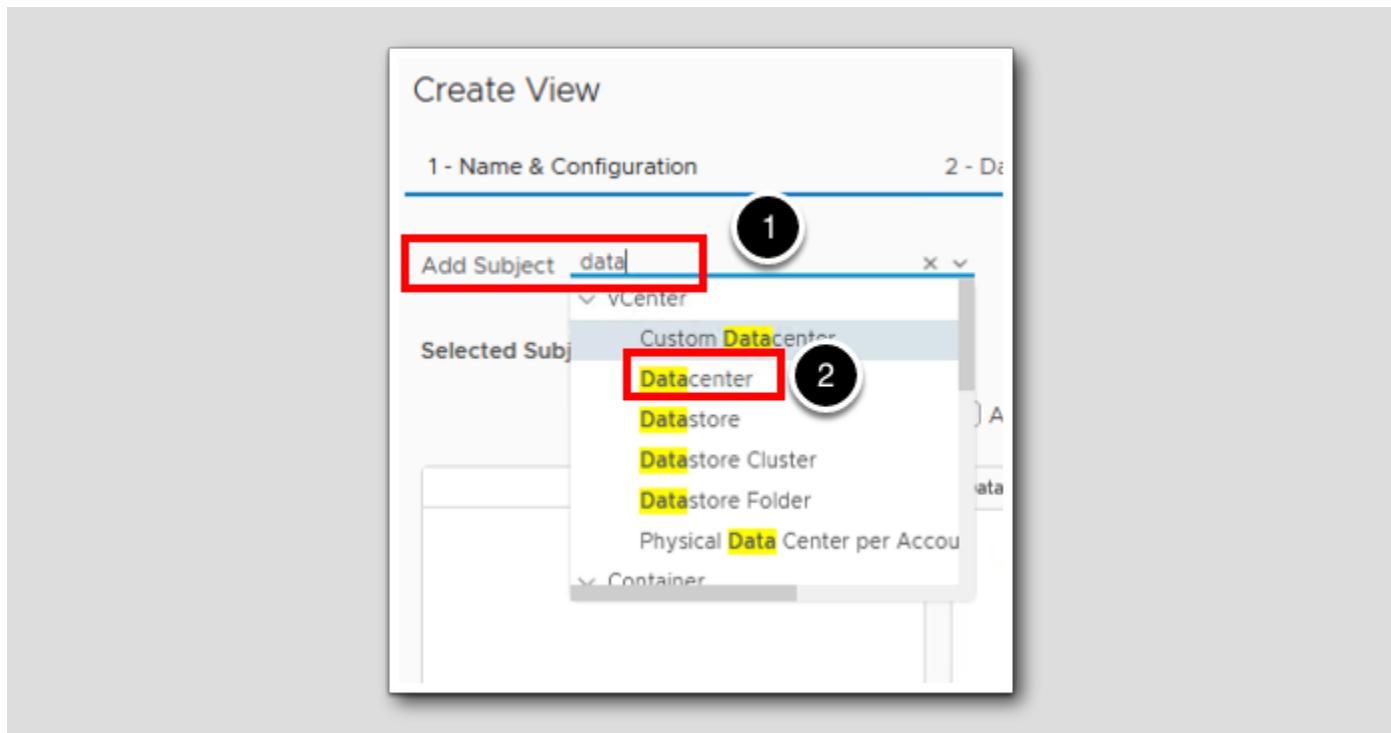
## Add View Name



1. Input the name: VM Growth Detail.
2. Select NEXT.

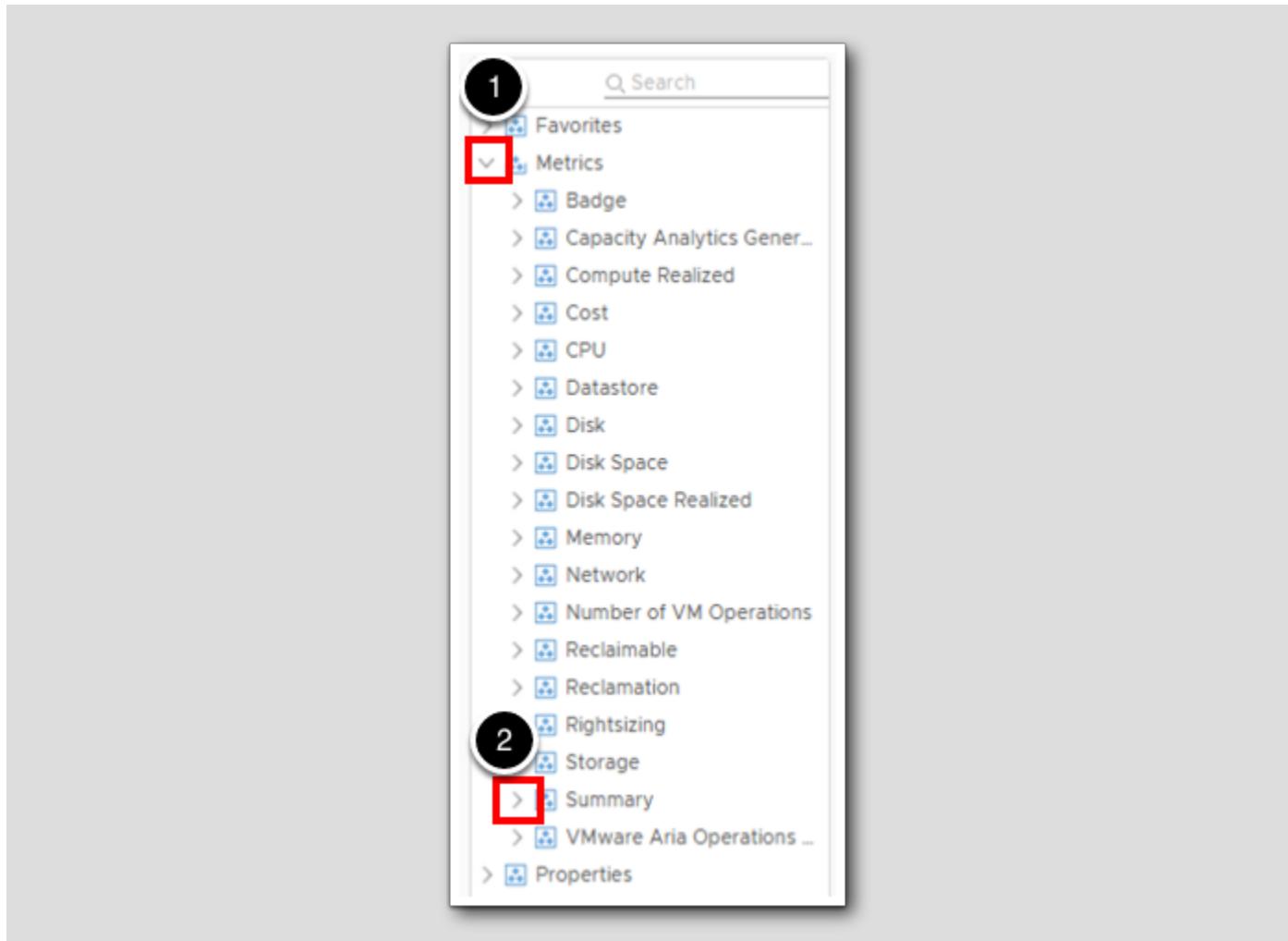
## Add View Subject

[364]



1. Click in the subject input field and type "data".
2. Select the auto populated Datacenter.

## Add Metrics to your View



1. Expand Metrics.
2. Expand Summary.

## Add Data to your View

**Create View**

1 - Name & Configuration    2 - Data    3 - Time Setting

Add Subject      Group by

**Selected Subject**

Datacenter

Add interval breakdown  Add instance breakdown

Data	Transformation
Summary Number of Runnin... Current	<input type="button" value="Delete"/>
Summary Number of Runnin... Current	<input type="button" value="Delete"/>
Summary Number of Runnin... Current	<input type="button" value="Delete"/>

**Left Sidebar (Step 1)**

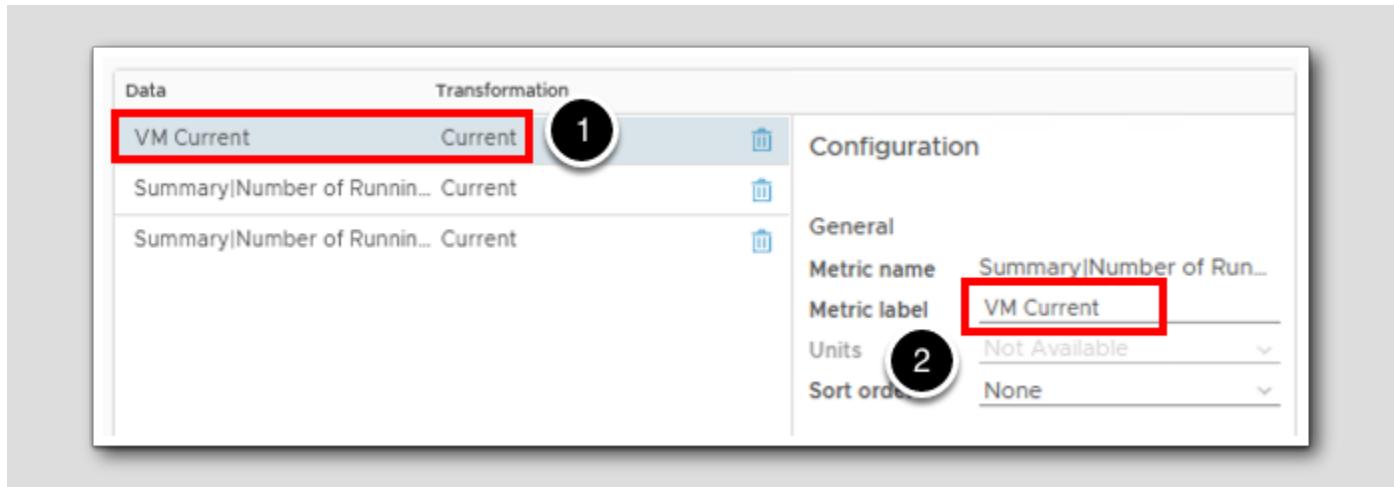
- > Number of VM Operations
- > Reclaimable
- > Reclamation
- > Rightsizing
- > Storage
- Summary
  - Average Cluster Availability (%)
  - Average Running VM Count per ...
  - Maximum Supported VMs
  - Number of Developer Managed ...
  - Number of Kubernetes clusters
  - Number of Namespaces
  - Number of Pods
  - Number of Powered Off VMs
  - Number of Running Hosts
  - Number of Running VMs**
  - Number of Supervisor Clusters

**Bottom Left (Step 2)**

**Right Panel (Step 3)**

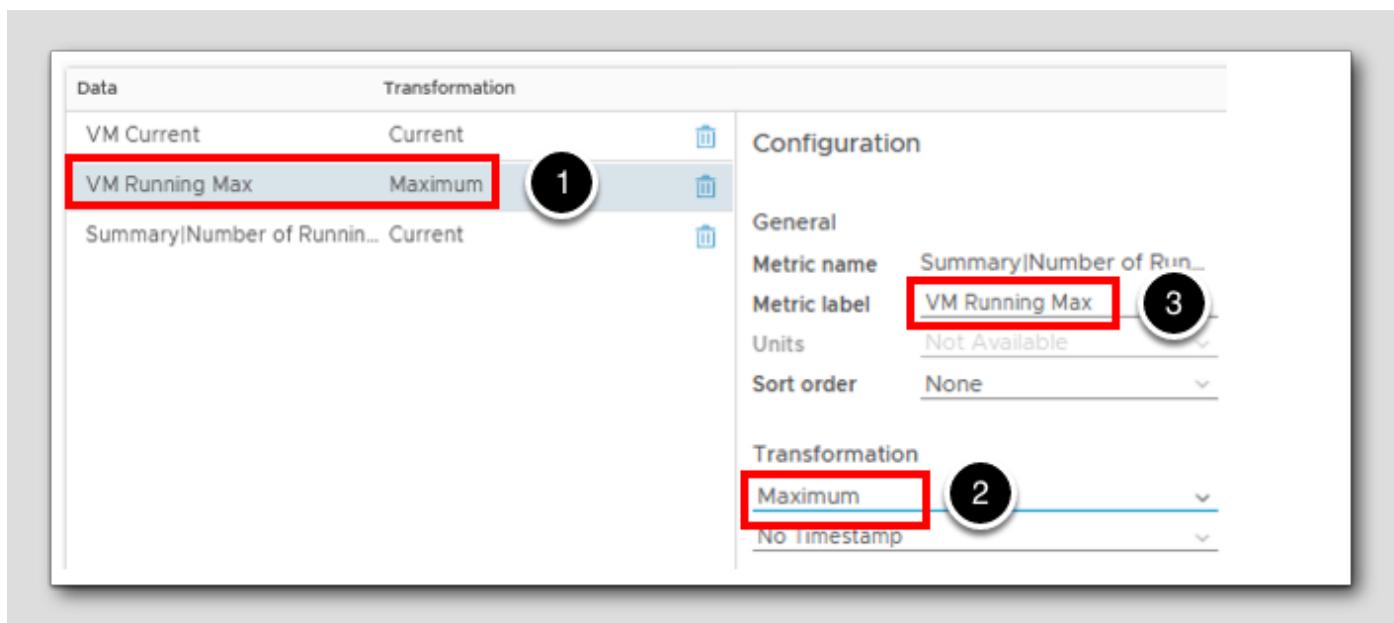
1. Scroll down to see the item Number of Running VMs.  
 2. Double-click Number of Running VMs 3 times.  
 3. Afterwards, you should see 3 items in the window on the right.

## Modify Current Number of VMs



1. Select the 1st Number of Running VMs Metric.
2. In the Metric label field, Type VM Current as the label.

## Add Max Transformation



1. Select the 2nd Number of Running VMs Metric.
2. In the Transformation field, select Maximum in the drop down list.
3. Type VM Running Max for the Metric Label.

## Add Growth Transformation

[369]

The screenshot shows a configuration interface with two main sections: 'Data' and 'Transformation' on the left, and 'Configuration' on the right.

**Data & Transformation:**

Data	Transformation
VM Current	Current
VM Running Max	Maximum
<b>VM Growth</b>	<b>Current</b>

A red box highlights the row for 'VM Growth'. A large black circle with the number '1' is positioned over the 'VM Growth' row.

**Configuration:**

**General**

Metric name	Summary Number of Run...
Metric label	<b>VM Growth</b>
Units	No Units
Sort order	No Order

A red box highlights the 'Metric label' field. A large black circle with the number '2' is positioned over the 'Metric label' field.

**Transformation**

Current
No Timestamp

1. Select the 3rd Data object.
2. Name this data Object VM Growth in the Metric label field.

## Add Growth Transformation Expression

The screenshot shows the 'Add Growth Transformation Expression' configuration screen. On the left, a table lists three datapoints: 'VM Current' (Transformation: Current), 'VM Running Max' (Transformation: Maximum), and 'VM Growth' (Transformation: Expression). The 'VM Growth' row is selected. To the right, the 'Configuration' panel is displayed, divided into 'General' and 'Transformation' sections. In the 'General' section, the 'Metric name' is 'Summary|Number of Run...', 'Metric label' is 'VM Growth', 'Units' is 'No unit', and 'Sort order' is 'None'. In the 'Transformation' section, the 'Transformation' dropdown is set to 'Expression', and the 'Expression Formula' field contains the formula `((last-first)/first)*100`. A red box highlights the 'Expression' dropdown and the formula field, and a red arrow points from step 3 to the 'Transformation' dropdown.

For this datapoint we are adding our own expression for growth. To show growth of VM's per datacenter we will use this expression: `((last-first)/first)*100`. This will give use the percentage of growth in VM for the time period of this view.

1. Change the Transformation field type from current to Expression.
2. Add the expression `((last-first)/first)*100`
3. Optional: If you have many datacenters you can select to sort the list by growth - ascending or descending.

## Preview Source Test

The screenshot shows a VMware vSphere Client window titled "Preview source: vcsa-01a.corp.vmbeans.com". The window displays a table with one item, circled with a black marker and labeled "1". The table has columns: Name, VM Current, VM Running Max, and V. The single row contains the value "RegionA01" in the Name column, and "17" in both the VM Current and VM Running Max columns. A red box highlights the "RegionA01" entry. At the bottom right of the table, it says "1 - 1 of 1 items".

## Preview Data

A screenshot of a software interface titled "Preview source: vcsa-01a.corp.vmbeans.com". The interface displays a table with three columns: "Name", "VM Current", and "VM Running Max". There is one row in the table, labeled "RegionA01", with values "17" in all three columns. A dropdown menu icon is visible at the top right of the table area.

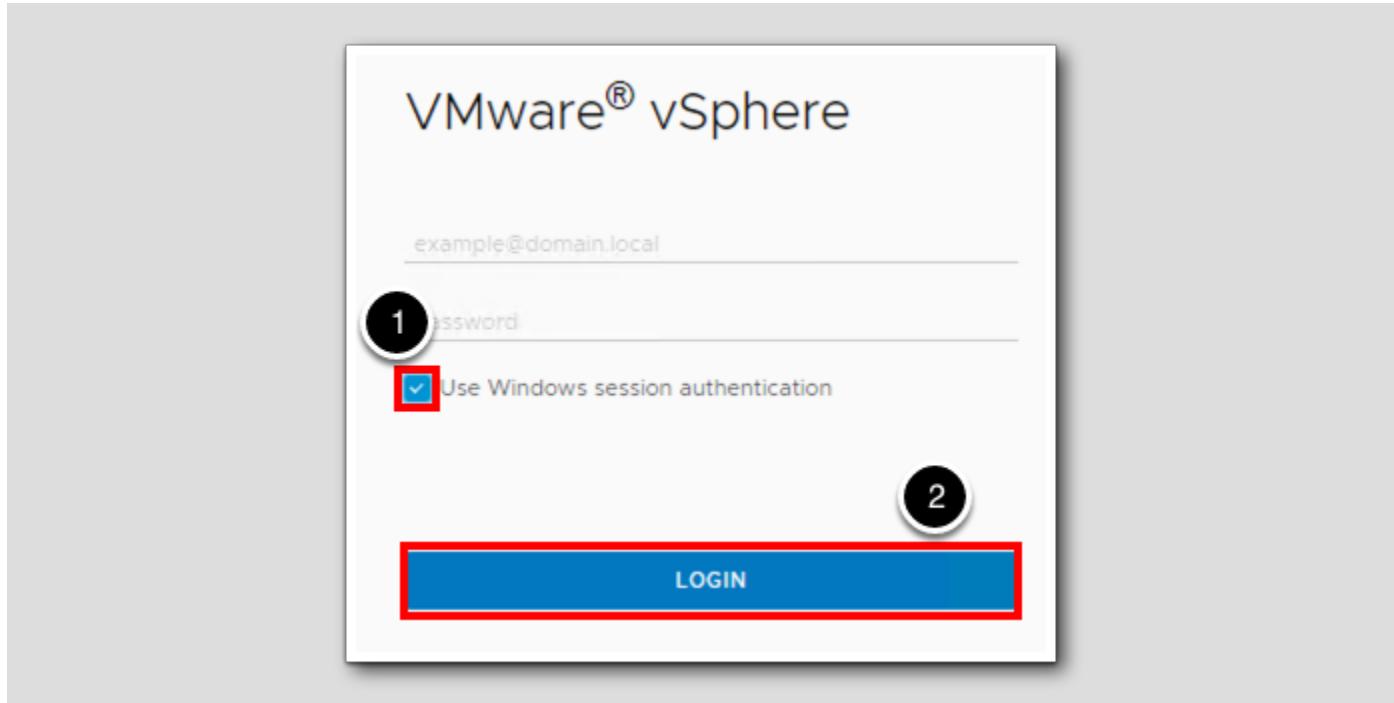
When we look at the preview data, it is always best to ensure the view is working correctly, and it is the right data we want to represent. Notice that the VM current and Max are the same, and we have no VM growth. Now we will make a change in the environment to make our new expression work!

## Open vCenter in a new tab

A screenshot of a browser toolbar. Step 1 highlights the "+" button to open a new tab. Step 2 highlights the "vCenter" bookmark icon. The toolbar also shows other bookmarks like "Views - VMware Aria Operations", "Aria Automation", "Aria Operations", and "Aria Operations for Logs". The URL bar shows "https://aria-ops.co".

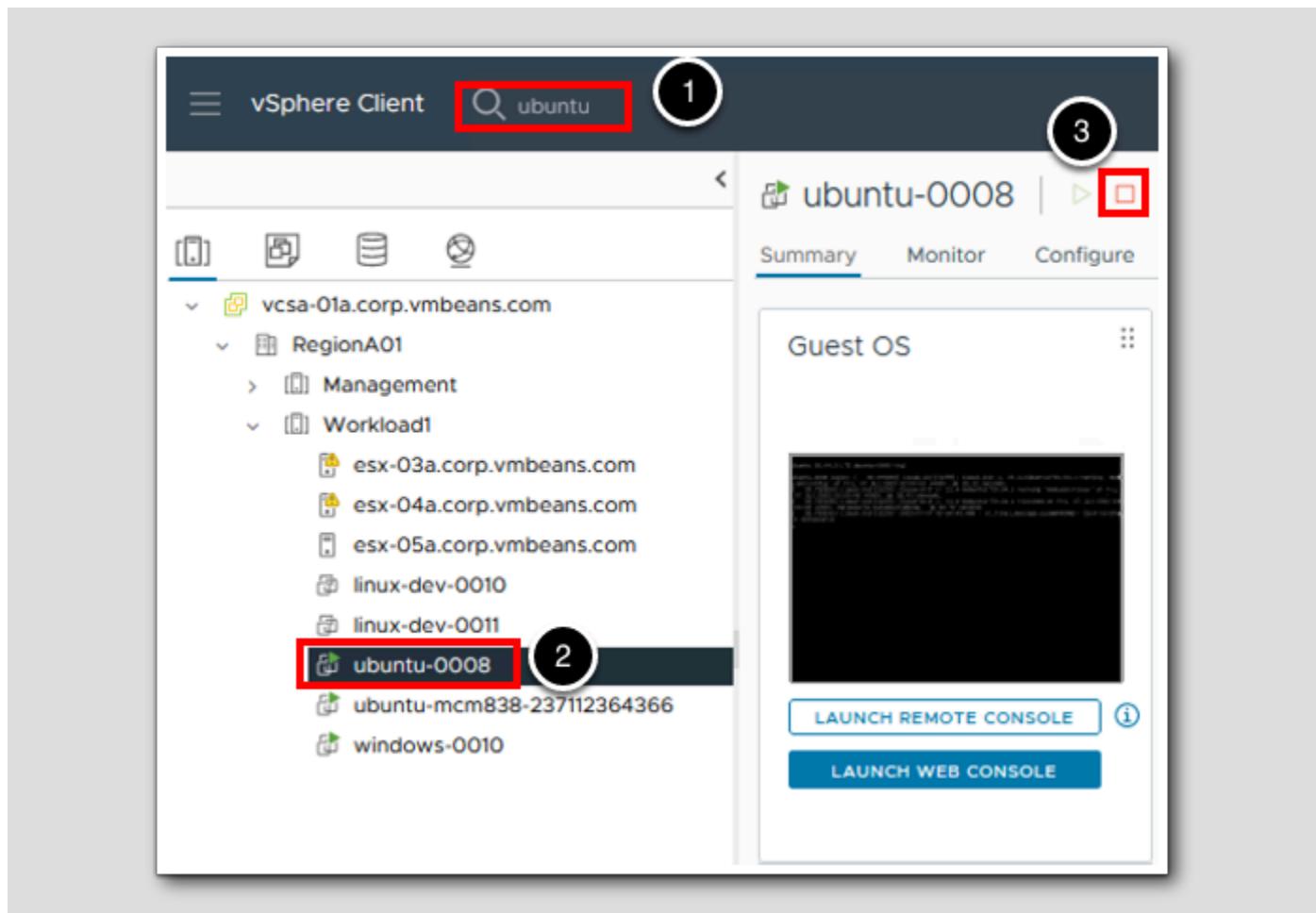
1. Select a **new Tab** to open a new Chrome tab.
2. Click on the **vSphere Client** button in the bookmarks bar.

## Log into vCenter



1. Select Use Windows session authentication.
2. Select Login.

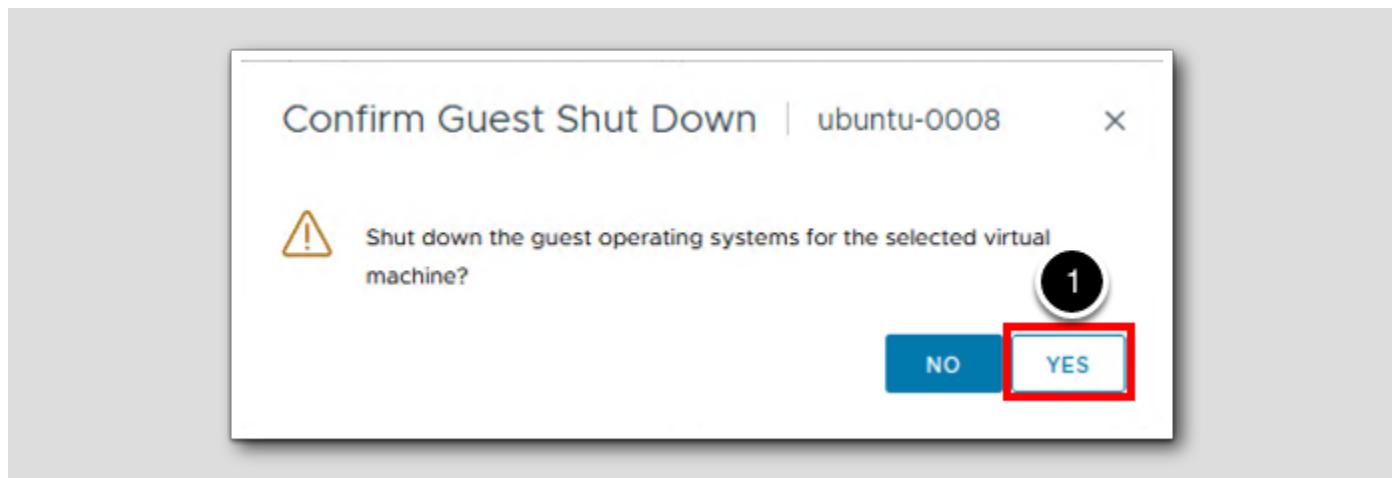
## Power Off VM



1. In the search bar type ubuntu.
2. Select the ubuntu-0008 VM.
3. Select Shut Down Guest OS.

## Confirm Power Off

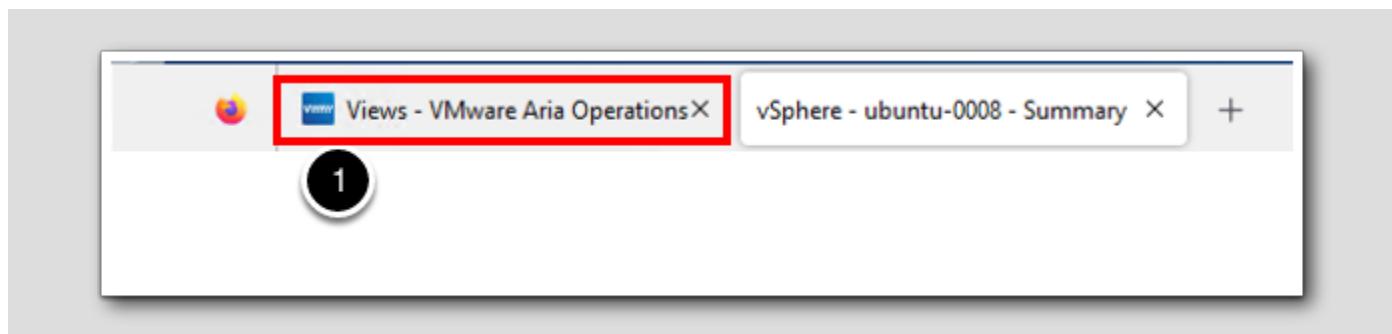
[376]



1. Select YES to power off the VM.

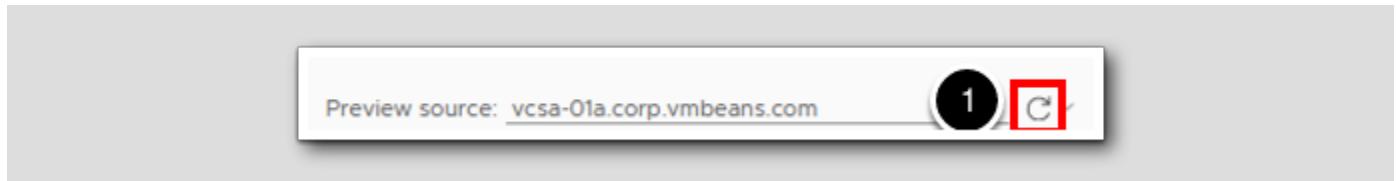
## Switch back to vRealize Operations

[377]



1. Select the Views - VMware Aria Operations Tab to return to Aria Operations.

## Refresh the View



1. Select the refresh button to preview the source again.

Note - this may take 1-2 minutes for the next collection cycle to refresh content.

## Preview Final Data

Name	VM Current	VM Running Max	V
RegionA01	16	17	4

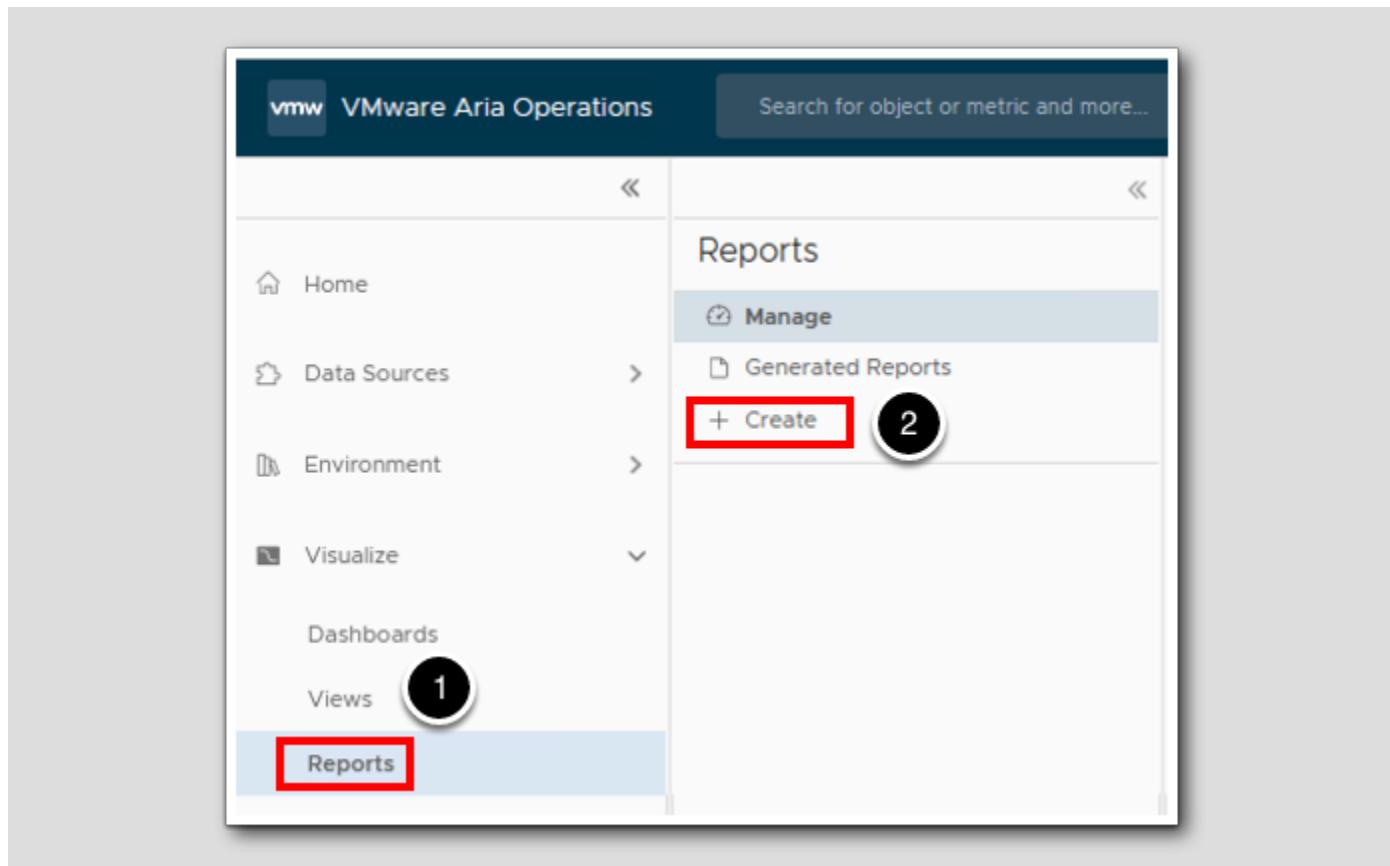
1

2

1. Now we can see that the amount of VM's running has decreased from the max value and the VM Growth has also decreased.
2. If you are comfortable with the data, click CREATE.

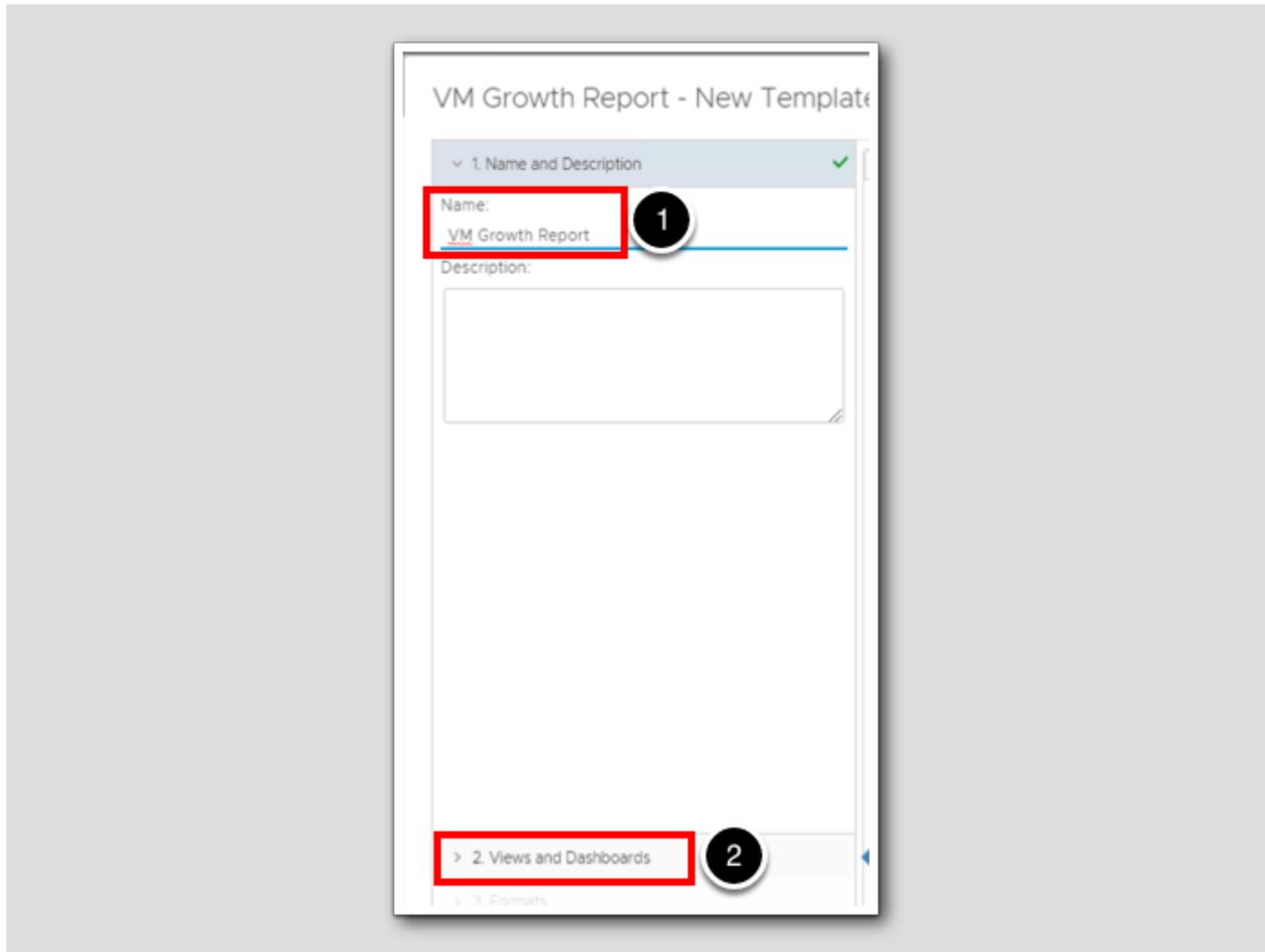
## Make a Growth List Report

[380]



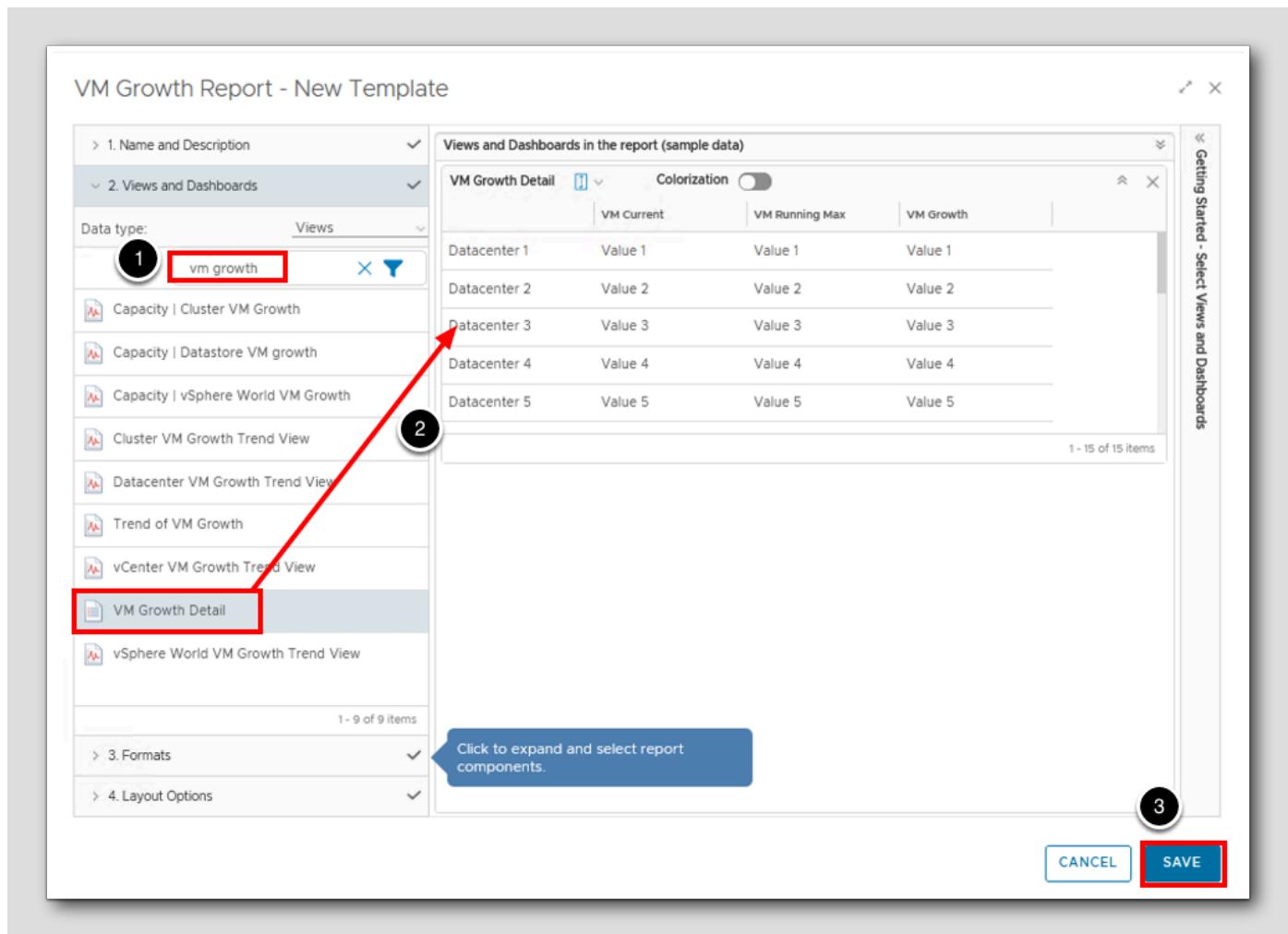
1. Click Reports.
2. Then select + Create to create a new report.

## Name the Report



1. Name the Report VM Growth Report.
2. Select 2. Views and Dashboard.

## Add the VM Growth Detail view to the report



## Locate the Newly Created Report

Name	Description	Subject	Generat...	Schedules	Last Modif...	Li...
Optimization Report - VMware Tools Status	Virtual Machine	0	0	6/16/23 10: -		
VM Growth Report	Datacenter	0	0	11:46 AM -		
VMC Configuration Maximums	Alert, Cluster Comp...	0	0	6/16/23 10: -		

You will now see the list of Reports that have been created in vRealize Operations.

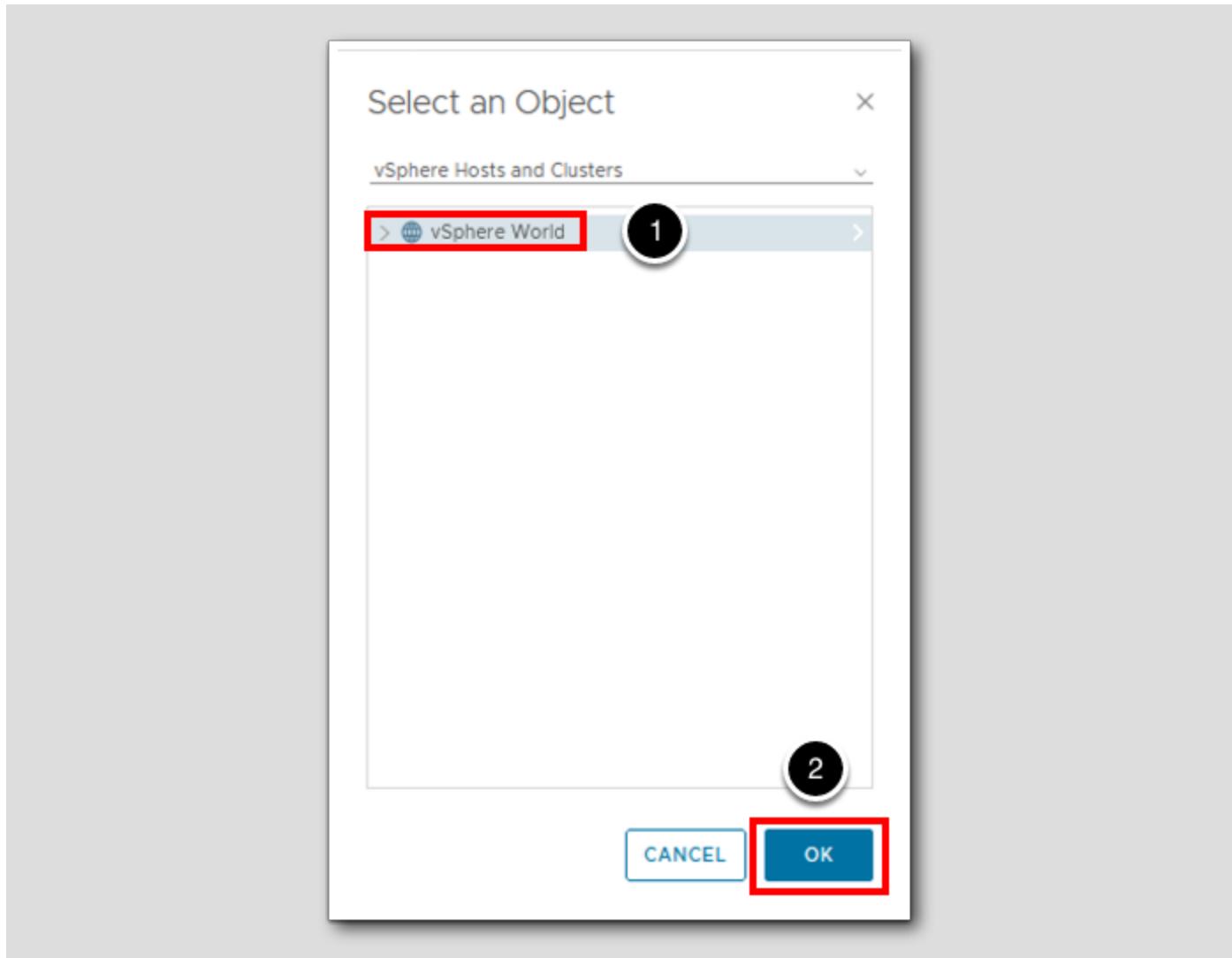
1. In the Quick Filter, type **vm** and then hit **Enter** to filter the list.
2. On the VM Growth Report, click the 3 dots beside the checkbox to open the actions menu.

## Run the Report

- Run
- Schedule
- Edit
- Delete
- Clone
- Export

1. Select Run to run the Growth Report.

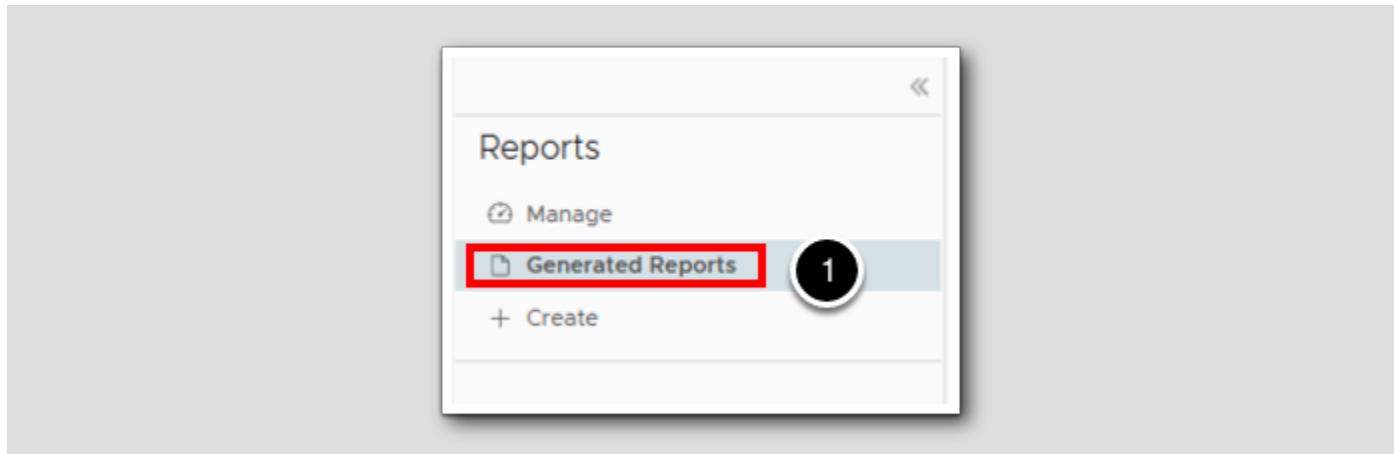
Select Object to run the report



1. Select vSphere World.

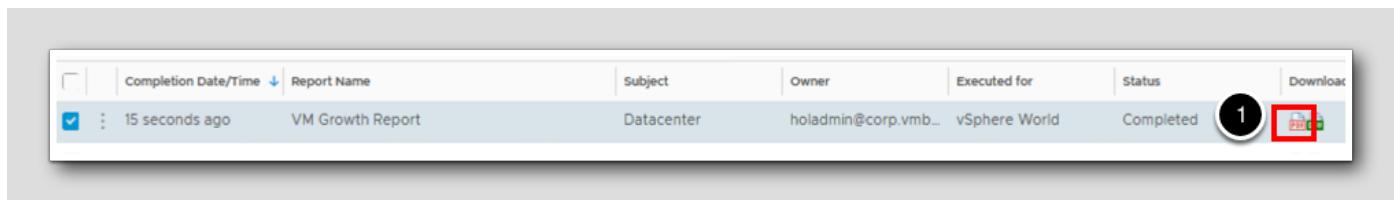
2. Click OK.

## View the Report



1. Select Generated Reports.

## PDF or CSV



1. We have the option to download the report in either PDF or CSV format, for this exercise select the red PDF icon (note you may have to wait a moment for the report to finish).

## Review the Report

[388]

The screenshot shows a report titled "1. VM Growth Detail" with a timestamp of "Jul 03, 2023 11:52 AM - Jul 10, 2023 11:52 AM (GMT-07:00)". The report displays a single row of data in a table:

Name	VM Current	VM Running Max	VM Growth
RegionA01	15	17	36.36

The report should automatically open a new browser tab and default to it. Now we have a report that includes detail about the growth of VM's in each DataCenter. We can send this to leadership to identify the growth trends each month, each week, or every day!

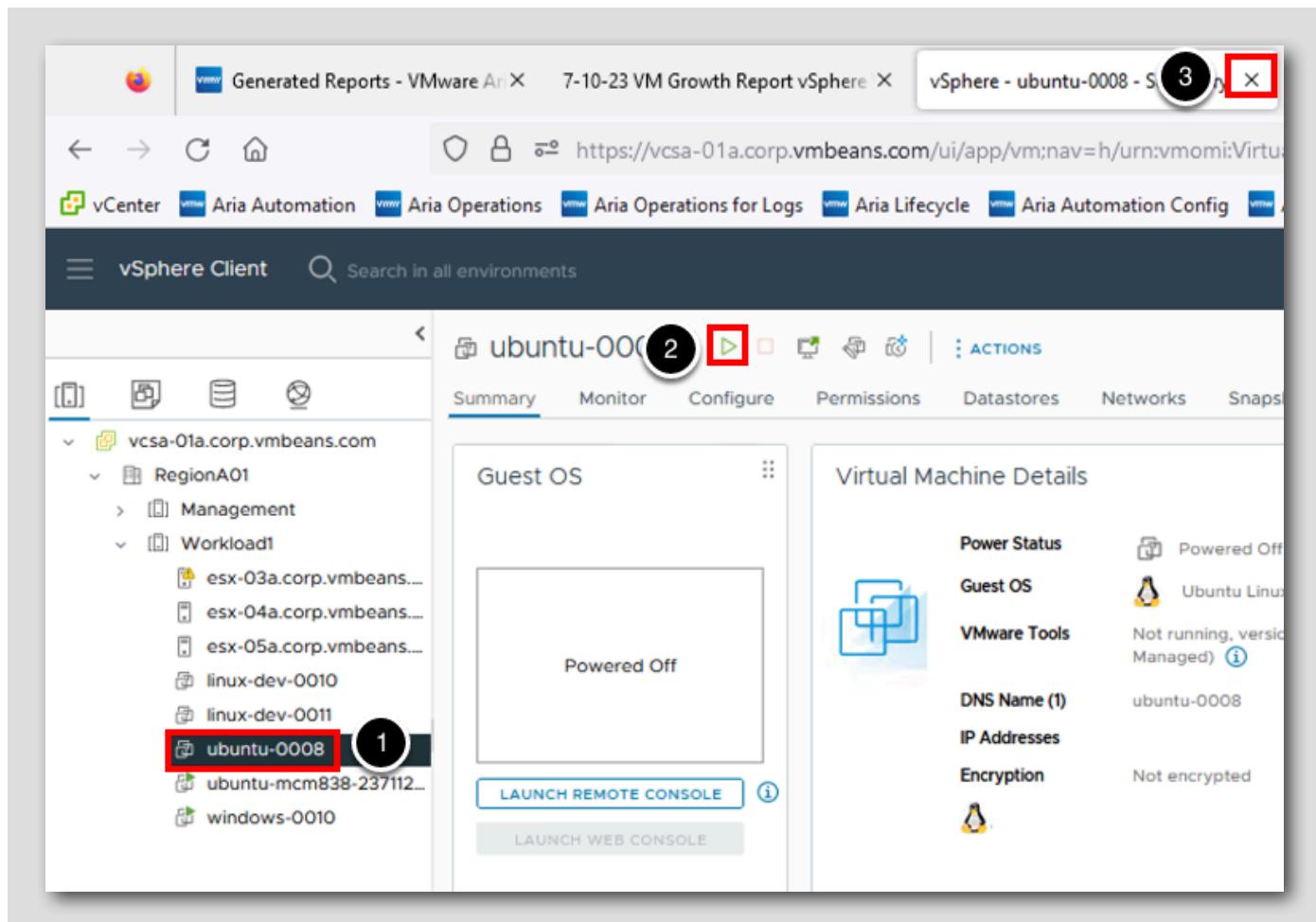
## Switch Back to vCenter

[389]

The screenshot shows a browser window with several tabs open. One tab is highlighted with a red box and labeled "vSphere - ubuntu-0008 - Summary". The URL for this tab is "file:///C:/Users/Administrator/Downloads/7-10-23 VM Growth Report vSphere V...". Other tabs visible include "Generated Reports - VMware Aria", "7-10-23 VM Growth Report vSphere", and "1 / Growth Report vSphere V...". The browser toolbar at the bottom includes icons for back, forward, search, and refresh, along with links to "Aria Automation", "Aria Operations", "Aria Operations for Logs", "Aria Lifecycle", "Aria Automation Config", and "Aria A...".

1. Return to the vCenter by clicking back to the open vCenter Tab. If you closed this tab, you will need to open a new tab and log back into vCenter.

## Start the ubuntu-0008 VM



Let's restart the ubuntu-0008 VM that we shutdown earlier because this VM will be needed in future lessons.

1. Click on the VM **ubuntu-0008**.
2. Click the green **Start** icon to restart this VM (or right-click and select Power On).
3. You may now click the **x** on the vCenter tab to close it.

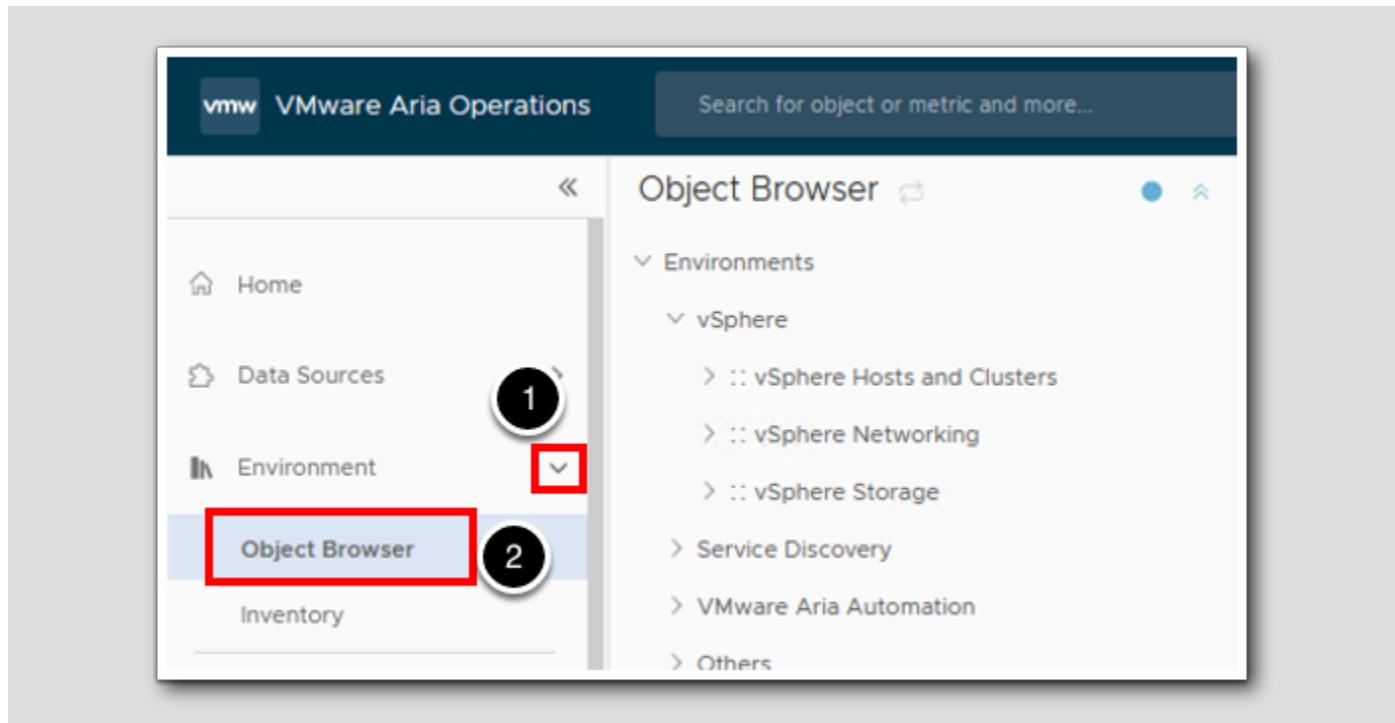
## Lesson End

This concludes the Create a View that shows VM Growth Lesson.

## Create a View with Distribution Data

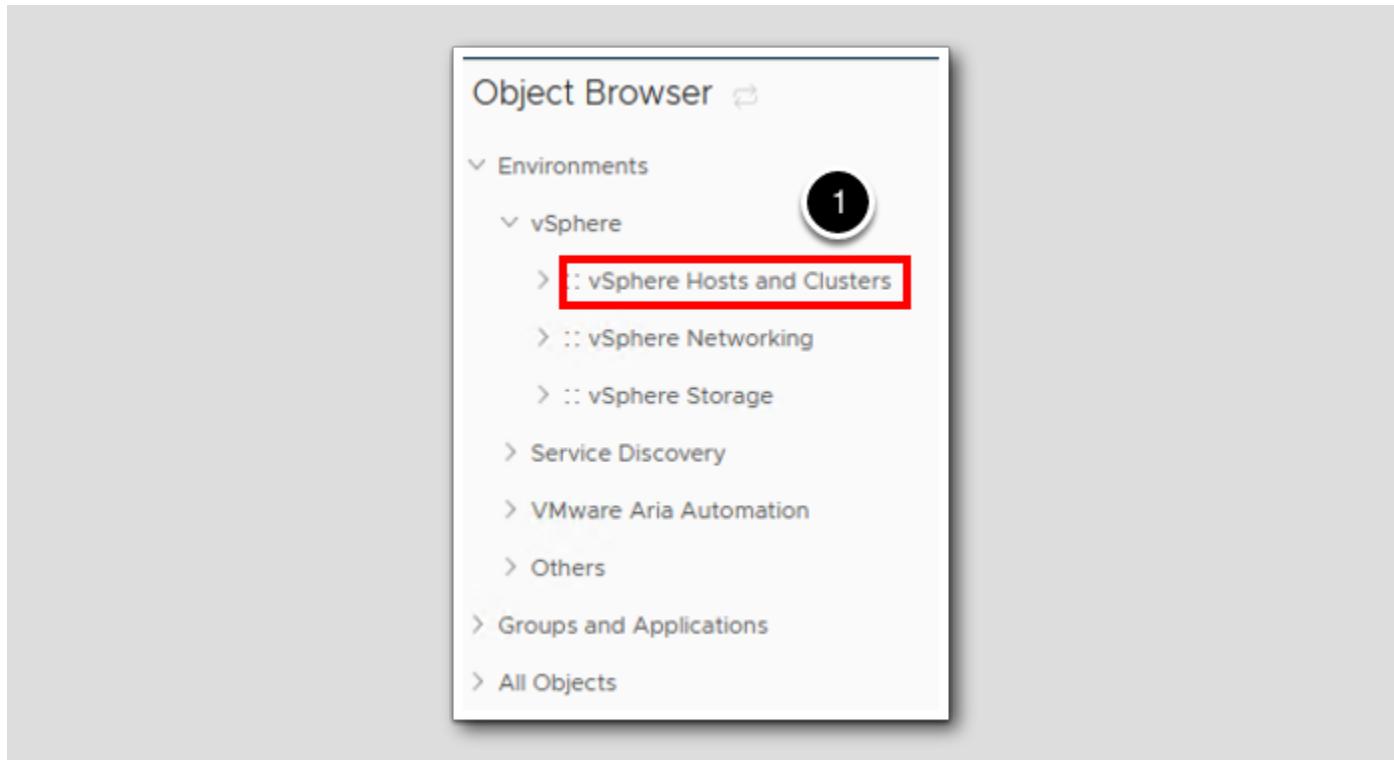
If you've completed the previous lessons in this module, we have created various views. In this lesson, we continue creating custom views with the Distribution view. The distribution view gives us the ability to create pie charts based on data from selected object type.

### Go to Environment



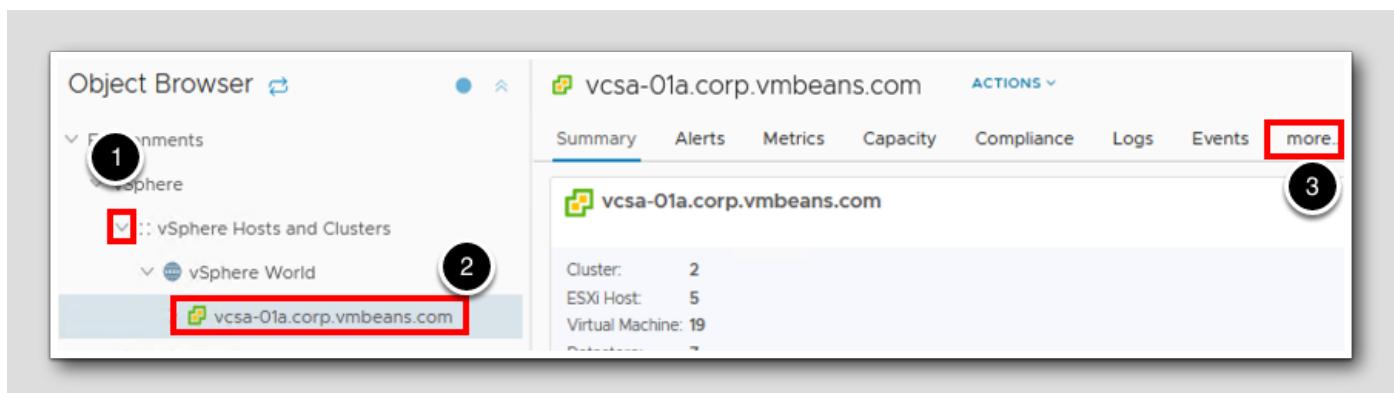
1. Expand Environment.
2. Click on Object Browser.

## Hosts and Clusters



1. Click on vSphere Hosts and Clusters.

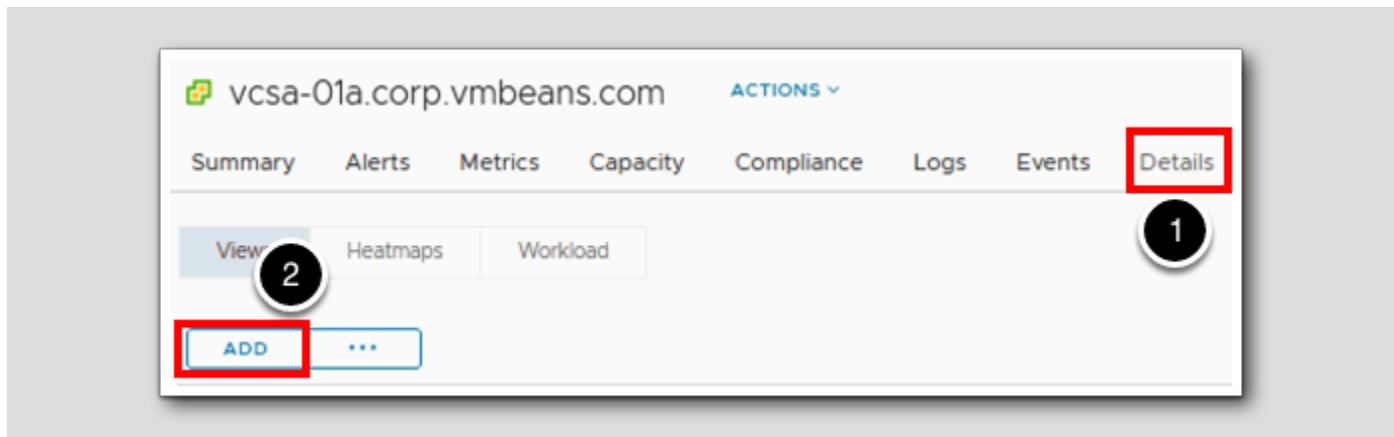
## Select a vCenter Server



1. Expand vSphere World by clicking the chevron to the left of the text.
2. Select vCenter Server vcsa-01a.corp.vmbeans.com.
3. Click on more...

## Create a View

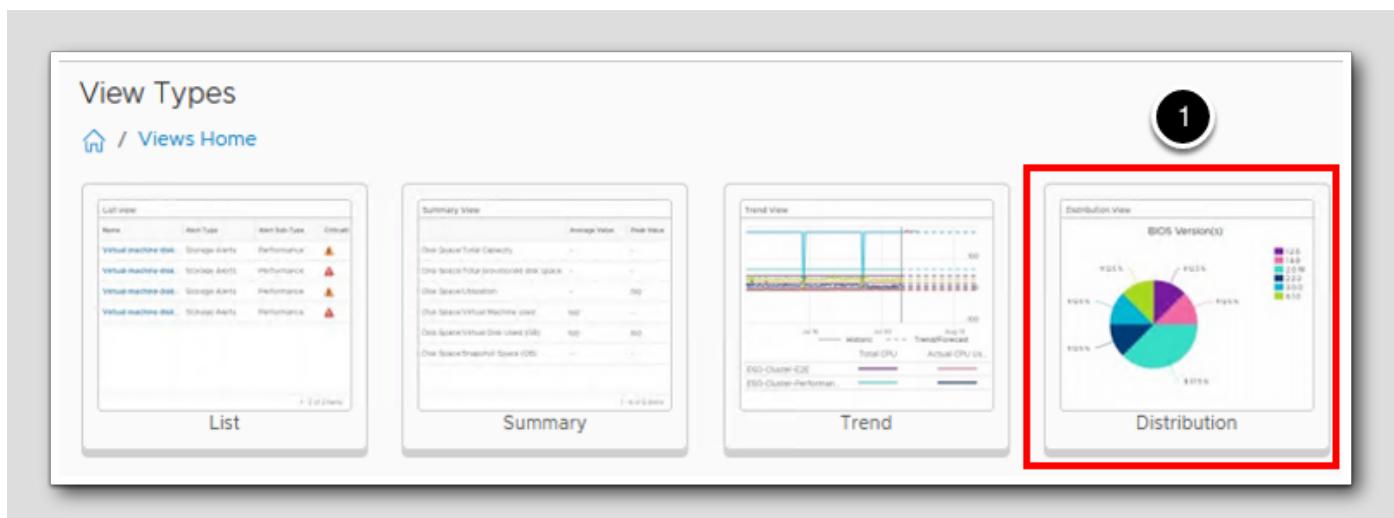
[396]



1. Click on Details.
2. Click ADD to create a new view.

## View Type

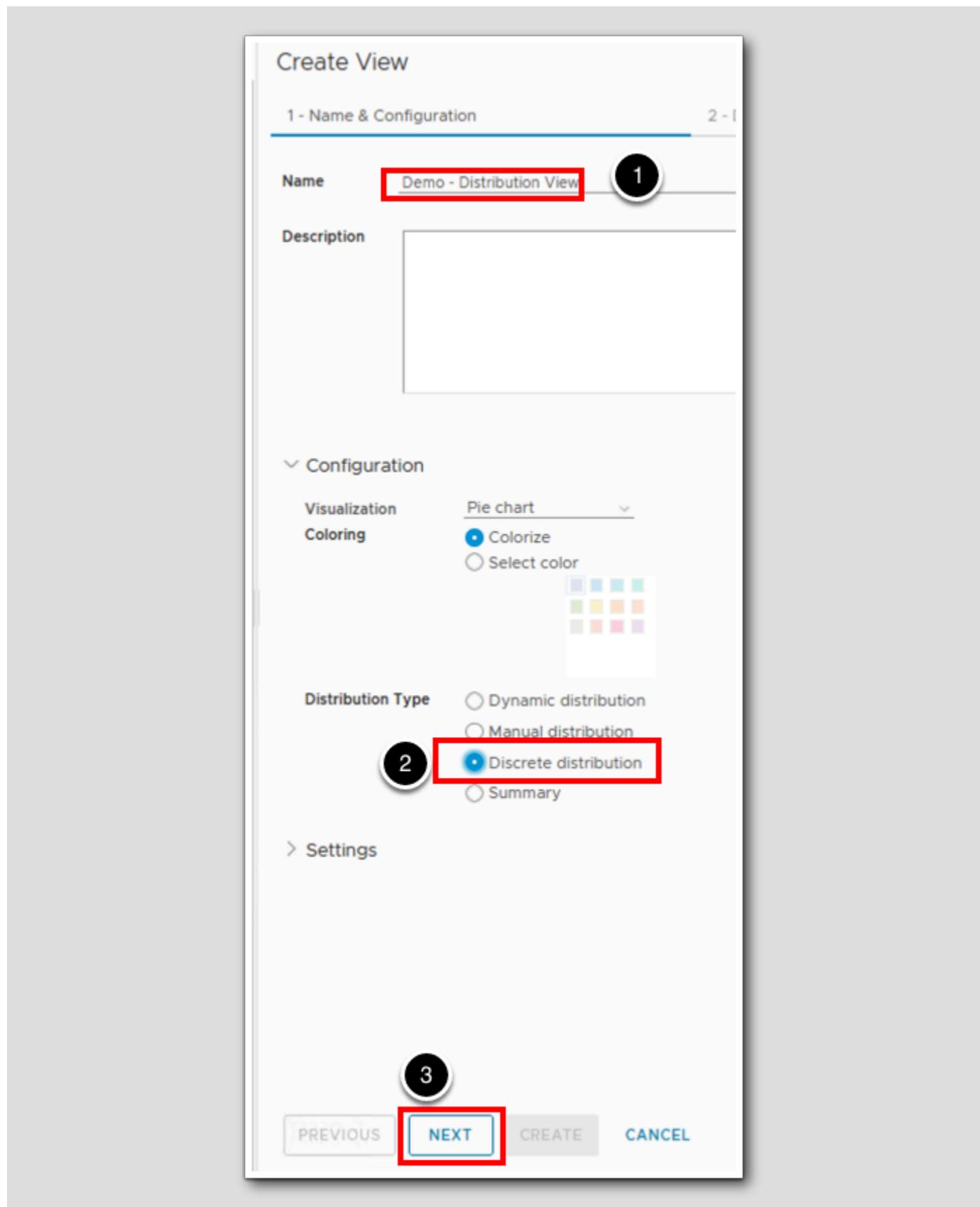
[397]



Click **Distribution** as the view type.

Enter the View name

[398]

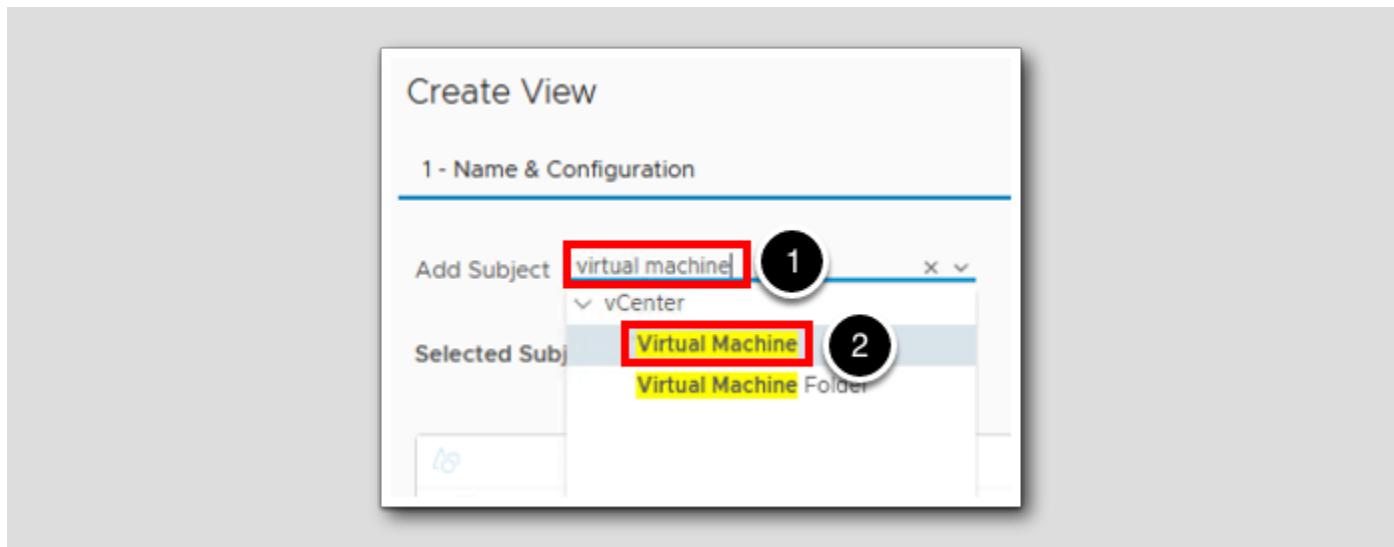


For this lesson we will use a **Discrete distribution** which allows us to specify the number of buckets in which VMware Aria Operations distributes the data. If you increase the number of buckets, you can see more detailed data

1. Enter the view name **Demo - Distribution View**.
2. Click **Discrete distribution**.
3. Click **NEXT**.

### Add Virtual Machines as the subject

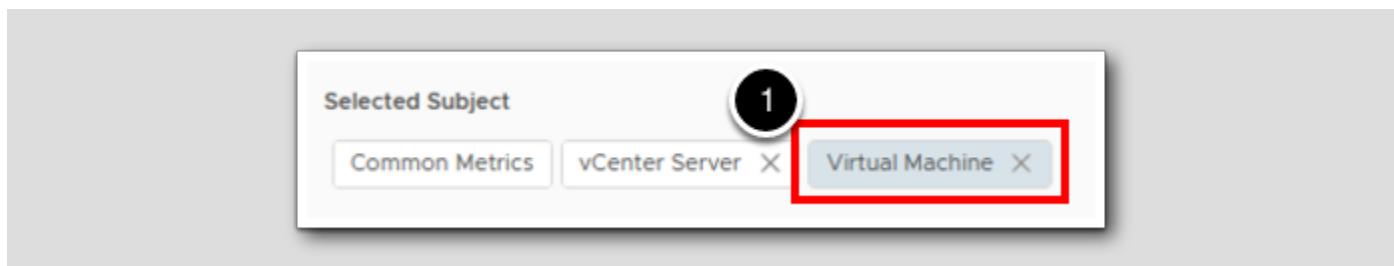
[399]



1. In the Add Subject line, start typing virtual machine.
2. Click Virtual Machine when it auto populates below.

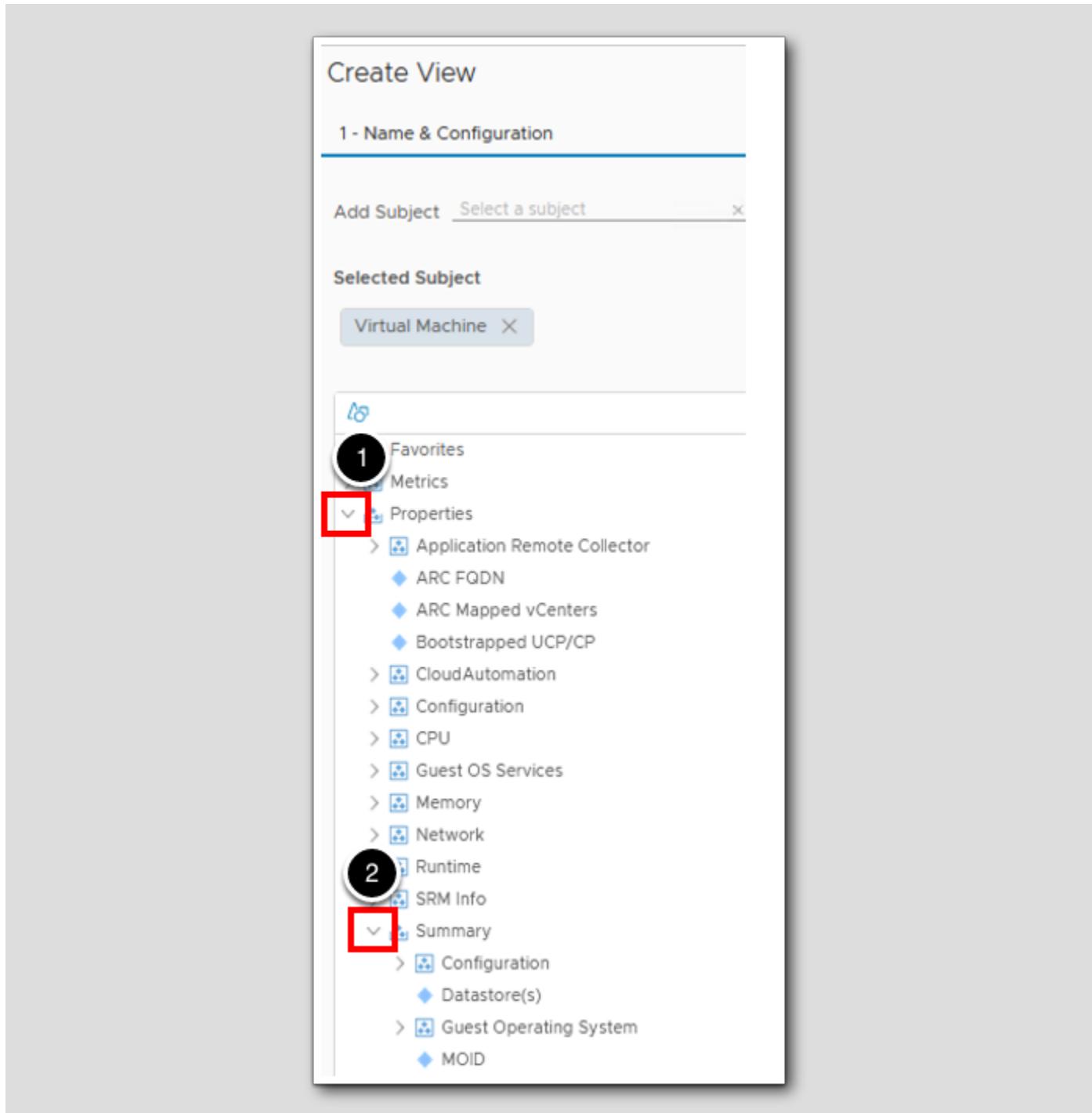
### Select Virtual Machine as the Subject

[400]



1. Select Virtual Machine.

## Select Properties

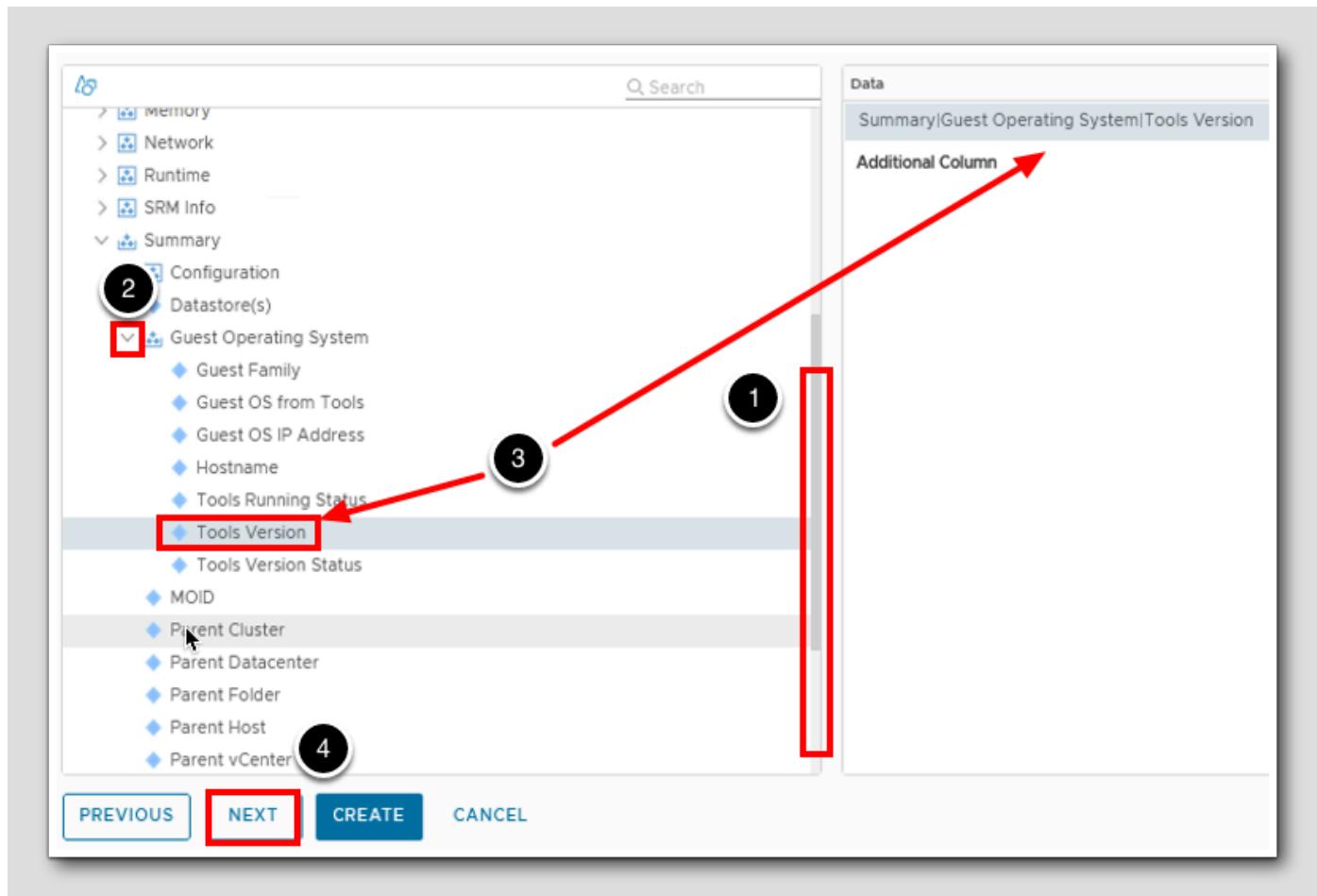


This time we will be selecting from the Properties list.

1. Expand Properties.
2. Expand Summary.

## Select a Property

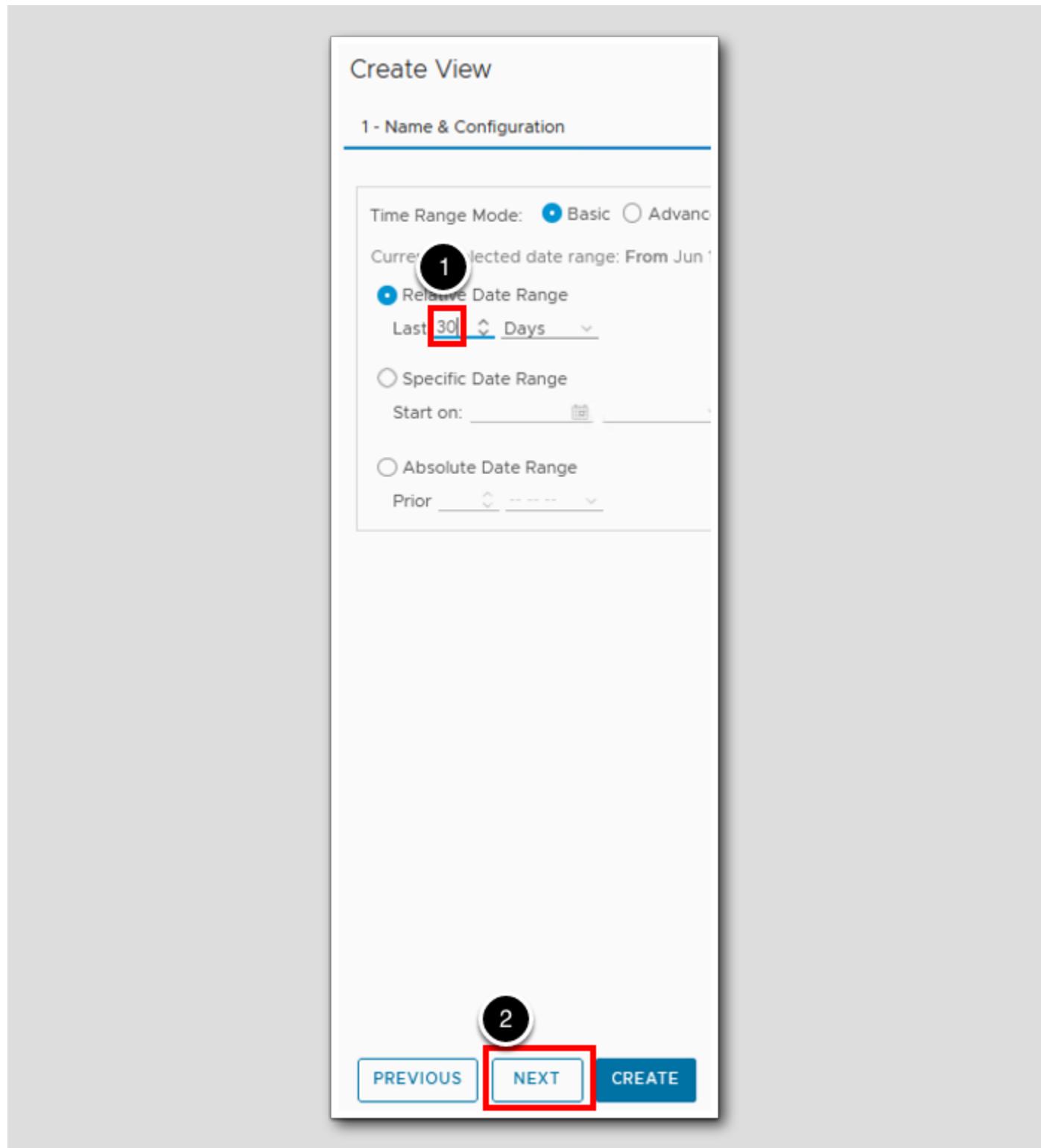
[402]



1. Scroll down so we can see the Guest Operation System Item under the Summary group.
2. Expand Guest Operating System.
3. Double-click on Tools Version to add it to the Data list on the right side of this window.
4. Click NEXT.

## Time Settings

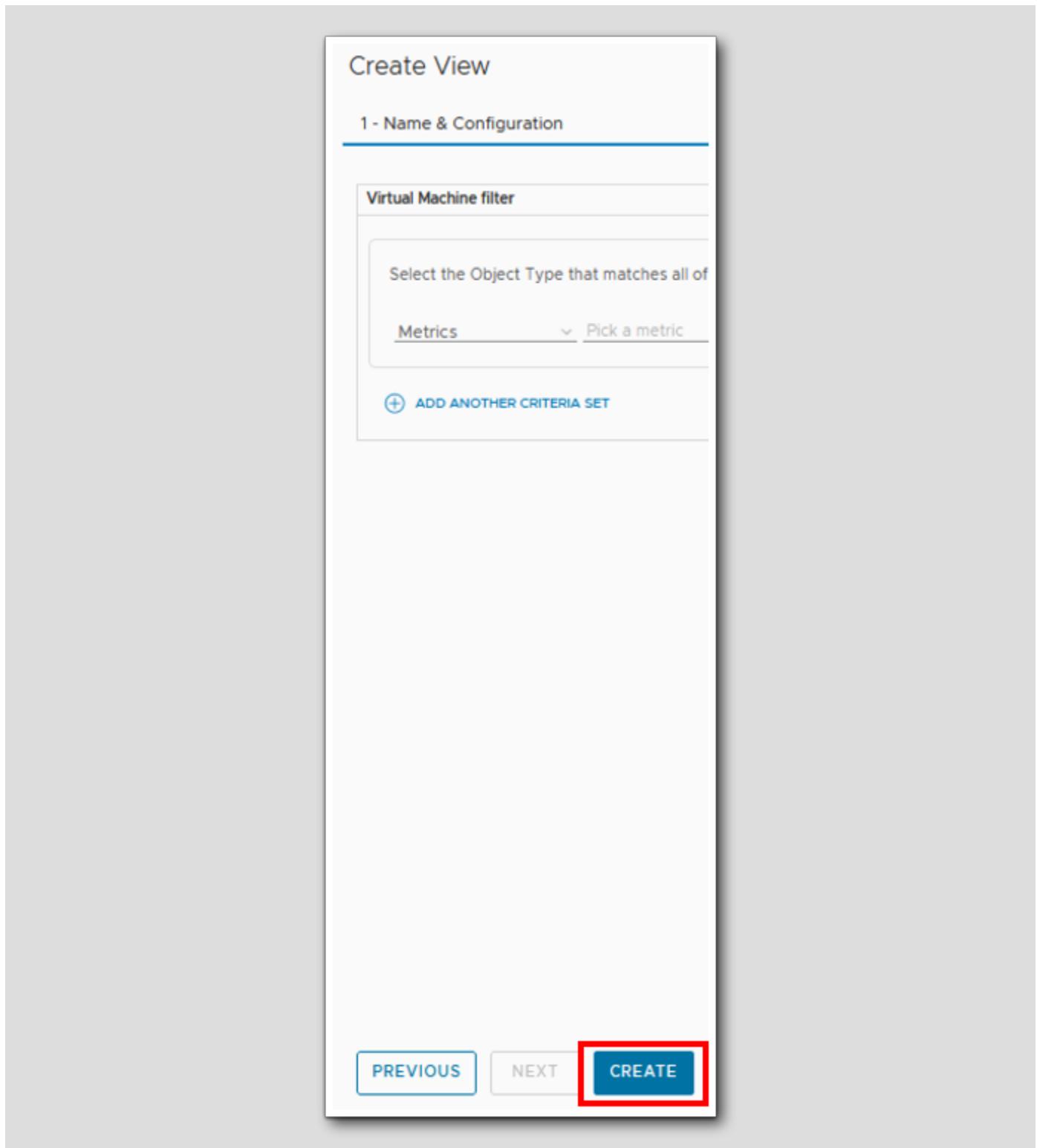
[403]



1. Change Relative Date Range to Last 30 Days.
2. Click **NEXT**.

Filter

[404]

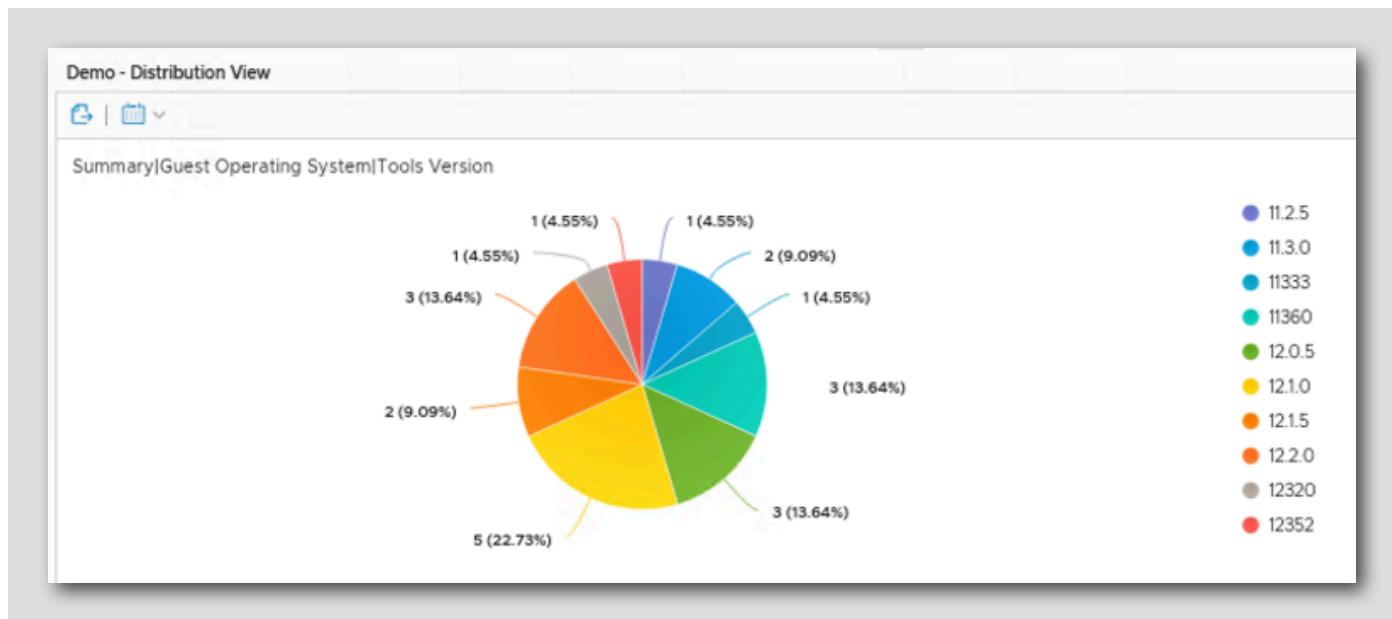


For this lesson we will not filter on any criteria

1. Click CREATE.

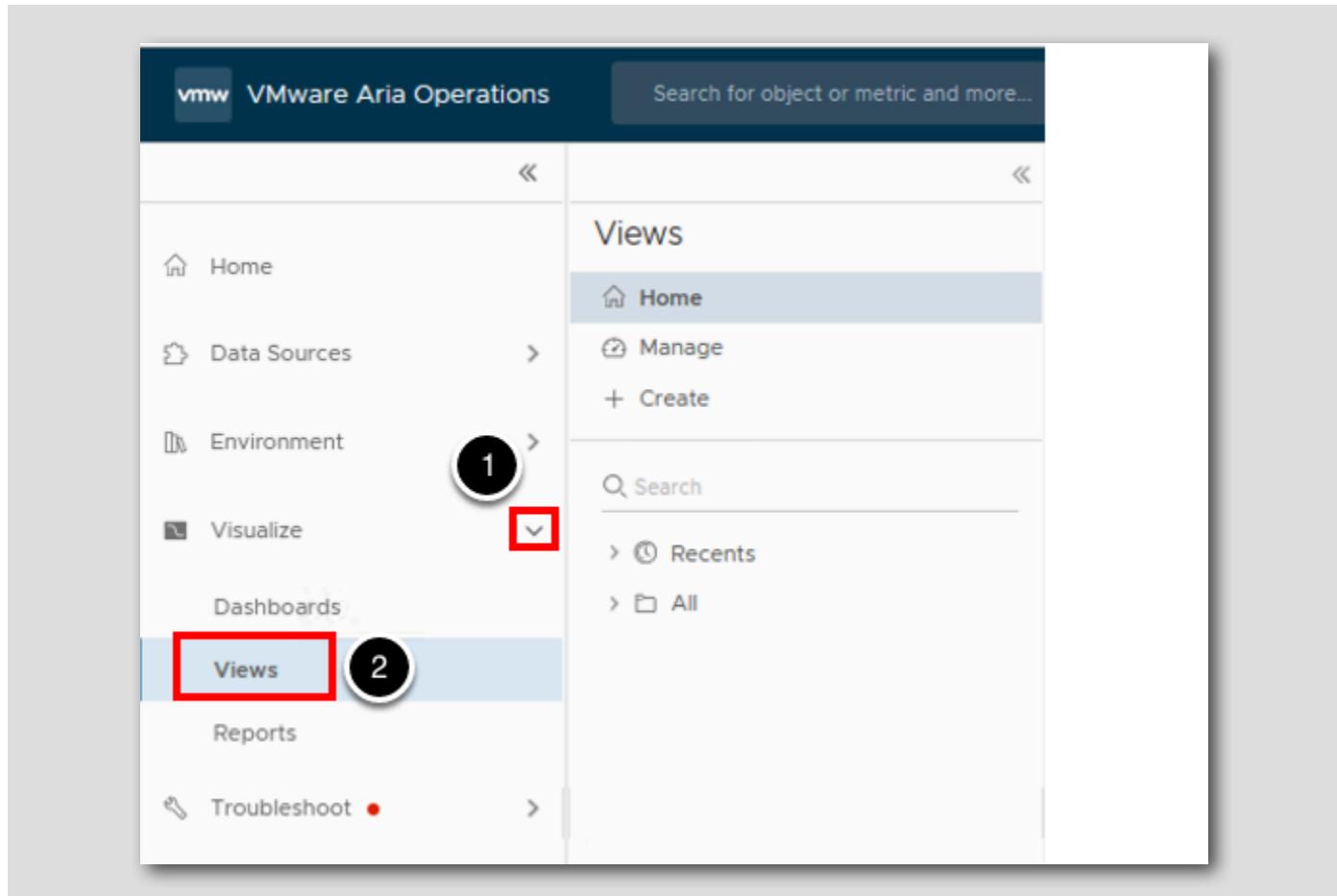
## View Report Output

[405]



We can now see the results of our new View for the 'vcsa-01a.corp.vmbeans.com' vSphere environment that we selected in the beginning of this lesson. But what if we have multiple environments that we want to look at and inspect individually? To do that we can go to the main views page and then select the environment we want to use as the source to create this view. In the next steps, we'll walk through this.

