



HOL-2401-03-CMP  
Becoming A Power User  
(Advanced)

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## Lab Overview - HOL-2401-03-CMP - Aria Operations - Becoming A Power User (Advanced)

### Lab Description

[2]

Get familiar with Custom Alerts and Notifications. Use Application Monitoring features and Workload Placement for optimization. Explore Custom Dashboards, Reports, and Super Metrics.

### 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 - Configuring and Managing Alert Notifications](#) (30 minutes) (Advanced)
- [Module 2 - Creating a Custom Alert Definition](#) (30 minutes) (Advanced)
- [Module 3 - Application Monitoring with VMware Aria Operations](#) (30 minutes) (Advanced)
- [Module 5 - Workload Placement – Running Host Based Optimization](#) (30 minutes) (Advanced)
- [Module 6 - Report Generation in VMware Aria Operations](#) (15 minutes) (Basic)
- [Module 7 - Creating Custom Dashboards for VMware Aria Operations](#) (15 minutes) (Basic)
- [Module 8 - Enhancing depth of VMware Aria Operations with Super Metrics](#) (15 minutes) (Basic)

### Lab Captains:

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- Module 6 - Greg Sylvestre, Senior Solution Engineer, US
- Module 7 - Greg Sylvestre, Senior Solution Engineer, US
- Module 8 - Greg Sylvestre, Senior Solution Engineer, US

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>

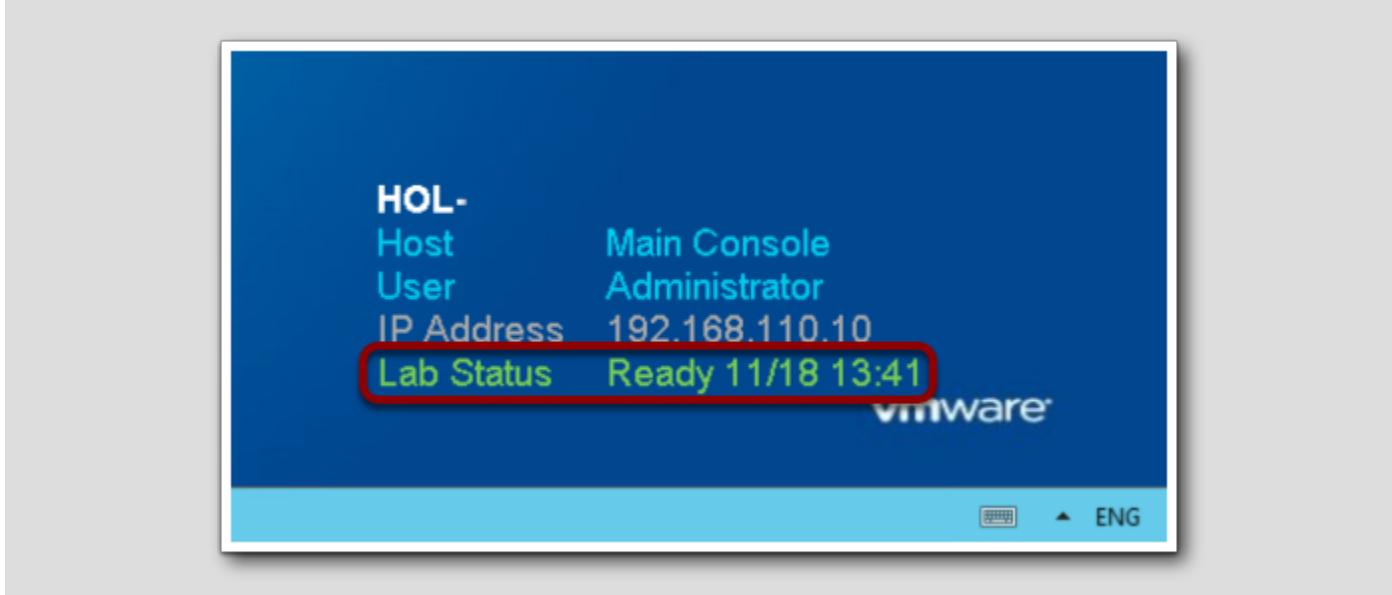
### First time using Hands-on Labs?

[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?



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 - Configuring and Managing Alert Notifications (35 minutes) Advanced

### Introduction

[7]

Upon completing this lab, you will be able to:

- Create a Notification using a Webhook and email.
- Customize a payload template.

Creating notifications using WebHooks or email serves many purposes. By leveraging notifications, you stay informed, collaborate effectively, respond promptly, and continuously improve your IT operations. It's the key to a proactive, integrated, and optimized environment.

**Real-time Notifications:** Webhooks facilitate real-time notifications, ensuring that relevant parties receive alerts promptly. This timely delivery helps facilitate faster incident response, reducing downtime and minimizing the impact on your environment.

A payload template acts as a customization blueprint for webhook notifications. It allows us to design the structure and content of the payload sent to external systems or applications. You can populate the payload with key information from the triggering event, ensuring it meets the recipient's requirements and enables informed actions. We can include specific information, such as alert details, impacted objects, timestamps, or any other relevant data, providing comprehensive context to aid in incident investigation and resolution.

Think of it as your creative tool to curate valuable and tailored data, empowering external systems to make swift and effective responses.

Note: This Lab is mostly on how to prepare for creating Alerts

### Log in to Aria Operations

[8]

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

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

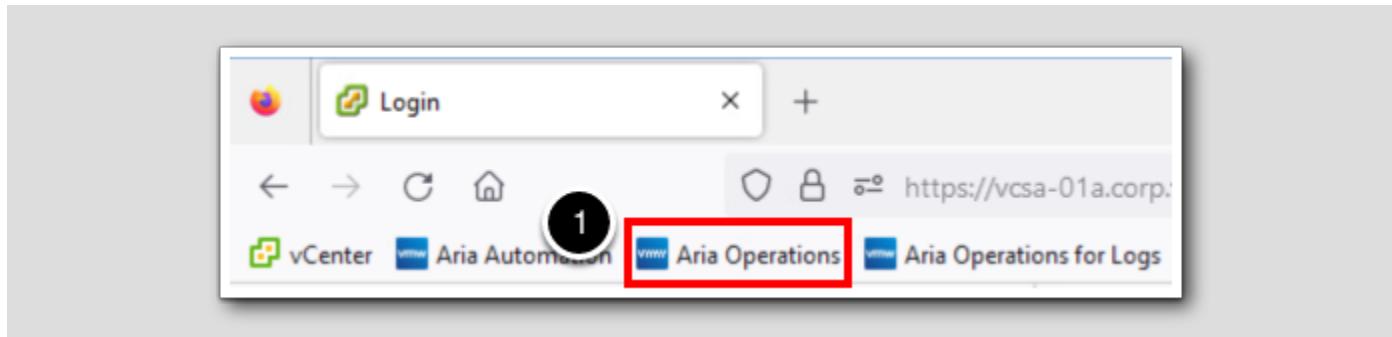
[9]



If the browser is not already open, launch Firefox.

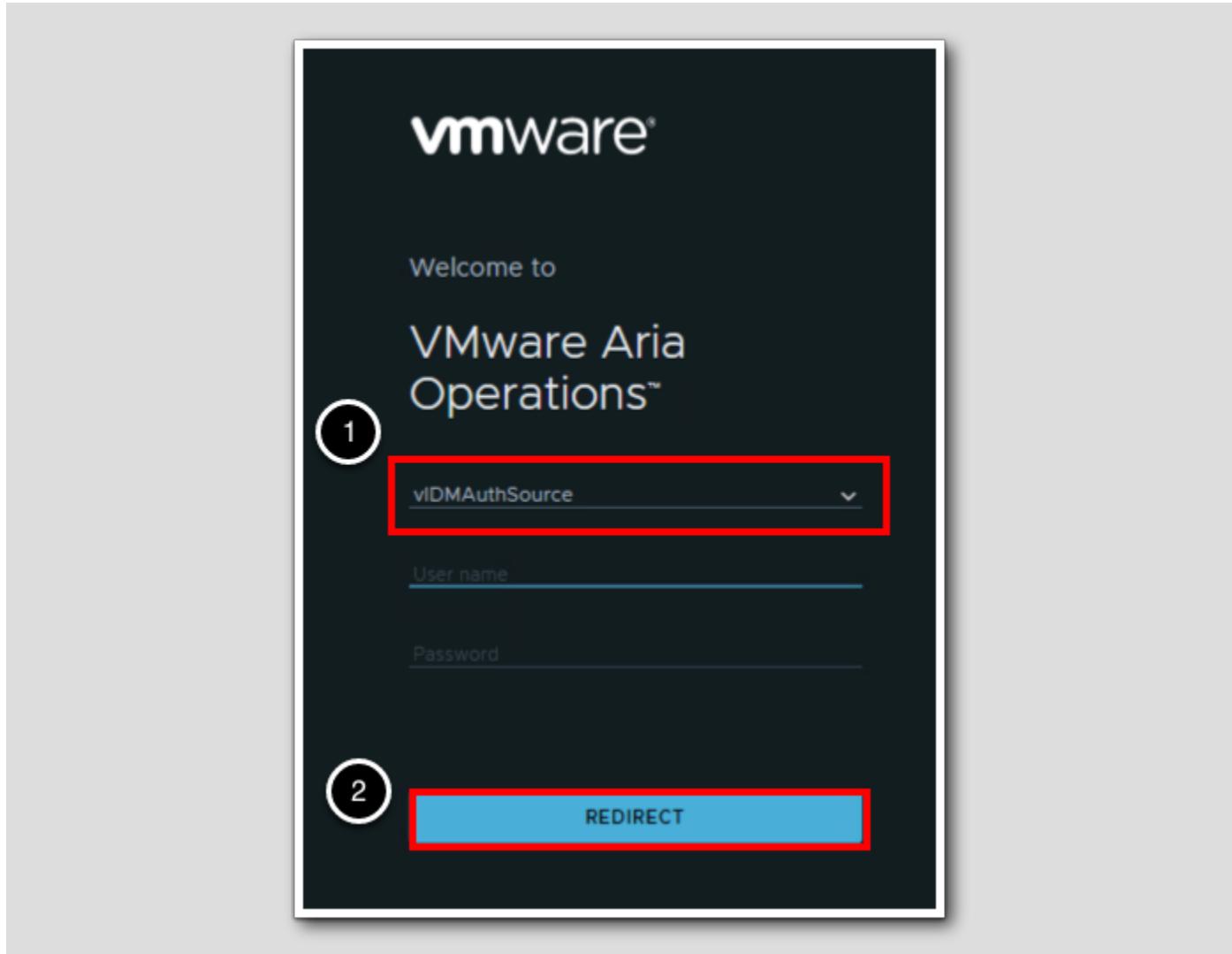
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

## Navigate to Aria Operations



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

## Log in to Aria Operations

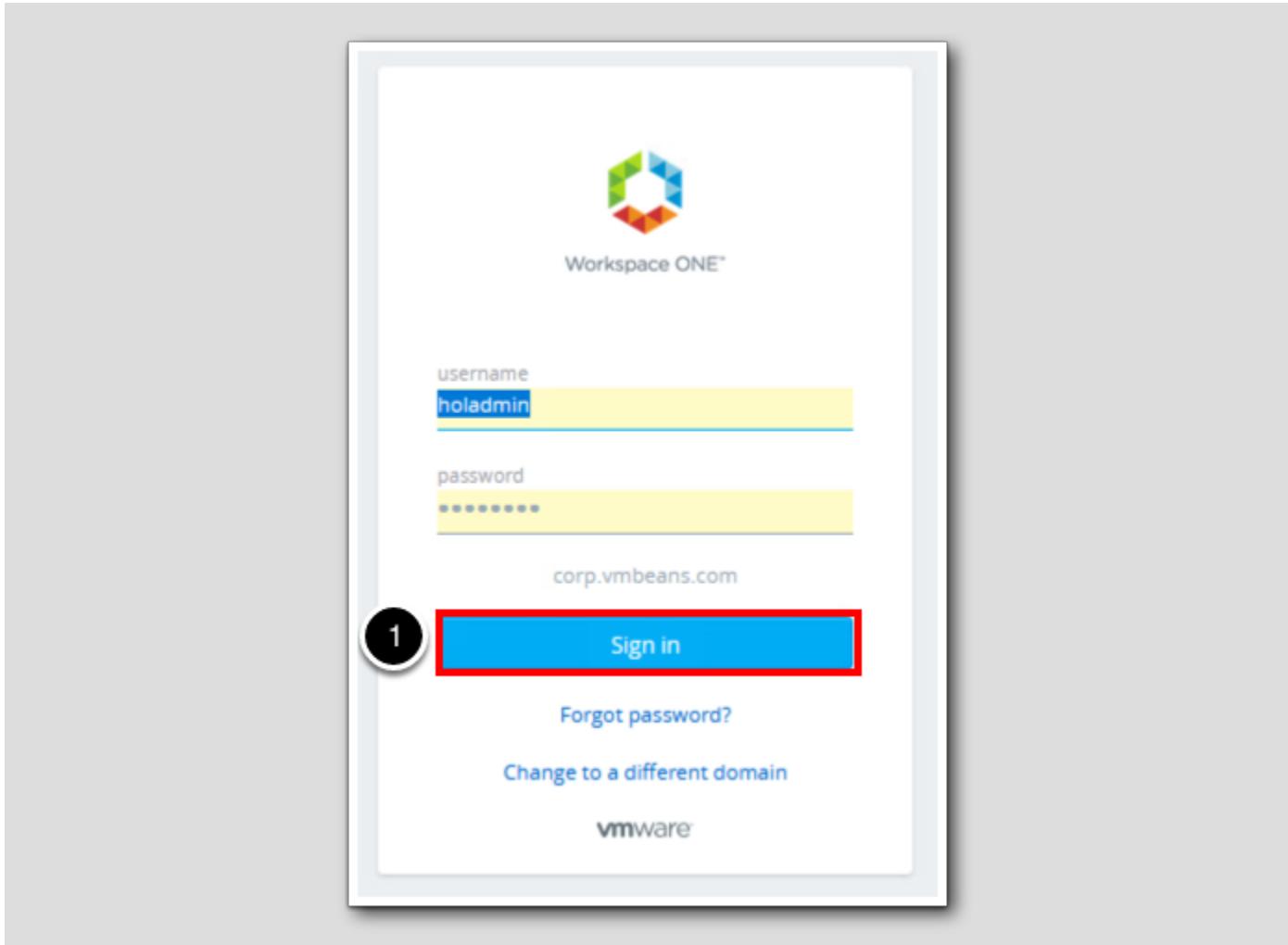


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

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

## Notification using Webhooks

Webhooks enhance Aria Operations by providing real-time, customizable alert mechanisms for proactive incident management

When a specified alert condition is met, the webhook notifications trigger an HTTP POST request containing a JSON payload. This payload encapsulates alert details, name, criticality, and other relevant data. The destination of these notifications is set as a URL

endpoint.

Webhooks provide substantial flexibility, we can configure webhooks to trigger remediation actions, integrate with ticketing systems, or notify on-call staff via communication tools.

Let's have a look on how to set up outgoing notifications with webhooks

## The Alerts Page

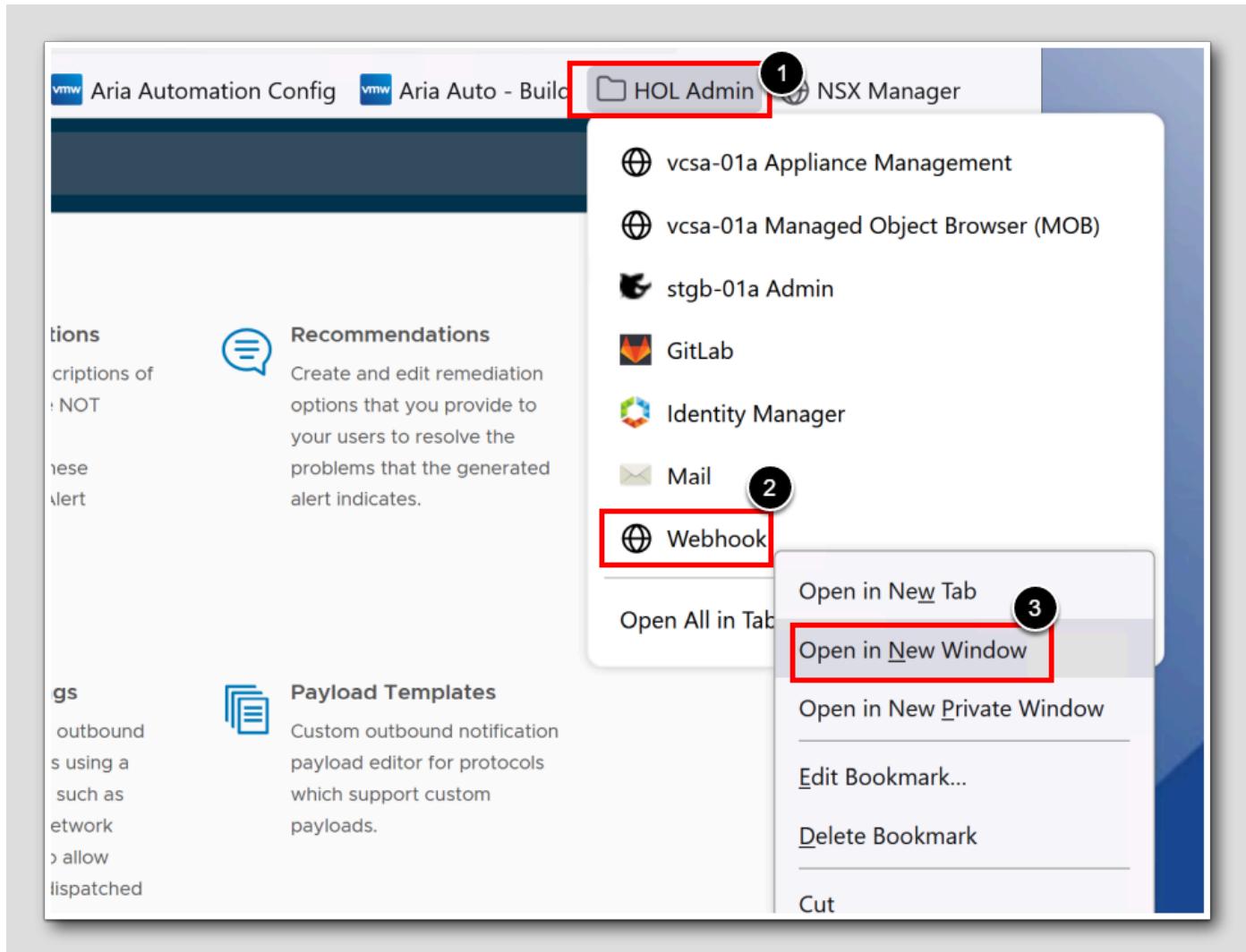
[14]

The screenshot shows the VMware Aria Operations interface. The left sidebar has a tree view with 'Configure' selected (marked with a red box and number 1) and 'Alerts' highlighted (marked with a red box and number 2). The main content area is titled 'Alerts' and contains several sections: 'Alert Definitions', 'Symptom Definitions', 'Recommendations', 'Actions', 'Notifications', and 'Outbound Settings'. Each section has a brief description and a corresponding icon.

Let's find our alerts page where we will be configuring notifications using Webhook

1. In the left menu, click **Configure**
2. Click **Alerts**

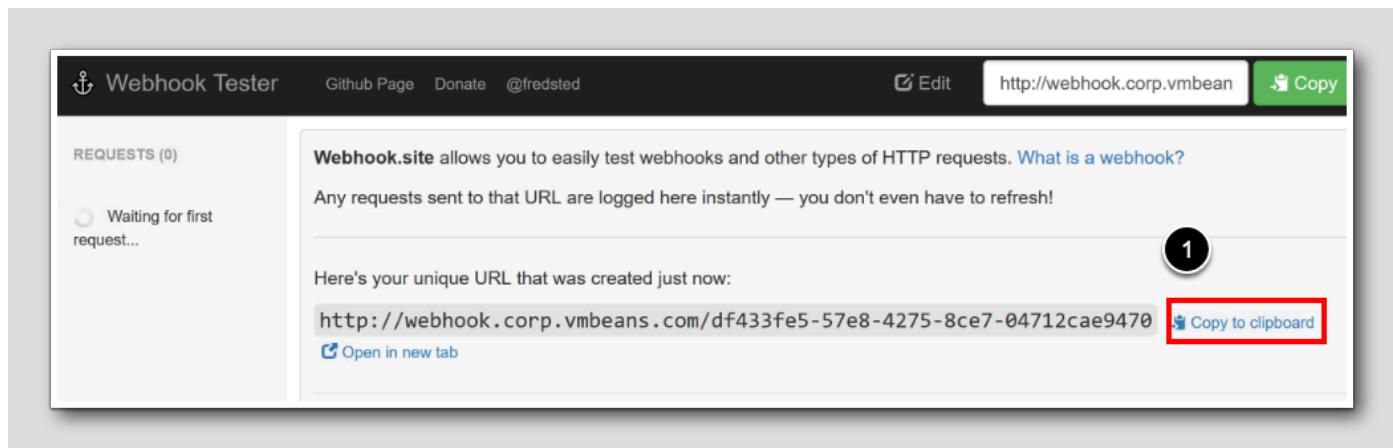
## The Webhook receiver



We are going to find the address for the webhook receiver we have enabled in the lab. We will have to use that address when we are going to configure Aria Operations to send webhooks to it.