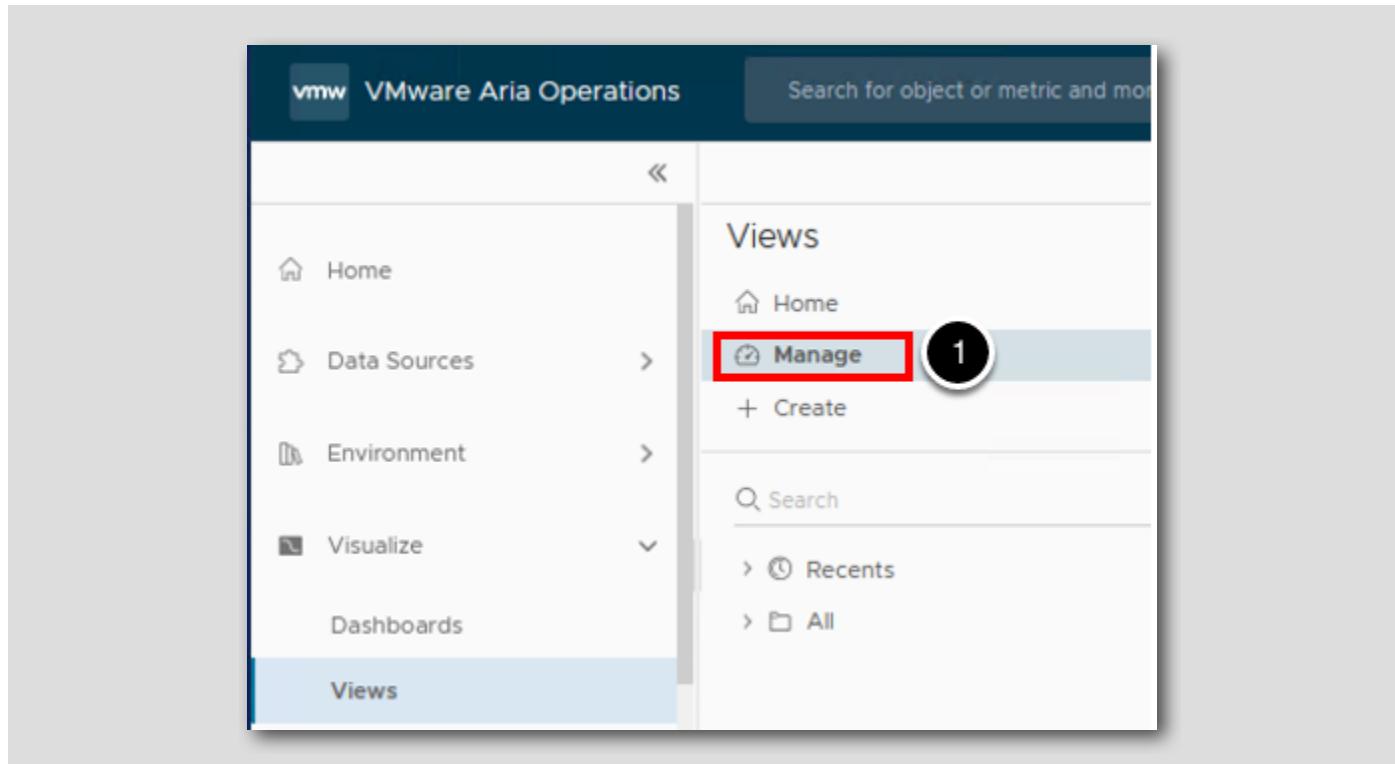
## Go to Views



1. Expand Visualize.

2. Click Views.

## Open Manage View



1. Click on **Manage** to open the list of Views.

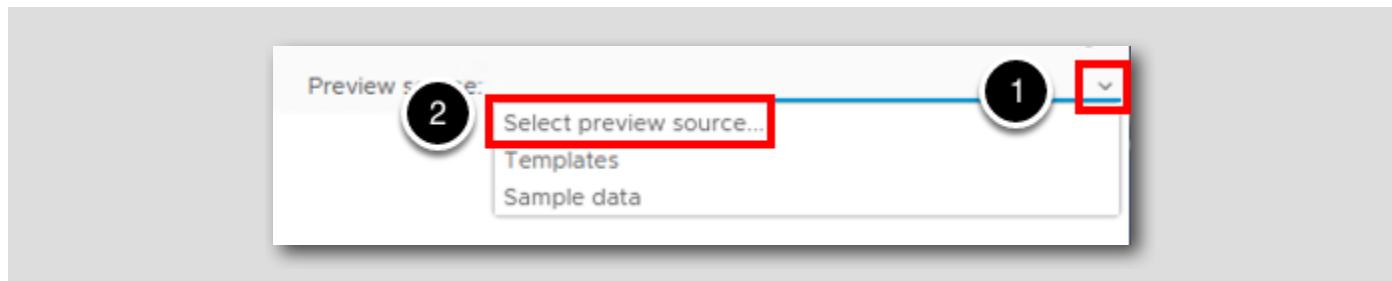
## Find our Newly Created View

Views				
	<b>ADD</b>	...		
	Name	Type	Description	Subject
<input checked="" type="checkbox"/>	Demo - Distribution View		Distribution	Virtual Mac
<input type="checkbox"/>	Demo - Trend View		Trend	Virtual Mac

1. In the quick search filter, type demo and hit Enter.
2. Click on the text Demo - Distribution View to open the View.

## Select Preview Source

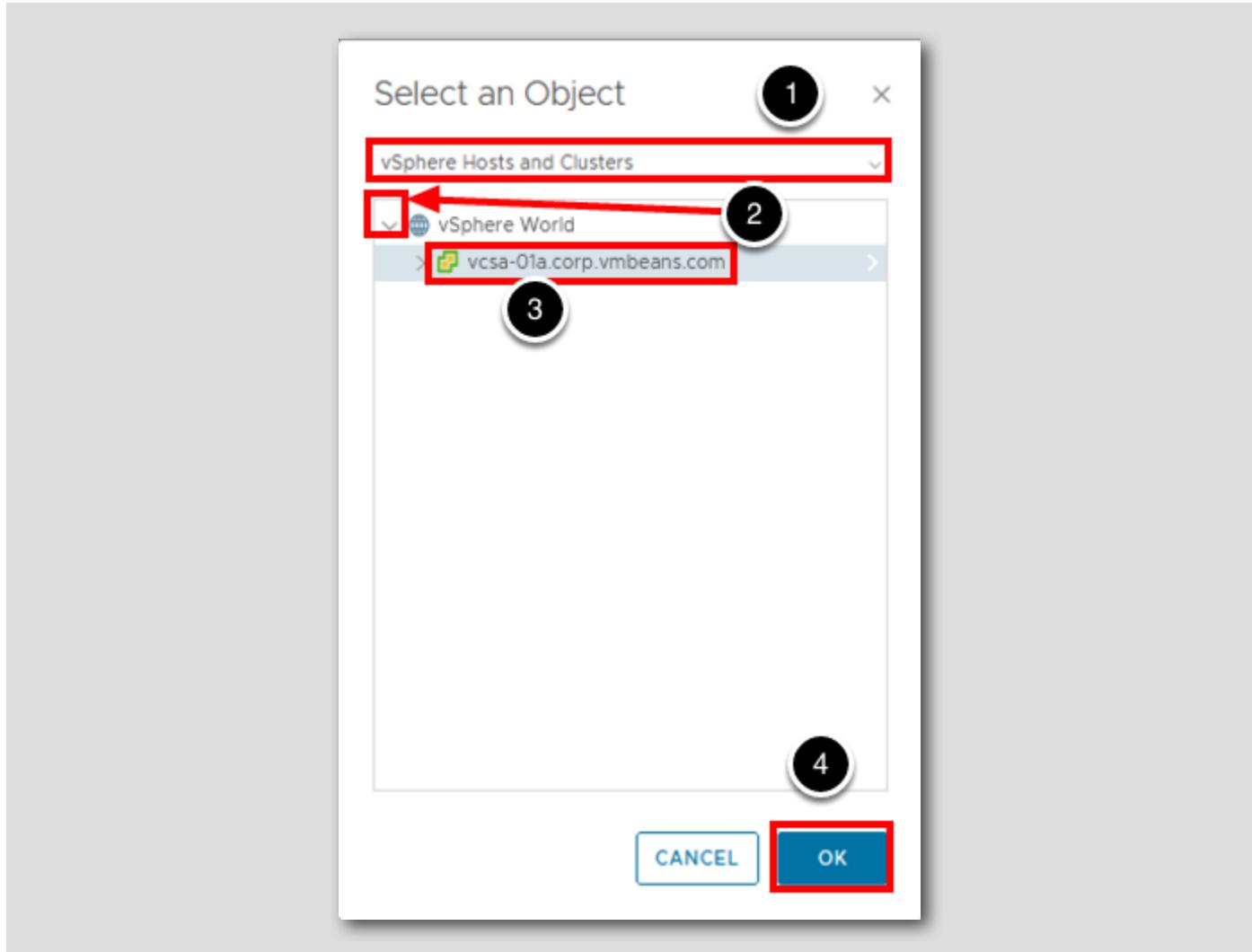
[409]



Our view may default to a source we don't want to see.

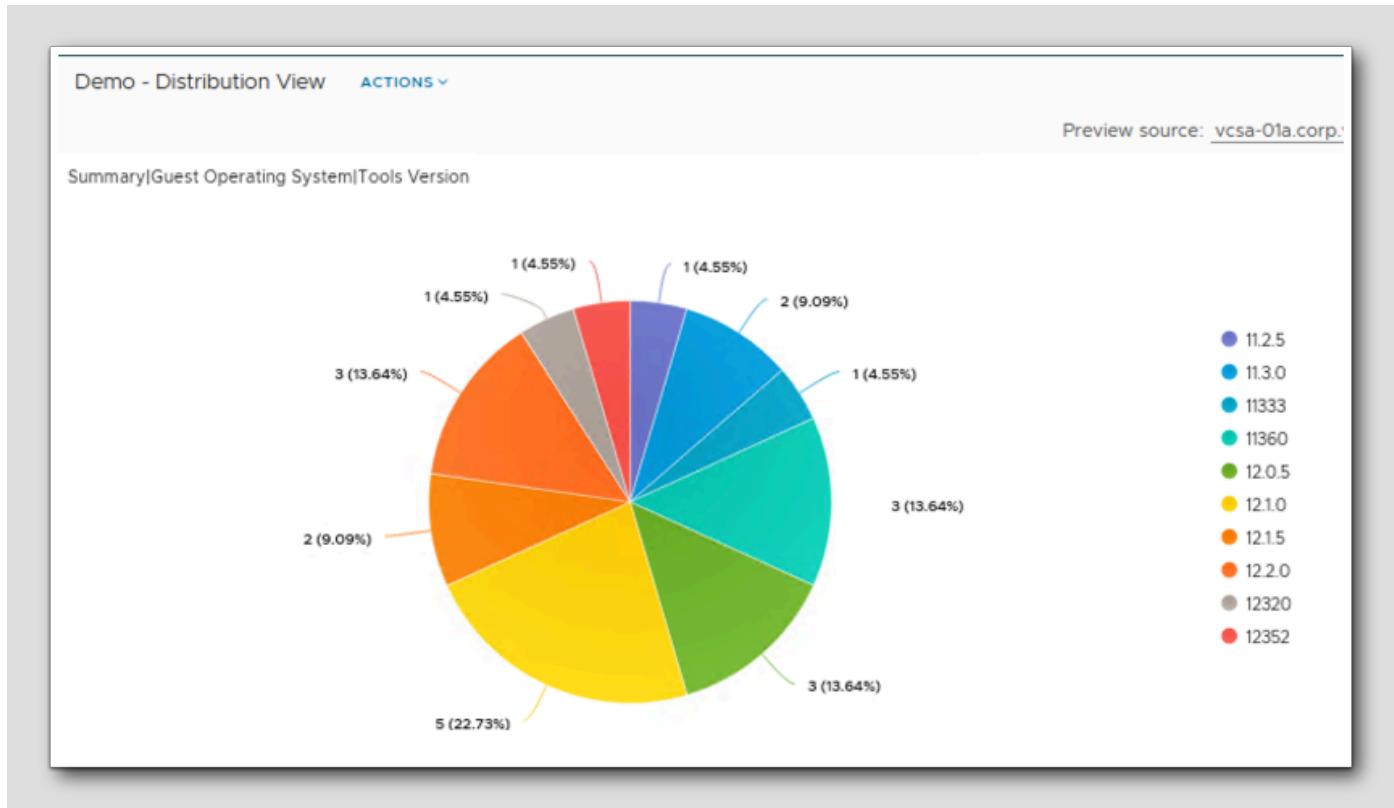
1. Expand Preview source in the top right-hand corner of the window.
2. Click on Select Preview source...

## Select the vcsa-01a.corp.vmbeans.com Object



1. In the drop-down, ensure vSphere Hosts and Clusters is selected. If it isn't expand the field and select vSphere Hosts and Clusters.
2. Expand vSphere World.
3. Click vcsa-01a.corp.vmbeans.com to select that object as the preview source for our new view.
4. Click OK.

## View Results



We will now have a distribution of the VMware Tools versions in the environment!

## Lesson End

[412]

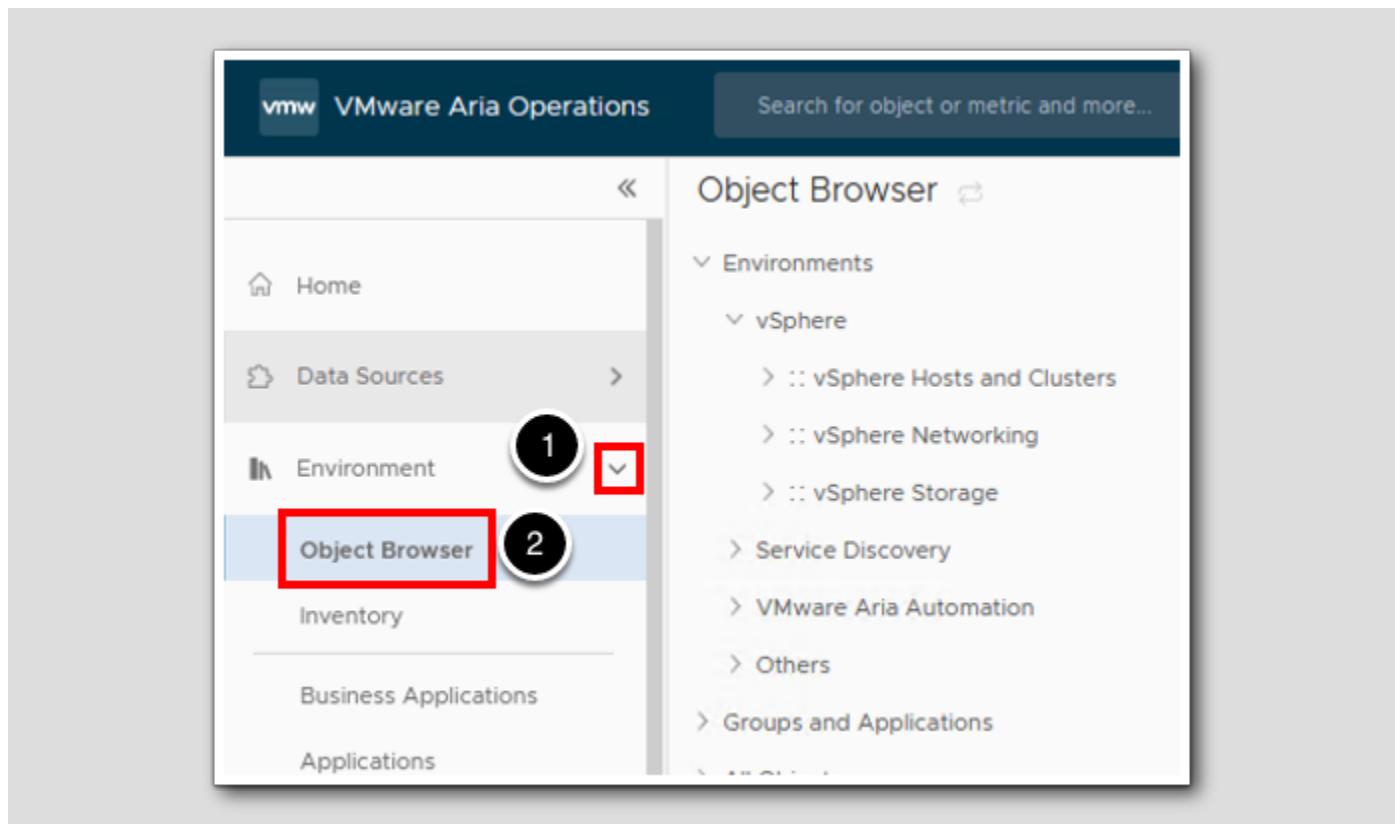
We have completed this lesson on Creating a View with Distribution Data! In the next lesson, we take you through the process to put views and dashboards into reports.

## Create Reports from Views and Dashboards

[413]

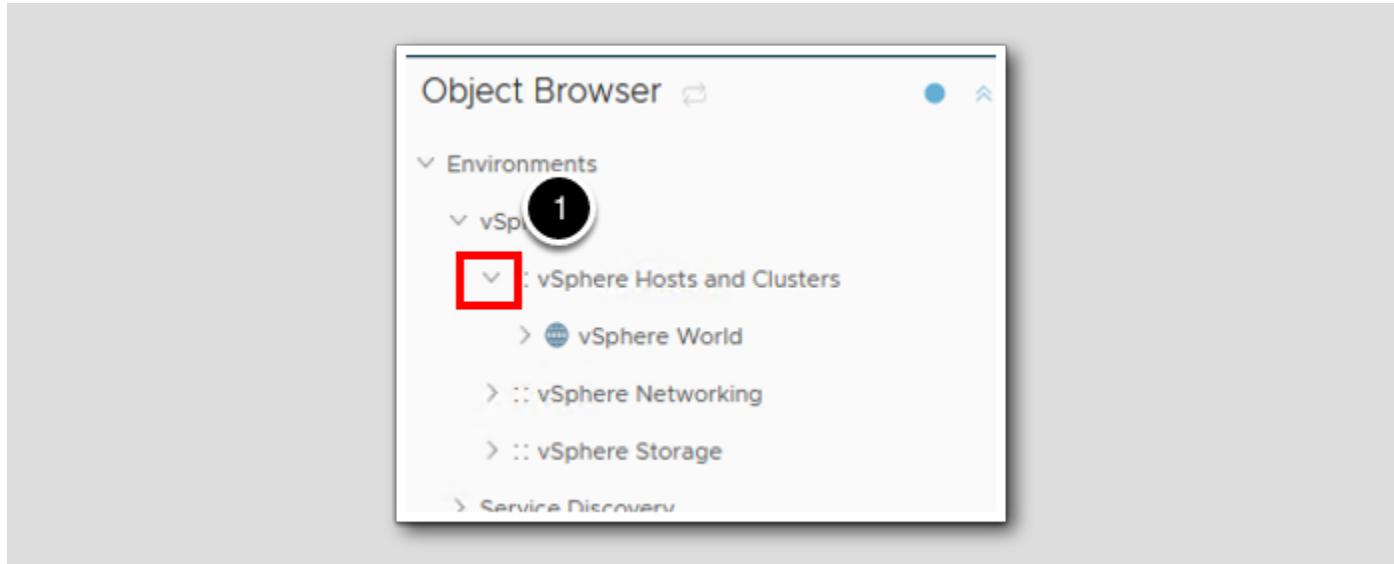
In this lesson, we show how to create custom reports using both views and dashboards.

## Go to Environment



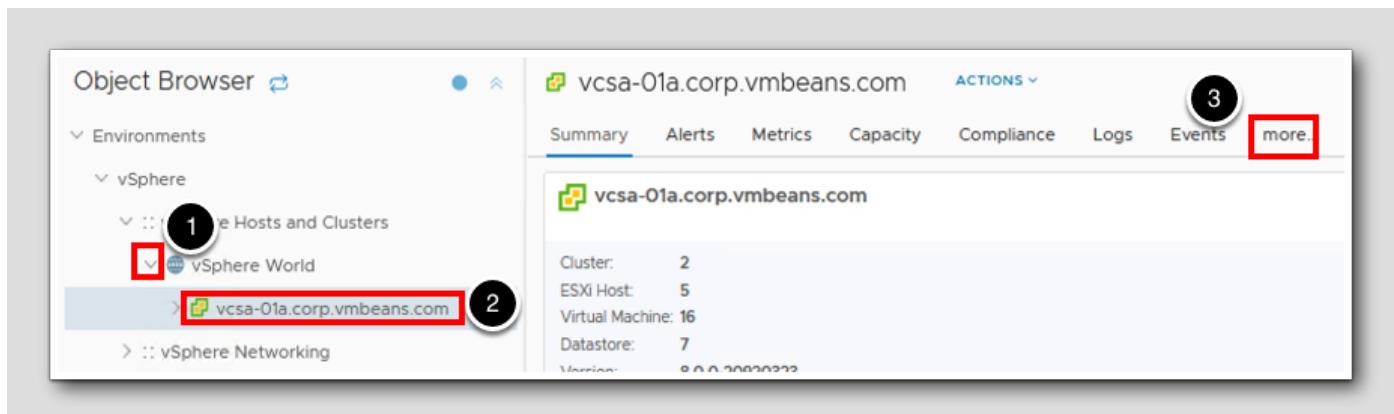
1. Expand Environment.
2. Click on Object Browser.

## Hosts and Clusters



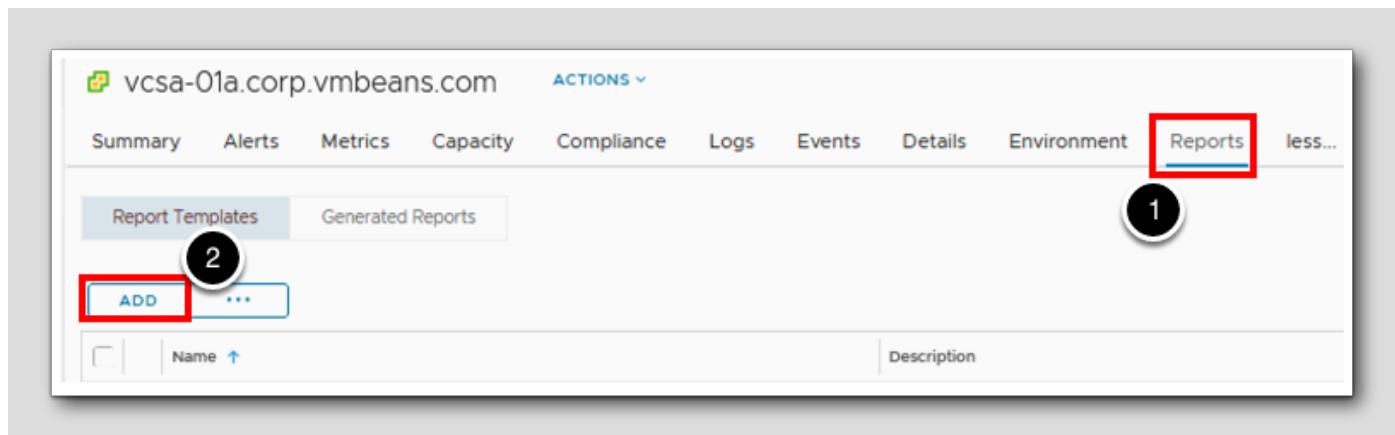
1. Expand vSphere Hosts and Clusters.

## Select a vCenter Server



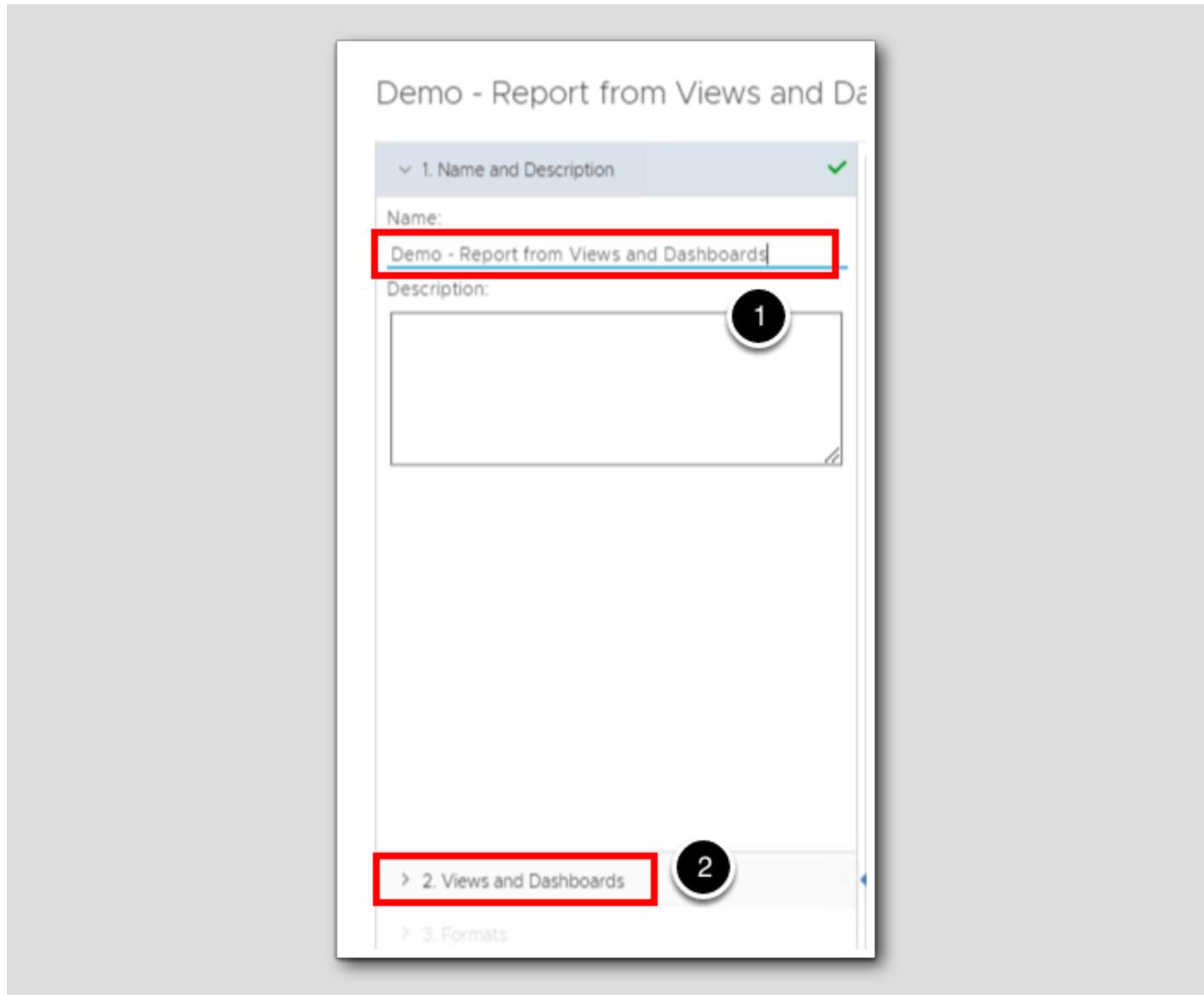
1. Expand vSphere World by clicking the chevron to the left of the text.
2. Select vCenter Server vcsa-01a.corp.vmbeans.com.
3. Click on more...

## Create a Report



1. Click on Reports.
2. Click ADD to create a new report.

## Report Name



1. Name the report Demo - Report from Views and Dashboards.

2. Click 2. Views and Dashboards.

## Selected Views

Demo - Report from Views and Dashboards - New Tem

1. Name and Description

2. Views and Dashboards

Data type: Views

Name: ALL FILTERS **sized**

CMA-Oversized Virtual Machine Details

CMA-Oversized VMs

CMA-Undersized Virtual Machine Details

CMA-Undersized VMs

Oversized Virtual Machines **2**

Rightsizing | Oversized Virtual Machine Details

Rightsizing | Undersized Virtual Machine Details

Rightsizing | VM Oversized and Undersized Status

Undersized Virtual Machines **3**

1 - 9 of 9 items

3. Formats

Views and Dashboards in the report

Oversized Virtual Machines

Name	Configured
vr-automation	12
saltstack	8
identity-manager	6
SupervisorControlPI...	2
SupervisorControlPI...	2

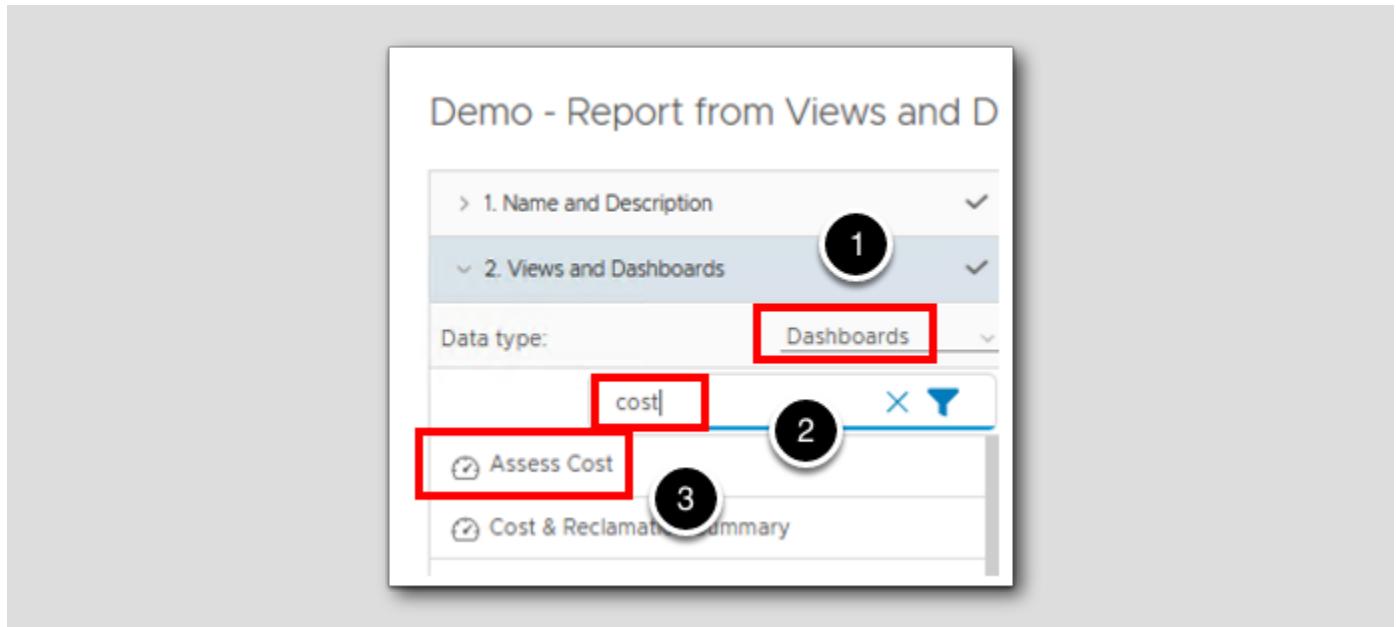
Undersized Virtual Machines

Name	Configured
dev-project-worker...	2
vr-loginsight	4
Total	6

Click to expand and select report components.

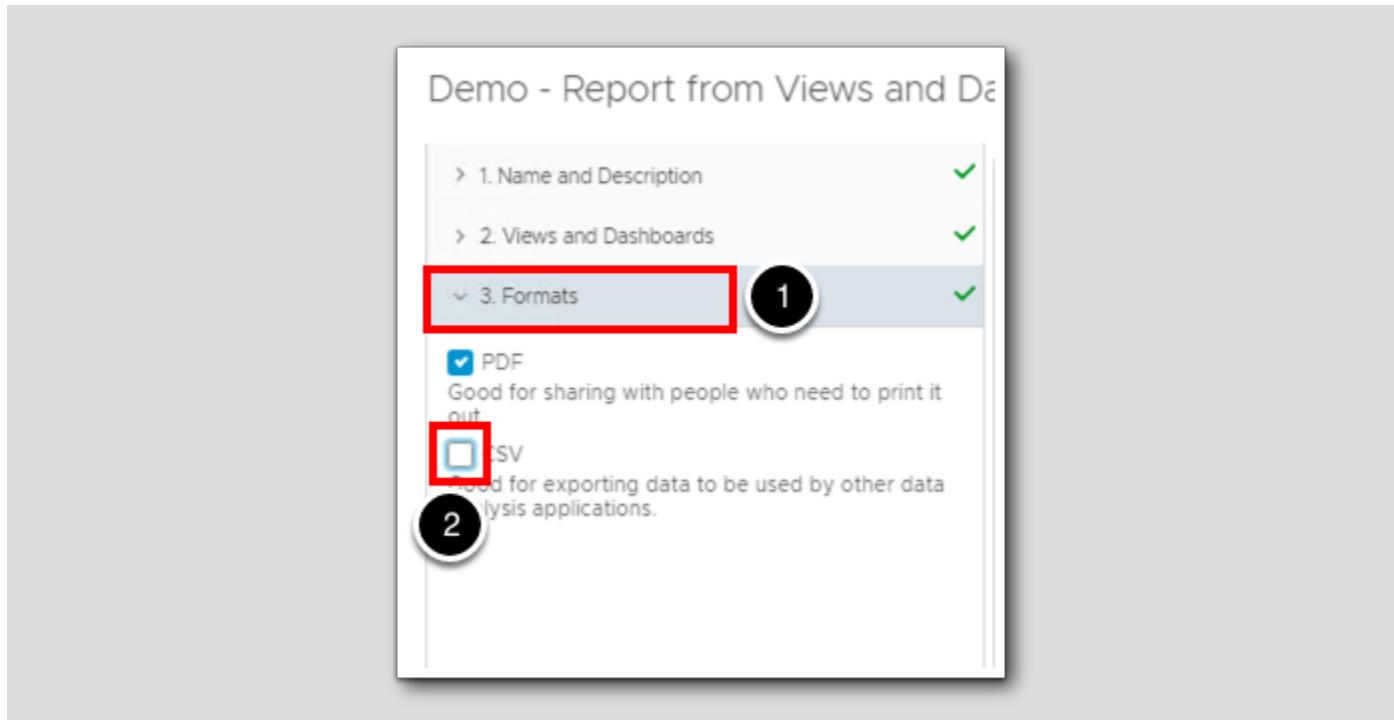
1. In the search box, type sized and hit Enter.
2. Double-click Oversized Virtual Machines.
3. Double-click Undersized Virtual Machines.

## Select Dashboard



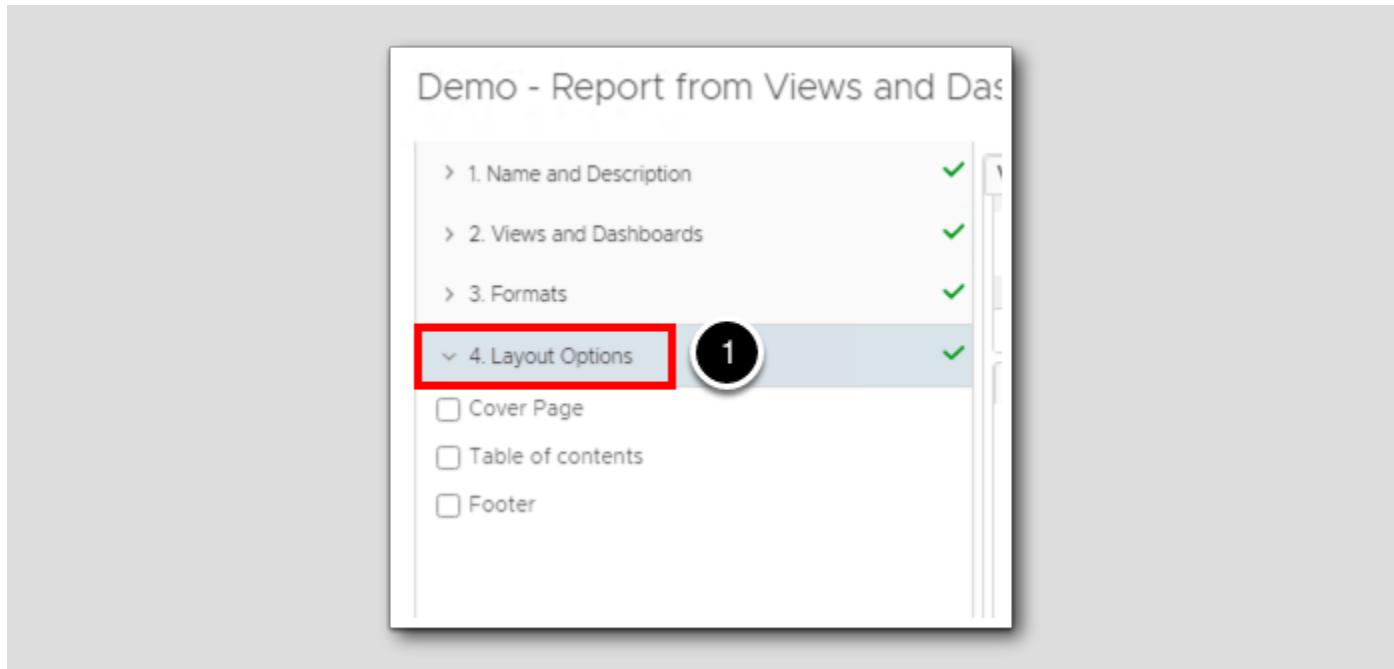
1. Change the Data Type from Views to Dashboards.
2. In the Quick Filter, type cost and hit Enter.
3. Double-click Assess Cost to add it to the Report.

## Report Format



1. Select 3. Formats.
2. Since we are including a dashboard as part of this report, uncheck CSV. A dashboard will not convert to CSV (comma separated values).

## Layout Options



### 1. Select 4. Layout Options.

We have the ability to include the following:

- Cover Page
- Table of contents
- Footer

For a Cover Page:

- Can contain an image up to 5 MB.
- The default report size is 8.5 inches by 11 inches. The image is resized to fit the report front page.

Table of Contents

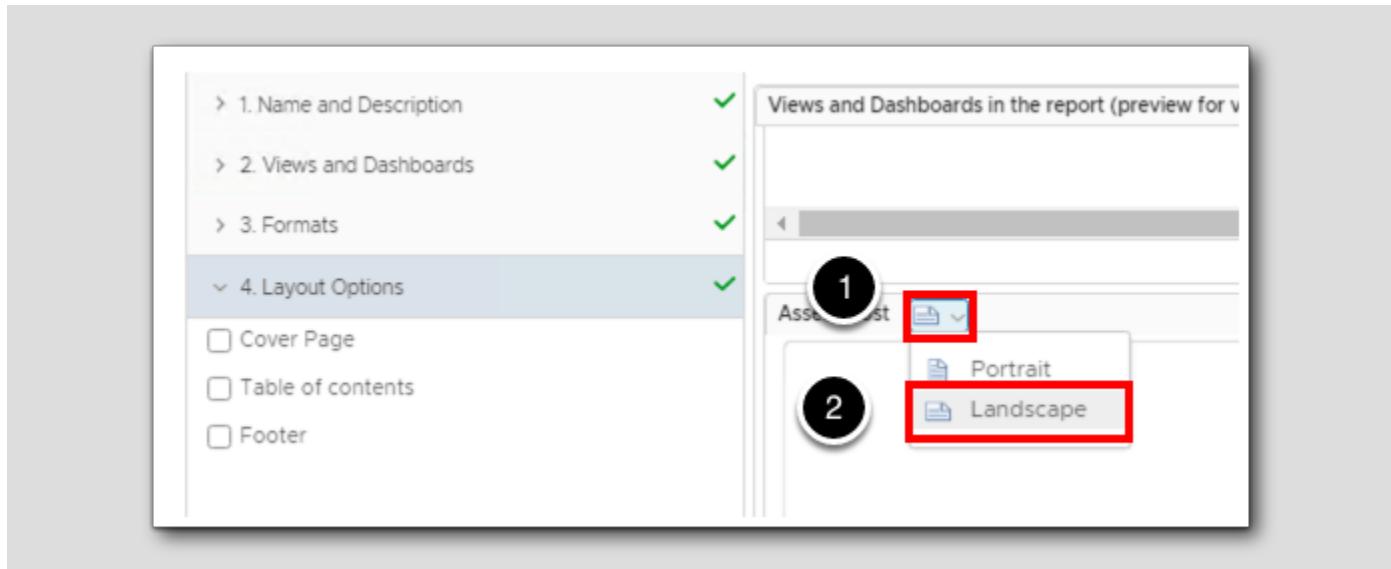
- Provides a list of the template parts, organized in the order of their appearance in the report

Footer

- Includes the date when the report is created, a note that the report is created by VMware vRealize Operations Manager, and page number.

Don't make any changes here, we will use the default settings.

## Portrait or Landscape

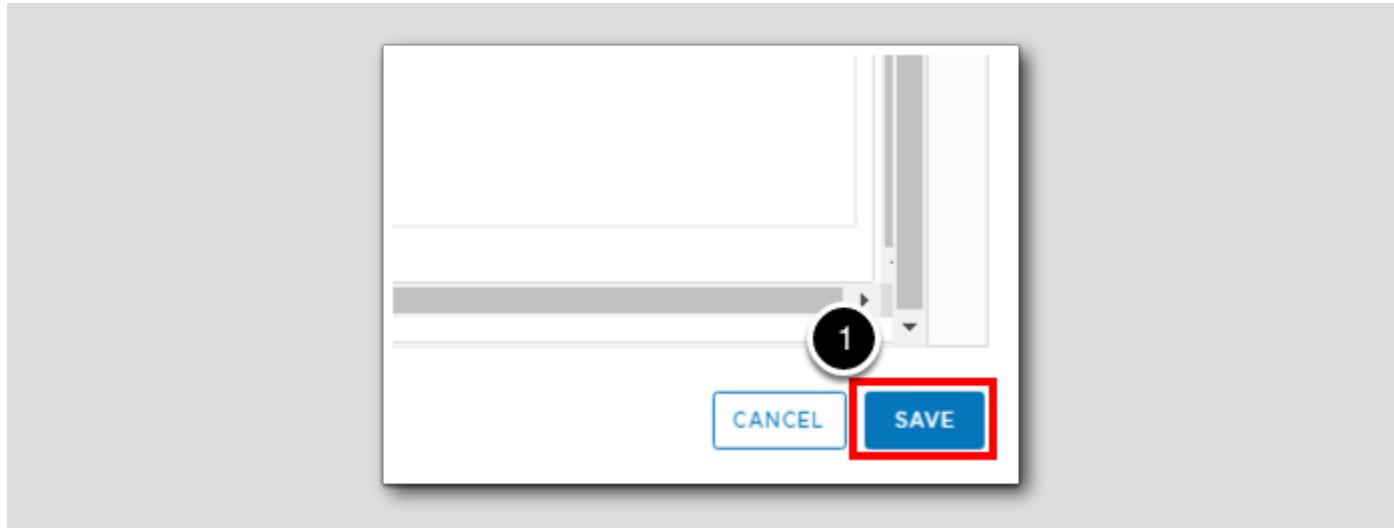


Each view and dashboard can be oriented to portrait or landscape mode. For dashboards in a report, landscape will likely be a better choice to simulate the aspect ratio of a monitor. Some dashboards require scrolling. When a dashboard is too large to be displayed on the screen, it will not fit into a report very well either. Make sure Assess Cost is set to Landscape.

1. Click the layout icon
2. Select Landscape.

Save

[424]



1. Click **SAVE** in the bottom right corner of the window.

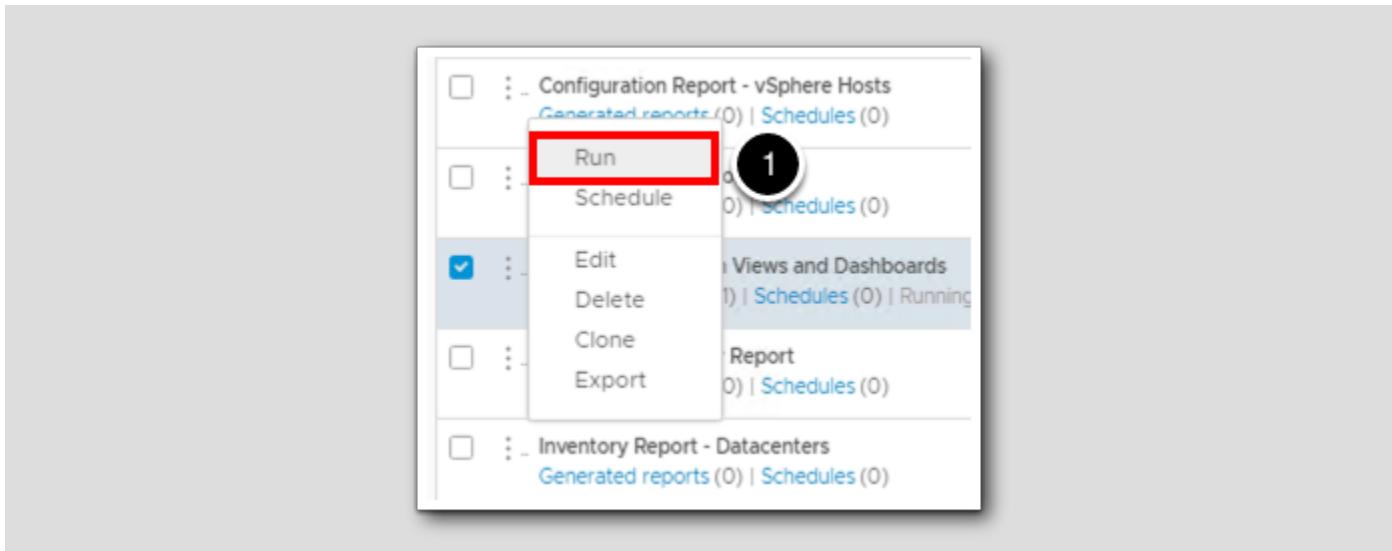
## New Report has been Created

The screenshot shows a software interface for managing reports. At the top, there are two tabs: 'Report Templates' and 'Generated Reports'. Below the tabs, there are two buttons: 'ADD' and '...'. A table lists several reports. The first three reports have their names partially visible: 'Configuration Report - Virtual Machines', 'Configuration Report - vSphere Clusters', and 'Configuration Report - vSphere Hosts'. The fourth report is highlighted with a red box around its name and a circled '1' above it, indicating a new entry. This report is titled 'Datastore Cost Report'. The fifth report, at the bottom of the list, is also highlighted with a red box around its name and has a checked checkbox to its left. This report is titled 'Demo - Report from Views and Dashboards'. The table columns include 'Name' (with an up arrow), 'Generated reports (0)', 'Schedules (0)', and 'Description'.

We can now see our new report in the Reports List.

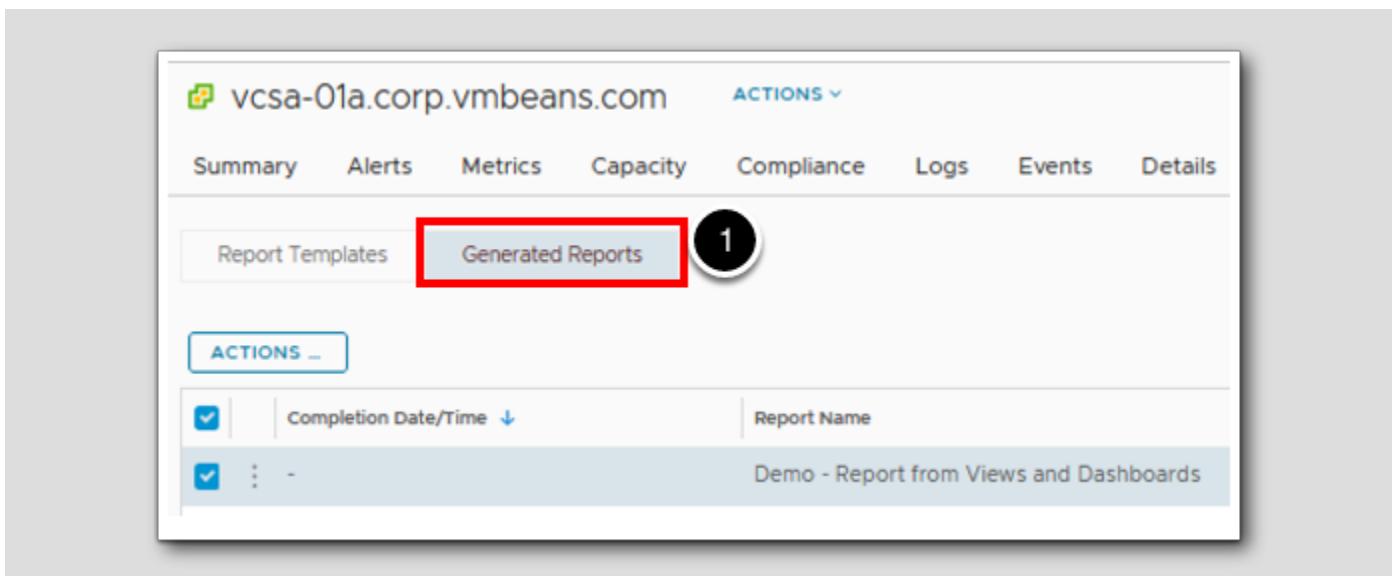
1. Click the 3 dots to the left of the report name to open the actions menu.

## Run the Report



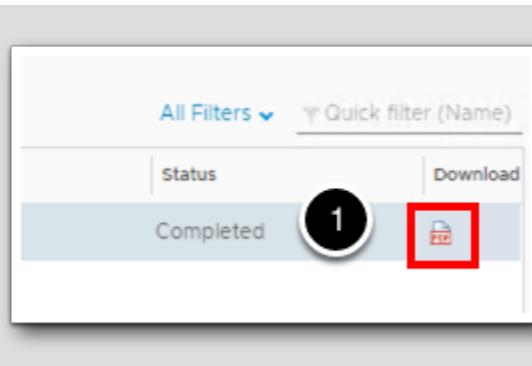
1. Click Run the run the report.

## Generated Reports



1. Click on Generated Reports to see the newly created report.

## Select PDF



1. Click on the PDF icon.

## View the Data

Demo - Report from Views and Dashboards -2 vcsa-01a.corp.vmbeans.com

### 1. Oversized Virtual Machines

List of the virtual machines which are marked as oversized. Reclaim from these virtual machines to reduce wastage and improve performance.  
May 19, 2023 02:26 PM - Jul 18, 2023 02:26 PM (GMT-07:00)

Name	Configured vCPU	Reclaimable vCPU(s)	Configured Memory	Reclaimable Memory	Parent vCenter
aria-auto	12	6	48 GB	3 GB	vcsa-01a.corp.vmbean
identity-manager	6	2	10 GB	2 GB	vcsa-01a.corp.vmbean
aria-ops-logs	4	2	8 GB	0 GB	vcsa-01a.corp.vmbean
aria-auto-config	4	2	8 GB	4 GB	vcsa-01a.corp.vmbean
SupervisorControlPlaneVM (1)	2	0	8 GB	3 GB	vcsa-01a.corp.vmbean
windows-0010	2	0	4 GB	1 GB	vcsa-01a.corp.vmbean
aria-ops	4	0	16 GB	3 GB	vcsa-01a.corp.vmbean
aria-ops-cp	2	0	8 GB	2 GB	vcsa-01a.corp.vmbean
SupervisorControlPlaneVM (2)	2	0	8 GB	4 GB	vcsa-01a.corp.vmbean
<b>Total</b>	<b>38</b>	<b>12</b>	<b>118 GB</b>	<b>22 GB</b>	-

The report should open automatically in a new browser tab.

## Lesson End

You have completed the last lesson in this module. You should now have an understanding in creating new views. You also now have the tools to create reports from any view or dashboard.

## Conclusion

Understanding how to create custom Views in Aria Operations can be a powerful skill to fine tune Aria Operations to track what is important/critical to the monitoring of our VMware Cloud Infrastructure. We hope this lesson has highlighted the power and ease of building custom views in Aria Operations.

### You've finished Module 7

Congratulations on completing the lab module.

If you are looking for additional general information on Aria Operations 8.4, try one of these:

- **VMware Product Public Page -Aria Operations:** <https://www.vmware.com/products/aria-operations.html>
- **Aria Operations 8.12 - Release Notes:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/rn/vmware-aria-operations-812-release-notes/index.html>
- **Aria Operations - Documentation:** <https://docs.vmware.com/en/VMware-Aria-Operations/index.html>
- **VMware Cloud Management Blog - What's New in Aria Operations 8.12 and Cloud:** <https://blogs.vmware.com/management/2023/04/whats-new-in-vmware-aria-operations-8-12.html>

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the **TABLE OF CONTENTS** to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 8 - Using Metrics and Metric Charts for Troubleshooting (15 minutes) Basic

### Introduction

[434]

Upon completing this lab, you will be able to:

- Understand how to build a multi-chart view into a VM
- Understand the chart toolbar icons and their uses
- Use the chart toolbar options to finetune your trouble

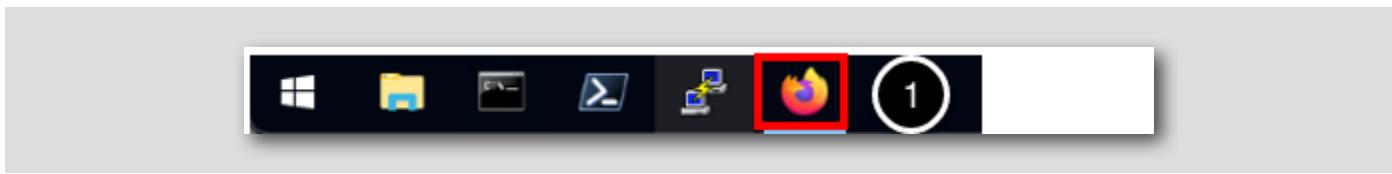
### Log in to Aria Operations

[435]

To begin this exercise, we will log in to Aria Operations. If you are not currently logged into any instance of Aria Operations, continue to the next page, but if you are already logged into Aria Operations, click [here](#) to skip ahead.

### Open the Firefox Browser from Windows Quick Launch Task Bar

[436]

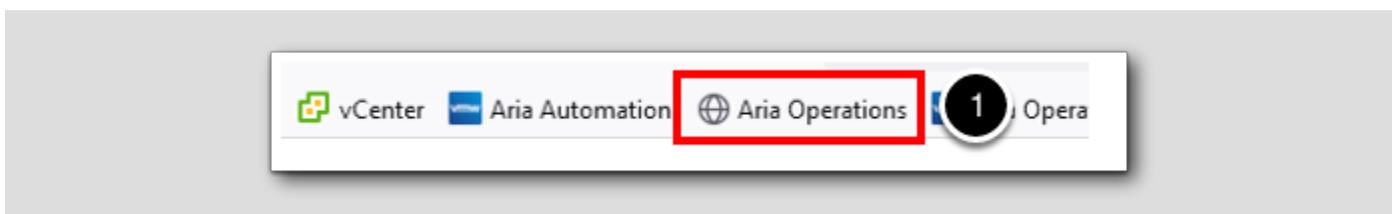


If your browser isn't already open, launch Firefox

1. Click the Firefox icon on the Windows Quick Launch Task Bar

### Launch Aria Operations

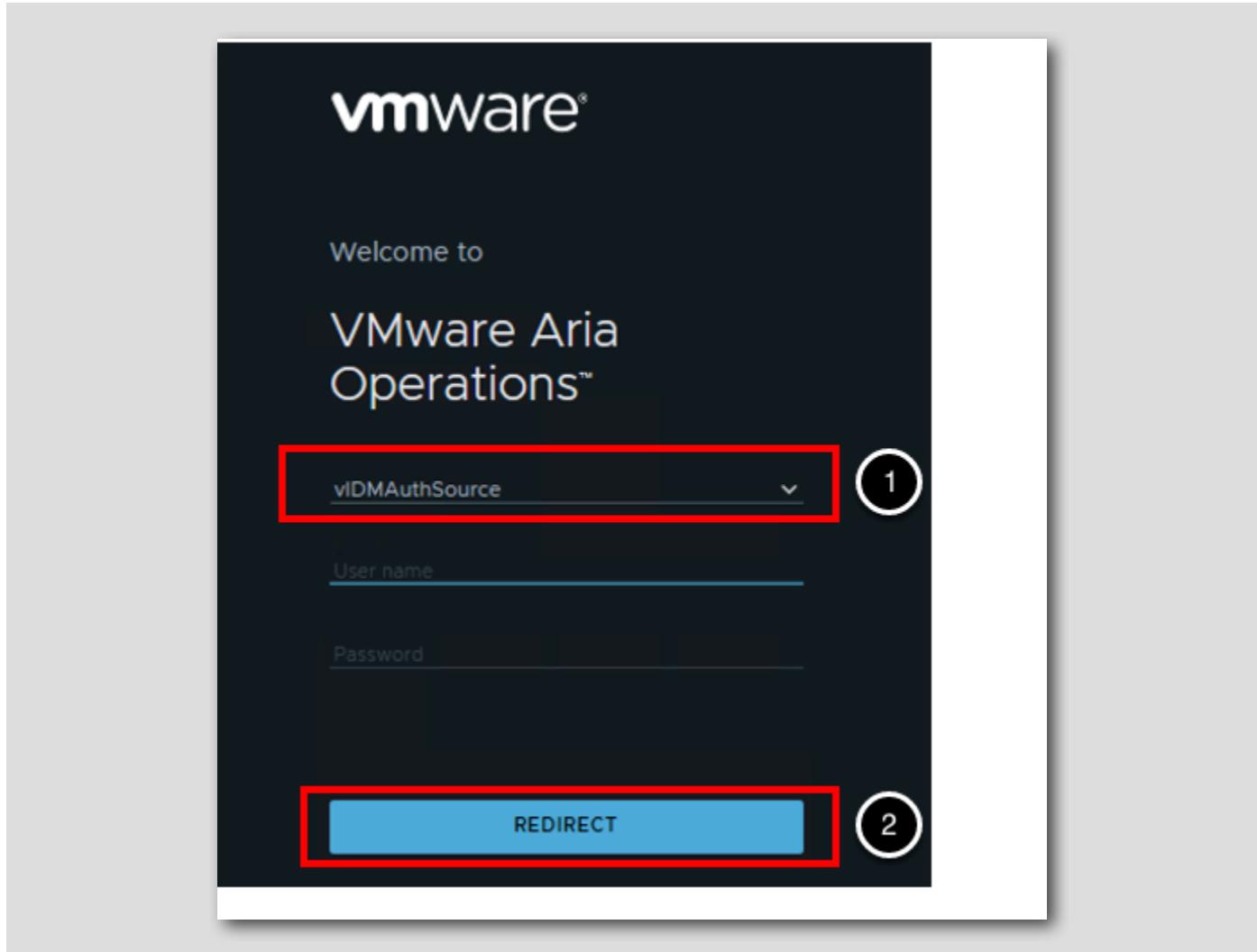
[437]



The browser Bookmarks Bar has links to the different applications that are running in the lab.

1. Click the Aria Operations Bookmark

## Log in to Aria Operations

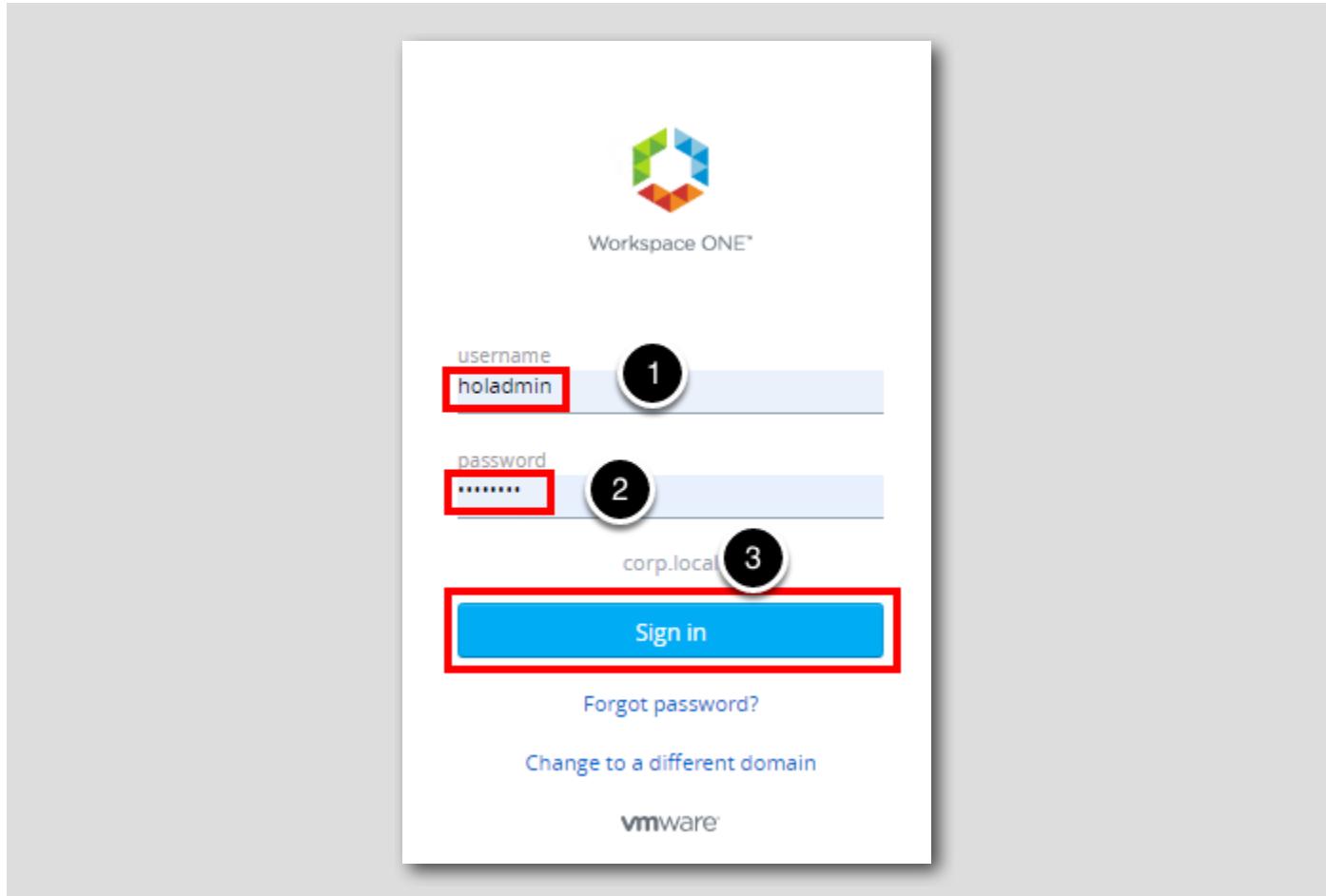


Aria Operations is integrated with VMware Identity Manager which we will use for user authentication in this lab.

vIDMAAuthSource (VMware Identity Manager) should be pre-selected as the identity source. However, if it is not selected you will choose it.

1. Click the drop-down arrow if vIDMAAuthSource is not selected.
2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login



At the Workspace ONE login screen, use these credentials:

1. username: **holadmin**
2. password: **VMware1!**
3. Click **Sign in**

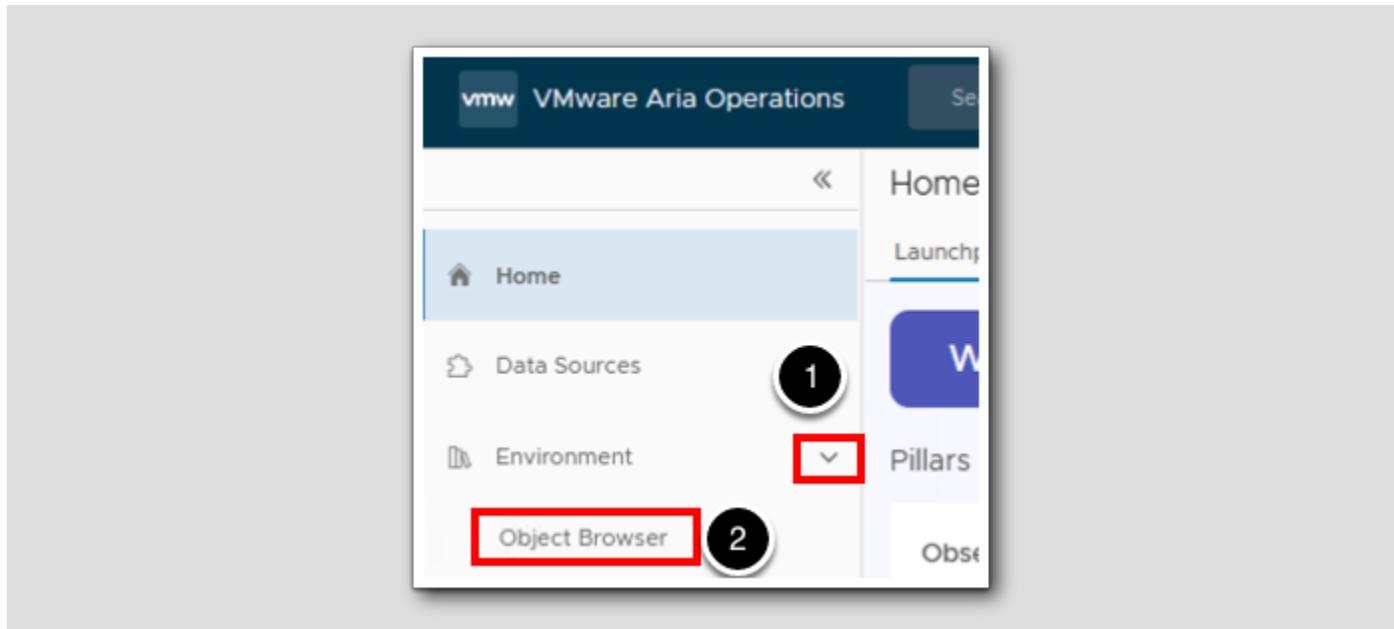
## Aria Operations Home Screen

You should be at the Aria Operations Home screen and ready to start the module.

## How to use Metrics

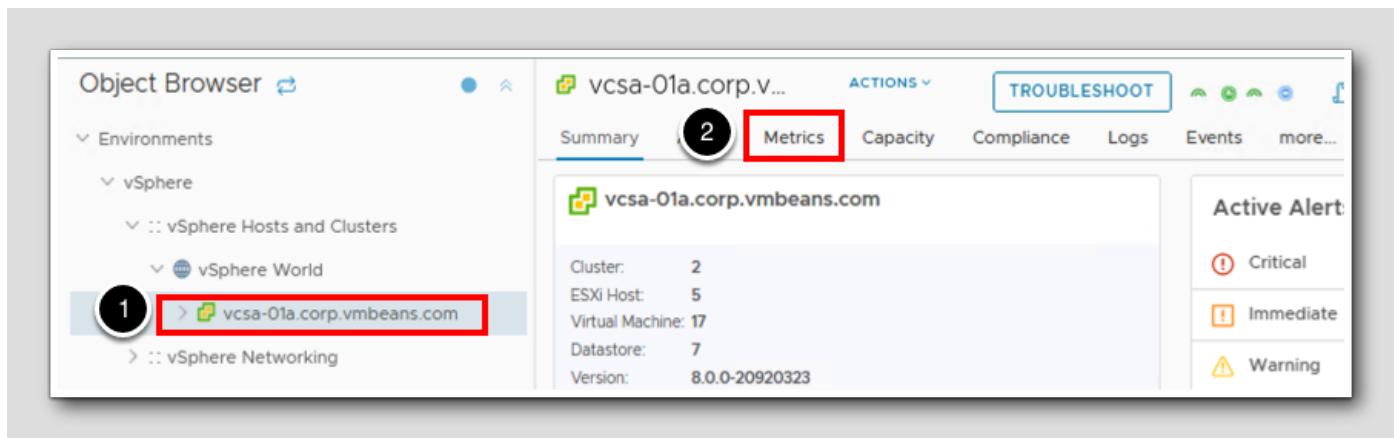
In this lesson we will dive into how metrics can help with troubleshooting.

## Environment



1. Click on > next to Environment.
2. Click Object Browser.

## vSphere Hosts and Clusters



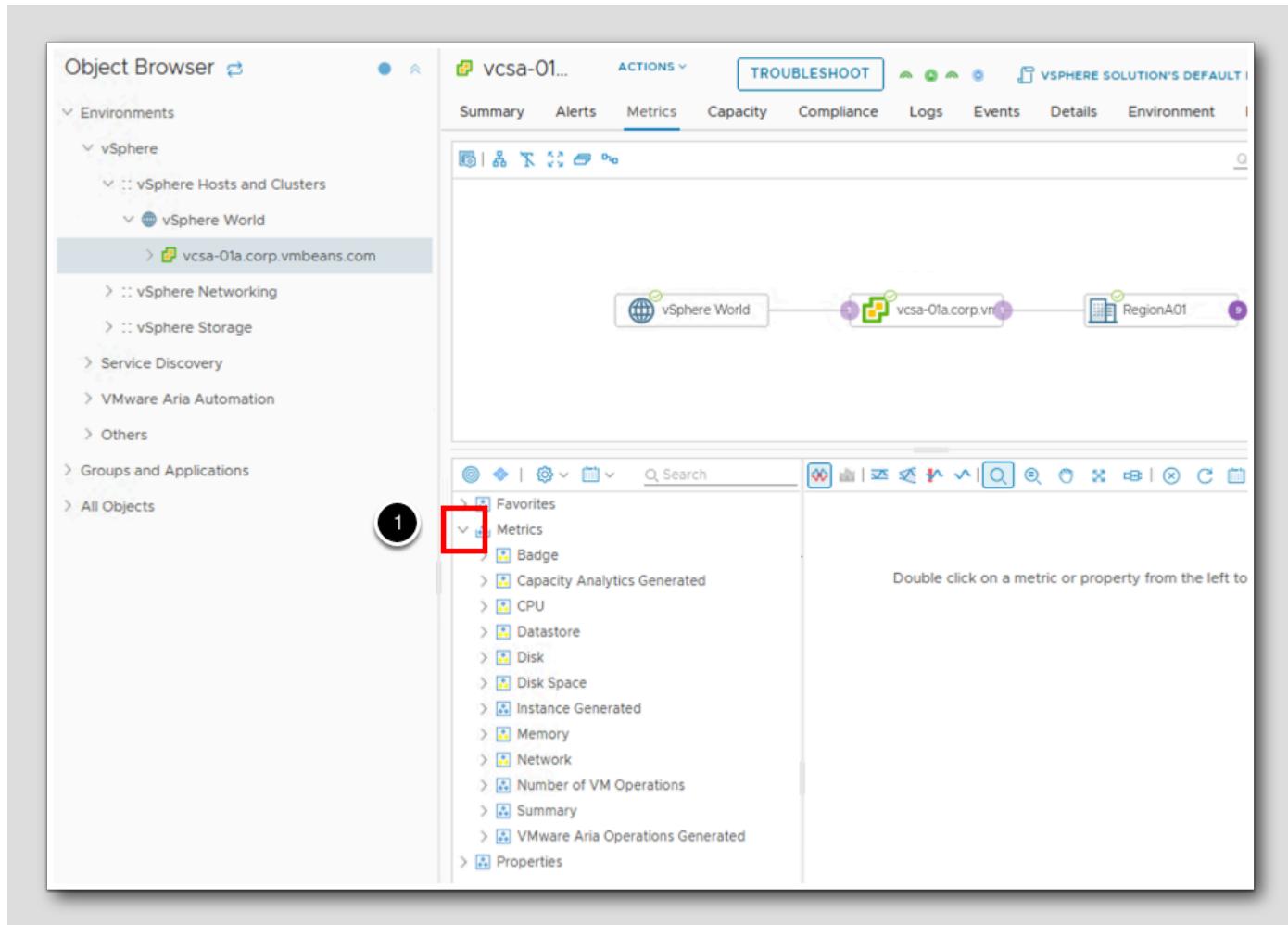
The Object Browser should have expanded the vSphere environment down to the vCenter vcsa-01a.corp.vmbeans.com. If it did not, click each > to expand down to vcsa-01a.corp.vmbeans.com.

1. Click on vcsa-01a.corp.vmbeans.com.
2. Click on Metrics.

## How the Metrics category works

[444]

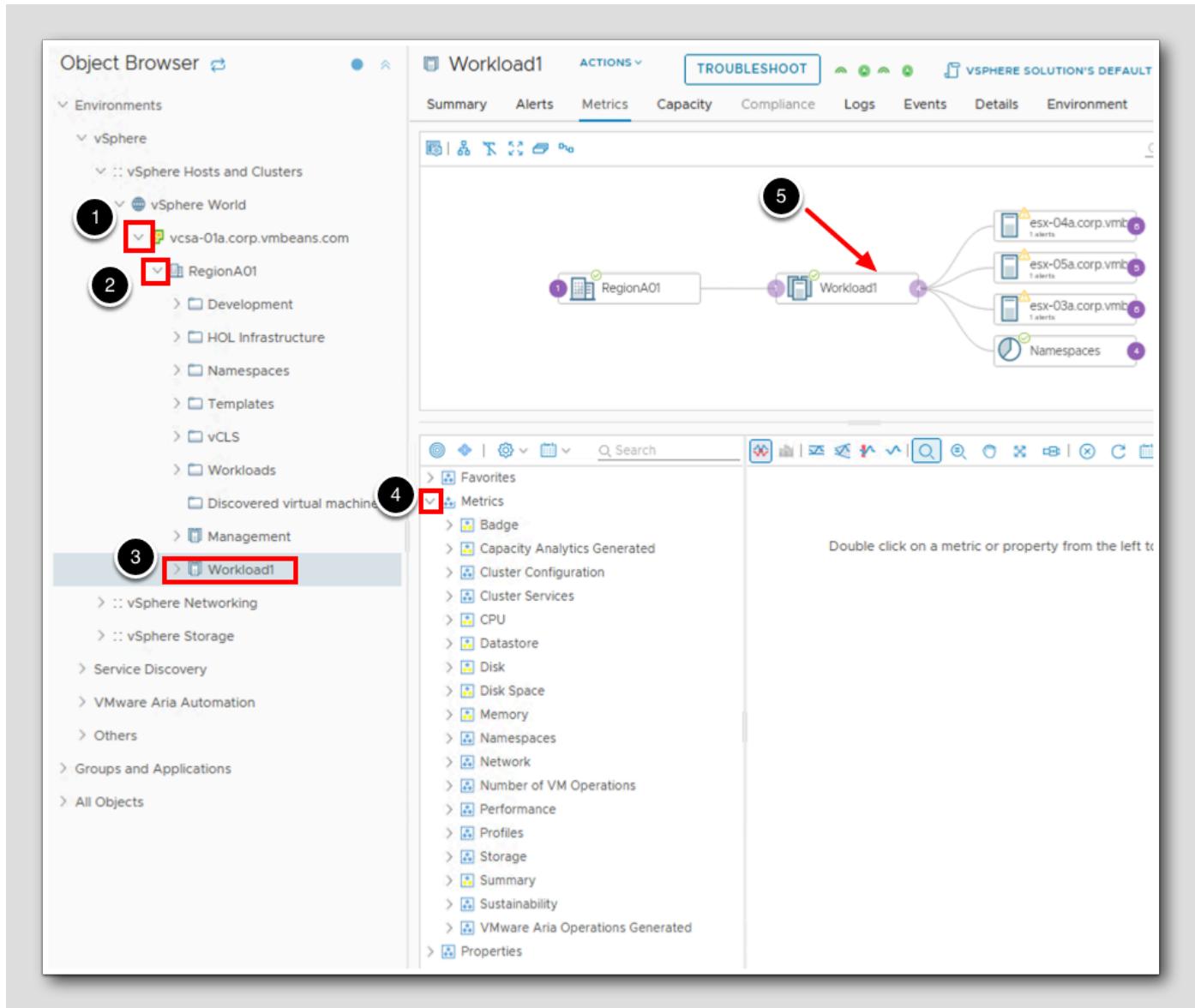
The Metrics category is dependent on what is selected in Object Browser



1. Click > next to Metrics.

The Metrics list is populated based on what is selected in Object Browser. The Metrics shown here are what is relevant for a vCenter object.

## Select a Cluster

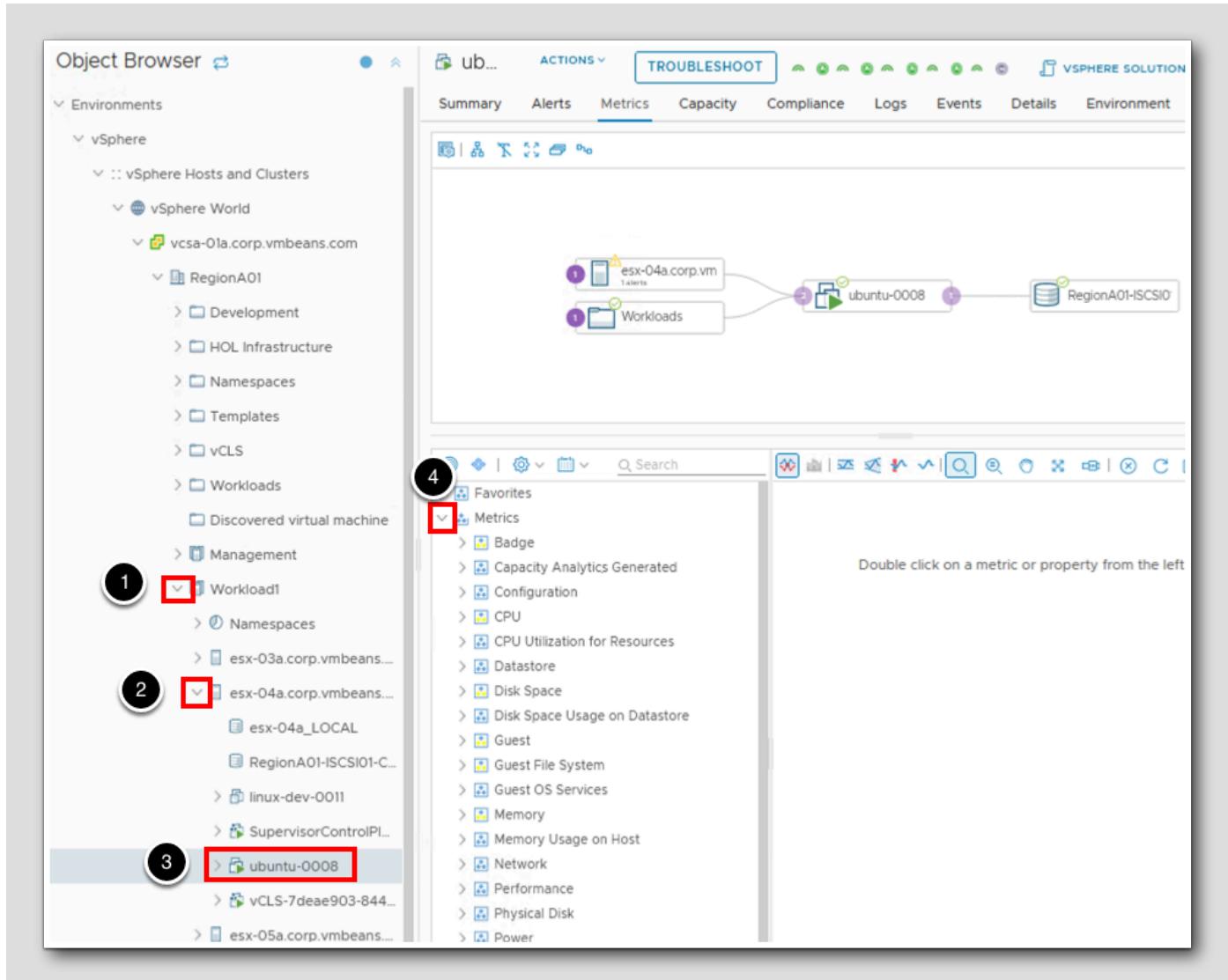


1. Click > next to vcsa-01a.corp.vmbeans.com.
2. Click > next to RegionA01.
3. Click on the Workload1 cluster.
4. Click > next to Metrics.
5. Notice how the Object Relationship box has changed to show the Workload1 parent and child objects.

Note that the list of Metrics for a cluster is longer than the list of Metrics for a vCenter.

## Select a VM

Notice that some of the Metrics have yellow in the little box in between the > and the Metric name. This indicates that something is currently alerting under that Metric category. This provides real-time troubleshooting information as you are selecting what to see.

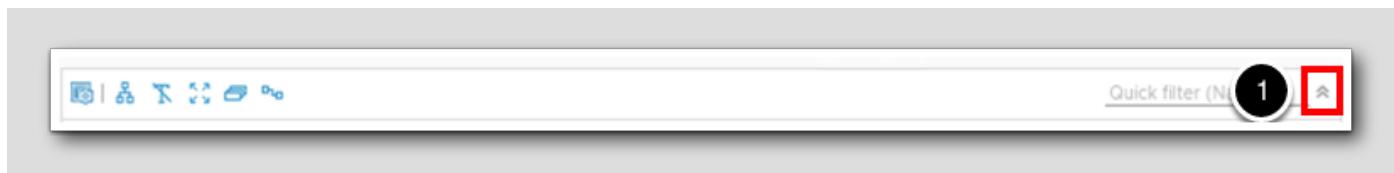


1. Click > next to **Workload1**.
2. Click > next to **esx-04a.corp.vmbeans.com**.
3. Select the VM **ubuntu-0008**.
4. Click > next to **Metrics**.

Note that the Metrics list for a VM is much longer than what is available for a vCenter or a Cluster.

Collapse the Object Relationship window to provide more space

[447]

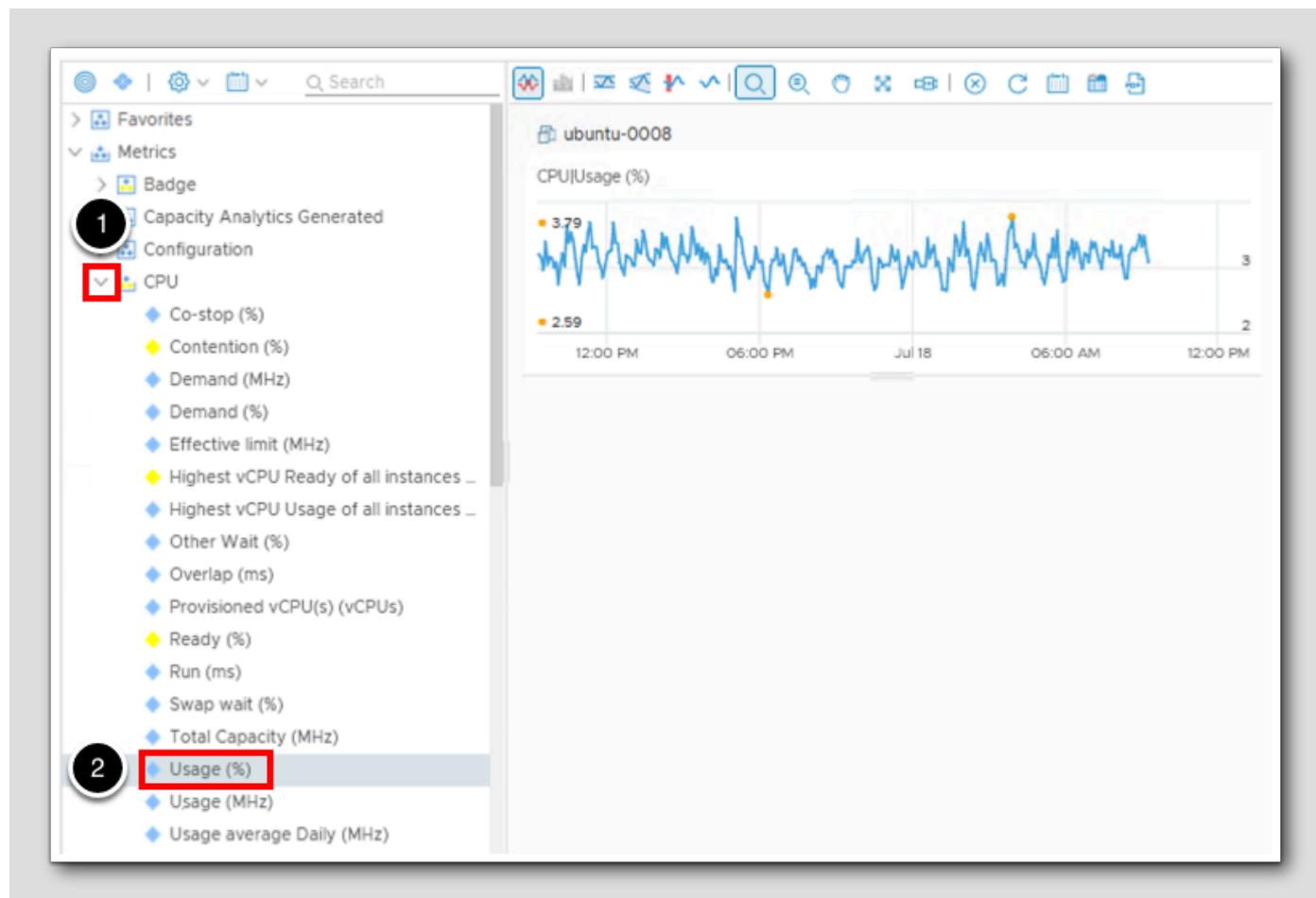


1. Click the **double chevron** on the right side of the screen.

My VM is slow and I need more resources

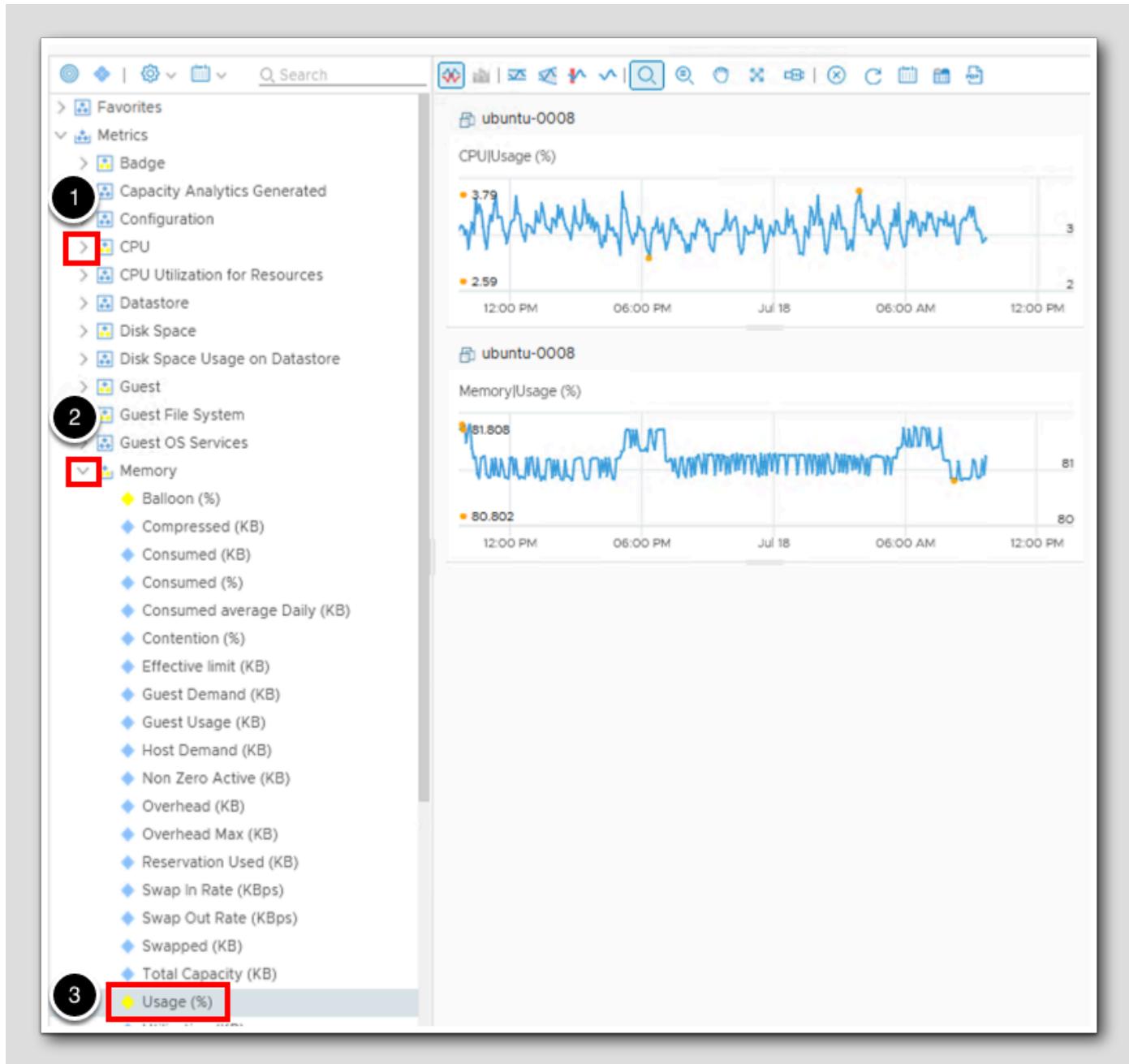
[448]

This is a common complaint vSphere administrators will hear. Metrics can be used to give a customer a simple wholistic view of how their VM is and has been performing.



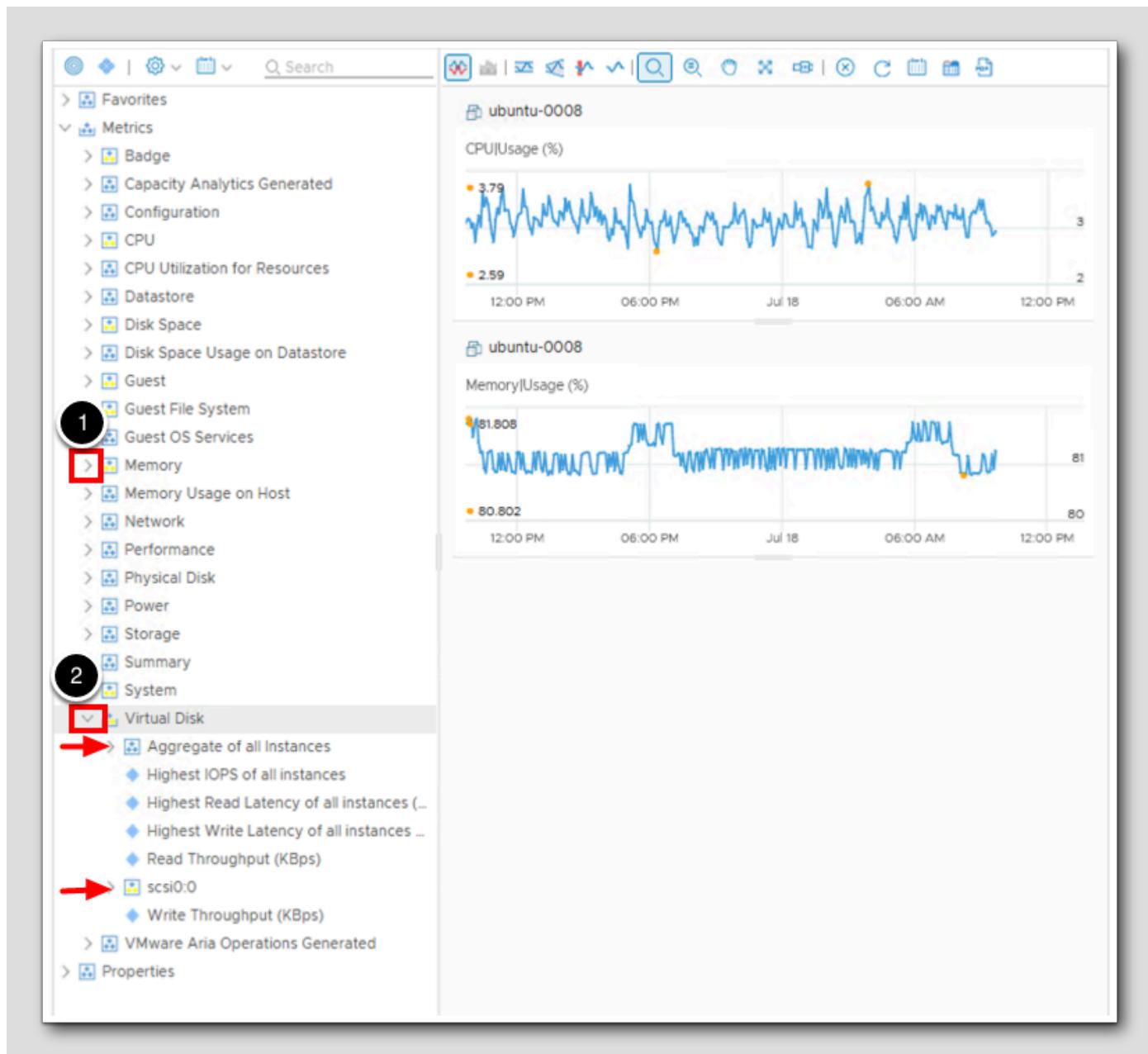
1. Click > next to CPU.
2. Double click on Usage%.

## Add Memory Usage%



1. Collapse the CPU Metric list to conserve space.
2. Click > next to Memory.
3. Double click Usage%. (you may need to scroll down)

## Add Disk performance Metrics

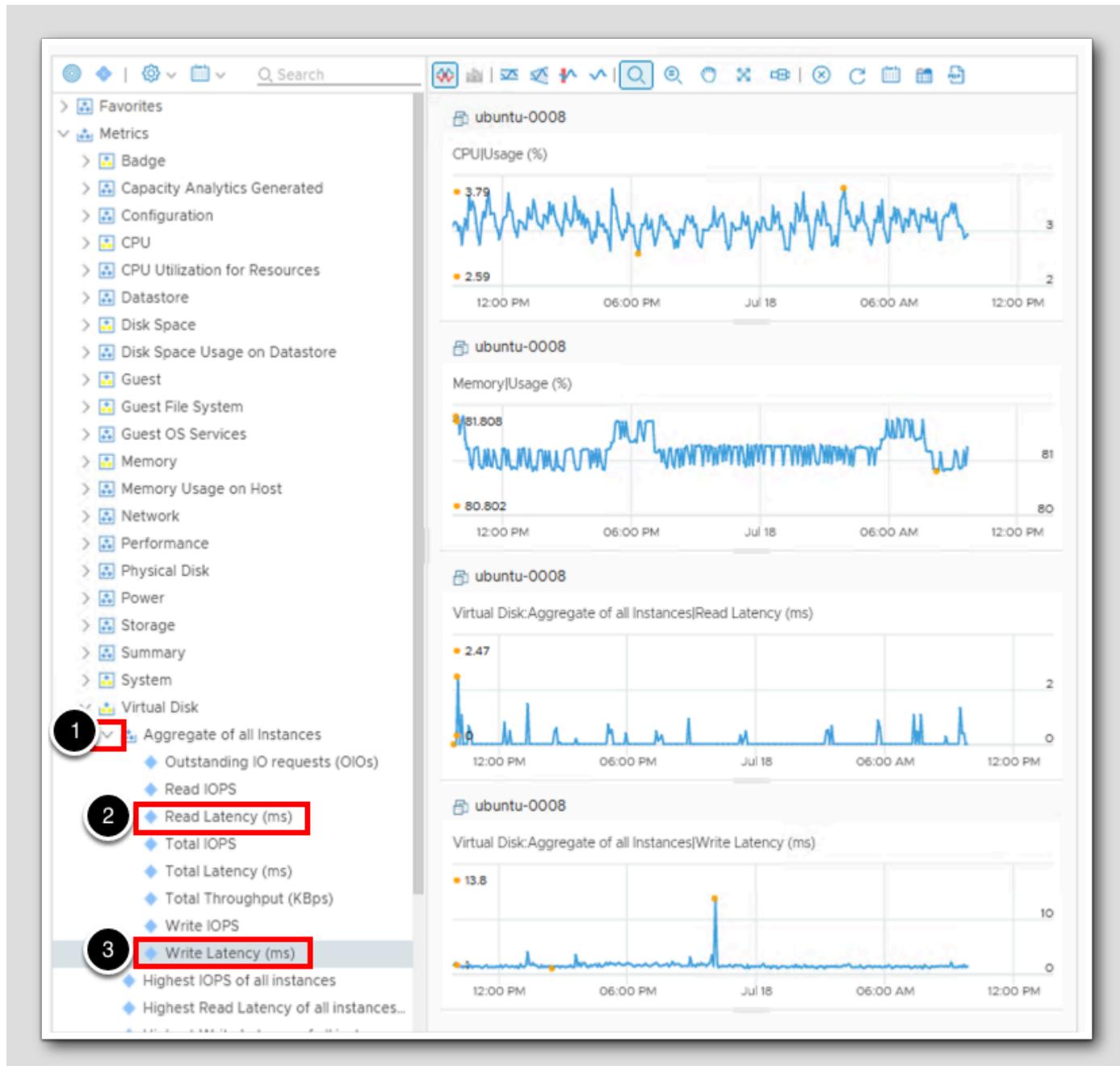


1. Collapse the Memory Metric list to conserve space.
2. Click > next to Virtual Disk.

Notice that there are two sub categories here. Aggregate of all Instances is relevant if you have multiple Virtual Disks on the VM. on ubuntu-0008 there is only one Virtual Disk labeled scsi0:0. This allows granular data for your disk performance

## Add Disk performance Metrics continued

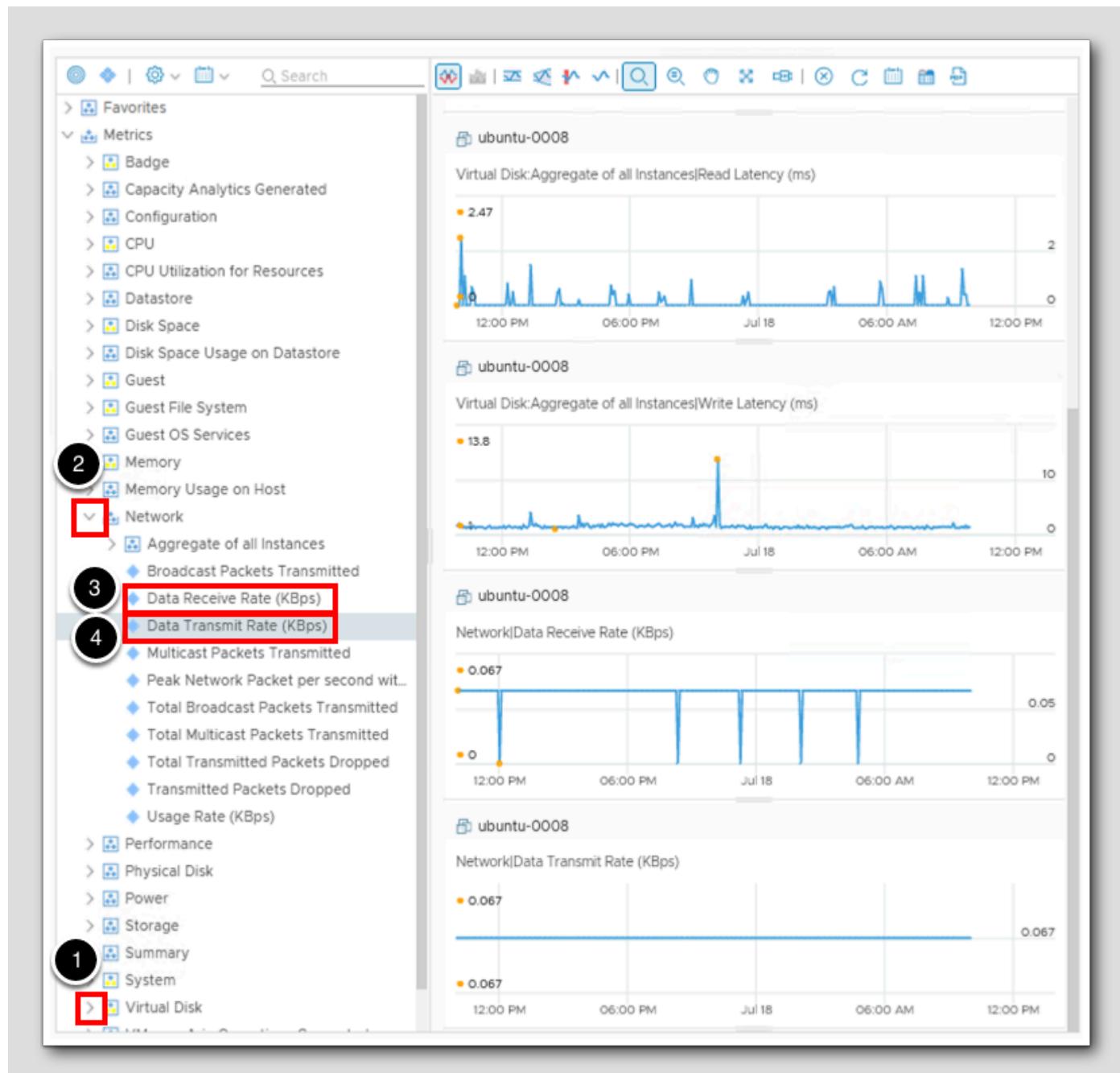
[451]



For this lesson we will use the Aggregate Metrics as we are building out a high level view of the VM performance and would be more versatile to make a View out of.