1. On the Firefox menu, click HOL Admin
2. Next, let's Right-Click Webhook
3. Select Open in New Window

## Webhook Tester unique URL



1. On the URL that was created for us, click copy to clipboard

Note: Do NOT close the window,

Use ALT+TAB or the taskbar to get back to the Aria Operations window (*not shown*)

## The Outbound settings

The screenshot shows the VMware Aria Operations interface. The left sidebar has a tree view with nodes like Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure, Policies, and Alerts. The Alerts node is selected and highlighted in blue. The main content area is titled 'Alerts' and contains three sections: 'Alert Definitions', 'Symptom Definitions', and 'Notifications'. A red box highlights the 'Notifications' section, which is labeled 'Outbound Settings' with a clock icon. A large number '1' is circled in black at the top right of the red box.

VMware Aria Operations

Search for object or metric and more...

Alerts

Data Sources >

Environment >

Visualize >

Troubleshoot > 1

Optimize >

Plan >

Configure >

Policies

Alerts

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.

**Symptom Definitions**

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

**Notifications**

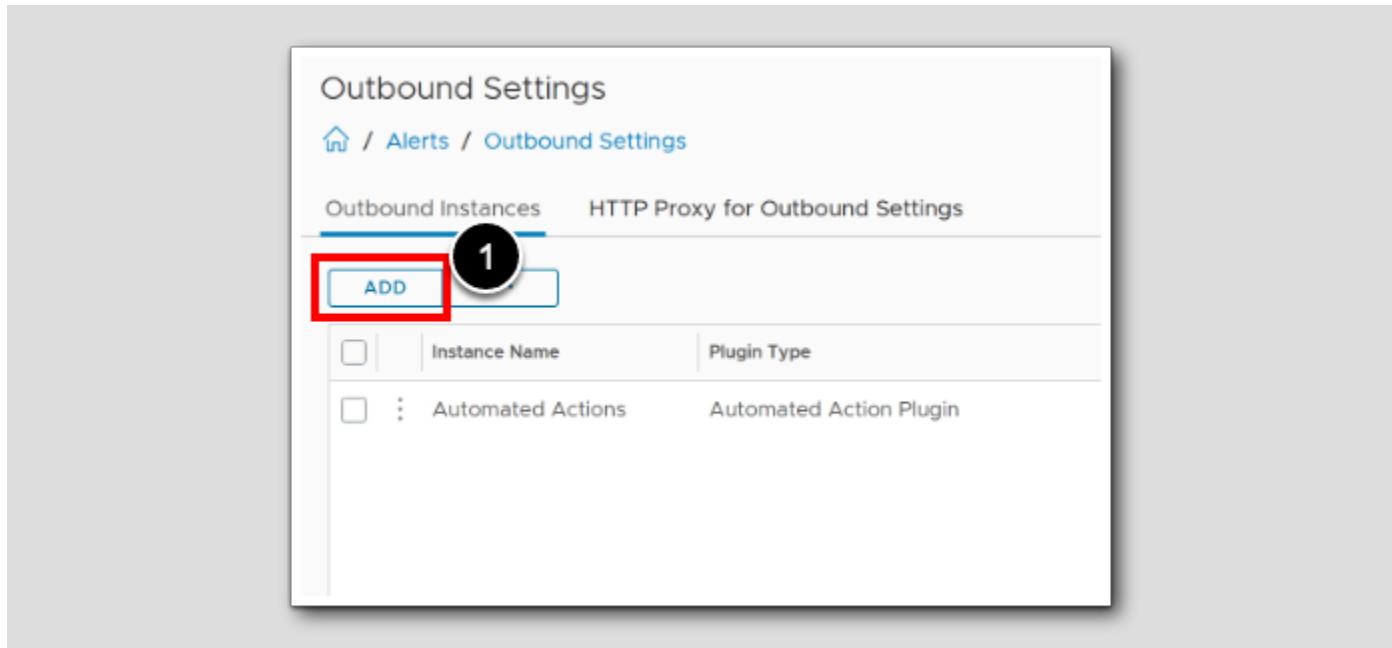
Define and modify notification settings to send out messages and custom payloads when an alert is triggered.

**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.

1. In the Alerts page in Aria Operations, click Outbound Settings

## Outbound Settings



1. In the Outbound settings, Under Outbound Instances, click ADD

## New Outbound Instance

Create New Outbound Instance

[Home](#) / [Alerts](#) / [Outbound Settings](#)

Plugin Type: 1 Webhook Notification Plugin

Instance Name: 2 Outbound WebHook Instance

Url: 3 http://webhook.corp.vmbeans.com/df433fe5-57e8-4275-8ce7-04712

Connection count: 20

HTTP Proxy: Select Your HTTP Proxy

Credential type: No Credential

4 TEST SAVE CANCEL

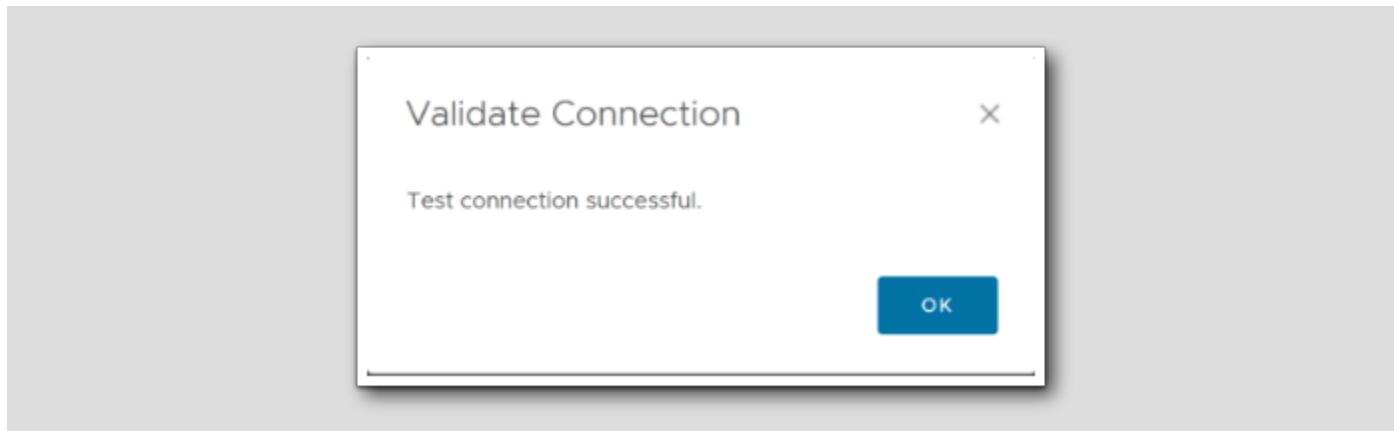
The screenshot shows a 'Create New Outbound Instance' dialog box. The 'Plugin Type' field contains 'Webhook Notification Plugin' (marked with a red box and number 1). The 'Instance Name' field contains 'Outbound WebHook Instance' (marked with a red box and number 2). The 'Url' field contains 'http://webhook.corp.vmbeans.com/df433fe5-57e8-4275-8ce7-04712' (marked with a red box and number 3). At the bottom, there are three buttons: 'TEST' (highlighted with a red box and number 4), 'SAVE', and 'CANCEL'.

We are about to create a new Outbound Instance using Webhook

1. From the drop-down menu for Plugin Type, choose **Webhook Notification Plugin**.
2. For the Instance Name, type something you can recognize, simply **Outbound WebHook Instance**.
3. For the URL, we previously copied the link, **Paste the link**.
4. To test this configuration, click **TEST**.

Validation successful

[20]



1. Click OK

NOTE: Do not close the Aria Operations window, use ALT+TAB or the taskbar to go to the Webhook Receiver.

## The Webhook tester

The screenshot shows the Webhook Tester application interface. At the top, there's a header with the title 'Webhook Tester', a GitHub link, a 'Donate' button, and a user handle '@fredsted'. To the right are buttons for 'Edit', 'Copy' (highlighted in green), and '+ New'. Below the header, a sidebar on the left lists 'REQUESTS (1)' with details for a single POST request: '#0f943', '192.168.110.70', and 'Jun 27, 2023 1:42 PM'. The main content area has sections for 'Request Details' (URL, Host, Date, ID), 'Headers' (accept-encoding: gzip, deflate; user-agent: Apache-HttpClient/4.5 (Java/11.0.18); connection: Keep-Alive; host: webhook.corp.vmbeans.com; content-length: 515; accept: application/json; content-type: application/json), 'Query strings' (empty), and 'Form values' (empty). A large yellow box highlights the JSON payload under 'Form values':

```
{"startDate": "Tue Jun 27 20:42:21 UTC 2023", "updateDate": "Tue Jun 27 20:42:21 UTC 2023", "cancelDate": "Tue Jun 27 20:42:21 UTC 2023", "resourceId": "test", "adapterKind": "test", "resourceKind": "test", "resourceName": "test", "Health": "0.0", "Risk": "0.0", "Efficiency": "0.0", "Impact": "health", "criticality": "Info", "alertName": "VMware Aria Operations alert definition", "type": "Tier Alerts", "subType": "Smart KPI Breach", "alertId": "38134f90-89fc-4500-ac76-5e052ec6cae1", "status": "Active", "recommendations": "N/A", "alertURL": "N/A"}
```

A red arrow points to the 'Enable CORS' checkbox in the top right. A vertical red rectangle on the far right covers the scroll bar and part of the interface.