1. Click > next to **Aggregate of all Instances**.
2. Double click on **Read Latency (ms)**.
3. Double click on **Write Latency (ms)**.

## Add Network performance



1. Collapse the Virtual Disk Metric list to conserve space.
2. Click > next to Network.
3. Double click Data Receive Rate (KBps).
4. Double click Data Transmit Rate (KBps).

We have just built a window into what ubuntu-0008 is consuming for CPU, Memory, Disk and Network resources. Now lets learn how to navigate what was built

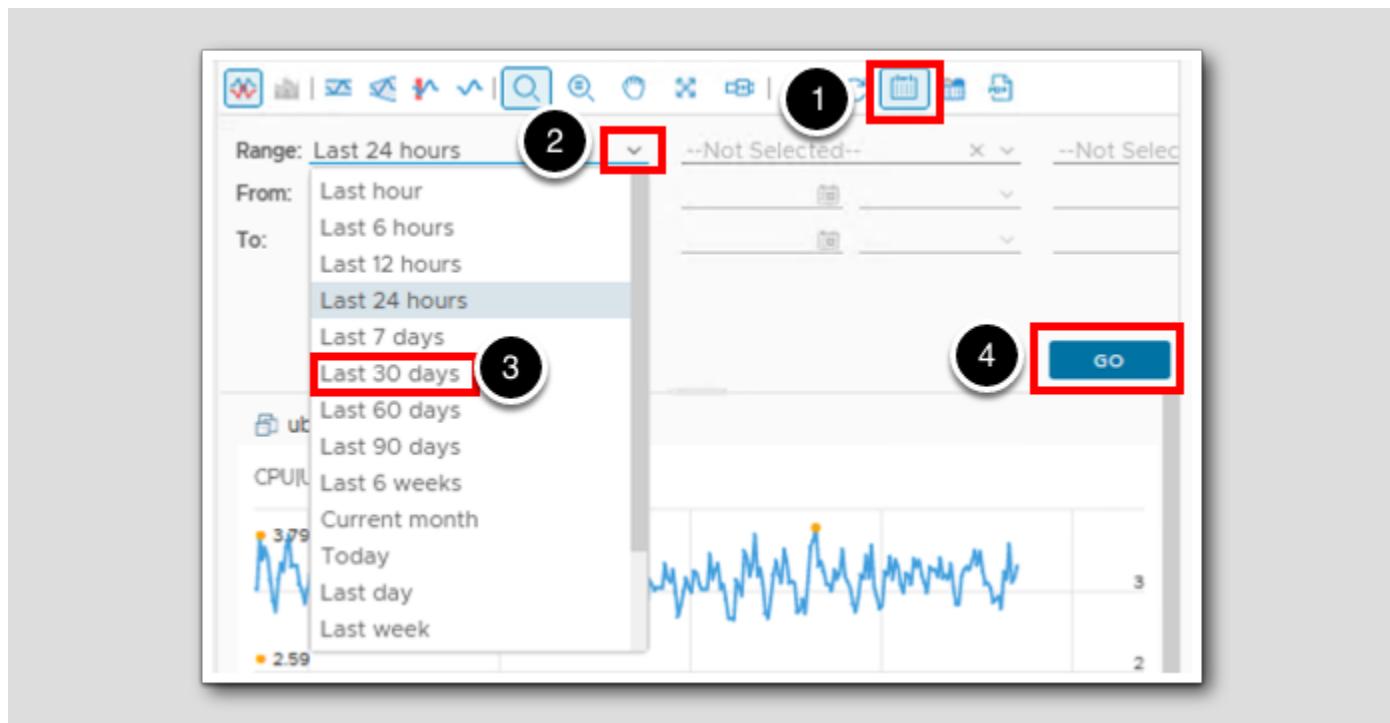
## Refresh and Date Control

[453]



At the top of the charts that we added there is a tool bar. The two icons shown above are the Refresh Charts icon (left) and the Date Controls icon (right). The Refresh Charts icon will force a refresh of all the charts added. The Date Controls icon is what we will use now.

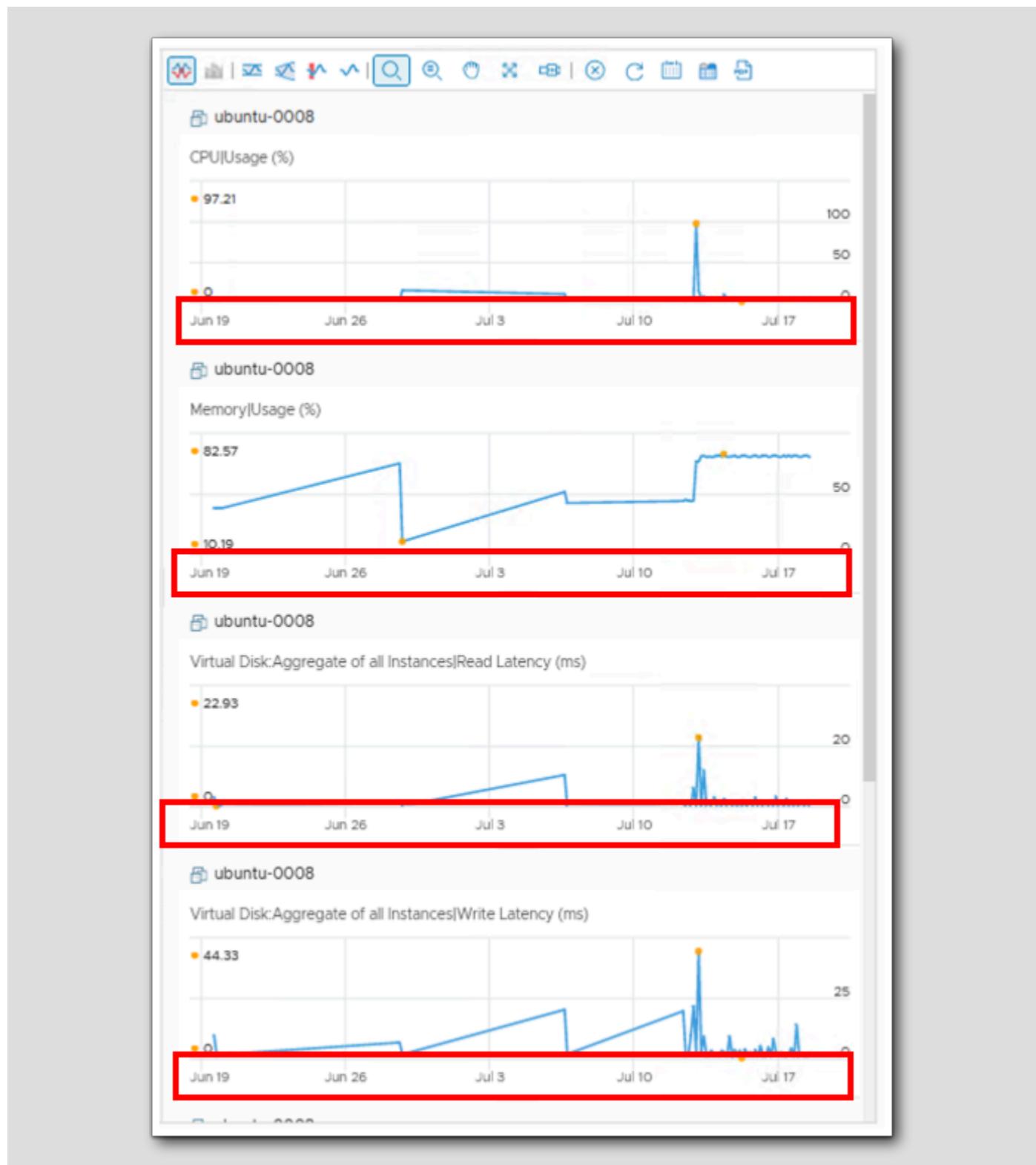
What timeframe do we want to see



1. Click on the Date Controls icon.
2. Click > at the end of the Range field.
3. Select Last 30 days.
4. Click GO.

All charts date range changed

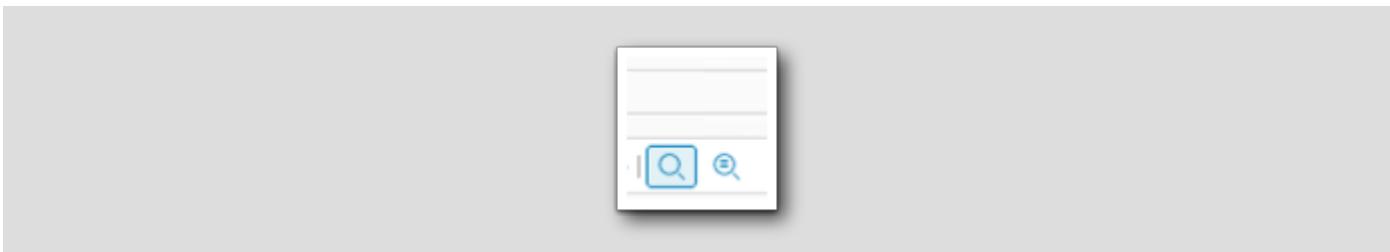
[455]



Notice that the date range for all of the charts have been changed to a 30 day window.

### Zoom one or zoom all

[456]



At the top of the charts that we added, there is a tool bar. In that tool bar are two magnifying glasses. The one on the left is blank (Zoom the view) and the other has a square in the middle of it (Zoom All Charts). The blank magnifying glass will zoom **only** in the chart box you are working in while the magnifying glass with the box in it will zoom in on any chart.

### Zoom one

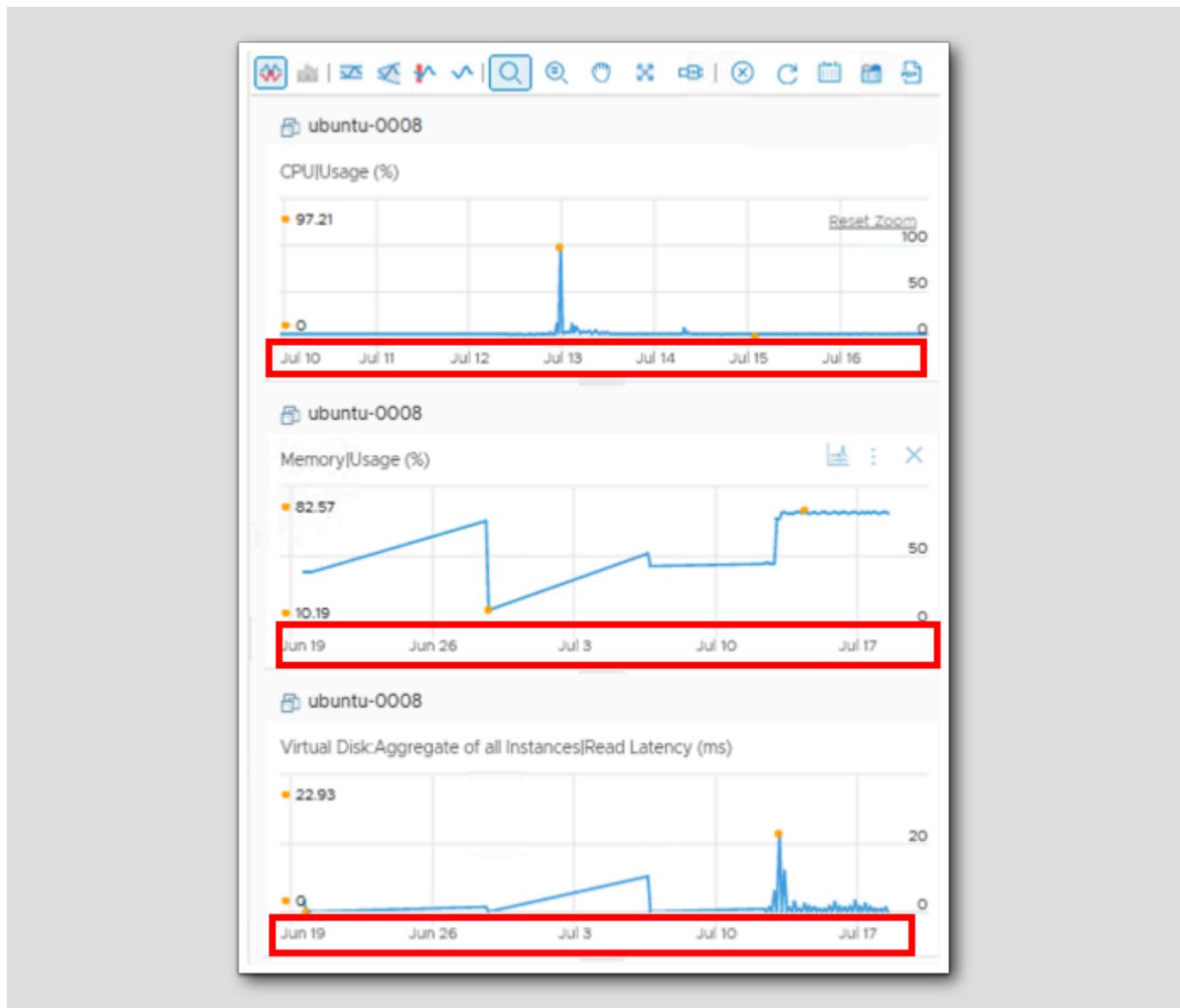
[457]



1. In the CPU|Usage (%) chart, left click and drag a box around a spike in the chart like the red box shown above.

Your chart may look different due to the lab environment being created when you start this lab

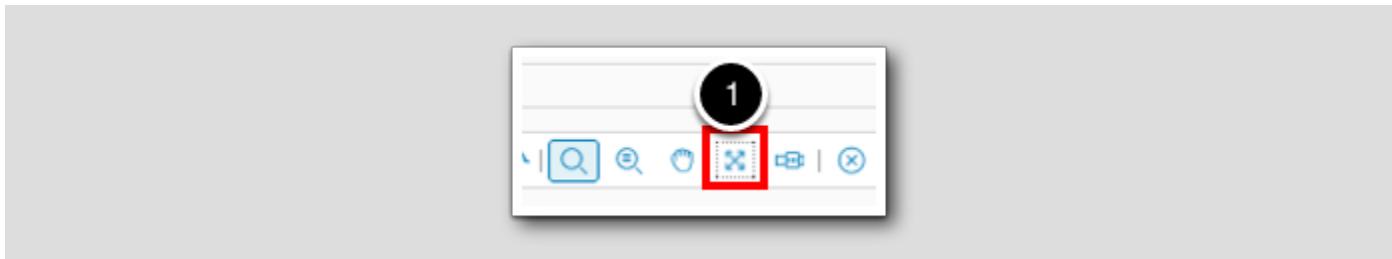
## CPU timeline



Notice that only the CPU|Usage (%) chart's timeline has changed. Use the blank magnifying glass to zoom in one chart at a time.

## Zoom all

[459]



1. Click the Reset Zoom icon to un-zoom the CPU Usage (%) chart.

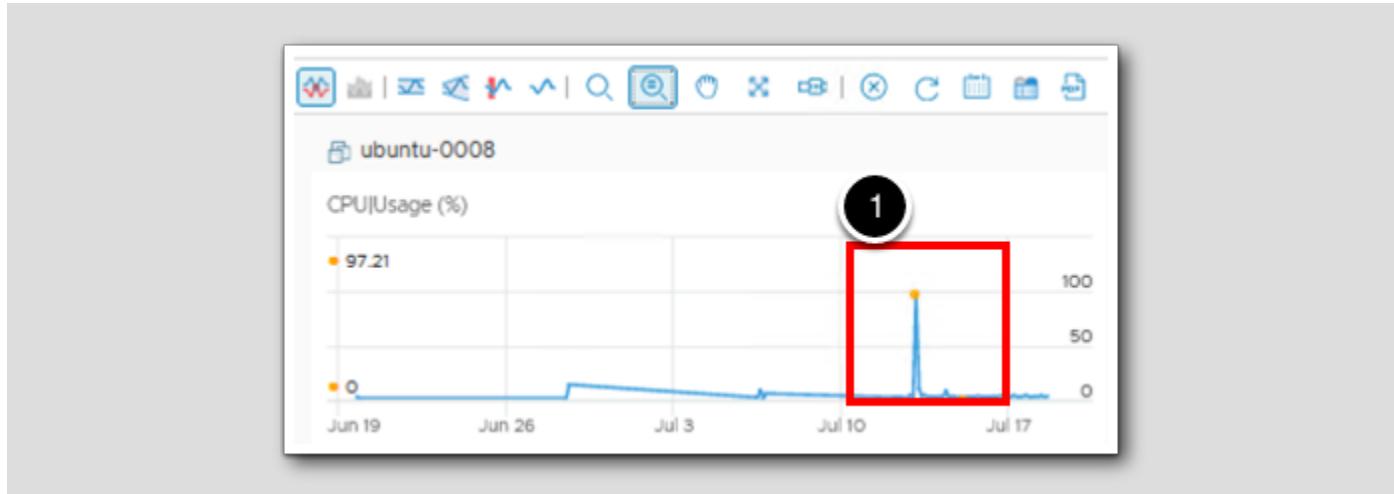
## Zoom All Charts

[460]



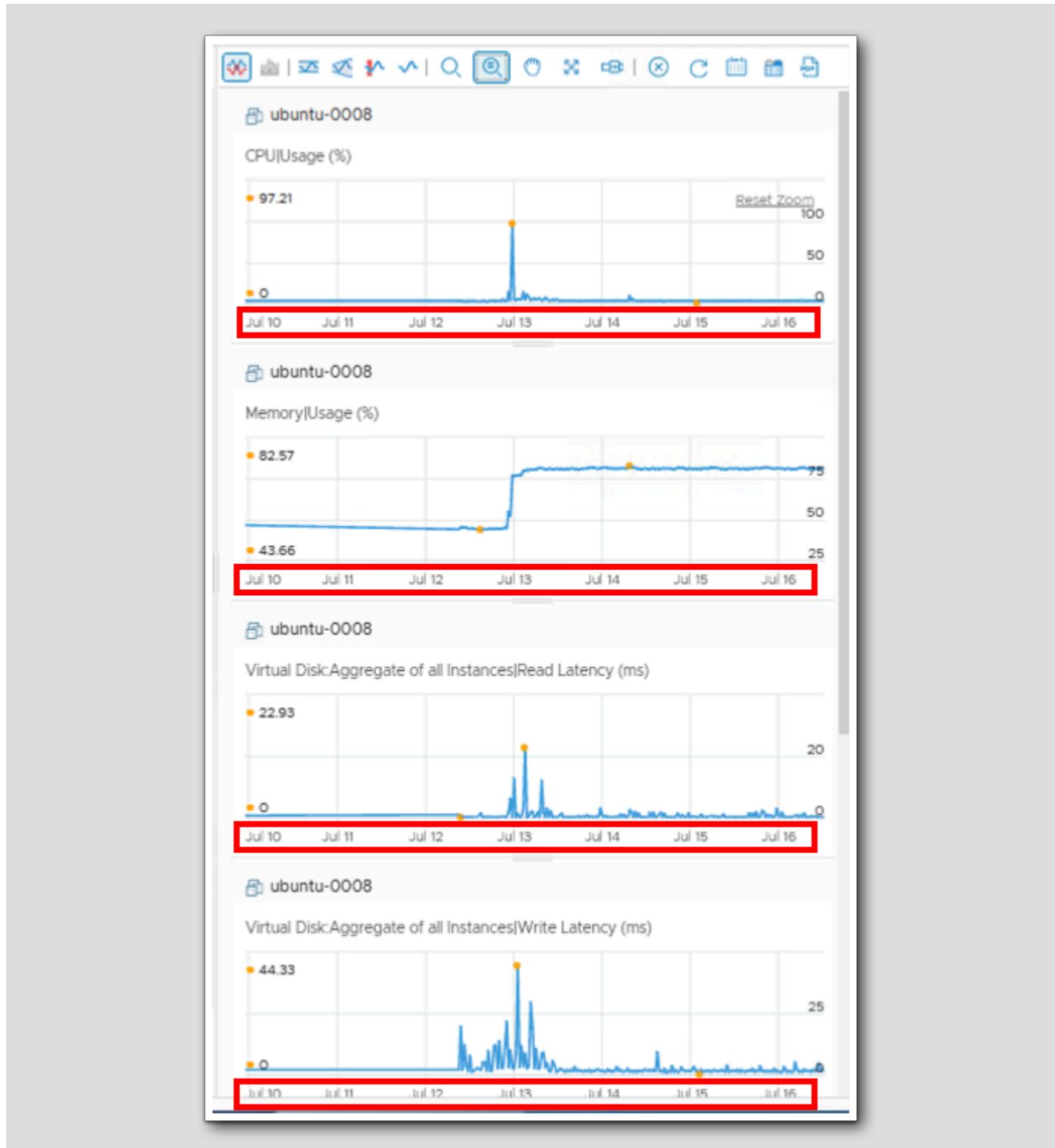
1. Click on the Zoom All Charts icon.

Zoom in on CPU again



1. In the CPU|Usage (%) chart, left click and drag a box around the same spike from the step above.

## All charts timeline change

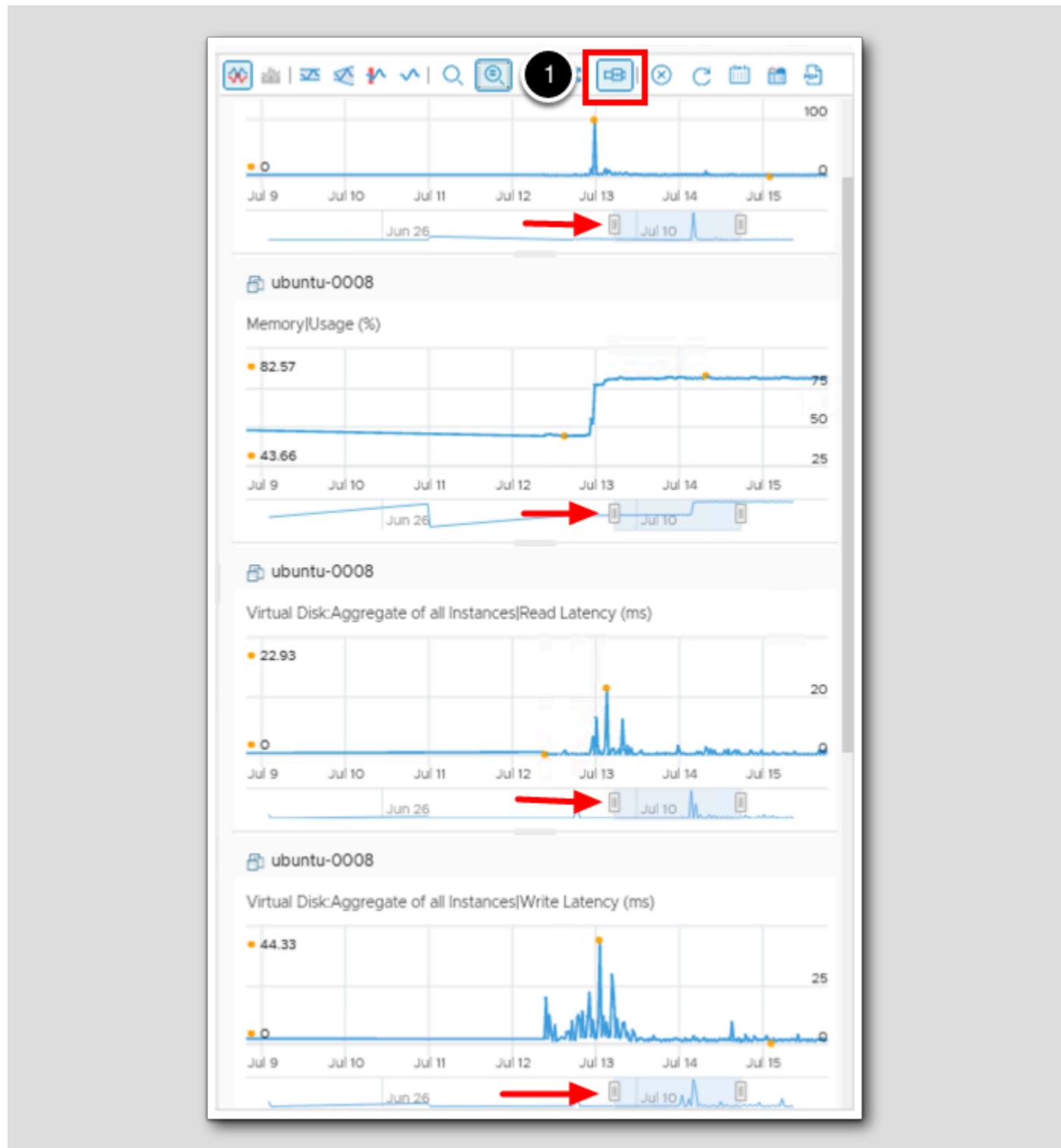


You will not only notice that all charts have had their timelines zoomed into the same timeframe, but that there is a commonality across the charts at the same time period. Using the Zoom All Charts feature is a quick way to identify issues during a specific event time.

## Chart Navigator

[463]

Chart Navigator will enable a slide bar under each chart and provides another way to adjust the timeline of your charts. Chart Navigator is also affected by the Zoom icons. If you have Zoom All Charts selected then all charts will change when you adjust the Chart Navigator slidebars.



1. Click on the Chart Navigator icon and test adjusting the chart timelines with both **Zoom the view** or the **Zoom All Charts** icons selected.

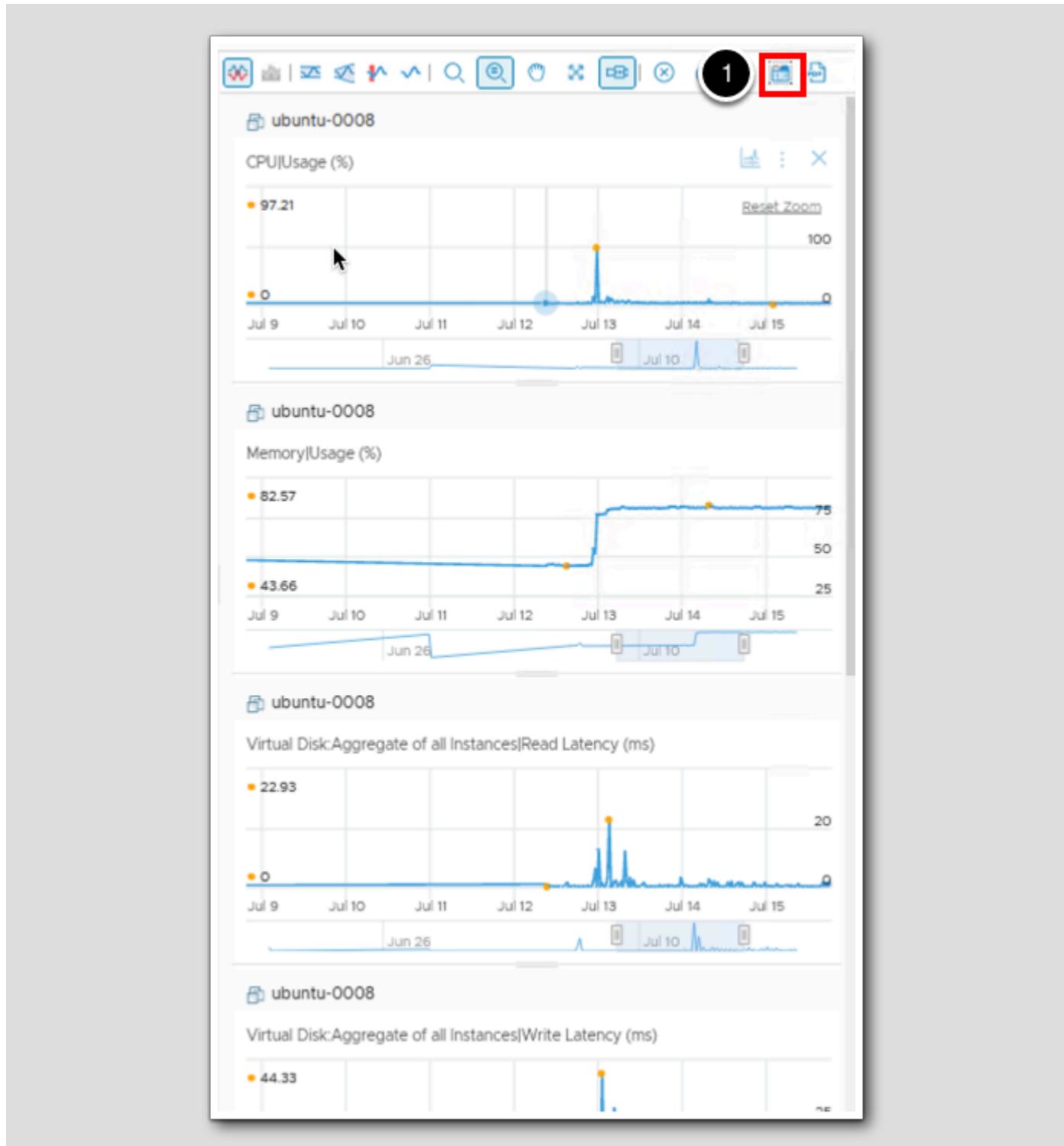
## Generate Dashboard and Save as a PDF

[464]



The last two icons we will discuss in this exercise are the Generate Dashboard and Save as a PDF. The chart list that this lesson walked you through is a good place to start troubleshooting a VM and how to get an idea of its general health. It may be nice to just make a dashboard of it instead of manually building it out every time. Save to PDF will generate a PDF of the current chart data presented.

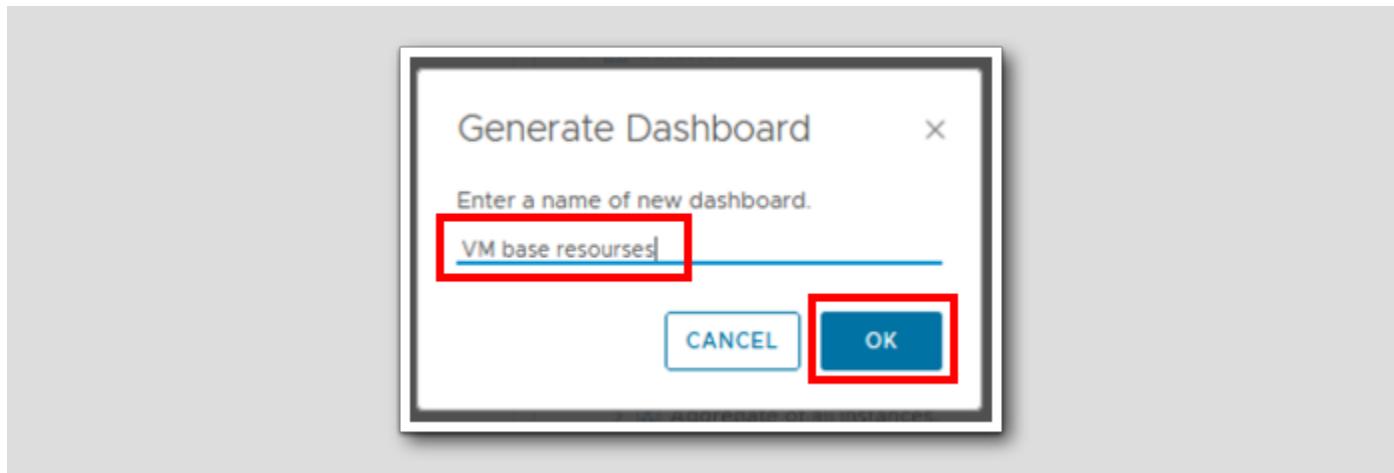
## Generate Dashboard



1. Click the Generate Dashboard icon.

Name the dashboard

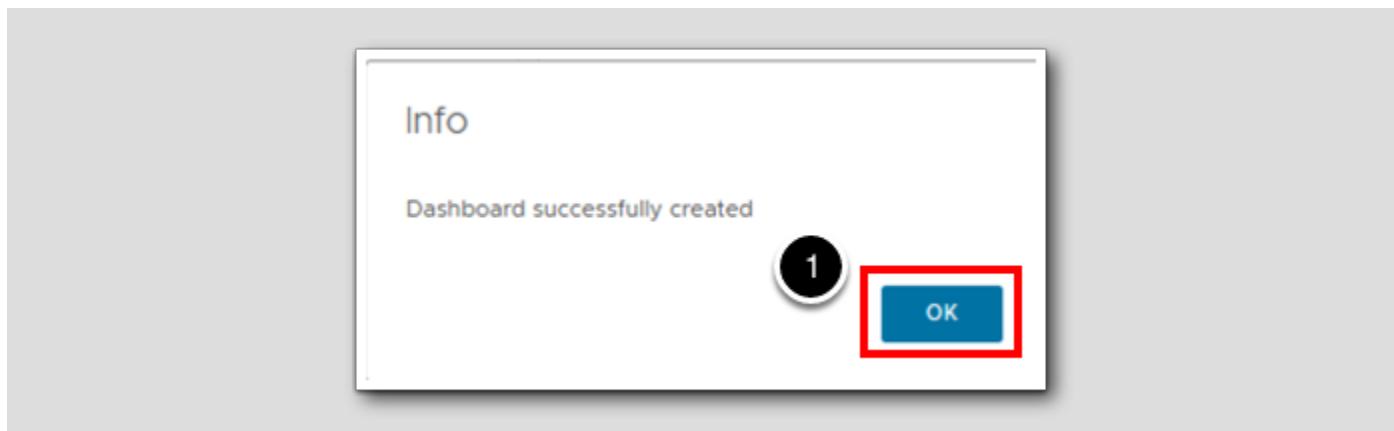
[466]



1. Enter VM base resources for the name

That was easy

[467]



1. Click OK.

## View the dashboard

The screenshot shows the VMware Aria Operations interface. On the left, there's a navigation sidebar with various options like Home, Data Sources, Environment, Visualize, Dashboards, Views, Reports, Troubleshoot, Optimize, Plan, Configure, Automation Central, Administration, and Developer Center. A red box highlights the 'Dashboards' option under 'Visualize'. A red circle with the number '1' is placed over the 'Data Sources' icon. A red box with the number '2' is placed over the 'Dashboards' icon. In the center, there's a search bar and a 'VM base resources' section with a 'Metric Chart' for 'ubuntu-0008'. The chart displays CPU Usage (%) with two data series: one at 3.58 and another at 2.79. Below it are two more charts for Memory Usage (%) and Virtual Disk Read Latency (ms), both also for 'ubuntu-0008'.

1. Click on > next to **Visualize**.

2. Click on **Dashboards**.

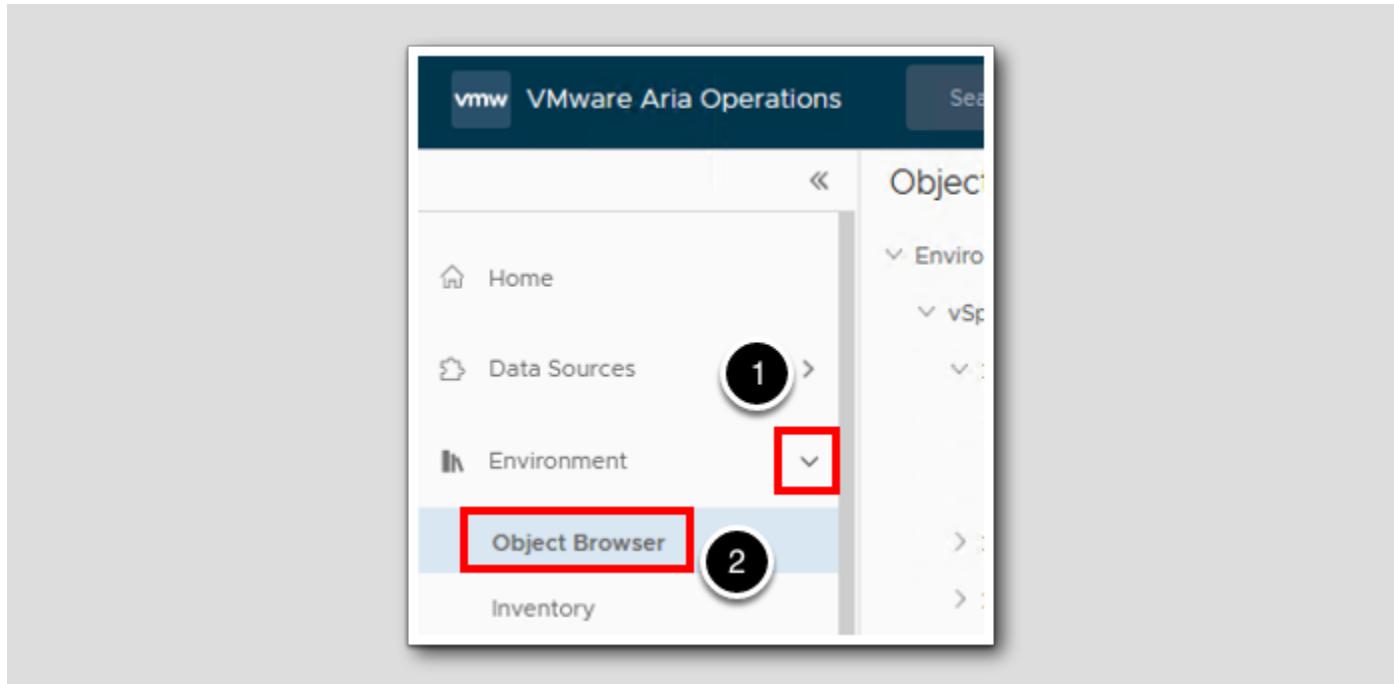
Notice that the newly created dashboard automatically shows up under Recents.

## Stacking Charts

In this lesson we will highlight the ability to stack multiple charts into one chart with a color key defining individual charts.

## Comparing CPUs

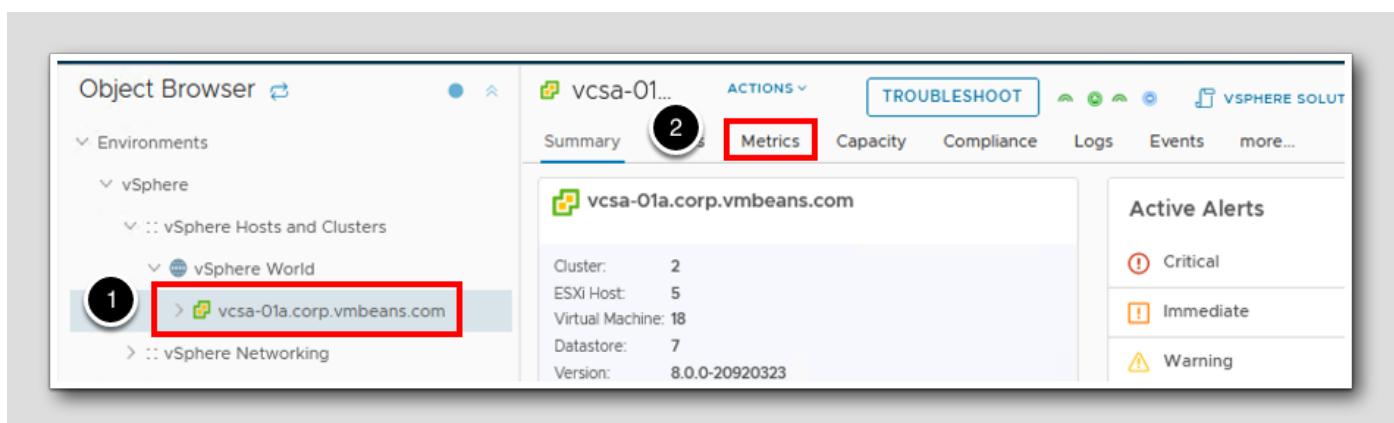
In this lesson we will build out charts from different host CPU usage and stack the charts for comparison.



1. Click > to expand Environment.

2. Click Object Browser.

## vSphere Hosts and Clusters



The Object Browser should have expanded the vSphere environment down to the vCenter vcsa-01a.corp.vmbeans.com. If it did not, click each > to expand down to vcsa-01a.corp.vmbeans.com.

1. Click on vcsa-01a.corp.vmbeans.com.
2. Click on Metrics.

Make sure Object Relationship window is minimized

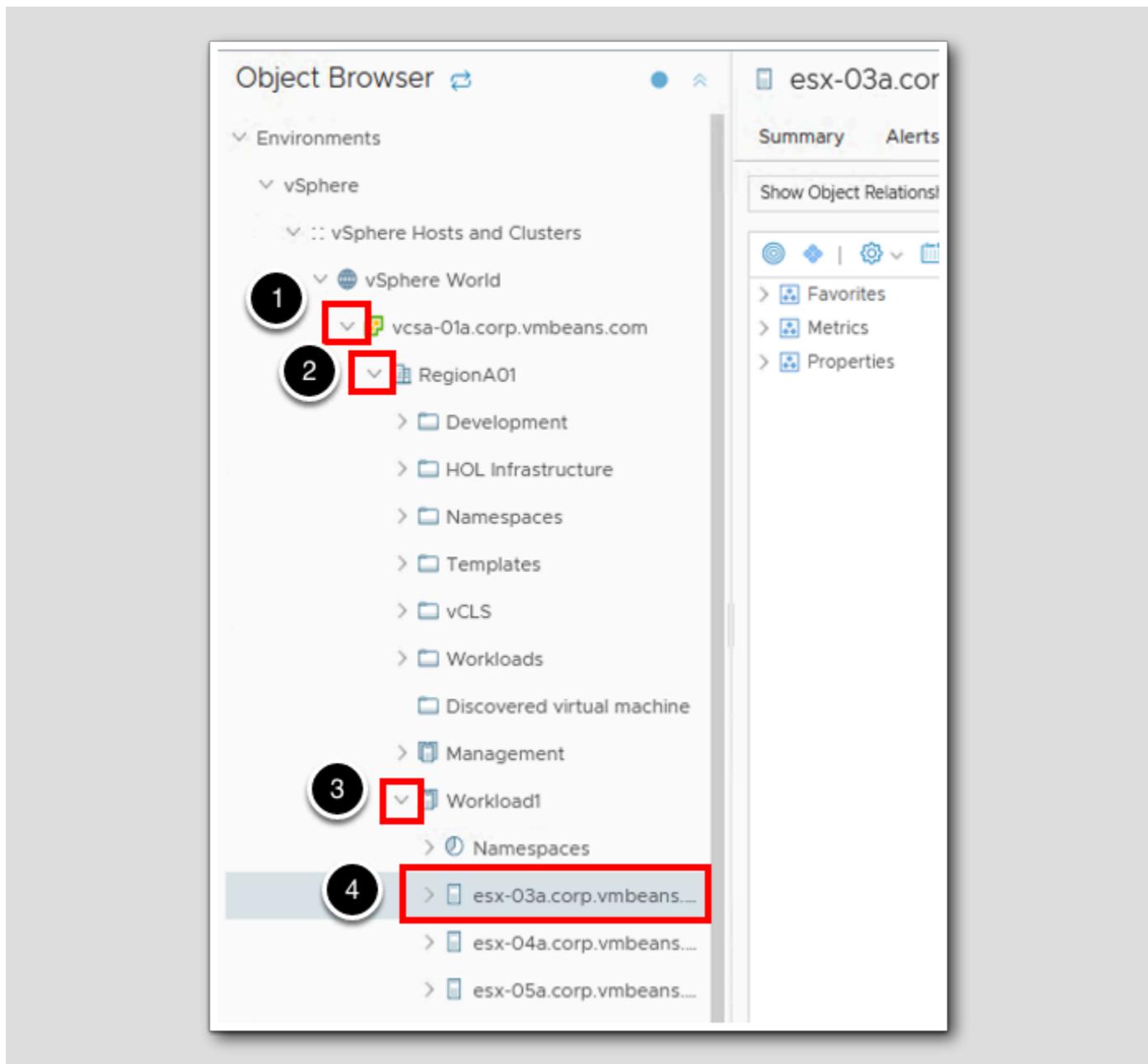
[472]



If the Object Relationship isn't minimized, minimize it so there's more real-estate for our Charts.

1. Click on the double chevron.

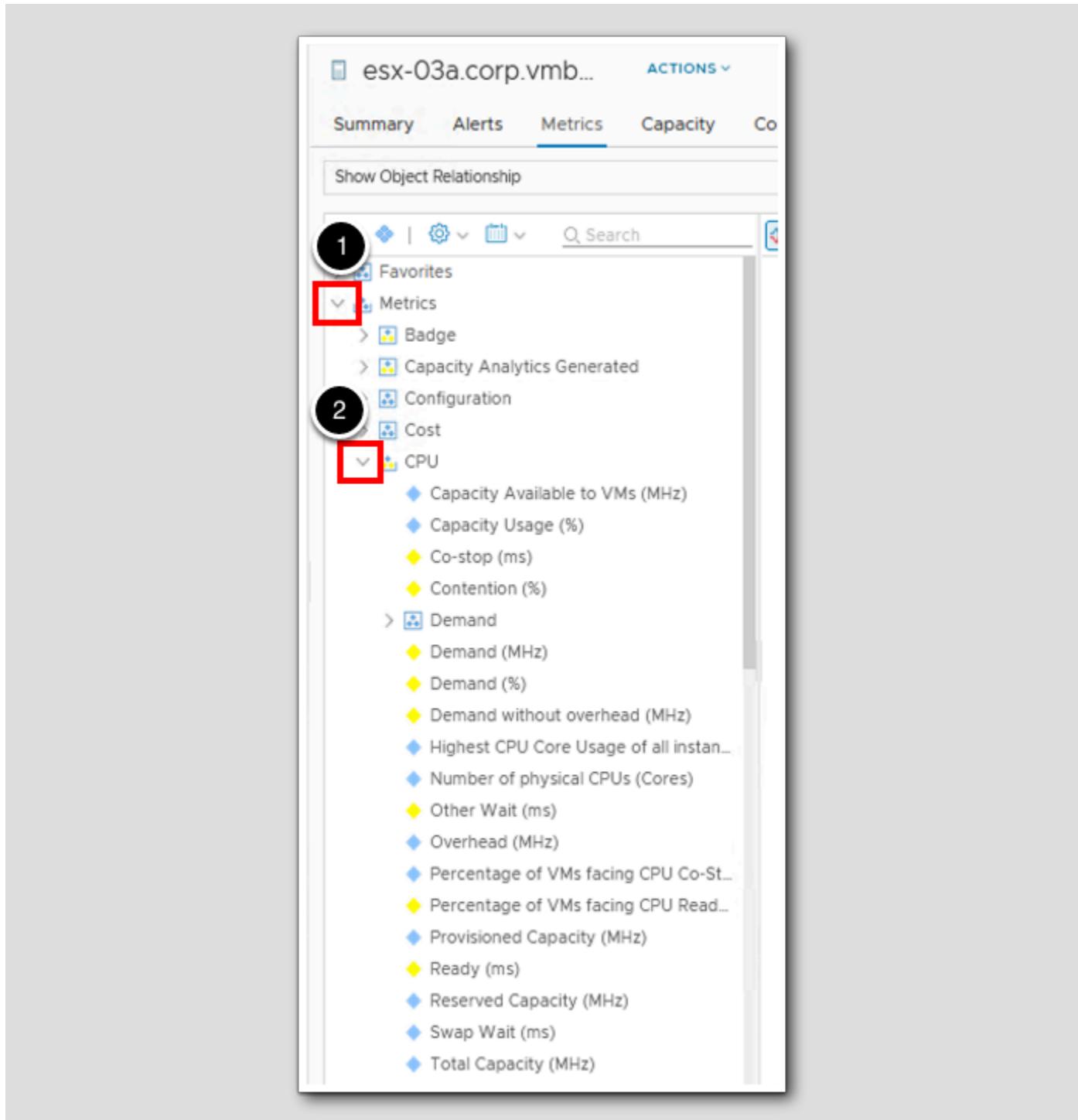
## Get workload cluster ESX host details



1. Click > to expand vcsa-01a.corp.vmbeans.com.
2. Click > to expand RegionA01.
3. Click > to expand Workload1.
4. Click on esx-03a.corp.vmbeans.com.



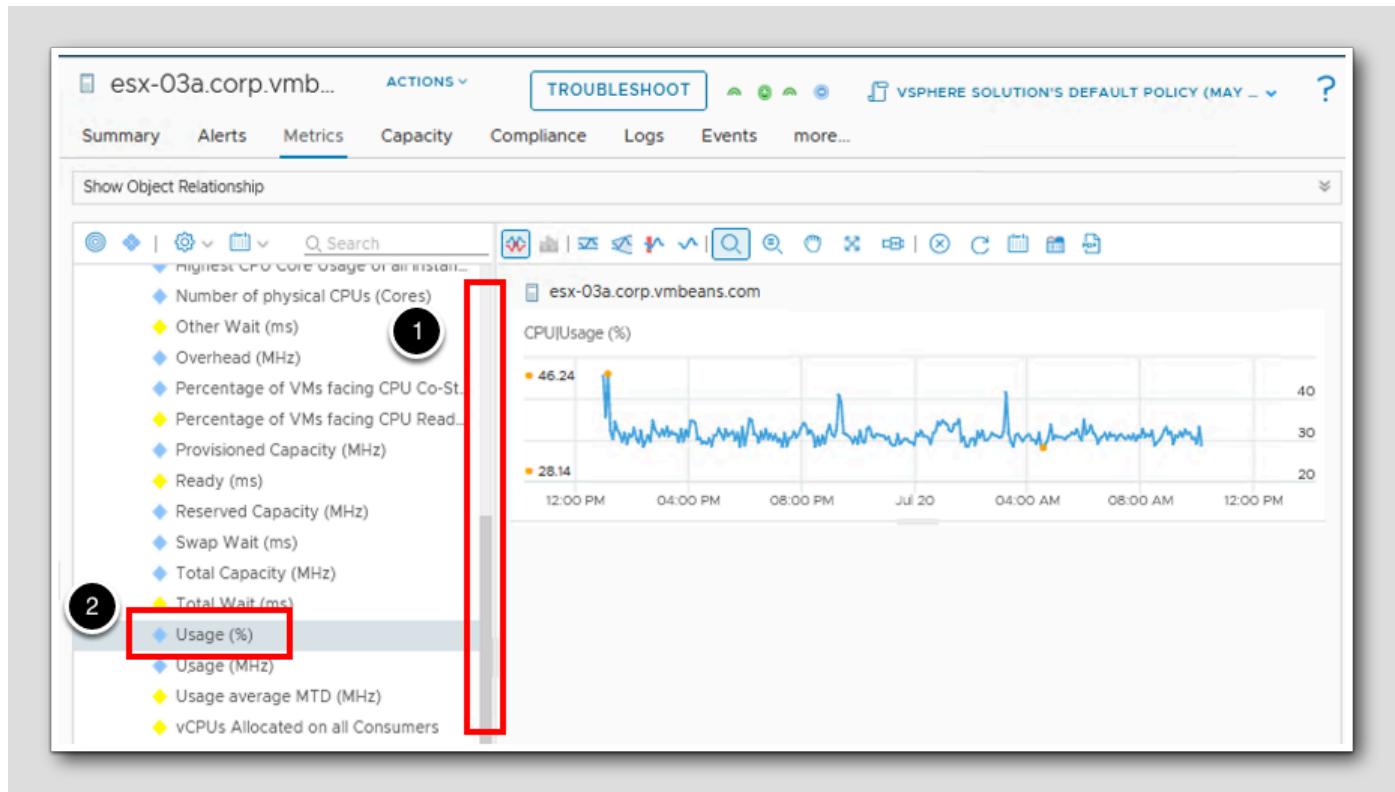
## Add host CPU Usage%



1. Click > to expand Metrics.
2. Click > to expand the CPU Metric list.

## Add host CPU Usage (%) continued

[475]



1. Scroll down until you see Usage (%).
2. Double click Usage (%).

Grab another host's CPU Usage (%)

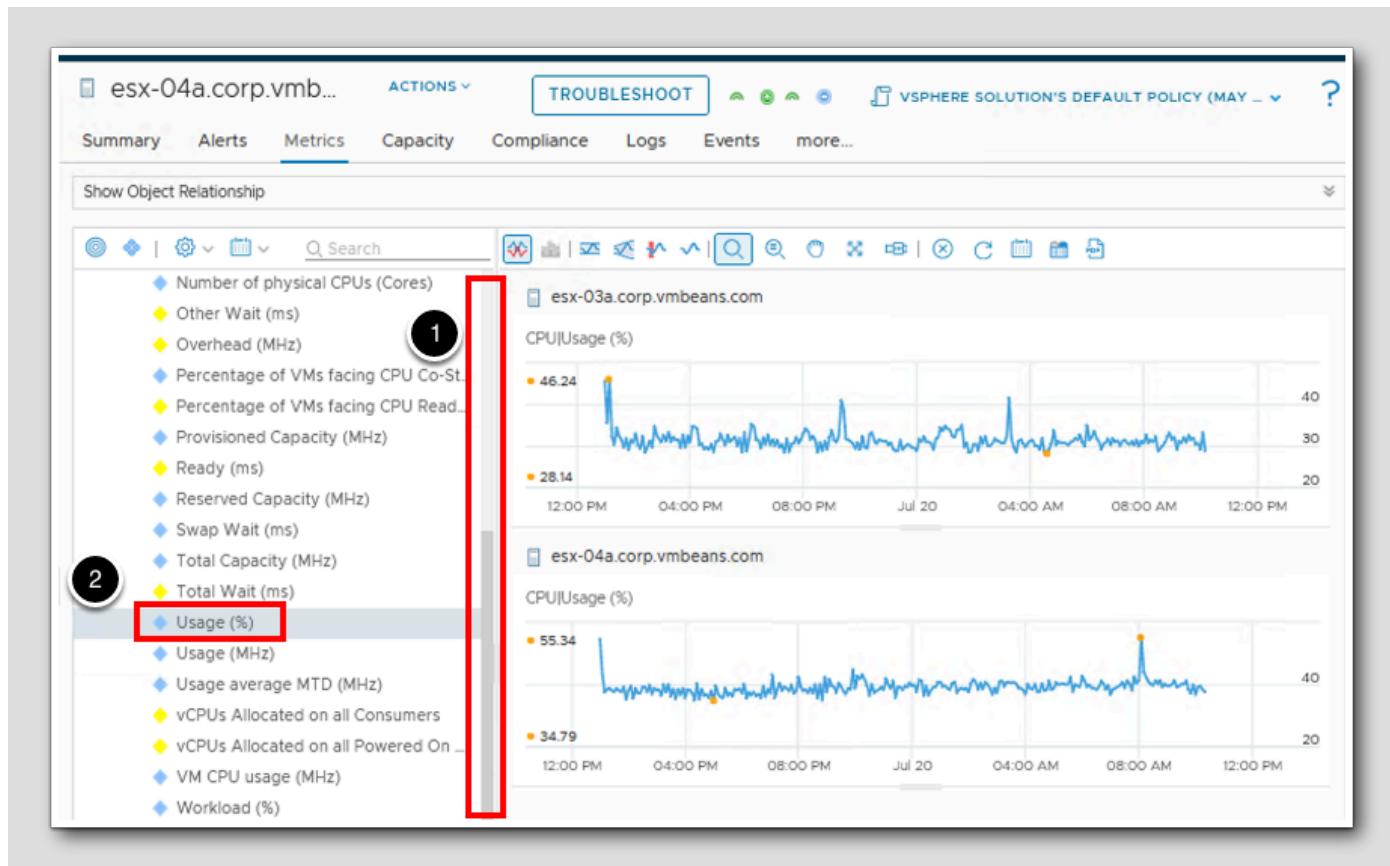
The screenshot shows the vSphere Client interface. On the left, the Object Browser displays a tree structure of vSphere objects. A red box highlights the node 'esx-04a.corp.vmbeans.com' under 'vSphere Hosts and Clusters'. A black circle labeled '1' is placed over this node. Another red box highlights the 'Metrics' section in the navigation bar at the top right. A black circle labeled '2' is placed over the 'Metrics' tab. A third red box highlights the 'CPU' section in the expanded Metrics list. A black circle labeled '3' is placed over the 'CPU' section. The expanded list includes various metrics such as Capacity Available to VMs (MHz), Capacity Usage (%), Co-stop (ms), Contention (%), Demand (MHz), Demand (%), Demand without overhead (MHz), Highest CPU Core Usage of all instances, Number of physical CPUs (Cores), Other Wait (ms), Overhead (MHz), Percentage of VMs facing CPU Co-St..., Percentage of VMs facing CPU Read..., Provisioned Capacity (MHz), and Ready (ms).

1. Click on esx-04a.corp.vmbeans.com.

2. Click > to expand Metrics.

3. Click > to expand CPU.

Grab another host's CPU Usage (%) continued



1. Scroll down until you see Usage (%).

2. Double click Usage (%).

## Add a third host's CPU Usage (%)

The screenshot shows the vCenter Operations Manager interface. On the left, the Object Browser displays a tree structure of environments, vSphere hosts, and clusters. A specific host, 'esx-05a.corp.vmbeans...', is selected and highlighted with a red box. On the right, the details pane for this host shows the 'Metrics' tab selected. Under the 'Metrics' section, the 'CPU' category is expanded, and its contents are listed. Another red box highlights the 'CPU' category in the metrics list.

Object Browser

- Environments
- vSphere
  - vSphere Hosts and Clusters
    - vSphere World
      - vcsa-01a.corp.vmbeans.com
        - RegionA01
          - Development
          - HOL Infrastructure
          - Namespaces
          - Templates
          - vCLS
          - Workloads
          - Discovered virtual machine
        - Management
        - Workload1
          - Namespaces
            - esx-03a.corp.vmbeans...
            - esx-04a.corp.vmbeans...
            - esx-05a.corp.vmbeans...
  - :: vSphere Networking
  - :: vSphere Storage

esx-05a.corp.vmbeans...

ACTIONS

Summary    Alerts    Metrics    Capacity

Show Object Relationship

Search

Favorites

Metrics

CPU

  - Capacity Available to VMs (MHz)
  - Capacity Usage (%)
  - Co-stop (ms)
  - Contention (%)

Demand

  - Demand (MHz)
  - Demand (%)
  - Demand without overhead (MHz)
  - Highest CPU Core Usage of all instances
  - Number of physical CPUs (Cores)
  - Other Wait (ms)
  - Overhead (MHz)
  - Percentage of VMs facing CPU Co-Stop
  - Percentage of VMs facing CPU Ready
  - Provisioned Capacity (MHz)
  - Ready (ms)
  - Reserved Capacity (MHz)

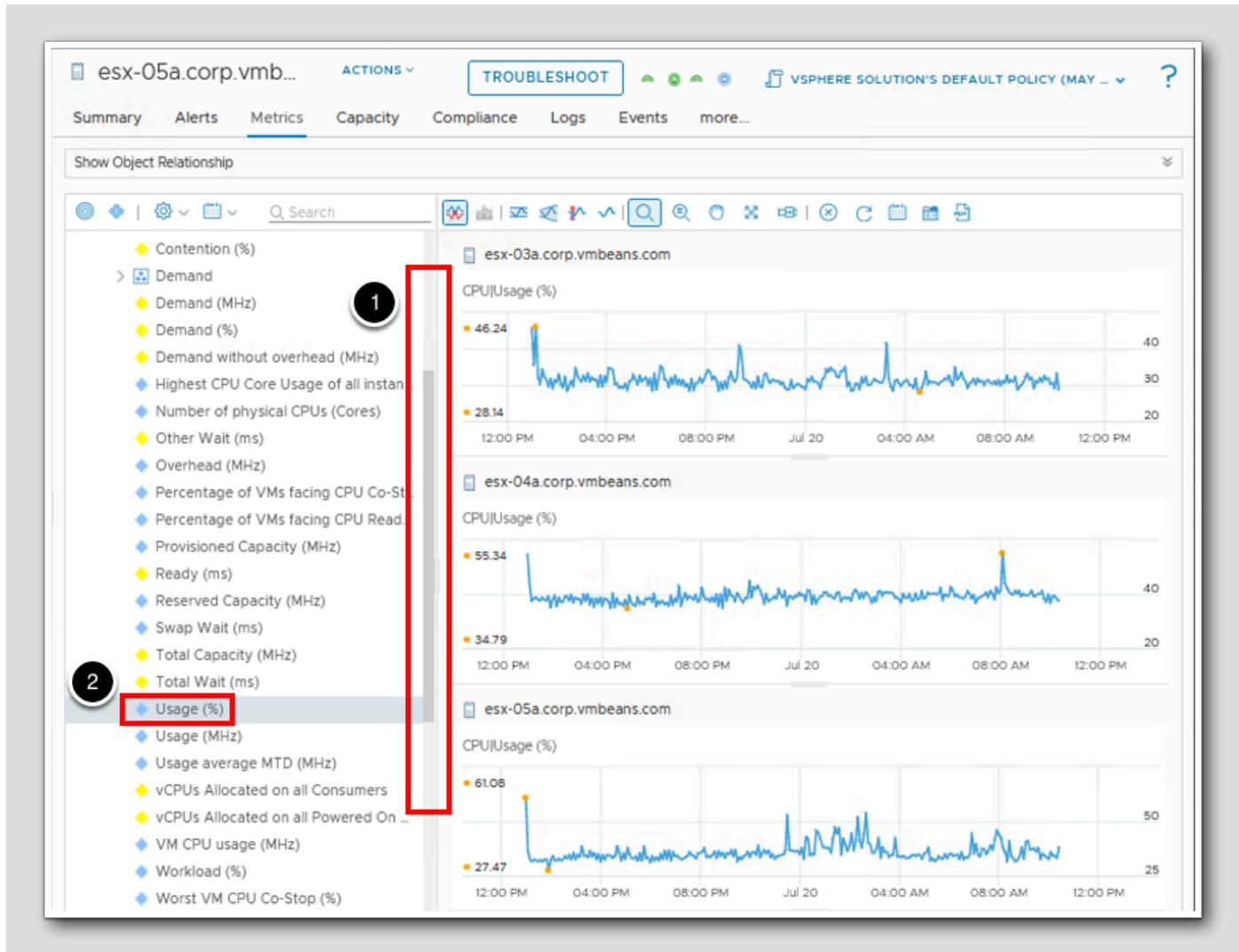
1. Click on esx-05a.corp.vmbeans.com.

2. Click > to expand Metrics.

3. Click > to expand CPU.

Add a third host's CPU Usage (%) continued

[479]

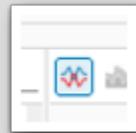


1. Scroll down until you see Usage (%).

2. Double click Usage (%).

We have now built out a Chart view of three different hosts and compare CPU Usage (%) but it's a little difficult to truly compare at a macro level. Let's stack these charts to make that a little easier.

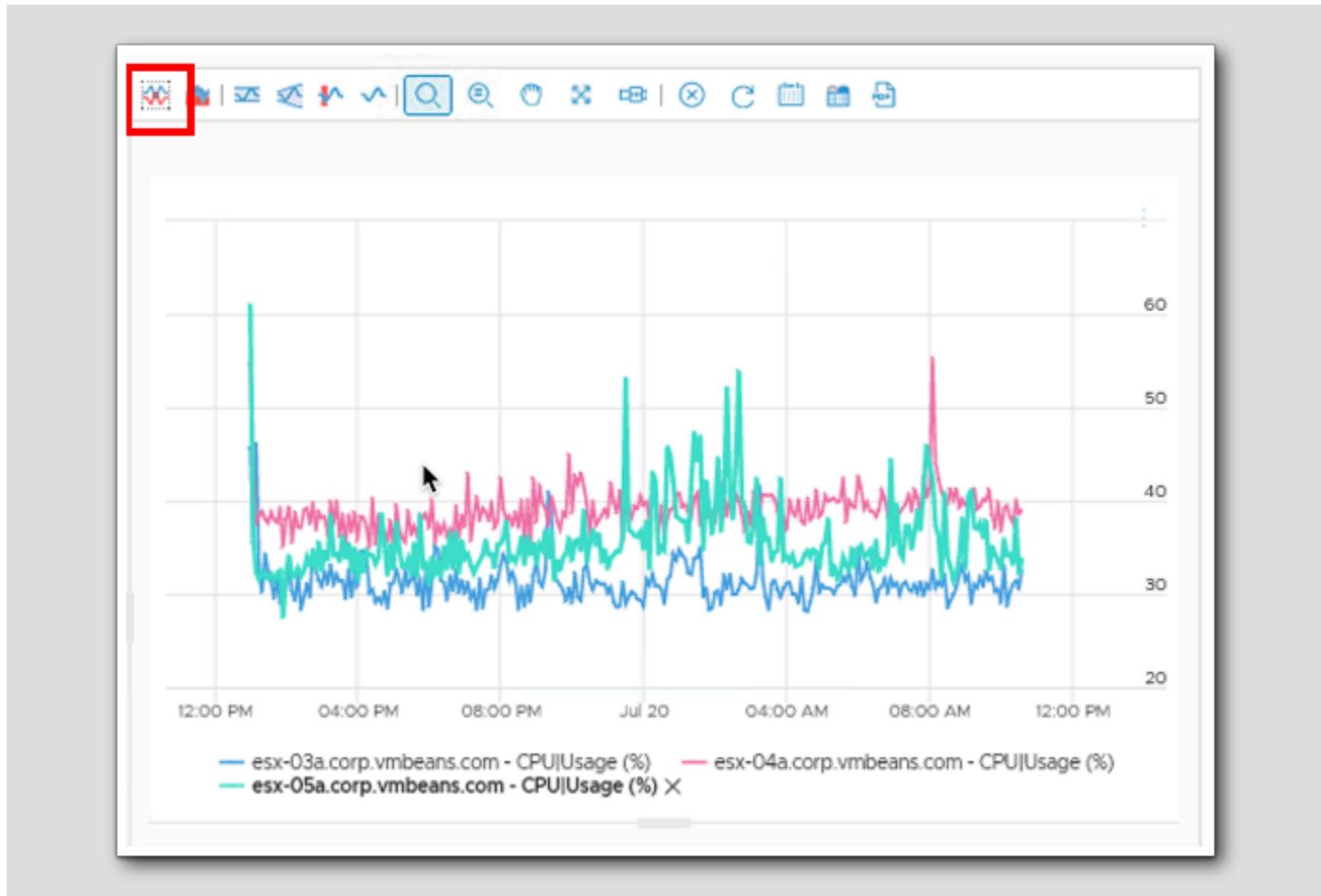
## Split Charts icon



This icon at the top of the charts list is called the Split Charts icon and is enabled by default. When enabled, each metric gets its own chart. Unchecking it will combine all charts into one chart and can provide a much easier view to compare metrics.

## Un-split the Host CPU charts

[481]



1. Click on the Split Charts icon to disable it.

We have now stacked the charts and we can read them relative to each-other giving us a comparison of CPU Usage (%) for each of the ESX hosts from minute to minute. Notice each host automatically gets its own color explained in the key below the graph.

This concludes this lesson

## Conclusion

[482]

Metrics use is a powerful way to build a custom window into the performance of a resource. We hope this lesson has shown how to build a multi chart view, and the options provided with that view, that can be used to troubleshoot the infrastructure.

## You've finished Module 8

Congratulations on completing the lab module.

If you are looking for additional general information on Aria Operations 8.4, try one of these:

- **VMware Product Public Page -Aria Operations:** <https://www.vmware.com/products/aria-operations.html>
- **Aria Operations 8.12 - Release Notes:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/rn/vmware-aria-operations-812-release-notes/index.html>
- **Aria Operations - Documentation:** <https://docs.vmware.com/en/VMware-Aria-Operations/index.html>
- **VMware Cloud Management Blog - What's New in Aria Operations 8.12 and Cloud:** <https://blogs.vmware.com/management/2023/04/whats-new-in-vmware-aria-operations-8-12.html>

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the **TABLE OF CONTENTS** to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 9 - Advanced Troubleshooting Techniques (15 minutes) Intermediate

### Introduction

[485]

The Troubleshooting Workbench is where you perform advanced troubleshooting tasks on an alert that triggered on an object. You can investigate both known and unknown issues in VMware Aria Operations. It was specifically designed to focus in and out of an object to quickly identify if there is an issue with a specific object or, by providing the ability to zoom out the scope, to see if there is a systemic issue within the infrastructure.

### Log in to Aria Operations

[486]

We will log in to a live instance of Aria Operations running in this lab.

### Open the Firefox Browser from the Windows Task Bar

[487]

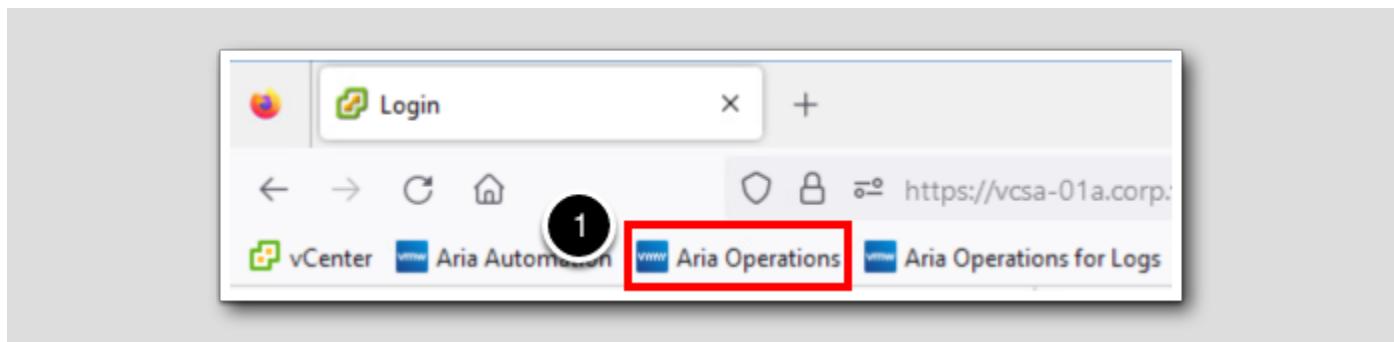


If the browser is not already open, launch Firefox.

1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

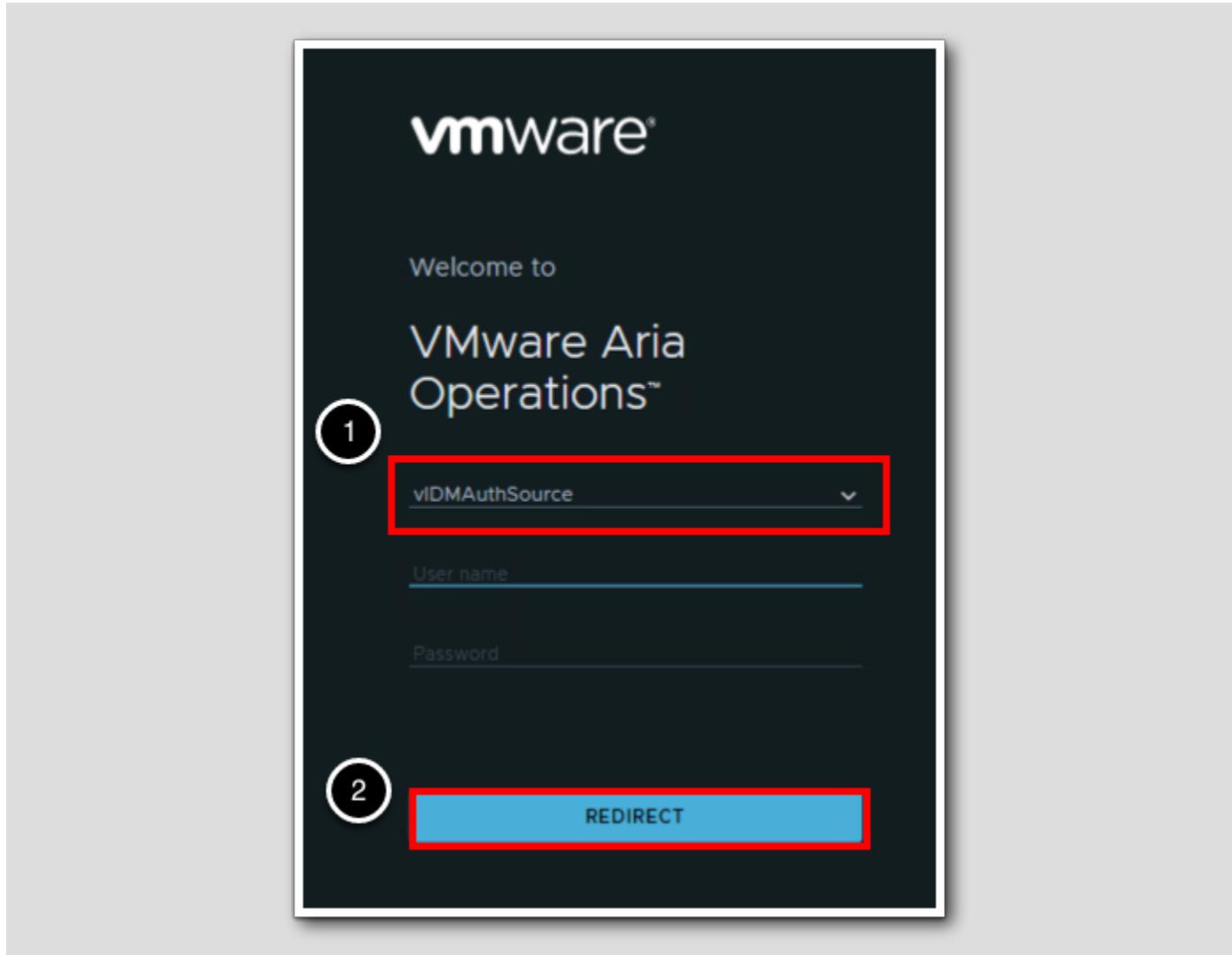
### Navigate to Aria Operations

[488]



1. Click the Aria Operations bookmark in the bookmarks toolbar.

## Log in to Aria Operations

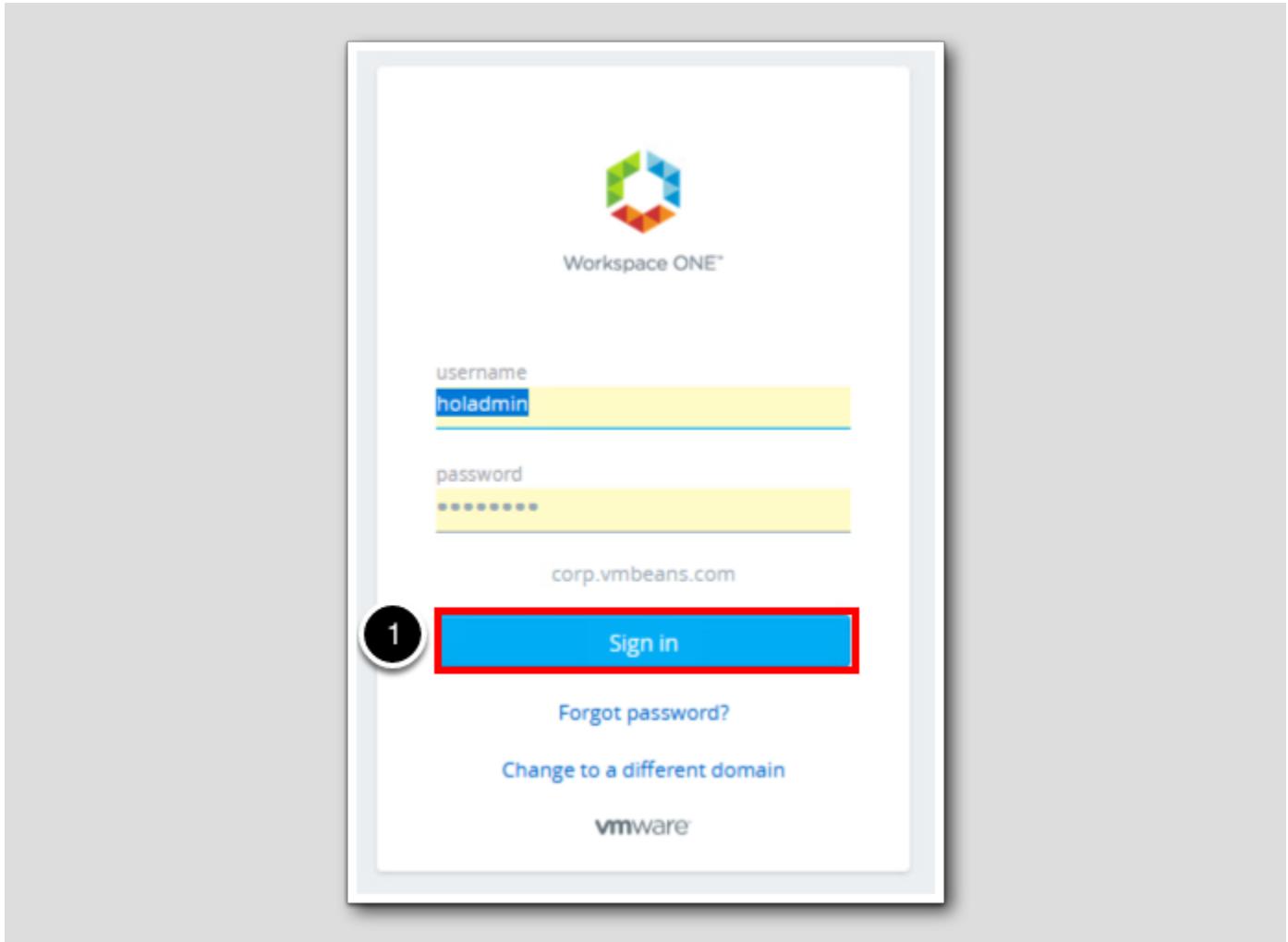


Aria Operations is integrated with VMware Workspace ONE Access (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

vIDMAuthSource may be pre-selected as the default identity source. If it is not, then you will need to select it.

1. Click the drop-down arrow and select vIDMAuthSource if it is not already selected.
2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login



VMware Identity Manager acts as the identity provider for the Active Directory authentication source in this lab.

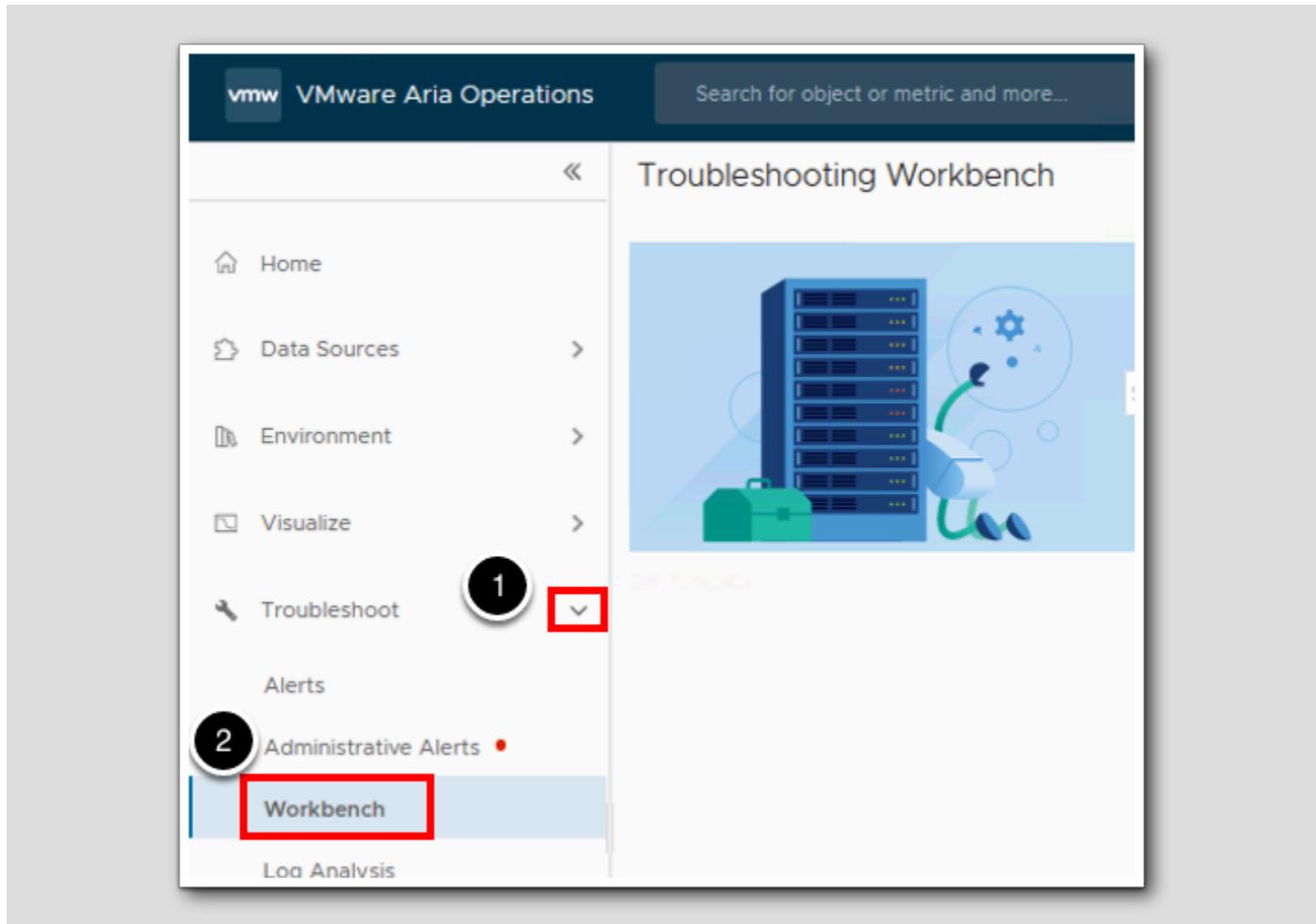
Credentials for the default user, holadmin, have already been provided.

1. Click Sign in.

## Introduction to Workbench

Workbench is a purpose built interface that allows for quick reference of not only a troubled resource but it's subordinate and parent objects. This allows a perfect window to assess if there is a problem with an individual resource or if there is a systemic issue happening.

## Open Workbench

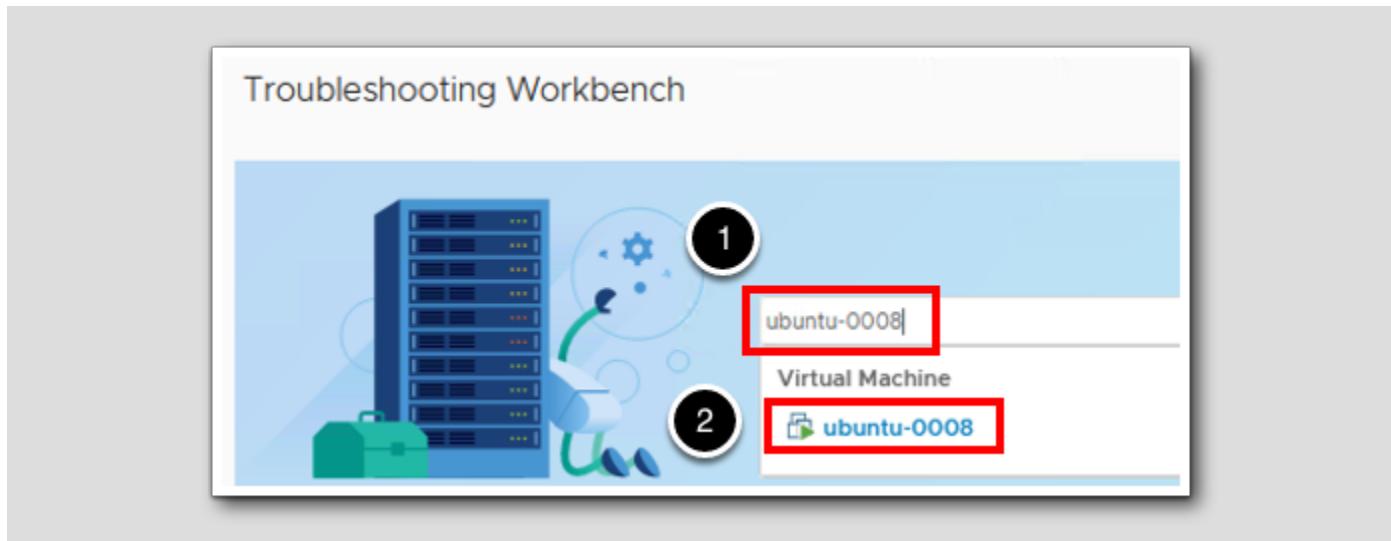


1. Click > next to Troubleshoot.

2. Click on Workbench.

## Search for your subject

In this lesson we will start our troubleshooting at the VM layer, as if a complaint came in about VM performance, and expand our scope from there.



1. In the search bar type **ubuntu-0008**.
2. Click on **ubuntu-0008**.

## Troubleshooting Workbench construct

[494]

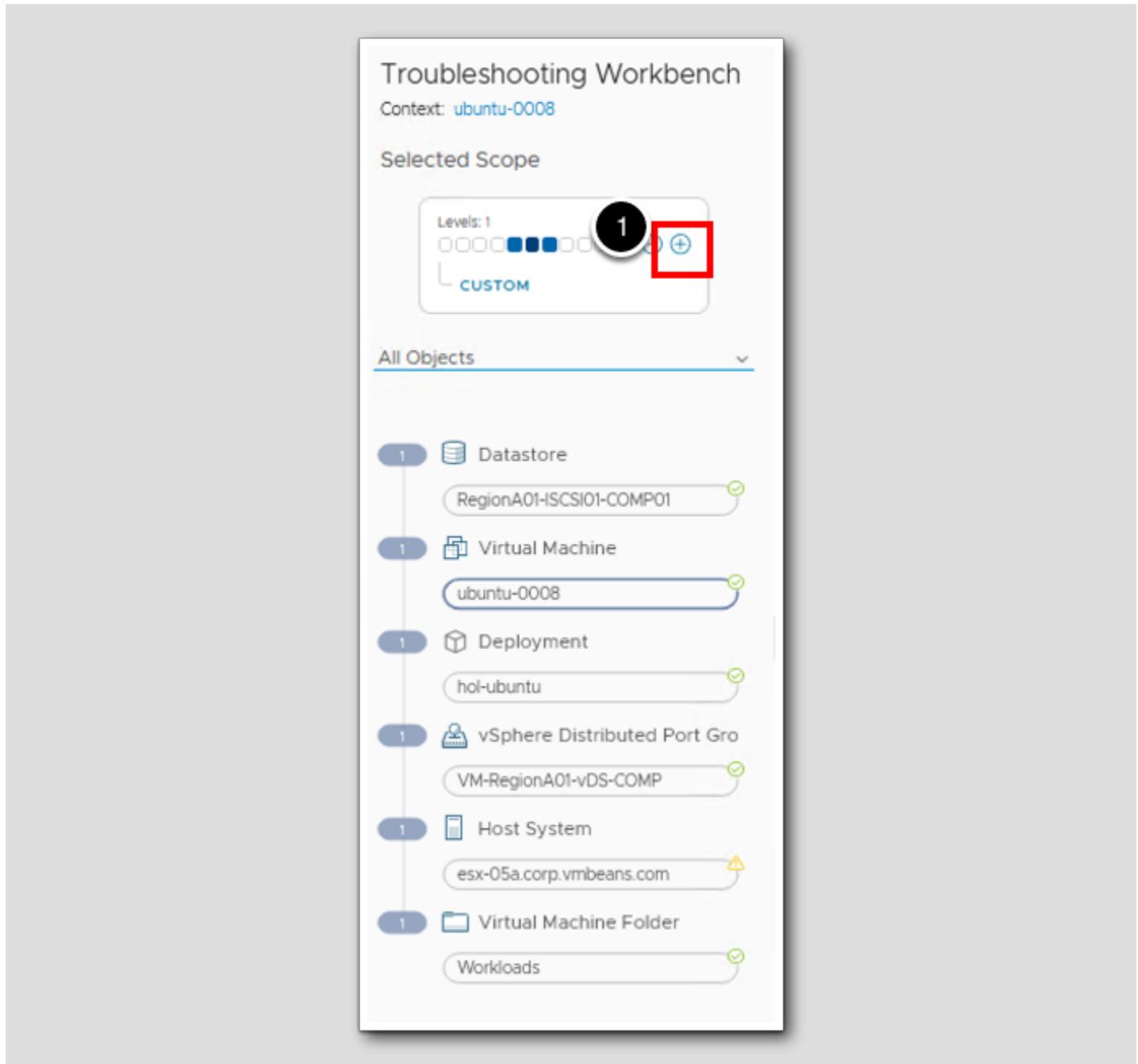
Let's take a look at how the Troubleshooting Workbench was purpose built to troubleshoot a problem in your infrastructure. The dashboard allows for a user to quickly switch from troubleshooting a specific object to pan out and troubleshoot a systemic issue in one page.

## Scope

[495]

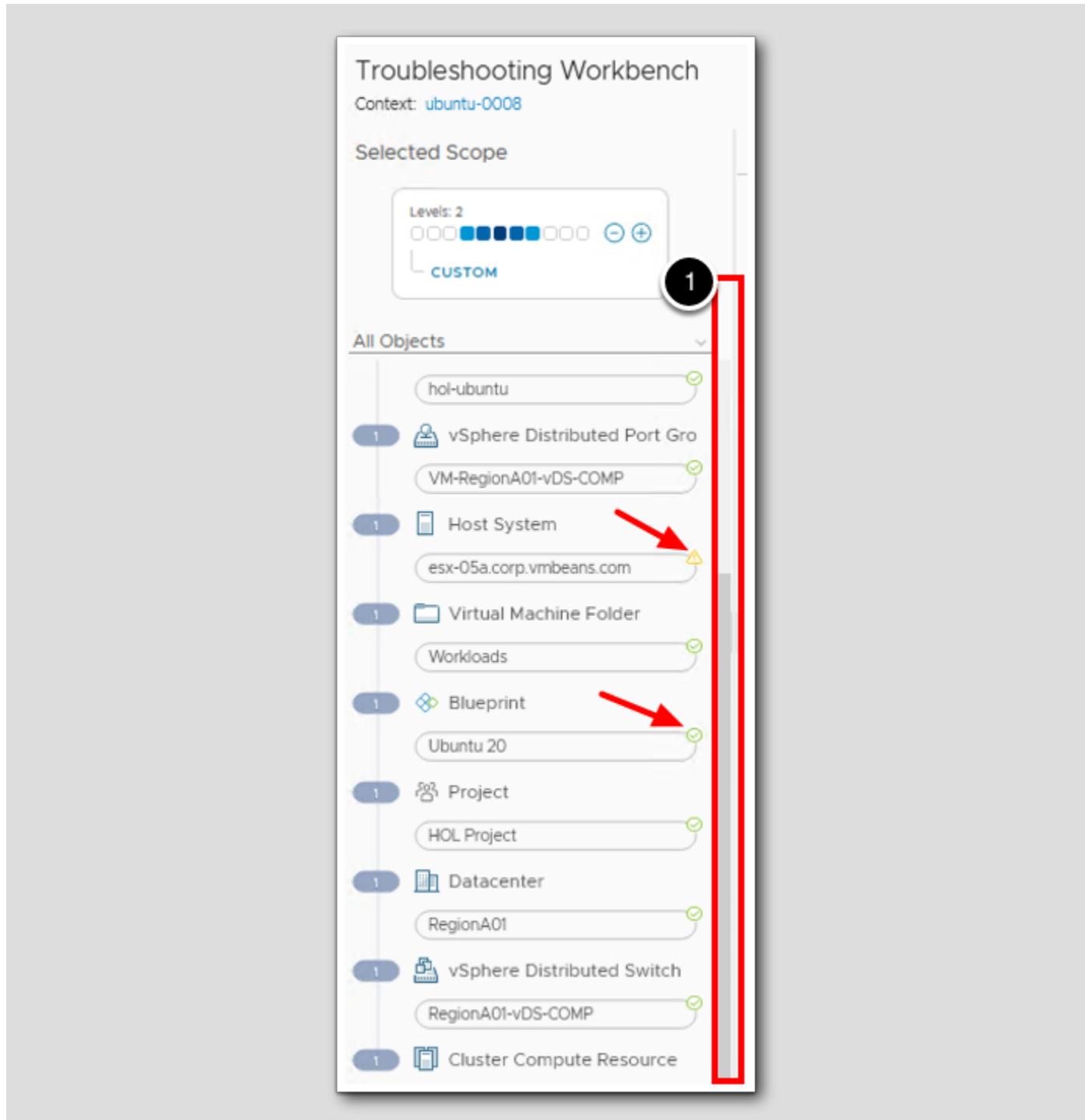
You look for potential evidences of a problem within a specific scope and time range. The Selected Scope control on the left of the Troubleshooting Workbench page is where you vary the scope. You can vary the scope in the following ways:

- You can select only the object that you are investigating, or include several upstream and downstream relationships by increasing the scope. As you increase the scope, more objects are displayed in the inventory tree.



1. Click on the + icon to expand the scope one more layer of parent and child objects.

One more layer

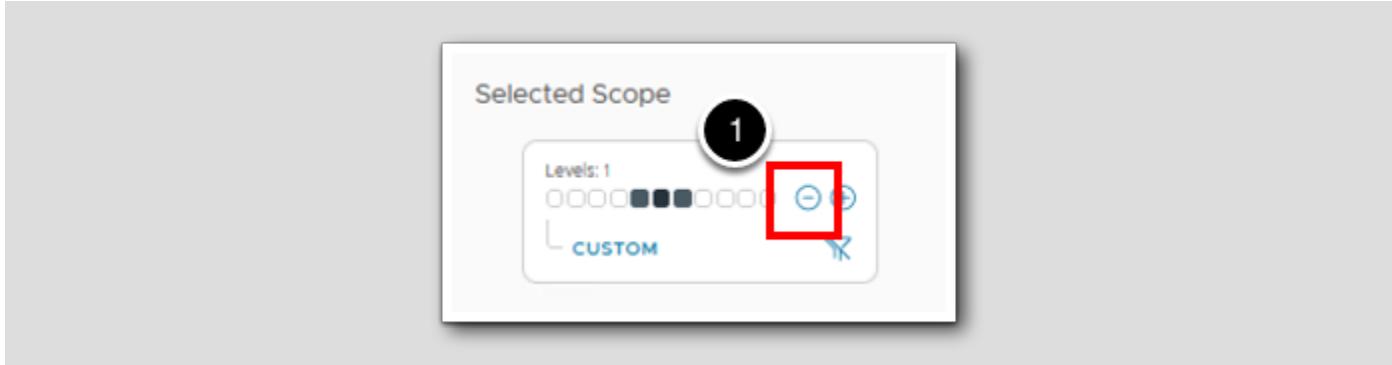


1. Scroll down to the bottom of the Scope window.

Notice that have expanded the scope to include Blueprint, Project, Datacenter, vSphere Distributed Switch and Cluster Compute Resource. On the right hand side notice the green checkmarks and the yellow exclamation points. As you zoom your Scope out you can quickly identify issues higher up in the stack that may be contributing to the issue at hand.