1. Scroll down to see the results properly

Congratulations! We have received our first webhook from Aria Operations. As you can see from the payload structure and content, several parameters and values are coming across.

In a real life use case we would probably have to review any documentation or specifications provided by the endpoint service to ensure we understand how the data should be formatted. Using Payload Templates will help us stay within these boundaries.

NOTE: Again Do not close this window, Again use ALT+TAB or the taskbar to get back to Aria Operations window.

## Save the Outbound Webhook Instance

Create New Outbound Instance

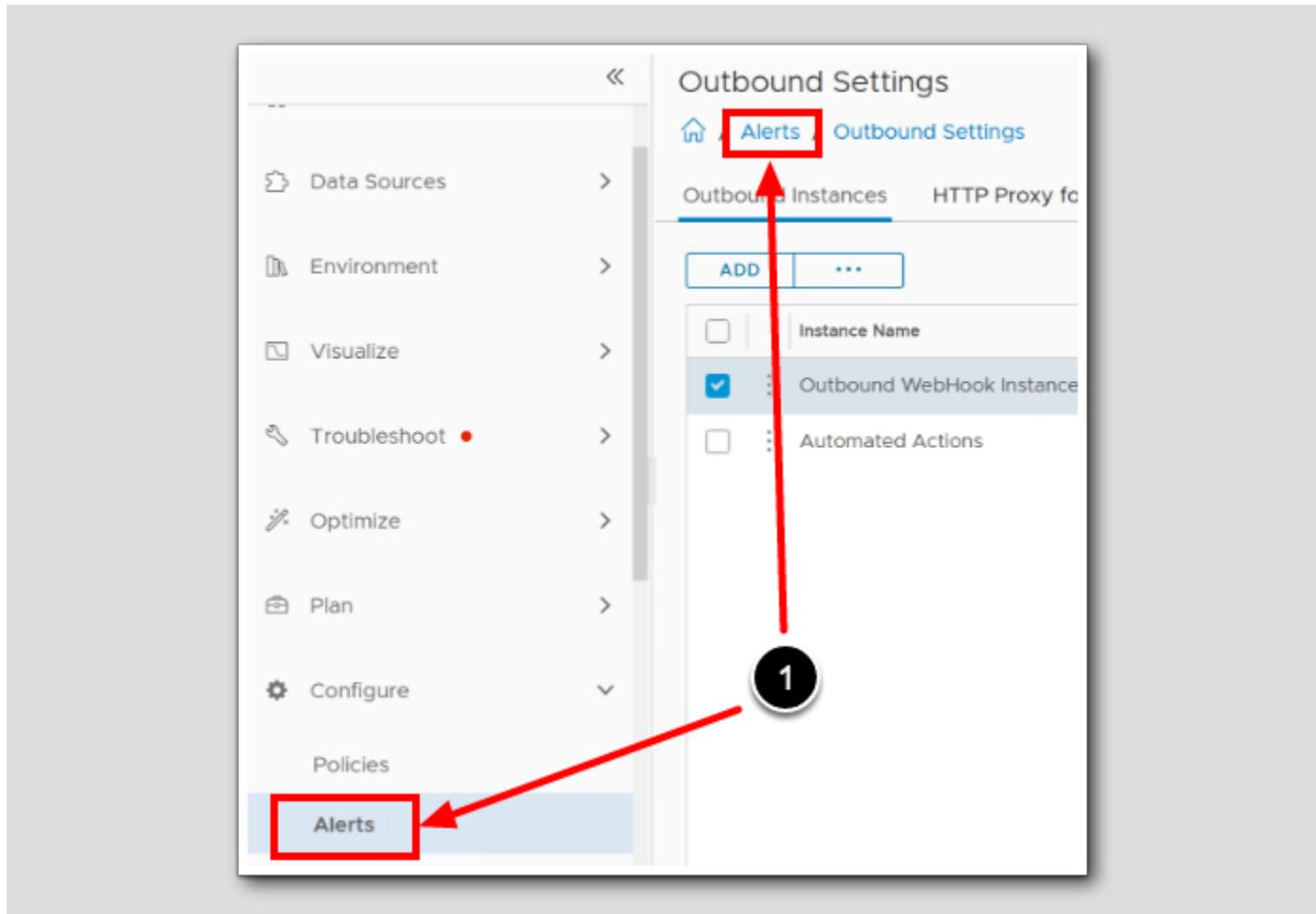
[Home](#) / [Alerts](#) / [Outbound Settings](#)

Plugin Type	Webhook Notification Plugin
Instance Name	Outbound WebHook Instance
Url	bhook.corp.vmbeans.com/df433fe5-57e8-4275-8ce7-04712cae9470
Connection count	20
HTTP Proxy	Select Your HTTP Proxy
Credential type	No Credential

**1**

TEST    **SAVE**    CANCEL

1. To save our new Outbound Webhook Instance, just click SAVE

[Back to Alerts](#)

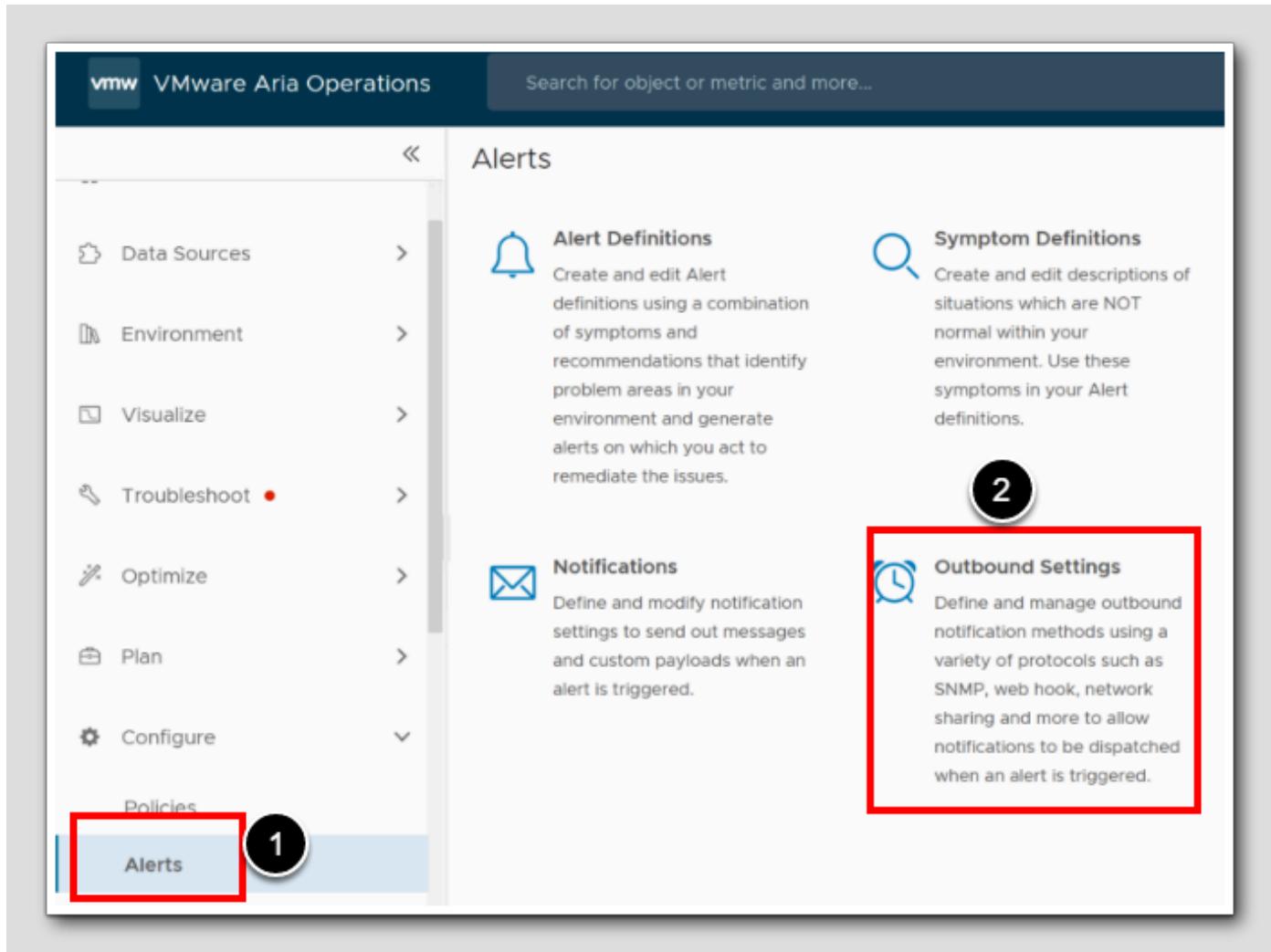
1. To get back to the Alerts, Click **Alerts** (any of the two places)

## Notifications using email

[24]

Creating notifications using email serves many purposes. By leveraging notifications, you stay informed, collaborate effectively, respond promptly, and continuously improve your IT operations. It's the key to a proactive, integrated, and optimized environment.

## Outbound settings



We are also going to set up the outbound settings for an email server.

1. Click Configure> Alerts
2. Click Outbound settings

## Add outbound instance

The screenshot shows the 'Outbound Settings' page under the 'Alerts' section. At the top, there are two tabs: 'Outbound Instances' (which is selected) and 'HTTP Proxy for Outbound Settings'. Below the tabs, there is a large 'ADD' button highlighted with a red box and a circled '1'. To the right of the 'ADD' button is a three-dot menu button. The main area displays two rows of configuration options:

	Instance Name	Plugin Type
<input type="checkbox"/>	Automated Actions	Automated Action Plugin
<input type="checkbox"/>	Outbound WebHook Instance	Webhook Notification Plugin

1. To add a new outbound instance, Click Add

## Create New Outbound Instance

### Create New Outbound Instance

[Home](#) / [Alerts](#) / [Outbound Settings](#)

Plugin Type **1**: Standard Email Plugin

Instance Name **2**: Outbound email Instance

Use Secure Connection:

Requires Authentication:

SMTP Host **3**: mail.corp.vmbeans.com

SMTP Port **4**: 25

Secure Connection Type:  X V

Sender Email Address **5**: AriaOps@corp.vmbeans.com

Sender Name **6**: YourNAMEGoesHere

Credential type: No Credential

Receiver Email Address **7**: holadmin@corp.vmbeans.com

**TEST** **SAVE** **CANCEL**

The screenshot shows a configuration dialog for creating an outbound instance. The fields highlighted with red boxes correspond to the numbered steps in the list below. The 'TEST' button at the bottom left is also highlighted.