## Collapse back down

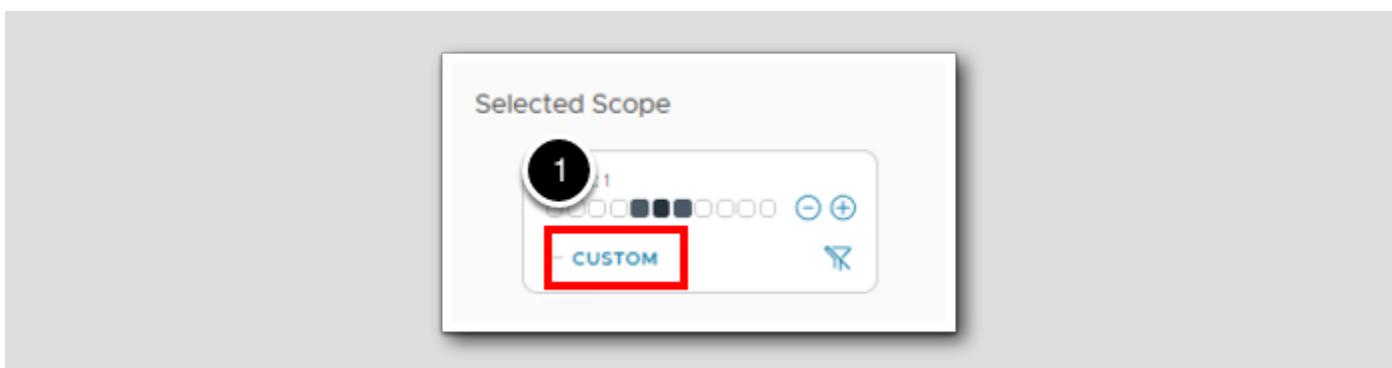
[497]



1. Click - to collapse the Scope back down to one level above and one level below.

## Custom

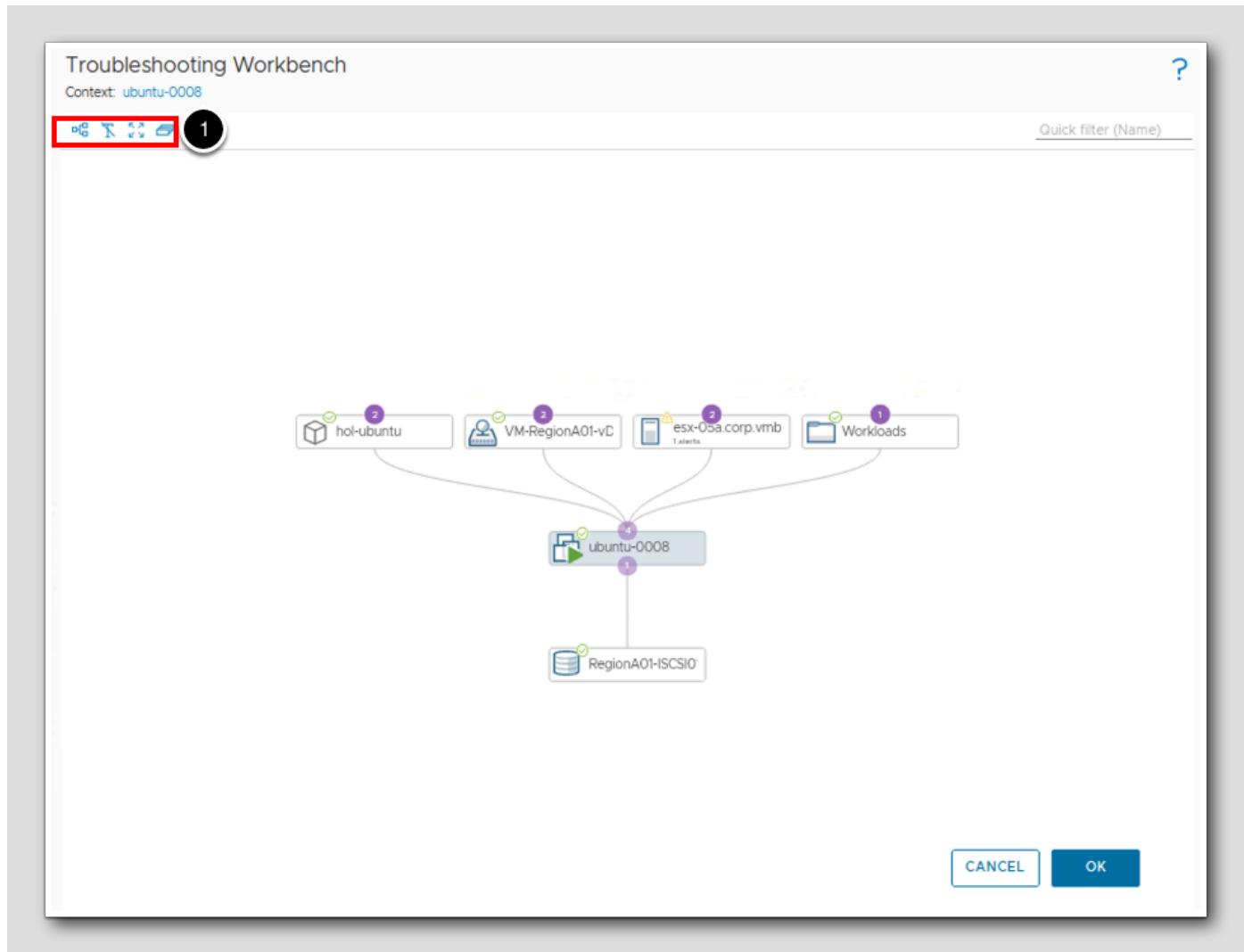
[498]



1. Click CUSTOM.

## Custom Scope

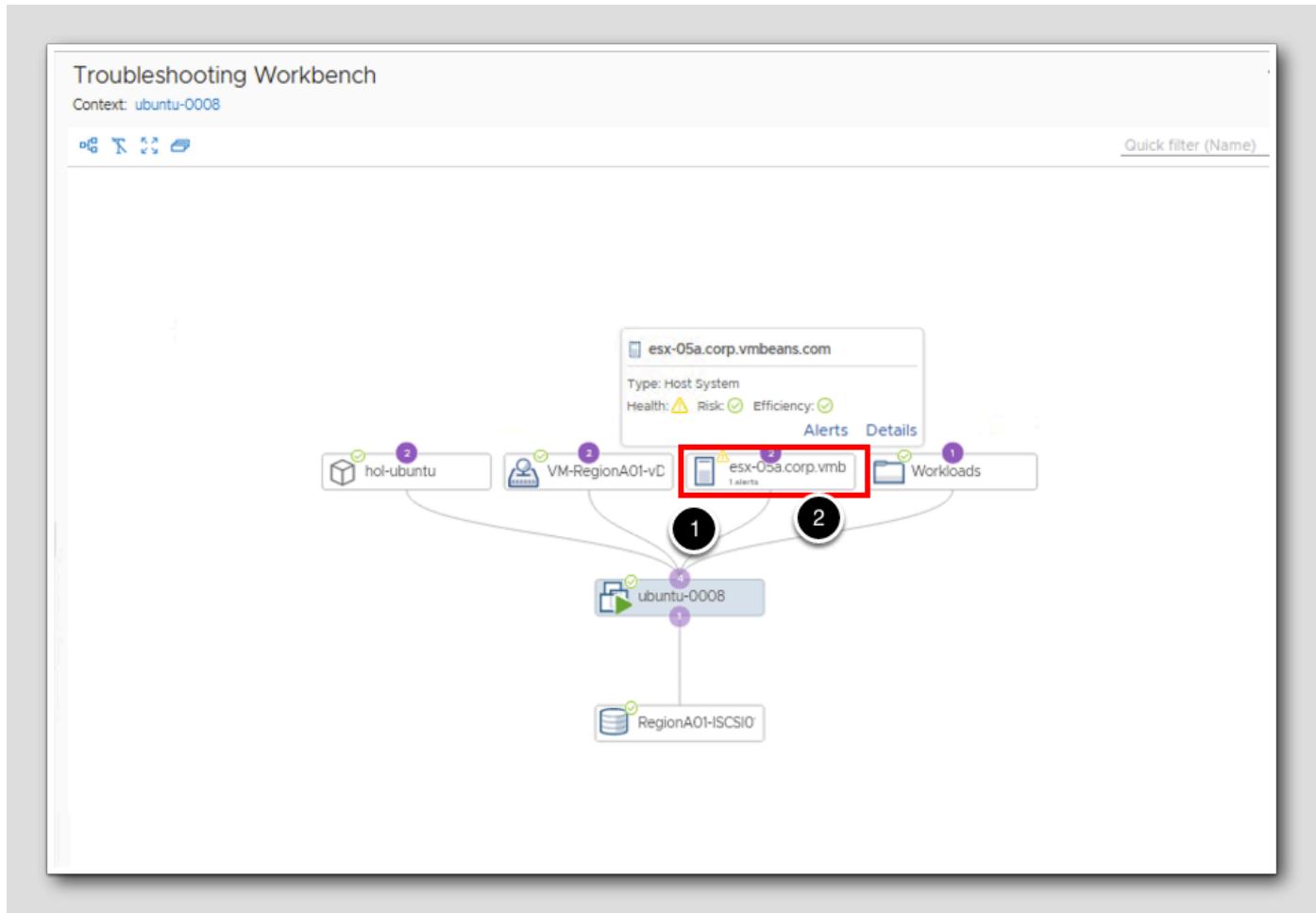
You can select a custom scope to include objects of your choice. Clicking Custom will open an interactive window where you use the pointer to visually rearrange your objects, view relationships and add peers to modify the relationships. To see details about the object, place the pointer for a few seconds above the object. You can reset a custom scope to start all over again.



1. Click on the Custom Scope icons to see how you can manipulate the visual display of the custom view

Hover for details

[500]

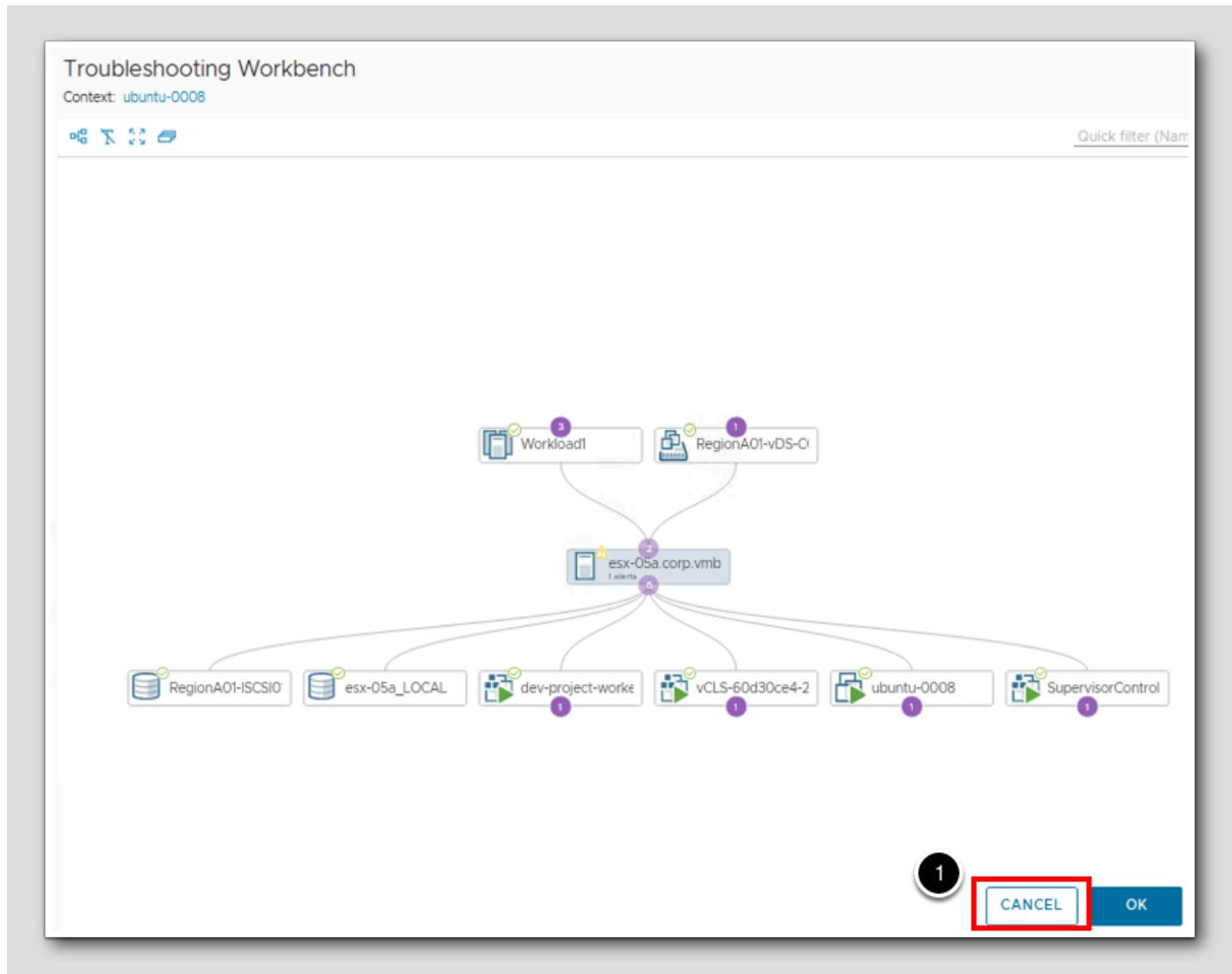


1. Hover over esx-05a.corp.vmbeans.com to bring up the information window and notice the Health indicator is yellow.
2. Double click on esx-05a.corp.vmbeans.com to focus on that object.

## Switch Focus

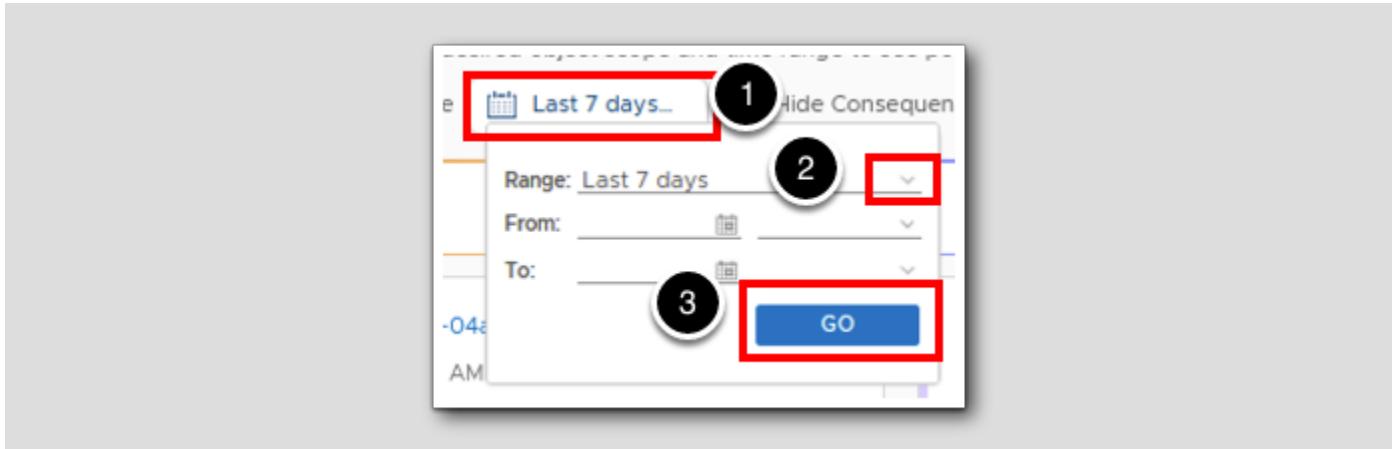
[501]

Double clicking on an object in the Custom view will quickly show the relationship of that object. This can be used to navigate the dependency structure to highlight root cause quickly.



Click CANCEL to return to the Troubleshooting Workbench.

## Time Range



1. Click on the Time Range field.
2. Click > at the end of the Range field.
3. Select Last 7 days.
4. Click GO.

## Potential Evidence

The potential evidences are based on Events, Property Changes, and Anomalous Metrics which are displayed on the right of the Troubleshooting Workbench change in the Potential Evidence tab. Information in these sections is displayed as cards. This is a purpose built collection of data points to highlight critical details of an object that will quickly identify problem areas.

The screenshot shows the 'Potential Evidence' window with the following interface elements:

- Header:** Potential Evidence, Alerts, Metrics, Events, Logs, Close button.
- Time Range:** Last 7 days, Hide Consequential Evidence.
- Sections:**
  - Events:** Shows a card for 'esx-05a.corp.vmbeans.com' on Jul 22, 2023, at 3:28:15 PM, with a metric 'Memory/Shared 315,552 (KB) DT above 0 (KB)' breached. A line chart shows a sharp increase from ~1M to ~2M KB between July 21 and July 22.
  - Property Changes:** Shows cards for 'esx-05a.corp.vmbeans.com' on Jul 23, 2023, at 2:00:23 PM, and 'ubuntu-0008' on Jul 22, 2023, at 3:18:14 PM. Both show configuration changes.
  - Anomalous Metrics:** Shows a card for 'VM-RegionA01-vDS-COMP' on Jul 23, 2023, at 3:23:31 AM, with a metric 'Summary/Ports Down (%)' showing a significant drop from ~25% to ~18% around July 22.
- Bottom Left:** Another section for 'esx-05a.corp.vmbeans.com' on Jul 22, 2023, at 3:28:15 PM, showing a metric 'Memory/Shared Common 106,321.33 (KB) DT above 8 (KB)' breached. A line chart shows a sharp increase from ~100K to ~200K KB between July 21 and July 22.
- Bottom Right:** A card for 'esx-05a.corp.vmbeans.com' on Jul 21, 2023, at 2:00:45 PM, showing a metric 'Cost/Server Purchase Date changed from 2021-12-01 to 2022-01-01' breached. A line chart shows a step change from ~10 to ~30 units.

Three main pillars of Events, Property changes and Anomalous Metrics are highlighted and driven by the Scope that is defined. Note that many of the events shown are on the parent object, the host, esx-05a.corp.vmbeans.com. The Potential Evidence window will automatically adjust as you zoom the Scope in and out to help identify critical data or issues.

- **Events** - Displays events, based on a change in the metrics. Events for metrics that have breached the usual behavior, and major events that have occurred within the selected scope and time are displayed. The cards are based on dynamic thresholds for a metric, which is calculated based on historical and incoming data.
- **Property Changes** - Displays important configuration changes that occurred within the selected scope and time. Both single and multiple property changes are displayed. For multiple property changes, you can view the latest and previous changes.
- **Anomalous Metrics** - Metrics which have shown drastic changes within the selected scope and time. Ranks the results based on the degree of change. The most recent anomalous metric based on a time-sliced comparison in the current time range is given the highest weightage.

## Alerts and Symptoms

The Alerts tab is also dependent on the Scope level that is defined so you can quickly include or exclude Alerts and Symptoms allowing for a faster identification of root cause.

The screenshot shows the VMware vSphere Client interface with the 'Alerts' tab selected. A red box highlights the 'Alerts' tab in the top navigation bar. A black circle with the number '1' is overlaid on the 'Metrics' tab. Below the tabs, there are two buttons: 'Alerts' (selected) and 'Symptoms'. Underneath these buttons are filter options: 'Actions' dropdown, 'Group By Time' dropdown, and a 'Criticality' section showing an alert for 'Uplink redundancy on DVPorts degraded'.

1. Click on **Alerts** to show what alerts have been triggered within the scope defined.

## Symptoms

The screenshot shows the Troubleshooting Workbench interface. The top navigation bar includes tabs for Potential Evidence, Alerts, Metrics, Events, and Logs. The 'Alerts' tab is currently selected. Below the navigation bar, there is a 'Selected Scope' section with a 'Levels: 2' indicator and a '+' icon, which is highlighted with a red box. The main content area shows a list of symptoms for the selected object 'ubuntu-0008'. The list is ordered by criticality, with the first item being 'Time remaining is critically low'. Each symptom entry includes an icon, the symptom name, and a status indicator.

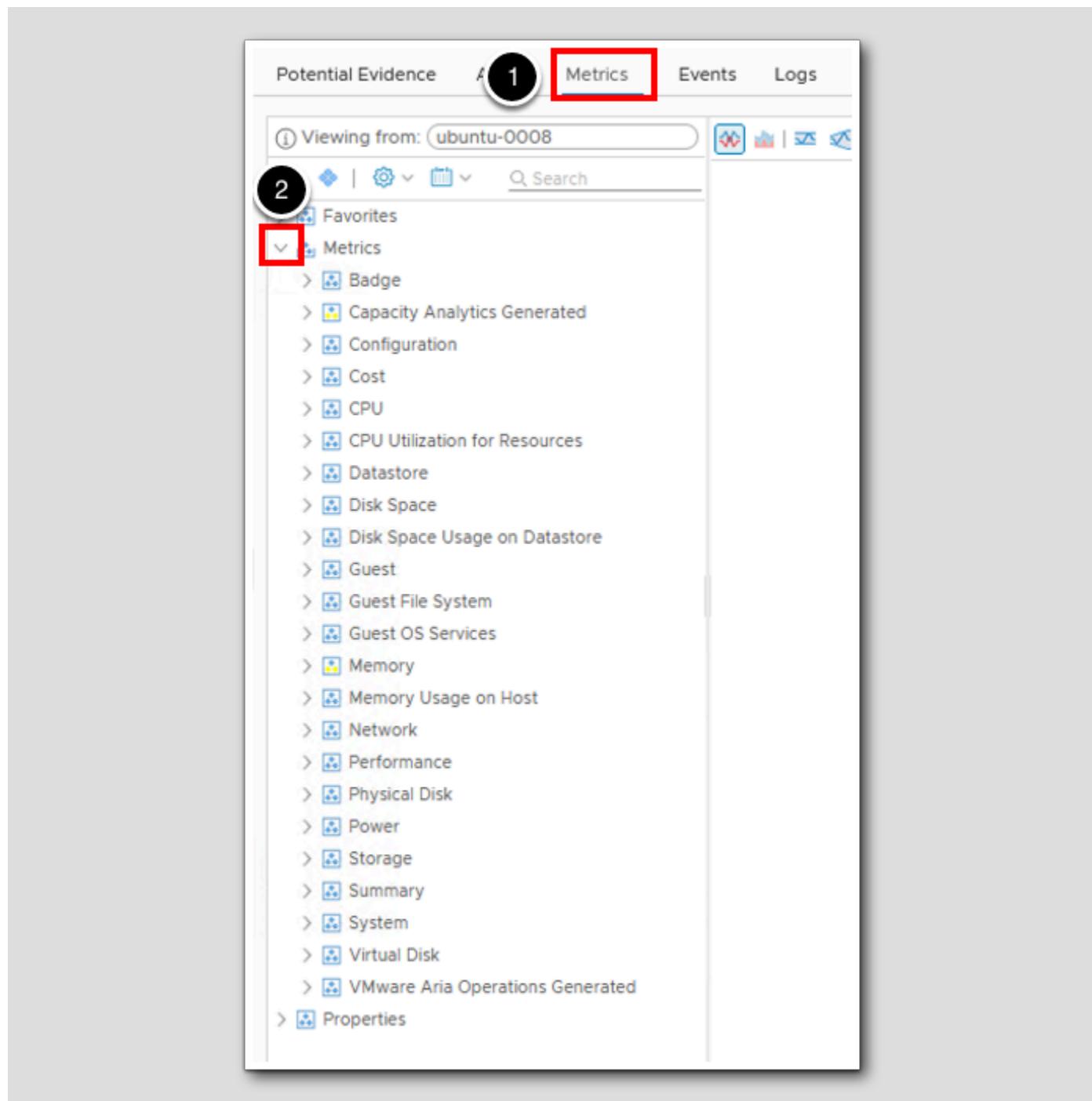
Criticality	Symptom	Status
!	Time remaining is critically low	<span style="color: yellow;">💡</span>
!	Capacity remaining is critically low	<span style="color: yellow;">💡</span>
!	Workload is critically high	<span style="color: yellow;">💡</span>
!	Cluster Compute Resource Capacity Remaining Percentage is critically low	<span style="color: yellow;">💡</span>
!	Workload is critically high	<span style="color: yellow;">💡</span>
!	Virtual machine memory demand exceeds configured memory limit	<span style="color: yellow;">💡</span>
!	Cluster Compute Resource Workload is critically high	<span style="color: yellow;">💡</span>
!	Cluster memory workload at Critical level	<span style="color: yellow;">💡</span>
!	Cluster Compute Resource Time Remaining is critically low	<span style="color: yellow;">💡</span>
!	Host memory workload at Critical level	<span style="color: yellow;">💡</span>
!	Time remaining is critically low	<span style="color: yellow;">💡</span>
!	Cluster Compute Resource Capacity Remaining Percentage is moderately low	<span style="color: yellow;">💡</span>

1. Click on **Symptoms**.

2. Click on + to expand the Scope to Levels: 2 and notice that the list of critical Symptoms has grown.

## Metrics

There was a deep dive into how to build a Metrics list in the previous module but as you can see the Troubleshooting Workbench puts the hierarchy of the focused object at your fingertips.



1. Click on **Metrics**.
2. Click > next to the **Metrics** list, notice you have the metrics list for a VM.

Quickly switch to the host that the VM is on

The screenshot shows the Troubleshooting Workbench interface. The top navigation bar includes tabs for Potential Evidence, Alerts, Metrics (which is underlined), Events, and Logs. Below the navigation is a search bar and a toolbar with various icons. The main area is divided into two sections: 'Selected Scope' on the left and 'Metrics' on the right.

**Selected Scope:** This section displays a tree view of objects. A red box highlights the 'Host System' entry under 'Virtual Machine'. A black circle with the number '1' is placed over this entry. Another red box highlights the 'esx-05a.corp.vmbeans.com' entry under 'Host System'. A black circle with the number '2' is placed over this entry.

**Metrics:** This section lists various metrics categories. A red box highlights the 'Metrics' category. A black circle with the number '2' is placed over the 'Metrics' category. The listed metrics include Badge, Capacity Analytics Generated, Configuration, Cost, CPU, CPU Utilization for Resources, Datastore, Disk, Disk Space, Hardware, Log Insight Generated, Memory, Network, Performance, Power, Runtime, Storage, Storage Adapter, Summary, System, VMware Aria Operations Generated, and Properties.

1. Click on `esx-05a.corp.vmbeans.com` to quickly switch to the VMs host.
2. Click `>` next to Metrics to show the metrics list for a host.

As you can see the Troubleshooting Workbench eliminates time trying to find resources that are applicable to the issue at hand.

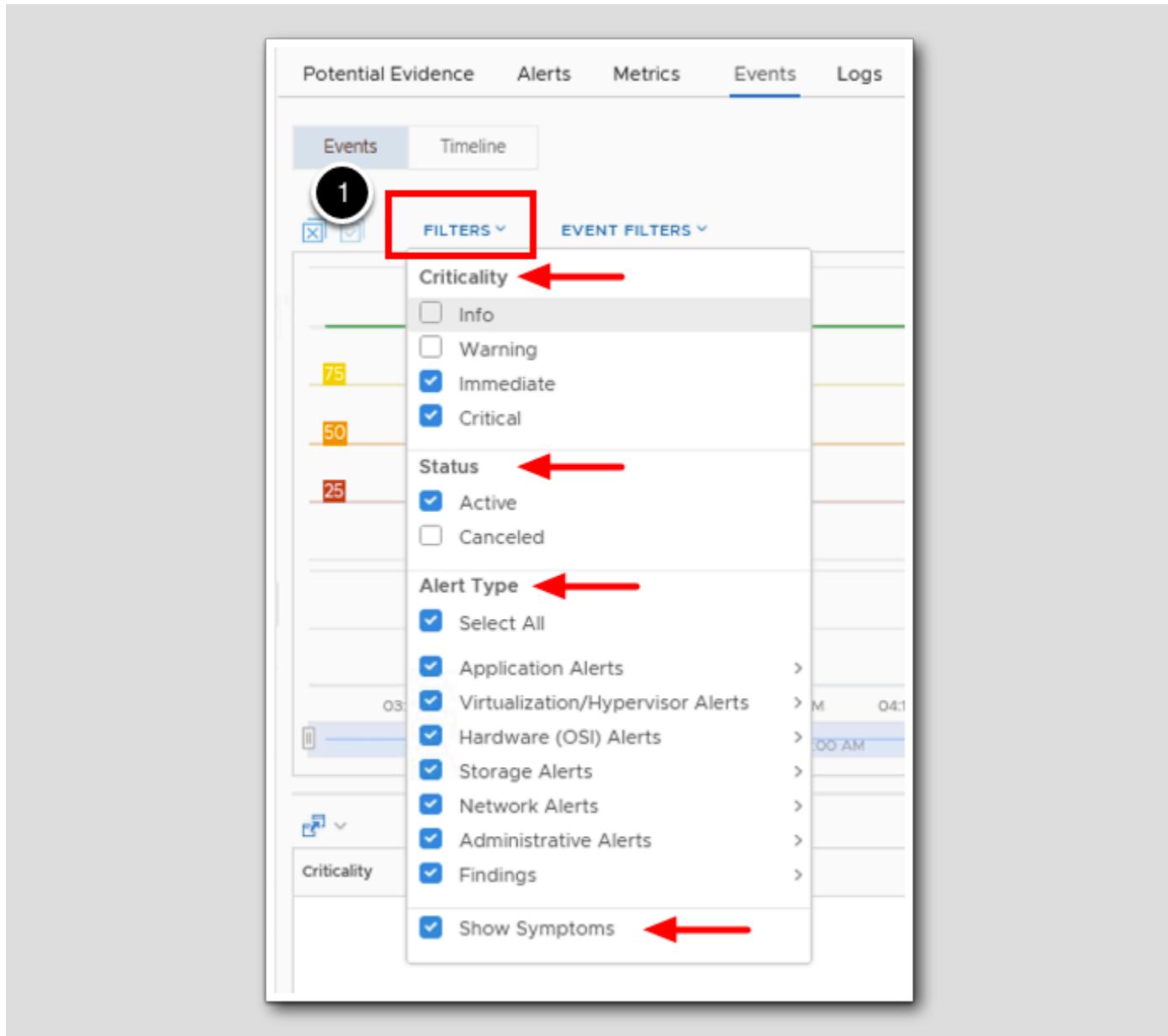
## Events and Timeline

[508]

The screenshot shows the Troubleshooting Workbench interface. At the top, there's a header with the title "Troubleshooting Workbench" and a context indicator "Context: ubuntu-0008". Below the header, there's a "Selected Scope" section with a "CUSTOM" button and a "Levels: 2" indicator. To the right, there are tabs for "Potential Evidence", "Alerts", "Metrics", "Events" (which is highlighted with a red box), and "Logs". Under the "Events" tab, there are two sub-tabs: "Events" (selected) and "Timeline". Below these tabs are "FILTERS" and "EVENT FILTERS" dropdowns. The main area is a timeline grid showing events over a period from 03:00 AM to 04:00 AM. The grid has horizontal lines at levels 75, 50, and 25, and vertical lines for each hour. A blue bar highlights the 03:00 AM to 03:30 AM range. At the bottom, there are filters for "Criticality" and "Object Name". On the left side, there's a sidebar titled "All Objects" listing various resources: Datastore (RegionA01-ISCSI01-COMP01), Virtual Machine (ubuntu-0008), Deployment (hol-ubuntu), vSphere Distributed Port Gro (VM-RegionA01-vDS-COMP), Host System (esx-05a.corp.vmbeans.com), Virtual Machine Folder (Workloads), and Blueprint. Each item has a status icon (green checkmark or yellow warning sign).

1. Click on **Events** to show all relevant events within the defined Scope.

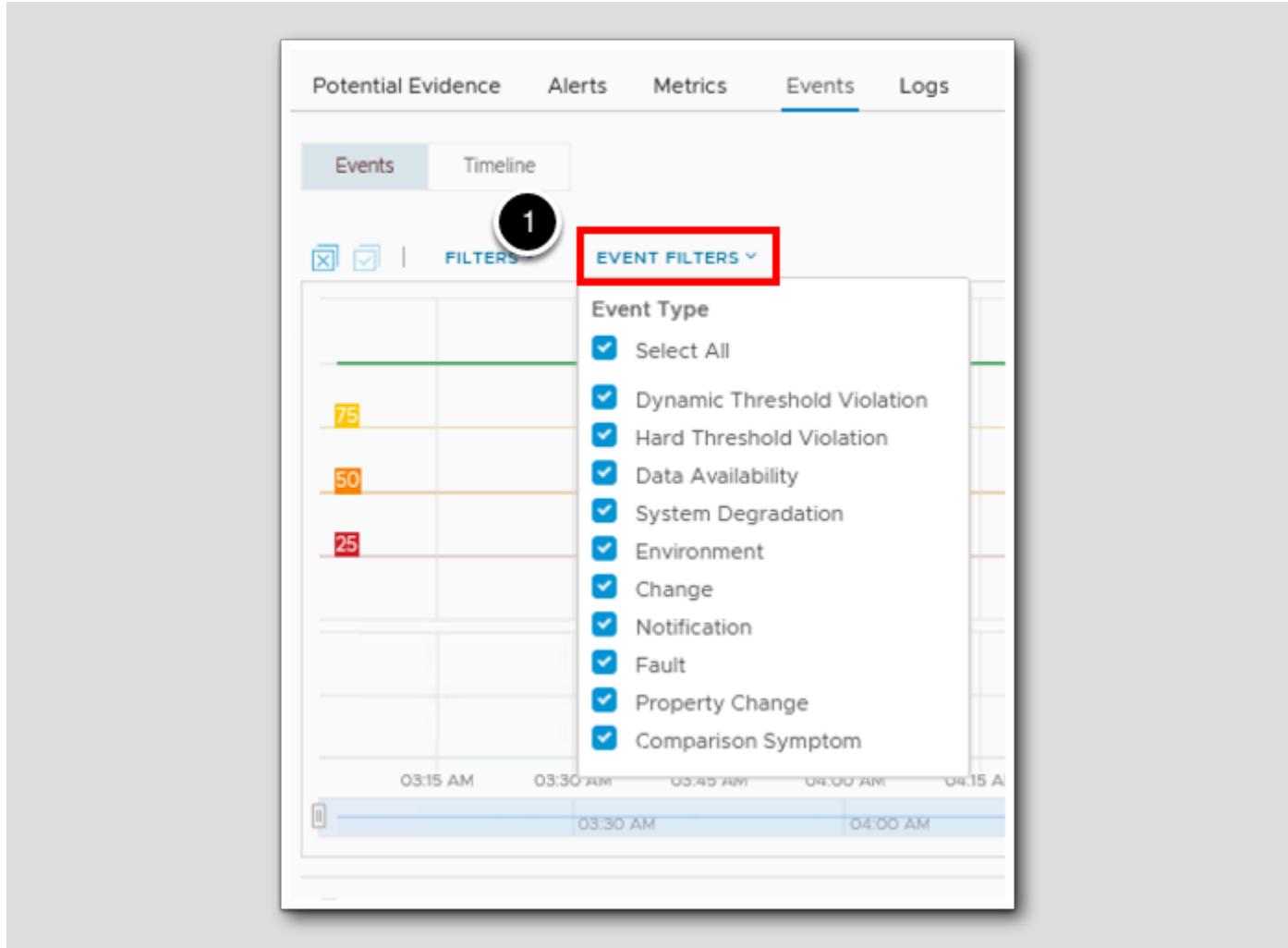
## Event Filters



1. Click on FILTERS.

1. Notice how you can filter on Criticality, Status and Alert Type to focus your troubleshooting efforts. The last Checkbox provides the ability to show or hide Symptoms.

## Event Filters

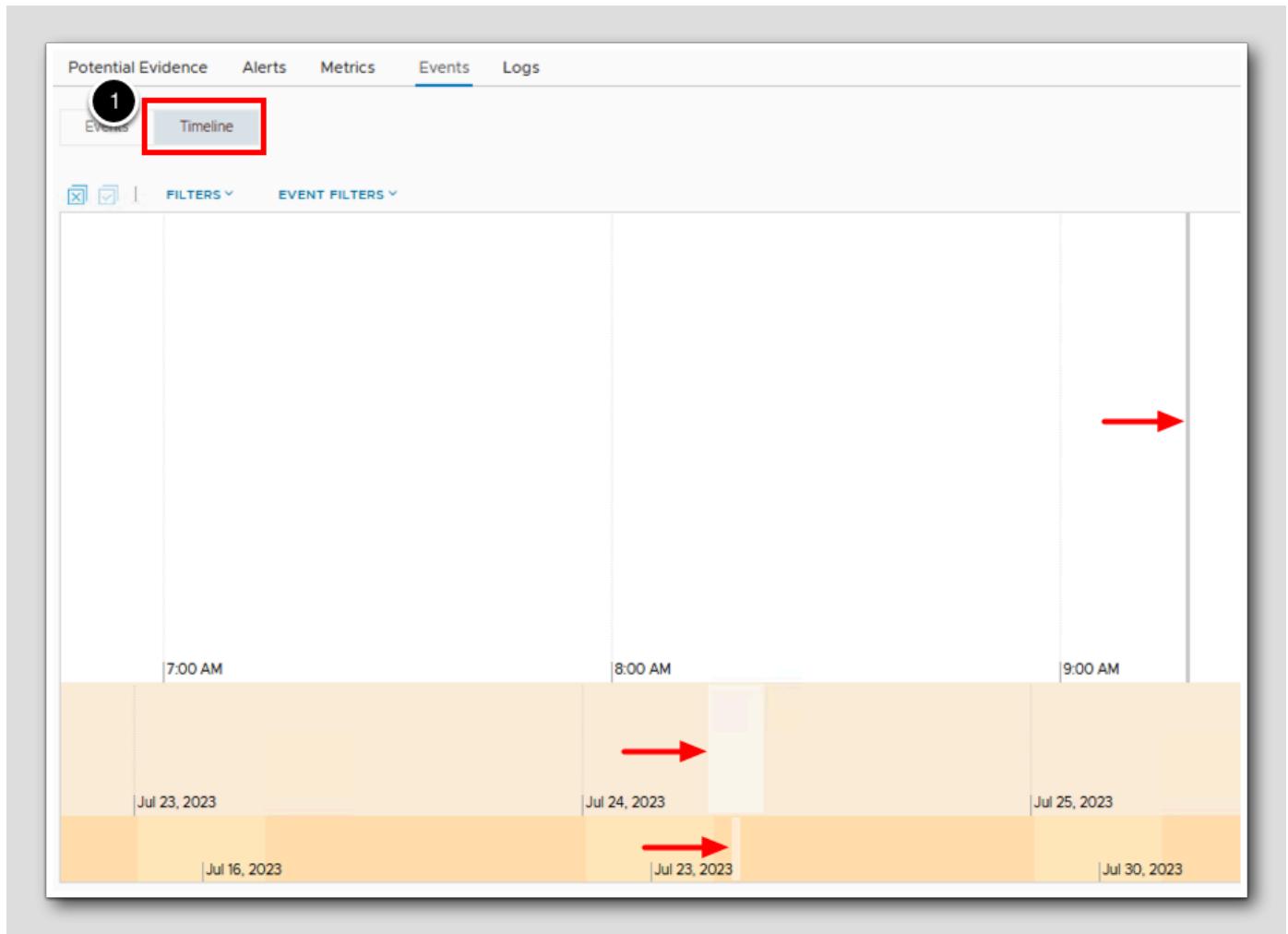


1. Click on EVENT FILTERS to show how you can narrow down the Events that are shown giving the ability to only show what's relevant for this troubleshooting session.

## Timeline

[511]

The Timeline graph is formatted, from bottom to top, Weekly, Daily and then Hourly.



1. Click on **Timeline** to show events based on the Timeline map below. If we had events to show they would show up on each of the Weekly, Daily and Hourly timelines based on the event time.

## Logs

[512]

The Logs tab is also driven by the Selected Scope level and will include appropriate logs for the related objects within that scope.

- ## 1. Click on Logs.

## Lesson End

You have completed the last lesson in this module. You should now have an understanding of how to use the Troubleshooting Workbench and how the Scope and structure of the Workbench can help quickly identify root cause of an issue.

## Conclusion

In this module, we reviewed the Troubleshooting Workbench and how it is purpose built to focus troubleshooting efforts and resources to quickly identify root cause.

## You've finished the module

Congratulations on completing the lab module.

For more information on getting started with Aria Operations, see the [VMware Aria Operations: Journey to Success](#) guide at the [VMware Apps & Cloud Management Tech Zone](#).

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the TABLE OF CONTENTS to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 10 - Save Time by Automating Remediation (15 minutes) Basic

### Introduction

[517]

The screenshot shows the VMware Aria Operations interface. At the top, there's a search bar and a navigation bar with icons for search, refresh, notifications, and user profile. The main area is titled "Welcome to VMware Aria Operations". On the left, a sidebar lists categories like Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure, Automation Central, Administration, and Developer Center. The "Observability" pillar is highlighted. Other pillars shown include Capacity, Cost, Compliance, Sustainability, Business Applications, and Applications. Below these are sections for Infrastructure (vSphere, vSAN, NSX, Horizon, Kubernetes), VMware Cloud (VMware Cloud Foundation, VMware Cloud on AWS, Azure VMware Solution, Google Cloud VMware Engine, Oracle Cloud VMware Solution, VMware Cloud on Dell EMC), and Public Cloud (Amazon Web Services, Microsoft Azure, Google Cloud Provider). A large rocket ship icon is visible on the right side of the screen.

Aria Operations gives administrators the ability to schedule automated actions within their Operations Manager environment. From Right-sizing a Virtual machine to other more complex actions, Automation Central gives Administrators flexibility to execute complex actions and workflows. Let's take a look.

The screenshot shows the VMware Aria Operations interface. On the left is a navigation sidebar with sections like Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure, Automation Central, Administration, and Developer Center. The main area features a "Welcome to VMware Aria Operations" banner. Below it are four cards: Observability (monitoring), Capacity (assessing and optimizing), Cost (managing infrastructure cost), and Compliance (complying with regulations). Further down are sections for Applications (Business Applications and Applications) and Infrastructure (vSphere, vSAN, NSX, Horizon, Kubernetes). The VMware Cloud section includes Foundation, AWS, Azure, Google, and Oracle solutions. The Public Cloud section lists AWS, Azure, and Google. A large rocket icon is on the right side of the interface.

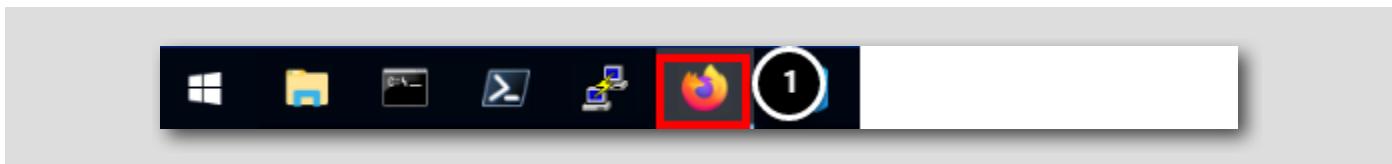
## Log in to Aria Operations

[518]

We will log in to a live instance of Aria Operations running in our lab.

## Open the Firefox Browser from Windows Quick Launch Task Bar

[519]

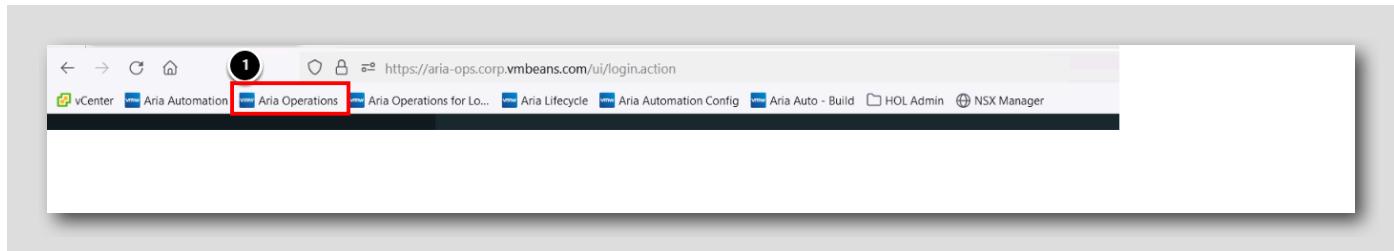


If the browser is not already open, launch Firefox.

1. Click the Firefox icon on the Windows Quick Launch Task Bar at the bottom of the screen

## Log in to Aria Operations

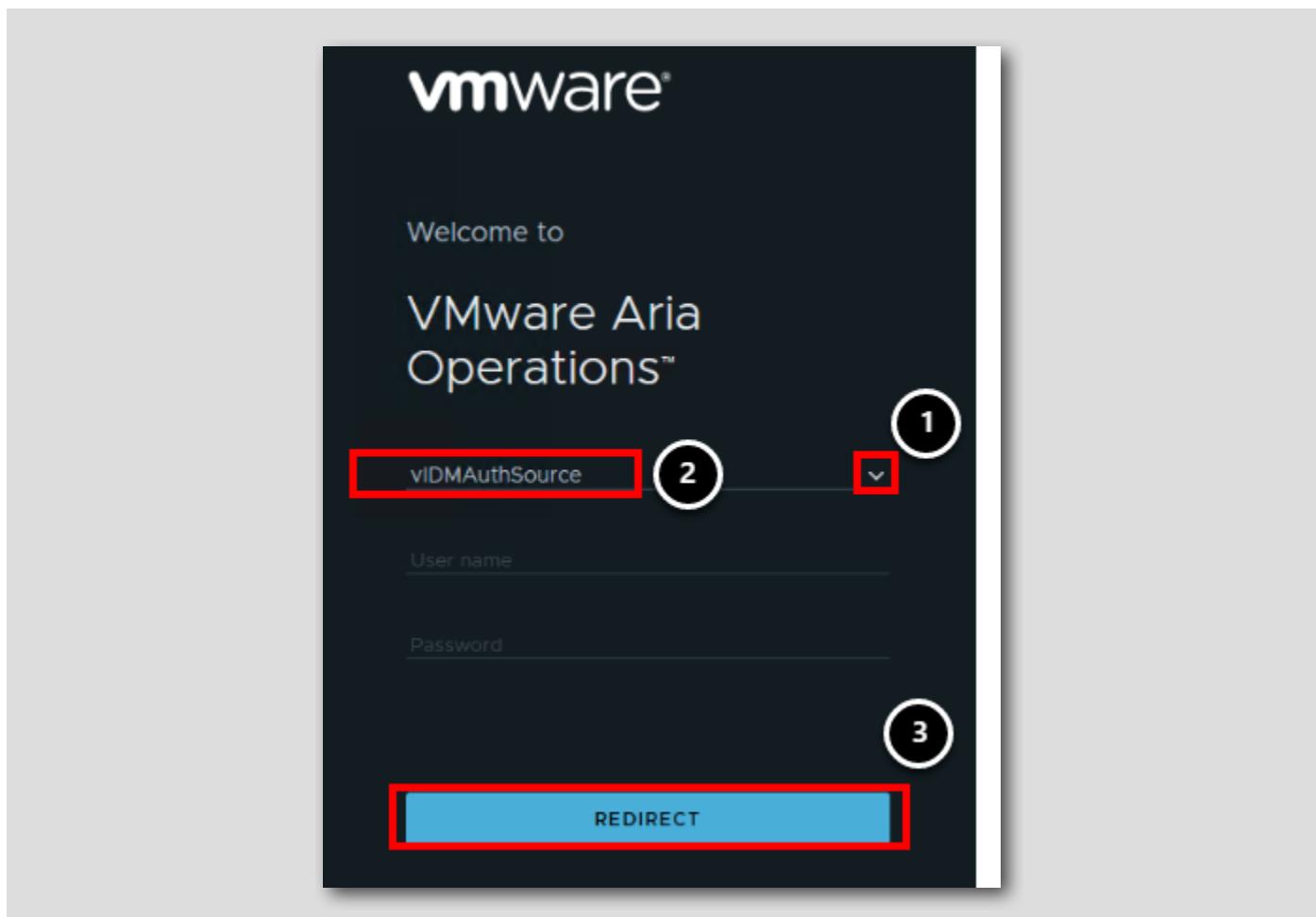
[520]



1. Click on the Aria Operations Favorites link from the Favorites Bookmark in the Chrome Browser.

## Sign In

[521]

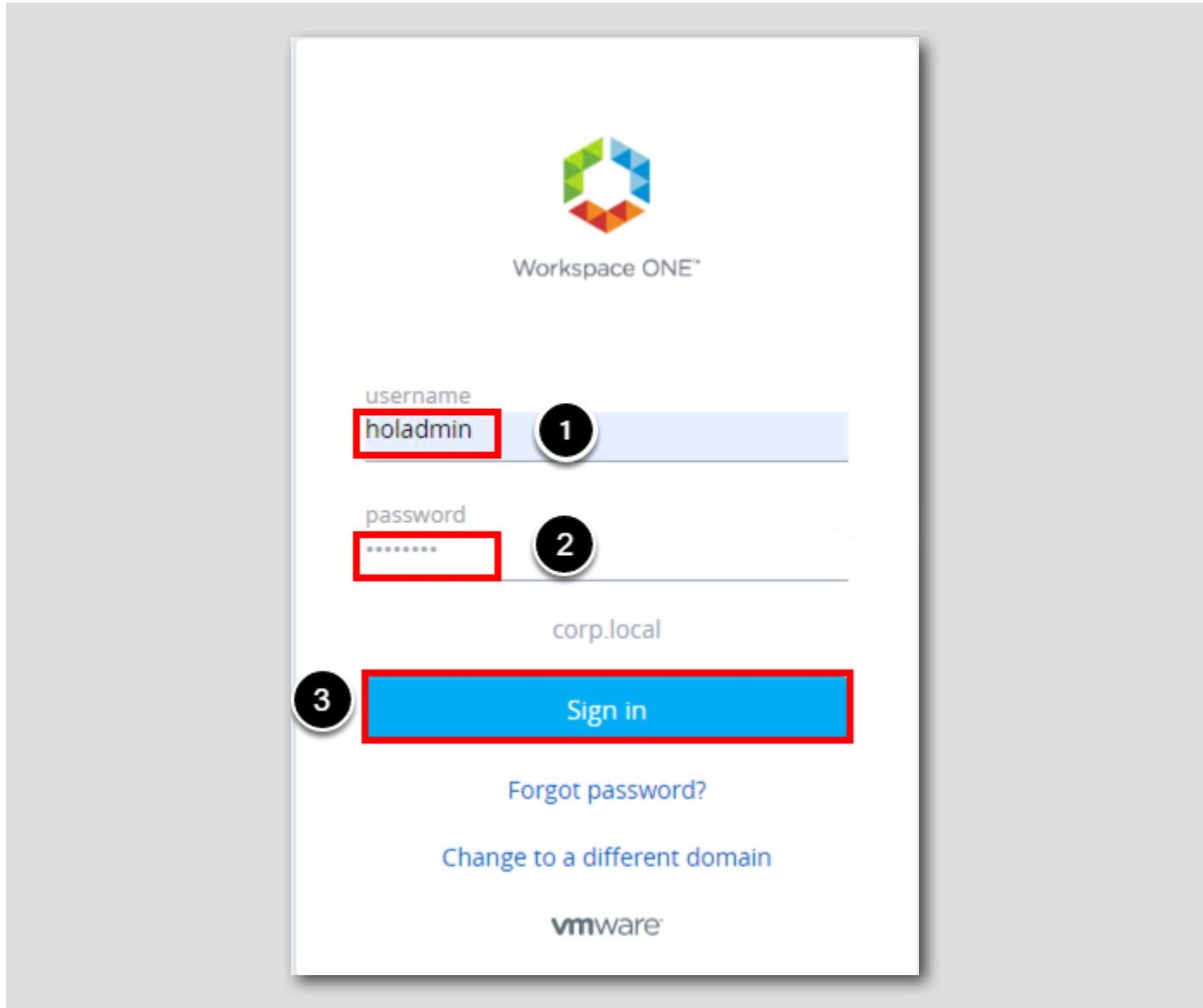


Aria Operations is integrated with VMware Identity Manager which we will use for user authentication in this lab. VMware Identity Manager is listed as vIDMAuthSource in our live lab environment.

vIDMAuthSource may not be pre-selected as the identity source. However, if it is not, you will need to choose it.

1. Click the drop-down arrow
2. Select vIDMAuthSource from the dropdown menu
3. Click **REDIRECT** to take you to the authentication page

## VMware Identity Manager Login



For this Aria Operations instance, the lab uses VMware Identity Manager as the identity provider for the Active Directory authentication source.

Type in the following user and password information.

1. username: **holadmin**
2. password: **VMware1!**
3. Click **Sign in**

## Introduction to Automation Central

Automation Central is a feature in Aria Operations (available in the Advanced, Enterprise and Cloud editions) that allows you to create one-time or recurring jobs to automate optimization actions such as reclaiming or rightsizing VMs. Once you set up recurring jobs, you can track and obtain reports on them. You can customize jobs so that they only run based on certain parameters. For example, if you choose to delete a snapshot as an action, you can specify how old the snapshot must be before it is deleted.

View reclamation and rightsizing reports through the Report Tab.

1. Click **Report**
2. Click **Reclamation** to view the reclamation report. The reclamation report displays graphical and numerical data on the total cost savings, CPUs reclaimed, memory reclaimed and storage reclaimed for different time periods
3. Click the **Rightsizing** reporting to view the rightsizing report. The rightsizing reports displays graphical and numerical data on the CPUs downsized, memory downsized, CPU oversized, and memory upsized for different time periods

Note: For each job, you also have the ability to view and change the scope of the reporting as well as the date range. For date ranges, you can pick the last 4 quarters or last quarter.

## Navigate to Automation Central

The screenshot shows the VMware Aria Operations interface. The left sidebar has a red box around the 'Home' link, which is highlighted in blue. Another red box labeled '2' highlights the 'Automation Central' link under the 'Configure' section. The main content area is titled 'Automation Central' and shows a 'Build Automated Jobs' section with a count of 1 upcoming job. Below this is a calendar for July 2023. Several dates are highlighted in blue, and a tooltip for July 26th says '11:00 PM Delete Snapshots'. The top navigation bar includes links for vCenter, Aria Automation, Aria Operations, Aria Operations for Lo..., Aria Lifecycle, Aria Automation Config, Aria Auto - Build, HOL Admin, and NSX Manager.

1. From the Quick Start (Home) page:
2. Click Automation Central in the navigation bar

## Schedule Tab

[525]

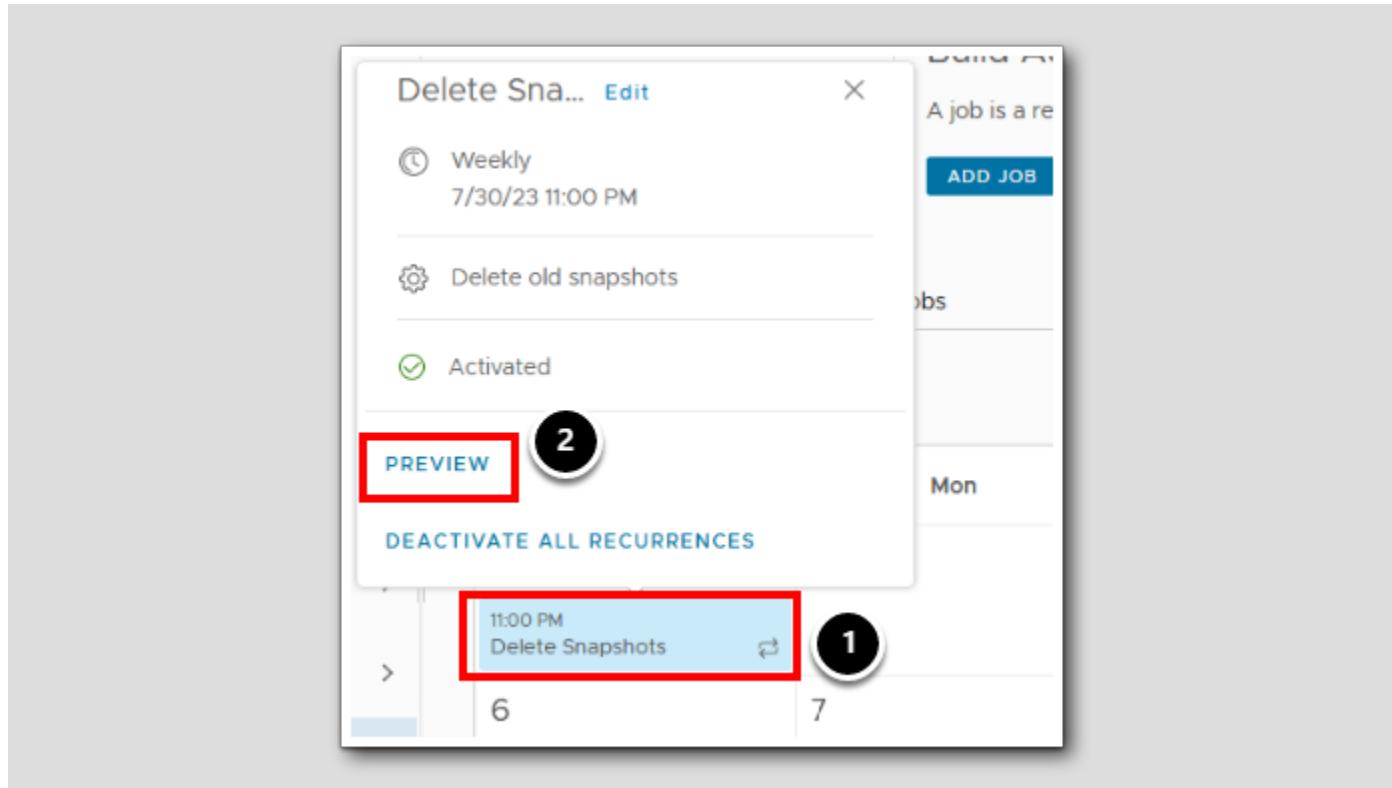
The screenshot shows the VMware Aria Operations interface. On the left, there is a navigation sidebar with various links: Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure, Automation Central (which is highlighted with a red box and a circled number 2), Administration, and Developer Center. The main content area is titled "Automation Central". It displays "1 Upcoming Jobs". Below this is a section titled "Build Automated Jobs" with a sub-section "A job is a recurring performance and capacity optimization process. Control". There is a blue "ADD JOB" button. At the bottom of this section is a date range selector with arrows and the text "August 2023". To the right of this is a calendar grid for August 2023. The grid shows days from Sunday to Saturday. Several dates have blue boxes overlaid on them, each containing the text "11:00 PM Delete Snapshots" and a small circular icon with two arrows. The dates are: 30, 6, 13, 20, and 27. The days of the week are labeled: Sun, Mon, Tue, Wed, Thu, Fri, Sat.

In the Automation Central page, you will see a list of upcoming jobs and a calendar under the Schedule tab. The calendar displays all the jobs that are scheduled for the current month. You can move between months to see more scheduled jobs.

1. Click the Left/Right arrows to view any jobs in the current month
2. Click on Automation Central to revert back to the current month (optional)

## Examine An Existing Job

[526]



Jobs can be viewed by clicking on them in the calendar view which brings up a limited information page as seen here. We're given the schedule of the job, what actions are being executed as well as its activated or deactivated status.

One key feature is the ability to view the scope of objects impacted by the job. Let's take a look.

1. Click on any of the Delete Snapshots scheduled jobs.
2. Click on Preview

## Preview Automation Group

Preview Automation Group X

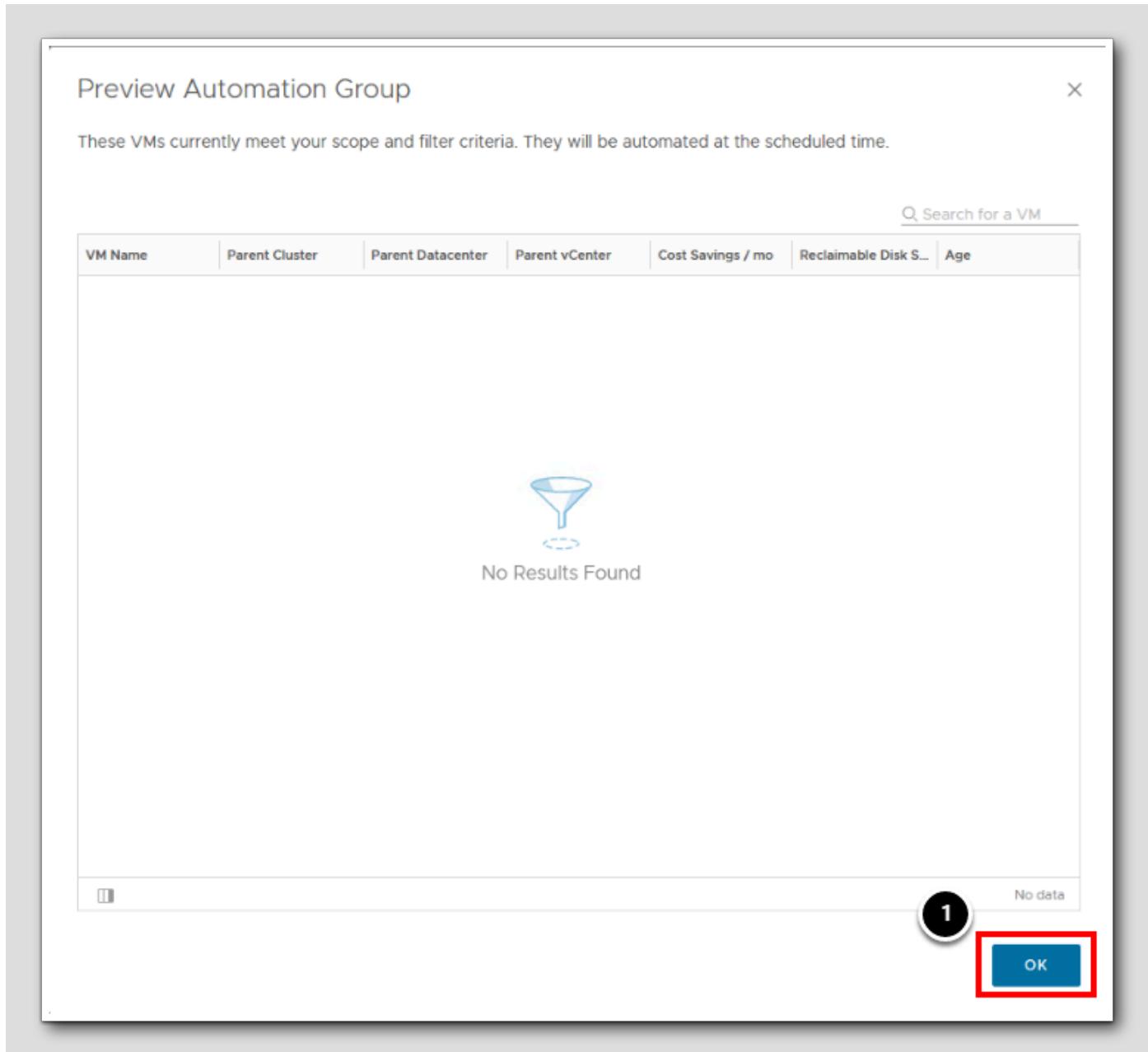
These VMs currently meet your scope and filter criteria. They will be automated at the scheduled time.

Search for a VM

VM Name	Parent Cluster	Parent Datacenter	Parent vCenter	Cost Savings / mo	Reclaimable Disk S...	Age
No Results Found 						

1 No data

OK



Our lab does not contain any Virtual Machines with snapshots older than 7 days, but in your environment you may have many Virtual Machines that do. In this preview screen, we would see the Virtual Machine as well as relevant information listed allowing you to easily identify impacted Virtual Machines.

1. Click OK to close the preview widow

## View a Report of Jobs

[528]

The screenshot shows the 'Automation Central' interface. On the left, there's a summary of 'Upcoming Jobs' (0). In the center, a 'Build Automated Jobs' section is visible with a 'Add Job' button. Below these, a navigation bar has tabs for 'Schedule', 'Report' (which is highlighted with a red box), and 'Jobs'. A circle labeled '1' is over the 'Report' tab. Underneath, a 'Job Reporting' section has three buttons: 'Reclamation' (highlighted with a red box), 'Rightsizing' (highlighted with a red box), and 'Cost Savings'. Circle '2' is over 'Reclamation' and circle '3' is over 'Rightsizing'. To the right, there's a 'Reclamation Report' section with metrics: 0 US\$, 0 vCPUs, 0 GB Memory, and 0 GB Storage. At the bottom right, there are filters for 'View Scope: All' and 'View Date: Last 4 Quarters'.

## View Job History

The screenshot shows the VMware Automation Central interface. At the top left, it says "Automation Central". On the left, there's a circular icon with a '0' and the text "Upcoming Jobs". Below that are tabs: "Schedule", "Report", "History" (which is highlighted with a red box and has a black circle with the number "1" above it), and "Jobs". To the right of these tabs is a section titled "Build Automated Jobs" with the sub-instruction "A job is a recurring performance and capacity optimization process. Cont..." and a blue "ADD JOB" button. Below the tabs is a dropdown menu "Group By Occurrences" set to "Occurrences". A table below has columns "Job Name", "Action", and "Resources Changed". The table body is currently empty.

You can also view the history of configured jobs which have run.

1. Click the **History** tab above the calendar to see the job name, and job details in a tabular format. Since this is a lab environment, we will not have any jobs to view.

## View Configured Jobs

The screenshot shows the 'Automation Central' interface. On the left, there's a summary section with 'Upcoming Jobs' (1) and tabs for 'Schedule', 'Report', 'History', and 'Jobs'. The 'Jobs' tab is highlighted with a red box and has a '1' badge above it. To the right, there's a 'Build Automated Jobs' section with a brief description and a 'ADD JOB' button. Below these sections is a table with columns 'Name', 'Action', and 'Status', which is currently empty.

The Jobs tab is where you see a list of configured jobs.

1. Click Jobs to view any configured jobs

For each job, clicking the ellipses icon brings up a menu from where you can edit, delete, clone or disable the job. If a job that you created is not visible in the list, check the All Filters option to see if the job is filtered out. Since this is a lab environment, we will not have any jobs to view.

That concludes this short lab giving your a brief introduction to automation central. In the following labs, we'll work to schedule some actions.

## Creating a job from a Virtual Machine Rightsizing Report

One of the most common tasks is to create Job from Reclaim or Rightsizing reports. You can create an automation job based on the recommendation provided by VMware Aria Operations Manager in the Reclaim or Rightsizing pages.

In this exercise we'll work on creating a task to rightsize our Virtual Machines on a scheduled basis. Let's get started.

## Locate Rightsizing Page

The screenshot shows the vRealize Operations Management Cloud interface. On the left, there is a navigation sidebar with the following items:

- Home (highlighted with a red box and numbered 1)
- Data Sources
- Environment
- Visualize
- Troubleshoot
- Optimize (highlighted with a red box and numbered 2)
- Capacity
- Reclaim
- Workload Placement
- Rightsizing (highlighted with a red box and numbered 3)
- Compliance
- Plan
- Configure

The main content area is titled "Rightsize". It displays two sections for "RegionA01":

- RegionA01**: Shows a green checkmark and the text "> 1 Year Remaining". Below it are "US\$0 Cost Savings" and a "Not Optimized" button.
- RegionA01**: Shows a green checkmark and the text "> 1 Year Remaining". Below it are "US\$0 Cost Savings" and a "Not Optimized" button.

Below these sections, there is a table titled "Oversized VMs".

Resource	Recommended Reduction
CPU	14 vCPUs
Memory	11 GB

Underneath the table, there are tabs for "Oversized VMs" and "Undersized VMs", with "Oversized VMs" being selected. There are also buttons for "SCHEDULE ACTION", "RESIZE VM(S)", "EXCLUDE VM(S)", and "EXPORT ALL".

At the bottom, there are two expandable sections:

- > Management
- > Workload1

We will use the Rightsizing page to create a Scheduled Job that appears in Automation Central.

1. If you are not already on the Home page, click **Home** from the top menu.
2. Click the chevron next to **Optimize**.
3. Click **Rightsize**.

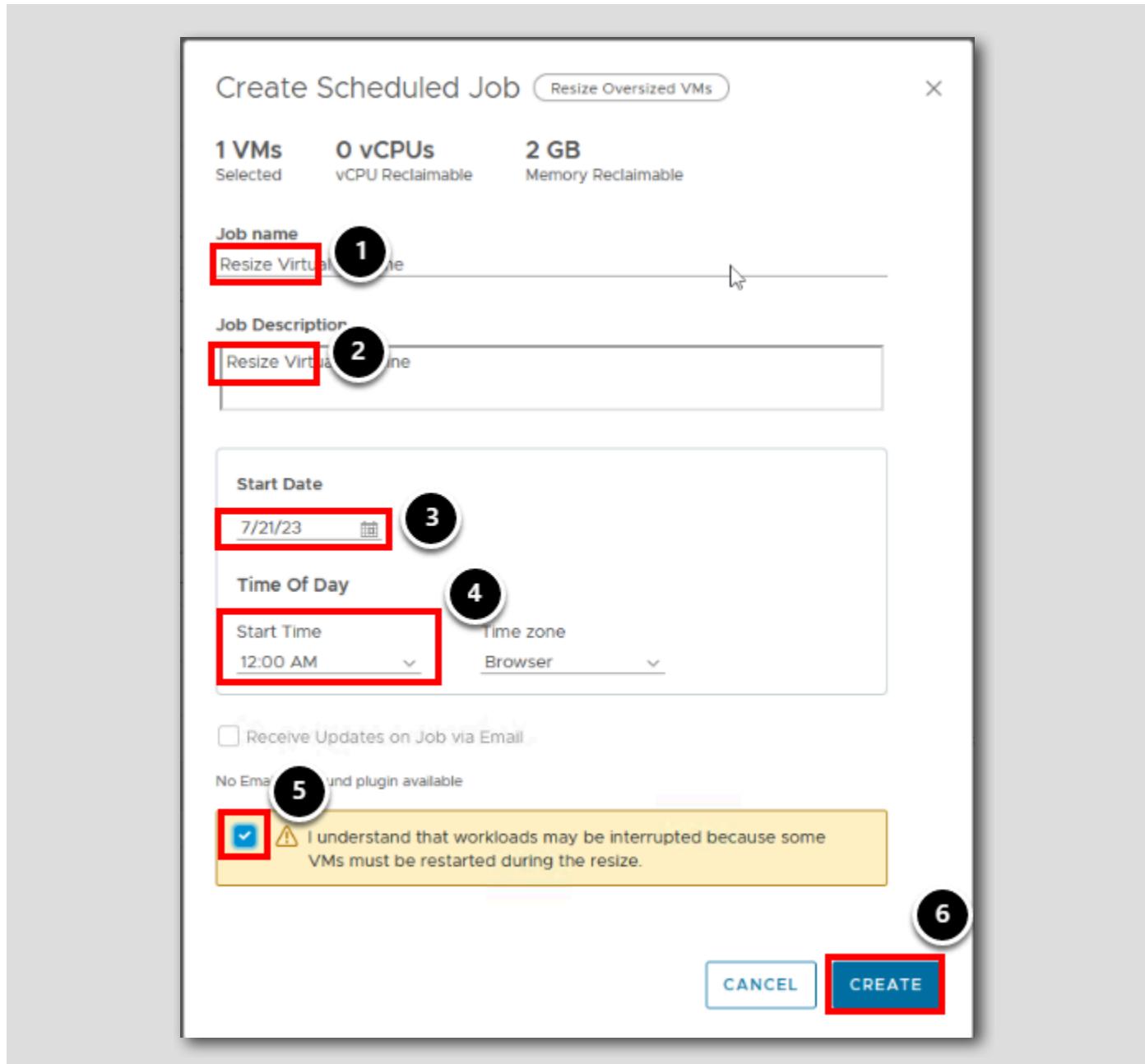
## The Rightsizing Page

The screenshot shows the VMware Aria Automation Rightsizing interface. At the top, there are two datacenter cards: RegionA01 and RegionB01. RegionA01 is selected and highlighted with a red box and a circled '1'. Below the cards, there are two main sections: 'Oversized VMs' and 'Undersized VMs'. The 'Oversized VMs' section shows 7 VMs listed for downsize. The 'Undersized VMs' section shows 1 VM listed for upsize. In the center, there's a table for a specific VM named 'windows-0010'. The table includes columns for Allocated CPU, Recommended CPU Reduction, Allocated Memory, and Recommended Memory Reduction. At the bottom of the table, it says '1 - 1 of 1 items'. Above the table, there are five numbered steps: 1. A red box around the RegionA01 card. 2. A red box around the 'Oversized VMs' tab. 3. A red box around the 'Management' section under 'Workload1'. 4. A red box around the checkbox for 'windows-0010'. 5. A red box around the 'SCHEDULE ACTION' button.

From the Rightsizing page, perform the following:

1. Make sure RegionA01 is selected as the Datacenter if it is not already. Note that there are two datacenters with that name - one is from vCenter and the other from Aria Automation. Be sure to select the datacenter with the "buildings" icon, not the one with the "clouds" icon. Also note that the values you see for cost savings may be different or may show a question mark (?) depending on how long your particular Hands On Lab pod has been running.
2. Scroll down to select the **Oversized VMs** subcategory.
3. Click the chevron next to **Workload1** in order to view Virtual Machines.
4. Check the box next to **windows-0010**.
5. From the menu above the Virtual Machine, click on **Schedule Action**.

## Creating a Scheduled Job



From the Create Scheduled Job window, perform the following:

1. Under **Job Name**, enter **Resize virtual Machine**
- 2.Under **Job Description**, enter **Resize virtual Machine**.
- 3.Under **Start Date**, select the nearest upcoming Friday.
- 4.Select **12:00 AM** for a Start Time
- 5.Click the box to verify the workloads will be interrupted in order to complete this action.
- 6.Click **Create** to complete.

## Viewing Your Scheduled Job

[535]

The screenshot shows the VMware Aria Operations interface. On the left, there's a navigation sidebar with various links like Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure, and Automation Central (which is highlighted with a red box and numbered 2). Above the sidebar, the 'Home' link is also highlighted with a red box and numbered 1. In the center, there's a section titled 'Upcoming jobs' with an 'Add Job' button. Below it, there are tabs for Schedule, Report, History, and Jobs, with 'Schedule' being the active tab and highlighted with a red box and numbered 3. A calendar for July 2023 is displayed, showing days from 25 to 12. A specific job entry for July 18th is highlighted with a red box and numbered 4. This entry shows two scheduled tasks: '7:30 AM Remove Old Snapshots' and '12:00 AM Resize Virtual Machine'. The entire screenshot is framed by a light gray border.

Now when you navigate back to Automation Central from the left hand navigation pane, your scheduled job will appear in the Schedule and we will be able to view it from Automation Central.

1. Click on **Home** to take you back to the main screen.
2. Click **Automation Central** from the left hand navigation pane.
3. Click on **Schedule** to ensure you are viewing the scheduled jobs.
4. Located the **Resize Virtual Machine** task that we created.

Note: Depending on the date you picked, you will see a different screen than the July 18th 2023 pictured above.

That concludes this short lab on creating a scheduled task within automation central using the Rightsizing functions within Aria Operations.

## Setting Up Recurring jobs

[536]

In this lab, we'll work on setting up a recurring job similar to the one already scheduled so you can see the process of picking your job, the task and schedule. Let's get started

### Adding a new Job

[537]

The screenshot shows the Automation Central interface. The left sidebar has a navigation menu with items like Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure, Automation Central (which is highlighted with a red box and step 2), Administration, and Developer Center. The main area has a title 'Build Automated Jobs' with a sub-section 'Upcoming Jobs'. It includes a brief description of what a job is and a large blue 'ADD JOB' button. Below this is a calendar for July 2023. On July 17th, there is a scheduled task named 'Remove Old Snapshots' at 7:30 AM. On July 18th, there is a scheduled task named 'Resize vm' at 12:00 AM. The days of the week are labeled Sun, Mon, Tue, Wed, and the dates 25, 26, 27, 28, 2, 3, 4, 5, 9, 10, 11, 12, 16, 17, 18, 19.

If you clicked away from the previous lab screen please return to Automation Central using Steps 1 &2, otherwise proceed to Step 3.

1. Click the **Home** at the top
2. Click on **Automation Central** to open the main window
3. From above the calendar, click on **Add Job**

## Creating a Job

[538]

**Create New Job**

1 - Select Action      2 - Select Scope      3 - Filter Criteria

**Name:**  1

**Description:**  2

**Action Configuration**

<b>Reclaim</b>	<input type="radio"/> Delete old snapshots	<b>Adapter Type:</b> <input type="text" value="vCenter"/> <span style="border: 1px solid red; padding: 2px;">4</span>
	<input type="radio"/> Delete idle VMs	<input type="text" value="Virtual Machine"/> <span style="border: 1px solid red; padding: 2px;">5</span>
	<input type="radio"/> Power off idle VMs	<input type="text" value="Reboot Guest OS For VM"/> <span style="border: 1px solid red; padding: 2px;">6</span>
<b>Rightsize</b>	<input type="radio"/> Downsize oversized VMs	
	<input type="radio"/> Scale-up undersized VMs	
<b>Other</b>	<input checked="" type="radio"/> Additional Actions	<span style="border: 1px solid red; padding: 2px;">3</span>

We are going to create a job that will reboot Virtual Machines on a weekly basis.

From the Create Job window that opens, perform the following:

1. In the Name field, use **Weekly Reboot**.
2. In the Description field, enter **Scheduled weekly reboots of Virtual Machines**.
3. Under Other, select the **Additional Actions**.
4. Select **vCenter** for our adapter type.
5. Select **Virtual Machine** for our object type.
6. Select **Reboot Guest OS For VM** as our action.
7. Click **Next** to continue (Not Shown)

Note: Aria Operations is a modular program that allows you to connect additional workflow orchestration programs, such as VMware Aria Orchestrator to expand the capabilities of your environment. While we will not explore this functionality here in this lab, Orchestrator gives you the ability to create custom complex workflows built specifically for your environments that we can schedule within Aria Operations.

## Select Scope

[539]

The screenshot shows the 'Create New Job' wizard in VMware Aria Operations. The current step is '2 - Select Scope'. In the 'Your selection:' section, 'vCenter' and 'Reboot Guest OS For VM' are selected. Below, a note says: 'According to your selected object type in the previous step, please carefully select the scope. Only objects of the selected object type and their ancestor objects would make the job run successfully.' On the left, a search bar shows 'vcsa-01a.corp.vmbeans.com'. A red box highlights this entry. A red arrow points from this entry to the 'Select Scope' tree view on the right. The tree view shows 'Environments' expanded, with 'vSphere' and 'vSphere World' expanded. 'vcsa-01a.corp.vmbeans.com' is highlighted with a red box and circled with a red number '1'. Other nodes like 'RegionA01' and 'Templates' are also visible.

The scope section is where we determine over how large an area we want this Job to run. We can select every virtual center in our environment or we can pick a singular Virtual Center.

1. Locate **vcsa-01a.corp.vmbeans.com** and drag it into the left hand scope selection screen.
2. Click **Next** (Not Shown)

## Filter Criteria

Create New Job

1 - Select Action      2 - Select Scope      3 - Filter Criteria

Set Filter Criteria

Set additional filters based on user defined criteria such as virtual machine names, tags, properties etc.

Object Type: Virtual Machine

Object name: contains Windows

Virtual Machine

- windows2019
- windows-0010**

Deployment

- Windows2019

Blueprint

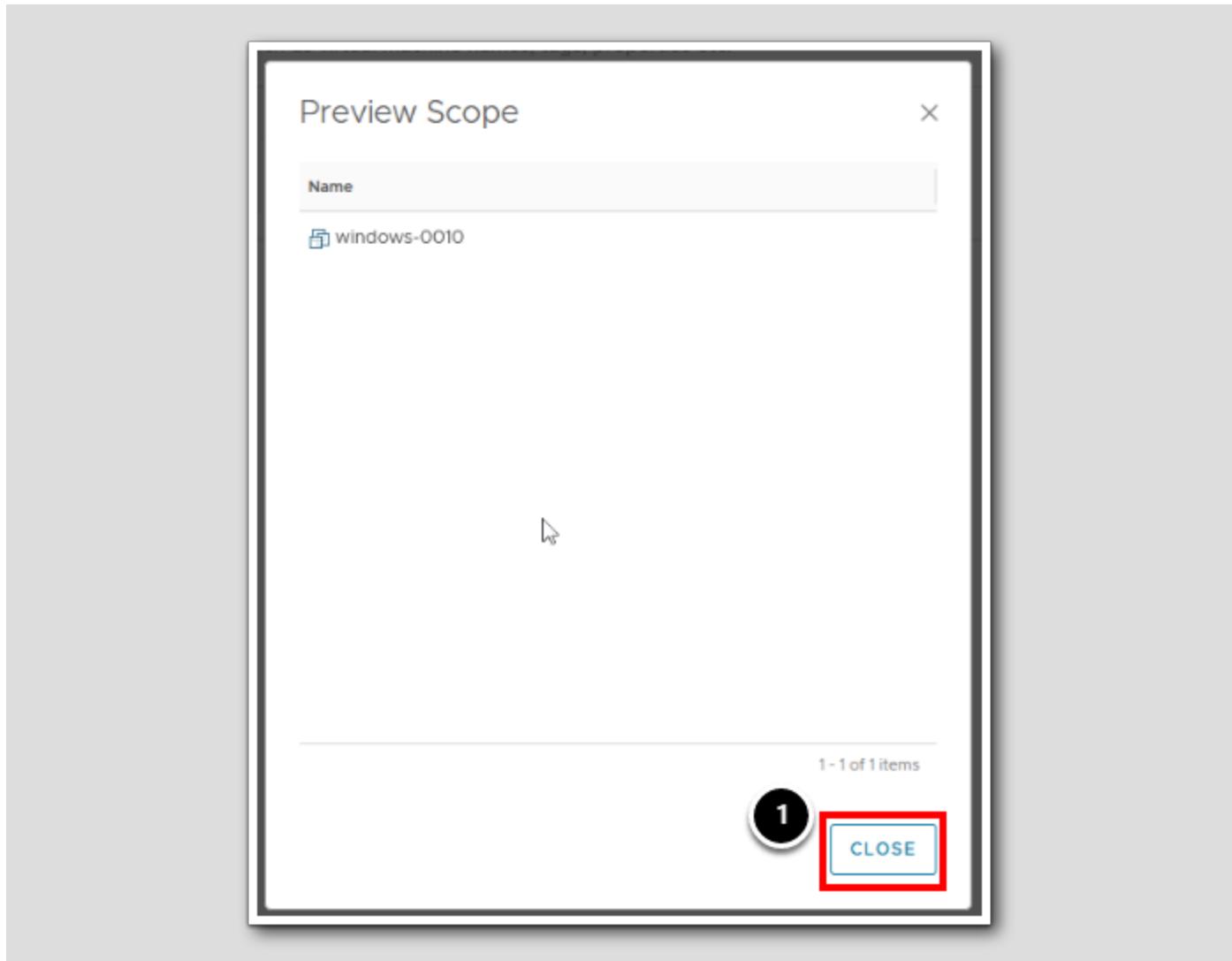
- Windows with cloudbase-init

Click to load more

Once we've selected the Scope of our environment, we need to filter down to the objects we want to schedule this job against. In this window you will have the option to create filtering criteria using multiple options such as Tags, Object Names, Properties, Relationships or Metrics matched with REGEX expressions. For this exercise we will pick a simple Object Name criteria.

1. Select Object Name.
2. Select Contains.
3. Type **Windows** .
4. Select the **windows-0010** Virtual Machine.

## Preview Scope



In a complex environment when setting the search and filter criteria it can be useful to preview what objects result from your query. Click on the **Preview Scope** button in the lower right hand corner of the screen will yield the above image. Here we can see that the singular Virtual Machine we picked is the scope that will be used but in a more complex environment this list may contain many more objects.

1. Click **Close** to return to the **Filter Criteria** page
2. Click **Next** in the lower left of the **Filter Criteria** page (Not Shown.)

## Schedule Interface

### Create New Job

1 - Select Action      2 - Select Scope      3 - Filter Criteria

Start Date 7/17/23	1
Time zone Browser	2
Start Time 8:55 AM	3
Recurrence Daily	4
Run Every 7	7
End 5	After 6
Occurrences 100	7

**Notifications**  
Receive status notifications including job success, job failure, and a reminder email 2 hours before this job is scheduled to run.

Receive Updates on Job via Email

No Email Outbound plugin available

The last option is to create the schedule itself. We will run this every Friday at 8:55 AM and end after 100 occurrences.

1. Select the Start Date (your start date will vary depending on when you take this lab)
2. Select Browser for the timezone.
3. From the Start Time, select 8:55 AM.
4. From Recurrence, select Daily.
5. Enter 7 for the Run Every number of Days field
6. Select the option After for our end date
7. Enter 100 for our Occurrences
8. Click Create (not shown)

Note: While a simple schedule, the schedule gives us the ability to select differing time zones, recurrence schedules, days of the week and end dates. Feel free to edit the fields from what we selected above to see what options are available to you.

This concludes the lab for creating a recurring job using Aura Automation Central.

## Conclusion

[543]

In this module, we explored the new Automation Central and used the scheduled job function to schedule regular tasks. We were able to create tasks from the Rightsizing page and from Automation Central's main interface.

## You've finished the module

[544]

Congratulations on completing the lab module.

If you are looking for additional information, visit the [Aria Operations Manager Documentation](#).

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the TABLE OF CONTENTS to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 12 - Achieve Optimal Performance with Rightsizing (45 minutes) Advanced

### Introduction

[546]

Rightsizing, identifying and fixing issues with oversized and undersized VMs, optimizes resource allocation. It maximizes performance efficiency, reduces costs, and ensures seamless alignment with requirements. With well-defined policies and automation, Rightsizing becomes a proactive practice for Aria Operation practitioners.

In this *Achieve Optimal Performance with Rightsizing* exercise, we will take a closer look at:

- Using Rightsizing based on Aria Operations Recommendations
- Configure Policies:
  - Criticality Thresholds
  - Risk Level (Conservative vs. Aggressive)
  - Business Hours
- Automate Rightsizing

### Log in to Aria Operations

[547]

To begin this exercise, we will log in to Aria Operations. If you are not currently logged into any instance of Aria Operations, continue to the next page, but if you are already logged into Aria Operations, click [here](#) to skip ahead.

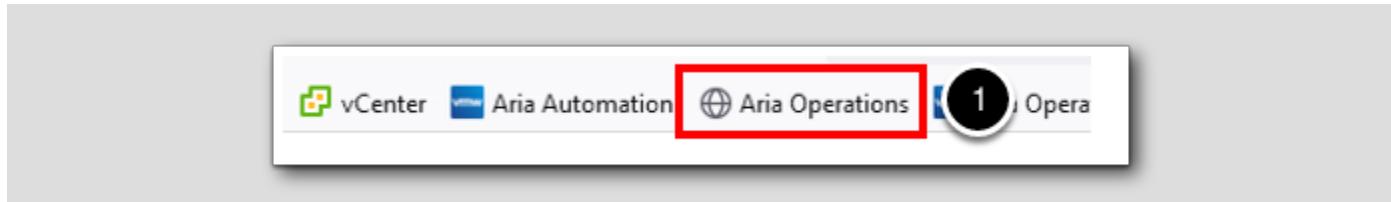
### Open the Firefox Browser from Windows Quick Launch Task Bar

[548]



If your browser isn't already open, launch Firefox

1. Click the Firefox icon on the Windows Quick Launch Task Bar



The browser Bookmarks Bar has links to the different applications that are running in the lab.

1. Click the Aria Operations Bookmark

Log in to Aria Operations

[549]



Aria Operations is integrated with VMware Identity Manager which we will use for user authentication in this lab.

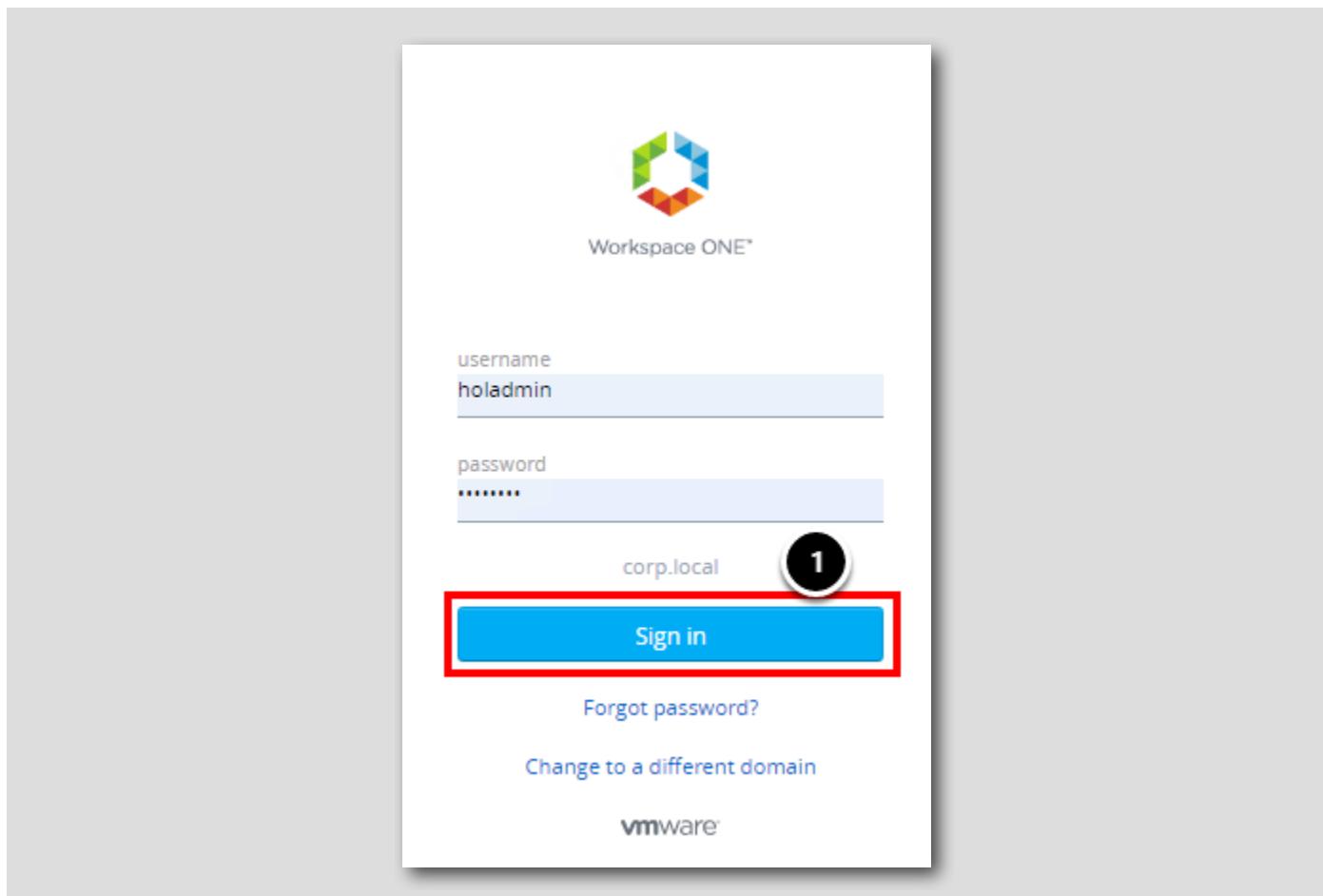
vIDMAuthSource (VMware Identity Manager) should be pre-selected as the identity source. However, if it is not you will choose it.

1. Click the drop-down arrow if vIDMAuthSource is not selected.

2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login

[550]



At the Workspace ONE login screen, use these credentials:

username: **holadmin**

password: **VMware1!**

1. Click Sign in

## Aria Operations Home Screen

[551]

You should be at the Aria Operations Home screen and ready to start the module.

## Oversized and Undersized VMs using Rightsizing

In this part of the module, we will go through Rightsizing, schedule the rightsizing, and use the Automation Central to create a recurring schedule without requiring manual intervention

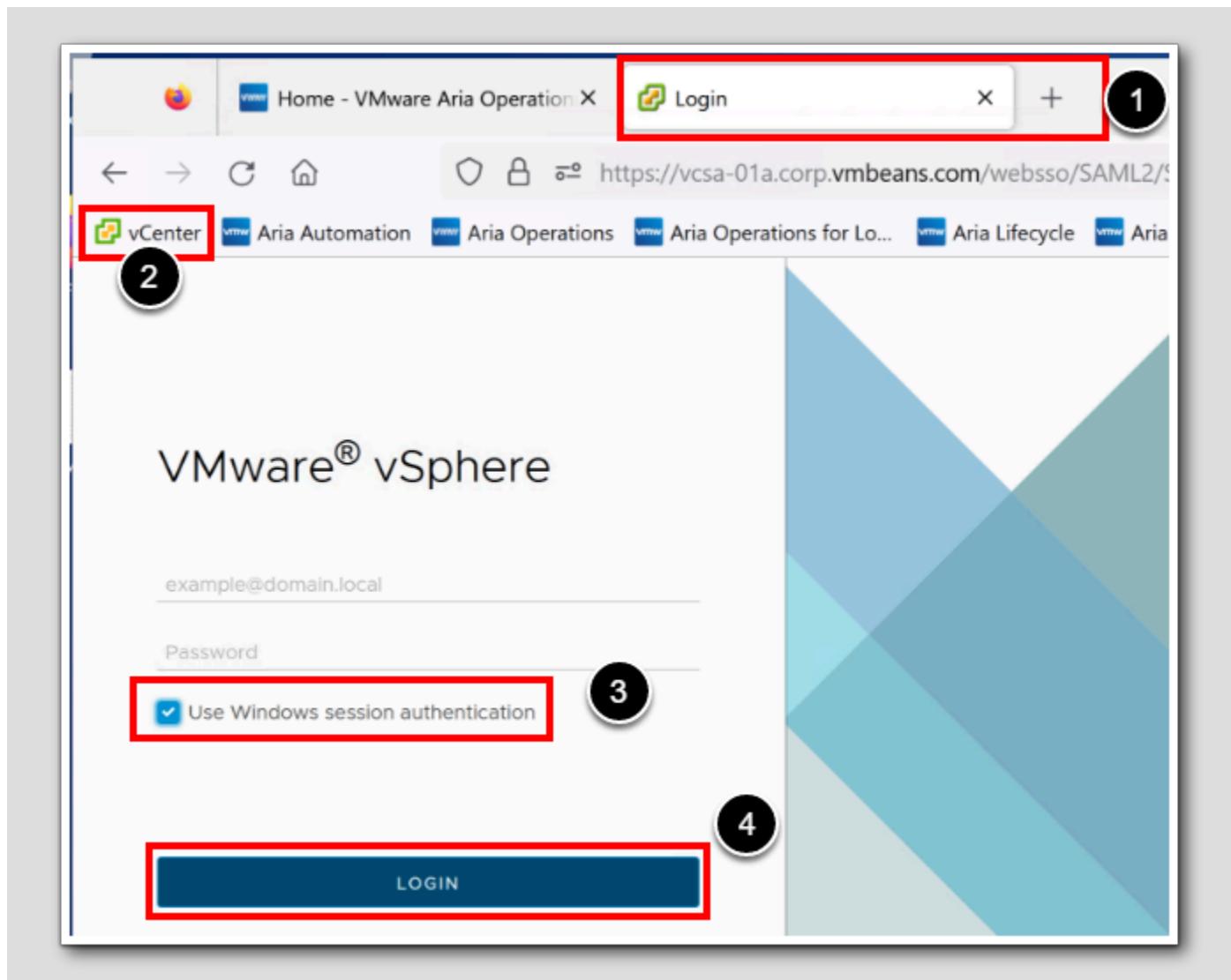
### Before rightsizing

Server	vCPU	Mem	New vCPU	New Mem	Result
linux-dev-0010	1	1GB	4	16 GB (Gigabyte)	Oversized
linux-dev-0011	1	1GB	1 (same)	4 MB (Megabyte)	Undersized

In order to examine the impact of undersized and oversized virtual machines (VMs), we will access the vSphere environment and deliberately modify the configurations of selected developer servers to reflect improper sizing based on the table provided above.

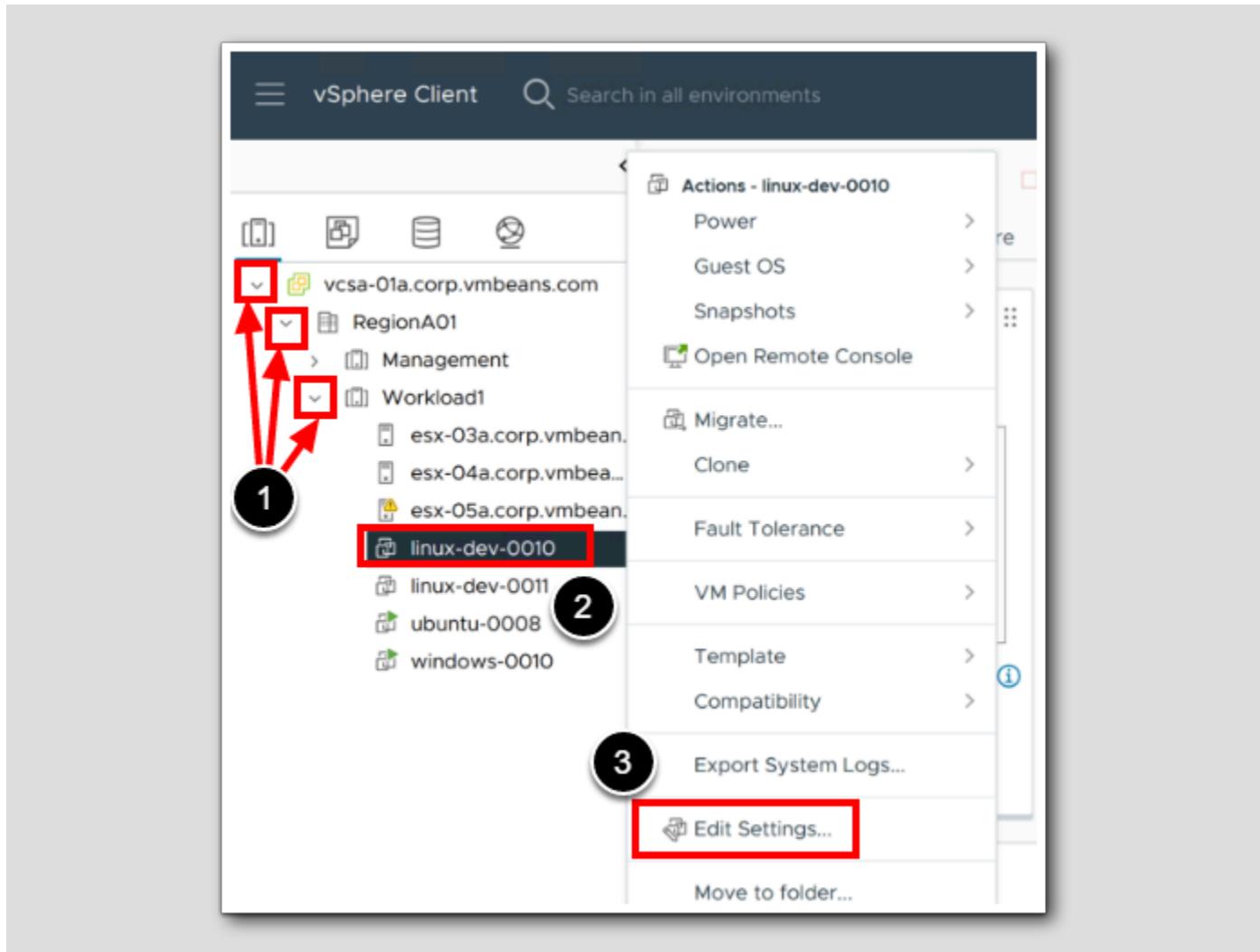
Let's proceed with the task at hand.