Let's add a receiving E-mail server and a group of professional Operations Administrators to receive alerts via email from Aria Operations.

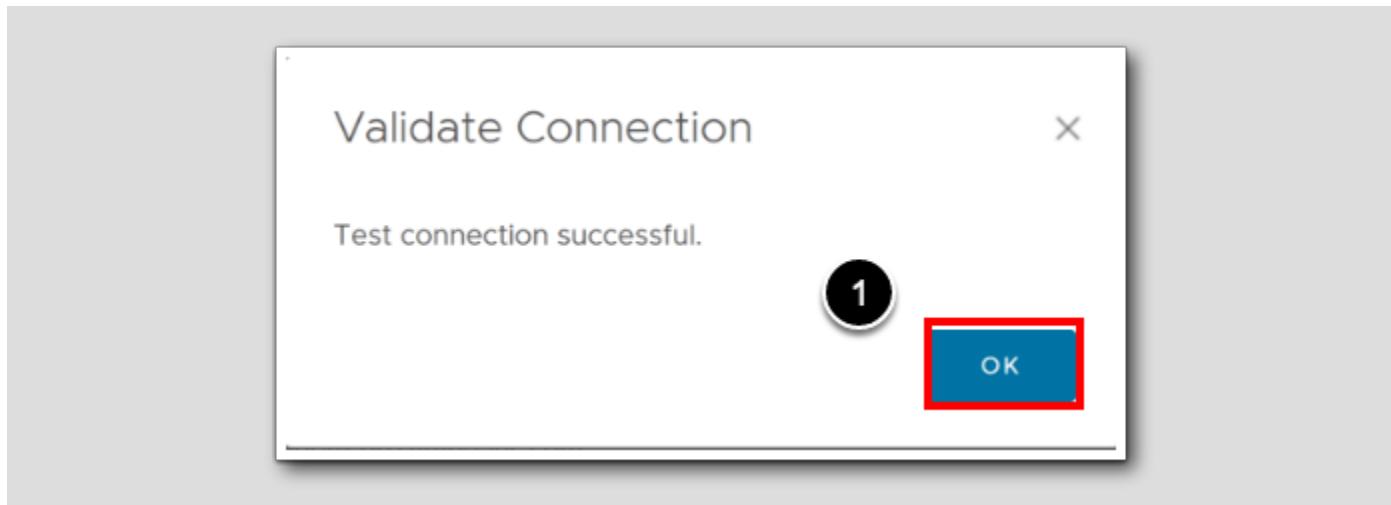
1. For Plugin type, choose Standard Email Plugin
2. Add an Instance name Outbound email Instance
3. Our SMTP Host **mail.corp.vmbeans.com**
4. SMTP port 25
5. Sender Email Address **AriaOps@corp.vmbeans.com**

Note: Our sender email address needs to be with a valid domain with an MX record, and since this is a closed off installation with no internet access or access to external systems, we need to use the corp.vmbeans.com domain.

6. As the Sender Name, fill in your own name instead of **YourNameGoesHere**
7. In the Received Email Address field, add the group of admins to receive emails from Aria Operations, type **holadmin@corp.vmbeans.com**
8. Click **TEST**

#### Validate Connection

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After you have clicked TEST to validate the connection to our internal mailserver with the credentials we have provided

1. Click **OK**

Save instance

### Create New Outbound Instance

[Home](#) / [Alerts](#) / [Outbound Settings](#)

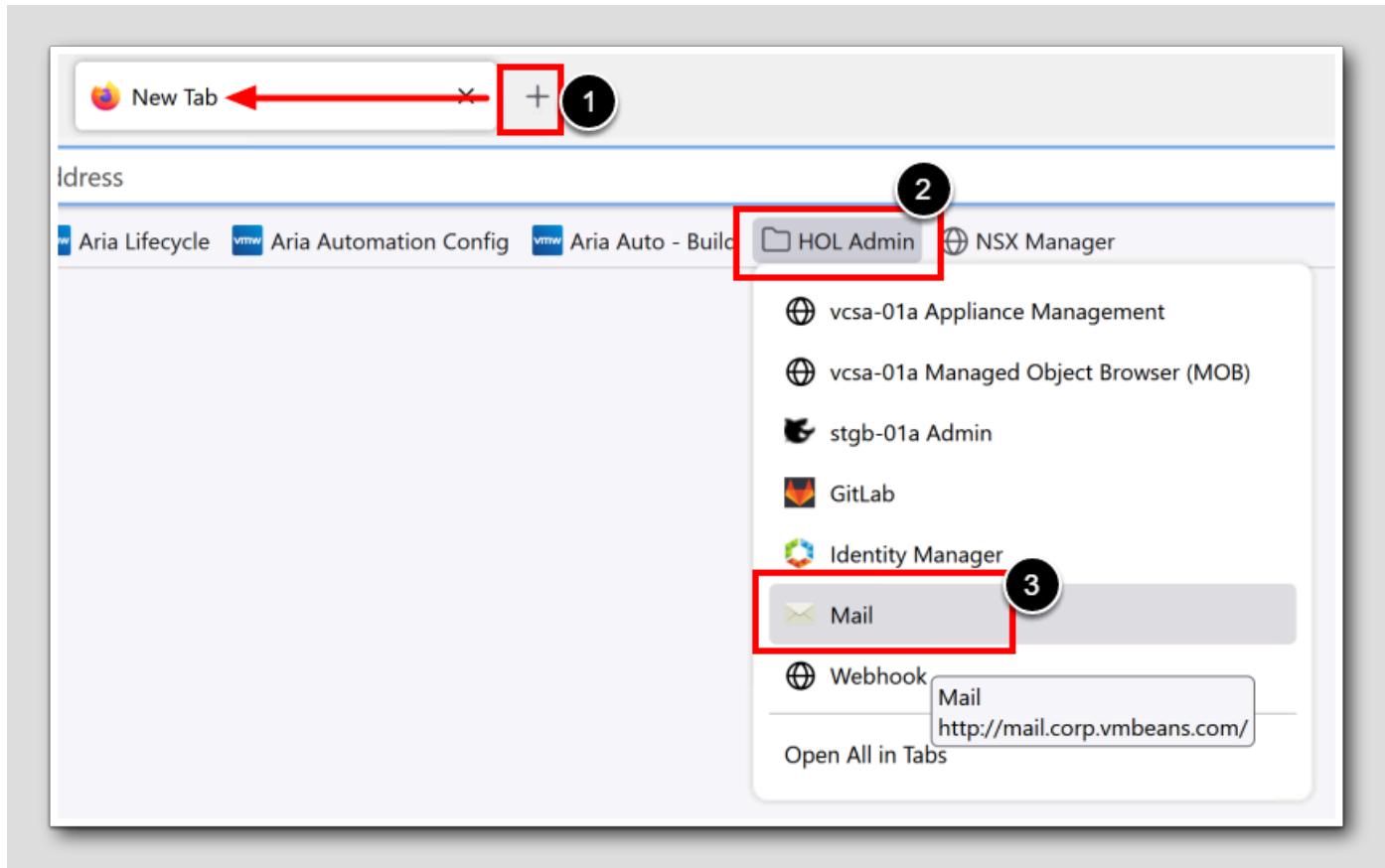
Plugin Type	Standard Email Plugin
Instance Name	Outbound email Instance
Use Secure Connection	<input type="checkbox"/>
Requires Authentication	<input type="checkbox"/>
SMTP Host	mail.corp.vmbeans.com
SMTP Port	25
Secure Connection Type	
Sender Email Address	AriaOps@corp.vmbeans.com
Sender Name	YourNameGoesHere
Credential type	No Credential
Receiver Email Address	holadmin@corp.vmbeans.com

1

**TEST** **SAVE** **CANCEL**

1. Click Save

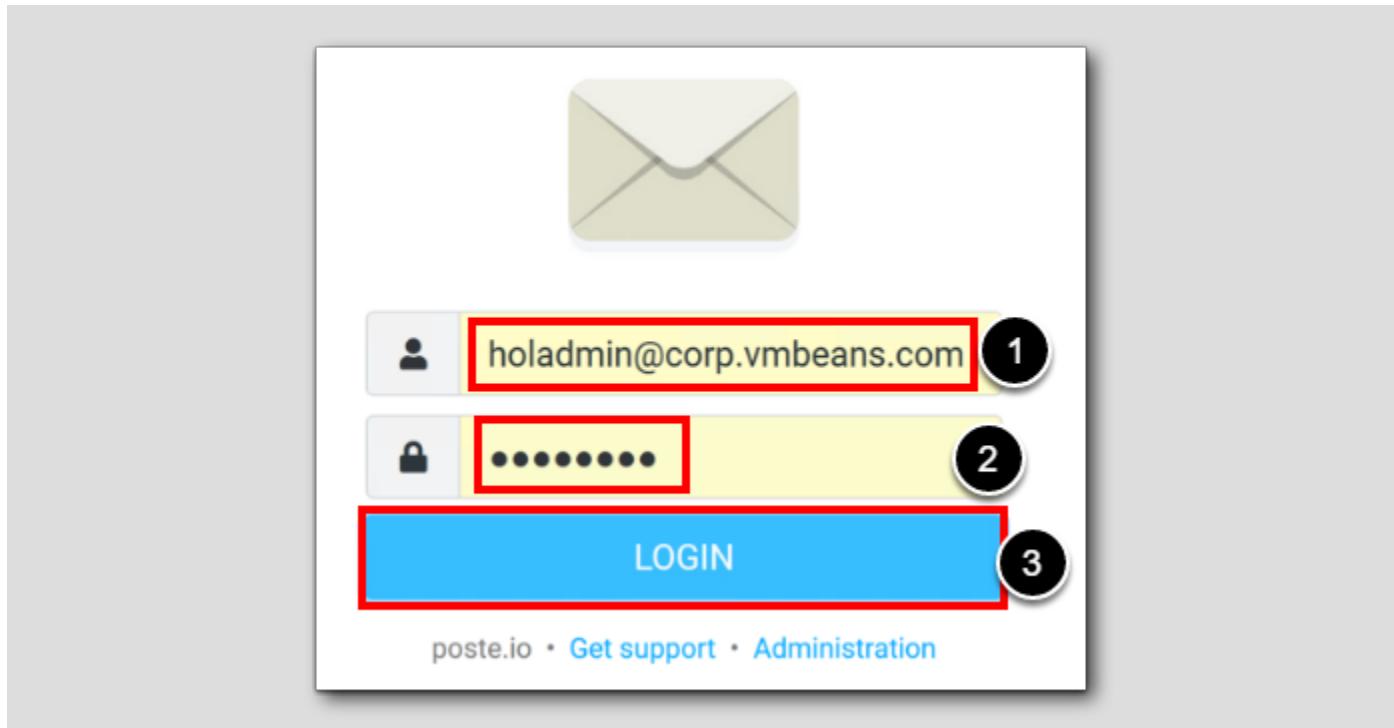
Start the email application



We have a local email server from poste.io that receives all emails we send in our lab.