## Starting vCenter



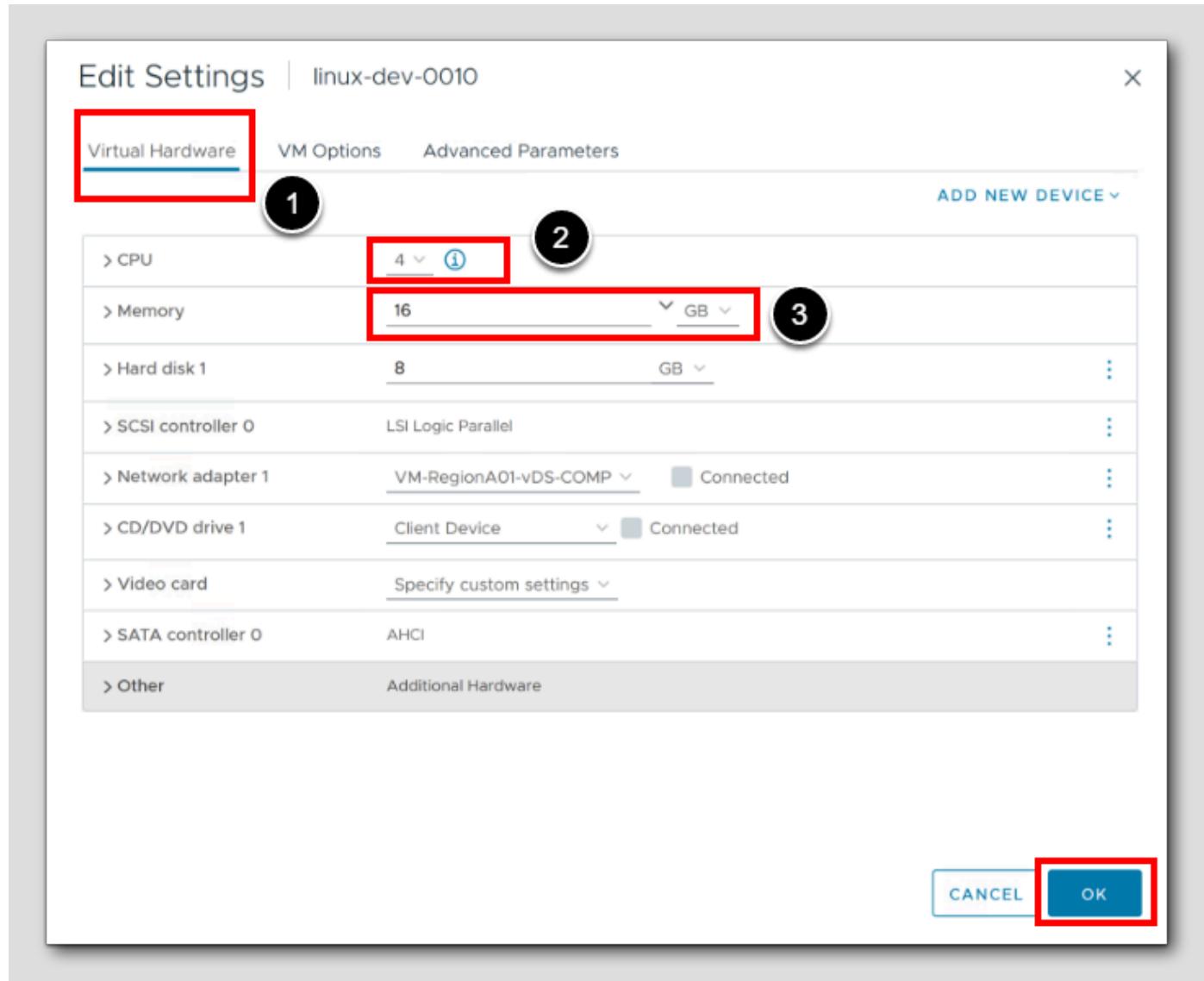
1. Start a new TAB by clicking '+'
2. On the toolbar, Click on vCenter
3. Select Use Windows session authentication
4. Click LOGIN

## Edit settings



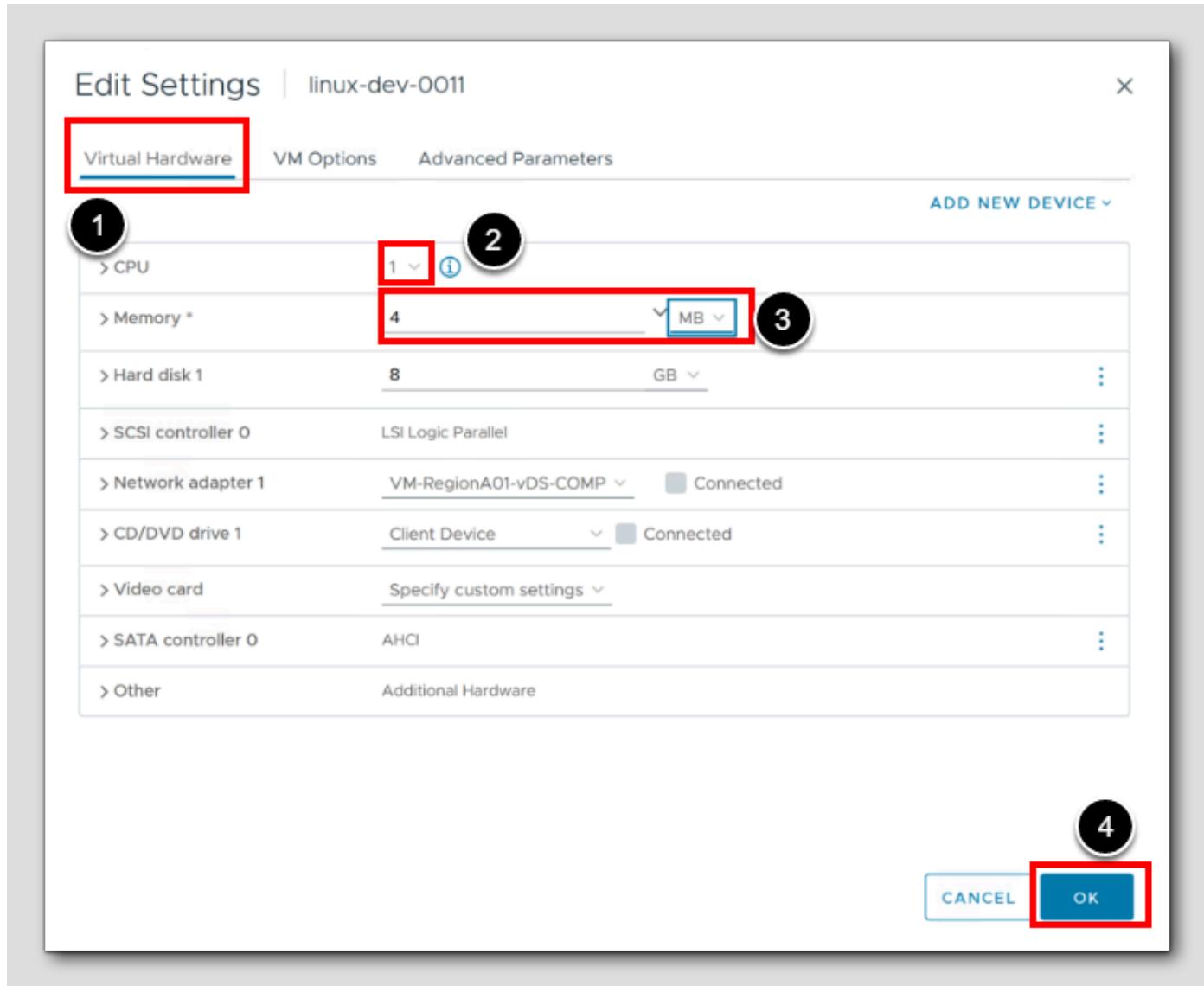
1. In the directory tree, click on the '>' and expand all the way down to the cluster Workload1.
2. Right-click linux-dev-0010.
3. Choose Edit settings.

## Oversizing a developer server



1. In the Edit Settings, if not already selected, select Virtual Hardware.
2. Give this VM too many virtual CPUs, behind CPU, select 4.
3. Give this VM too much memory for a simple Ubuntu server, behind Memory, type 16, let's make sure we select GB (Gigabyte).
4. Click OK.

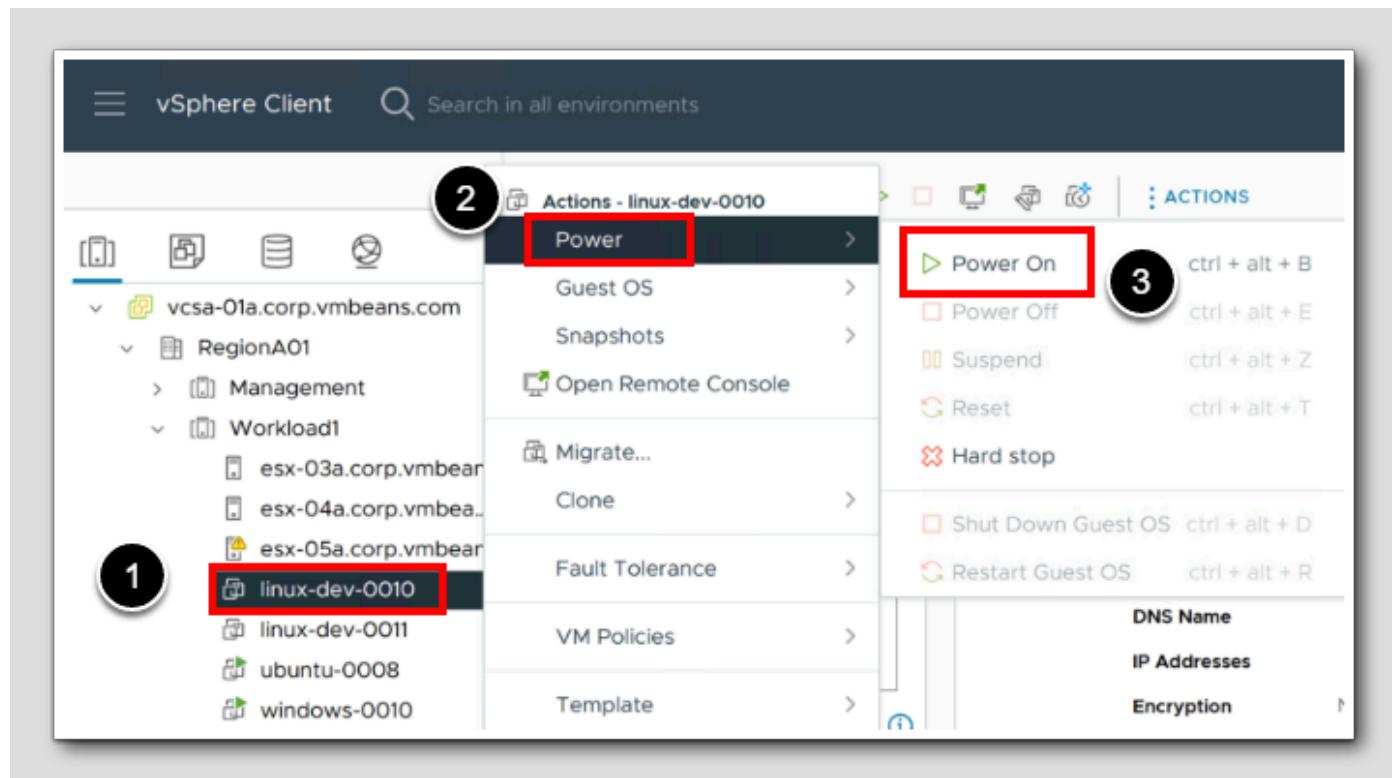
## Undersizing the other developer server



We are going to deprive the Ubuntu server VM for memory. The Virtual Machine may not even start with just 4MB of memory which is our evil intention. To edit the settings for the second developer server, right-click *linux-dev-0011* and choose **Edit Settings** (not shown)

1. In the Edit Settings, if not already selected, select **Virtual Hardware**.
2. If not already set, Give this VM just one virtual CPUs, behind CPU, **select 1**.
3. Behind Memory, **type 4**, let's make sure we select **MB** (Megabyte).
4. Click **OK**.

Start both VMs



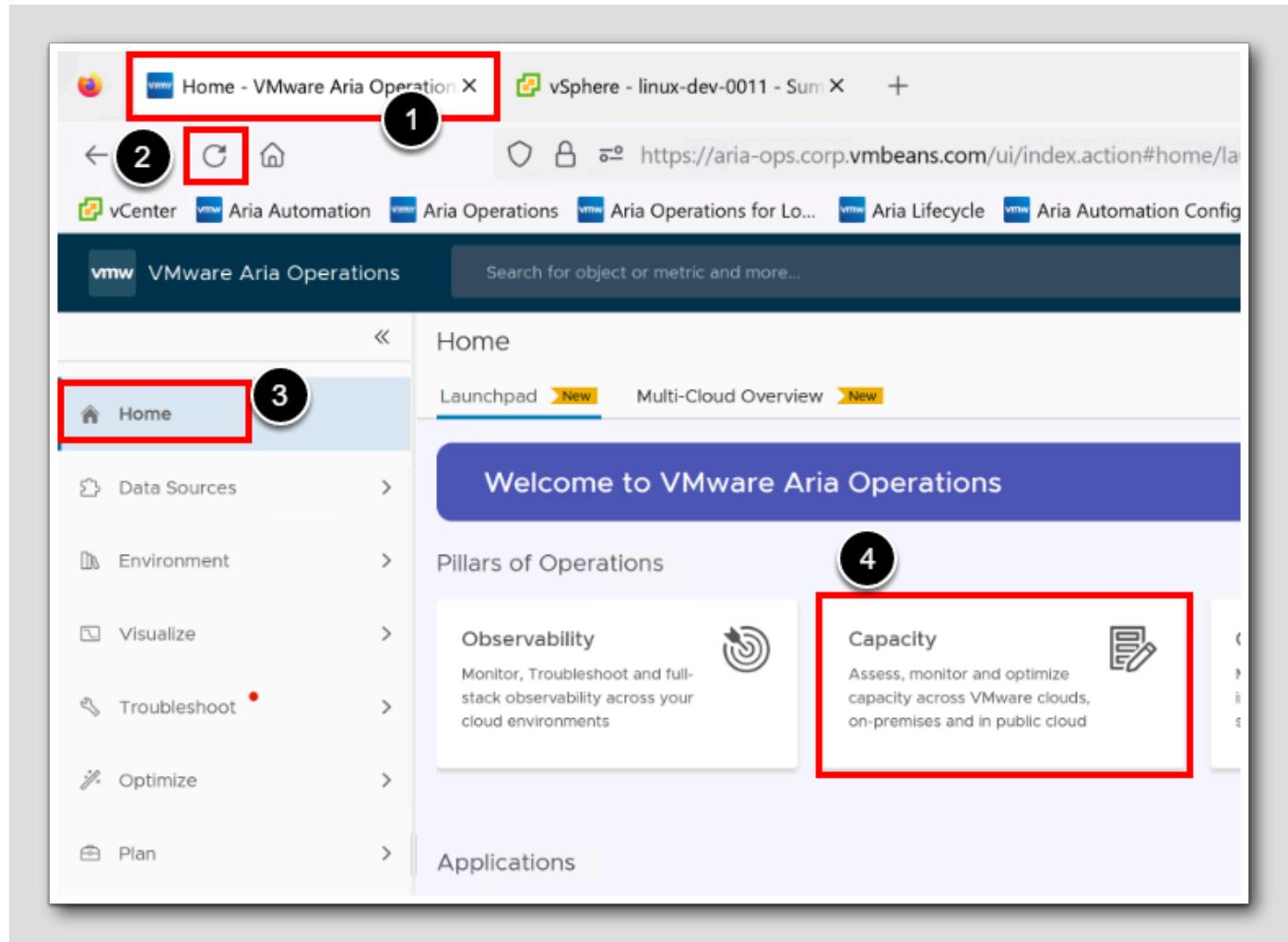
1. Right click the VM linux-dev.0010.

2. Click Power.

3. Choose Power On.

NOTE: Repeat this step for the other developer server linux-dev-0011

Back to Aria Operations



1. Go back to Aria Operations, In FireFox Browser select the Aria Operations TAB.
2. To make sure we're still logged in, and the UI has been refreshed since last collection cycle, on the toolbar, click the Refresh button.
3. If not already selected, Click Home.
4. To access the Rightsizing, that is a part of capacity planning, Click Capacity.

## Open RightSizing

Capacity

Home / Launchpad / Capacity

> Learn more

Assess

Capacity

Determine if there is sufficient capacity in your VMware Cloud environment for current and...

VIEW LEARN MORE

Optimize

Rightsize

Rightsize workloads to ensure performance and optimize utilization

1

VIEW LEARN MORE

Reclaim

Reduce waste by reclaiming unused resources

VIEW LEARN MORE

1. In the Capacity page, Under Optimize, Under Rightsize, Click VIEW.

## A faster navigation

The screenshot shows the VMware Aria Operations interface. The left sidebar has sections: Home, Data Sources, Environment, Visualize, Troubleshoot (with a red dot), Optimize, Capacity, Reclaim, Workload Placement, Rightsize (highlighted with a red box and labeled 2), and Compliance. Step 1 is indicated by a circle with '1' over the expand arrow next to the 'Optimize' section. Step 2 is indicated by a circle with '2' over the 'Rightsize' button. The main content area is titled 'Rightsize' and shows three regions: RegionA01 (twice) and RegionA02. Each region has a status (0 Days Remaining, US\$0 Cost Savings, Not Optimized). Below this is a section for 'Oversized VMs' showing 8 VMs To Downsize, with recommendations for CPU (14 vCPUs) and Memory (26 GB). At the bottom are tabs for 'Oversized VMs' (selected) and 'Undersized VMs'.

TIP: A much faster way to navigate to the Rightsize page

1. In the Left toolbar, behind *Optimize* expand the section, Click on the '>' Arrow
2. Click on **Rightsize**

NOTE: It's not necessary to perform these two steps now.

## Sizing overview

The screenshot shows the Aria Operations interface with the following details:

- Top Bar:** Includes a search bar, a refresh button (circled 1), a notifications icon, and user account information.
- Region Selection:** Shows 'RegionA01' selected. A red box highlights this selection. A red arrow points from a circled '2' to the refresh button in the top right corner.
- RegionA01 View:**
  - Oversized VMs:** Shows 8 VMs to downsize. It includes columns for Resource (CPU, Memory), Recommended Reduction, and % Reduction.
  - Undersized VMs:** Shows 1 VM to upsize. It includes columns for Resource (CPU, Memory), Recommended Increase, and % Increase.
- Bottom Right:** Displays the URL 'vcsa-01a.corp.vmbeans.com'.

1. If no datacenters are selected, select the RegionA01 Datacenter.
2. The view could be a little different from what you see in this Lab, but to be sure we are up to date, click the Aria Operations refresh button.

In the highlighted section in our view, we see that I have 8 VMs that are oversized, and from those 8 VMs we can reduce with 14 vCPUs and 26 GB of RAM, meaning that we would give back just that in wasted resources that have never been used. This is really powerful, because in the same view we see one VMs that lacks memory to be performing well. So we have 1 VM which needs an increase of 1 GB (Gigabyte) memory

## Which workloads are oversized

The screenshot shows the 'Oversized VMs' report in the VMware vSphere Client. The 'Management' cluster is expanded, revealing the 'Workload1' cluster. Under 'Workload1', two VMs are listed: 'linux-dev-0010' and 'windows-0010'. Both VMs have their checkboxes selected. The 'RESIZE VM(s)' button is highlighted with a red box and a number '4'.

VM Name	Allocated CPU	Recommended CPU Reduction	Allocated Memory	Recommended Memory Reduct...
linux-dev-0010	4 vCPUs	2 vCPUs	16 GB	8 GB
windows-0010	2 vCPUs	0 vCPUs	4 GB	2 GB

1. Select Oversized VMs.
2. For now, we will ignore the Management Cluster. Expand the workload cluster **Workload1**, click '>'.
3. The Oversized VMs with their VM name and recommended Reduction are shown, **Select all the workloads**.
4. Click **RESIZE VM(s)**.

## Editing resize

Resize VMs

Review the suggested sizes and make adjustments as necessary.

VM Name	Decrease CPU From	To	Decrease Memory Size From	To
windows-0010	2 vCPUs	2 vCPUs	4 GB	3 GB <span style="border: 2px solid red; padding: 2px;">1</span>
linux-dev-0010	4 vCPUs	2 vCPUs	16 GB	9 GB <span style="border: 2px solid red; padding: 2px;">2</span>

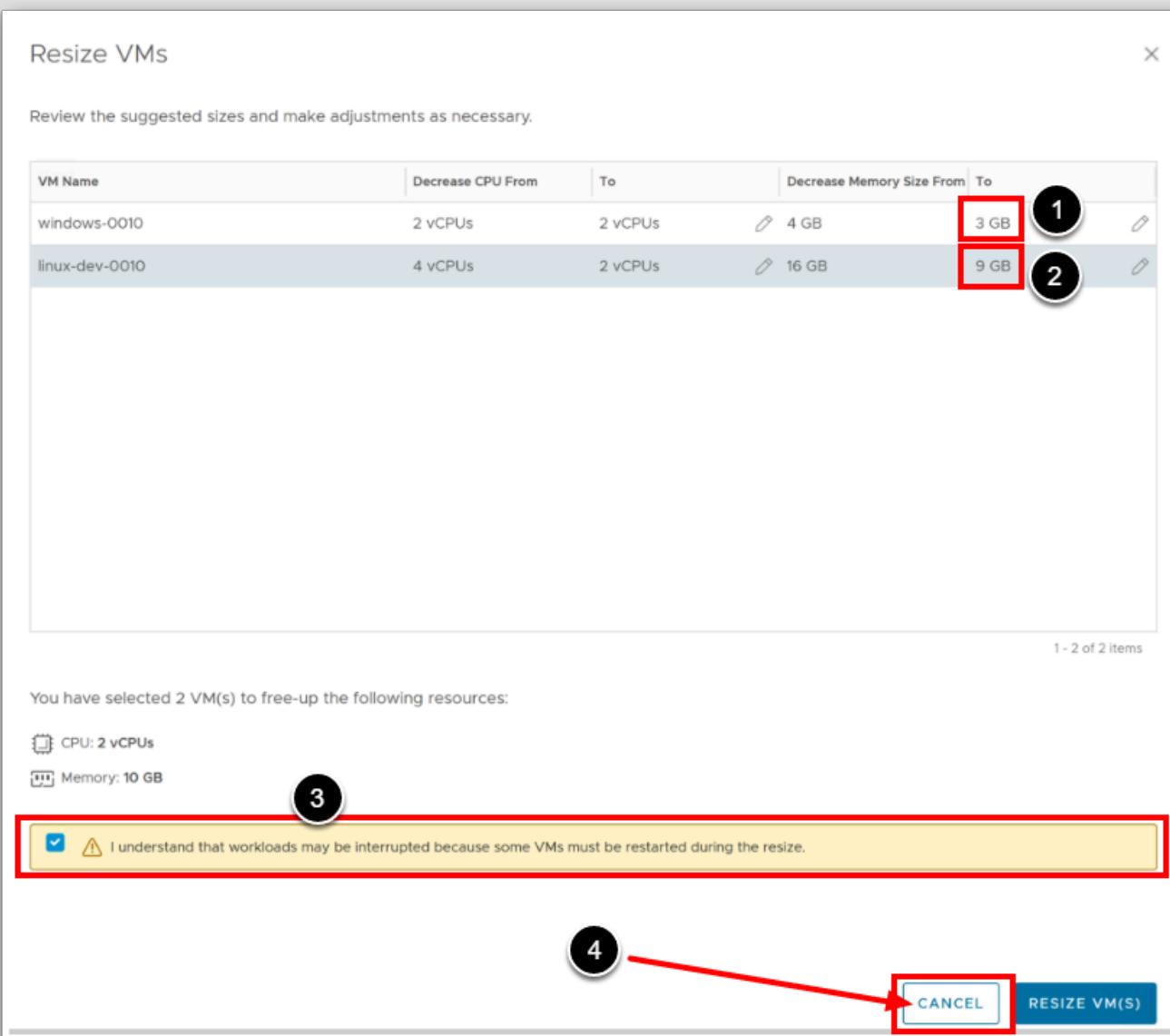
1 - 2 of 2 items

You have selected 2 VM(s) to free-up the following resources:

CPU: 2 vCPUs  
Memory: 10 GB

3  ⚠ I understand that workloads may be interrupted because some VMs must be restarted during the resize.

4 CANCEL RESIZE VM(S)



The Resize VM(S) workspace appears. The table displays suggested reductions for vCPU and memory. Click the edit icons to accomplish to changes you wish.

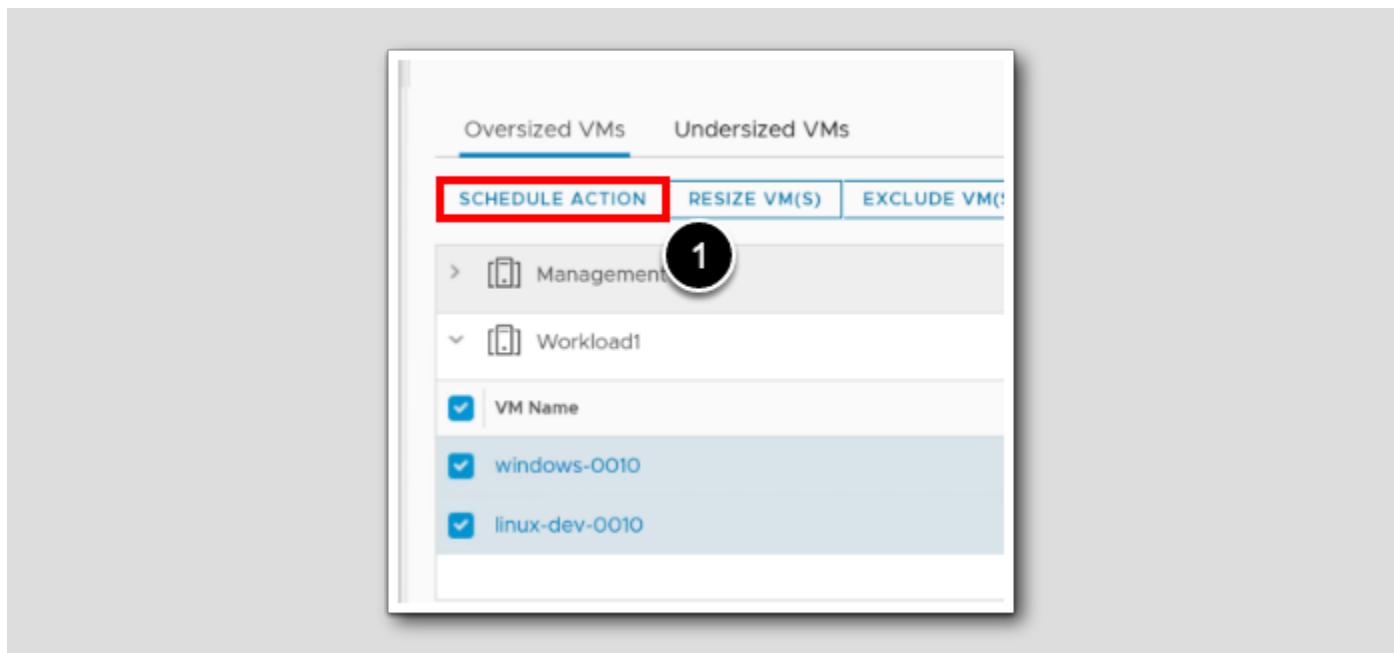
1. Change Memory to 3.
2. Change CPU to 9.
3. Check the '*I understand that workloads may be interrupted because some VMs must be restarted during the resize.*'

Many customers are often hesitant to make significant alterations to their virtual machines (VMs) and prefer a more cautious approach. The Recommended Size feature has been purposefully designed to adopt a conservative stance in its suggestions. For VMs that are oversized, the Recommended Size is limited to a maximum of 50% of their current configuration. This gradual approach aims to guide VMs toward their optimal size without proposing drastic changes, such as reducing the number of virtual CPUs from 32 to just 1.

4. STOP! For now, we will actually not perform the resizing manually, so just Click Cancel

## Opening the Scheduling

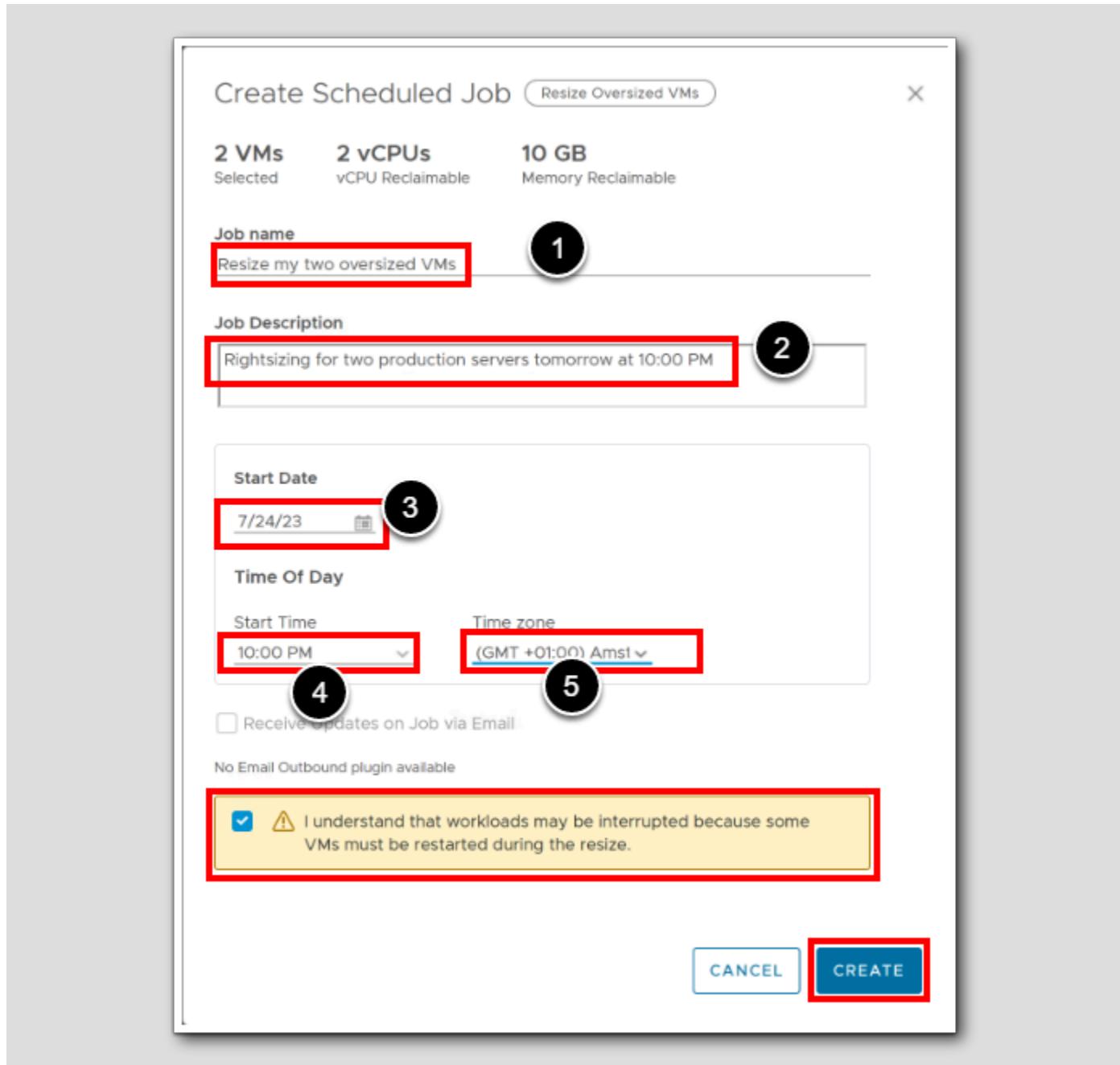
[565]



As part of our commitment to Self-Driving Operations, we are taking an additional measure to enhance Rightsizing. To ensure minimal disruption for the careful consideration of Aria Operations' recommendations, we've scheduled the rightsizing for two production servers tomorrow at 10:00 PM, by the end of the regular working hours.

1. Click SCHEDULE ACTION.

## Create Scheduled Job



1. Fill in Job Name **Resize my two oversized VMs**.
2. Fill in the Job description **Rightsizing for two production servers tomorrow at 10:00 PM**.
3. Make sure you select a Start Date that is **tomorrow**, at the time of writing the date was 23rd July 2023, so I've picked the date to be 7/24/23 (meaning 24th July 2023).
4. Select Start Time **10:00 PM**.
5. Just leave the Timezone, or let's select our closest Timezone. At the time of writing **GMT+1** (Nordics) was selected.
6. Check '**I understand that workloads may be interrupted because some VMs must be restarted during the resize.**'
7. Click **CREATE**.

## Automation Central results

The screenshot shows the VMware Aria Operations interface. On the left, there's a navigation sidebar with various options like Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure, Automation Central (which is highlighted with a red box and a circled '1'), Administration, and Developer Center. The main area is titled 'Automation Central' and shows '1 Upcoming Jobs'. Below this is a calendar for July 2023. The 23rd is a blue circle, the 24th has a green bar from 1:00 PM to 2:00 PM labeled 'Resize my two oversized VMs', and the 25th is a blue circle. The days are labeled Sun, Mon, Tue, etc., at the top of the calendar. At the bottom of the calendar, there are tabs for Schedule, Report, History, and Jobs, with 'Jobs' highlighted by a red box and circled '2'.

1. In the left navigator, click Automation Central.

Notice that our newly scheduled job occurs the day after today. Also Notice that since we selected a totally different timezone, it translates to 01:00 p.m. local time (Palo Alto, USA).

2. In Automation Central, Click Jobs.

## One-Time Job review

The screenshot shows the 'Automation Central' interface with the title 'Build Automated Jobs'. A red box highlights the 'ADD JOB' button. A circled '1' indicates there is one upcoming job. The 'Jobs' tab is selected, showing a table with one row:

Name	Action	Status	Runs On	Schedule	Next Run Start
Resize my two oversized VMs	Downsize oversized VMs	Activated	linux-dev-0010 ***	One-Time	7/24/23 1:00 PM

Based on the information available in our Automation Central listing, a scheduled one-time job is set for tomorrow. In alignment with our commitment to automatic self-driving operations, we aim to execute this task on a recurring schedule without requiring manual intervention.

1. Proceed by clicking ADD JOB.

## Create Job from Automation Central

**Create New Job**

1 - Select Action      2 - Select Scope      3 - Filter Criteria      4 - Schedule

**Name:** Weekly Downsize 1

**Description:** Downsize all oversized resources on a weekly basis 2

**Action Configuration**

**Reclaim:**

- Delete old snapshots
- Delete idle VMs
- Power off idle VMs
- Delete powered off VMs

**Rightsizing:** 3

- Downsize oversized VMs
- Scale-up undersized VMs

**Other:**

- Additional Actions

**Rightsize Resource Type:**  vCPUs 4     Memory 4

**Limit Downsizing Amount:**  Default Recommendation 5     50% of Default Recommendation

**Warning:**  ⚠️ I understand that workloads may be interrupted because some VMs must be restarted during the resize. 6

**Buttons:** PREVIOUS    **NEXT** 7    CREATE    CANCEL

We will now establish an automated job to schedule actions seamlessly.

1. Specify a name for the job. This will be displayed in the calendar. Type **Weekly Downsize**
2. Provide a description for the job. Type **Downsize all oversized resources on a weekly basis**
3. Action Configuration, Behind *Rightsize*, Select **Downsize oversized VMs**
4. Behind the *Rightsize Resource Type*, select both **vCPU and Memory**
5. Under the *Limit Downsizing Amount*, Select **Default Recommendation**.

We discussed the *downsizing limit amount* previously, and we should of course apply extra care in a production environment, but since this is a test environment we can ignore the 50% of default recommendation and do max downsizing each time.

6. Check '*I understand that workloads may be interrupted because some VMs must be restarted during the resize.*'
7. Click **NEXT**

VMware Aria Operations does not check if the VM hot add/remove setting is enabled. If the VM power off is not allowed, then the action will fail. Note: If the number of resources for a job is ten or less, then the job runs at once. If the number of resources is more than ten, then the jobs run in groups of ten, in parallel.

## Select Scope

Create New Job

1 - Select Action    2 - Select Scope    3 - Filter Criteria    4 - Schedule

vCenter    Virtual Machine

Please carefully select the scope. Only Virtual Machines and their ancestor objects would make the job run successfully.

**Select Scope**

Drag and drop items from the list below to populate your scope.

1. vSphere World

- 1. vcsa-01a.corp.vmbeans.com
- 2. RegionA01
  - Development
  - HOL Infrastructure
  - Namespaces
  - Templates
  - vCLS
  - Workloads
  - Discovered virtual machine
  - Management
  - Workload1

2. RegionA01

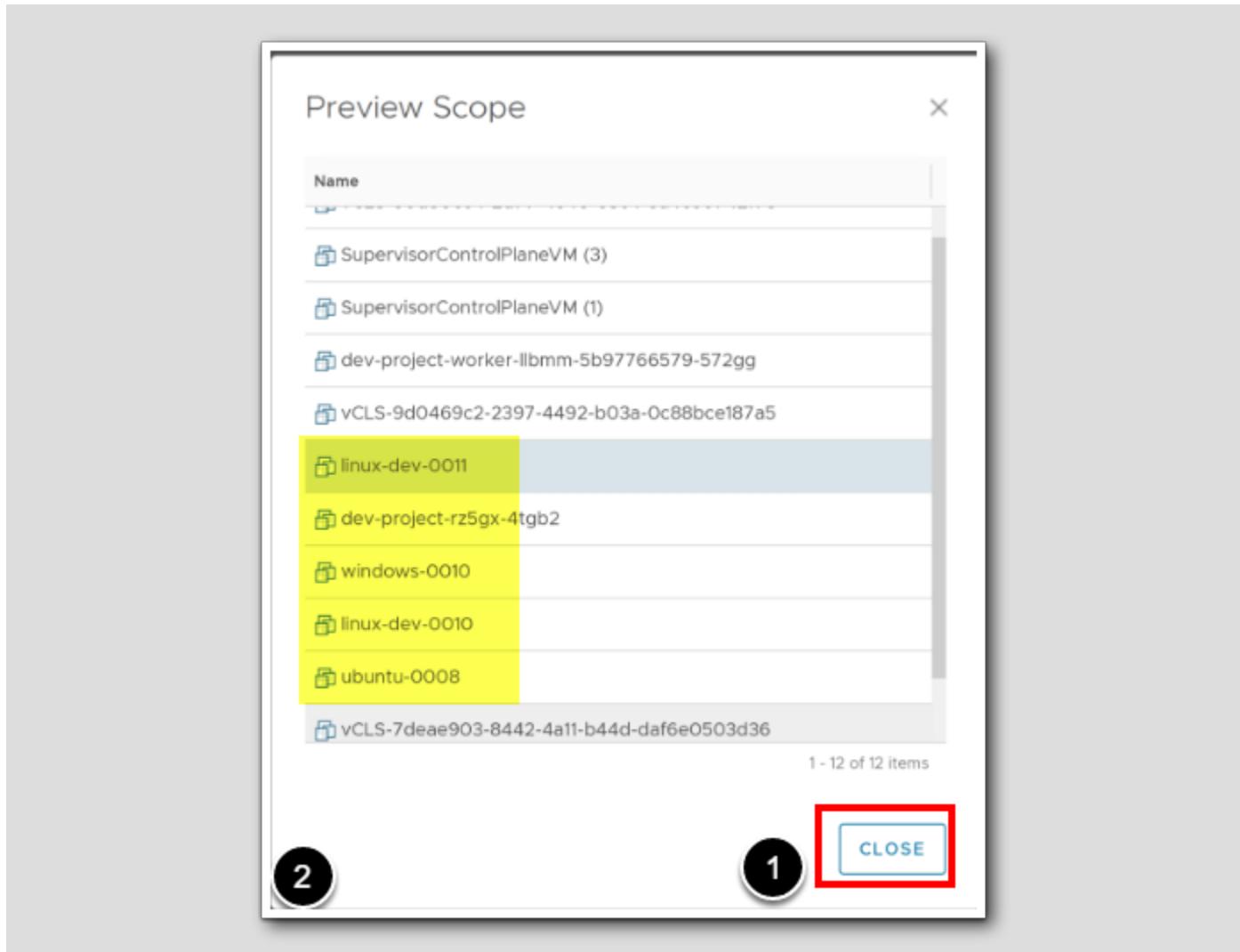
3. Workload1

4. PREVIEW SCOPE

PREVIOUS    NEXT    CREATE    CANCEL

1. Expand the vCenter vcsa-01a.corp.vmbeans.com
2. Expand the datacenter RegionA01
3. Drag and Drop the cluster Workload1
4. Click PREVIEW SCOPE

## Preview Scope



I can see my windows and linux servers that I'd like to resize each week, but also some other resources I do not manage. In the next step we will filter out these.

1. Click Close
2. To go to the Filter Criteria which is the next step, Click Next (NOT SHOWN)

## Adding a criteria for Windows

Create New Job ?

1 - Select Action      2 - Select Scope      3 - Filter Criteria      4 - Schedule

Set Filter Criteria  
Set additional filters based on user defined criteria such as virtual machine names, tags, properties etc.

Object Type: Virtual Machine X ▾

1 Properties 2 Guest OS from vCenter 3 contains 4 Windows

+ ADD ANOTHER CRITERIA SET 5

PREVIOUS NEXT CREATE CANCEL PREVIEW SCOPE

The screenshot shows the 'Create New Job' wizard at step 3 - Filter Criteria. The 'Object Type' is set to 'Virtual Machine'. A filter is being constructed: 'Properties' (Step 1) is selected, followed by 'Guest OS from vCenter' (Step 2), 'contains' (Step 3), and 'Windows' (Step 4). Below this, there is a button labeled '+ ADD ANOTHER CRITERIA SET' (Step 5). At the bottom, there are buttons for PREVIOUS, NEXT, CREATE, CANCEL, and PREVIEW SCOPE.

1. Select Properties
2. Select Guest OS from vCenter
3. Select Contains
4. Type Windows
5. To add another criteria for Ubuntu, Click on ADD ANOTHER CRITERIA SET

## Add criteria for Ubuntu

Create New Job ?

1 - Select Action      2 - Select Scope      3 - Filter Criteria      4 - Schedule

Set Filter Criteria  
Set additional filters based on user defined criteria such as virtual machine names, tags, properties etc.

Or

(−) REMOVE CRITERIA

Object Type: Virtual Machine X ✓

Properties RESET ADD

|Guest OS from vCenter contains Windows

(−) REMOVE CRITERIA

1 Object Type: Virtual Machine X ✓

2 Properties RESET ADD

3 |Guest OS from vCenter contains X ✓

4 Ubuntu RESET ADD

(+) ADD ANOTHER CRITERIA SET

PREVIOUS NEXT CREATE CANCEL PREVIEW SCOPE

PREVIEW SCOPE

1. Select Properties
2. Select Guest OS from vCenter
3. Select Contains
4. Type Ubuntu
5. Click PREVIEW SCOPE

## Preview Scope



We have successfully implemented Criteria filters that Single out Windows or Ubuntu machines. This facilitates the resizing process specifically for the VMs under our administration.

1. Click **Close**
2. When you return to the Create New Job Wizard, Click **NEXT** (not shown)

Create New Job ?

1 - Select Action      2 - Select Scope      3 - Filter Criteria      4 - Schedule

---

Start Date	<input type="text" value="7/25/23"/>		<span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">1</span>
Time zone	<input type="text" value="Host"/>		<span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">2</span>
Start Time	<input type="text" value="10:00 PM"/>		<span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">3</span>
Recurrence	<input type="text" value="Weekly"/>		<span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">4</span>
Run Every	<input type="text" value="1"/>		<span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">5</span> Week(s)
On (Days of the week)	SU M TU W TH F		<span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">6</span>
End	<input type="text" value="No end date"/>		

**Notifications**  
Receive status notifications including job success, job failure, and a reminder email 2 hours before this job is scheduled to run.

Receive Updates on Job via Email 7  
No Email Outbound plugin available

PREVIOUS NEXT CREATE CANCEL PREVIEW SCOPE

1. Select the Start date two days from now. Click the calendar Icon and select 2 days from now
2. Set the Time Zone to Host
3. Set the start time to 10:00 p.m.
4. Under Recurrence select Weekly
5. Under Run Every, select 1 Week(s)
6. Behind On (Days of the Week) Deselect Su Sunday, and Select Sa for Saturday
7. We're finally done, Click Create

## Review the results

The screenshot shows the 'Automation Central' interface with the title 'Build Automated Jobs'. A sub-header explains that a job is a recurring performance and capacity optimization process. There is a blue 'ADD JOB' button. Below it, there are tabs: 'Schedule' (which is highlighted with a red box and has a circled '1' above it), 'Report', 'History', and 'Jobs'. The 'Jobs' tab is currently selected. A table lists two jobs:

Name	Action	Status	Runs On	Schedule	Next Run Start
Resize my two oversized VMs	Downsize oversized VMs	Activated	linux-dev-0010 ***	One-Time	7/24/23 1:00 PM
Weekly Downsize	Downsize oversized VMs	Activated	Workload1 ***	Weekly, every 1 weeks on Saturday	7/29/23 3:00 PM

We observe that we have two upcoming jobs. Review the Schedule for these two Jobs (highlighted)

1. Click Schedule

## Review Schedule Calendar

**Automation Central**

## Build Automated Jobs

A job is a recurring performance and capacity optimization process. Control the behavior of your environment by building customizable processes that run jobs for you.

**Upcoming Jobs**

**ADD JOB**

Schedule   Report   History   Jobs

1 ← → January 2024   Synchronize time with: Browser GMT-07:00

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	1	2	3	4	5	6 3:00 PM Weekly Do... ↗
7	8	9	10	11	12	13 3:00 PM Weekly Do... ↗
14	15	16	17	18	19	20 3:00 PM Weekly Do... ↗
21	22	23	24	25	26	27 3:00 PM Weekly Do... ↗
28	29	30	31	1	2	3 3:00 PM Weekly Do... ↗

- From the calendar page, choose an upcoming month. Click the left '<-' and right '->' arrows to go to January (2024)

As you can see from the calendar, the job is scheduled to do resizing every saturday at 10 p.m.

## Rightsizing Calendar Summary

We are going to create Automated Jobs in Automation Central. By building Automated Jobs with a recurring performance and capacity optimization process, we say goodbye to waste, and welcome cost savings. Your intelligent and cost-effective Aria Operations operates in the background to ensure the effortless execution of all tasks and processes.

## Undersized, the lack of resources

The screenshot shows the VMware Aria Operations interface with the 'Rightsize' feature selected. The interface is divided into several sections:

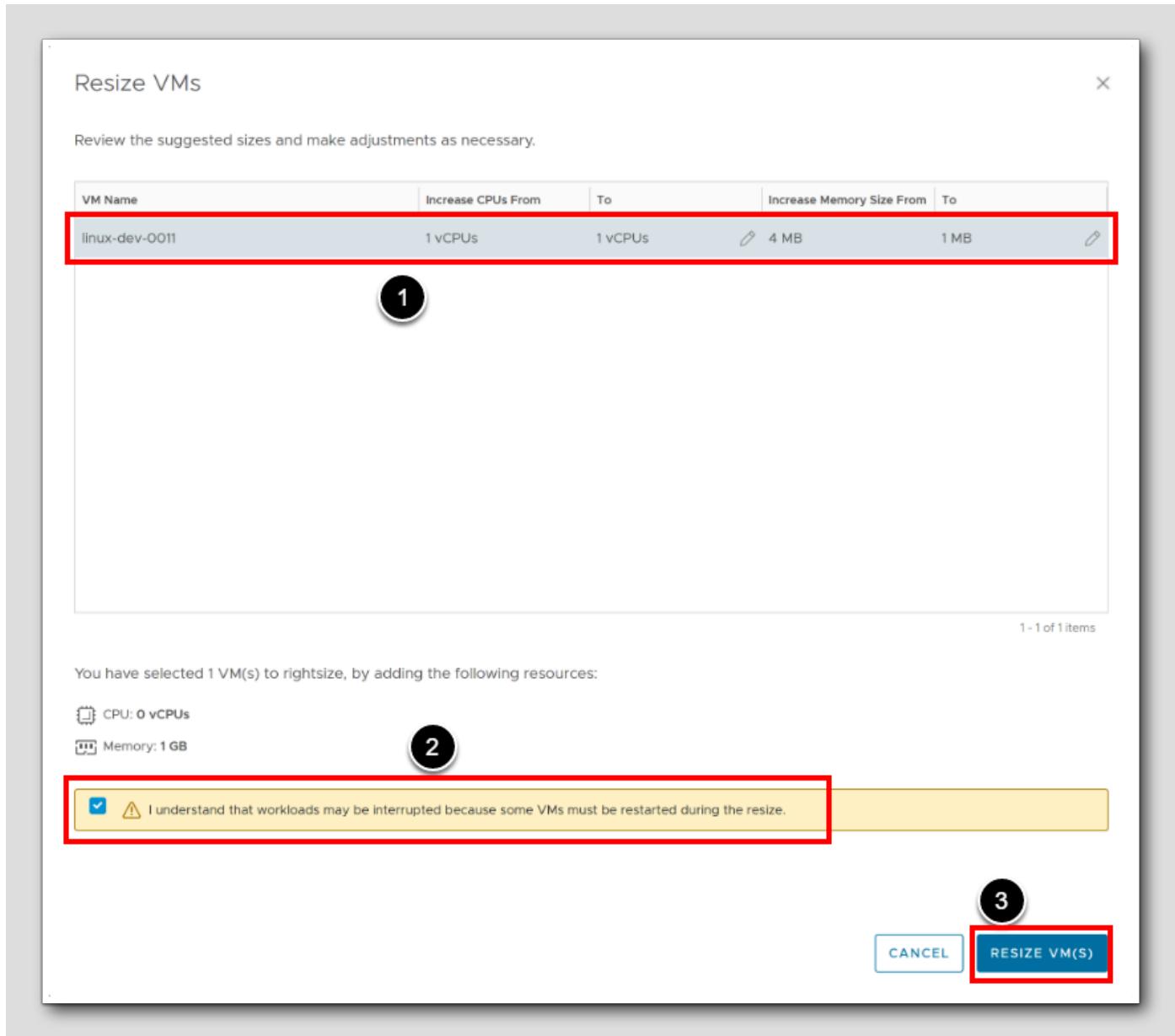
- Left Sidebar:** Includes links for Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize (with a red box around it), Capacity, Reclaim, Workload Placement, Rightsize (highlighted with a red box and circled 2), Compliance, Plan, Configure, and Automation Central.
- Region Summary:** Shows two regions: RegionA01 and RegionA01. Both show 0 Days Remaining, US\$0 Cost Savings, and Not Optimized status.
- RegionA01 Details:**
  - Oversized VMs:** Shows 8 VMs To Downsize. A table lists CPU (14 vCPUs) and Memory (26 GB) with recommended reductions.
  - Undersized VMs:** Shows 1 VM To Upsize.
- Action Bar:** Contains buttons for SCHEDULE ACTION, RESIZE VM(S) (highlighted with a red box and circled 3), EXCLUDE VM(S), and EXPORT ALL.
- VM Selection:** Shows a dropdown for Workload1 and a list of VMs with checkboxes. One VM, 'linux-dev-0011', is checked and highlighted with a red box and circled 5.
- Resource Metrics:** Shows 0 vCPUs Allocated CPU and Recommended CPU Increase.

In our rightsizing strategy, we must also consider the increasing demands of our workloads. Being proactive in resizing undersized servers improves their efficiency and ensures a better user experience.

Let's not forget our undersized server that has been struggling for too long. It deserves immediate attention, and we should resize it manually right away.

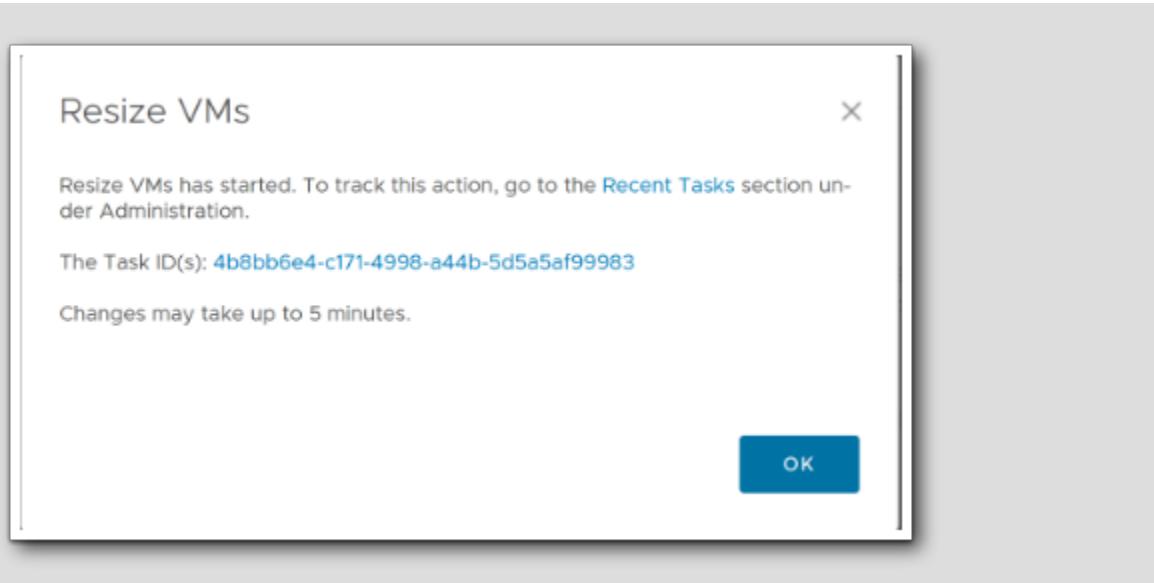
1. Expand **Optimize**
2. Click **Rightsize**
3. Click **Undersized VMs**
4. Expand the cluster **Workload1**
5. Select the undersized VM **linux-dev-0011**
6. Click **Resize VM(s)**

## Resize VMs



1. Leave all recommendations from Aria Operations
2. Check the '*I understand that workloads may be interrupted because some VMs must be restarted during the resize.*'
3. Click RESIZE VM(S)

Go to Recent Tasks



1. Click the Task ID

## Failed task and Requirements

The screenshot shows the 'Recent Tasks' page in Aria Operations. At the top, there's a navigation bar with 'EDIT PROPERTIES' and '...'. Below it is a table with columns: Task, Status, Started Time, Completed T..., Automated, Object Name, Object Type, Event Source, Source Type, Submitted By, and Task ID. One task is listed: 'Set CPU Count and Me...' with a status of 'Failed'. The 'Object Name' is 'linux-dev...' and the 'Object Type' is 'Virtual Ma...'. The 'Submitted By' is 'viDMAuth...' and the 'Task ID' is '4b8bb6e'. Below the table, a message box says '1 - 1 of 1 item'.

**Details of Task Selected**

Associated Objects (Completed 0 from 1)			Messages	Severity: All	Search
Object Name	Object Type	Status	Severity	Time ↑	Message
linux-dev-0...	Virtual Machine	Failed	Information	2023-07-23 07:04:10.0...	Params: CPUMemoryReconfigureParam{cpuParam=CPUParam{value=1} com.integri...
			Information	2023-07-23 07:04:10.0...	Cpu modification request matches current value
			Information	2023-07-23 07:04:10.0...	Current Memory (MB) value: 4
			Information	2023-07-23 07:04:10.0...	Requesting increase Memory (MB) value to 1024
			Information	2023-07-23 07:04:10.1...	Power off required and allowed
			Error	2023-07-23 07:04:10.1...	Unable to shut down or power off vm. VMware Tools is not installed.

1. We can see that the resizing from Aria Operations failed with an error; "*Unable to shut down or power off vm. VMware Tools not installed*"

The Shutdown VM action requires that VMware Tools is installed and running on the target virtual machines. If you ran the action on more than one object, then VMware Tools was not installed, or installed but not running, on at least one of the virtual machines.

Since this is a requirement for Aria Operations to run Actions on virtual machines in a vCenter, we need to resolve the issue by ensuring that VMware Tools is installed and running on the affected virtual machines in the vCenter Server instance that manages the virtual machine that failed to run the action.

This will enable you to perform actions on the virtual machines using Aria Operations without any further issues related to VMware Tools requirements.

## Configure Policy Settings

Aria Operations continuously collects data on CPU, memory, storage, and other metrics to assess workload status. The analytics behind

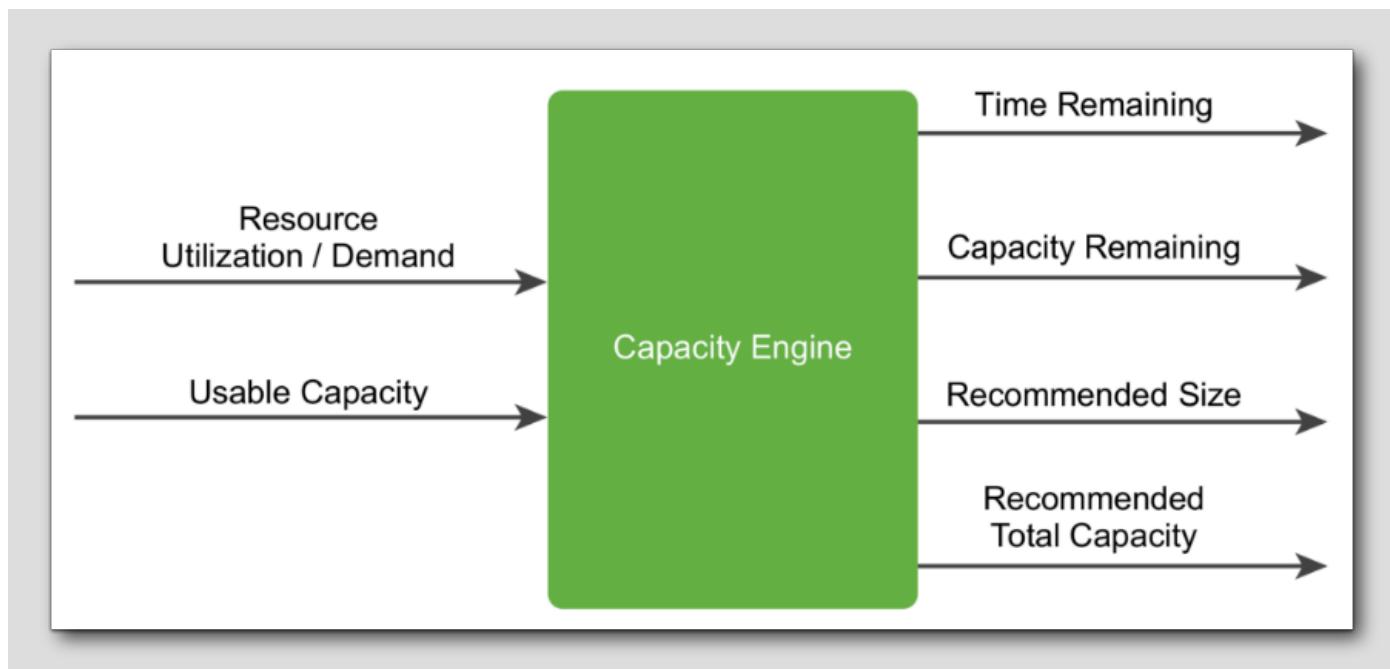
rightsizing leverage historical data, statistical models, and machine learning to ensure accurate recommendations without compromising system performance. Aria Operations identifies **oversized** VMs (overallocated resources) and **undersized** VMs (insufficient resources). We can customize recommendations and take action to implement the resizing changes in the policies. We will delve into

- Criticality Thresholds
- Business Hours
- Risk Level (Conservative vs. Aggressive)

Let's get to work.

### Recommended Size Calculation

[584]



The capacity engine analyzes historical utilization and projects future workload by using real-time predictive capacity analytics, which is based on an industry-standard statistical analysis model of demand behavior. As shown in the figure, the engine takes the Demand and Usable Capacity metrics as input and generates the output metrics, which are Time Remaining, Capacity Remaining, Recommended Size, and Recommended Total Capacity.

#### Recommended Size (optimal resource configuration)

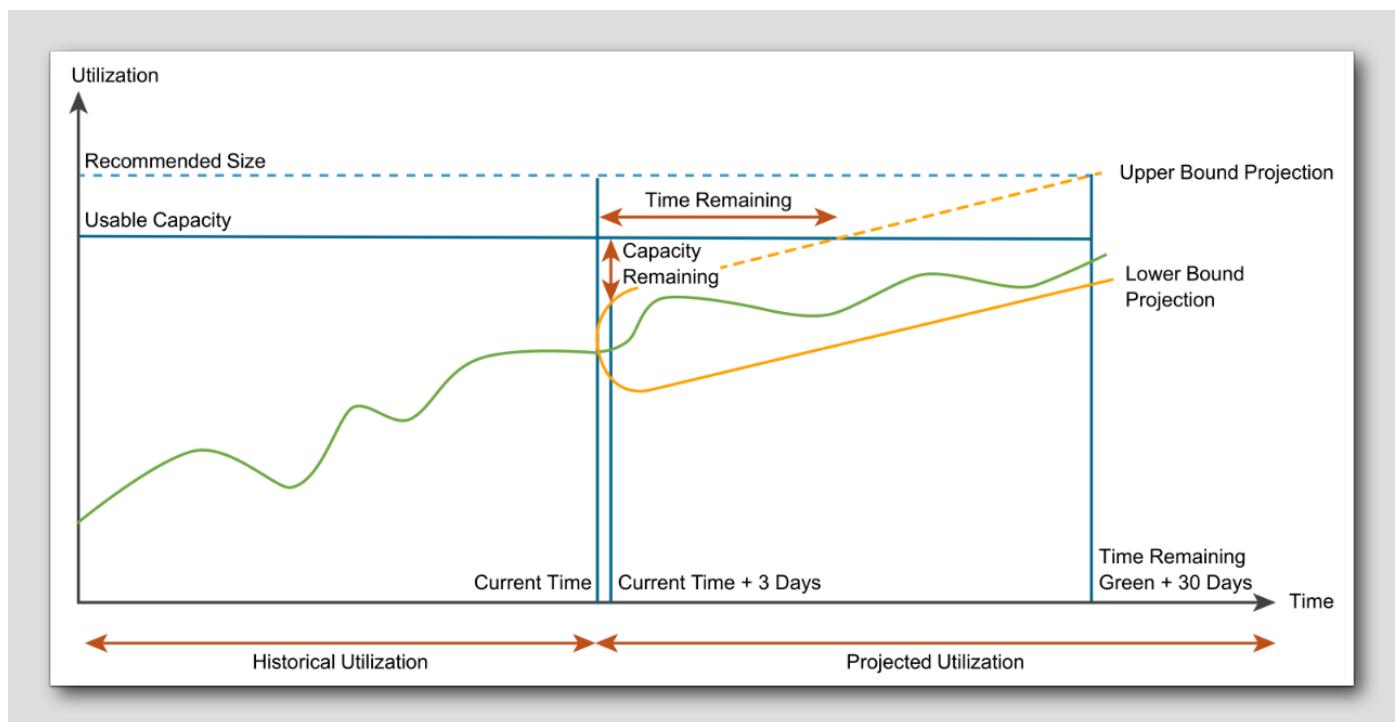
Determined by projecting utilization for a specific period. It extends 30 days beyond the warning threshold, which is the green period for time remaining. The recommended size does not include HA settings. By default, if the warning threshold is set at 120 days, the recommended size reflects the maximum projected utilization 150 days ahead. To maintain conservative recommendations, VMware Aria Operations imposes caps on the recommended size generated by the capacity engine.

**Oversized:** Aria Operations limits oversized recommendations to 50% of the current allocation. For instance, if a virtual machine with 8 vCPUs historically only used up to 10% CPU, the recommendation is capped at reclaiming 4 vCPUs rather than 7.

**Undersized:** Aria Operations limits undersized recommendations to 100% of the current allocation. For example, if a virtual machine with 4 vCPUs consistently experiences high resource utilization, the recommendation is capped at adding 4 vCPUs instead of suggesting 8.

#### Projection - Conservative Risk

[585]

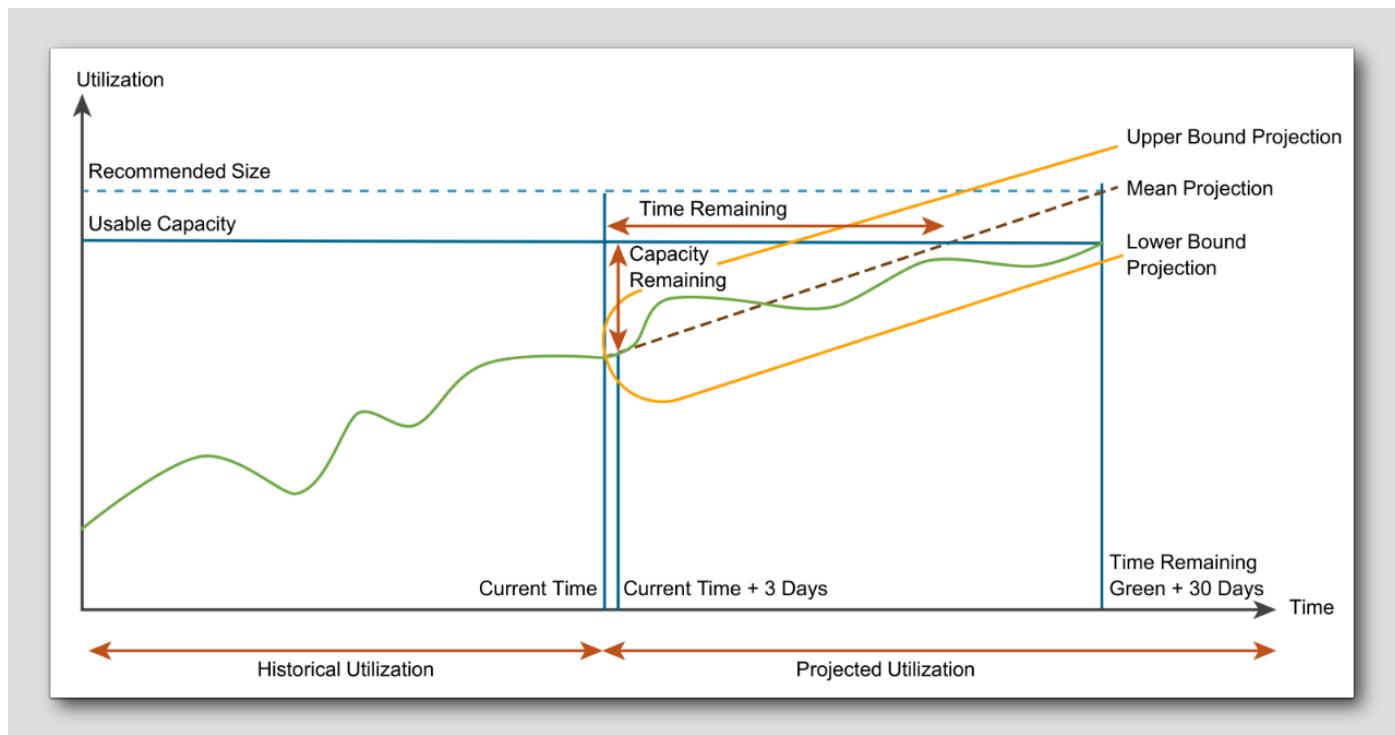


## Conservative Risk Level

In Aria Operations, capacity calculations can be adjusted based on the desired risk level, allowing you to customize the level of conservatism in capacity planning. The figure shows the capacity calculations for a conservative risk level. The Conservative Risk Level parameter influences the capacity engine's recommended resource size, and you can modify it in the policy settings to match your desired level of conservatism.

## Projection - Aggressive risk

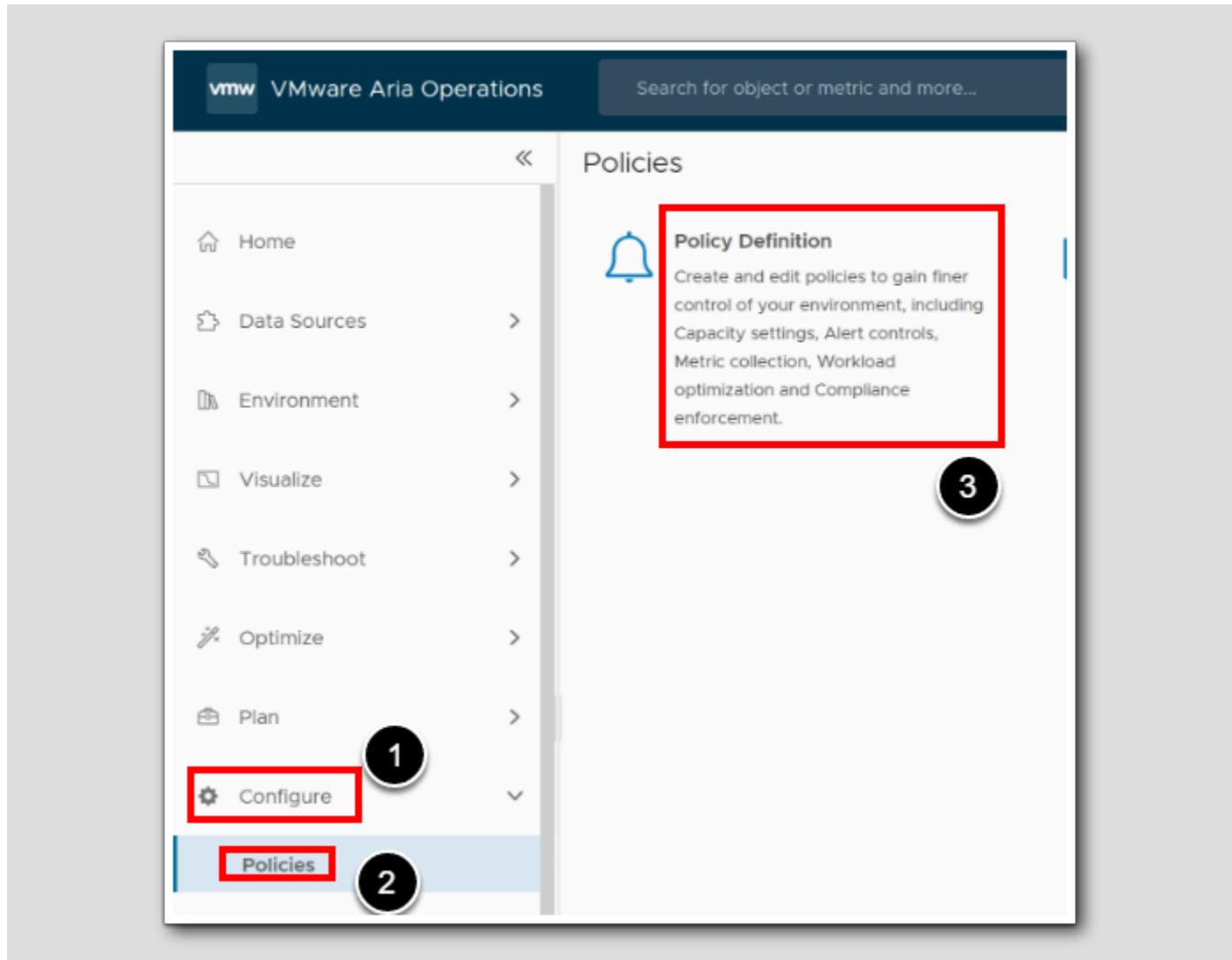
[586]



## Aggressive Risk Level

Capacity calculations at an aggressive risk level aim to maximize resource utilization and minimize overhead. This setting assumes a higher tolerance for risk and allows for more aggressive allocation of resources. It may result in higher consolidation ratios and tighter resource utilization. The aggressive risk level settings can be adjusted in the Capacity policy settings, where you can specify the desired level of aggressiveness.

## Go To policy



1. Click Configure
2. Click Policies
3. Click Policies Definition

## Edit Policy definition

Name	Status	Priority
Set Default Policy	Inactive	
Import	Inactive	
Export	Inactive	
Reorder Policies	Inactive	
HOL Policy	Inactive	
NSX-T Security Configuration Guide	Inactive	
Policy for Virtual Machines - Risk Profile 1	Inactive	
Policy for Virtual Machines - Risk Profile 2	Inactive	
Policy for Virtual Machines - Risk Profile 3	Inactive	
vSAN Security Configuration Policy	Inactive	
vSphere Security Configuration Guide	Inactive	
<b>vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM)</b>	<b>Active</b>	<b>D</b>

We are going to edit the default policy, but normally you would have multiple policies for multiple purposes.

1. In the policy list, find and highlight the Status Active and Priority Default (D)
2. Click the ellipsis menu
3. Choose Edit

## Go to Capacity

vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM) [Edit]

Name: vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM) [🔗](#)

Description: - None - [🔗](#)

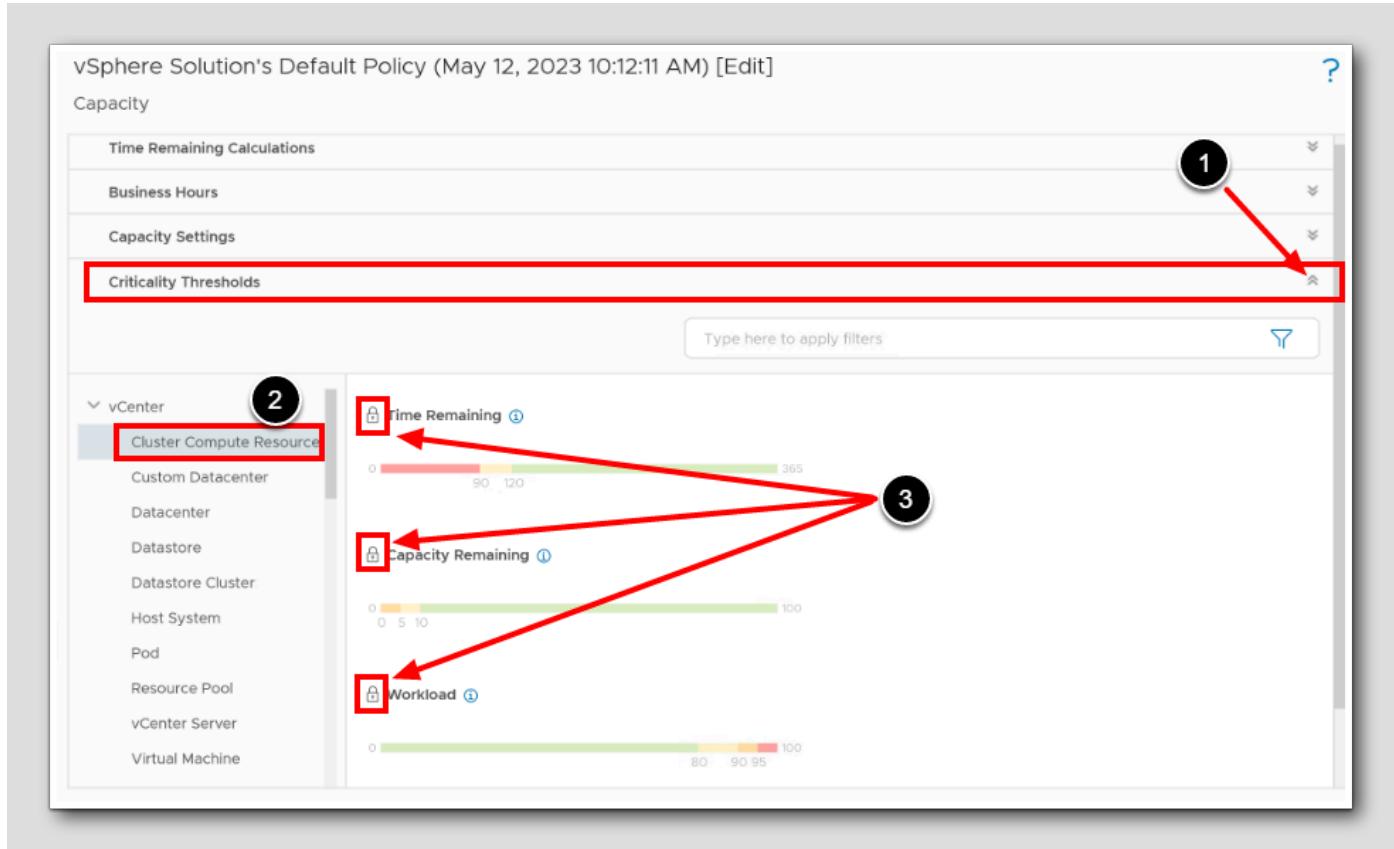
Inherit From: Base Settings

1

Metrics and Properties	Alerts and Symptoms	Capacity
Locally defined attributes None	Locally defined alerts 113 Locally defined symptoms None	Locally defined policy elements None

1. Click Capacity

## Criticality Thresholds



**Criticality Thresholds** allows us to define when an alert should be triggered for a particular symptom based on the severity of a condition. The default is 30 days for yellow (warning) and 10 days for red (critical). When it comes to Rightsizing, the Time Remaining Criticality Threshold is used to control how much of the projected demand to consider when projecting the Recommended Size. The Recommended Size is determined by considering the peak projected demand between now and 30 days beyond the Time Remaining Criticality Threshold. Since the default warning threshold is 30 days, that means Recommended Size also defaults to 60 days in the future (30 days from the Time Remaining Criticality Threshold + 30 days).

The Recommended Size projection considers peak demand within 30 days beyond the Criticality Threshold. We adjust appropriate values as needed for our Rightsizing frequency, and set it to a value that gives us enough lead time to rightsize our VMs.

1. While you still have the policy open in Edit mode, **expand Criticality Thresholds**
2. Select **Cluster Compute Resource**
3. To unlock and override parent policy settings, click each of the padLocks

Open the Time Remaining risk level

The screenshot shows the 'vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM) [Edit]' screen. Under the 'Capacity' tab, there is a section titled 'Time Remaining Calculations'. A large number '1' is circled in black at the top left of this section. To the right of the circle is a red square highlighting a lock icon next to the text 'Set time remaining risk level.' Below this, there are three radio button options: 'Conservative' (selected), 'Aggressive', and 'Peak focused'. Each option has a brief description below it.

1 Set time remaining risk level.

Conservative  
Time remaining is based on the upper bound projection and represents the time remaining before the project threshold.

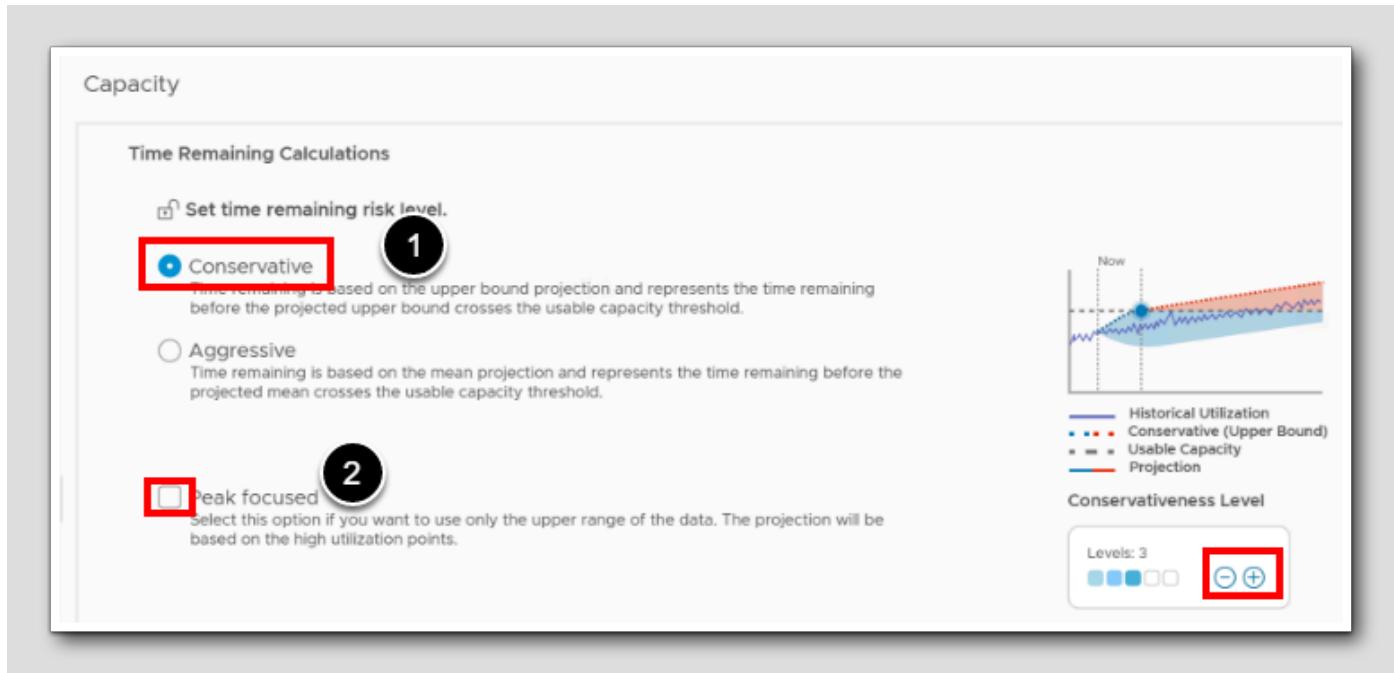
Aggressive  
Time remaining is based on the mean projection and represents the time remaining before the projected mea

Peak focused  
Select this option if you want to use only the upper range of the data. The projection will be based on the hig

The capacity settings for host systems, virtual machines, and other object types that you select appears in the workspace.

1. To open the settings, Click on the padlock

## Conservative Risk Level



You can set the risk level for the time that is remaining when the forecasted total need of a metric reaches usable capacity.

1. To use the option for production and mission-critical workloads, select **Conservative**.
2. **Peak focused:** Select this option if you want to use only the upper range of the data.
3. **Conservativeness Strength:** You can tune the level of conservativeness from 1-5, with level 1 being the least conservative and level 5 being the most conservative. By default, the level of conservativeness is set to 3. Leave this at 3

The upper bound will vary based on the level of conservativeness that you choose. Modifying the level of conservativeness will make the projection bounds narrower or wider. Higher the level, the wider the bounds and more conservative the projections for the Recommended Size.

## Aggressive Risk Level

Capacity

Time Remaining Calculations

1 Set time remaining risk level.

2

Conservative  
Time remaining is based on the upper bound projection and represents the time remaining before the projected upper bound crosses the usable capacity threshold.

Aggressive  
Time remaining is based on the mean projection and represents the time remaining before the projected mean crosses the usable capacity threshold.

Peak focused  
Select this option if you want to use only the upper range of the data. The projection will be based on the high utilization points.

Now

Historical Utilization

Aggressive (Mean)

Usable Capacity

Projection

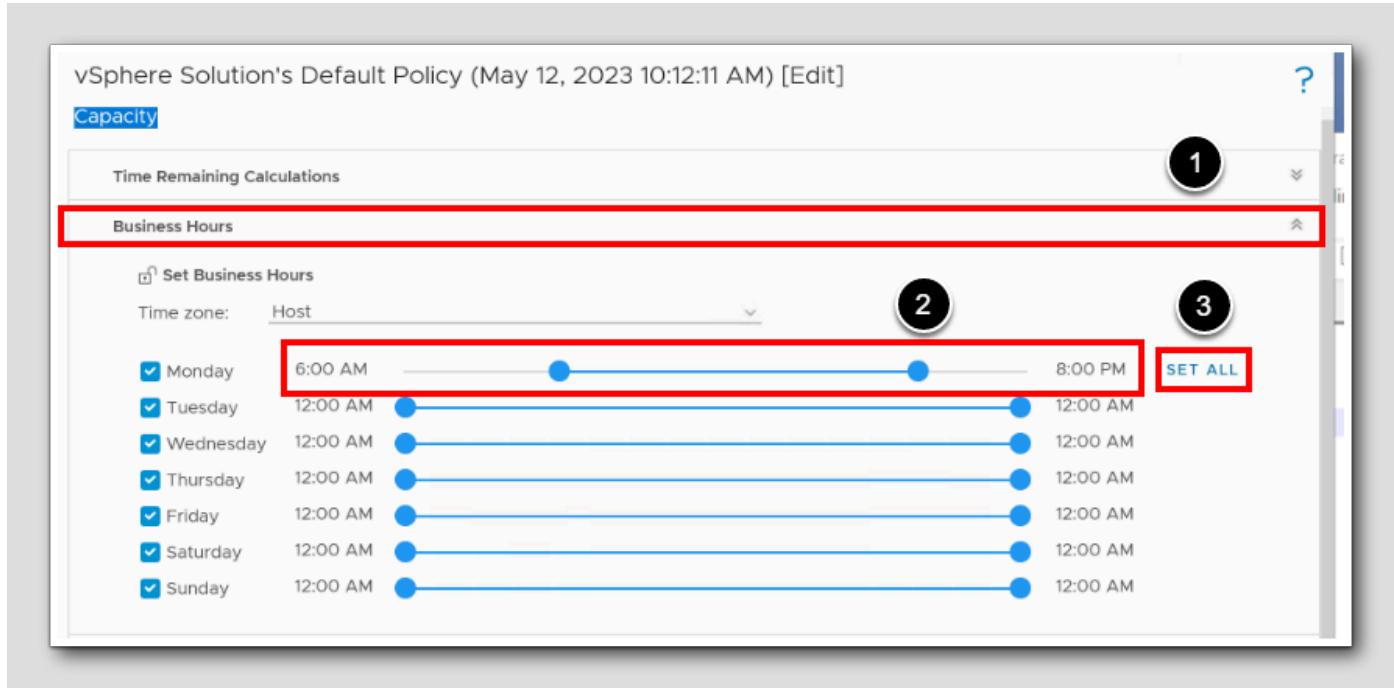
Conservativeness Level

Levels: 3

We will set the risk level for the time that is remaining when the forecasted total need of a metric reaches usable capacity.

1. For non-critical workloads, select **Aggressive**.
2. Unselect **Peak focused**

## Set business hours

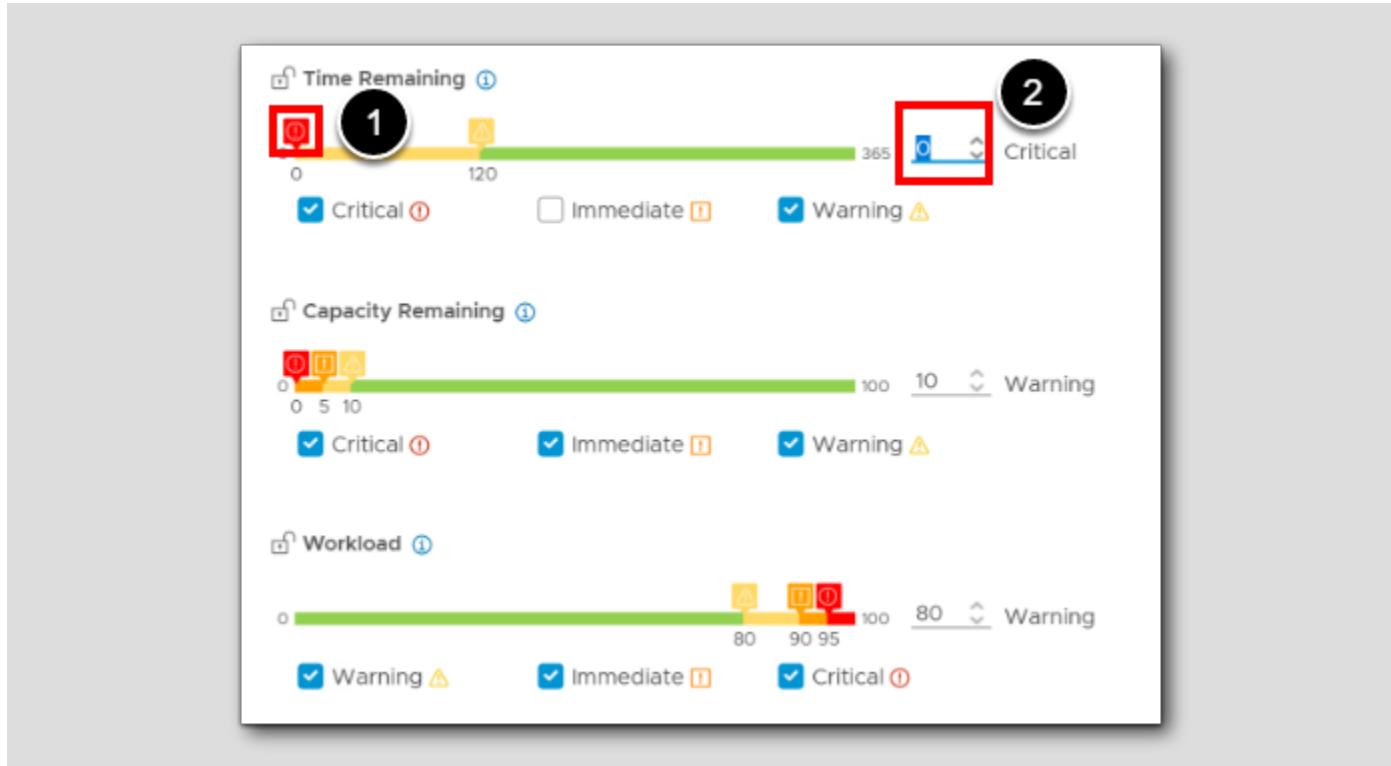


## Business Hours Schedule

Configure business hours for enhanced capacity analysis and projections in VMware Aria Operations. Non-business hour activities on VMs, such as OS upgrades or virus scans, can skew perceived idleness. By setting business hours, off-hour metrics can be effectively analyzed for inventory, compliance, and troubleshooting. Analysis and recommendations for reclamation and rightsizing consider only these hours, ignoring post-business hour spikes. Policies allow different objects to have varied business hours, which are reflected in capacity charts. After you specify business hours, the capacity forecast for the object will be based on the business hours and not 24 hours.

1. Expand Business Hours
- 2.Under Monday, set the business hours from 6 a.m. (06:00) to 8 p.m. (20:00)
- 3.Click Set All

## Set Time Remaining Threshold



Time Remaining is how many days you have until the utilization projection crosses the usable capacity threshold. Capacity Remaining is the % of usable capacity not consumed. Workload is the immediate % of capacity consumed of the most constrained of several key resource containers. Since workload changes every collection cycle, you can set how many cycles it takes to trigger or clear an alert.

1. Under Time Remaining, Click the red Critical slider
2. Set the value to 0

## Saving and Exiting

vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM) [Edit]

Capacity

Time Remaining Calculations

Set time remaining risk level.

Conservative  
Time remaining is based on the upper bound projection and represents the time remaining before the projected upper bound crosses the usable capacity threshold.

Aggressive  
Time remaining is based on the mean projection and represents the time remaining before the projected mean crosses the usable capacity threshold.

Peak focused  
Select this option if you want to use only the upper range of the data. The projection will be based on the high utilization points.

Now

Historical Utilization  
Aggressive (Mean)  
Usable Capacity  
Projection

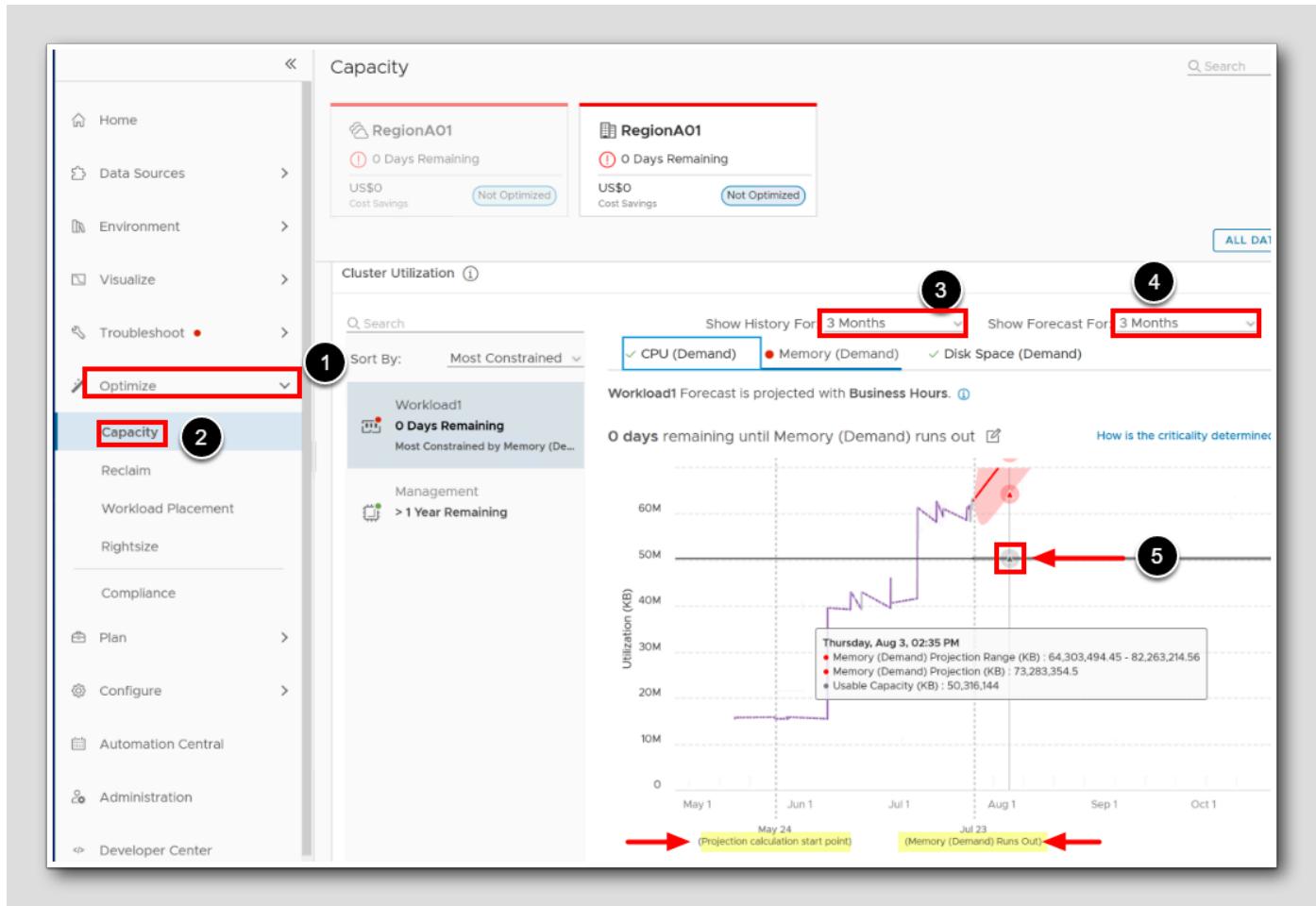
Conservativeness Level  
Levels: 5

1

SAVE CANCEL

1. To save and exit, Click Save

## Cluster Utilization



1. Go to the Capacity settings and see what has happened there, click Optimize

2. Click Capacity

3. Behind 'Show History for', Select 3 months

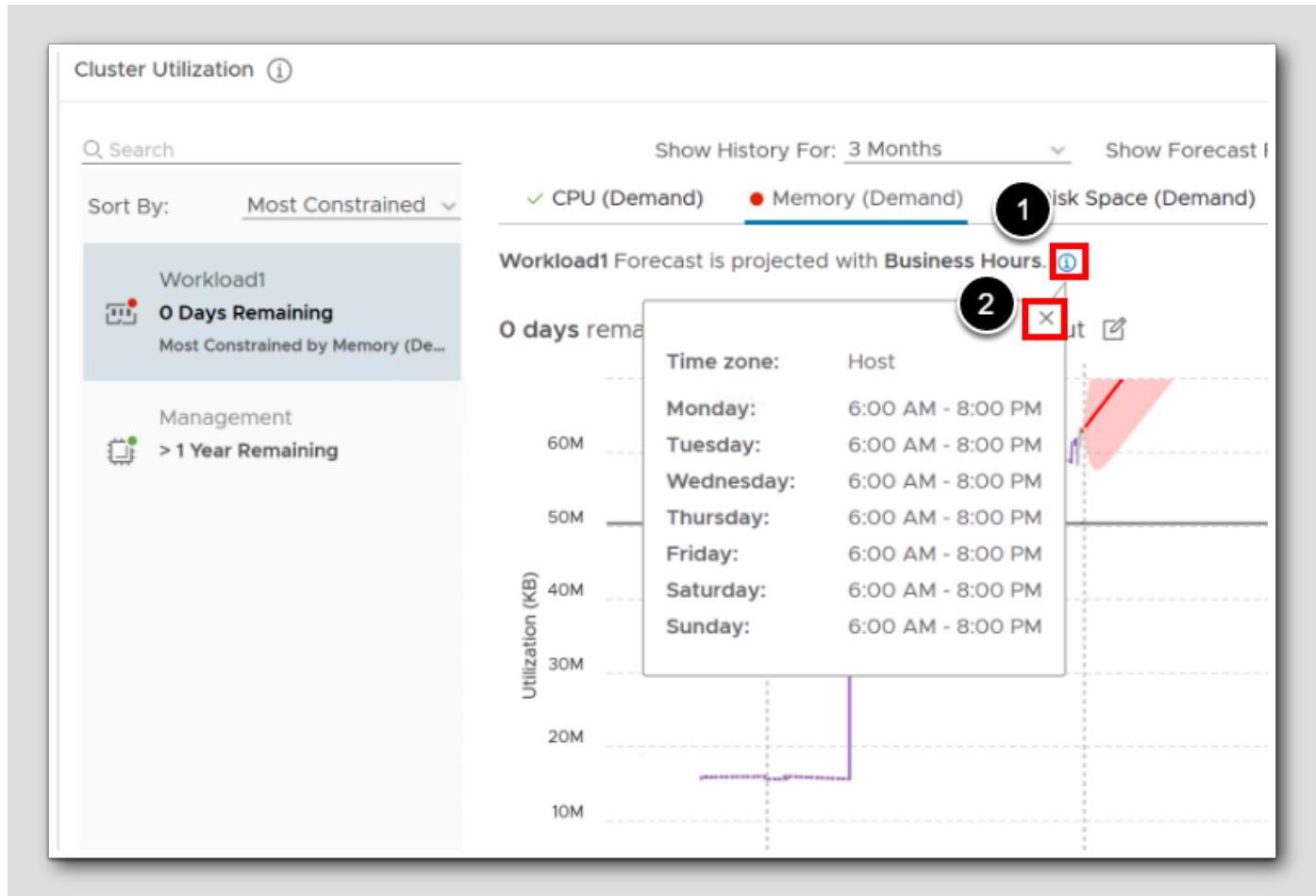
4. Behind 'Show Forecast for', Select 3 months

Notice the Projection Calculation Start Point and When memory runs out

5. Hover the Usable Capacity line.

Notice the values for 3. August 2023.