1. Add a new TAB in the browser by pressing CTRL+T or click the '+'
2. Click the menu bar HOL Admin
3. Choose Mail

## Email Server Login

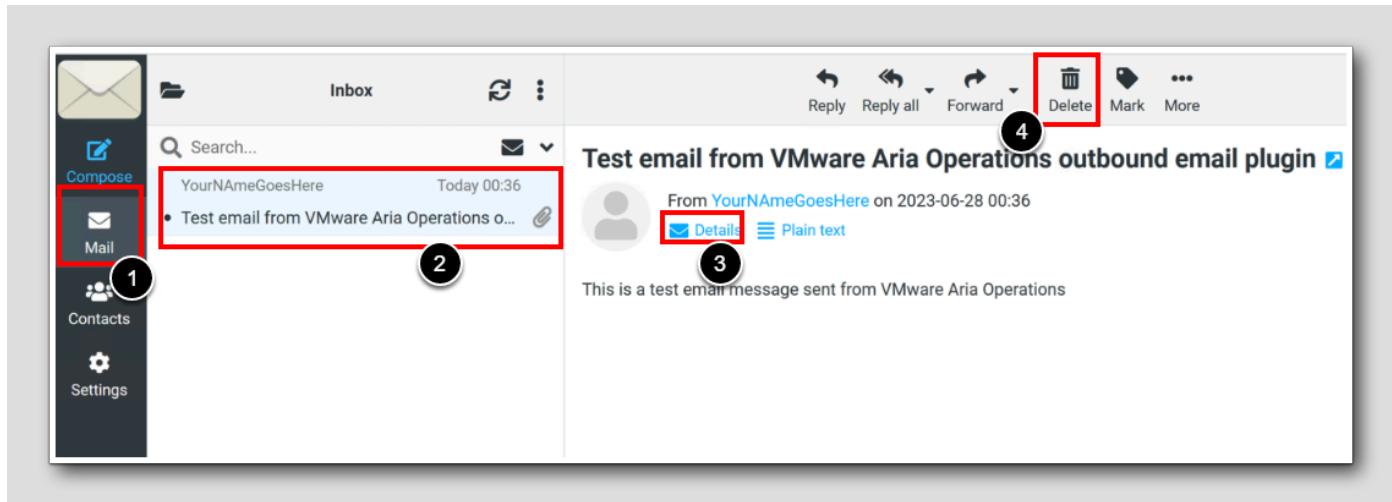


1. Username holadmin@corp.vmbeans.com

2. password VMware1!

3. Click LOGIN

## Confirm email reception



1. In the left menu, click **Mail**
2. Click the first email in the Inbox received today **Test email from ..**
3. Click **Details**
4. Delete this email by clicking **Delete**

Note: Do not close this tab, just leave it, go back to the previous tab with Aria Operations (not shown)

## Payload templates

Let's continue to prepare for a better environment for Alerts by creating custom Payload template.

## Why Payload Templates

**Payload Templates**

[Home](#) / [Alerts](#) / [Payload Templates](#)

**ADD** **...** Type here to apply filters

Template Name
<input checked="" type="checkbox"/> Default Email Template
<input type="checkbox"/> Default Log Template
<input type="checkbox"/> Default SNMP Trap Template
<input type="checkbox"/> Default ServiceNow Template
<input type="checkbox"/> Default Slack Template
<input type="checkbox"/> Default Webhook Template

1 - 6 of 6 items

**Standard Email Plugin**  
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}

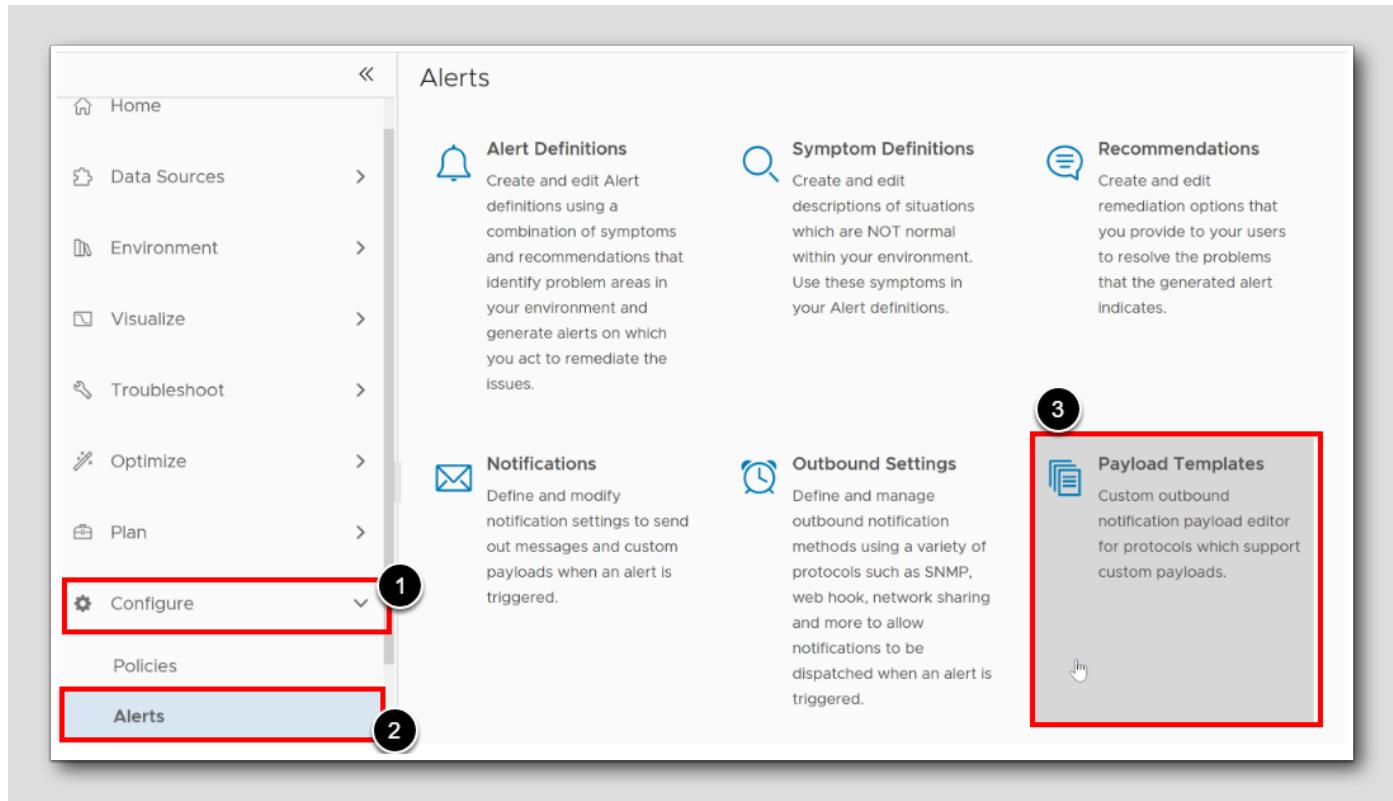
By leveraging notifications, you stay informed, collaborate effectively, respond promptly, and continuously improve your IT operations. It's the key to a proactive, integrated, and optimized environment.

A payload template acts as a customization blueprint for notifications. It allows us to design the structure and content of the payload sent to external systems or applications. You can populate the payload with key information from the triggering event, ensuring it meets the recipient's requirements and enables informed actions. We can include specific information, such as alert details, impacted objects, timestamps, or any other relevant data, providing comprehensive context to aid in incident investigation and resolution.

Think of it as your creative tool to curate valuable and tailored data, empowering external systems to make swift and effective responses.

With this in mind let's customize two payload templates to use with email and webhooks.

## Opening Payload Templates



To get to the Payload templates page

1. Click **Configure**
2. Click **Alerts**
3. Click **Payload Templates**

## The default Email Template

The screenshot shows the 'Payload Templates' screen under 'Alerts'. A single template, 'Default Email Template', is selected and highlighted with a red box. A context menu is open over this template, with the 'Clone' option highlighted by a red box and circled with a black number '3'. A red arrow points from the bottom right towards the 'Subject' field, which contains the alert template subject line: '[VMware Aria Operations] new alert Type State:\${ALERT\_CRITICALITY}, Object Type \${ALERT\_TYPE}'.

1. Click the blue text Default Email Template

Note: You see some of the text and variables that can be used for a template.