## Checking the business hours

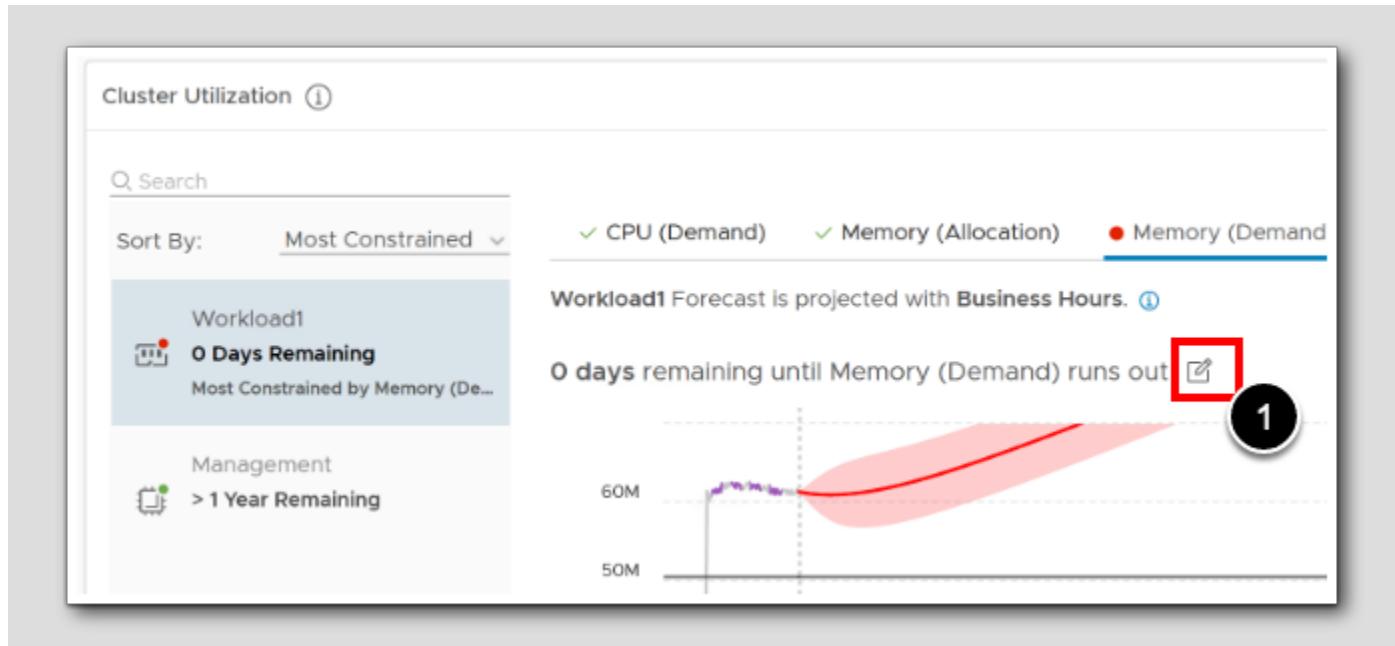


1. Behind business hours, Click the information button (i)

Notice that the previously values entered in our policy for the business hours are shown

2. To close the business hours preview, Click the 'X'

## Quick-edit relevant Policy Settings



1. Behind the x days remaining until Memory (Demand) runs out, click the Edit Icon

## Risk Level and criticality threshold

**Cluster Time Remaining Settings**

Affected Policy: vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM)

**Criticality Threshold**

**⚠ Applying these changes affects all clusters in the policy.**

Set the time remaining thresholds.

**!** Critical Threshold  Days

**⚠** Warning Threshold  Days

**Risk Level**

**⚠ Applying these changes affects all objects in the policy.**

Set time remaining risk level.

**Conservative**  
Time remaining is based on the upper bound projection and represents the time remaining before the projected upper bound crosses the usable capacity threshold.

**Aggressive**  
Time remaining is based on the mean projection and represents the time remaining before the projected mean crosses the usable capacity threshold.

**Peak focused**  
Select this option if you want to use only the upper range of the data. The projection will be based on the high utilization points.

Conservativeness Level  
Levels: 3

**Allocation Model**

**⚠ Applying these changes affects all clusters in the policy.**

Set overcommit ratio, to enable Allocation Model

1 CANCEL SAVE

From this pop-up page you can also edit everything related to the policy directly without going into the Configure>policies section.

1. Click **Cancel** to exit

## Summary

[601]

Aria Operations analytics behind rightsizing leverage historical data, statistical models and machine learning to ensure accurate recommendations for **Oversized VMs** (overallocated resources) and **Undersized VMs** (insufficient resources).

We customized the relevant changes in the policies for Rightsizing.

## Conclusion

[602]

Mastering Rightsizing in Aria Operations is essential for efficient resource management and optimization.

With appropriate risk levels and business hours, you unlock your infrastructure's full potential while minimizing risks. Achieve optimal performance by Rightsizing VMs based on Aria Operations' recommendations. Automate Rightsizing for streamlined efficiency and configure Policy Settings with Criticality Thresholds, Risk Level, and Business Hours for effective resource utilization. We looked into:

- Rightsizing VMs based on Aria Operations Recommendations.
- Automation central to Automate Rightsizing
- Configured the Policy Settings with Criticality Thresholds, Risk Level (Conservative vs. Aggressive), and Business Hours

## You've finished Module 12

[603]

Congratulations on completing the lab module.

If you are looking for additional general information on Aria Operations, try one of these:

- VMware Product Public Page - Aria Operations: <https://www.vmware.com/products/aria-operations.html>
- Aria Operations - Documentation: <https://docs.vmware.com/en/VMware-Aria-Operations/index.html>
- Aria Operations - Rightsizing: <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Configuring-Operations/GUID-871D6B56-52AE-49C2-9B64-B36BE2BE8F4F.html>

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the **TABLE OF CONTENTS** to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 13 - Enabling Chargeback for Your Business (30 minutes) Advanced

### Introduction

[605]

In VMware Aria Operations, financial management we are going to focus on the Chargeback mechanism. Key activities include setting up Pricing Rate Cards and utilizing the associated dashboards.

There are two crucial processes in Aria Operations' financial management: Showback and Chargeback.

- **Showback** in Aria Operations gives an overview of the costs involved in operating IT infrastructure, such as the cost to run a VM. It's about the visibility and accountability of the actual expenses incurred in providing these resources. It's the cost to the IT department to provide the services.
- **Chargeback**, on the other hand, is about how much the IT department, as an internal service provider, charges back to the business units (the consumers) for using those resources. It's essentially the "price tag" for the use of IT resources.

Simply put; A report showing the 'cost' can be seen as showback (e.g., the cost to run a VM on the infrastructure), while a report showing the 'price' is chargeback (e.g., what you're charging the consumer for using a VM in your infrastructure).

### Log in to Aria Operations

[606]

We will log in to a live instance of Aria Operations running in this lab.

### Open the Firefox Browser from the Windows Task Bar

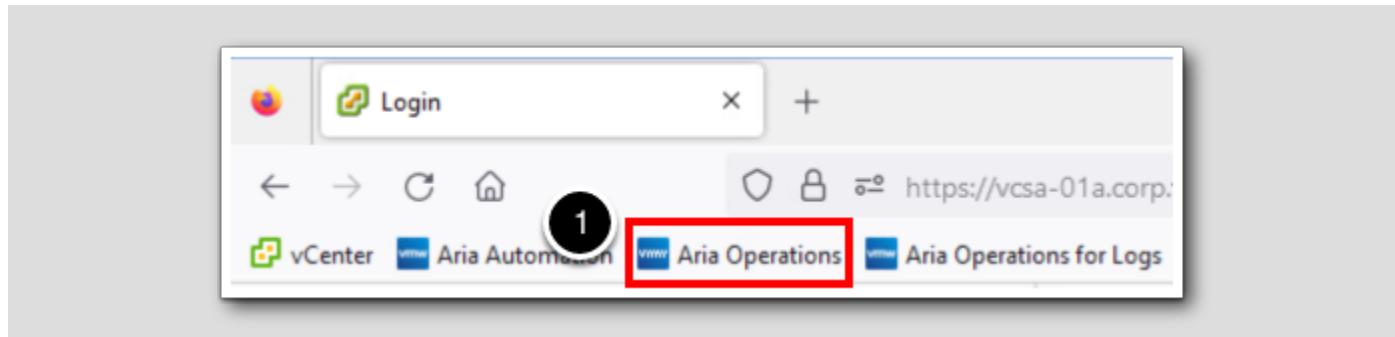
[607]



If the browser is not already open, launch Firefox.

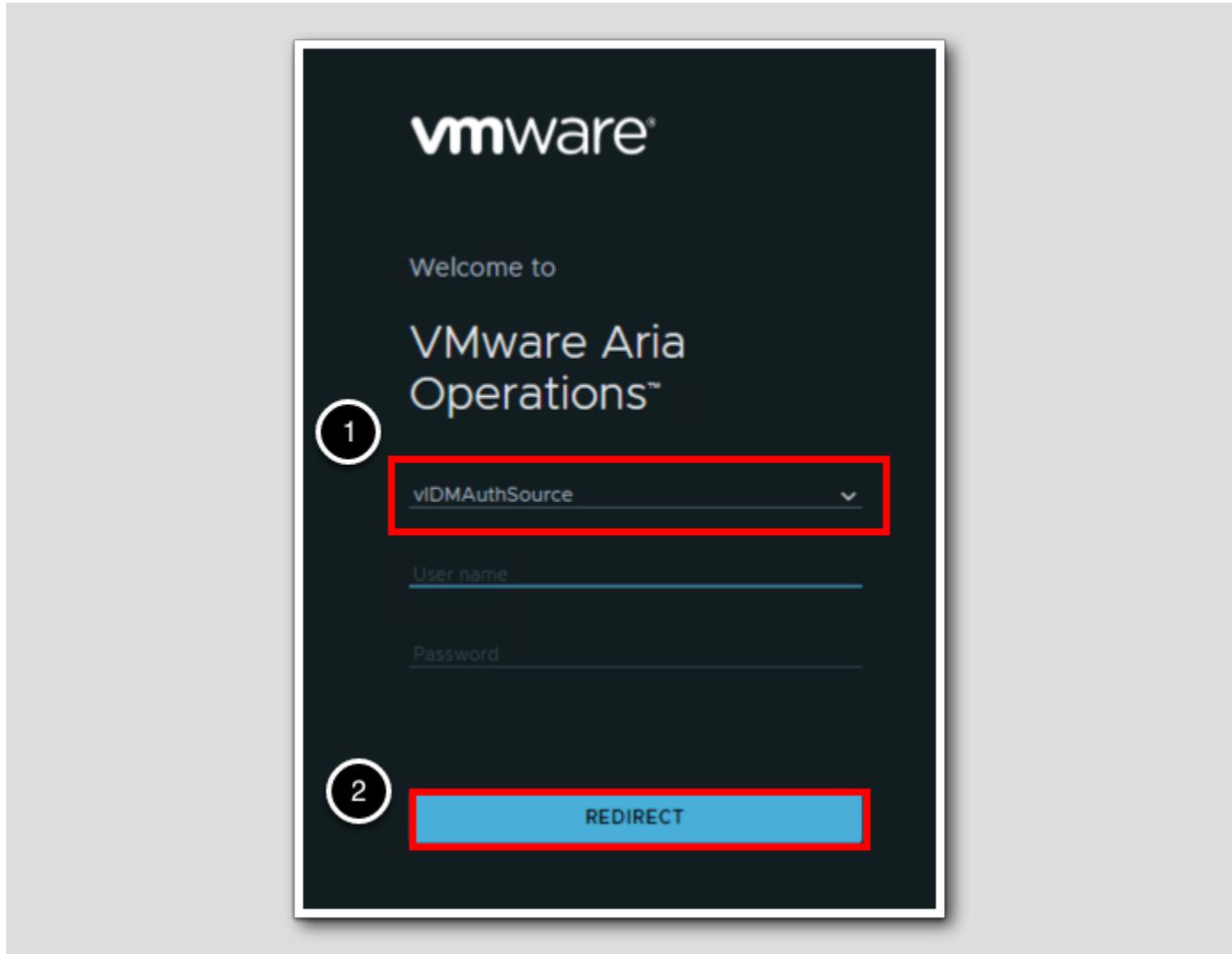
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

## Navigate to Aria Operations



1. Click the **Aria Operations** bookmark in the bookmarks toolbar.

## Log in to Aria Operations



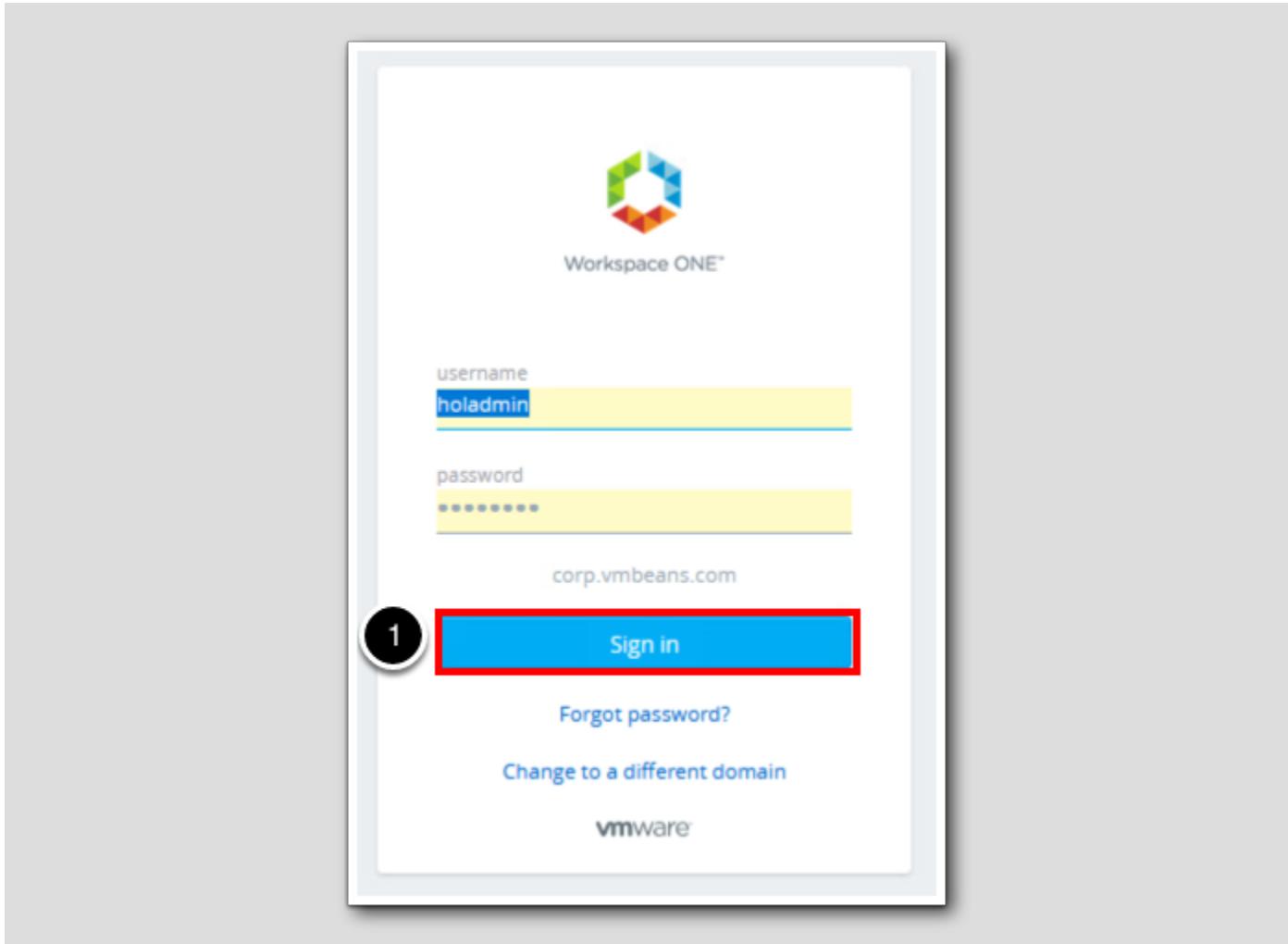
Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

vIDMAuthSource may be pre-selected as the default identity source. If it is not, then you will need to select it.

1. Click the drop-down arrow and select vIDMAuthSource if it is not already selected.

2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login



VMware Identity Manager acts as the identity provider for the Active Directory authentication source in this lab.

Credentials for the default user, holadmin, have already been provided.

1. Click Sign in

## Rate Cards/Pricing

[611]

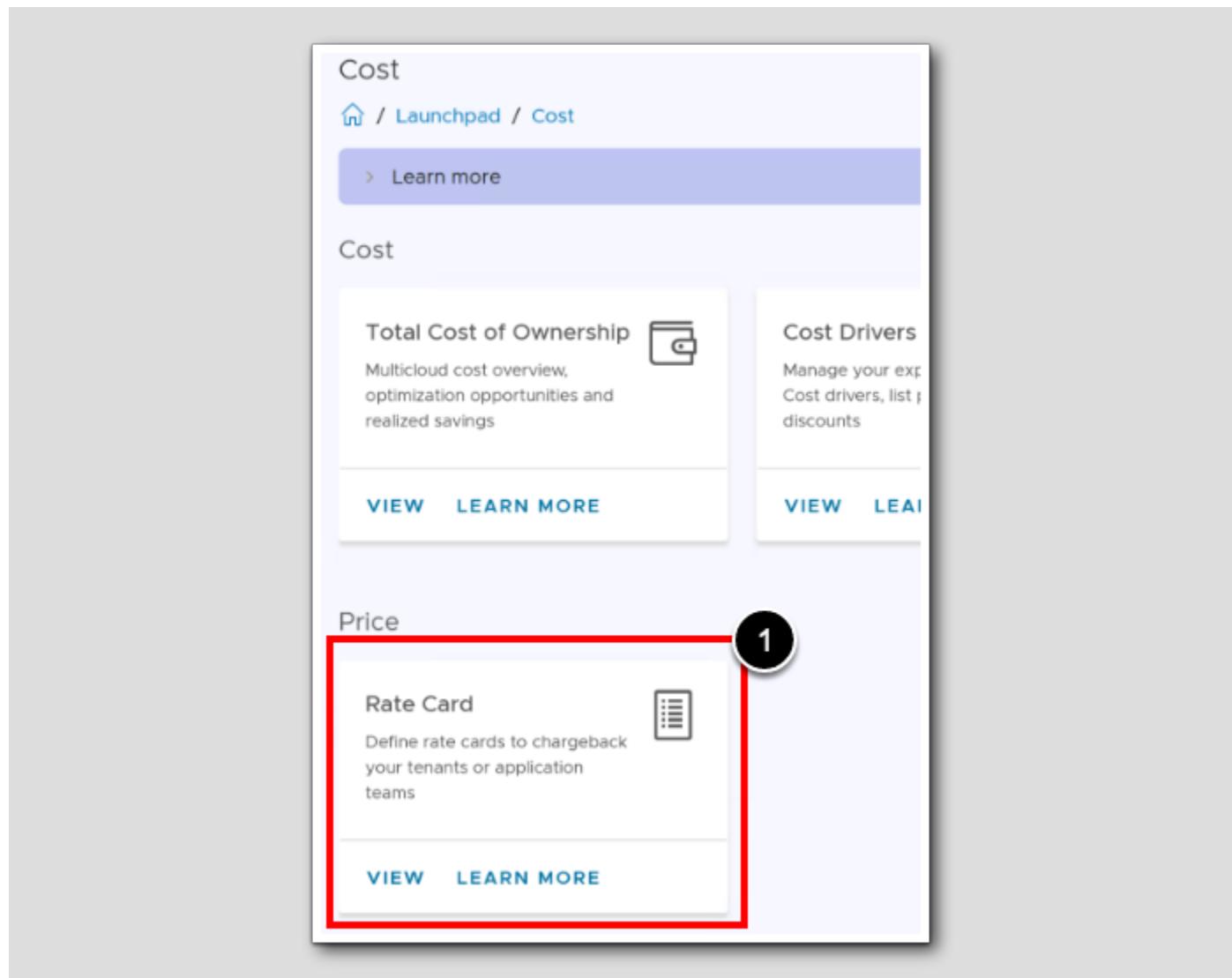
In this segment, we'll focus on the fundamental role of rate cards. Rate cards play a vital part in translating resource usage into actionable costs by assigning financial values to resources. The foundation of our cost data is the real-time metrics collected through continuous monitoring by Aria Operations. To illustrate this process, let's explore how to create a rate card.

Go to price Rate Card

The screenshot shows the VMware Aria Operations interface. At the top left is the 'vmw' logo and 'VMware Aria Operations'. To the right is a search bar with placeholder text 'Search for object or metric and more...'. On the far right are icons for search, refresh, notifications, and user profile. The main navigation bar has a 'Home' button highlighted with a red box and a black circle containing the number '1'. Below the navigation bar, there are links for 'Launchpad' and 'Multi-Cloud Overview'. The central area features a blue banner with the text 'Welcome to VMware Aria Operations'. Below the banner is a section titled 'Pillars of Operations' with three cards: 'Observability' (monitoring), 'Capacity' (assessing and optimizing), and 'Cost' (managing infrastructure cost and price). The 'Cost' card is highlighted with a red box and a black circle containing the number '2'.

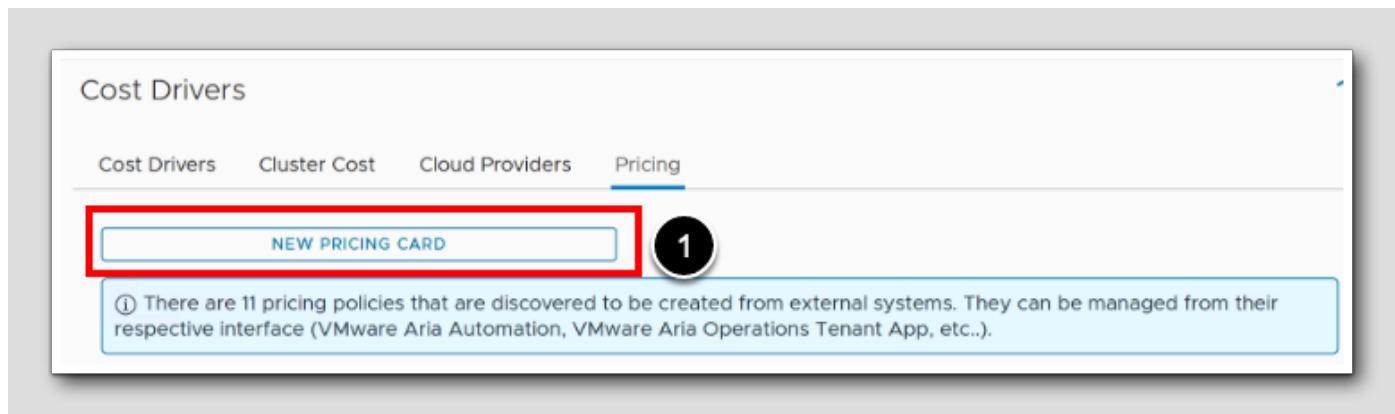
1. Click **Home**.
2. Click **Cost**.

## Price Rate Card



1. On the Cost page under the Price heading, click VIEW on the Rate Card.

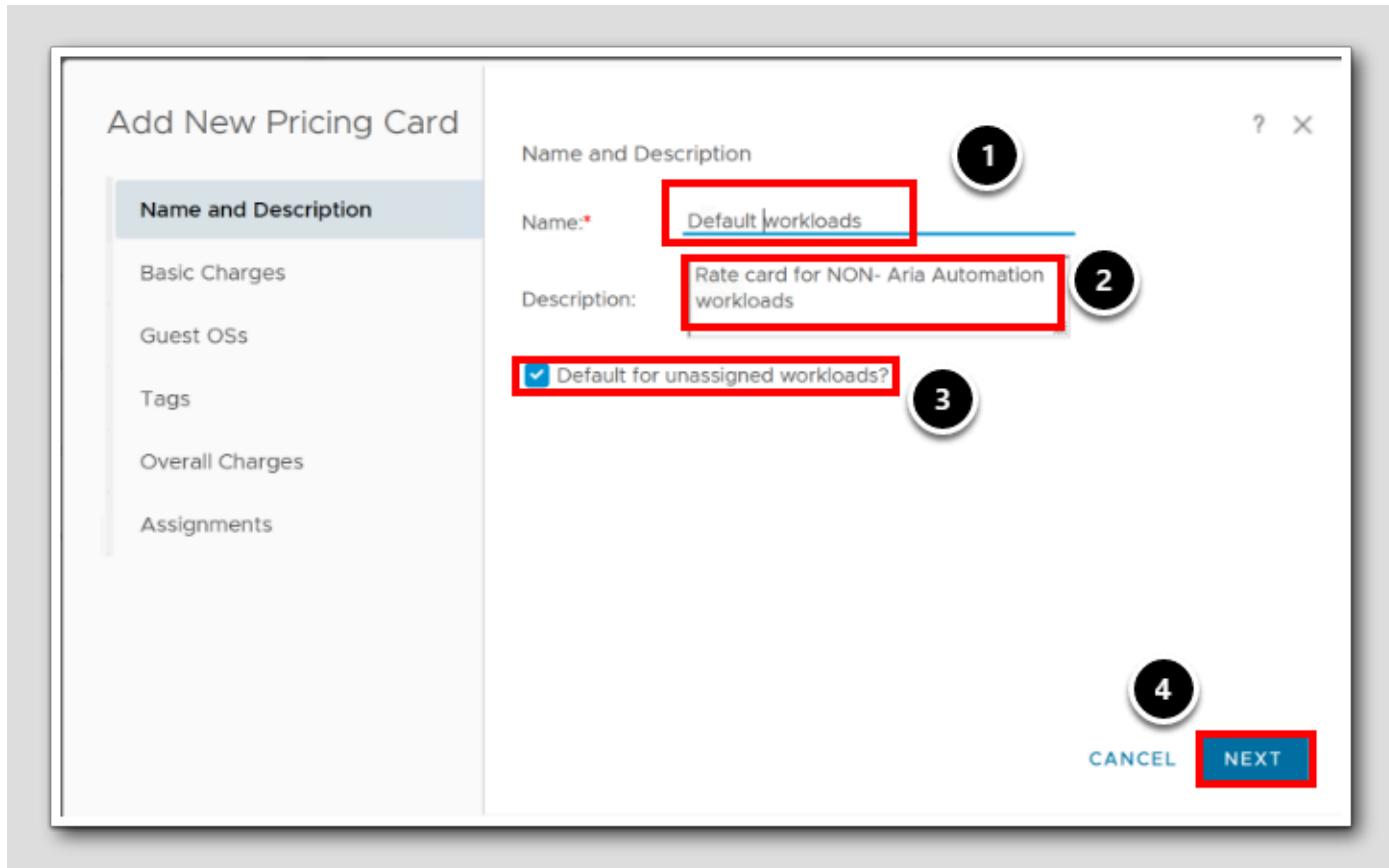
## New Pricing card



A rate card is a document that outlines the pricing structure of the company services we offer. The purpose of a rate card is to provide "clients" or "consumers" with a clear understanding of the costs associated with specific services. By adding a Price Card we can produce a Provider-Price, that will be the Consumer-Cost.

1. To get started, Click **NEW PRICING CARD**.

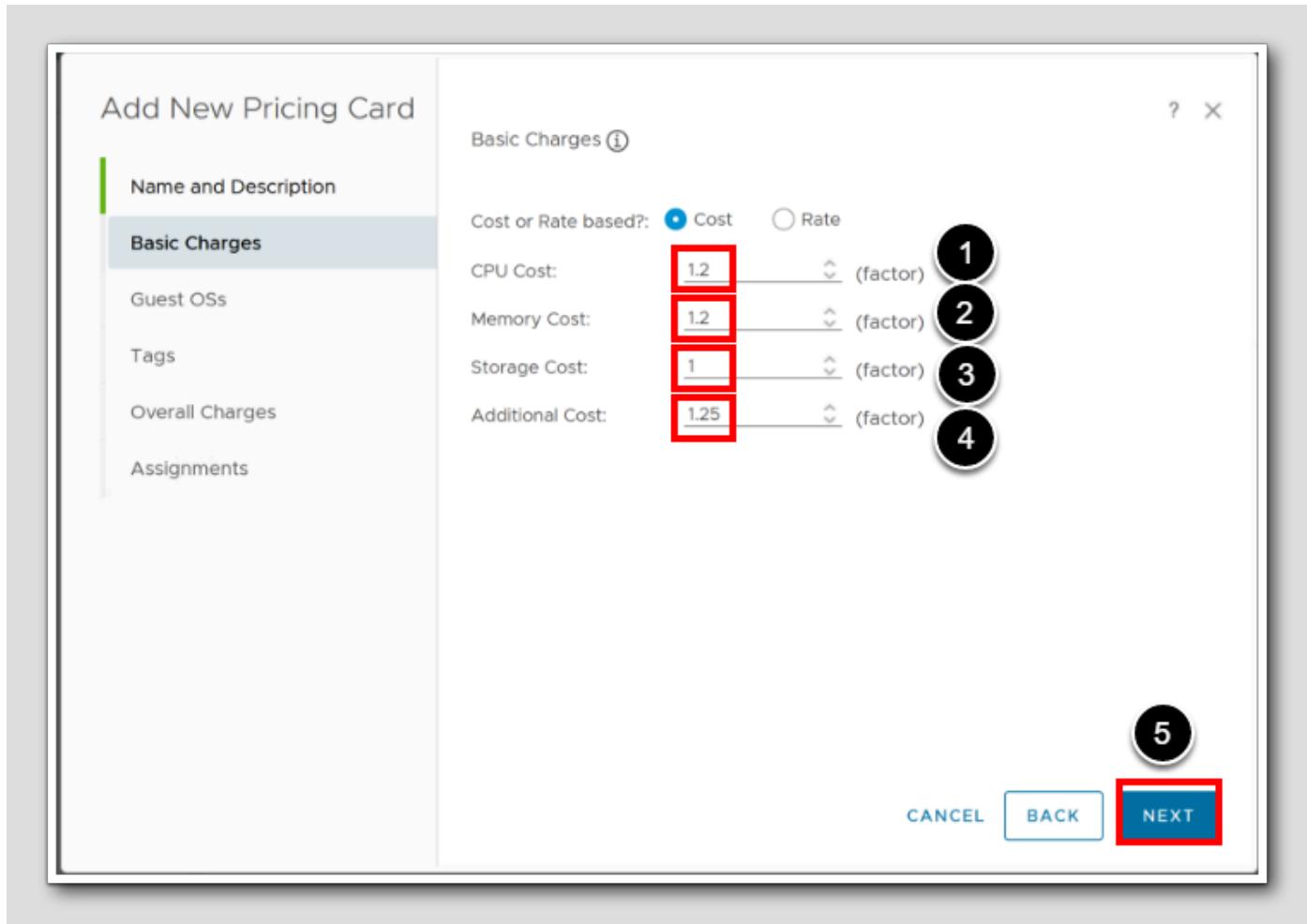
## Pricing, Name and Description



The pricing card can be cost-based or rate-based. We will customize the cost-based pricing card as per our requirement. Then we will assign the pricing card to our vCenter rather than to our Clusters, but maybe companies would have another pricing strategy in real life. This Default pricing card will apply to all vCenter resources which do not have a direct cost policy assigned to them.

1. Enter the Name: **Default Workloads**.
2. Enter a Description: **Rate card for NON- Aria Automation workloads**.
3. Select Default for Unassigned Workloads.
4. Click **Next**.

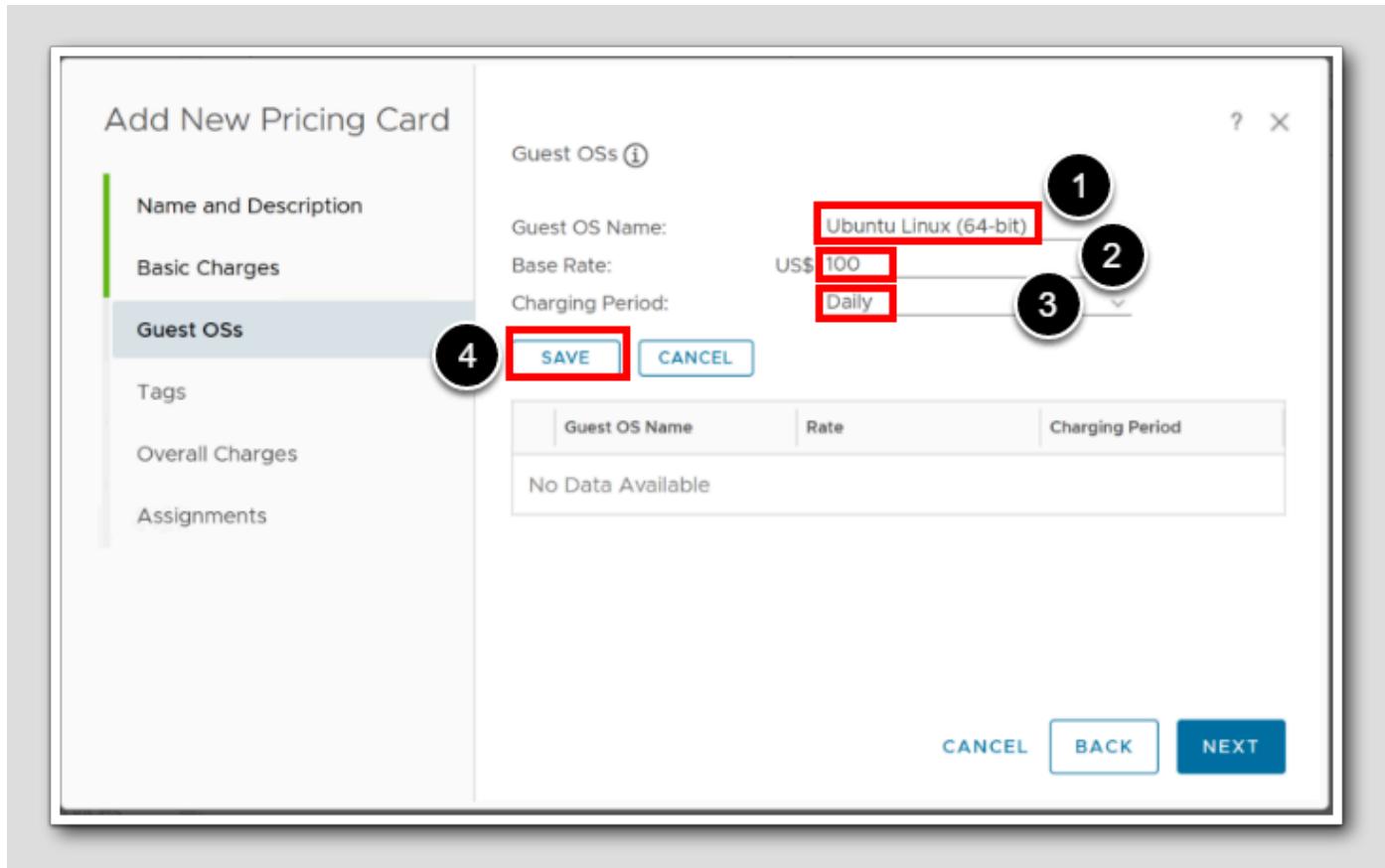
## Pricing, Basic Charges



The factor entered here is multiplied with the cost calculated as a derivative of cost drivers.

1. CPU costs are fair, so we will add a factor: 1.1.
2. Our Company got really high memory costs, so we will add a factor: 1.2.
3. Our storage costs are very low, so we will add a factor: 1.
4. Any Additional Cost, for example a DRaaS (Disaster Recover as a Service) we add a factor: 1.25.
5. Click **Next**.

## Pricing, Adding Linux Expenses

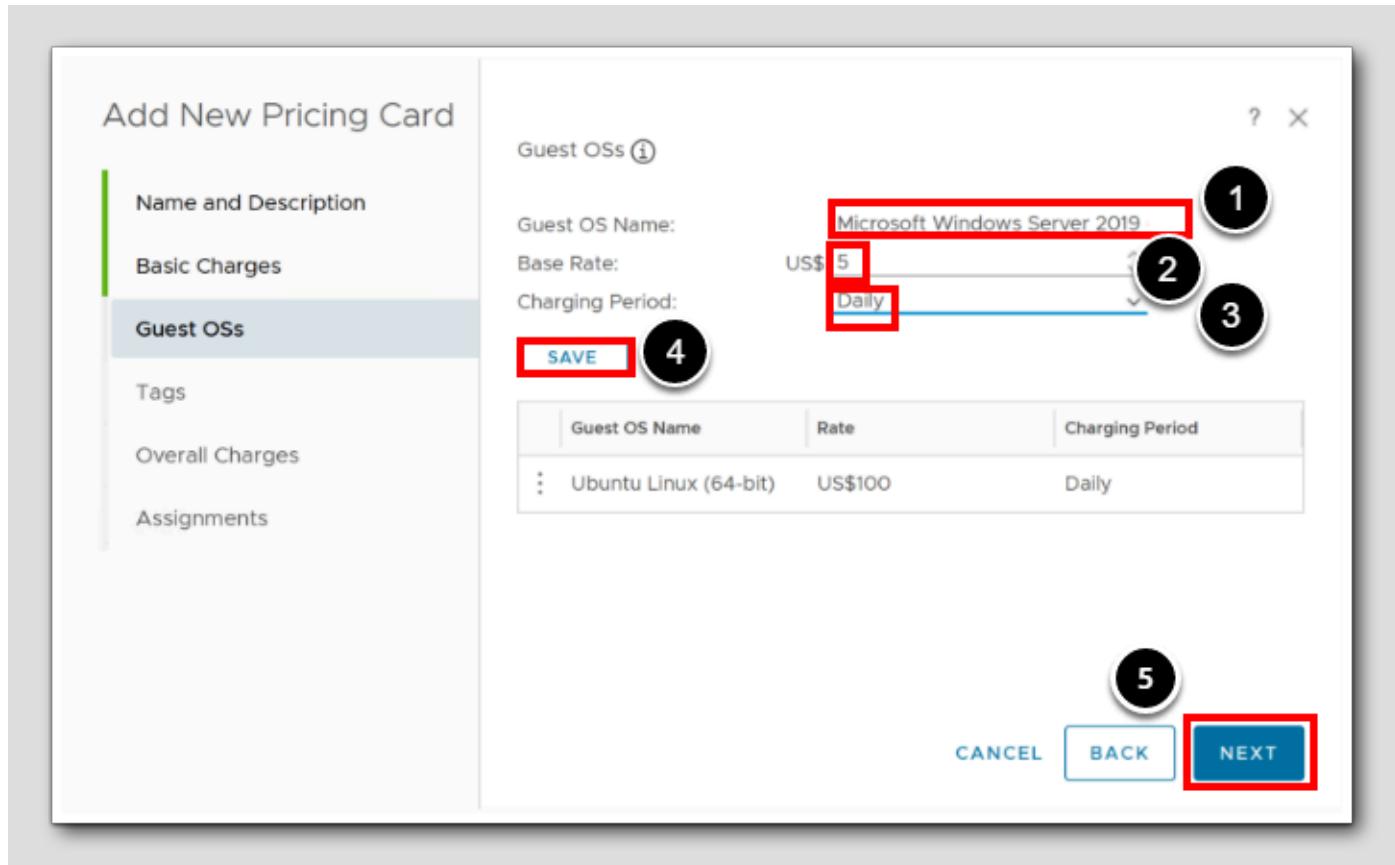


The scarcity of Linux knowledge within our organization results in higher costs associated with Linux expertise due to the need for additional time and resources allocated by our administrators to research and resolve Ubuntu-related issues, resulting in increased expenses (assumed \$100/day)

Currently we have just two OS types, "Microsoft Windows Server 2019 (64-bit)" and "Ubuntu Linux (64-bit)". Note: These are the Names from vCenter, meaning how vCenter perceives the OS names.

1. Enter the exact Guest OS Name **Ubuntu Linux (64-bit)**.
2. Enter Base Rate: **100**.
3. Enter Charging Period: **Daily**.
4. Click **Save**     *[Don't click next yet].*

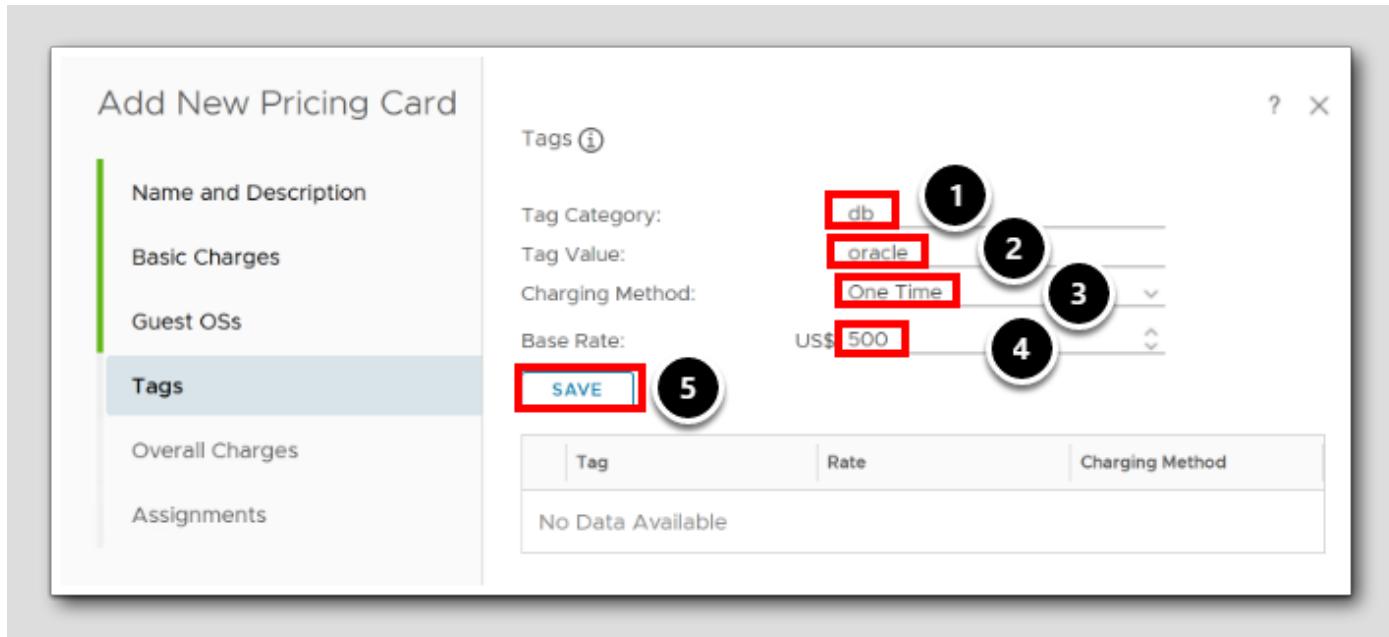
## Pricing, Adding Windows expenses



The abundance of Windows knowledge within our organization results in a rather low costs associated with Windows expertise resulting in lower expenses (assumed to conservative \$5/day)

1. Enter the exact Guest OS Name **Microsoft Windows Server 2019 (64-bit)**.
2. Enter Base Rate: 5.
3. Enter Charging Period: Daily.
4. Click **SAVE**.
5. Click **NEXT**.

## Pricing, Tags

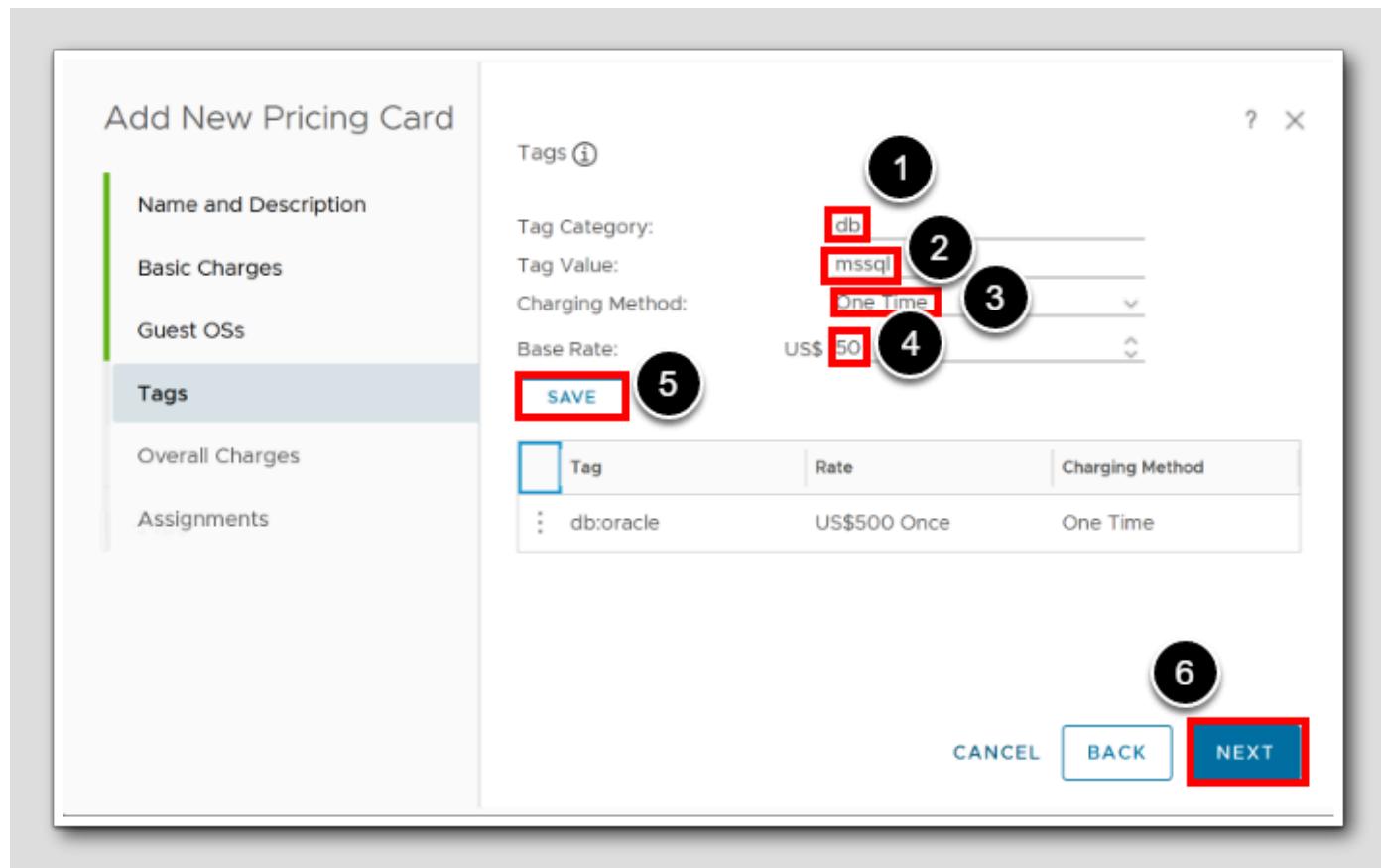


VMs tagged with "oracle" or "mssql" under a tag category "db" is going to indicate that a rather expensive database is running on top of the VM. This is resulting in a higher expense for installation, meaning a one-time expense. For Oracle Databases this expense is \$500 and for Microsoft MS SQL it is \$100.

1. Under Tag Category, Type db.
2. Tag value, type oracle.
3. Charging method, Choose One Time.
4. Base Rate type 500.
5. Click SAVE.

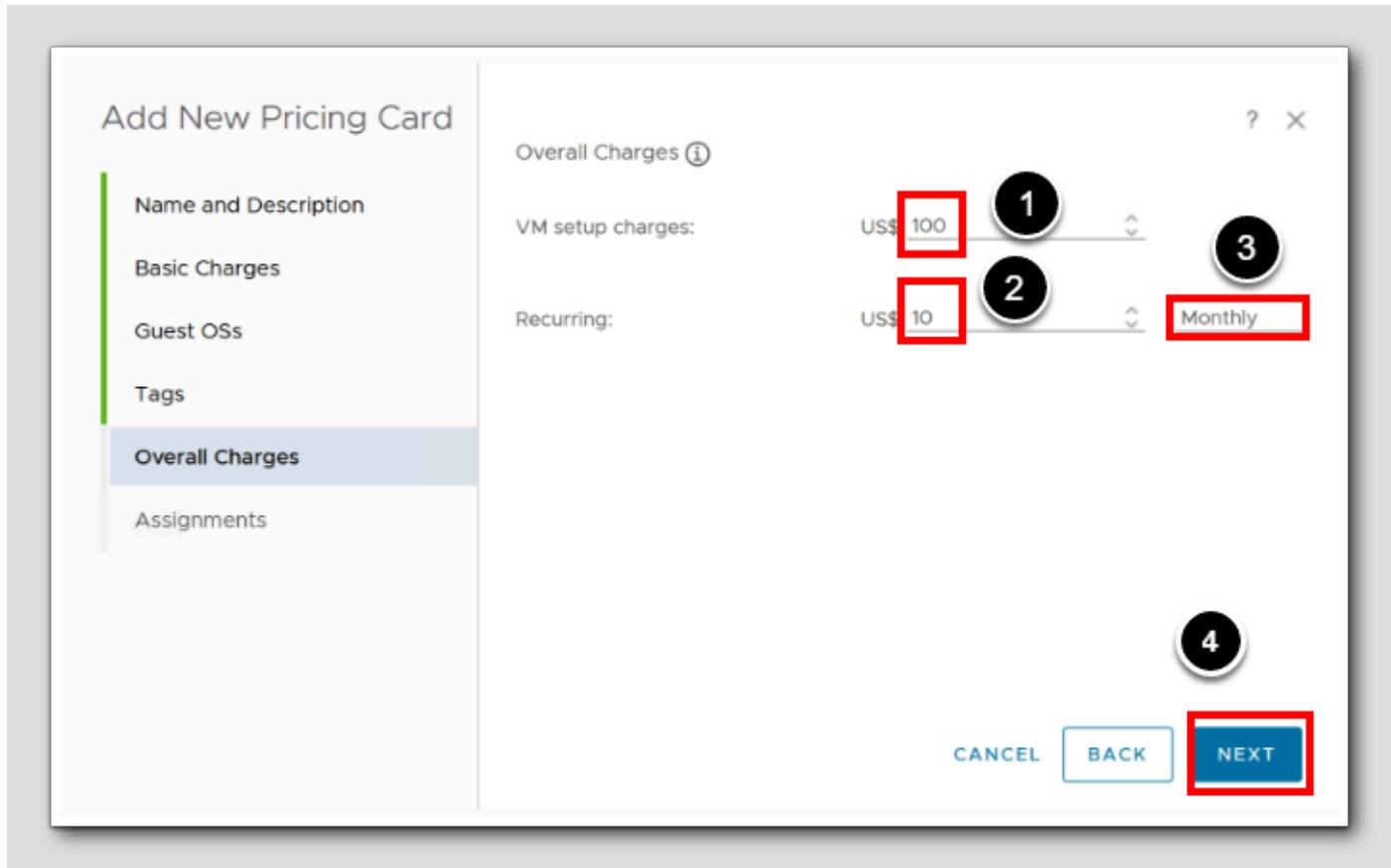
Note: actually no VMs are tagged *db:oracle* or *db:mssql* in vSphere at the moment, but in the future VM's could be tagged in vSphere by the application owners

## Pricing, MSSQL Tag



1. Under Tag Category, Type db.
2. Tag value, type mssql.
3. Charging method, Choose One Time.
4. Base rate type 50.
5. Click SAVE.
6. Click NEXT.

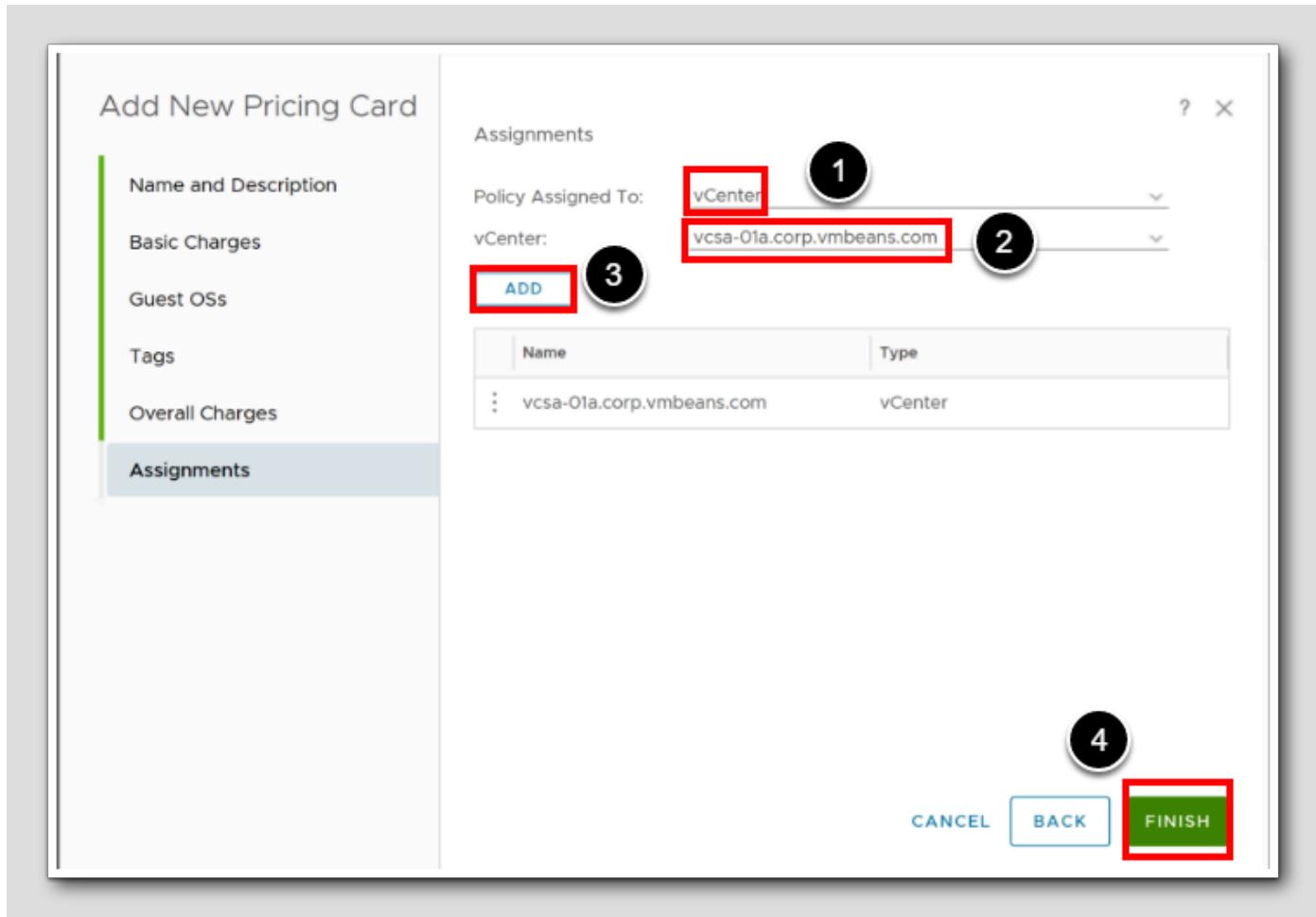
## Pricing, flat charges



These Overall Charges are flat charges that are applied to all VMs that match this policy. We charge \$100 extra to set up a VM, and a little extra \$10 monthly.

1. Under VM Setup charges, type 100.
- 2.Under Recurring type 10.
- 3.Choose Montly.
- 4.Click Next.

## Pricing, Assignments



Almost Done! We can assign the new pricing card to vCenters or Clusters. We will assign our pricing to *anything* in our vCenter.

1. Under Policy Assigned to, select vCenter.
2. Select the vCenter we want to apply the pricing card vcsa-01a.corp.vmbeans.com.
3. Click ADD.
4. Click FINISH.

## Pricing Card Result

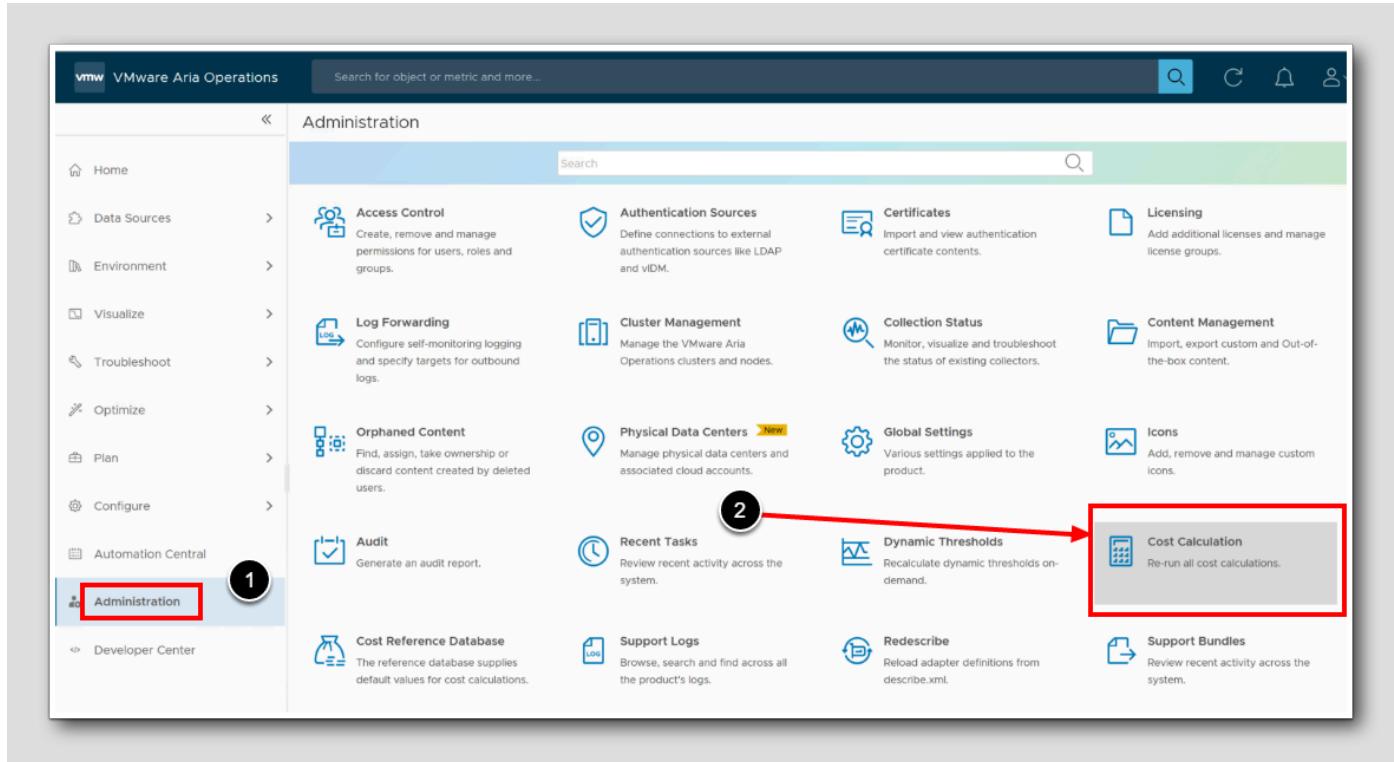
The screenshot shows the 'Cost Drivers' section of the VMware Aria Operations interface. The 'Pricing' tab is selected. A blue box highlights a note: '① There are 16 pricing policies that are discovered to be created from external systems. They can be managed from their respective interface (VMware Aria Automation, VMware Aria Operations Tenant App, etc.).'. Below this note is a table for a 'Default Workloads (Default)' card. The table contains three rows: 'Description' (Rate card for NON- Ar...), 'Workloads' (1), and 'Policy' (Cost Based). At the bottom of the card are 'EDIT' and 'DELETE' buttons. A red arrow points from the explanatory text in the blue box to the 'Default Workloads (Default)' card.

Default Workloads (Default)	
Description	Rate card for NON- Ar...
Workloads	1
Policy	Cost Based

**EDIT** **DELETE**

Notice that there are pricing policies other than our policy coming from workloads deployed by Aria Automation. These Pricing cards or Rate cards for those workloads are all handled by Aria Automation. We did just set up one that will be working for anything else.

## Cost Calculation



When we do changes in pricing, it is necessary to run a new manual cost calculation to see the impact of changes immediately, rather than waiting for the next automatic calculation cycle.

1. Click Administration.
2. Click Cost Calculation.

## Running a manual Cost Calculation

The screenshot shows the 'Cost Calculation' page. At the top left is the breadcrumb navigation: Home / Administration / Cost Calculation. Below it, the title 'Cost Calculation' is displayed. On the left, there's a 'RUN' button with a red border and a circled '1' above it, indicating one pending task. A progress bar shows '0%' completion. To the right, the status is listed as 'Calculation: Completed' with 'Start time: 7/11/23 2:00 PM' and 'Finish time: 7/11/23 2:13 PM'. It also states 'Calculation completed on 1 out of 1 DCs (failed 0)' and 'Next calculation planned for: 7/12/23 2:00 PM'.

1. To run a new manual Cost Calculation, Click RUN.

## Cost calculation results

The screenshot shows the 'Cost Calculation' page. At the top left is the breadcrumb navigation: Home / Administration / Cost Calculation. Below it, the title 'Cost Calculation' is displayed. On the left, there's a 'RUN' button and a refresh button with a red border and a circled '1' above it, indicating one pending task. A progress bar shows '53%' completion with a yellow highlight. To the right, the status is listed as 'Calculation: In Progress' with 'Start time: 7/12/23 7:17 AM' and 'Finish time: -'. It also states 'Calculation completed on 0 out of 1'.

1. To refresh the progress of the calculation, click the refresh button on top.

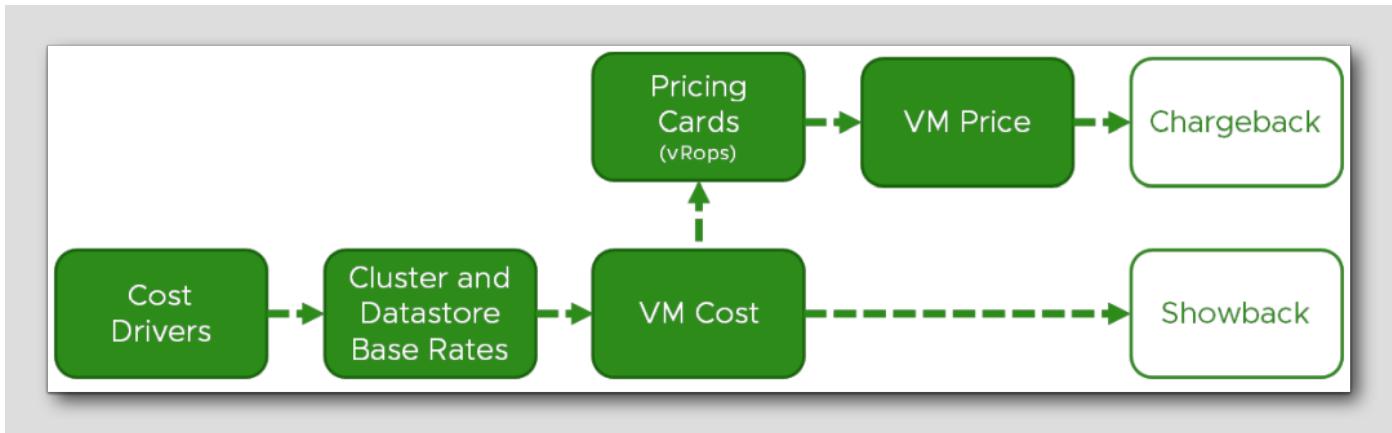
Note: You don't have to wait for it to finish.

## Chargeback

Quantifying costs and implementing showback practices are vital in cloud-based IT environments. Let's have a look.

- From the Cost page, under the Showback/Chargeback heading, Click Chargeback

## Price and Chargeback



Accurately determining prices and implementing chargeback processes are crucial for billing customers based on their virtual machine (VM) usage, including any additional fees or upcharges. This promotes transparency and enables customers to understand the costs associated with their services.

**Price:** Price represents the amount charged to customers for utilizing a VM. The price of a VM most often differ from its actual operational costs, as additional charges or profit margins (upcharge) is included. Price considerations are specific to VMs, and customers are typically billed on a monthly basis.

**Chargeback:** Involves generating a bill for customers based on the determined price for their VM usage. The bill should include a breakdown of the charges associated with each VM, reflecting the price per month. Chargeback aims to provide customers with an accurate representation of the costs incurred for their VMs and promotes transparency in billing practices.

## Go to Cost

The screenshot shows the VMware Aria Operations Home page. On the left, there's a sidebar with links: Home, Data Sources, Environment, Visualize, Troubleshoot (with a red dot), and Optimize. The main area has a blue header bar with the text "Welcome to VMware Aria Operations". Below it, there are three cards: "Observability" (monitoring full-stack observability), "Capacity" (assessing, monitoring, and optimizing capacity across environments), and "Cost" (managing, planning, and optimizing infrastructure cost and price). A red box highlights the "Cost" card, which is circled with the number "1".

1. From the Home page Click Cost

## Start Chargeback

The screenshot shows the VMware Launchpad interface, specifically the 'Cost' section. It includes:

- Cost**: A top-level category.
- Total Cost of Ownership**: Multicloud cost overview, optimization opportunities and realized savings. Includes **VIEW** and **LEARN MORE** buttons.
- Cost Drivers**: Manage your expenses using Cost drivers, list prices and discounts. Includes **VIEW** and **LEARN MORE** buttons.
- Cost Analysis**: Analyse cost and price metrics for your objects, groups, applications, tenants etc. Includes **VIEW** and **LEARN MORE** buttons.
- Cost Optimization**: Get quantified Cost op recommendations and savings. Includes **VIEW** and **LEARN MORE** buttons.
- Price**: A category.
- Rate Card**: Define rate cards to chargeback your tenants or application teams. Includes **VIEW** and **LEARN MORE** buttons.
- Showback/Chargeback**: A category.
- Showback - Virtual Machine Cost**: Includes **VIEW** and **LEARN MORE** buttons.
- Showback - Container Cost**: Includes **VIEW** and **LEARN MORE** buttons.
- Chargeback**: This option is highlighted with a red box and a circled '1' above it. It includes **VIEW** and **LEARN MORE** buttons.
- ROI Analysis**: Includes **VIEW** and **LEARN MORE** buttons.

## Finding Chargeback (VM Price)

[631]

The screenshot shows the VMware Aria Operations interface. The left sidebar contains the following navigation items:

- Home
- Data Sources
- Environment
- Visualize
  - Dashboards
  - Views
  - Reports
- Troubleshoot
- Optimize
- Plan
- Configure
- Automation Central
- Administration

The "Dashboards" item under "Visualize" is currently selected, highlighted in blue. The main content area displays a list of dashboards:

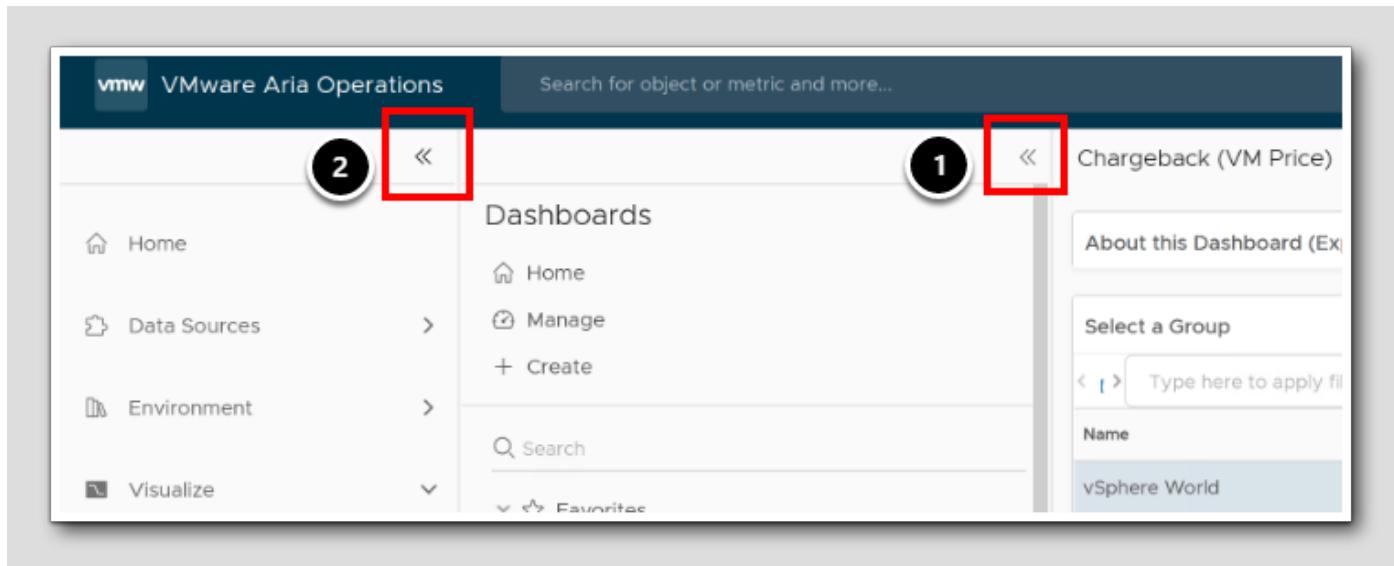
- Home
- Manage
- Create
- Search
- Favorites
  - Recents
    - Chargeback (VM Price) (highlighted in yellow)
  - All
    - Availability
    - Capacity
    - Cloud Management Assessment
    - Configuration
    - Cost
      - Consumer Layer
        - Chargeback (VM Price) (highlighted in green)
        - Showback (VM Cost)
        - Showback (vSphere Pod Cost) (highlighted in yellow)
      - Cost Optimization
      - Provider Layer
      - Dashboard Library

For a later reference, to start the dashboard *Chargeback (VM Price)*, navigate through the dashboard menu by clicking Visualize>Dashboards>All>Cost>Consumer Layer> Chargeback (VM Price) as shown highlighted in the navigator in the picture. Note: As soon as the dashboard is accessed, it is added to the *Recents* list for easy access, as highlighted.

Also notice the other Consumer Layer Cost dashboards, and that we have a Provider Layer.

Make room for viewing

[632]



To fully utilize the screen, let's get rid of the navigators, so we can do a full detailed walk-through of the Chargeback dashboard.

1. To Collapse the Dashboards navigator on the outer side Click on <<
2. To Collapse the Aria Operations Navigator, on the inner side Click on <<

## Selecting the group

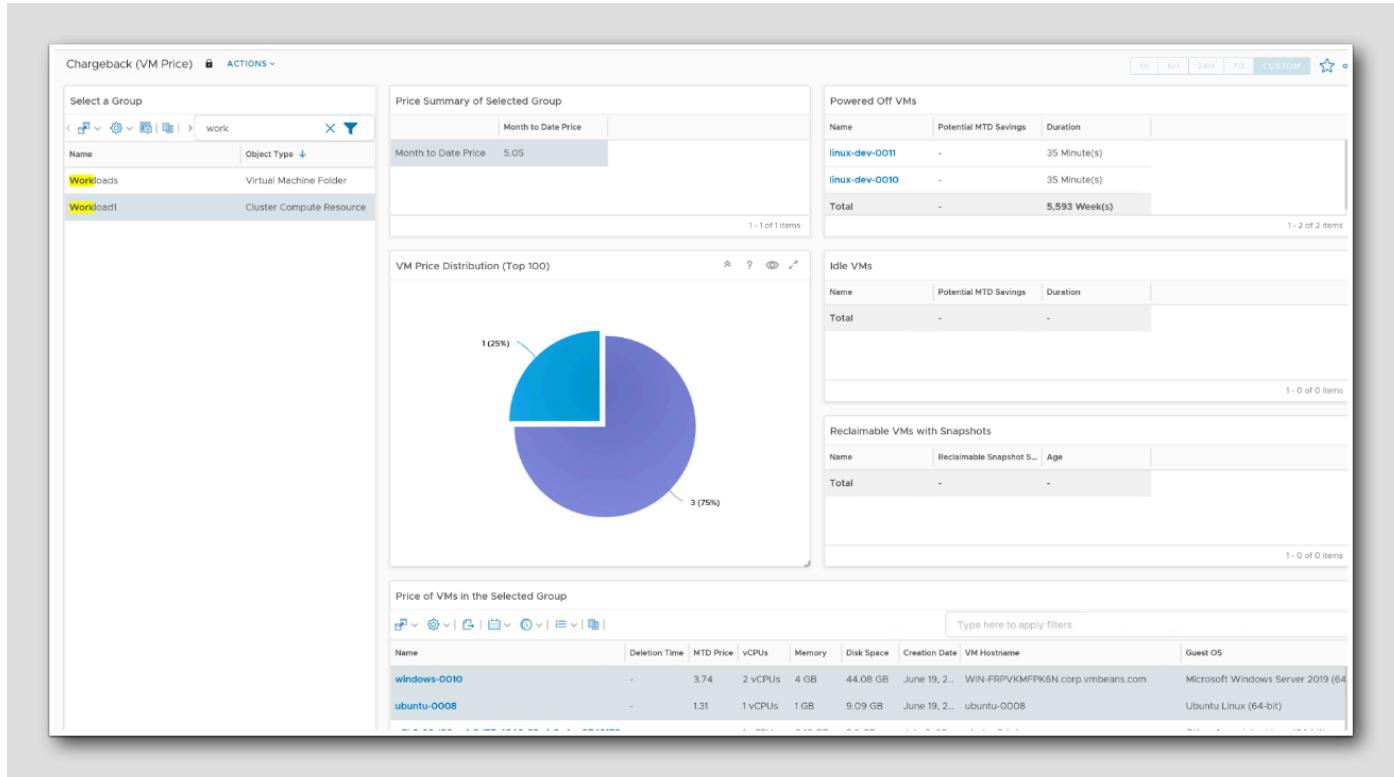
The screenshot shows the 'Chargeback (VM Price)' dashboard. At the top, there's a search bar labeled 'Select a Group' with a placeholder 'work'. Below the search bar is a table with two columns: 'Name' and 'Object Type'. The first row shows 'Workloads' as the name and 'Virtual Machine Folder' as the object type. The second row, which is highlighted with a red box and circled with a black number 2, shows 'Workload1' as the name and 'Cluster Compute Resource' as the object type.

We will ignore our management cluster, and only select the workload cluster. This is the cluster containing the VMs that we will use for pricing and charge the consumer for.

1. In the Chargeback (VM Price) dashboard, under Select a Group, in the search field **type work** and press **ENTER**
2. Select **Workload1**

In Aria Operations you can use the *Custom Groups* to find vSphere Objects, such as departments or business units via Tags or names, and make these groups show up on this selection list. Then the price of hardware, software, services and shared services would be applied to the business unit in which they are used, making departments or business units responsible for their usage.

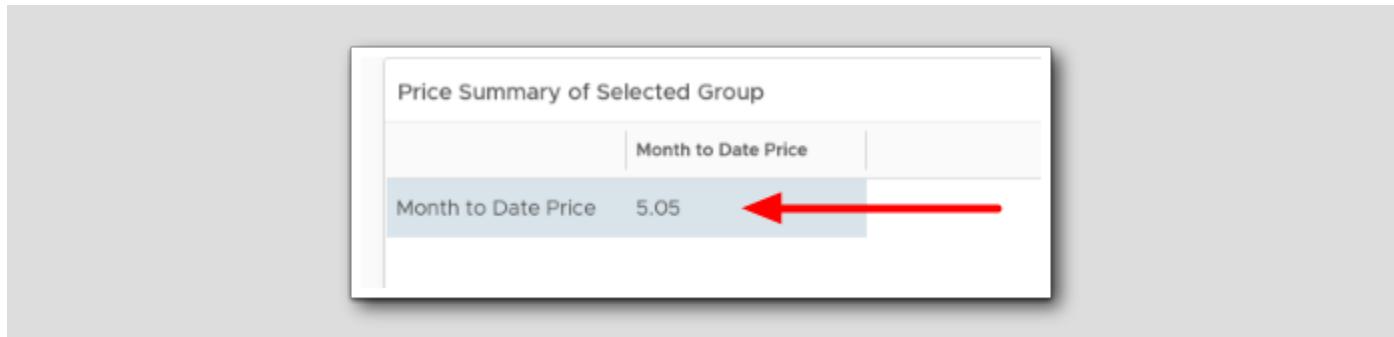
## Chargeback (VM Price) - Dashboard Overview



The chargeback VM price dashboard lets you know how much you must spend to run a VM on behalf of your customer. In Aria Operations, we configure the **cost** drivers and let the system automatically determine how much a VM costs based on your infrastructure requirement. Cost Drivers cover server hardware, storage, licenses, application, maintenance, labor, network, facilities, and additional costs configured within Aria Operations. See the previous [Costing and Cost Drivers](#).

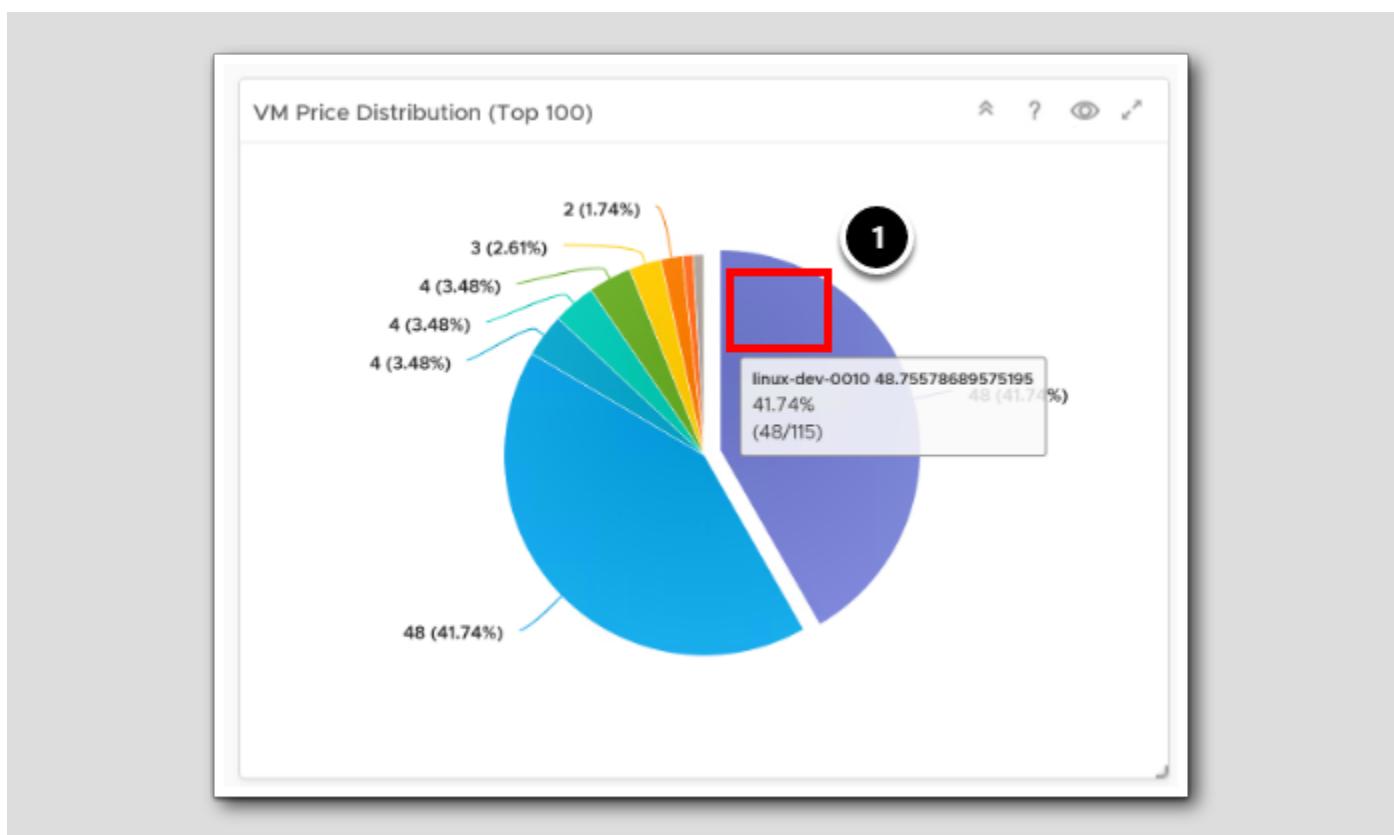
Price is what you charge your customer for running their VM. The price of a VM can be based on the cost of the VM or based on a rate card that you define. See the previous [Rate Cards/Pricing](#). Prices can include up charges, service charges, and others.

## Month to date price



Price Summary of Selected Group shows the month to date price of the group. Month-to-date (MTD) Price calculates the price from the time from the first day of the current month to the last completed business day before the current date not including the current date.

## Price distribution



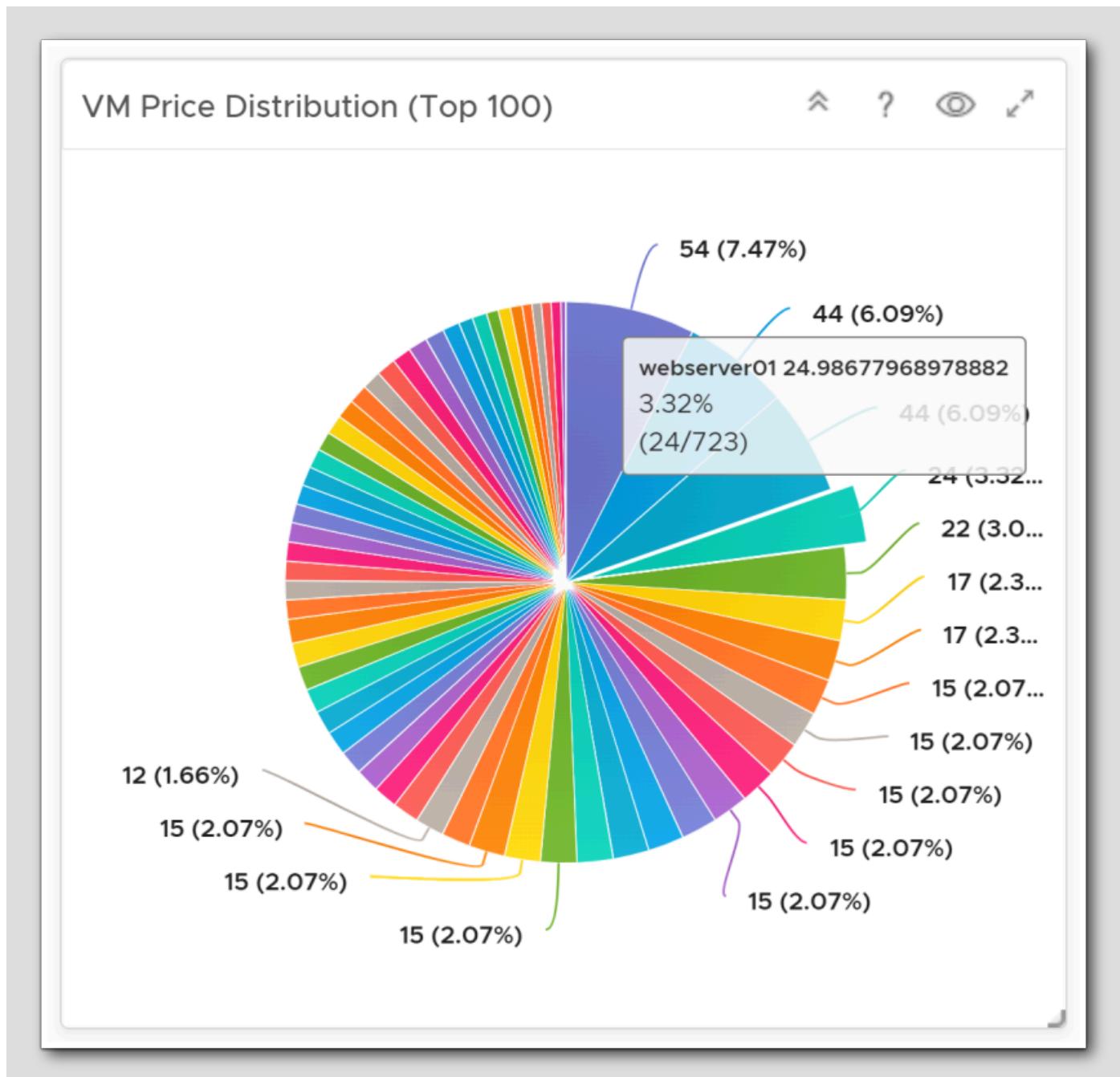
VM Price Distribution (Top 100) shows the most expensive VMs in the group we have selected (Workload1). To Single out or identify expensive servers we can click on the pie chart on the larger slices to reveal the price percentage.

1. Click one of the larger slices in the pie chart

As expected, this server runs on Linux. Recall our previous adjustments to the Pricing Rate Cards, particularly when we factored in the Linux-related expenses in [\*Pricing, Adding Linux Expenses\*](#)

**Note:** The data in the Lab we see here, will differ a lot depending on how long the environment have been running. We will probably just have few values compared to what we see in the figure or in real life environments, since less servers have been online. Don't worry if your data does not show the same as the image. In your own environment there will probably be more serious values.

## Price distribution, practical example



Based on a **real life practical example**, we've found that our third largest priced server is a Web server, representing 3.32% of the total pricing structure. This serves as a starting point for further inquiries. We aim to determine why this specific server from our consumer perspective has such a cost. Is the provider's charge excessive? Does the server genuinely consume 3.32% of resources, leading to the elevated cost, which then impacts the price?".

Probing a server's price/cost is fundamental for delivering and receiving optimal value for both provider and consumer.

- **Efficiency:** Assuring provider costs match the value of the service.
- **Resource Allocation:** Optimizing what the provider offers and the consumer receives.
- **Transparency:** A clear billing strengthens the trust between provider and consumer.
- **Insights:** Highlighting areas for improvements.
- **Strategy:** Inform about the future provider decisions.

## Reclaimable resources

The screenshot shows the VMware vSphere Client interface with three main sections:

- Powered Off VMs:** Shows a single entry for "Total" with zero savings and duration.
- Idle VMs:** Shows one VM named "ubuntu-0008" with 1.64 potential MTD savings over 10 hours. It also shows a total entry for "ubuntu-0008" with 1.64 savings over 1 ms.
- Reclaimable VMs with Snapshots:** Shows a single entry for "Total" with zero reclaimable snapshot savings and age.

- Powered Off VMs shows reclaimable VMs and their potential savings.
- Idle VMs shows reclaimable VMs and their potential savings.
- VMs with Snapshots shows reclaimable snapshots and their age.

## Price of VMs, Overview

The screenshot shows a table titled "Price of VMs in the Selected Group". The table has columns: Name, Deletion Time, MTD Price, vCPUs, Memory, Disk Space, and Creation Date. The data includes six rows of VM configurations and their associated costs. A red arrow points from a circled '1' to the maximize button in the top right corner of the window frame.

Name	Deletion Time	MTD Price	vCPUs	Memory	Disk Space	Creation Date
linux-dev-0010	-	48.76	-	1 GB	9.84 GB	July 6, 2023 at 5:23:4
linux-dev-0011	-	48.73	-	1 GB	9.84 GB	July 6, 2023 at 5:24:2
SupervisorControlPlaneVM (1)	-	4.86	2 vCPUs	8 GB	40.08 GB	July 6, 2023 at 3:00:1
windows-0010	-	4.68	2 vCPUs	4 GB	44.08 GB	June 19, 2023 at 5:14:
SupervisorControlPlaneVM (3)	-	4.1	2 vCPUs	8 GB	40.08 GB	July 6, 2023 at 3:00:1
SupervisorControlPlaneVM (2)	-	3.48	2 vCPUs	8 GB	40.08 GB	July 6, 2023 at 3:00:1

1 - 12 of 12 items

If we scroll all the way to the bottom of the page, we will see the the price and configuration of each VM in the selected group.

1. Click the Maximize button

## Price of VMs, details

The screenshot shows a table titled "Price of VMs in the Selected Group". The columns include Name, Deletion Time, MTD Price (sorted by descending price), vCPUs, Memory, Disk Space, Creation Date, VM Hostname, and Guest OS. The MTD Price column is highlighted with a red box and a circled '1'. The minimize button in the top right corner is also highlighted with a red box and a circled '2'.

Name	Deletion Time	MTD Price	vCPUs	Memory	Disk Space	Creation Date	VM Hostname	Guest OS
linux-dev-0010	-	48.76	-	1 GB	9.84 GB	July 6, 2023 ...	base-linux-cli	Ubuntu Linux (64-bit)
linux-dev-0011	-	48.73	-	1 GB	9.84 GB	July 6, 2023 ...	base-linux-cli	Ubuntu Linux (64-bit)
SupervisorControlPlaneVM (1)	-	4.86	2 vCPUs	8 GB	40.08 GB	July 6, 2023 ...	421f08c67b623c...	VMware Photon OS (64-bit)
windows-0010	-	4.68	2 vCPUs	4 GB	44.08 GB	June 19, 202...	WIN-FRPVKMFP...	Microsoft Windows Server 2019 (64-bit)
SupervisorControlPlaneVM (3)	-	4.1	2 vCPUs	8 GB	40.08 GB	July 6, 2023 ...	421fae39289e15f...	VMware Photon OS (64-bit)
SupervisorControlPlaneVM (2)	-	3.48	2 vCPUs	8 GB	40.08 GB	July 6, 2023 ...	421f4b3350973d...	VMware Photon OS (64-bit)
dev-project-rz5gx-4tgb2	-	2.65	2 vCPUs	4 GB	24.08 GB	July 6, 2023 ...	dev-project-rz5g...	VMware Photon OS (64-bit)
dev-project-worker-libmm-5b97766579-...	-	1.81	2 vCPUs	4 GB	24.08 GB	July 6, 2023 ...	dev-project-work...	VMware Photon OS (64-bit)
ubuntu-0008	-	1.64	1 vCPUs	1 GB	9.09 GB	June 19, 202...	ubuntu-0008	Ubuntu Linux (64-bit)
vCLS-9d0469c2-2397-4492-b03a-0c88...	-	0.51	1 vCPUs	0.12 GB	2.2 GB	July 6, 2023 ...	photon3-hdcs	Other 4.x or later Linux (64-bit)
vCLS-60d30ce4-2d77-4340-83c4-8a4ce...	-	0.51	1 vCPUs	0.12 GB	2.2 GB	July 6, 2023 ...	photon3-hdcs	Other 4.x or later Linux (64-bit)
vCLS-7deae903-8442-4a11-b44d-daf6e0...	-	0.51	1 vCPUs	0.12 GB	2.2 GB	July 6, 2023 ...	photon3-hdcs	Other 4.x or later Linux (64-bit)
Total	-	122.24	16 vCPUs	39.38 GB	247.87 GB	-	-	-

1. To sort on the Month to date price, click once or twice on the column header **MTD Price**

*The arrow should point down, showing a descending sort from highest to lowest MTD Price*

2. To get back to the Chargeback main dashboard, click the minimize button

**Note:** The lab data varies based on the environment's runtime. You might see fewer or other values here than in actual scenarios due to fewer or more active VMs. Don't be concerned if your data differs from the provided image; real-world environments typically show more substantial values.

## Price of VMs, practical example

Price of VMs in the Selected Group					
Name	Deletion Time	MTD Price ↑	vCPUs	Memory	Disk Space
sc2-nested-nas	-	435.05	2 vCPUs	16 GB	2,108.78 GB
nsx-us-intelligence	-	495.48	16 vCPUs	64 GB	3,824.5 GB
nsx-intelligence-em...	-	511.35	16 vCPUs	64 GB	3,824.44 GB
nsx-intelligence-pks	-	511.35	16 vCPUs	64 GB	1,912.11 GB
vrNI-FieldDemo-Pla...	-	620.75	-	64 GB	6,144.63 GB
vrNI-FieldDemo-Pla...	-	621.45	-	64 GB	6,144.79 GB
vrNI-FieldDemo-Pla...	-	621.91	-	64 GB	6,208.71 GB
sc2-backup-proxy01	-	655.54	4 vCPUs	24 GB	3,112.06 GB
share	-	658.24	4 vCPUs	16 GB	3,228.65 GB
wdc-backup-proxy01	-	1,427.74	4 vCPUs	24 GB	7,386.2 GB
Total	-	90,670.64	5,951 vCPUs	20,544.59 GB	479,881.07 GB

In this real-world scenario, we identified a server named "share" with fewer vCPUs and RAM than another production servers. This difference raises questions about its higher cost despite having fewer allocated resources. Investigating server costs ensures both provider and consumer get maximum value. The higher cost might come from what the provider offers compared to what the customer gets, and it could mean that the "share" server might have special charges (eg. for services) on its **pricing card**. Again, transparency is important for the trust between the provider and consumer.

Observe the total price as well as the aggregate values for vCPUs, Memory, and disk space utilized.

## Closing Comments

When we set up Pricing Rate Cards, the price is reflected in our Chargeback dashboard.

By utilizing the Chargeback dashboard we gain comprehensive insights into the Price breakdown, potential savings related to each of the VMs, and we might raise questions about price vs. allocated resources or why certain servers costs more due to different pricing defined in our pricing cards.

## Conclusion

Upon completing this module, we've enriched our technical understanding of VMware Aria Operations, particularly its use of Chargeback to foster financial transparency and clarity. This knowledge could guide us in shaping a more conscious IT ecosystem inspired with responsibility and accountability. We've come to understand that Chargeback is a process of translating 'costs' into 'prices' for the resources used by different business units. Ultimately, it boils down to cost transparency (Showback) and price accountability (Chargeback).

## You've finished Module 13

Congratulations on completing the lab module. If you are looking for additional information on Aria Operations, try one of these:

- **VMware Product Public Page - Aria Operations:** <https://www.vmware.com/products/aria-operations.html>
- **Aria Operations - Documentation:** <https://docs.vmware.com/en/VMware-Aria-Operations/index.html>
- **Best Practices:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Best-Practices.pdf>
- **Architecture Guide:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Reference-Architecture-Operations.pdf>
- **Aria Operations 8.12 Release Notes:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/rn/vmware-aria-operations-812-release-notes/index.html>
- **Analysis of Price Metrics:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Configuring-Operations/GUID-253E7142-A50A-47A1-B389-99063454ABD3.html?hWord=N4IghgNiBcIMIAswCcDmBTARmAxgaxAF8g>
- **Consumer Layer:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Configuring-Operations/GUID-667D0E19-9CC9-48CC-A44A-0A0C1AB59500.html?hWord=N4IghgNiBcIMIAswCcDmBTARmAxgaxAF8g>
- **Chargeback VM Price Dashboard:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Configuring-Operations/GUID-020468AF-8884-4B9B-9ED1-6DE1BCC946AD.html>

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the TABLE OF CONTENTS to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 14 - Plan for Your Future Capacity Needs (30 minutes) Intermediate

### Introduction

[646]

#### Optimize Capacity with a What-If Scenario

A scenario is a situational model to determine a detailed estimation of the resources we must have available in the environment to incorporate upcoming changes. We define scenarios that can potentially add resources to actual data centers. Aria Operations models the scenario and calculates whether the desired workload can fit in the targeted data center. We can save multiple scenarios for comparison or review.

Using the **What-If** tool, we can plan for an increase or decrease in workload or capacity requirements in the virtual infrastructure. To evaluate the demand and supply for capacity on the system objects, and to assess the potential risk to the current capacity, we can create scenarios for adding and removing workloads. We can also determine how much capacity is required to make a migration work. We can run one scenario or group scenarios and run them cumulatively.

### Log in to Aria Operations

[647]

We will log in to a live instance of Aria Operations running in this lab.

### Open the Firefox Browser from the Windows Task Bar

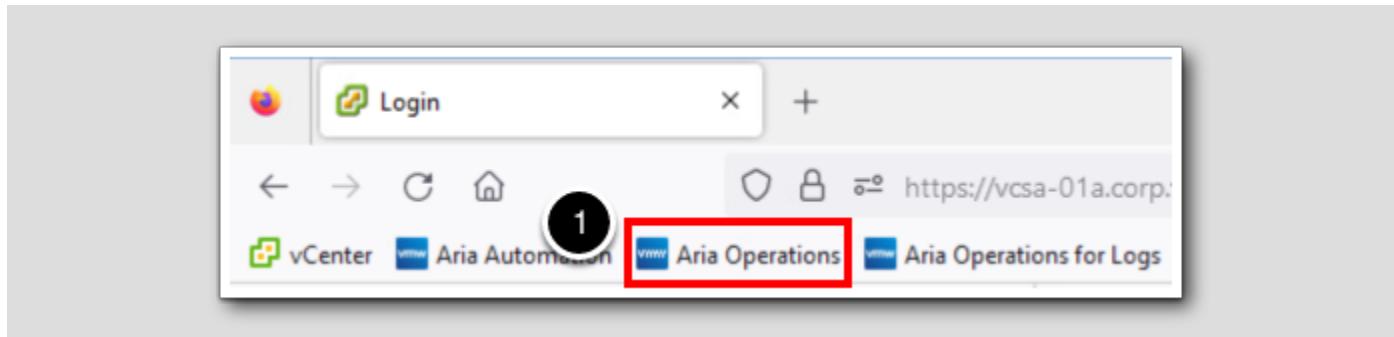
[648]



If the browser is not already open, launch Firefox.

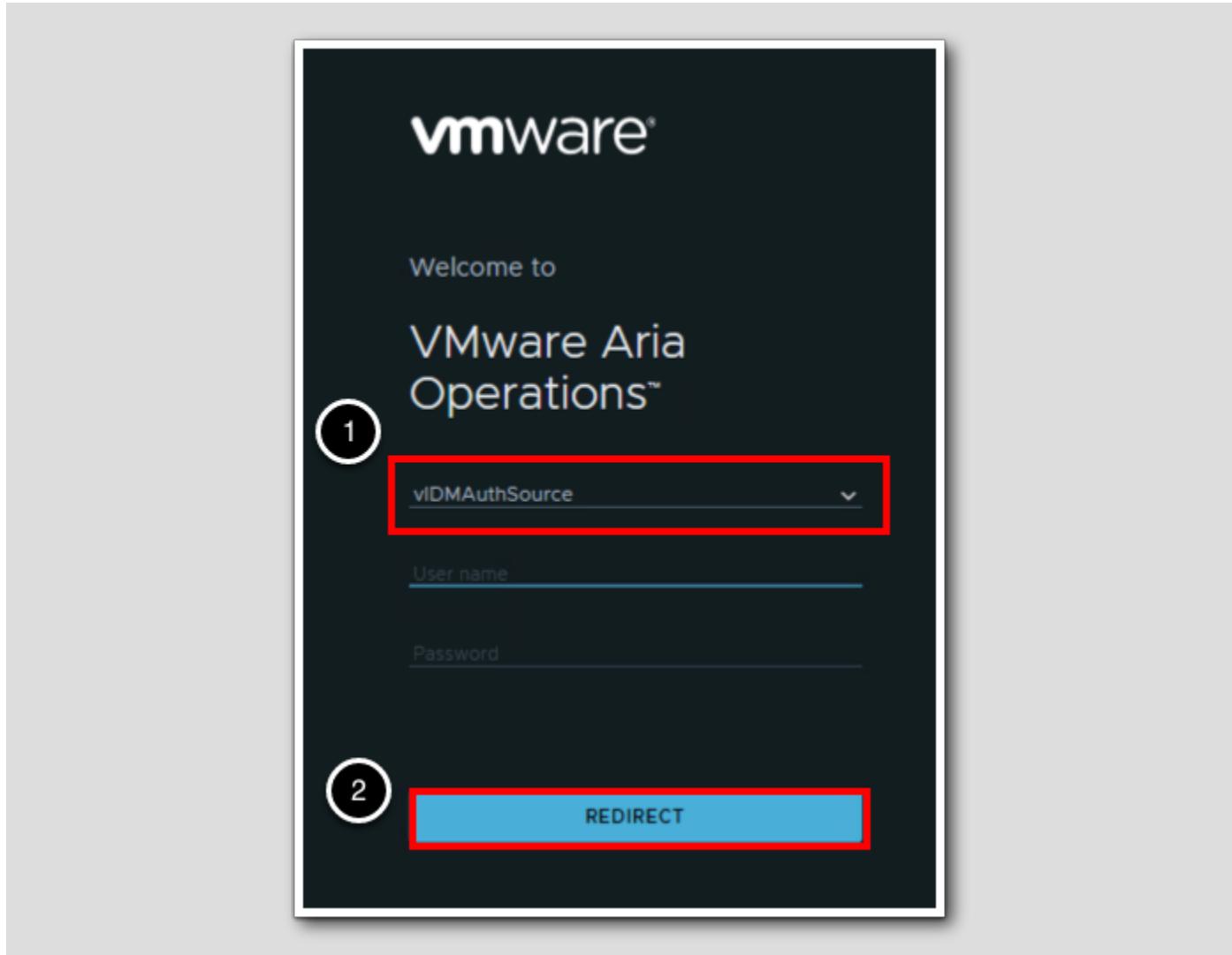
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

## Navigate to Aria Operations



1. Click the **Aria Operations** bookmark in the bookmarks toolbar.

## Log in to Aria Operations

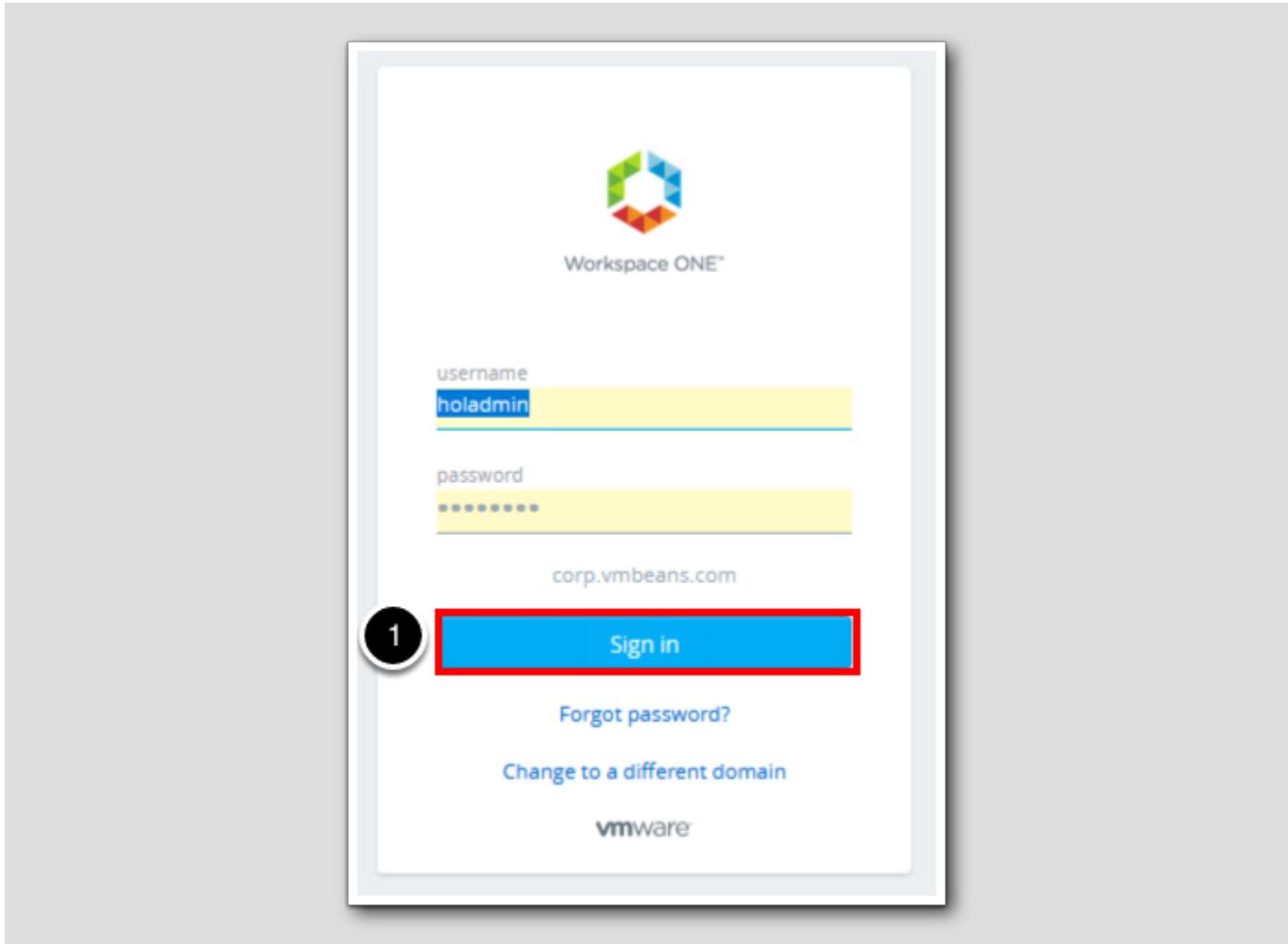


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

vIDMAuthSource may be pre-selected as the default identity source. If it is not, then you will need to select it.

1. Click the drop-down arrow and select vIDMAuthSource if it is not already selected.
2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login



VMware Identity Manager acts as the identity provider for the Active Directory authentication source in this lab.

Credentials for the default user, holadmin, have already been provided.

1. Click Sign in

## Optimize Capacity with What-If Scenarios and Costs

[652]

Let's take a look at the What-If analysis in Aria Operations.

Since **Memory** is going to be a problem, let's add a couple of additional hosts to the **Hosts for Remote Site** scenario.

3. Scroll back up to the top

4. Scroll back up to the top, Click X

The screenshot shows the 'What-If Analysis' interface with the 'Saved Scenarios' tab selected (marked with a circled '1'). The 'Hosts for Remote Site' scenario is highlighted with a red box (marked with a circled '2'). The table below lists two scenarios:

Scenario Name	Scenario Type	Datacenter	Cluster	Date Created	Start Date	End Date
<input checked="" type="checkbox"/> Hosts for Remote Site	Add Hosts	RegionA01 (vcsa-01a.corp.vmbeans.com)	Workload1	Jun 18, 2023	Jun 19, 2023	Jun 18, 2024
<input type="checkbox"/> New Application	Add VMs	RegionA01 (vcsa-01a.corp.vmbeans.com)	Workload1	Jun 18, 2023	Jul 18, 2023	Oct 18, 2023

We need to add another host to the Remote Site due to the Memory bottleneck and rerun the multiple scenario

1. Click Saved Scenarios

2. Left of *Hosts for Remote site*, Click the 3-dotted "hamburger icon" and choose Edit

The screenshot shows the 'What-If Analysis' interface with the 'Saved Scenarios' tab selected (marked with a circled '2'). Both scenarios are selected (marked with circled '1'). The 'RUN' button is highlighted with a red box (marked with a circled '2').

1. Back in the What-If Analysis *Saved Scenarios*, Select both scenarios by clicking the header check box

2. Click RUN

Make note of the Total Cost: This shows the cost of running the hosts to our Private Cloud for a year based on default industry costing populated in Aria Operations. The default costs in Aria Operations can be adjusted to our company's actual purchase costs. Don't close the window just yet.

NOTE: Keep in mind, images may differ due to our Lab environment.

The screenshot shows the 'What-If Analysis' interface. At the top, there is a navigation bar with 'Capacity Plan / What-If Analysis'. Below it, there are two tabs: 'New' and 'Saved Scenarios', with 'Saved Scenarios' being the active tab (indicated by a red box and a circled '1'). There are also 'RUN' and '...' buttons. A search bar says 'Type here to apply filters'. The main area displays a table of saved scenarios:

Scenario Name	Scenario Type	Datacenter	Cluster	Date Created	Start Date	End Date
<input checked="" type="checkbox"/> Hosts for Remote Site	Add Hosts	RegionA01 (vcsa-01a.corp.vmbeans.com)	Workload1	Jun 18, 2023	Jun 19, 2023	Jun 18, 2024
<input type="checkbox"/> New Application	Add VMs	RegionA01 (vcsa-01a.corp.vmbeans.com)	Workload1	Jun 18, 2023	Jul 18, 2023	Oct 18, 2023

This screenshot is identical to the one above, showing the 'What-If Analysis' interface with the 'Saved Scenarios' tab selected. However, the 'RUN' button is now highlighted with a red box and circled with a black circle containing the number '2', indicating the next step in the process.

## The What-If Analysis

The screenshot shows the VMware Aria Operations web interface. The left sidebar has a 'Home' button (1) highlighted with a red box. Below it is a 'Plan' button (2) also highlighted with a red box. Under 'Plan', there is a 'Capacity' button (3) highlighted with a red box. The main content area is titled 'Capacity Plan' (4). It features a 'What-If Analysis' section with a description: 'Create Scenarios to check if you can potentially add/remove infrastructure resources or VM'. To the right is a 'Committed Scenarios' section with a 'New' badge.

1. Click Home
2. Click Plan
3. Click Capacity
4. Click What-If Analysis

## What-If Analysis Overview Tab

**Workload Planning: Traditional**

Setup a scenario to 'deploy applications' by adding new workload or 'deprecate applications' by removing existing workload. You can also evaluate the impact of 'reclaiming inefficient workload' by using remove workload scenario.

**Workload Planning: Hyperconverged**

Plan for 'future workload' to be deployed in VMC on AWS or vSAN environment with VMs associated with specific storage policy related factors (such as FTT, RAID), to evaluate if the usable capacity can cater to workload to be deployed. You can also evaluate the impact of 'reclaiming inefficient workload' on vSAN cluster by using remove VMs scenario.

**Infrastructure Planning: Traditional**

Determine the impact of adding or removing specific capacity in your environment. If you are planning to upgrade the hosts in a cluster, setup a stacked scenario to 'Refresh hardware' with combination of remove existing capacity from cluster and add new capacity to cluster.

**Infrastructure Planning: Hyperconverged**

Determine the impact of adding specific hyperconverged capacity in your vSAN environment. You can plan to add new vSAN ready nodes to your vSAN cluster to evaluate the impact of increase in HCI capacity.

**Migration Planning: VMware Cloud**

Evaluate the possibility of moving workloads and compare capacity and cost across different VMware clouds.

**Migration Planning: Public Cloud**

Evaluate the possibility of moving workloads across different public clouds. You can compare capacity and cost of workload across vSphere, AWS, Azure, GCP, IBM Cloud by default or any cloud provider of choice by uploading the rate card as prerequisite.

**Datacenter Comparison: Private Cloud**

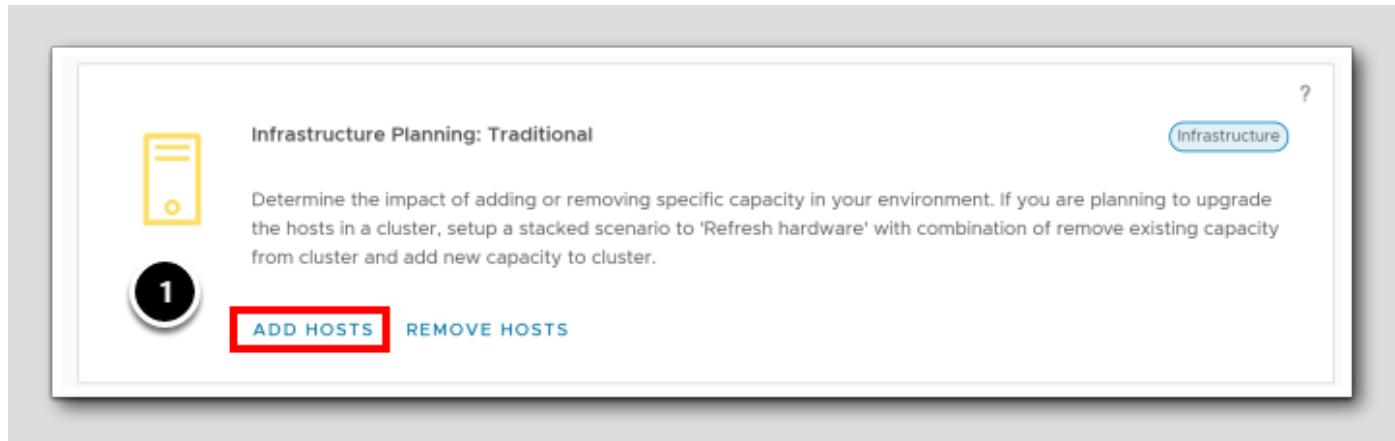
Evaluate the possibility of moving workload across different datacenters and clusters in your private cloud. You can

The Overview tab of the What-If analysis page has the following panes.

Each pane lets us run What-If scenarios to optimize capacity based on workload, physical infrastructure, HCI nodes, or migration to the cloud.

- **Workload Planning: Traditional** - Setup a scenario to 'deploy applications' by adding new workloads or 'deprecate applications' by removing existing workloads. We can also evaluate the impact of 'reclaiming inefficient workloads' by using the remove workload scenario.
- **Infrastructure Planning: Traditional** - Determine the impact of adding or removing specific capacity in our environment. If we're planning to upgrade the hosts in a cluster, setup a stacked scenario to 'Refresh hardware' with combination of remove existing capacity from cluster and add new capacity to cluster.
- **Migration Planning: VMware Cloud** - Evaluate the possibility of moving workloads and compare capacity and cost across different VMware clouds. We can compare capacity and cost of workload across VMware Cloud for AWS(Amazon Web Services), AVS(Azure VMware Solution), GCVE(Google Compute VMware Engine), VMware Cloud on Dell EMC, and OCVS (Oracle Cloud VMware Solution)
- **Datacenter Comparison: Private Cloud** - Evaluate the possibility of moving workloads across different datacenters and clusters in the private cloud. We can compare cost of workloads across various datacenters so as to optimize and decide best fitting datacenter for the workload under consideration.
- **Workload Planning: Hyperconverged** - Plan for 'future workloads' to be deployed on vSAN environment with virtual machines associated with specific storage policy related factors, such as Failures to Tolerate (FTT) and RAID level, to evaluate if the usable capacity can cater to workloads to be deployed. We can also evaluate the impact of 'reclaiming inefficient workloads' on vSAN cluster by using remove virtual machines scenario.
- **Infrastructure Planning: Hyperconverged Infrastructure** - Determine the impact of adding or removing specific hyperconverged capacity to the vSAN environment. We can plan to add new vSAN ready nodes to the vSAN cluster to evaluate the impact of increase in HCI capacity.
- **Migration Planning: Public Cloud Migration** - Evaluate the possibility of moving workloads across different public clouds. We can compare capacity and cost of workloads across vSphere, AWS, Azure, GCP, IBM Cloud by default or any cloud provider of choice by uploading the rate card as prerequisite.

## What-If Analysis - Infrastructure Planning: Traditional



Infrastructure Planning for traditional environments enables us to forecast successfully the impact of adding capacity to the environment or removing capacity from the environment. By trying various scenarios, we can arrive at an optimum configuration. Once we select the **Infrastructure Planning: Traditional** pane, we can choose where we want to locate the additional capacity or from where we can remove the existing capacity.

In this lab, we will create a new scenario to add capacity to the Remote Site: RegionAO1, and we will run this new scenario with the required VMs needed for the New Application.

1. From the **What-If Analysis** page, click **ADD HOSTS** in the pane titled **Infrastructure Planning: Traditional**

## Add Hosts

Create Infrastructure Planning: Traditional

[Capacity Plan](#) / [What-If Analysis](#) / [Add Capacity](#)

Scenario Name	① <input type="text" value="Hosts for Remote Site"/>	
Location	Where would you like to add capacity?	
	② <input type="text" value="RegionA01 (vcsa-01a.corp.vmbeans.com)"/> ➤ <input type="text" value="Workload1"/>	
Server Details	③ Server type <input type="button" value="SELECT SERVER"/>	
	Number of servers to add <input type="text" value="1"/>	
Date	Start Date 6/18/23 <input type="button" value=""/>	End Date (optional) 6/18/24 <input type="button" value=""/> Specify an end date if the workload in this scenario is temporary. Our engine is able to make projections up to a maximum of one year from the current date.
<input type="button" value="RUN SCENARIO"/> <input type="button" value="SAVE"/> <input type="button" value="CANCEL"/>		

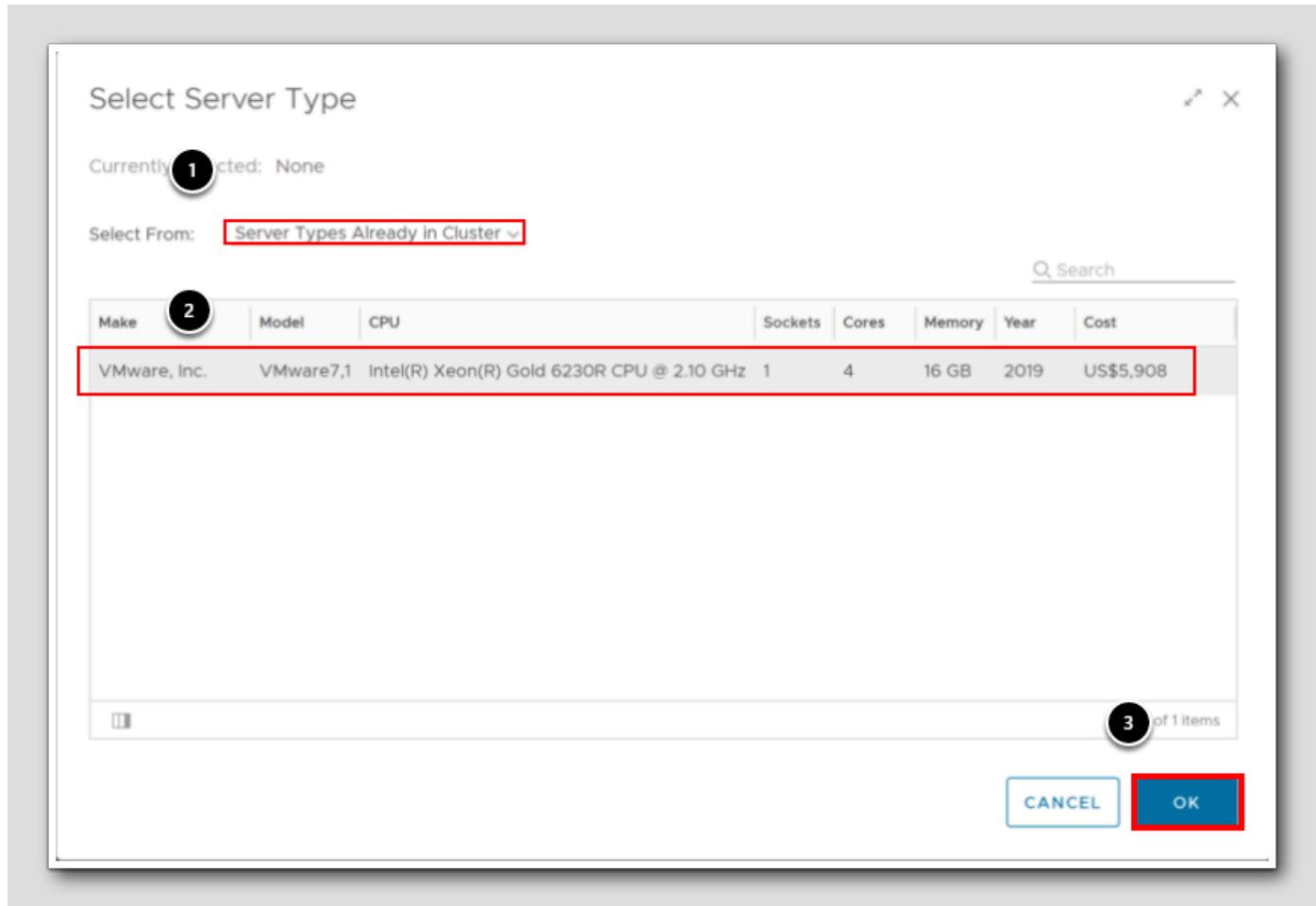
When selecting the profile to add capacity, we have two options:

- Select a server type from a list of commercially available servers. We can select from a list of 1) server types already in the cluster or 2) all server types approved for purchase
- Configure a custom server manually by specifying CPU attributes, memory, and cost

In this exercise, we will add a server type already in the cluster:

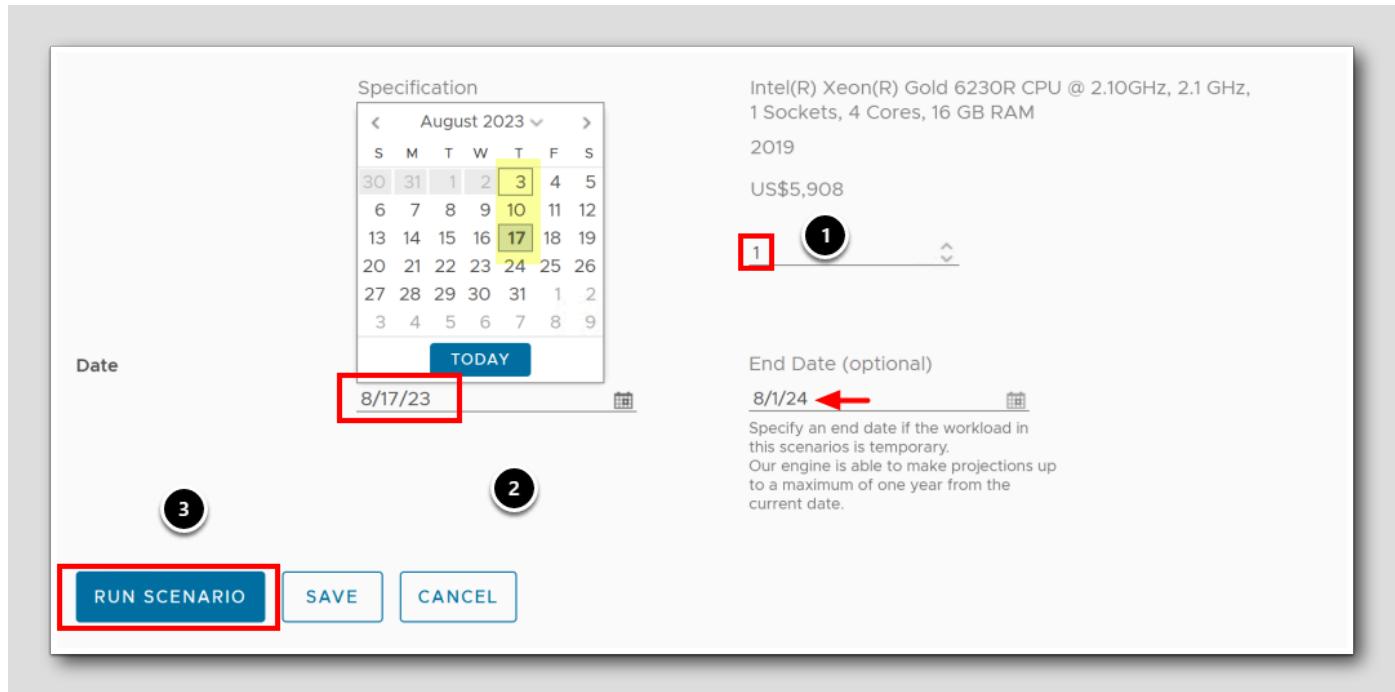
1. Enter the SCENARIO NAME as: **Hosts for Remote Site**
2. In LOCATION, click drop down to select **RegionA01 (vcsa-01a.corp.vmbeans.com)**, and click drop down to select **Workload 1**
3. In SERVER DETAILS, click **SELECT SERVER**

## Select Server Type



1. In Select From, select Server Types Already in Cluster
2. Select the VMware, Inc. VMware Virtual Platform server type
3. Click OK

## Run Scenario



1. In *Number of servers to add*, leave the default at 1
2. In *DATE*, in *Start date*, Change the date from today's date to 2 weeks in the future.

In this exercise, we will project the scenario with **end date approximately 12 months from today's date**.

3. Click **RUN SCENARIO**

## Results: Add Hosts

Infrastructure Planning: Traditional

[Home](#) / [Capacity Plan](#) / [What-If Analysis](#) / [Add Capacity](#)

Results: Add Hosts

Hosts for Remote Site

Scenario: Add Hosts  
Date: Aug 13, 2023 to Aug 13, 2024

Add Capacity to: RegionA01 (vcsa-01a.corp.vmbx) ▶ Workload1

Number of Servers: 1 VMware, Inc. VMware7.1

RUN SCENARIO

Scenario Results

After adding hosts your time remaining will still be 0 days

Total Cost: US\$5,908

**CPU (Demand)\***  
Available Capacity: 7.93 GHz of 25.14 GHz  
With Added Capacity: +8.38 GHz, 16.32 GHz of 33.52 GHz

**Memory (Demand)\***  
Available Capacity: -269.02 GB of 47.99 GB  
With Added Capacity: +16 GB, 0 KB of 63.99 GB

\*All capacity utilization numbers are projected peak values for forecasted period.

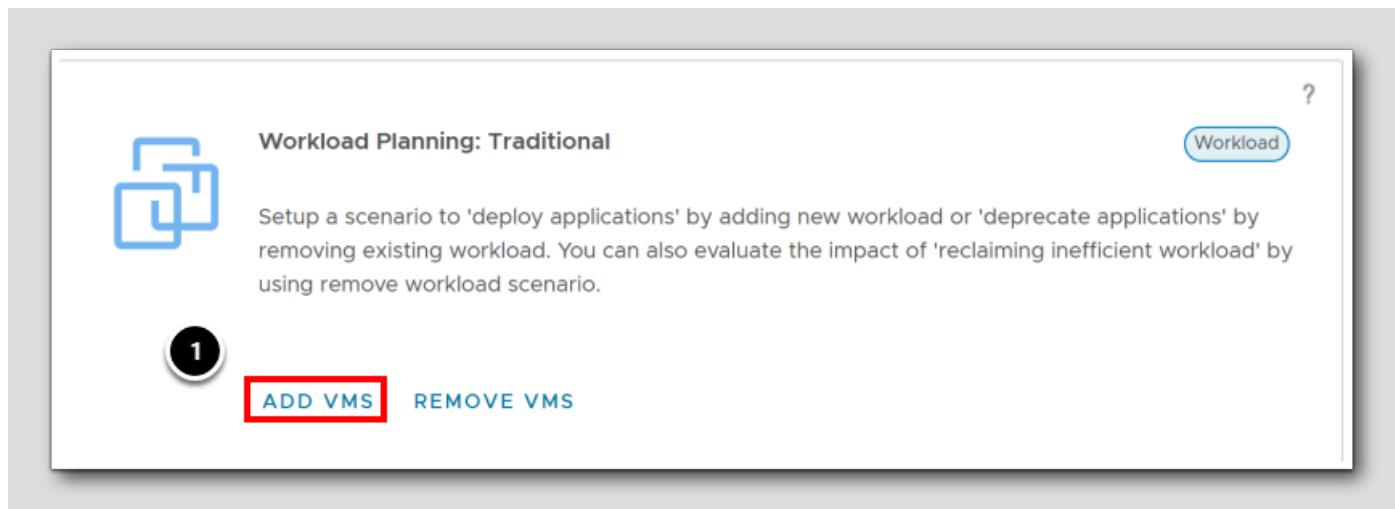
EDIT **SAVE** X

COMMIT SCENARIO

The system displays immediately the impact on cluster size of the additional amount of CPU and memory, and shows the total cost of adding the specified capacity. The system also shows the extension of time remaining when adding new capacity before CPU or memory runs out. In this exercise, due to the different compute resources where this lab is running, the CPU or Memory, **Available** and **Added** capacity may vary from the figure above. We will now save this scenario to edit or run later. The list of saved scenarios is available on the **What-If Analysis** main page.

1. Click **SAVE**
2. Click "X" to close this scenario

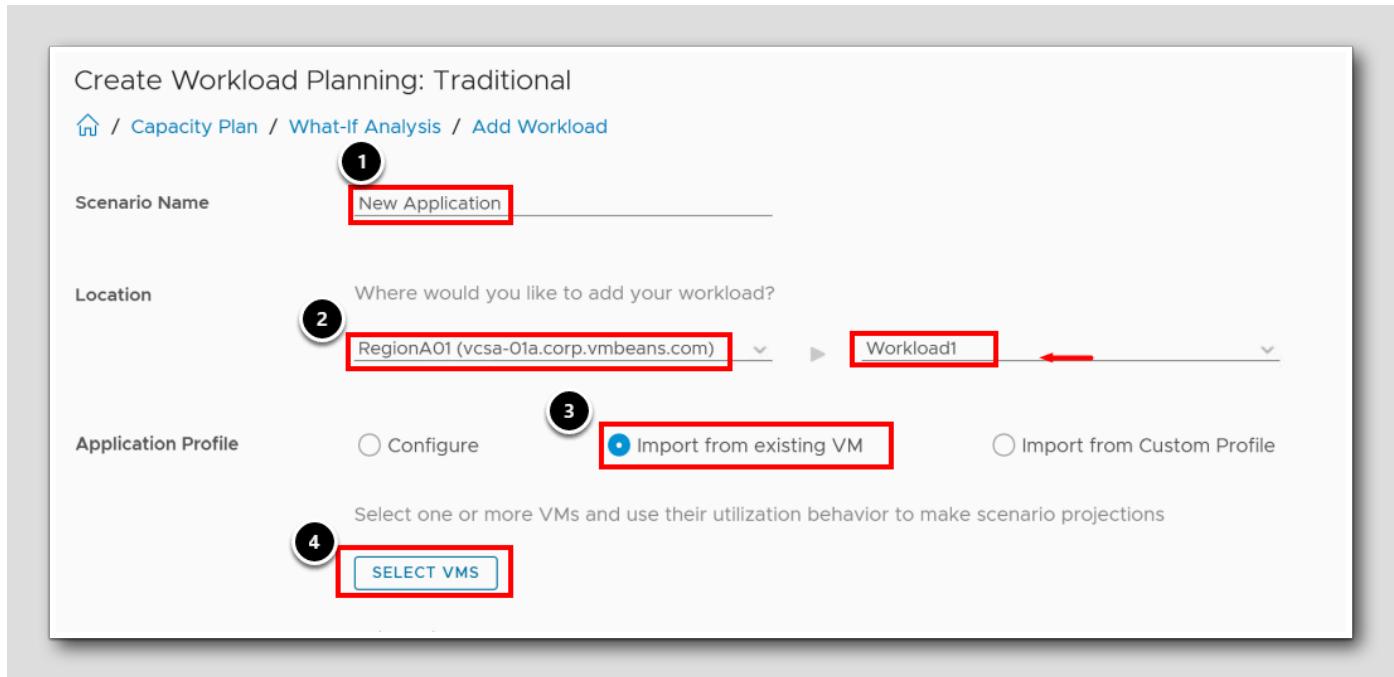
## What-If Analysis - Workload Planning: Traditional



We will now plan a new scenario of a future deployment of applications, by adding the application workloads (VMs).

1. From the What-If Analysis page, in the pane titled *Workload Planning: Traditional*, click ADD VMS.

## Add VMs



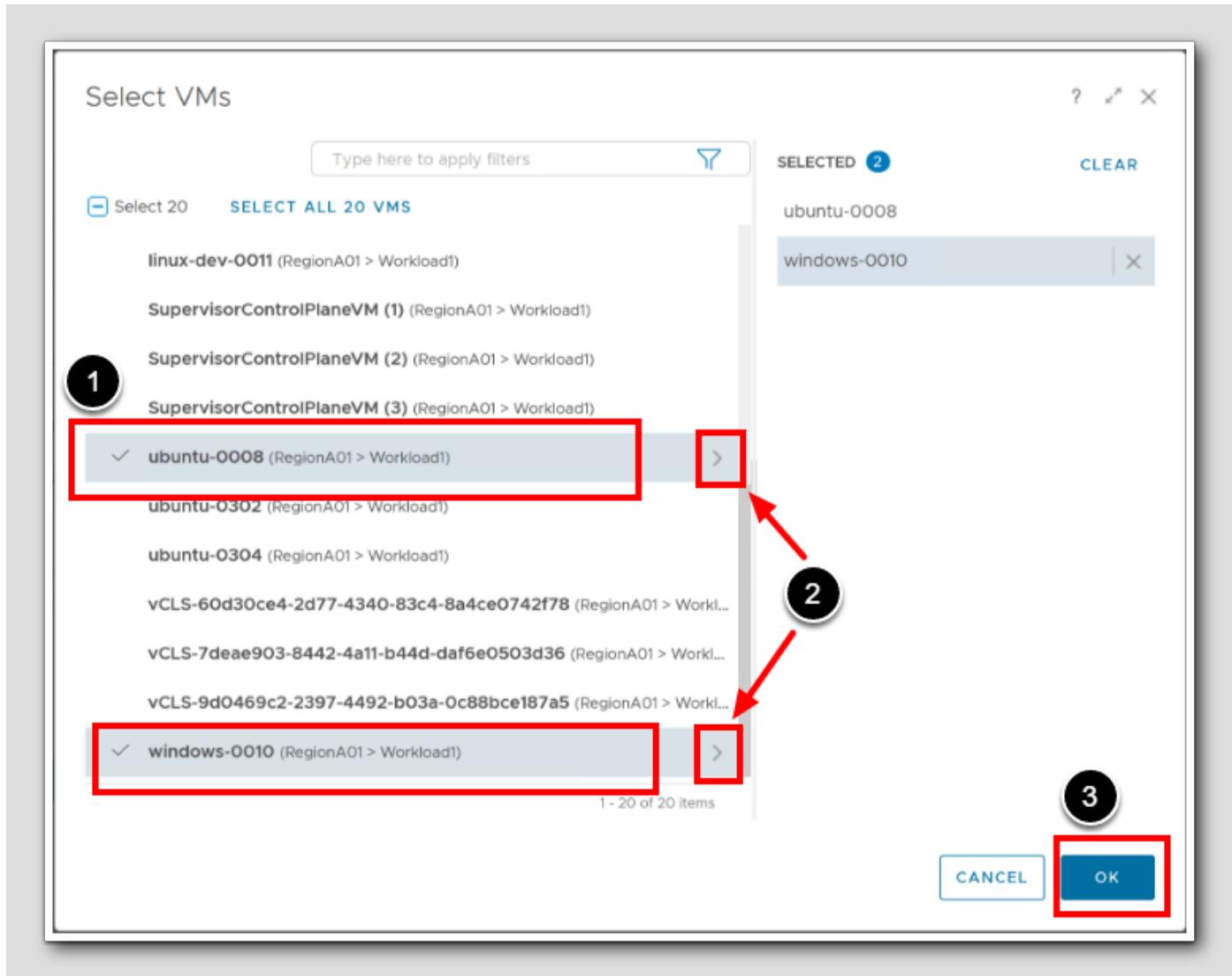
When selecting the profile of our workload, we have two options:

- Configure the workload manually by specifying virtual CPUs, memory, storage, and expected use percentage. We have the further option to click **Advanced Configuration** and specify more precise characteristics for our workload.
- Use an existing virtual machine or templates, importing all the attributes of the selected virtual machine to our workload scenario. The system allows us to specify how many copies of each selected virtual machine we want to add to the proposed workloads.

In this exercise, instead of guessing the size of our workload, we will Import from an existing VM:

1. Enter the SCENARIO NAME as: **New Application**
2. In LOCATION, click drop-down to select **RegionA01 (vcsa-01a.corp.vmbeans.com)**, and click the other drop-down to select **Workload1**
3. In *Application Profile*, select **Import from existing VM**
4. Lastly, click **SELECT VMS**

## Select similar VM build



In this scenario, the existing two VMs (Linux and Windows) was built from the same VM Template that will be used to build our New Application VMs.

1. Select the **ubuntu-0008** and **windows-0010** VMs from the list. We can use *Ctrl+Select* to select both.
2. Click on the **>** arrow for the VMs to move the VMs into the selected list
3. Click **OK**

Enter how many VMs will be needed

VM Name	CPU (Demand)	CPU (Allocation)	Memory (Demand)	Memory (Allocation)	Disk Space	Quantity
windows-0010	110.4 MHz	2 vCPU	1.87 GB	4 GB	22.5 GB	2
ubuntu-0008	79.33 MHz	1 vCPU	516.94 MB	1 GB	5.34 GB	10

Override Utilization Projection

Annual Projected Growth  %  Advanced Configuration

Start Date: 8/3/23

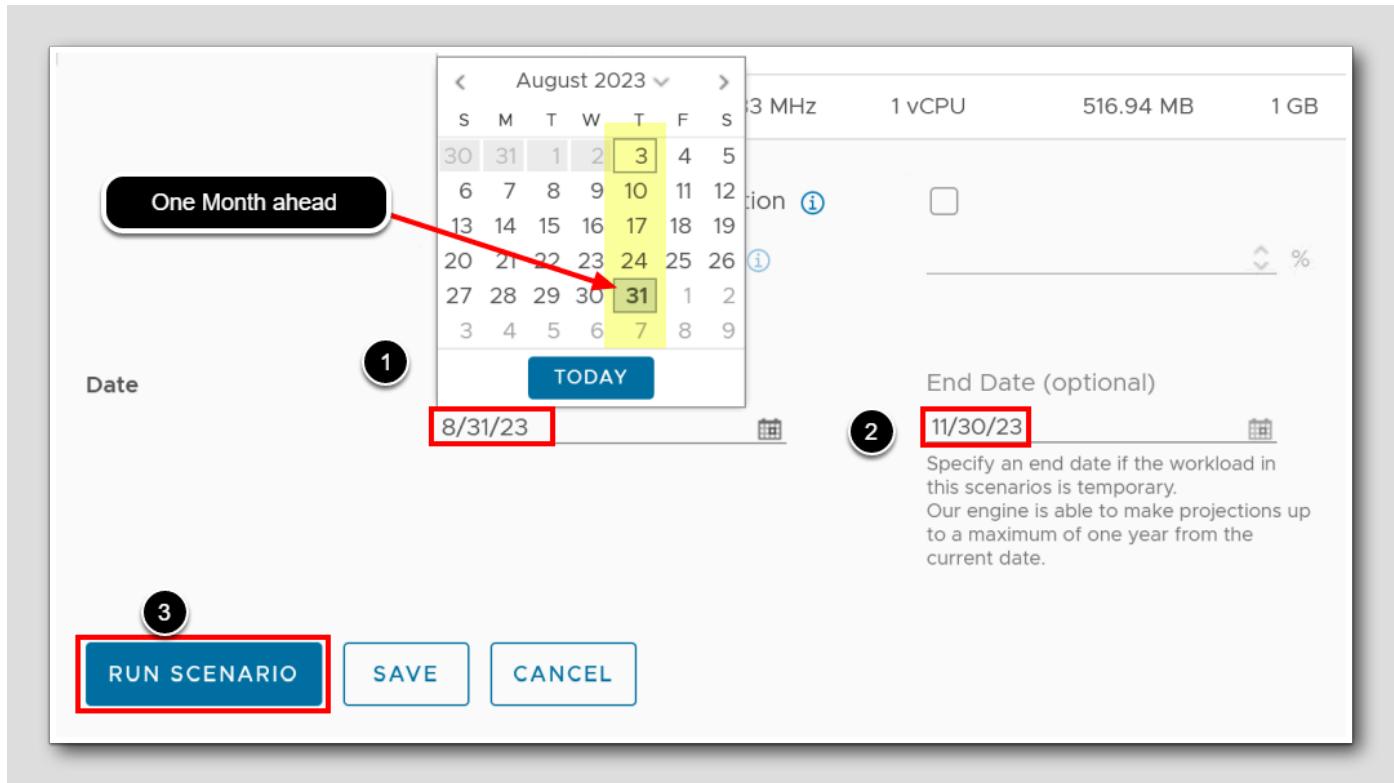
End Date (optional): 11/3/23

Specify an end date if the workload in this scenario is temporary.  
Our engine is able to make projections up to a maximum of one year from the current date.

The number of selected VMs defaults to 1 so we will need to change this to make it accommodate the power needed for our application.

1. Click on the Edit pencil icon in the Quantity section and update it to 2 for the windows server windows-0010
2. Click on the Edit pencil icon in the Quantity section and update it to 10 for the Linux server ubuntu-0008

## Enter the Date Range and Run Scenario



Next, we enter the start and end date for the period when we want the workload to be active. The default is: starting today and ending one year from today. The system can project scenarios ending up to one year from the current date. For this Exercise we will be installing the VMs one month from now and will be running until the end of the year

1. For Start Date, select a date approximately one month from today's date
2. For End Date, select the last date approximately 3 months from today's date.
3. Click RUN SCENARIO

## Results: Add VMs

Workload Planning: Traditional

Results: Add VMs

New Application

Scenario	Add VMs	Total to be Added	12 VMs
Date	Sep 13, 2023 to Dec 14, 2023	Demand	1.26 GHz
		Allocation	14 vCPU
		CPU	9.29 GB
		Memory	99.51 GB
		Disk Space	179.13 GB

Add VMs to: RegionA01 (vcsa-01a.corp.vmbar) ► Workload1 RUN SCENARIO

Private Cloud: Datacenter

**!** The workload does not fit in **Workload1** within your selected timeframe and would decrease your time remaining from **0 days to 0 days.**

**Workload1**

Demand	Peak CPU	Peak Memory	Peak Disk Space
20.49 GHz	122.3 GB (Deficit)	474.91 GB (Deficit)	

The system lets us know immediately if the proposed workload fits or does not fit in the suggested location, because of the memory and disk space deficit. In this case the Remote Site has no active hosts yet so the proposed workload does not fit. Aria Operations announces the outcome and provides the following information:

- How much the added workload reduces the *time remaining* for the target cluster
- The discrepancy between the space available in the target cluster and what the proposed workload requires

\*\*\*We will need to run a **Multiple Scenario** to simulate the Host resource availability combined with the demand of the proposed VMs to accommodate room enough for our new Application.

We can now save the scenario to edit or run later on. A list of saved scenarios is available on the **What-If Analysis** main page.

1. As We did before, Click **SAVE**
2. Click "X" to close this scenario

## Running Multiple Scenarios

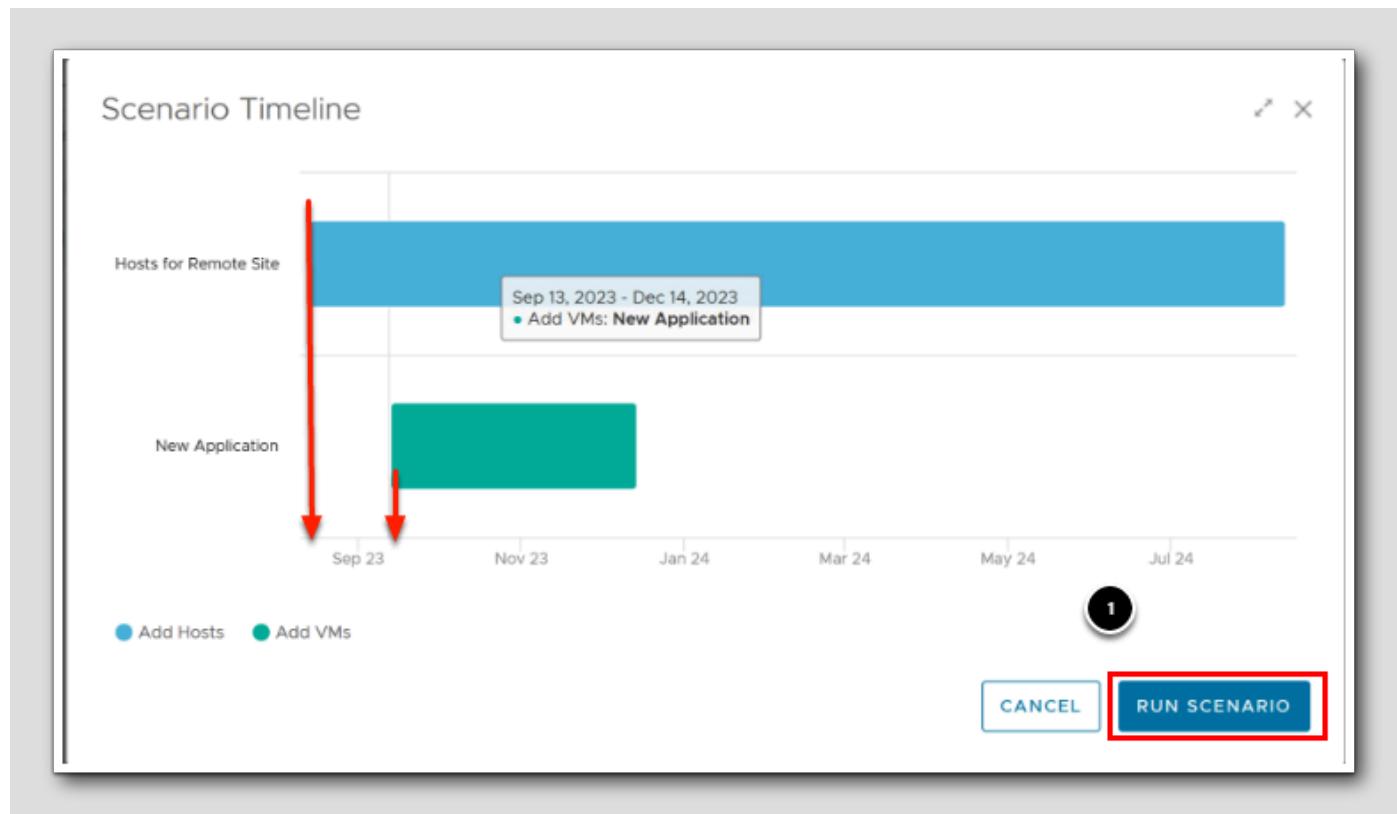
The screenshot shows the 'What-If Analysis' interface in the VMware Capacity Plan. The 'Saved Scenarios' tab is selected (marked with a red box and number 1). Two scenarios are listed in the table: 'Hosts for Remote Site' and 'New Application'. Both scenarios have checkboxes checked in their respective rows (marked with red boxes and numbers 2 and 3). The 'RUN' button is highlighted with a red box and number 3.

Scenario Name	Scenario Type	Datacenter	Cluster	Date Created	Start Date	End Date
Hosts for Remote Site	Add Hosts	RegionA01 (vcsa-01a.corp.vmbeans.com)	Workload1	Aug 3, 2023	Aug 17, 2023	Aug 1, 2024
New Application	Add VMs	RegionA01 (vcsa-01a.corp.vmbeans.com)	Workload1	Aug 3, 2023	Aug 31, 2023	Nov 30, 2023

"Saved scenarios are listed under the 'Saved Scenarios' tab for later use, and can be run, edited, or deleted. 'Stacked Scenarios' let us run compatible scenarios together, for instance, planning hardware updates by removing old hosts and adding new ones. This lets us preview capacity after these changes. **Note:** only scenarios involving the same object can be combined. In this exercise, we'll run our scenarios together to predict our final capacity, as we add our New Application workloads and one host in Workload 1."

1. Click Saved Scenarios
2. Select the previously two created scenarios: New Application and Hosts for Remote Site  
\*\*\*Note the disparate Scenario Start & End Date for each Scenario\*\*\*
3. Click RUN

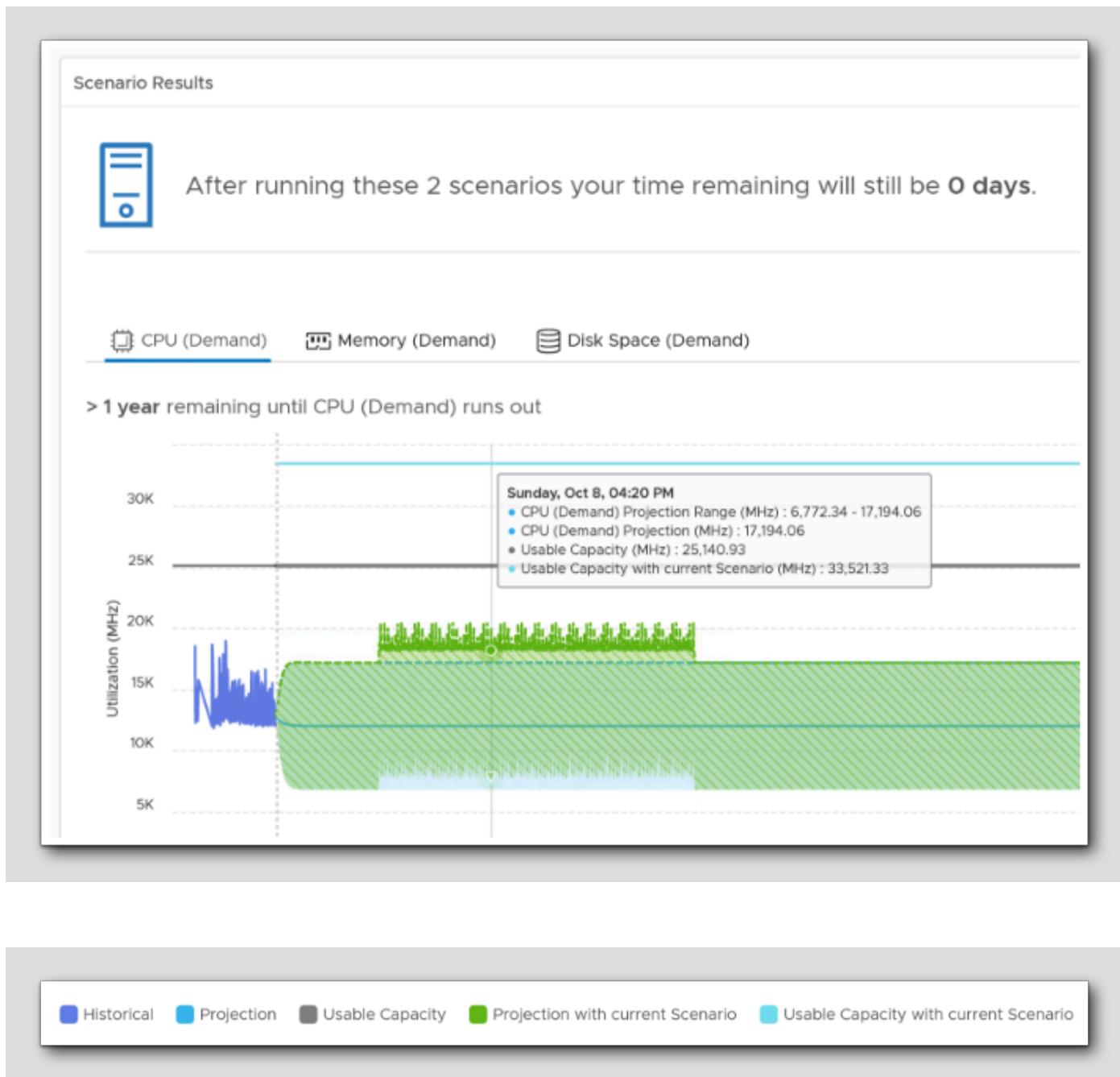
## Scenario Timeline



The *Scenario Timeline* indicates the projected start and end dates of the scenarios we previously configured. Adding the new application comes after we add hosts.

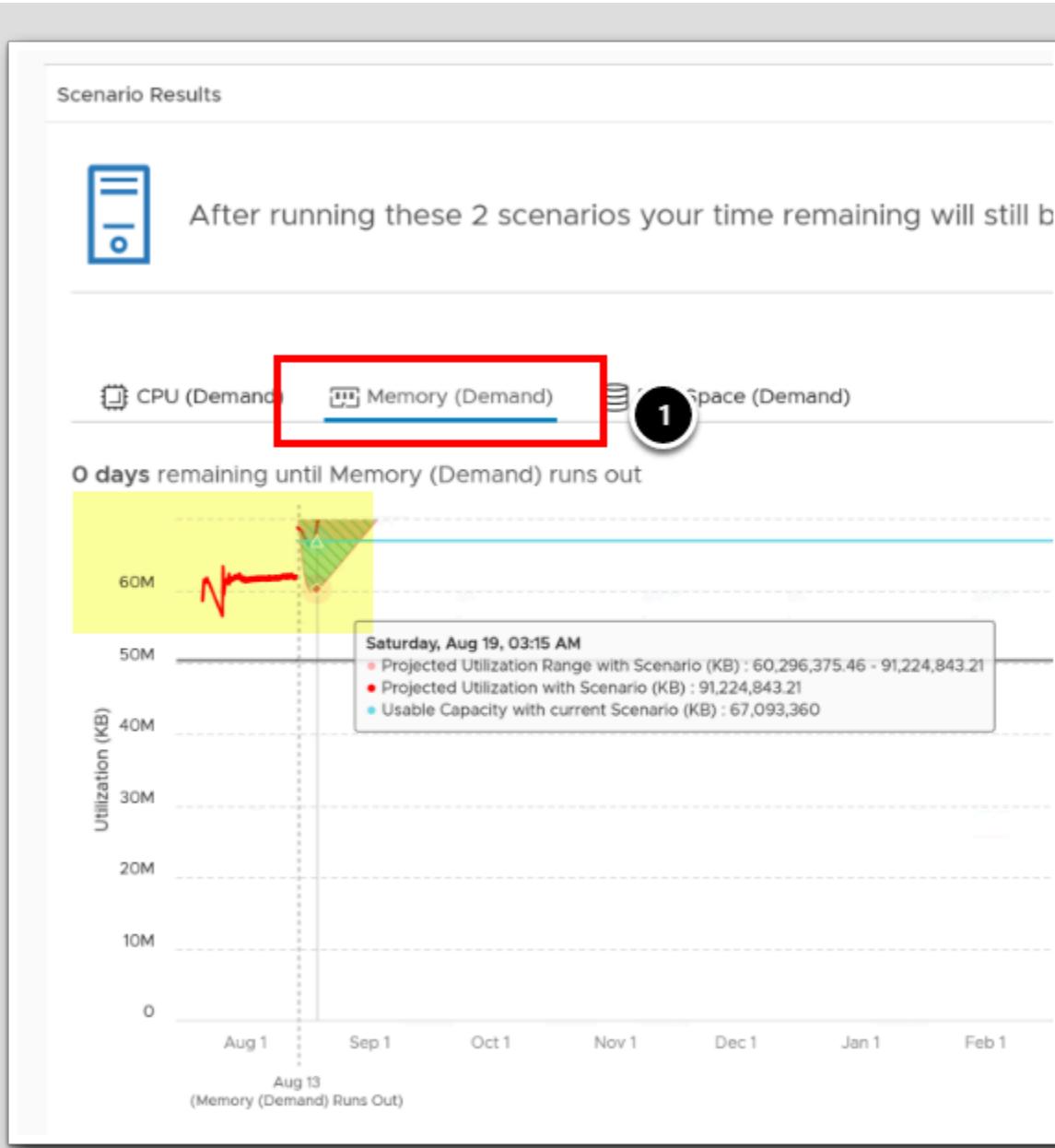
1. Click RUN SCENARIO

## CPU demand Scenario Result



Immediately we see that even if we project a certain load, by adding several VMs, it does not exceed the Usable Capacity. Also notice that the CPU Usable capacity increases a lot from adding servers.

## Memory Demand Scenario Result



On the previous page we saw that one host would be enough for CPU demand. But, let's check the Memory Demand.

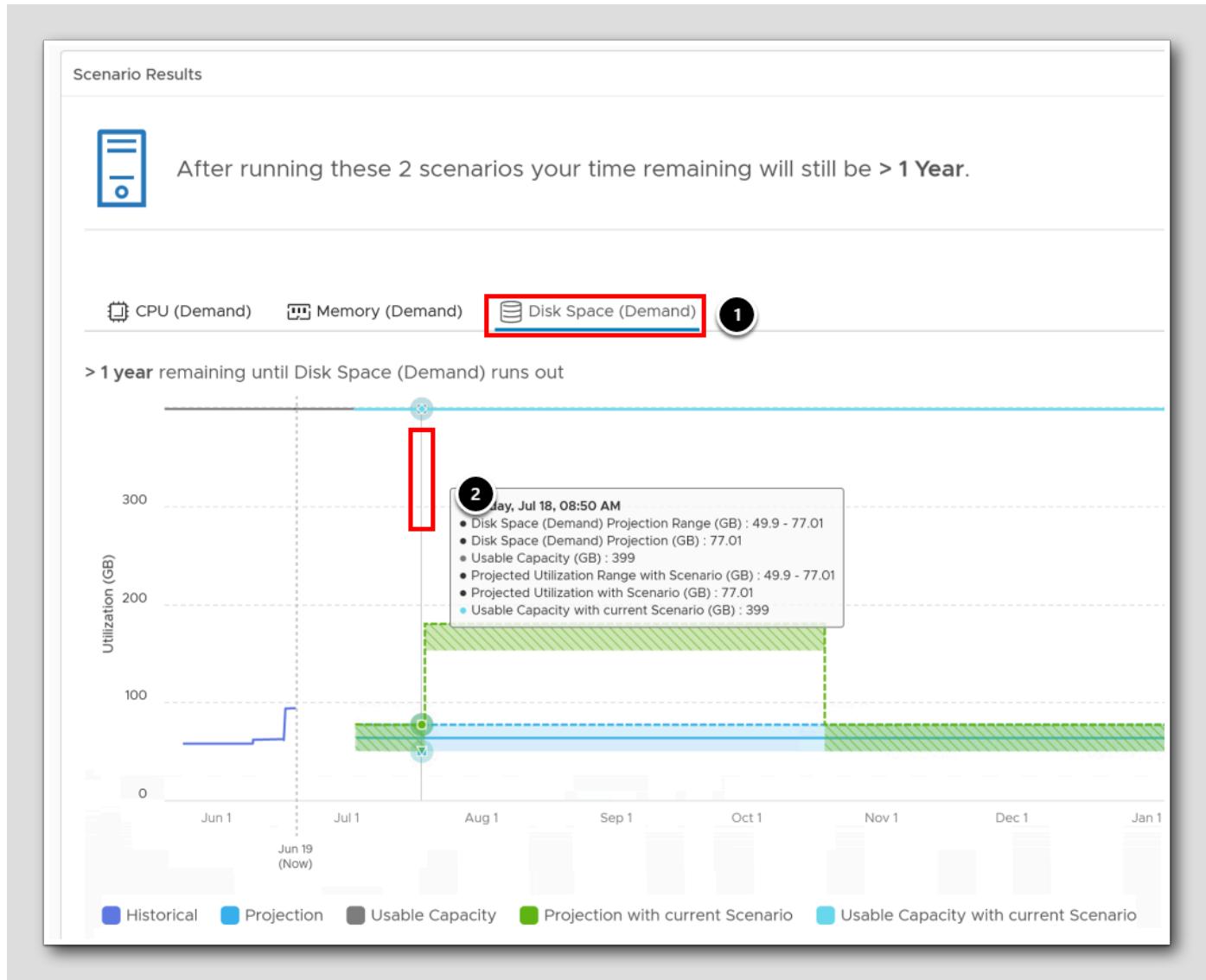
1. Click on **Memory (Demand)**

These curves are out of proportion. We notice an increase in the projection due to added VMs, the 'Usable Capacity With Current Scenario' shows a significant rise compared to 'Usable Capacity', but in this particular scenario, we predict memory issues both now and after the added capacity.

The plan is to integrate more than just 1 planned extra server, to make sure we accommodate the need for memory.

NOTE: Keep in mind, images may differ due to our Lab environment.

## Disk Space Scenario Results



We had a bottleneck with **Memory**, we'll need the new host. Let's check **Disk Space**.

1. Click on Disk Space
2. Hover the mouse to see what date our scenario s projected

Note: Memory was a bottleneck; the new host is necessary. In this particular scenario, we're set with disk space, pre- and post-server addition, thanks to existing storage in this cluster.

NOTE: Keep in mind, images may differ due to our Lab environment.

Multiple Scenarios

Capacity Plan / What-If Analysis / Stacked

Scenario Summary

Scenarios Selected: 2

VIEW ON TIMELINE

Run on Cluster: RegionA01 > Workload1

EDIT X

Scenario Results

After running these 2 scenarios your time remaining will still be > 1 Year.

CPU (Demand) Memory (Demand) Disk Space (Demand)

> 1 year remaining until Disk Space (Demand) runs out

Timeline Chart: A horizontal axis representing time with a vertical dashed line at approximately 300 units. The text '300' is visible near the origin.

## Edit an existing Scenario

[671]

## Adding a different server

The screenshot shows the 'Edit Infrastructure Planning: Traditional' interface. At the top, the navigation path is: Home / Capacity Plan / What-if Analysis / Add Capacity. The 'Scenario Name' is set to 'Hosts for Remote Site'. Under 'Location', it says 'Where would you like to add capacity?' with 'RegionA01 (vcsa-01a.corp.vmbeans.com)' selected and 'Workload1' assigned. In the 'Server Details' section, the 'Server type' is listed as 'VMware, Inc. VMware7.5'. A red box highlights the pencil icon (step 1) next to the server type. Below this, the 'Specification' is shown as 'Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz, 2.1 GHz, 1 Sockets, 4 Cores, 16 GB RAM'. The 'Manufacture year' is '2019' and the 'Cost' is 'US\$5,908'.

We have to admit that the small server we added did not meet our needs. We will now add a more resilient server to accommodate our memory problems for now and the future. Let's edit the server type.

1. Under the *Server Details*, Click the Pencil Icon

## Select Server Type

Currently Selected: **Lenovo ThinkServer RD440, 2 Sockets, 8 Cores, 192 GB RAM**

Make	Model	CPU	Sockets	Cores	Memory	Year	Cost
Lenovo	ThinkServer RD630 2595	Intel® Xeon® Processor ...	2	16	320 GB	2012	US\$35,881
Lenovo	PureFlex System x240	Intel® Xeon® Processor ...	2	20	256 GB	2013	US\$11,694
Lenovo	<b>ThinkServer RD440</b>	Intel® Xeon® Processor ...	2	8	192 GB	2014	US\$9,996
Lenovo	ThinkServer RD340	Intel® Xeon® Processor ...			Intel® Xeon® Processor E5-2403 v2 @ 1.80 GHz		
Lenovo	ThinkServer RD340	Intel® Xeon® Processor ...	2	8	192 GB	2014	US\$19,888
Lenovo	ThinkServer RD340 70A...	Intel® Xeon® Processor ...	2	12	192 GB		US\$18,999
Lenovo	ThinkServer RD540 70A...	Intel® Xeon® Processor ...	2	20	160 GB	2013	US\$11,999

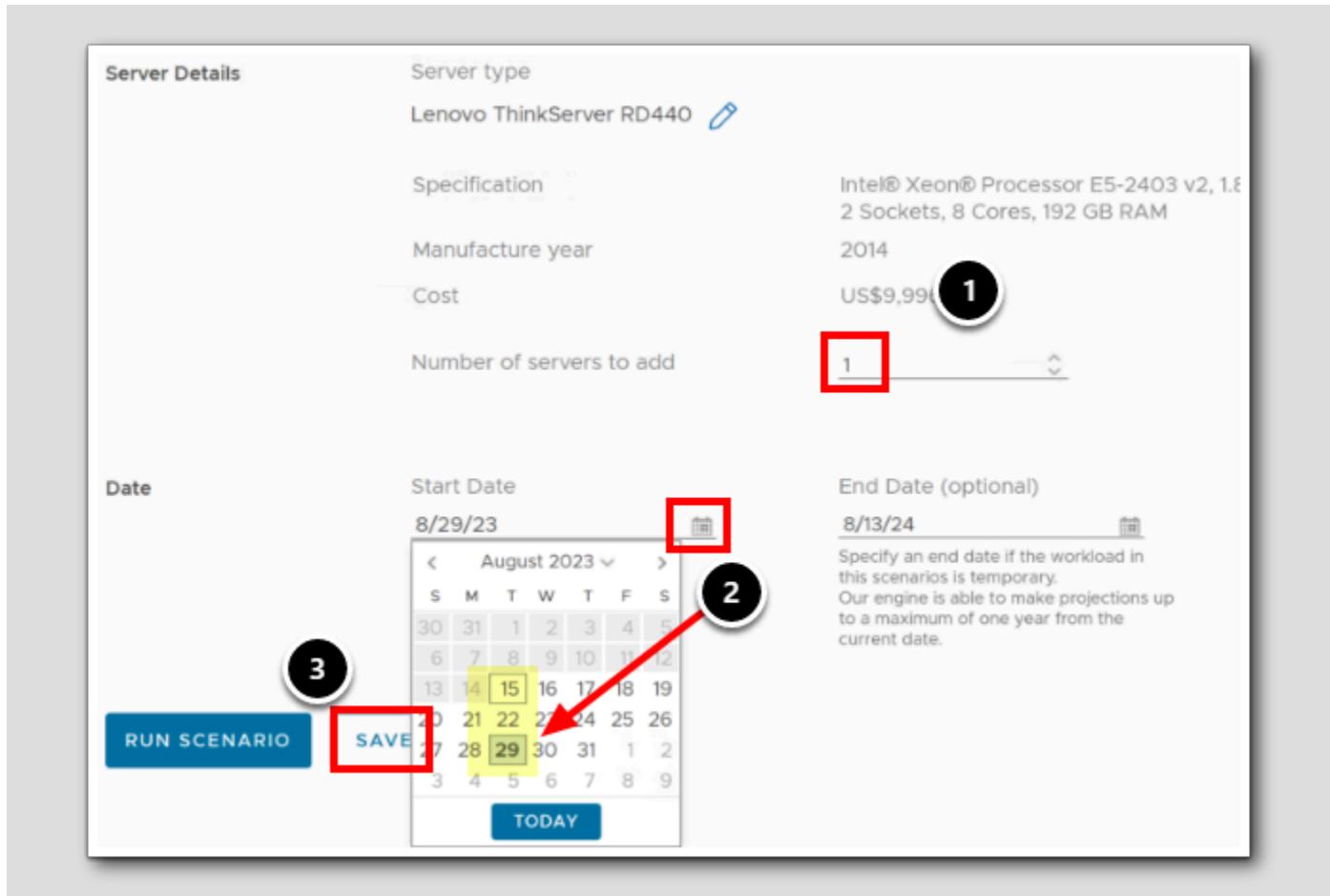
1 - 20 of 667 items    < 1 2 3 4 5 ... >

**CANCEL** **OK**

- Under Select from, from the drop-down list, choose All Server Types
- In the search\* field, type **Lenovo**, and press ENTER
- Sort the *Memory* column from high to low, by clicking the column header twice
- Select the **Lenovo Thinkserver RD440**
- Click OK

\* We can search for other server vendors, for example Dell, Acer, HPE, IBM, or othera that would fit our environment or purchasing agreements.

## Changing amount and date

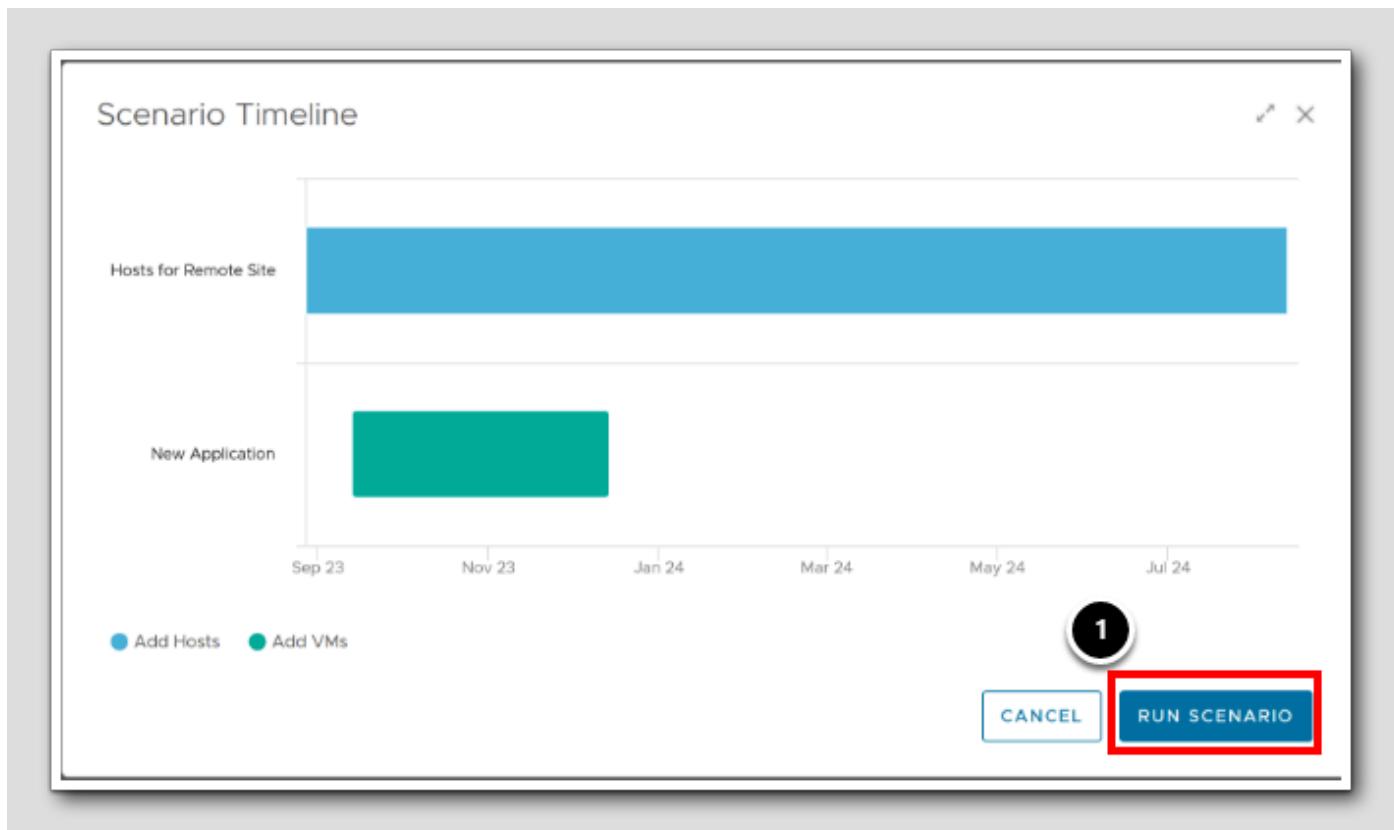


We will make a couple of small changes before we add server capacity.

1. From the Number of servers to add, type 1
2. Under Date, change the Start Date to be two weeks in the future
3. Click SAVE (almost hidden)

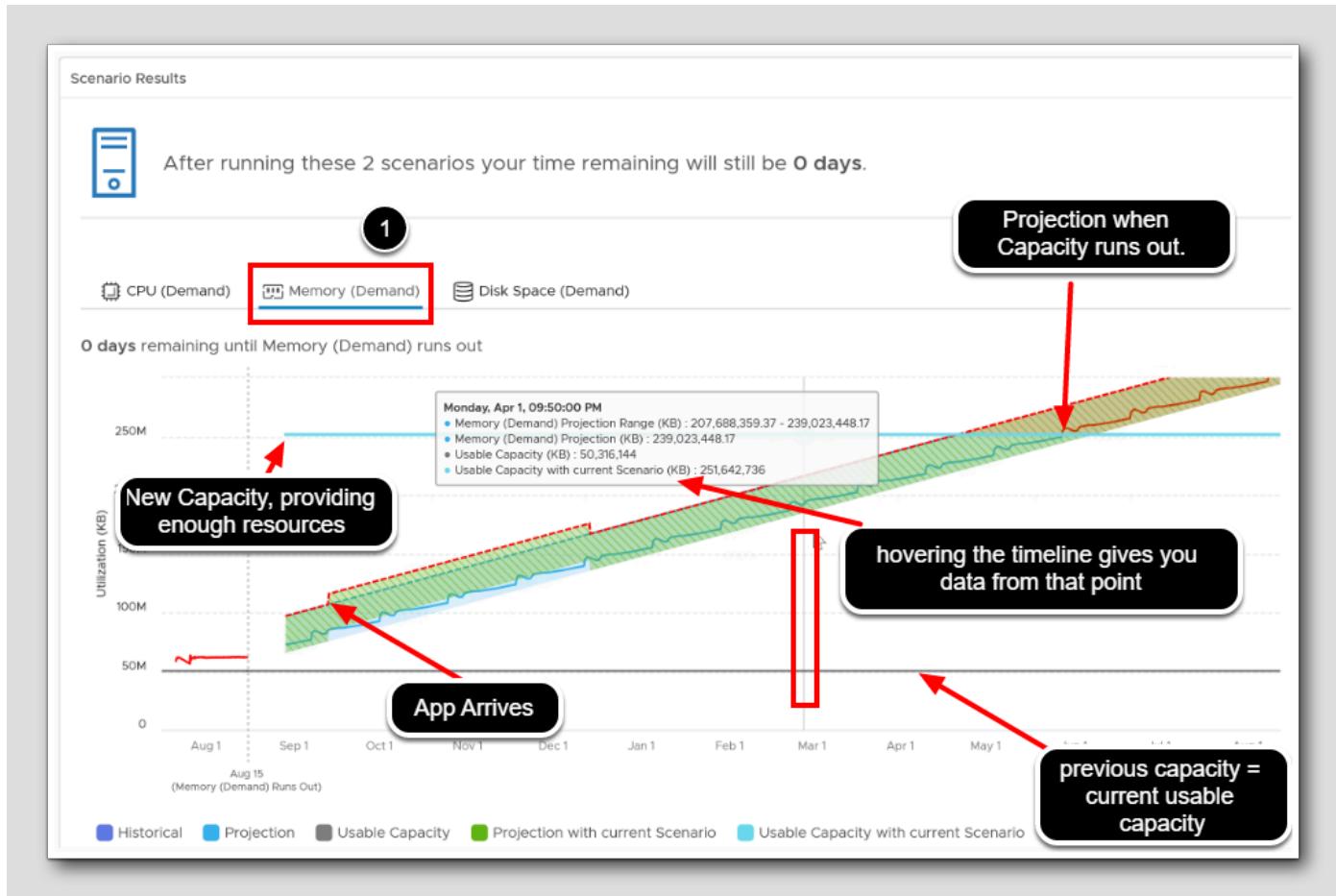
## Using the new Datacenter Requirements

## Scenario Timeline



1. Click RUN SCENARIO

## Enough resources for the New Application



Let's go straight to the memory section to see if we have solved the memory problem

1. Select the **Memory (Demand)**
2. As we see from the image with annotations, we now have more than enough memory for our New Application.
3. To close the Multiple Scenarios, Scroll to the top and Click X (not shown)

NOTE: Keep in mind, images may differ due to our Lab environment.

Lets check what the cost of 1 Hosts will be in our Private Cloud

The screenshot shows the 'What-If Analysis' page in the VMware Capacity Plan. At the top, there are three numbered callouts: 1 points to the 'RUN' button, 2 points to the checked checkbox for the 'Host for Remote Site' scenario, and 3 points to the 'Saved Scenarios' link. The main table lists two scenarios:

Scenario Name	Scenario Type	Datacenter	Cluster	Date Created	Start Date	End Date
Host for Remote Site	Add Hosts	RegionA01 (vcsa-01a.corp.vmbeans.com)	Workload1	Jun 19, 2023	Jul 3, 2023	Jun 19, 2024
New Application	Add VMs	RegionA01 (vcsa-01a.corp.vmbeans.com)	Workload1	Jun 19, 2023	Jul 19, 2023	Oct 19, 2023

1. Select Saved Scenarios
2. Select only the Hosts for Remote Site this time
3. Click RUN

## Cost Results for Adding Hosts

Infrastructure Planning: Traditional

Home / Capacity Plan / What-If Analysis / Add Capacity

Results: Add Hosts

Hosts for Remote Site

Scenario: Add Hosts  
Date: Aug 29, 2023 to Aug 13, 2024  
Add Capacity to: RegionA01 (vcsa-01a.corp.vmb) ▶ Workload1  
Number of Servers: 1 ▾ Lenovo ThinkServer RD440 EDIT | SAVE ✎ X

RUN SCENARIO

Scenario Results

 After adding hosts your time remaining will still be 0 days COMMIT SCENARIO

Total Cost: **US\$9,996** 

 CPU (Demand)\*   
Available Capacity: 8.02 GHz of 25.14 GHz  
With Added Capacity:  
+14.4 GHz, 22.42 GHz of 39.54 GHz

 Memory (Demand)\*   
Available Capacity: -263.03 GB of 47.99 GB  
With Added Capacity: +192 GB, 0 KB of 239.99 GB

## About Committed Scenarios

Before we move on, take a moment to read through this:

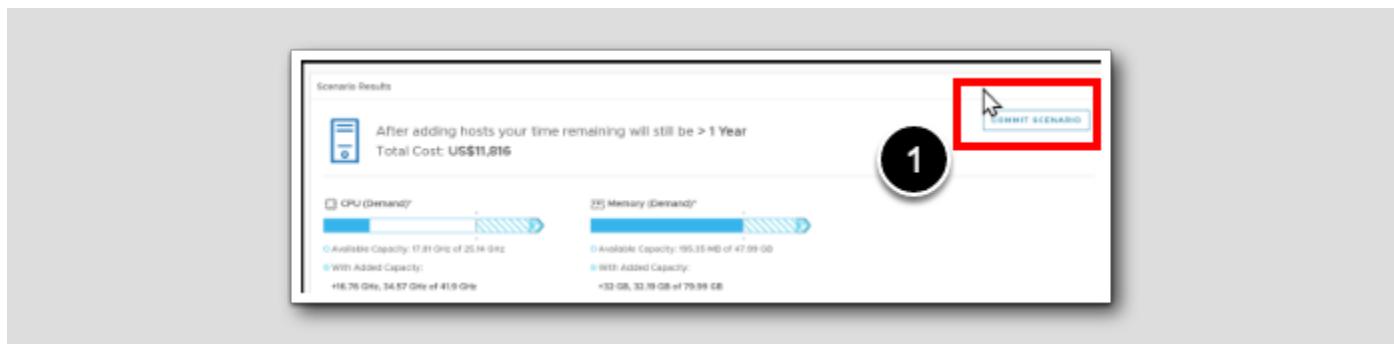
### Committed Scenarios:

- When we're sure that we need to reserve capacity, we can commit the scenario to have VMware Aria Operations set aside resources for new, upcoming, or planned workloads.
- A committed scenario is a supposition about how the capacity and load change on our objects when we change the conditions in our virtual infrastructure environment.
- We do not have to implement the changes that our committed scenario represents. By committing a scenario, we can determine our capacity requirements before we implement the actual changes.

### Why Create a Committed Scenario?

- In organizations which have separate capacity management and operations teams, committing a scenario helps stakeholders understand the current capacity and upcoming capacity requirements across the board.
- With committed scenarios, capacity is reserved and this prevents the operations team from performing adhoc resource increase on workloads, while the capacity manager is engaged in resource planning of new projects.
- Committed Scenarios also helps the team responsible for infrastructure expansion, as it provides actionable insights into future scenarios. In the event capacity becomes limited, it could be accounted for in the expansion

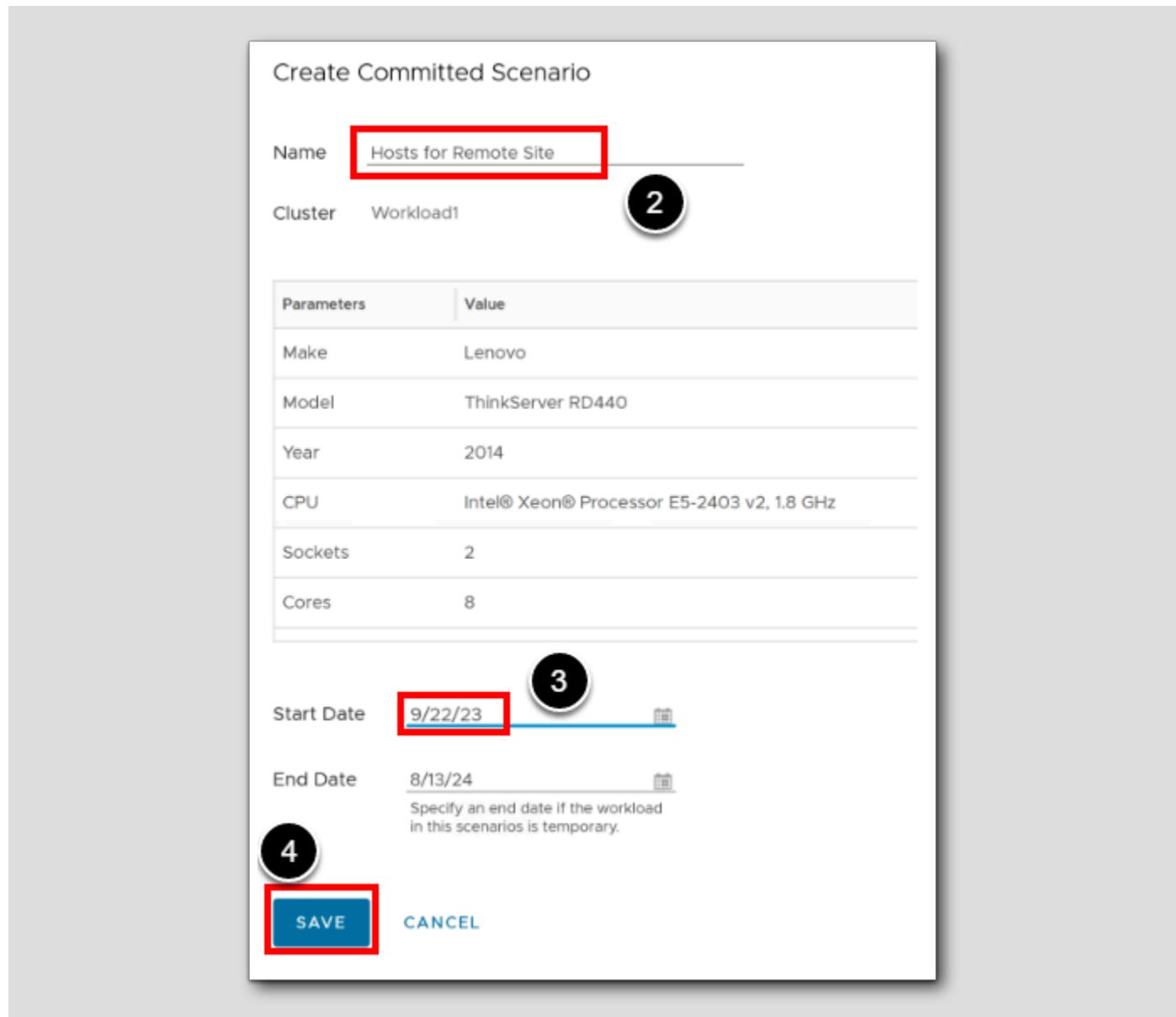
## Committing our Scenario



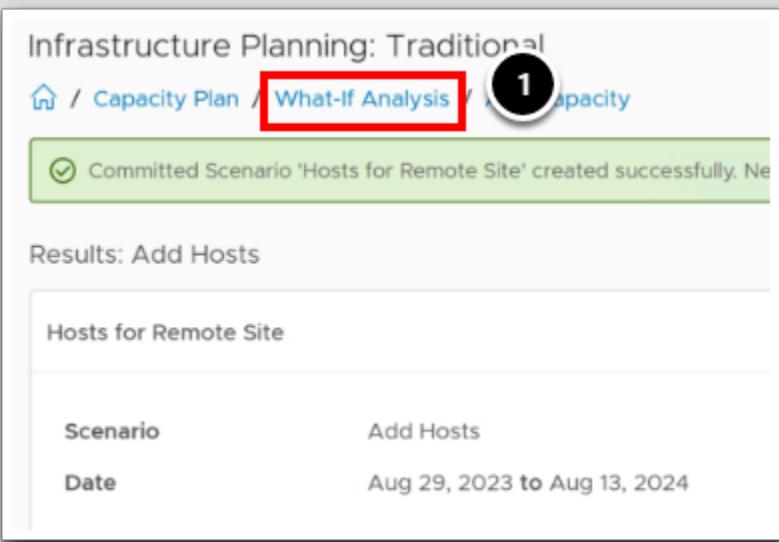
We would like to commit our scenario and reserve capacity

- Click the COMMIT SCENARIO button.

The Create Committed Scenario fly-out opens from the right hand side of the page.



2. Add a name to the scenario we want to commit.
3. Provide an implementation date, a week from now (end date is optional)
4. Click SAVE.

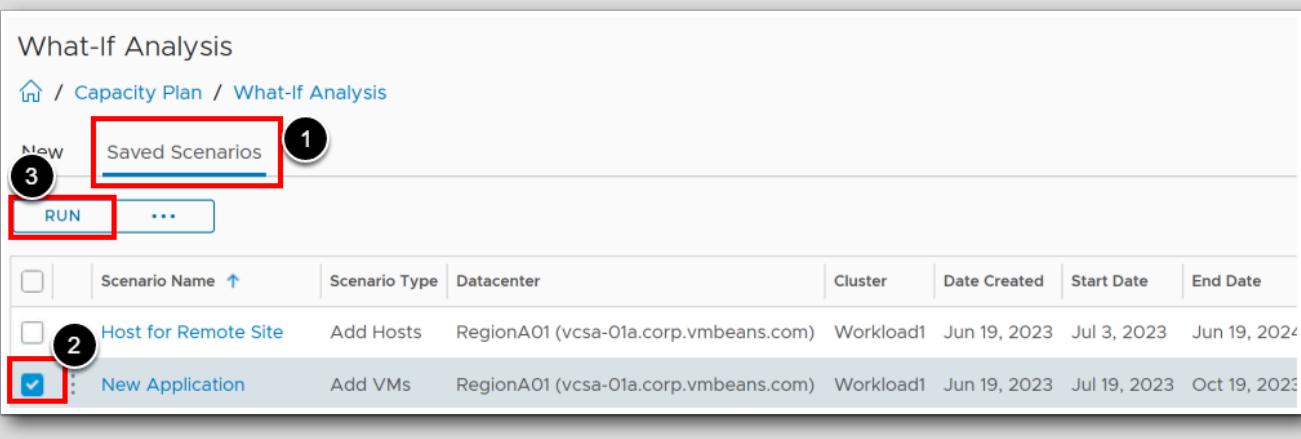
[Close](#)


The screenshot shows a modal window titled "Infrastructure Planning: Traditional". The URL in the header is [/ Capacity Plan / What-if Analysis](#). A red box highlights the "What-if Analysis" link. A green success message box contains the text: "Committed Scenario 'Hosts for Remote Site' created successfully. Next step: Run scenario". Below this, a section titled "Results: Add Hosts" displays a table for "Hosts for Remote Site". The table has two columns: "Scenario" and "Add Hosts". Under "Scenario", it says "Date" and "Aug 29, 2023 to Aug 13, 2024".

1. Click the Link to What-if Analysis

Where else could we put our New Application?

[683]



The screenshot shows the "What-If Analysis" interface. The URL in the header is [/ Capacity Plan / What-if Analysis](#). A red box highlights the "Saved Scenarios" link. Another red box highlights the "RUN" button. A third red box highlights the checkbox for the "New Application" scenario. The table lists two scenarios: "Host for Remote Site" and "New Application". The "New Application" scenario is selected, indicated by a checked checkbox.

Scenario Name	Scenario Type	Datacenter	Cluster	Date Created	Start Date	End Date
<a href="#">Host for Remote Site</a>	Add Hosts	RegionA01 (vcsa-01a.corp.vmbeans.com)	Workload1	Jun 19, 2023	Jul 3, 2023	Jun 19, 2024
<input checked="" type="checkbox"/> <a href="#">New Application</a>	Add VMs	RegionA01 (vcsa-01a.corp.vmbeans.com)	Workload1	Jun 19, 2023	Jul 19, 2023	Oct 19, 2023

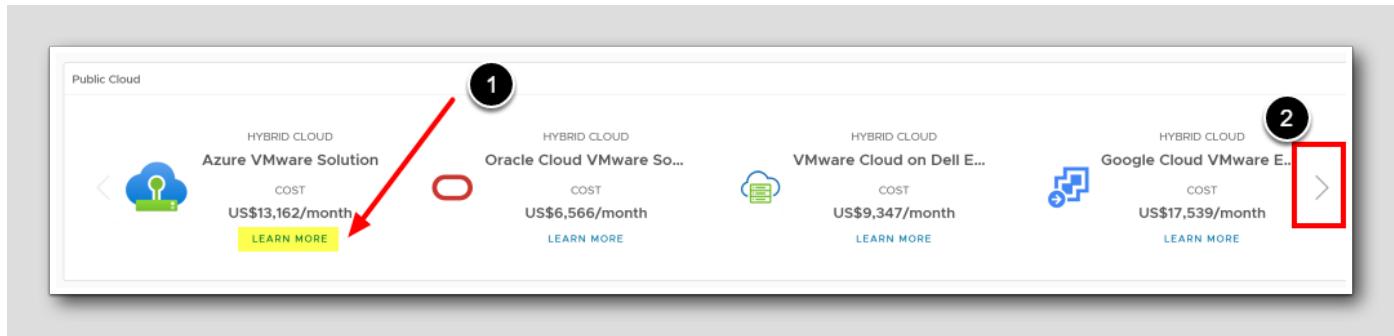
1. Select Saved Scenarios

2. In front of our application, Check the checkbox

3. Click Run

## Public Cloud section for Add VMs

[684]



We can see the cost per month for different private and public clouds, and the Public Cloud section displays information which help us understand where our workload would fit, the associated costs, and the time remaining (Private Cloud) based on peak CPU, Memory, and Disk Space for demand and allocation model after we add VMs.

1. Without clicking, you could for a more detailed comparison click Learn more.
2. For more Public Cloud Options, click the Scroll Right button

NOTE: Keep in mind, images may differ due to our Lab environment.

This concludes this part of the module.

## Conclusion

[685]

We have seen that when we're using the **What-If** tool, we can plan for an increase or decrease in workload or capacity requirements in the virtual infrastructure.

We can also determine how much capacity is required to make a migration work. We can run one scenario or group scenarios and run them cumulatively.

## You've finished Module 14

Congratulations on completing the lab module.

If you are looking for additional general information on Aria Operations, try one of these:

- **VMware Product Public Page - Aria Operations:** <https://www.vmware.com/products/aria-operations.html>
- **Aria Operations - Documentation:** <https://docs.vmware.com/en/VMware-Aria-Operations/index.html>
- **Aria Operations - Cost Overview:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Configuring-Operations/GUID-79297017-77F1-40C3-930A-90CE5C388362.html>

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the **TABLE OF CONTENTS** to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Module 15 - Application Monitoring (45 minutes) Intermediate

### Introduction

[688]

Aria Operations monitors the availability of your processes, services, and applications. We can leverage the Telegraf agent to monitor the availability of multiple Linux processes and Windows services. Plus, Aria Operations Enterprise or Cloud customers can monitor the availability of their applications. **Linux process monitoring** can be configured to evaluate processes based on name, PID file, or via regular expressions for cases where processes may have a unique naming scheme. **Windows services** are configured via the service name.

Once Aria Operations has been configured to monitor these processes and services, it will begin collecting not only its status or running state, but also basic utilization metrics such as CPU and Memory Usage. Aria Operations can also alert you when a service or process goes down using pre-defined alerts.

Aria Operations supports native monitoring of applications using the Aria Operations Telegraf Agent. This works out of the box for most applications, but do check out the documentation first as there may be additional requirements for some applications.

In this module, we will explore and compare Discover Services and Monitor Applications.

**Discover Services:** Aria Operations can leverage the VMware Tools agent already installed and running on most virtual machines to discover and monitor processes and services, and to run basic OS commands and queries.

**Monitor Applications:** Aria Operations can deploy the an agent based on the open-source Telegraf agent to any managed virtual machines and can also collect metrics from customer-deployed open-source Telegraf agents.

You will typically get more property/configuration information from the Discover Services functionality but many more performance metrics from the Monitor Applications functionality.

### Log in to Aria Operations

[689]

We will log in to a live instance of Aria Operations running in this lab.

### Open the Firefox Browser from the Windows Task Bar

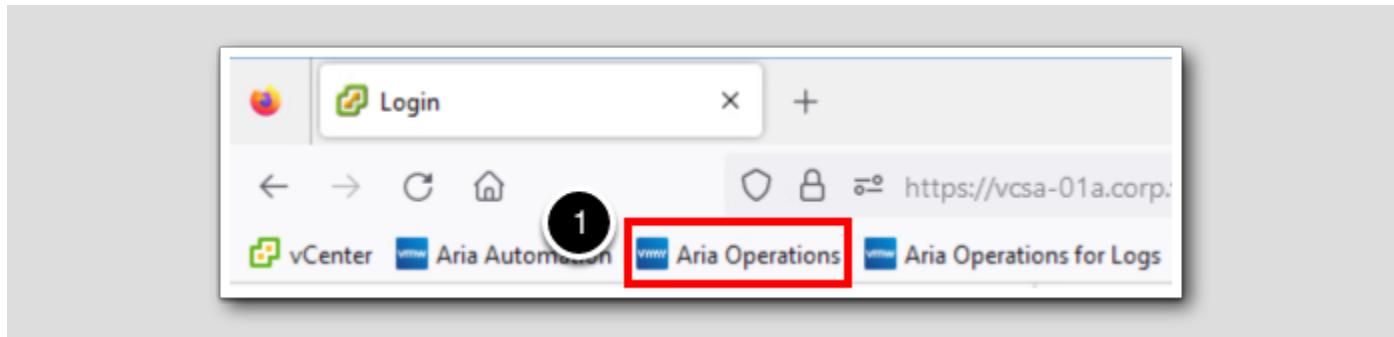
[690]



If the browser is not already open, launch Firefox.