2. Click the ellipsis
3. Choose CLONE

## Step 1 - cloning email template

Create Payload Template

[Home](#) / [Alerts](#) / [Payload Templates](#)

1 - Details      2 - Object Content      3 - Payload Details

Name: Company Email Template (1)

Description: Email template we use in our company (2)

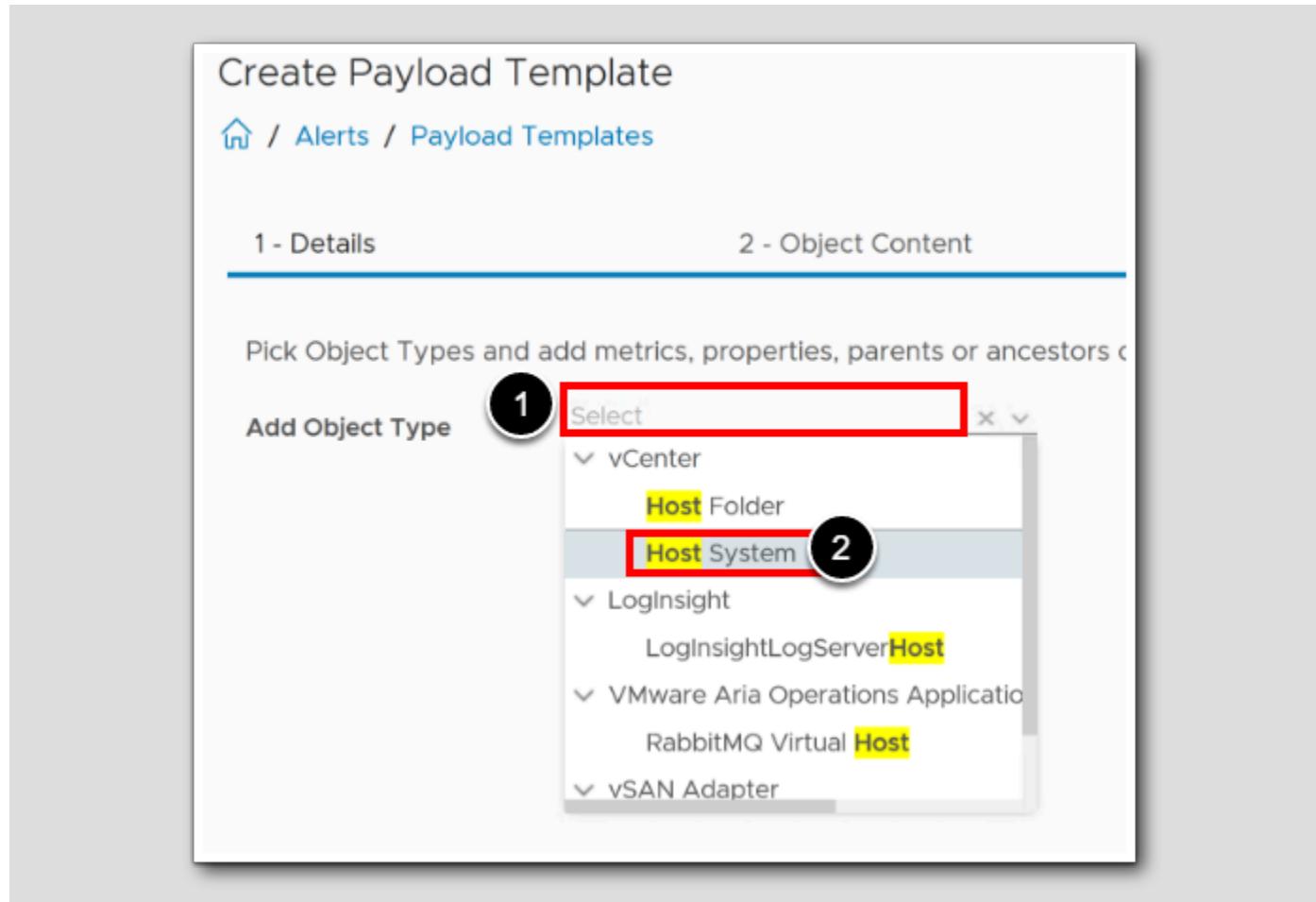
Outbound method: Standard Email Plugin (3)

PREVIOUS      NEXT (4)      CREATE      CANCEL

We are creating a new version for our company to use this as a template for information we need sent to us by email every time a notification is triggered from Aria Operations

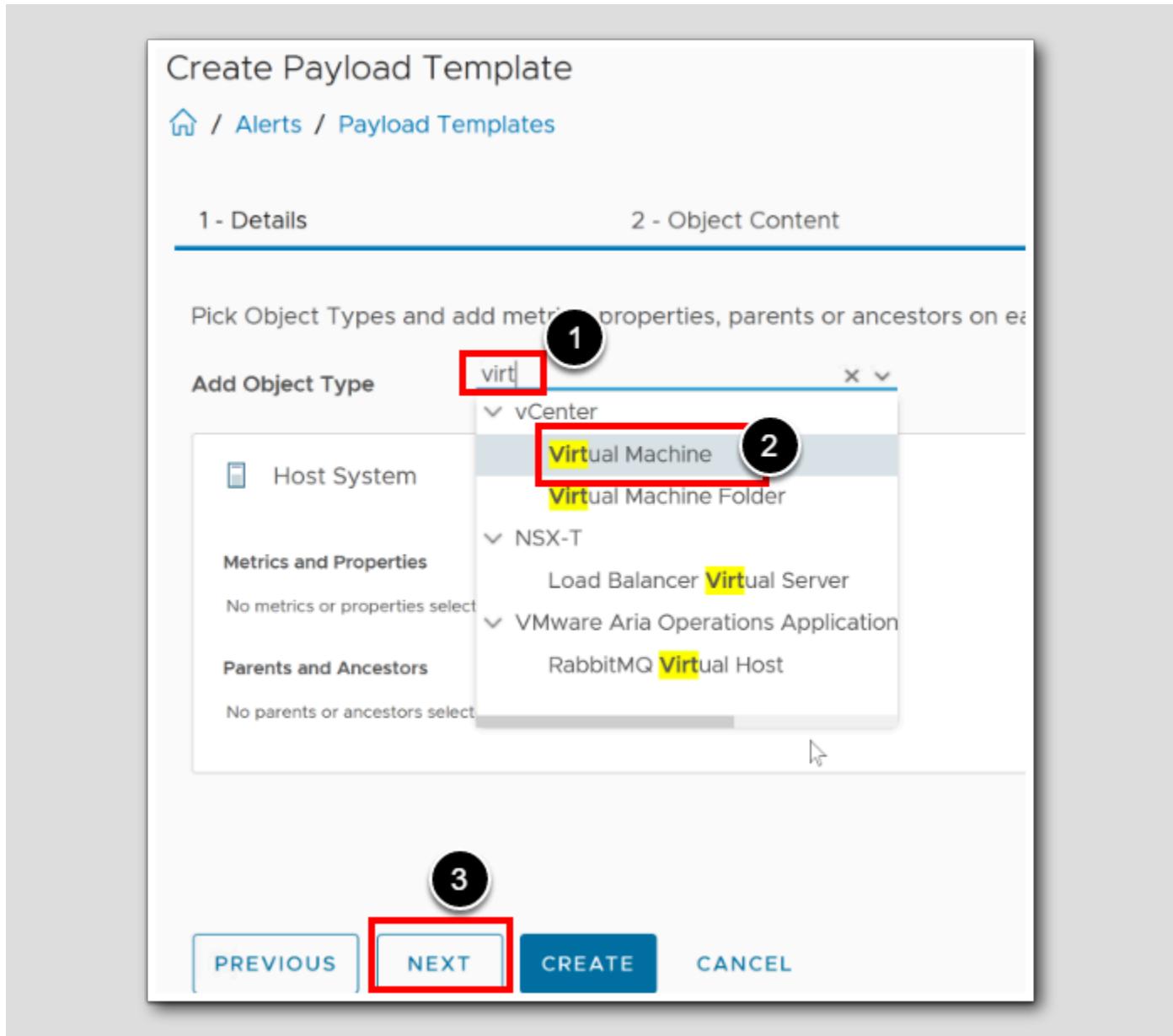
1. Give this payload template a meaningful name, for simplicity I've typed **Company Email Template**
2. For the description **Email template we use in our company**
3. Leave the value **Standard Email Plugin**
4. Click **Next**

## Add host objects



1. To easily find host object type. Start typing host
2. Select Host System

## Add VM Object



1. To easily find Virtual Machine object type. Start typing `virt`
2. Select **Virtual Machine**
3. Click **Next**

## Payload email Subject details

The screenshot shows the 'Create Payload Template' interface. The top navigation bar includes 'Home / Alerts / Payload Templates'. Below it, three tabs are visible: '1 - Details' (selected), '2 - Object Content', and '3 - Payload Details'. The '1 - Details' tab contains fields for 'Do you want to add template input properties?' (radio button 'No' selected) and 'Do you want different payload details for new, updated, and canceled alerts?' (radio button 'Yes' selected). Below these are three alert types: 'New Alert' (selected), 'Updated Alert', and 'Canceled Alert'. The 'Subject' field contains the placeholder text: `\${ALERT\_CRITICALITY} - New \${ALERT\_TYPE} \${ALERT\_SUBTYPE}, on \${RESOURCE\_KIND}: \${RESOURCE\_NAME}, [ \${CREATE\_TIME}]` (the square bracket is highlighted with a red box and numbered 5). The 'Body' section contains a rich text editor toolbar and a preview of the alert message. At the bottom are 'PREVIOUS', 'NEXT', 'CREATE', and 'CANCEL' buttons. To the right, a 'Parameters' column lists variables with copy icons: `\${CREATE\_TIME}` (highlighted with a red box and numbered 4), `\${UPDATE\_TIME}`, `\${CANCEL\_TIME}`, and `\${ALERT\_STATUS}`.

1. Choose the **default** radio buttons

2. Click **New Alert**

We would like to clean up the Subject.

3. Edit or delete the subject, and replace with `\${ALERT\_CRITICALITY} - New \${ALERT\_TYPE} \${ALERT\_SUBTYPE}, on \${RESOURCE\_KIND}: \${RESOURCE\_NAME}, [