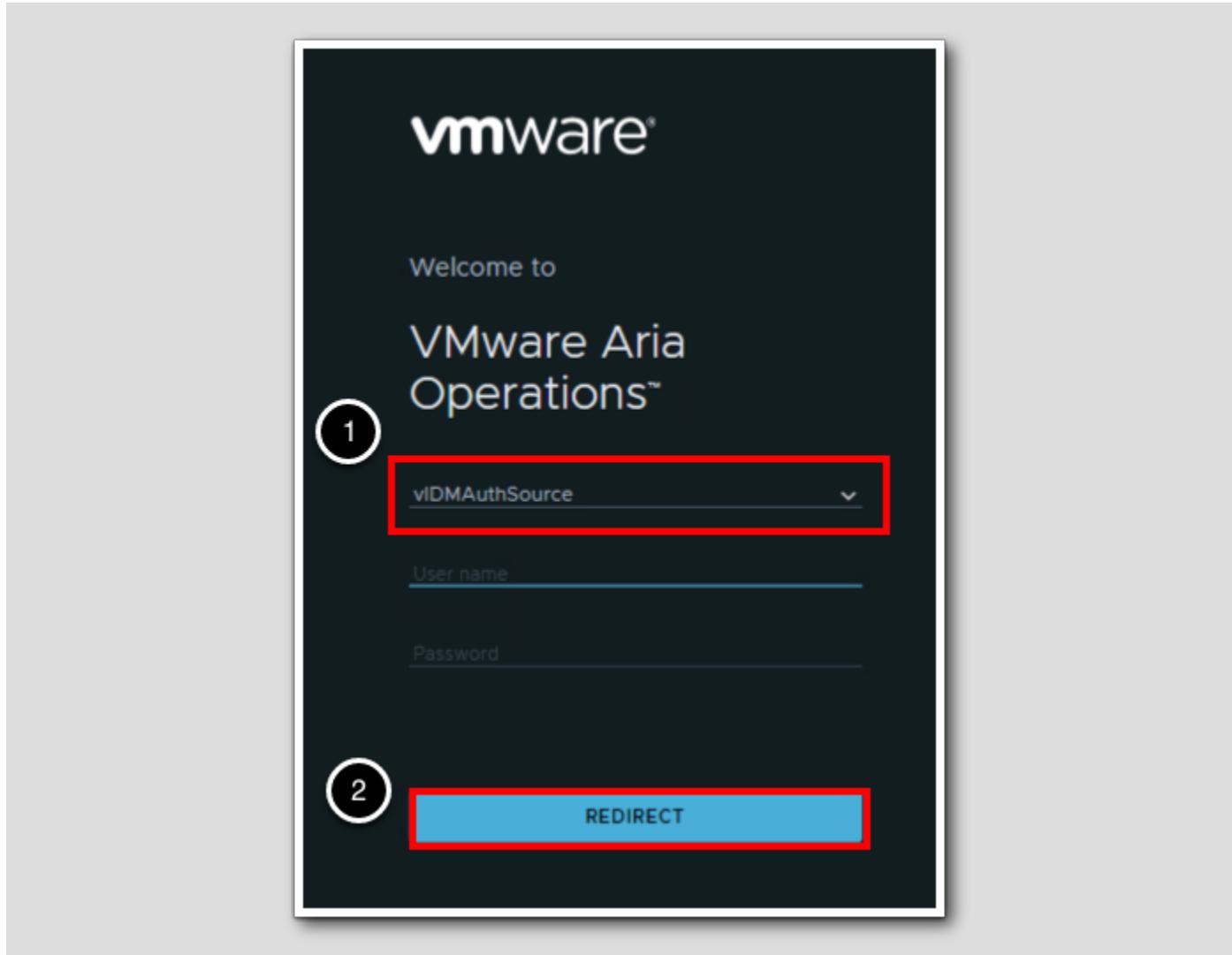
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

## Navigate to Aria Operations



1. Click the **Aria Operations** bookmark in the bookmarks toolbar.

## Log in to Aria Operations

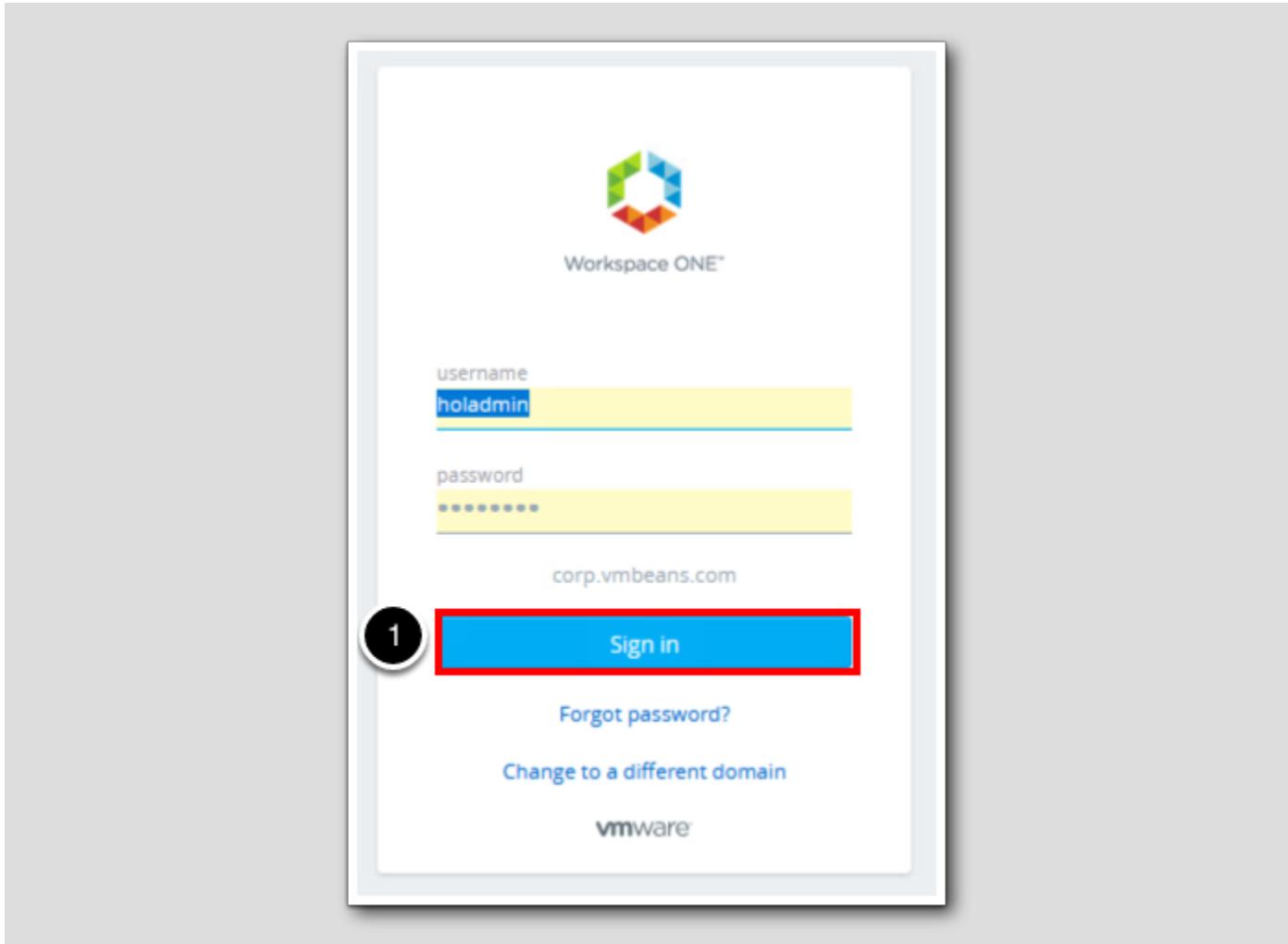


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

vIDMAuthSource may be pre-selected as the default identity source. If it is not, then you will need to select it.

1. Click the drop-down arrow and select vIDMAuthSource if it is not already selected.
2. Click REDIRECT to be taken to the authentication page.

## VMware Identity Manager Login



VMware Identity Manager acts as the identity provider for the Active Directory authentication source in this lab.

Credentials for the default user, holadmin, have already been provided.

1. Click Sign in

## Configure Service Discovery

To discover applications and services and their relationships and to access basic monitoring, you can either provide guest operating system credentials with appropriate privileges or use the credential-less approach to discover services.

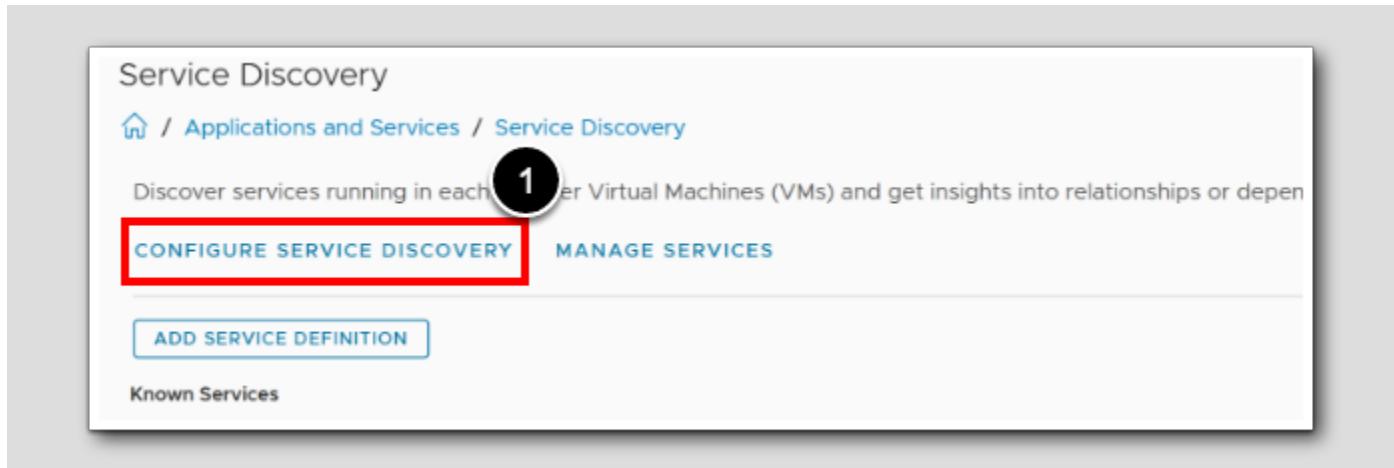
## Applications and services

The screenshot shows the VMware Aria Operations interface. The left sidebar has a 'Configure' dropdown (step 1) with 'Applications and Services' (step 2) selected. The main content area is titled 'Applications and Services' and contains four tiles: 'Service Discovery' (highlighted with a red box and step 3), 'Application Discovery: Service Based', 'Application Discovery: Rule Based', and 'Application Monitoring: Telegraf'. The 'Service Discovery' tile describes discovering services running in vCenter VMs.

To access service discovery in Aria Operations

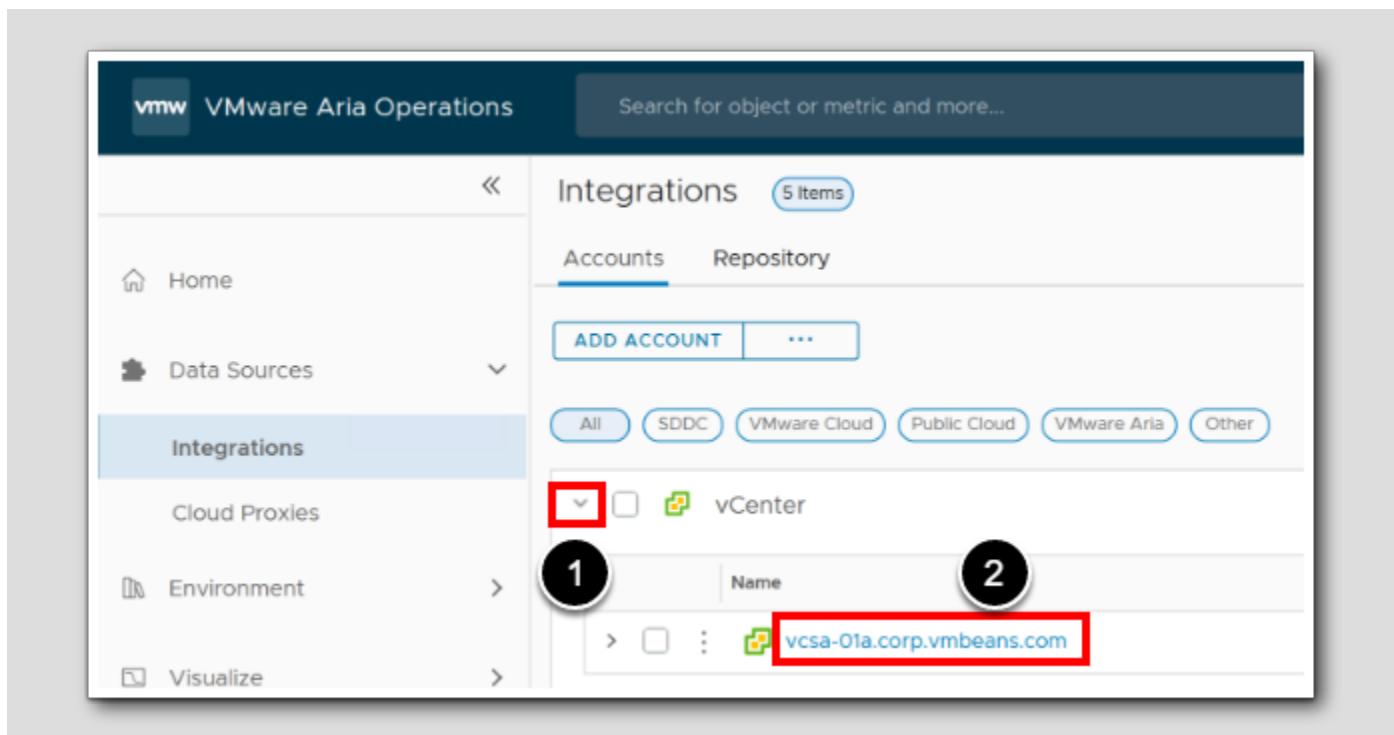
1. From the left menu, click **Configure**
2. Click **Applications and Services**
3. Click the **Service Discovery** tile to open Service Discovery

## Configure Service Discovery



1. From the Service Discovery page, click the Configure Service Discovery option.

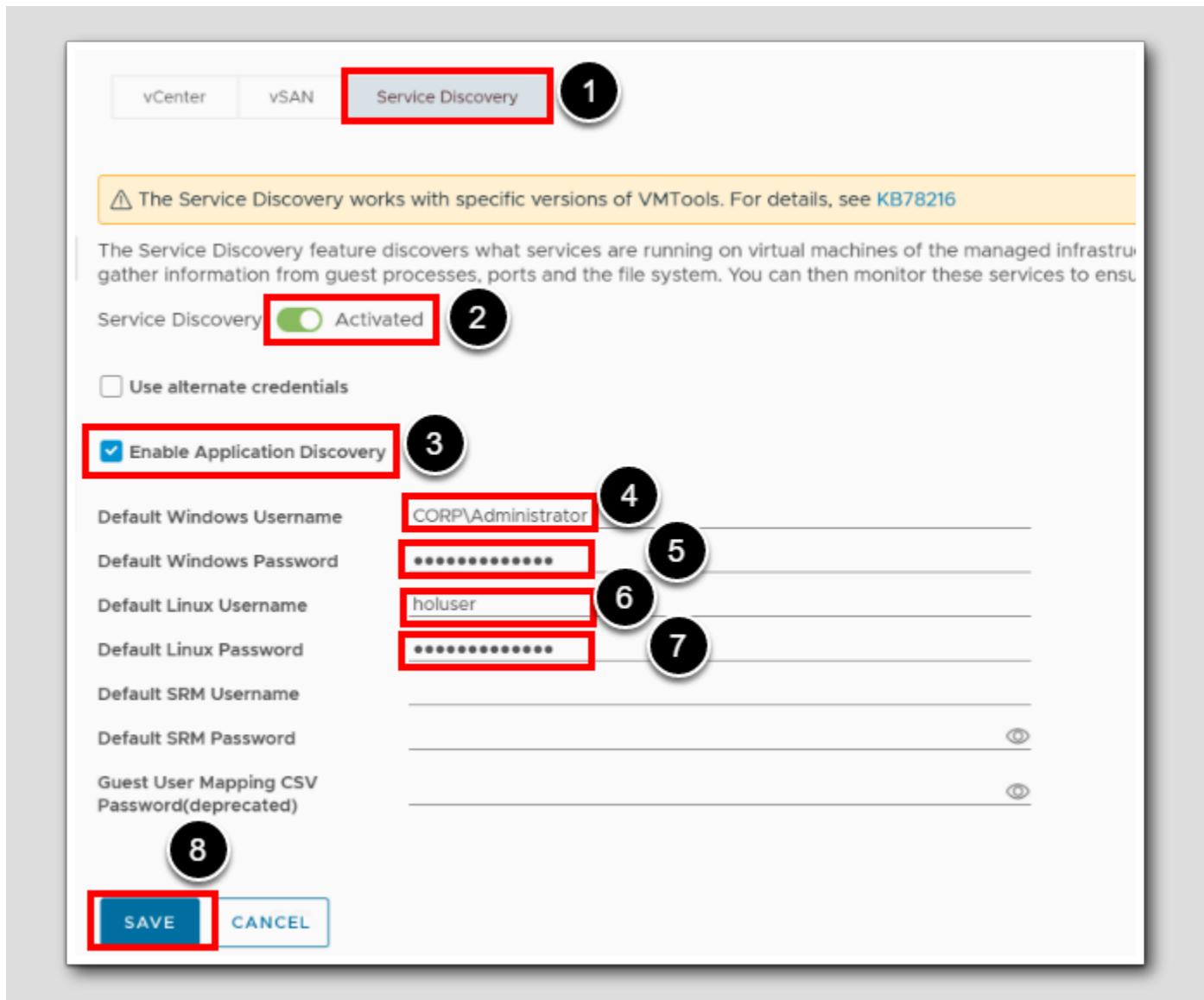
## About the Service discovery



1. To expand the list of vCenter integrations from the Integrations page, click the > next to vCenter
2. Click the vCenter Server instance from the list: vcsa-01a.corp.vmbeans.com

## Enabling Service Discovery

[698]



1. Select the Service Discovery tab.

2. To activate service discovery in this vCenter Server, activate the Service Discovery option.

**Please Note:** As Service Discovery is already set up, there's no need to change any settings. Simply click CANCEL. However, if Service Discovery was not enabled, you would need to complete all of these steps.

3. To activate application discovery in this vCenter Server, select the Enable Application Discovery check box.

You can choose to add credentials by selecting the Use alternate credentials check box. Then you will be prompted to Click a plus sign and enter the details in the Manage Credentials dialog box, which include a credential name and a vCenter user name and password. In addition, enter the user name and password for Windows, Linux, and SRM and then click OK.

We are using the default user name and password

4. Enter a default user name for Windows, CORP\Administrator

5. Enter a default password for Windows, VMware1!

6. Enter a default user name for Linux, holuser

7. Enter a default password for Linux, VMware1!

8. Click Save

## Manage SDMP Services

[699]

VM Name	Operating System	Service Monitoring	Authentication Status
identity-manager	VMware Photon OS (64-bit)	Failed	Failed
aria-ops-logs	VMware Photon OS (64-bit)	Failed	Failed
linux-dev-0011	none	Unknown	Unknown
aria-auto-config	VMware Photon OS (64-bit)	Failed	Failed
windows-0010	Microsoft Windows Server 2019 (64-bit)	Credential-less	Credential-less
ubuntu-0008	Ubuntu Linux (64-bit)	Common Credentials	Common Credentials
aria-auto	VMware Photon OS (64-bit)	Failed	Failed
aria-ops	VMware Photon OS (64-bit)	Credential-less	Credential-less
aria-ops-cp	VMware Photon OS (64-bit)	Credential-less	Credential-less
linux-dev-0010	none	Unknown	Unknown

You can manage services supported by VMware Aria Operations on the specific VMs. The abbreviation SDMP, derives from the old vRealize Operations *Service Discovery Management Pack*

1. From the left menu, select **Environment**
2. Click **Applications**
3. From the Applications panel, select **Manage SDMP Services**

You can view specific details from the options in the data grid.

## The Data grid

[700]

<b>Services Discovered</b>	Displays the names of discovered services. None, if services are not discovered on the VM.
<b>Service Monitoring</b>	Displays the current value of the VM's service monitoring setting. If set, services are discovered, and service performance metrics are calculated every 5 minutes. Otherwise, service discovery is performed every 24 hours.
<b>Authentications Status</b>	VM authentication status for service discovery. The possible values are: <ul style="list-style-type: none"> <li>• Unknown</li> <li>• Failed</li> <li>• Guest Alias</li> <li>• Common Credentials</li> <li>• Credential-less</li> </ul>
<b>Power State</b>	Power status of the VMs. The possible values are: <ul style="list-style-type: none"> <li>• Powered On</li> <li>• Powered Off</li> <li>• Suspended</li> <li>• Unknown</li> </ul>

The data we are looking at contains the name of the VM, and other specific details. We have highlighted a few here.

## Activate Service monitoring

The screenshot shows the 'Manage SDMP Services' interface. A specific VM, 'ubuntu-0008', is selected and highlighted with a red box and a circled '1'. A context menu is open over the 'ubuntu-0008' row, with the 'Activate Service Monitoring' option highlighted by a red box and circled '2'. The menu also includes 'Deactivate Service Monitoring' and 'Provide Password' options. The main table lists various VMs with their status (e.g., Failed, Powered On, Powered Off) and service monitoring status (e.g., Failed, Credential-less, Common Credentials). The table has columns for Service Monitoring, Authentication Status, and Power State.

VM Name	Op	Service Monitoring	Authentication Status	Power State
identity-manager	VM	Failed	Failed	Powered On
aria-ops-logs	VMware Photon OS (64-bit)	Failed	Failed	Powered On
linux-dev-0011	none	Unknown	Unknown	Powered Off
aria-auto-config	VMware Photon OS (64-bit)	Failed	Failed	Powered On
windows-0010	Microsoft Windows Server 2019 (64-bit)	Credential-less	Credential-less	Powered On
<b>ubuntu-0008</b>	Ubuntu Linux (64-bit)	Common Credentials	Common Credentials	Powered On
aria-auto	VMware Photon OS (64-bit)	Failed	Failed	Powered On
aria-ops	VMware Photon OS (64-bit)	Credential-less	Credential-less	Powered On
aria-ops-cp	VMware Photon OS (64-bit)	Credential-less	Credential-less	Powered On
linux-dev-0010	none	Unknown	Unknown	Powered Off

Please note: On ubuntu-0008, the Service Discovery is already active. You can confirm this by looking for a green check-mark in the Service Monitoring column. Consequently, you may not need to follow the next steps in our current setup. However, they are included to demonstrate the usual procedure if needed.

1. Select the **ubuntu-0008** VM from the list
2. Click the Horizontal Ellipsis
3. Click **Activate Service Monitoring**

When we click Activate Service Monitoring we activate frequent service discovery and service performance metrics calculation (every 5 minutes).

Note: If we select too many VMs, this could potentially result in vCenter Server degradation

## Discovered Services

The screenshot shows the Service Discovery interface in vCenter. On the left, a sidebar menu includes Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure (highlighted with a red box), Policies, Alerts, Super Metrics, Applications and Services (highlighted with a blue box), Cost Drivers, Custom Profiles, Configuration Files, and Maintenance Schedules. Number 1 points to the 'Configure' dropdown. Number 2 points to the 'Applications and Services' option. The main pane displays a grid of discovered services, each with a gear icon and a status indicator:

Service	Status
Active Directory	Green (Healthy)
Apache HTTP	Yellow (Warning) 1 virtual machine
Apache Tomcat	Yellow (Warning) 2 virtual machines
Cassandra	Green (Healthy)
Exchange Hub Transport Server	Green (Healthy)
Exchange Mailbox Server	Green (Healthy)
Exchange Server	Green (Healthy)
Exchange Unified Messaging Server	Green (Healthy)
MS-SQL DB	Green (Healthy)
MySQL DB	Green (Healthy)
Nginx	Green (Healthy)
Oracle DB	Green (Healthy)

You can view discovered services, the number of VMs on which each discovered service is running, and we will have a look at where You View the Discovered Services

1. From the left menu, click Configure
2. Click Applications and Services.
3. From the right panel, click the Service Discovery tile (not shown) to open Service Discovery and view the list of available services.

## Discovered Services

After you have configured Service Discovery and the services are discovered, we will see a list of services that are discovered and the number of VMs that have the services running.

**Known Services:** We see a list of all the services supported and those that can be discovered.

**Custom Services:** It is possible to add a Custom Service by clicking *Add Service Definition* and use a process name or Regex. A Custom service can be discovered via Service Discovery if there is a permanent listening TCP port or if there is an established UDP connection.

## Configure Telegraf Agent

[703]

### About the Telegraf agent

[704]

The Telegraf agent is a versatile and efficient open-source data collector widely used in monitoring systems, including Aria Operations.

It serves as a lightweight and flexible agent that collects and reports metrics from various sources. Its plugin-driven architecture, lightweight nature, and flexibility in configuration make it a valuable component in monitoring and managing virtualized environments.

Since it is pretty efficient and customizable, it's also actively supported by a thriving community.

Open source Telegraf's source code is hosted on GitHub and InfluxData, the organization behind Telegraf, maintains an active community where users can access forums, ask questions, and get support for Telegraf. Stack Overflow, the popular Q&A platform for developers, has a dedicated Telegraf tag and Reddit's r/Telegraf subreddit hosts relevant sections and monitoring-focused forums.

We will take a look at how to install the Telegraf Agent easily using the Aria Operations User interface

## Applications Home

The screenshot shows the VMware Aria Operations interface. On the left, the navigation pane has 'Environment' expanded, with 'Applications' selected (highlighted by a red box and numbered 2). Under 'Applications', 'Manage Telegraf Agents' is also highlighted with a red box and numbered 3. The main content area is titled 'Manage Telegraf Agents' and lists several VMs with their status and last operation status. A red arrow points to the 'windows-0010' entry, which is marked as 'Agent Running'.

VM Name	Operating System	Agent status	Last operation status
aria-auto	VMware Photon O...	Not Installed	-
aria-auto-config	VMware Photon O...	Not Installed	-
aria-ops	VMware Photon O...	Not Installed	-
aria-ops-cp	VMware Photon O...	Not Installed	-
aria-ops-logs	VMware Photon O...	Not Installed	-
identity-manager	VMware Photon O...	Not Installed	-
linux-dev-0011	none	Not Installed	-
linux-dev-0012	none	Not Installed	-
ubuntu-0008	Ubuntu Linux (64-bit)	Not Installed	-
windows-0010	Microsoft Windows...	Agent Running	Install Success

Let's get to the *Manage Telegraf Agents* page to start installing a Telegraf agent on a Linux server.

1. Click Environment
2. Click Applications
3. Click **Manage Telegraf Agents**

Notice that a Telegraf agent is already installed on an Windows server in the environment. (arrow)

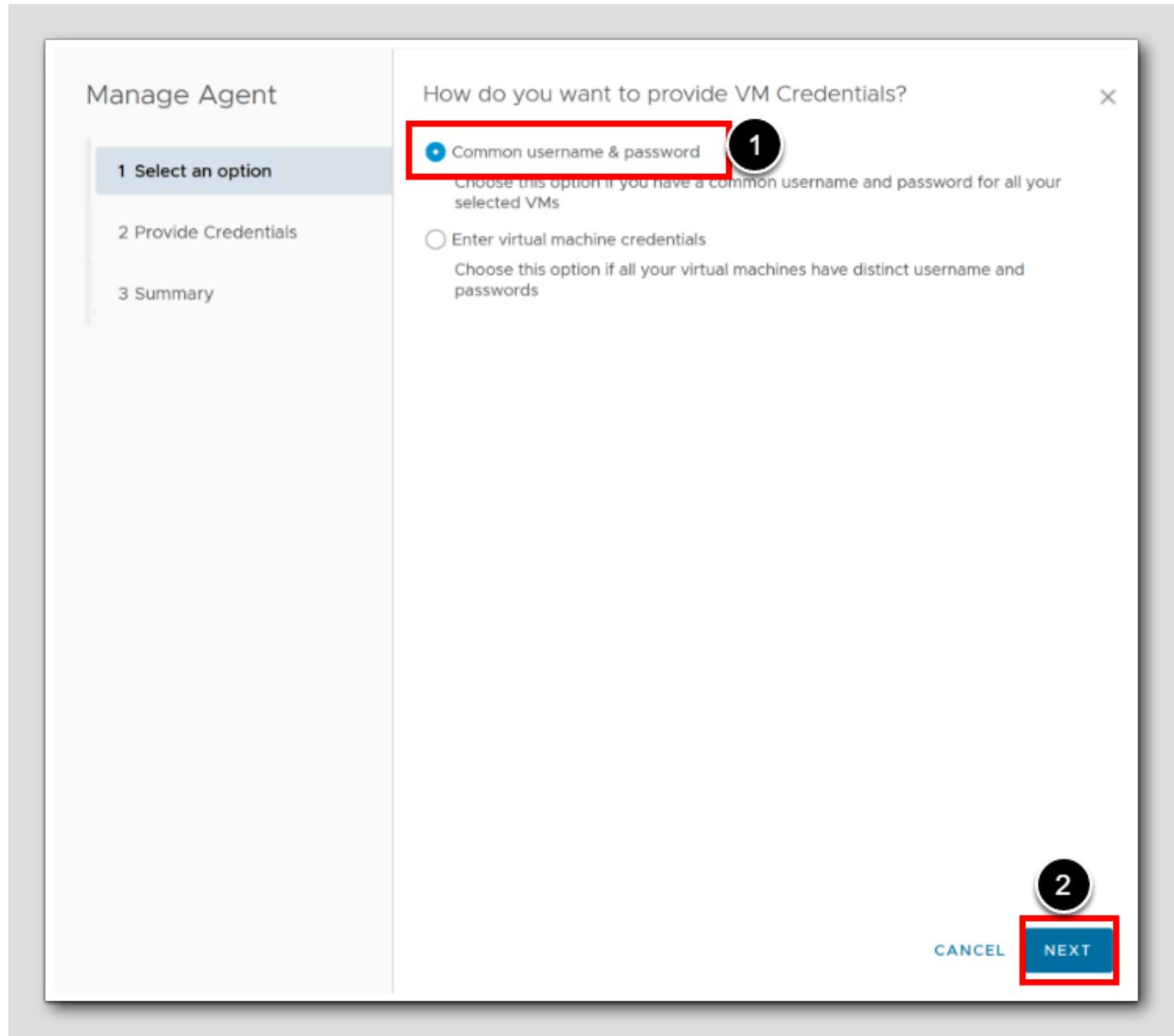
## Installing

The screenshot shows the vSphere Web Client interface. On the left, the navigation sidebar is visible with various options like Applications Home, Manage Telegraf Agents (which is selected and highlighted in grey), Manage SDMP Services, Manage Applications, Environments, vSphere, Service Discovery, VMware Aria Automation, Others, Groups and Applications, and All Objects. The main content area is titled "Manage Telegraf Agents". At the top right of this area, there are three buttons: "GO TO DETAILS", "VM ACTIONS", and an ellipsis (...). The "VM ACTIONS" button has a red box drawn around it. A dropdown menu is open from this button, showing options: "Install" (which is highlighted with a red box and has a black circle with the number 2 over it), Uninstall, Update, Start, and Stop. Another red box highlights the "Install" option. Below this menu, a table lists several VMs. The first row, which is highlighted with a red box and has a black circle with the number 1 over it, represents an Ubuntu server named "ubuntu-0008". This row shows the VM Name, operating system (Ubuntu Linux (64-bit)), and agent status (Not Installed). The second row shows a Windows server named "windows-0010" with Microsoft Windows as the OS and Agent Running status.

VM Name	Agent status
aria-auto	Not Installed
aria-auto-config	Not Installed
aria-ops	Not Installed
aria-ops-cp	VMware Photon O... Not Installed
aria-ops-logs	VMware Photon O... Not Installed
identity-manager	VMware Photon O... Not Installed
linux-dev-0011	none Not Installed
linux-dev-0012	none Not Installed
<b>ubuntu-0008</b>	<b>Ubuntu Linux (64-bit) Not Installed</b>
windows-0010	Microsoft Window... Agent Running

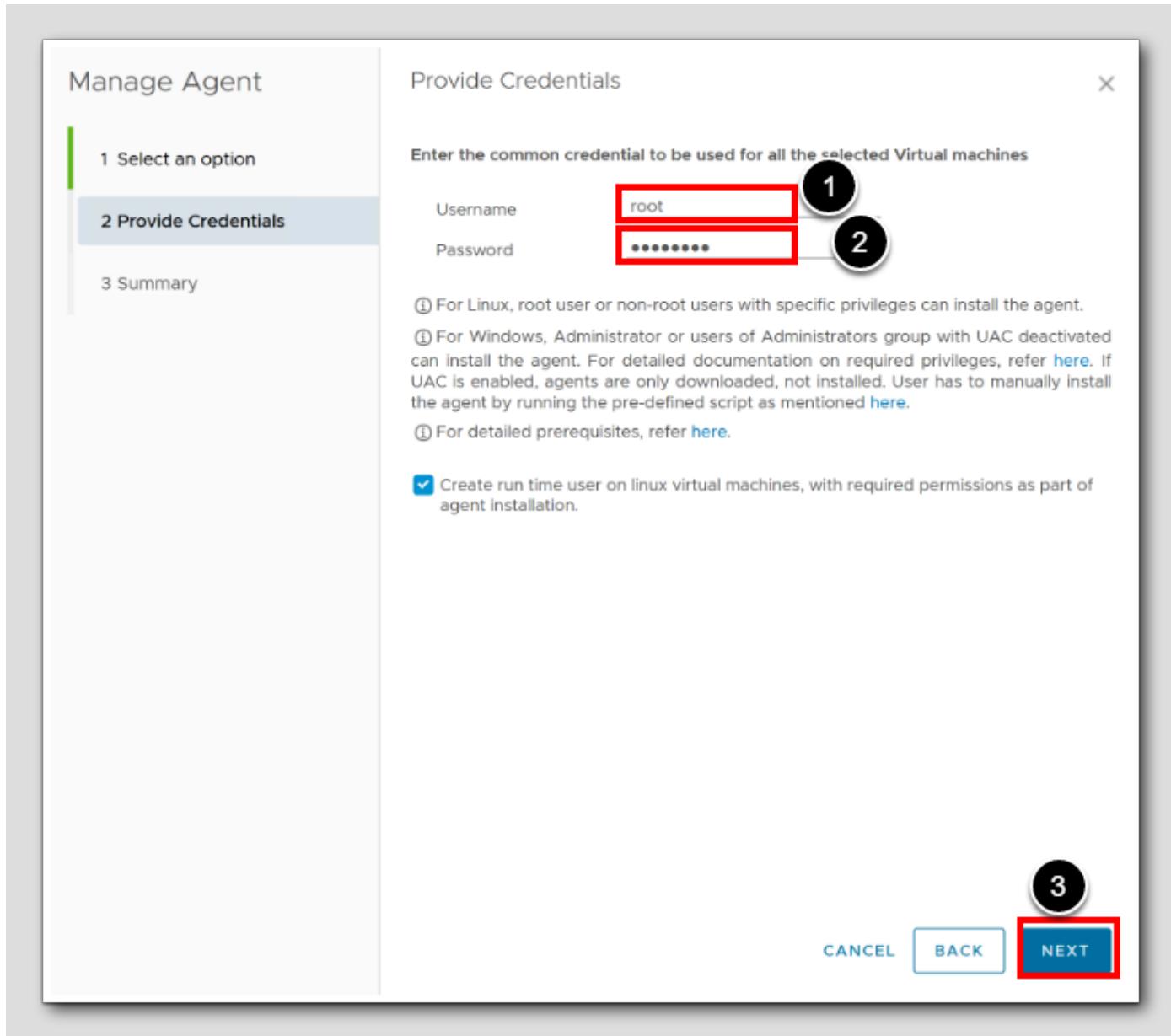
1. Have a look for a powered On Linux Server, and Click the Ubuntu server **ubuntu-0008**
2. Click the **ellipse** menu
3. Choose **Install**

## Common Username and password



1. Select Common username & password
2. Click Next

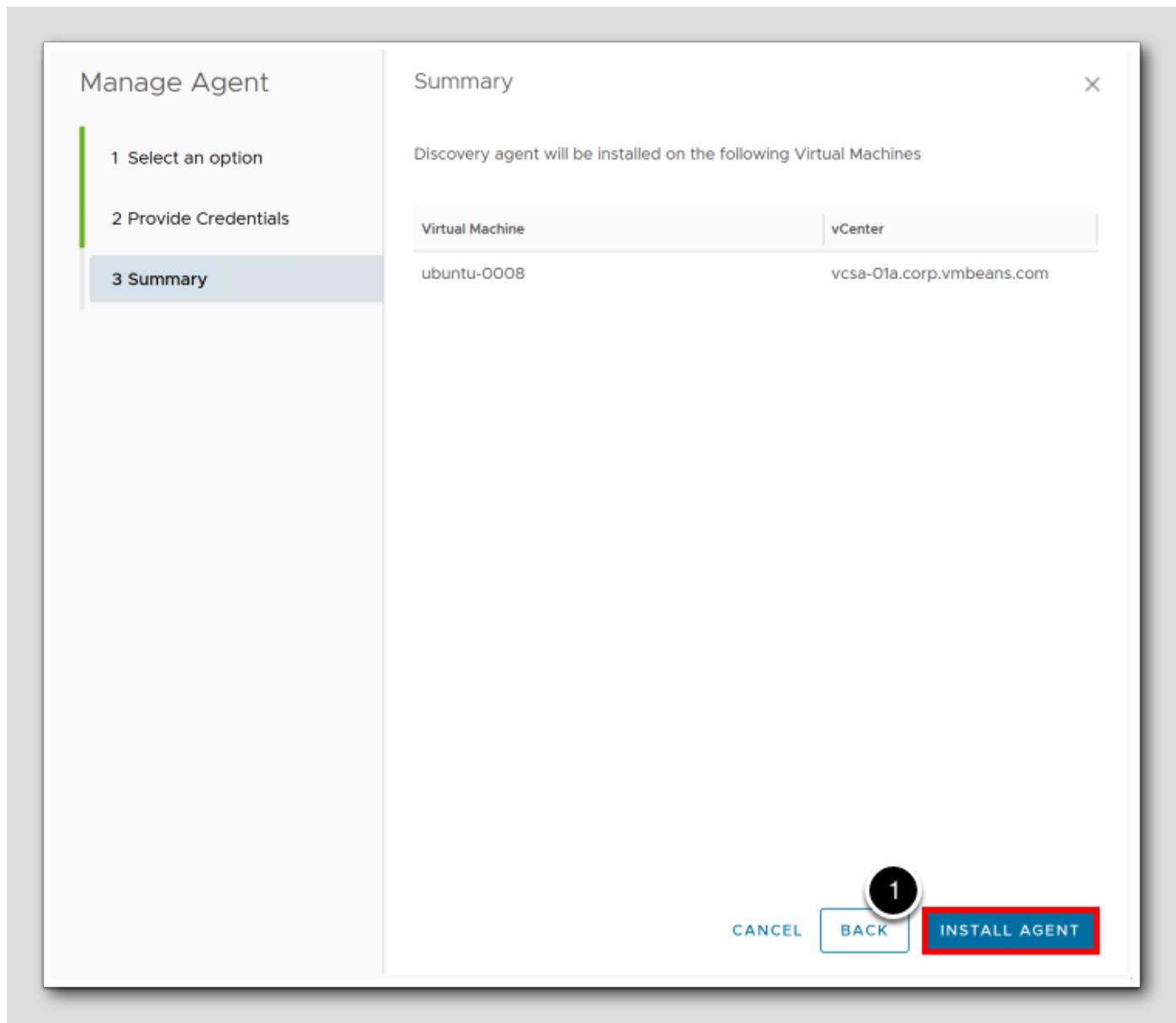
## Provide Credentials



Let's provide some credentials for the installation

1. Username, type **root**
2. Password, type **VMware1!**
3. Leave the rest and click **Next**

## Summary and confirm



1. Click **INSTALL AGENT**

## Monitor the Installation

The screenshot shows a table titled "Manage Telegraf Agents" with the following data:

VM Name	Operating System	Agent status	Last operation status	VM State	Virtual IP Det...	Collector Group	Cloud Proxy	Agent Version	vCenter Name	Colle...	Colle...
aria-auto	VMware Photon O...	Not Installed	-	Powered On	-	-	192.168.110....	None	vcsa-01a.c...		
aria-auto-config	VMware Photon O...	Not Installed	-	Powered On	-	-	192.168.110....	None	vcsa-01a.c...		
aria-ops	VMware Photon O...	Not Installed	-	Powered On	-	-	192.168.110....	None	vcsa-01a.c...		
aria-ops-cp	VMware Photon O...	Not Installed	-	Powered On	-	-	192.168.110....	None	vcsa-01a.c...		
aria-ops-logs	VMware Photon O...	Not Installed	-	Powered On	-	-	192.168.110....	None	vcsa-01a.c...		
identity-manager	VMware Photon O...	Not Installed	-	Powered On	-	-	192.168.110....	None	vcsa-01a.c...		
linux-dev-0011	none	Not Installed	-	Powered Off	-	-	192.168.110....	None	vcsa-01a.c...		
linux-dev-0012	none	Not Installed	-	Powered Off	-	-	192.168.110....	None	vcsa-01a.c...		
ubuntu-0008	Ubuntu Linux (64-bit)	Not Installed	Install in Progress	Powered On	-	-	192.168.110....	None	vcsa-01a.c...		
windows-0010	Microsoft Windows 10 Pro	Agent Running	Install Success	Powered On	-	-	192.168.110....	8.12.0.57	vcsa-01a.c...		

Please Note: Under the installation, the "Last Operations Status" column will show the changes. When the installation is done it will show "Install Success" as you can see indicated on the windows-0010 server column below (This image might differ from yours).

1. Use the Refresh button to monitor the status of the installation

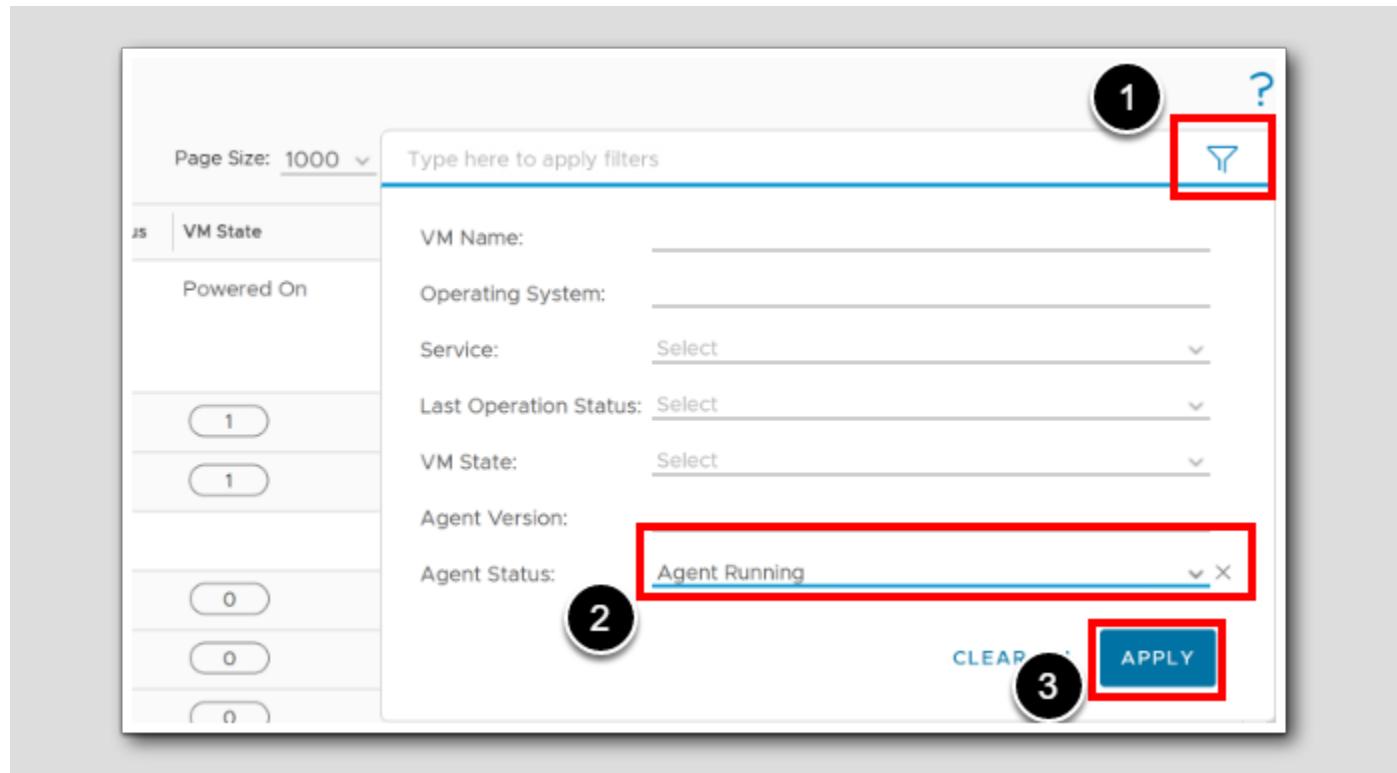
## Comments

[711]

Using the GUI is a very simple way to install Telegraf Clients onto Virtual Machines for OS and Application monitoring.

## Custom Monitoring Using Telegraf Agent

## Filter on installed Agents



1. In the upper right corner click the Filter Icon
2. From the Agent Status, select Agent Running
3. Click Apply

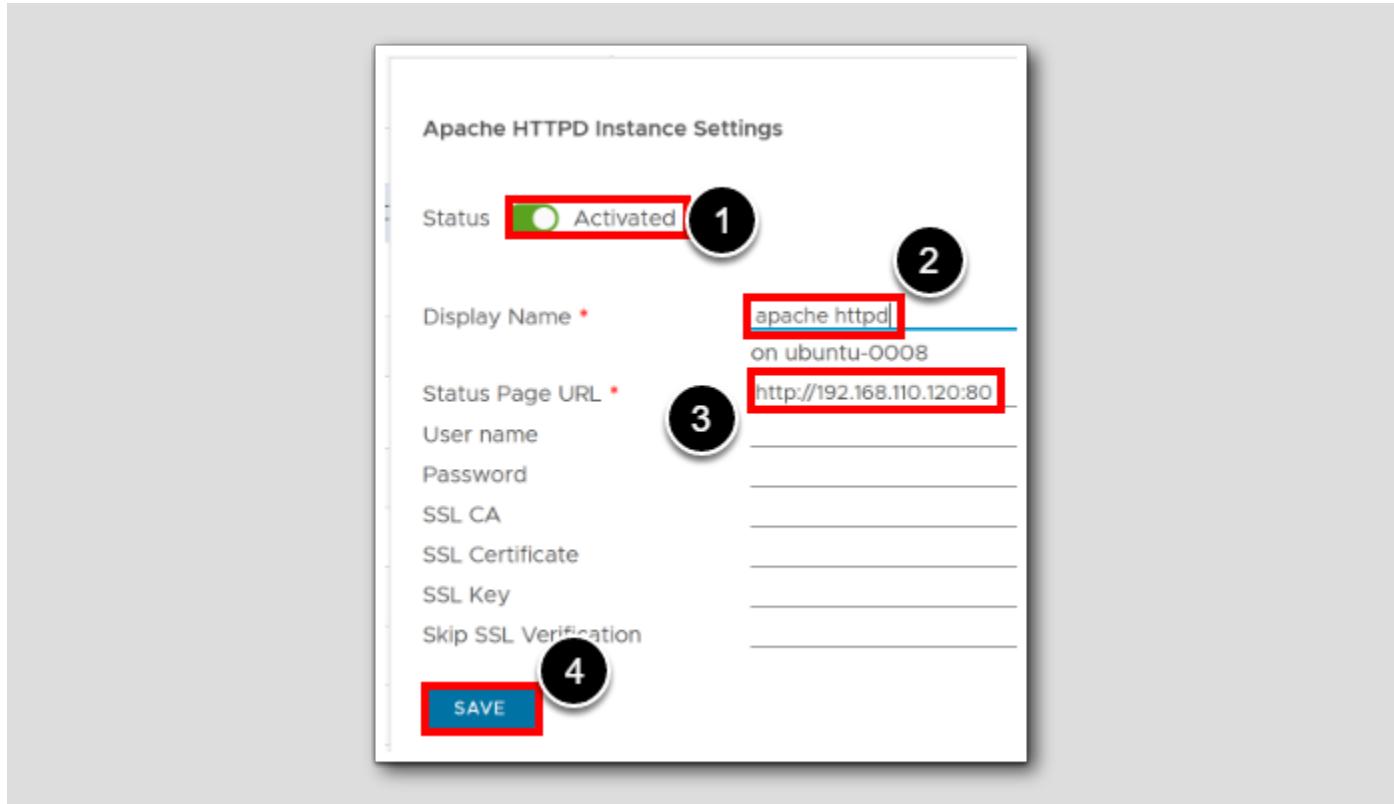
## Apache daemon service check

### Manage Telegraf Agents

VM Name	Operating System	Agent status	Last operation st...	VM State
ubuntu-0008	Ubuntu Linux ...	Agent Runn...	Install Success	Powered On
<b>Services Discovered</b> 2				
⋮	Apache HTTPD	Add	0	0
⋮	Network Time Protocol		0	0
<b>Custom Monitoring</b> 6				
⋮	Ping Check	0	0	0
⋮	UDP Check	0	0	0
⋮	TCP Check	0	0	0
⋮	HTTP Check	0	0	0
⋮	Custom Script	0	0	0
⋮	Processes	0	0	0
windows-0010	Microsoft Win...	Agent Runn...	Install Success	Powered On

1. Expand *ubuntu-008* by clicking the > icon
2. Click the ellipsis
3. Choose Add

## Adding a Apache httpd check



1. In the Apache HTTPD Instance Settings, set Status to **Activated**
- 2.Under Display Name, type **apache httpd**
- 3.Under Status Page URL enter the url for the apache server **http://192.168.110.120**
- 4.Click **SAVE**

Congratulations, you are now monitoring the Apache httpd process on the Linux server ubuntu-0008 !

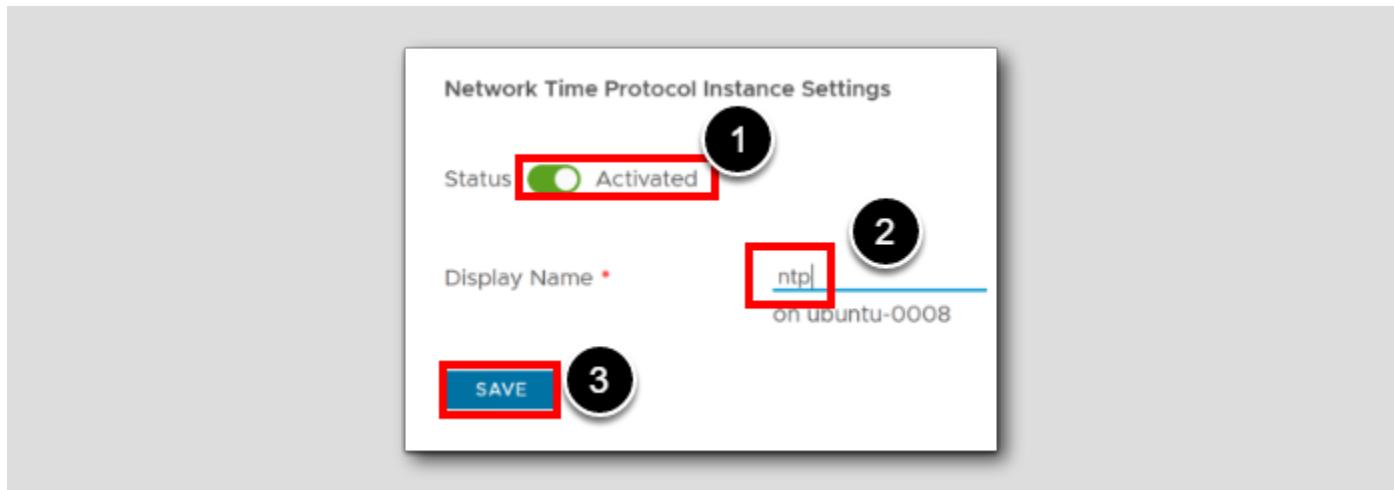
## NTP daemon check



1. On the (?) Network Time Protocol, click the ellipsis

2. Choose Add

## NTP instance settings

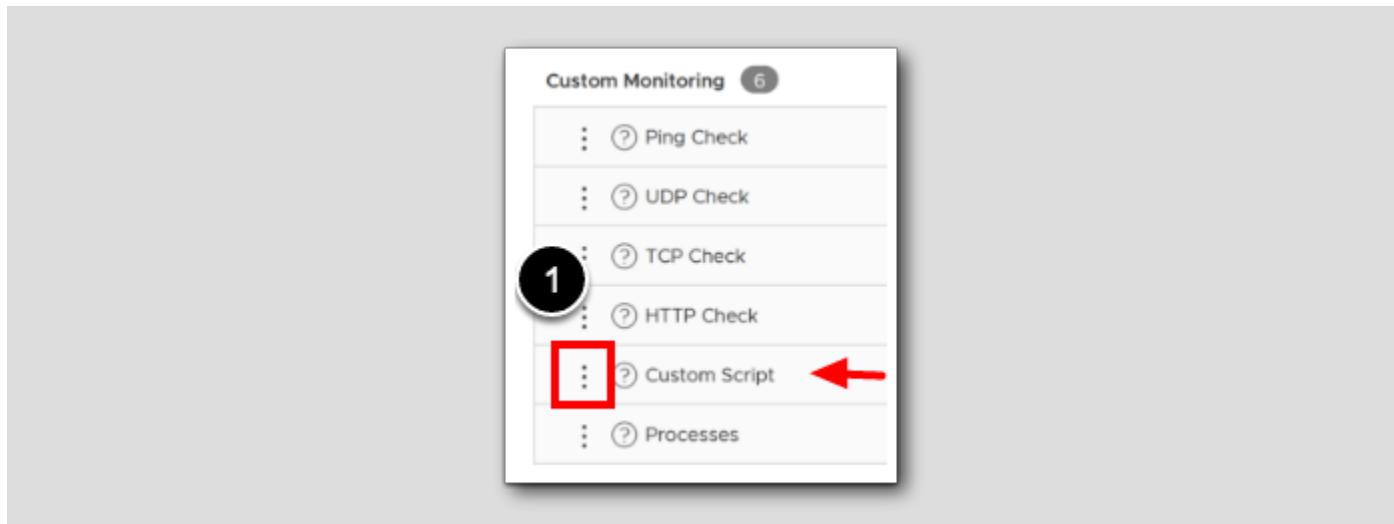


1. Under the Network Time Protocol Instance Settings, set Status to Activated
2. Set Display Name to **ntp**
3. Click **SAVE**

Congratulations, you are now monitoring the network Time Protocol (NTP) daemon process on the Linux server ubuntu-0008 !

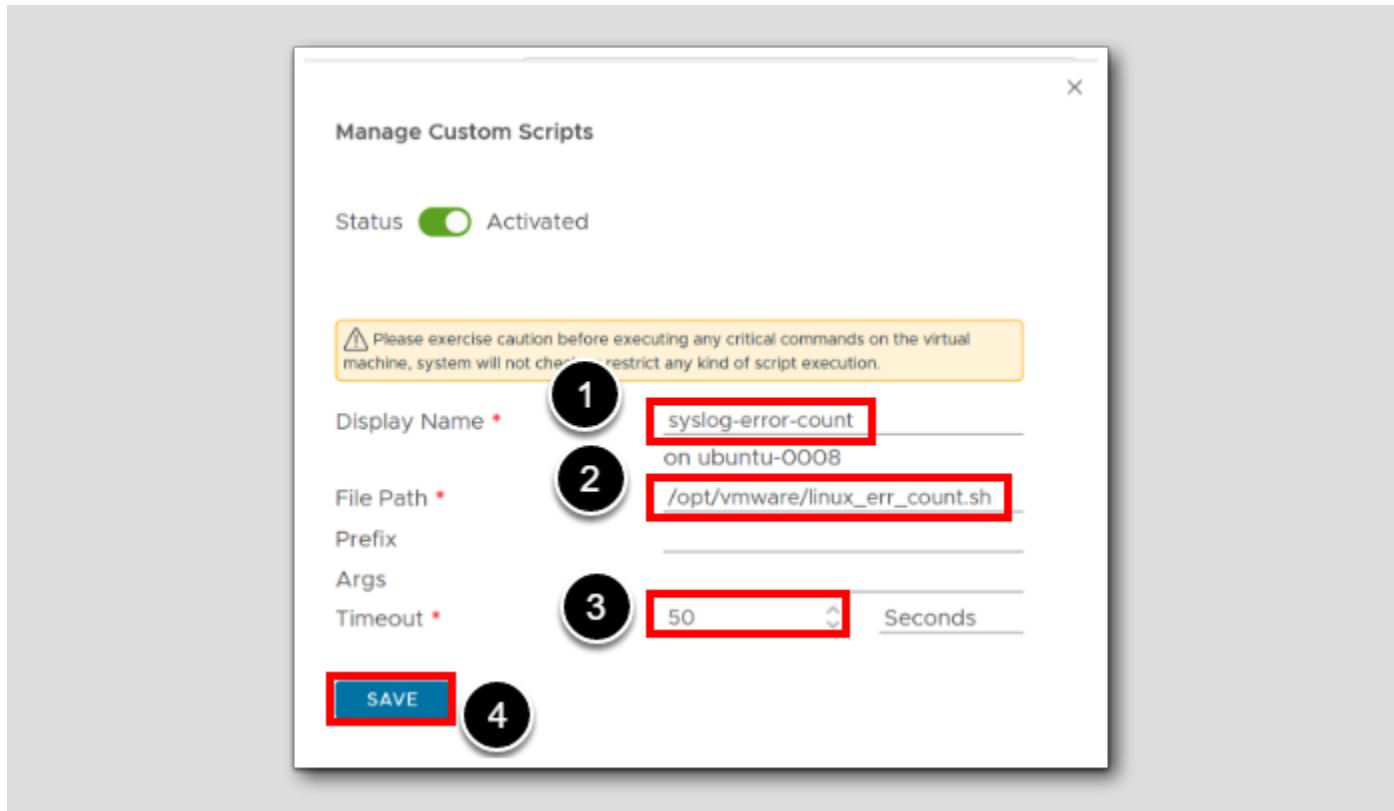
## Custom monitoring

[718]



1. Under Custom Monitoring, behind (?) *Custom Script* Click the ellipse
2. Choose **Add** (not shown)

## Adding the custom script



Under the Manage Custom Scripts we are going to add a script located on the Linux server ubuntu-0008, that will return a value back to Aria Operations that returns the Number of SYSLOG errors in the last 7 days. In other environments you would probably change that to 24 hours. See both scripts below

1. Set Display name to **syslog-error-count**
2. Set the File Path to **/opt/vmware/linux\_err\_count.sh**
3. Set the Timeout to 50 Seconds
4. Click **SAVE**

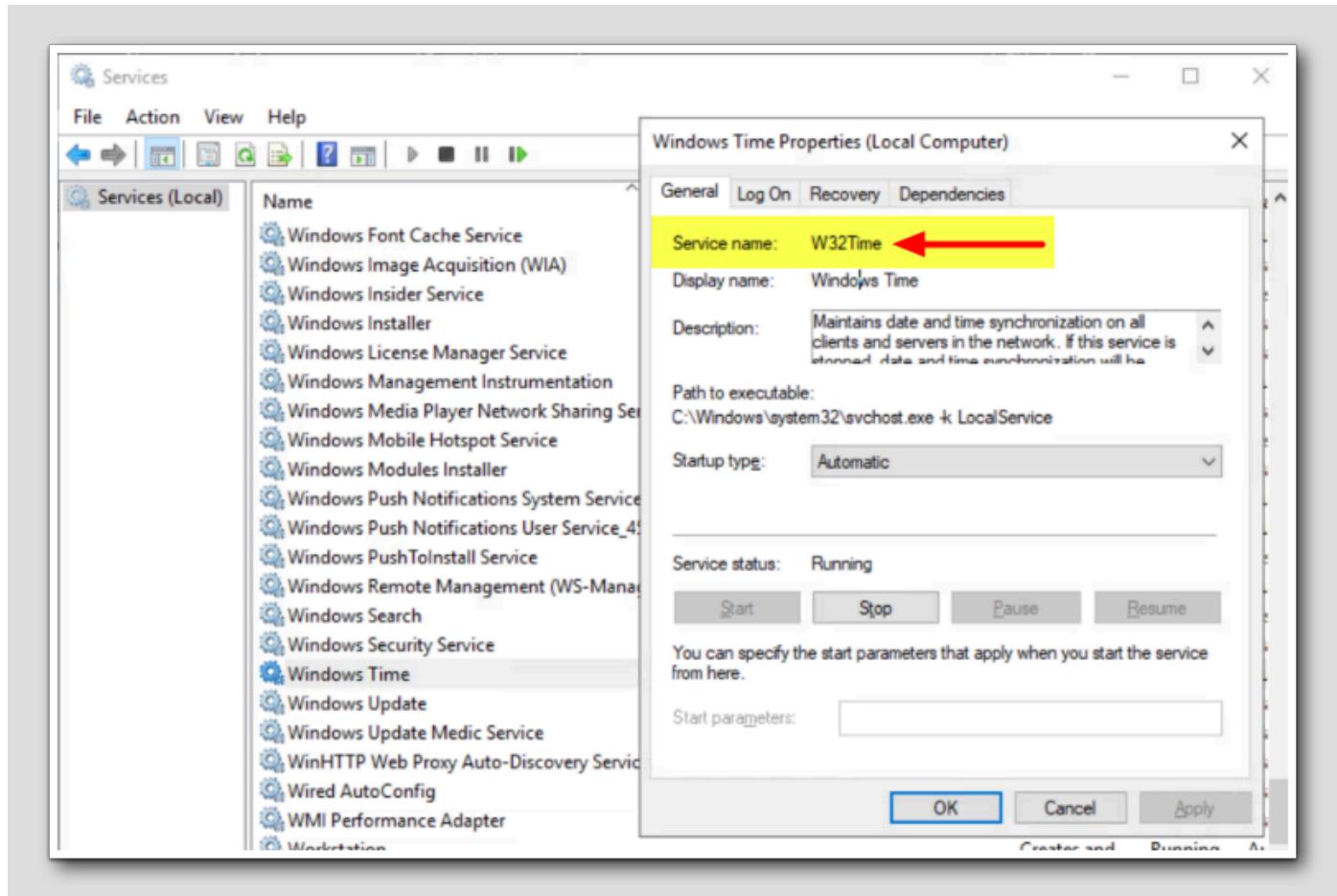
Here is the Linux script counting SYSLOG errors for the last 24 hours

```
#!/usr/bin/bash
# Number of SYSLOG errors in the last 24 hours
error_count=$(grep -i "error" /var/log/syslog | grep "$(date --date='24 hours ago' '+%b %e')" | wc -l
echo $error_count
```

Here is the Linux script counting SYSLOG errors for the last 7 days

```
#!/usr/bin/bash
# Number of SYSLOG errors in the last 7 days
error_count=$(grep -i "error" /var/log/syslog | grep "$(date --date='7 days ago' '+%b %e')" | wc -l
echo $error_count
```

## Monitoring any Windows service

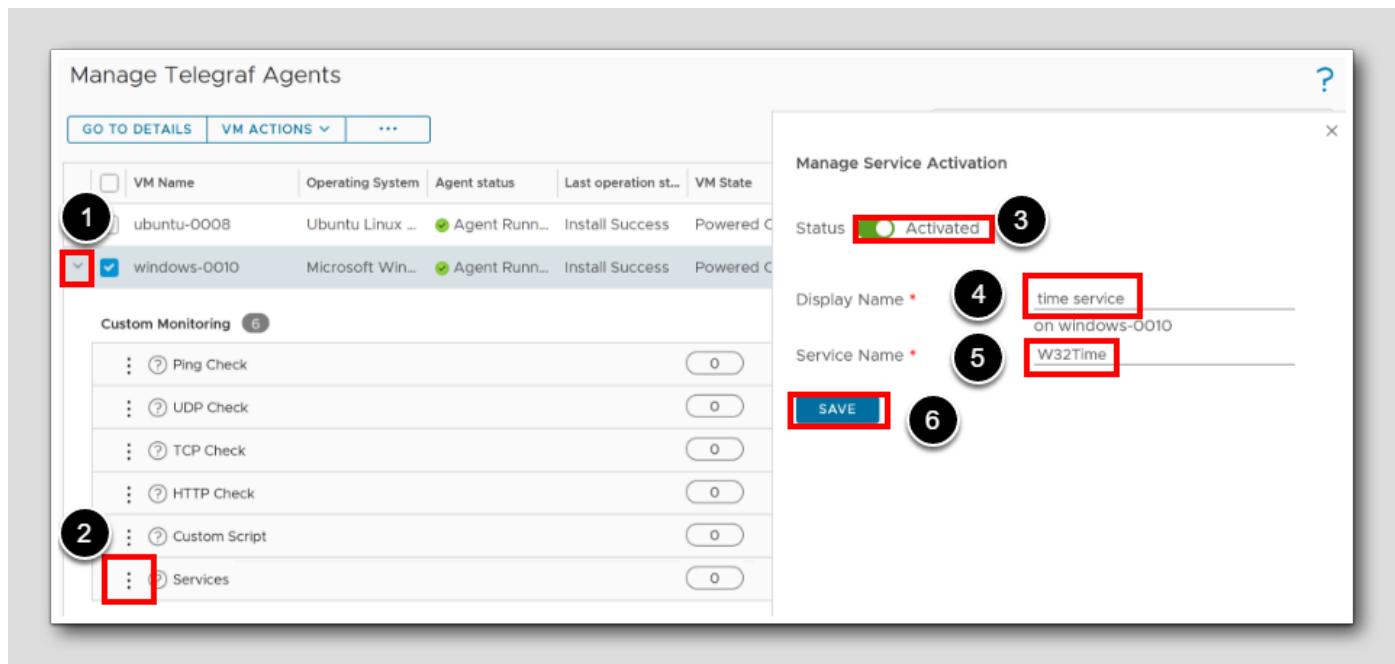


On any windows server there might be necessary to monitor specific services, for example IIS service, DNS Service, SQL Service, etc.

All we need to know is the Service Name from the Windows Services Console (*Start>Run>services.msc*). In this example we will be checking a windows server for the Windows Time Service, where the service name is **W32Time** - the server we will be checking this on is windows-0010

Let's dive in.

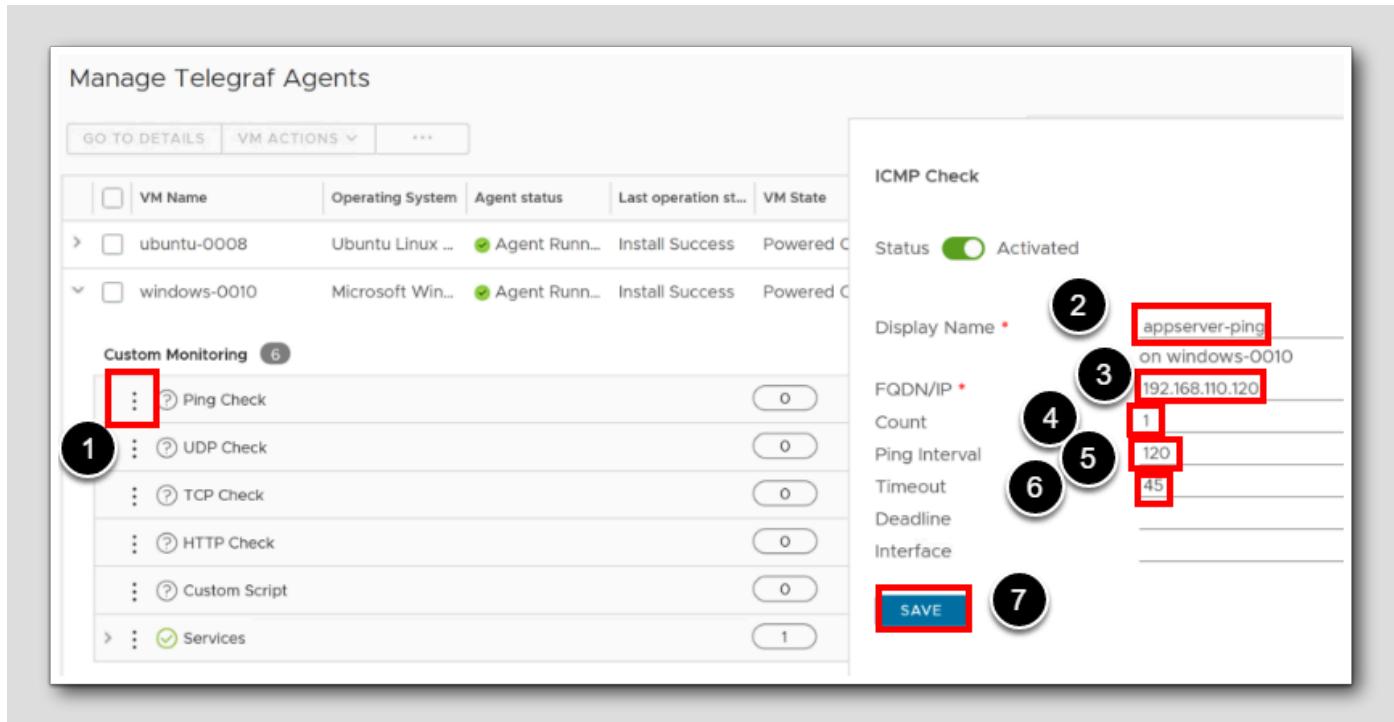
## Windows Service monitoring



1. This time, under the manage Telegraf Agents, Expand the Windows server windows-0010 by clicking the expand icon >
2. In front of (?) services, click the Ellipse and Choose Add (not shown)
- 3.Under the Manage Service Activation, make sure it is Activated
- 4.Behind Display Name type time service
- 5.Behind Service Name, type W32Time
- 6.Click SAVE

Congratulations, You are now monitoring the Time Service on the windows server windows-0010. Other important services could be IIS, MSSQL, DNS, Active Directory, etc.

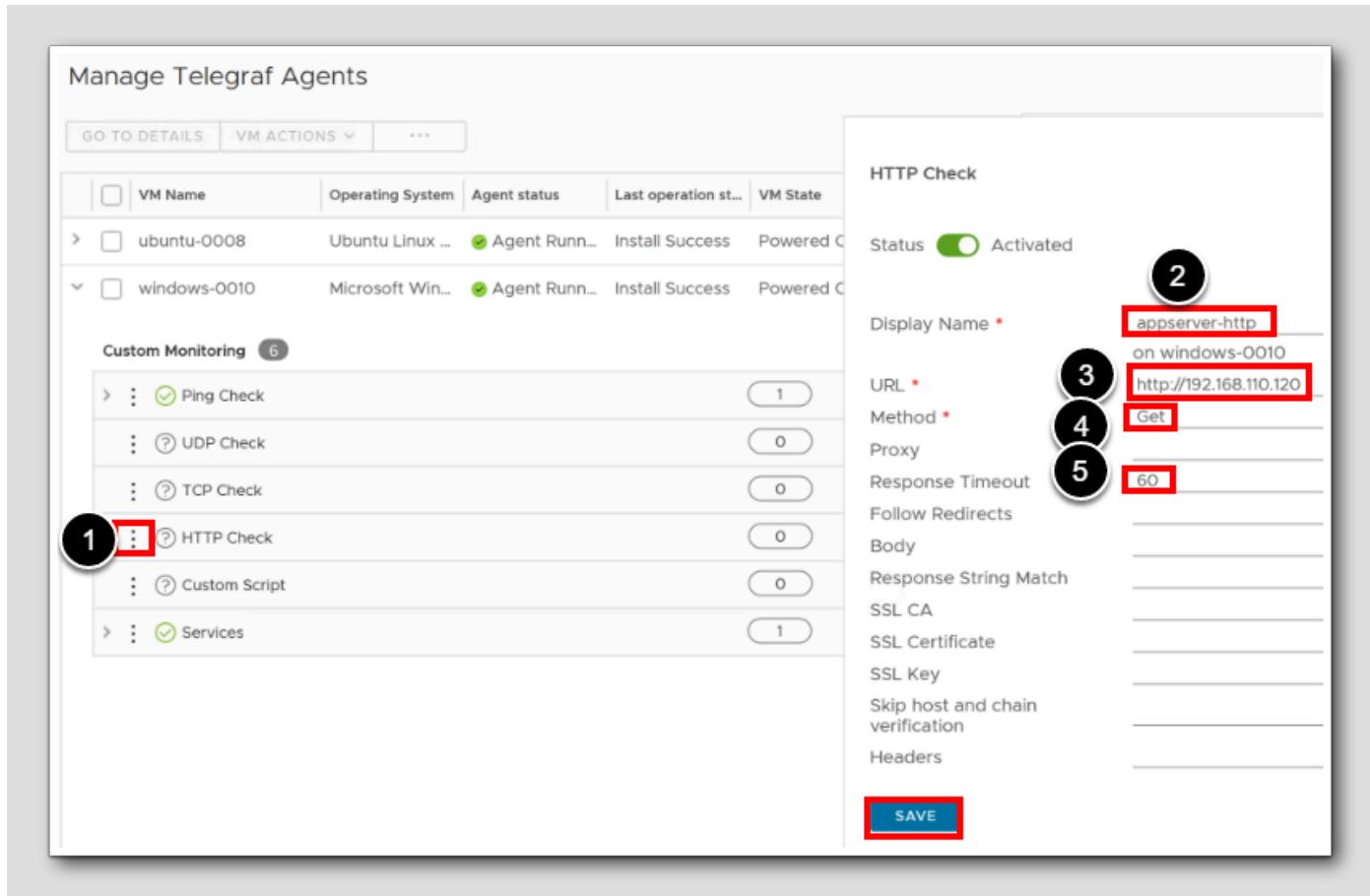
## Adding a remote ping check



1. Under the *Manage Telegraf Agents*, In front of (?) Ping Check, click the Ellipse and then Choose Add (not shown)
- 2.Under the *Manage Service Activation*, Behind *Display Name* type **appserver-ping**
- 3.Behind FQDN/IP, type the IP address for the Linux Ubuntu-0008 server: **192.168.110.120**
- 4.Number of pings will be just one, behind Count type **1**
- 5.We will ping only every other minute, behind Ping Interval type **120**
- 6.If nothing has happened within 45 seconds, we have timed out, Behind Timeout type **45**
- 7.Click **SAVE**

Congratulations, You have just added a ping coming initiated on the windows server windows-0010, that pings our important application server ubuntu-0008 every other minute.

## Adding a remote HTTP check

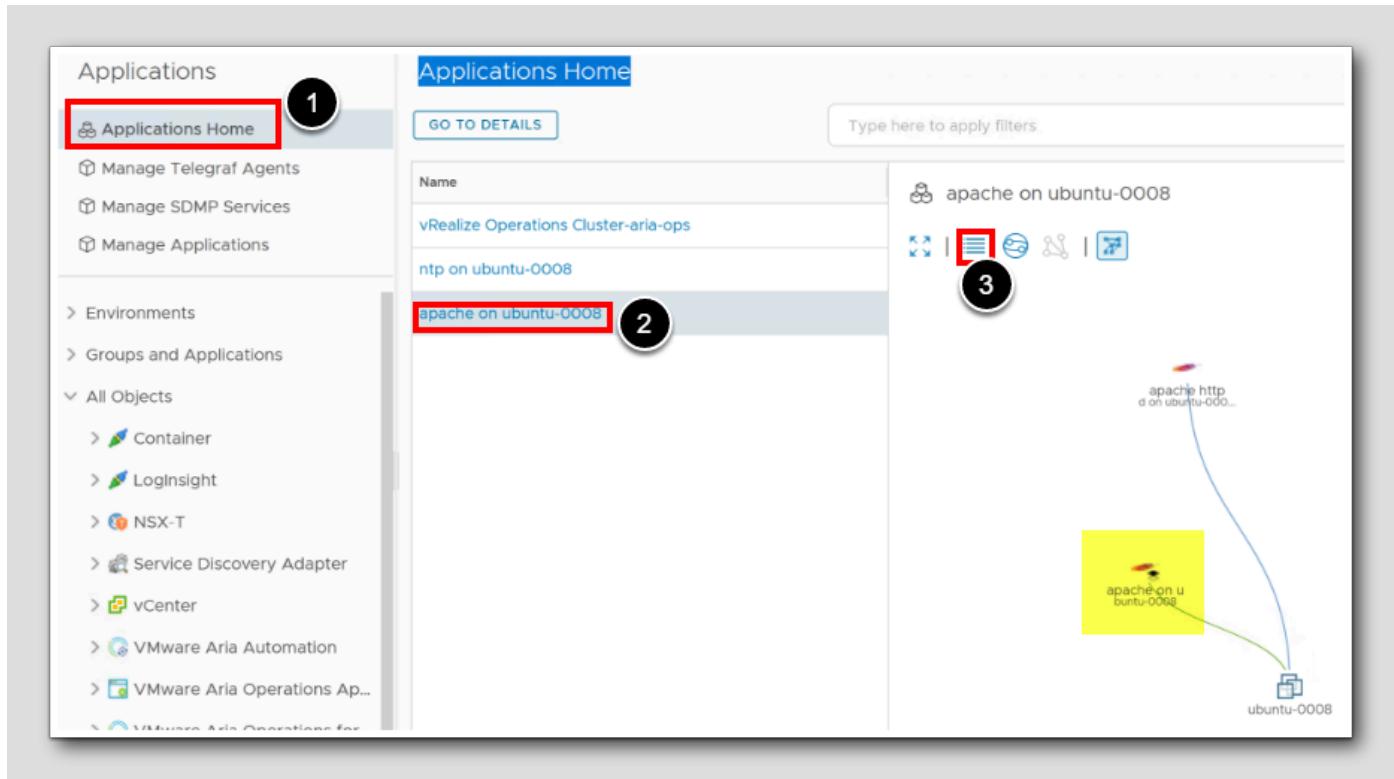


Since our application server is very important we would like to see if we can contact it remotely in the network via a HTTP request to see if it's running OK.

- Under the *Manage Telegraf Agents*, In front of (?) *HTTP Check*, click the Ellipse and then Choose Add (not shown)
- Under the *HTTP Check* popup, Behind *Display Name* type **appserver-http**
- Behind URL, type the URL address for the Linux Ubuntu-0008 web-server: **http://192.168.110.120**
- Behind Method, type **Get**
- If nothing has happened within 60 seconds, we have timed out, Behind Response Timeout type **60**
- Click **SAVE**

Congratulations, You have just added a remote HTTP check initiated on the windows server windows-0010, that does a HTTP request towards our web application server ubuntu-0008.

## Show me the apps



1. Under Applications click Applications Home
2. Under the listed application Names, click the name apache on ubuntu-0008

Hover the services and apps to see information about them (highlighted)

3. Click the table view icon

## Application table view

The screenshot shows the 'Applications Home' interface. On the left, there's a sidebar with a 'GO TO DETAILS' button highlighted by a red box and a circled '1'. Below it are listed 'vRealize Operations Cluster-aria-ops', 'ntp on ubuntu-0008', and 'apache on ubuntu-0008'. The main area is a table titled 'apache on ubuntu-0008'. The table has columns for 'Name', 'Object Type', and 'Adapter Type'. It contains three rows: 1) 'ubuntu-0008' (Virtual Machine, vCenter). 2) 'apache on ubuntu-0008' (Apache HTTPD Application, VMware Aria Operations Application Management Pack). 3) 'apache httpd on ubuntu-0008' (Apache HTTPD, VMware Aria Operations Application Management Pack). A search bar at the top right says 'Type here to apply filters'.

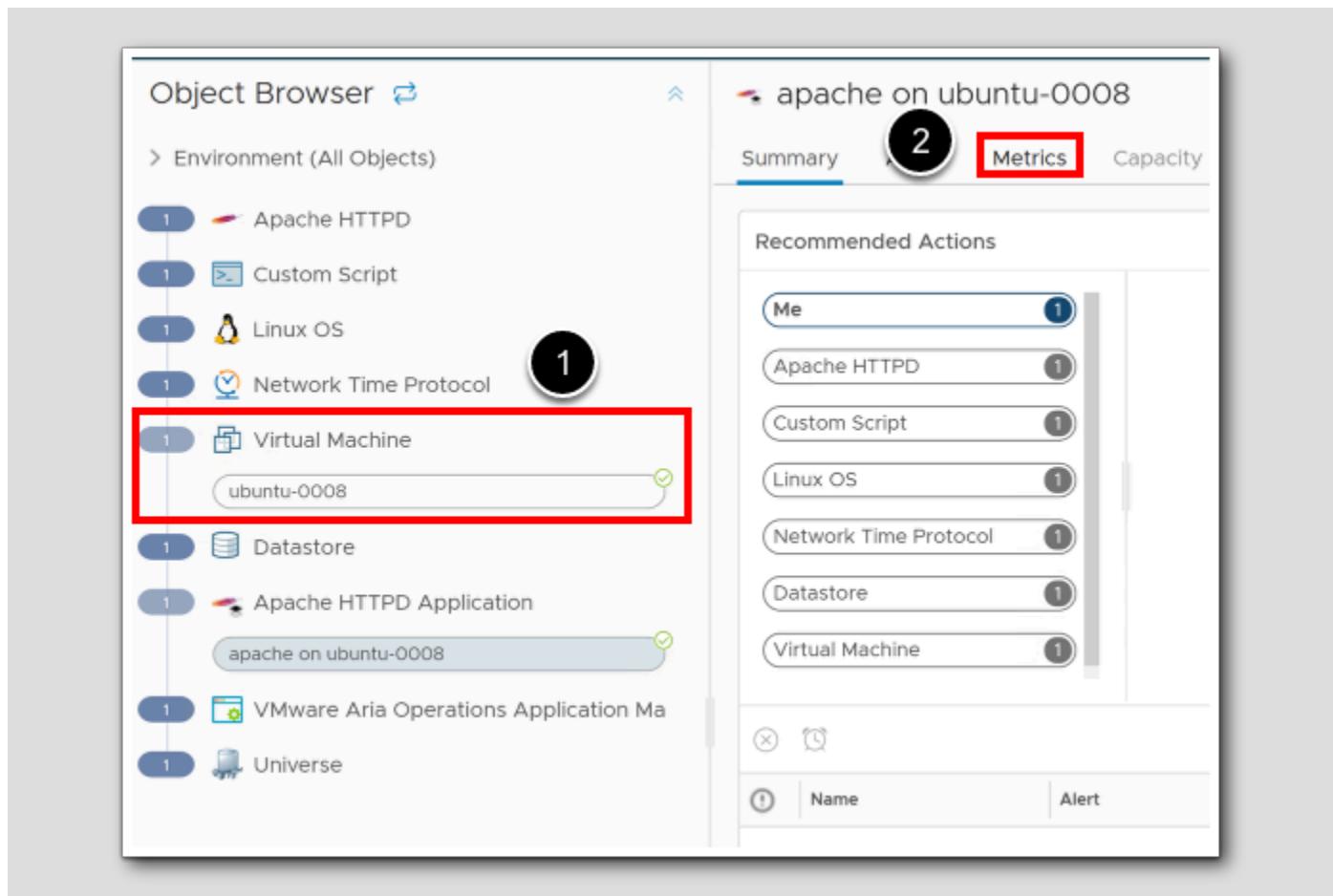
Name	Object Type	Adapter Type
ubuntu-0008	Virtual Machine	vCenter
apache on ubuntu-0008	Apache HTTPD Application	VMware Aria Operations Application Management Pack
apache httpd on ubuntu-0008	Apache HTTPD	VMware Aria Operations Application Management Pack

Review the application or daemon in the table.

Our successful integration of Custom Monitoring functionalities, including but not limited to Operating System Monitoring, Windows Service Monitoring, Daemon/Process Monitoring, Application Monitoring, Custom Script Monitoring, and Remote Checks, it becomes imperative to effectively visualize and leverage the collected metrics. By creating intuitive and informative dashboards, or alternatively, the ability to navigate through the available metrics for analysis and utilization purposes. Let's jump right in.

1. Click GO TO DETAILS

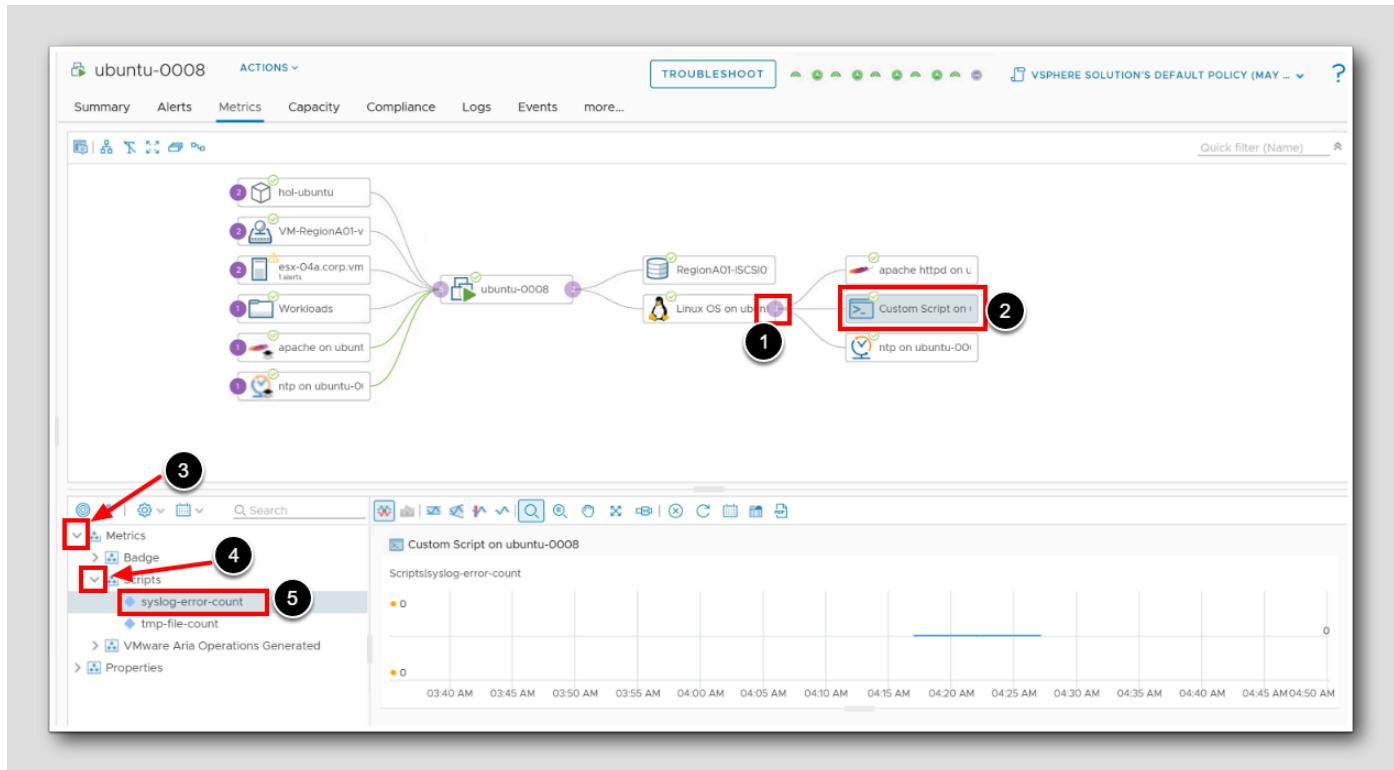
## Find the metrics



1. From the Summary page, click on Virtual Machine and then click ubuntu-0008

2. Click on Metrics

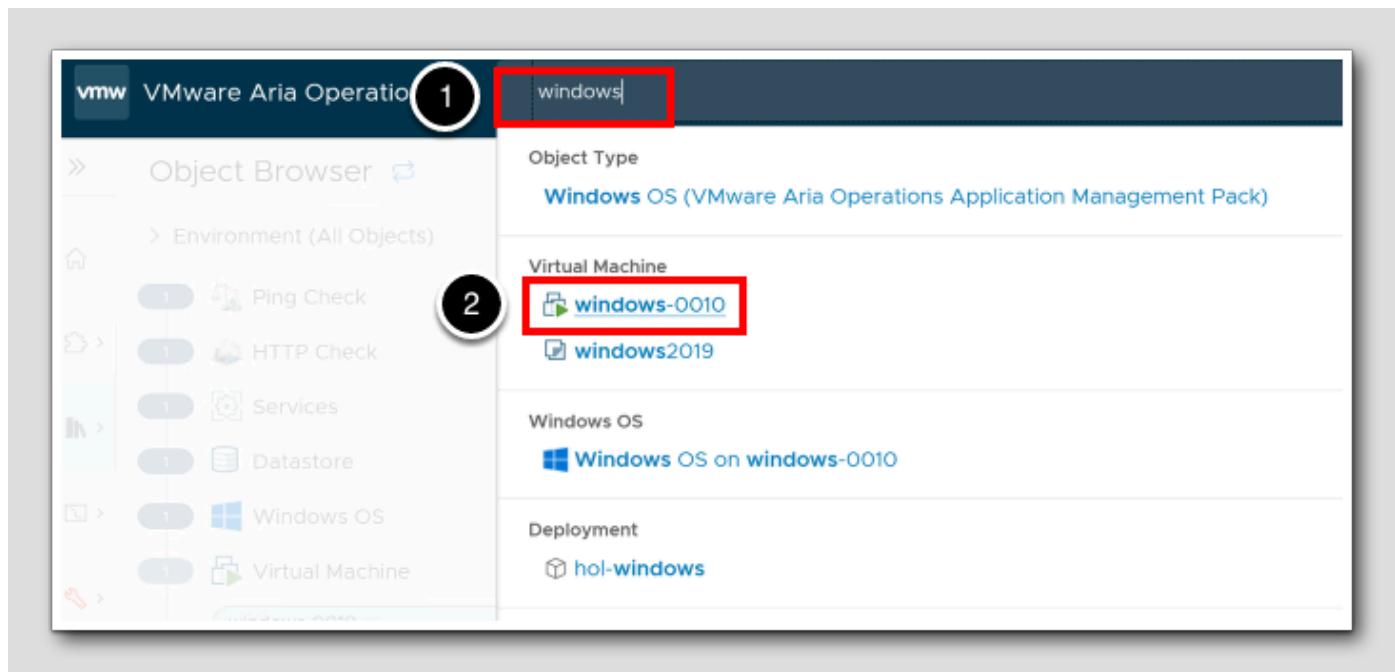
## Show me the metrics



1. Expand Linux OS (3)
2. Highlight Custom script by Clicking on Custom Script on ...
3. Expand Metrics
4. Expand Scripts
5. Double click on syslog-error-count

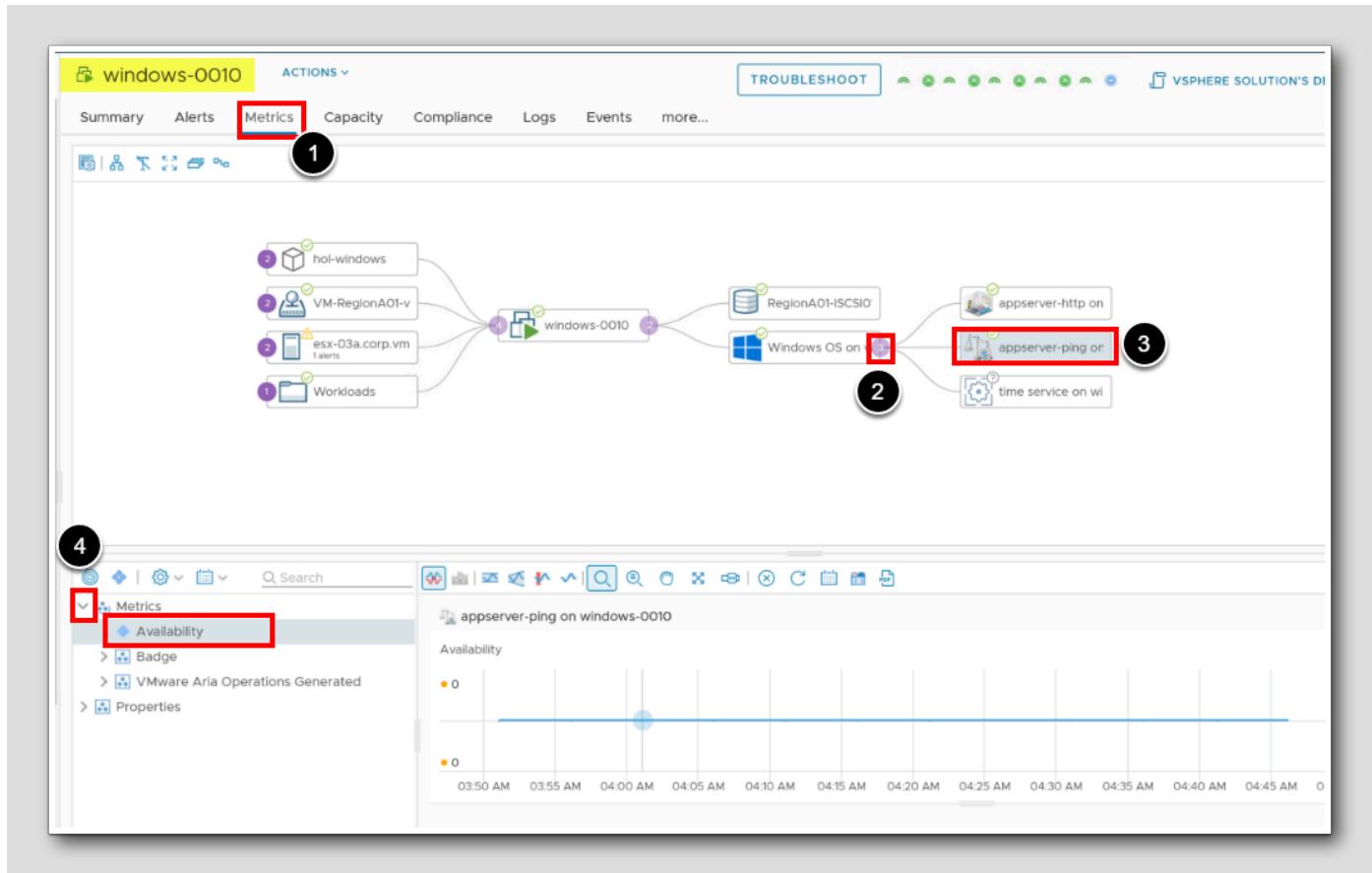
Note: Our custom script on ubuntu-0008 is constantly returning the number of SYSLOG errors. In this view we can monitor the trend of that metric of those errors to see if anything have changed in our environment.

## The Ping check



1. At the top search field, type **windows**
2. Click on the virtual machine **windows-0010**

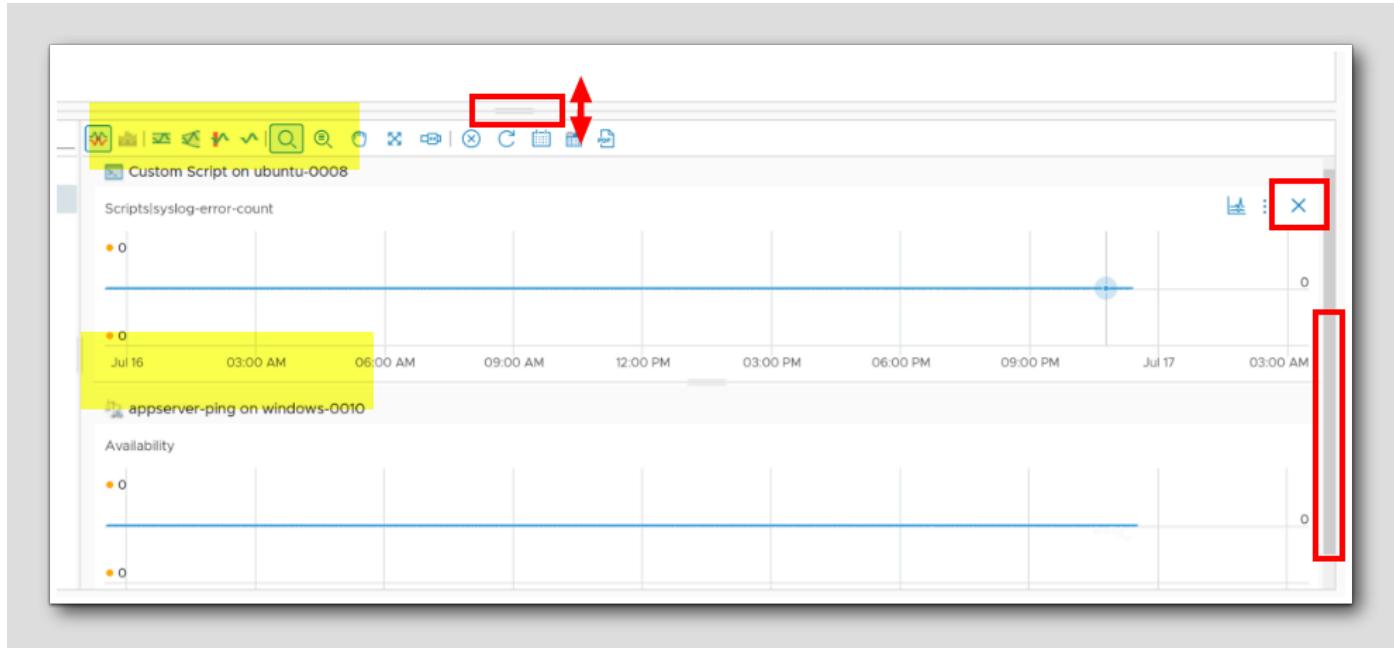
## Show the ping availability



We are showing the object windows-0010 (highlighted)

1. If not already there, click Metrics
2. Expand Windows OS on (3)
3. Click on appserver-ping on..
4. Expand Metrics
5. Double-click Availability to add it to the view

## Reviewing the metrics



We can observe that the metrics from both servers are displayed (highlighted). This can often prove useful when comparing and correlating various metrics from different servers.

1. Resize the metrics column by **clicking and dragging**
2. To walk through the metrics we have added, we can use the **scroll bar**
3. To remove the the *ubuntu-0008 custom script chart* click on the '**X**'

## Final remarks

Using the Telegraf Agent with Aria Operations by setting Telegraf to output data in a format that Aria Operations can ingest enhances Aria Operations and extends the capabilities, gives **Improved flexibility and scalability** in environments with many different systems, and **Consolidates Metrics from Different Sources** by collecting the metrics using Telegraf, and centralize these into Aria Operations. This allows for a unified view of your operations across different platforms and when we correlate events or identify patterns, we can broaden the scope and not just look at data in isolation.

## Conclusion

In this module, we examined Aria Operations ability to monitor processes, services, and applications, leveraging the Telegraf agent for both Linux and Windows platforms. Aria Operations gathered crucial utilization metrics and initiated alerts for process or service downtime. Native application monitoring was facilitated via the Aria Operations Telegraf Agent, with additional requirements for some applications referenced in the documentation.

We explored the Discover Services and Monitor Applications functionalities. Discover Services employs the VMware Tools agent to monitor processes and services, while Monitor Applications utilizes an open-source Telegraf agent for metric collection from managed VMs. In summary, Discover Services offers more configuration information, whereas Monitor Applications provides a wider range of performance metrics. The choice between these functionalities depends on the specific objectives of your operations.

## You've finished the module

[733]

Congratulations on completing this lab module.

If you are looking for additional information, please visit the [Aria Operations Documentation](#)

From here you can:

1. Click to advance to the next page and continue with the next lab module
2. Open the TABLE OF CONTENTS to jump to any module or lesson in this lab manual
3. End your lab and come back and start it again in the future

## Conclusion

### Learning Path Next Steps!

[735]

Learn More about Modern Apps and Cloud Management on Tech Zone



- Learn
- Try
- What's New

Visit <https://via.vmw.com/LearnMACM>





VMware, Inc. 3401 Hillview Avenue Palo Alto CA 94304 USA Tel 877-486-9273 Fax 650-427-5001 [vmware.com](http://vmware.com).  
Copyright © 2023 VMware, Inc. All rights reserved. This product is protected by U.S. and international copyright and intellectual property laws. VMware products are covered by one or more patents listed at [vmware.com/go/patents](http://vmware.com/go/patents). VMware is a registered trademark or trademark of VMware, Inc. and its subsidiaries in the United States and other jurisdictions. All other marks and names mentioned herein may be trademarks of their respective companies. Lab SKU: HOL-2401-02-CMP Version: 20230921-190527