4. From the Parameters column, copy `\${CREATE\_TIME} by clicking the copy icon,

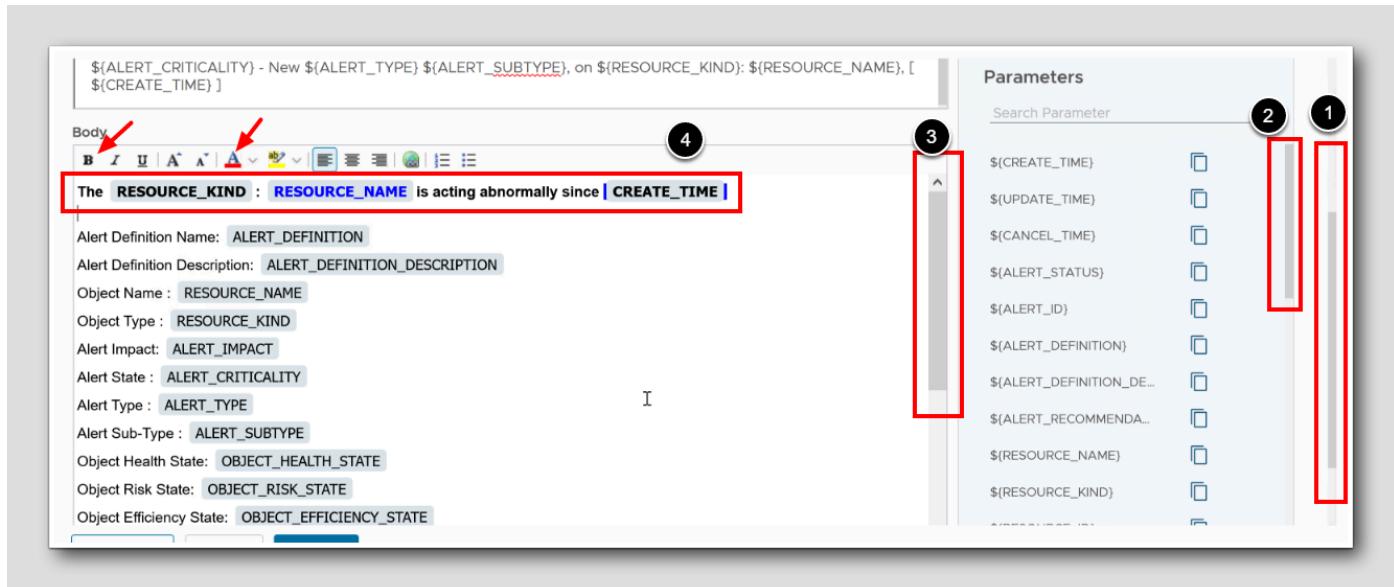
5. Click the empty space after `\${RESOURCE\_NAME} and Paste with CTRL+V into the Subject Window

The Complete Subject string could look like this: `\${ALERT\_CRITICALITY} - New \${ALERT\_TYPE} \${ALERT\_SUBTYPE}, on \${RESOURCE\_KIND}: \${RESOURCE\_NAME}, [ at \${CREATE\_TIME} ]

Notice I added the word 'at' and a square bracket [] around the CREATE TIME to make it readable for my company.

Up next is to change the body

## Payload Body details



1. To see expand the view of the Body and Parameters use the Window Scroll down
2. To see more Parameters use the Parameters Scroll Down/Up
3. To edit the complete Body, Use the Body Window Scroll Down/Up
4. Let's edit, cut'n'paste, and add Parameters to change the top of the body to what the picture above shows: The RESOURCE\_KIND: RESOURCE\_NAME is acting abnormally since CREATE\_TIME

Notice we made `resource_name` and `create_time` **Blue!** This means that the virtual machine name and the time of the alert will be shown in Blue color to force our eyes to focus on WHEN something happened to WHAT.

The result of this top part of the body would be something like this:

The VirtualMachine: **ubuntu-0008** is acting abnormally since **Wed Jun 28 13:34:15 UTC 2023**

This is your chance to showcase your abilities and give it your all, pouring in maximum effort, energy, and enthusiasm without holding back. However, for now, we will simplify our email alert template to avoid going overboard and keep it short, concise, and straight to the point. This will enable us to swiftly address and investigate any arising problems, ensuring clarity and ease of understanding for all IT administrators involved.

Let's continue:

New Alert    Updated Alert    Canceled Alert

**Subject**

```
$(ALERT_CRITICALITY} - New ${ALERT_TYPE} ${ALERT_SUBTYPE}, on ${RESOURCE_KIND}: ${RESOURCE_NAME}, [ ${CREATE_TIME} ]
```

**Body**

The **RESOURCE\_KIND** : **RESOURCE\_NAME** is acting abnormally since **CREATE\_TIME** |

# Alert:  
ALERT\_TYPE ALERT\_SUBTYPE ALERT\_IMPACT ALERT\_CRITICALITY  
alert definition: ALERT\_DEFINITION

# Symptoms:  
SYMPTOMS

# Recommendations:  
ALERT\_RECOMMENDATIONS

# Link: LINK\_TO\_ALERT

Created by YourName at YourCompany

PREVIOUS    NEXT    **CREATE**    CANCEL

**Parameters**

Search Parameter
\$(RESOURCE_ID)
\$(ADAPTER_KIND)
\$(RESOURCE_KIND_TYPE)
\$(ALERT_IMPACT)
\$(CONTROL_STATE)
\$(ALERT_CRITICALITY)
\$(ALERT_TYPE)
\$(ALERT_SUBTYPE)
\$(OBJECT_HEALTH_STAT...)
\$(OBJECT_RISK_STATE)
\$(OBJECT EFFICIENCY_S...)

1. We want a more simple and cleaner template, and here is One suggestion on how we could format our e-mail template to make it concise. Try to fill in most of these values, or edit as you see fit
2. Add your name and your company Created By YourName at YourCompany
3. Click CREATE

## The finished result

The screenshot shows the 'Payload Templates' page in a web interface. On the left, a list of templates is displayed with checkboxes next to them. The 'Company Email Template' is selected, indicated by a red box and a circled '1'. To the right of the list, detailed information about the selected template is shown:

- Template Name:** Company Email Template
- Description:** Email template we use in our company
- Payload Details:** New Alert (selected), Updated Alert, Canceled Alert
- Subject:** \${ALERT\_CRITICALITY} - New \${ALERT\_TYPE} \${ALERT\_SUBTYPE}, on \${RESOURCE\_KIND}: \${RESOURCE\_NAME}; [ \${CREATE\_TIME} ]
- Body:**

```

The ${RESOURCE_KIND}: ${RESOURCE_NAME} is acting abnormally since ${CREATE_TIME}
# Alert:
${ALERT_TYPE}${ALERT_SUBTYPE}${ALERT_IMPACT}${ALERT_CRITICALITY}
alert definition: ${ALERT_DEFINITION}

# Symptoms:
${SYMPTOMS}

# Recommendations:
${ALERT_RECOMMENDATIONS}

# Link: ${LINK_TO_ALERT}

```
- Created by:** YourName at YourCompany

Congratulations! You have now finished a cool new Payload template for email notifications.

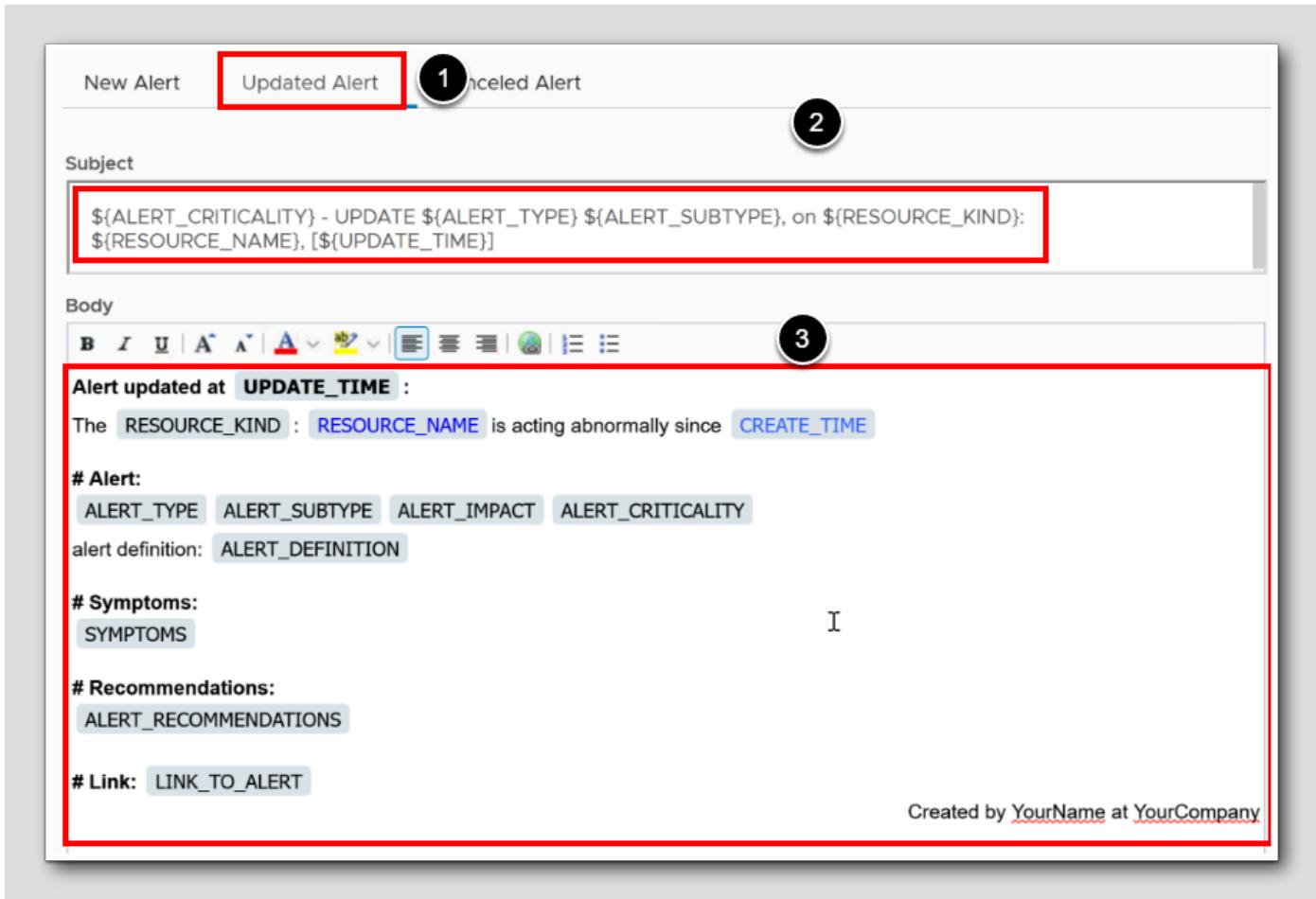
1. To get an overview of the finished result, Click on Company Email Template

The next step is to edit this Payload template and make the Updated Alert and the Canceled Alert ju

The screenshot shows the 'Payload Templates' page in the vSphere Web Client. At the top, there's a breadcrumb navigation: Home / Alerts / Payload Templates. Below the breadcrumb is a toolbar with 'ADD' and a three-dot menu. The main area displays a table of payload templates. The first row, labeled 'Company Email Template', has its row header selected (indicated by a red box and step 1). A context menu is open over this row, with the 'Edit' option highlighted (indicated by a red box and step 2). The table columns are 'Description' and 'Object Type'. The first row contains the description 'Email template we use in our co...' and the object type 'Template'. The second row contains the description 'Description for Default Email Te...' and the object type 'Template'.

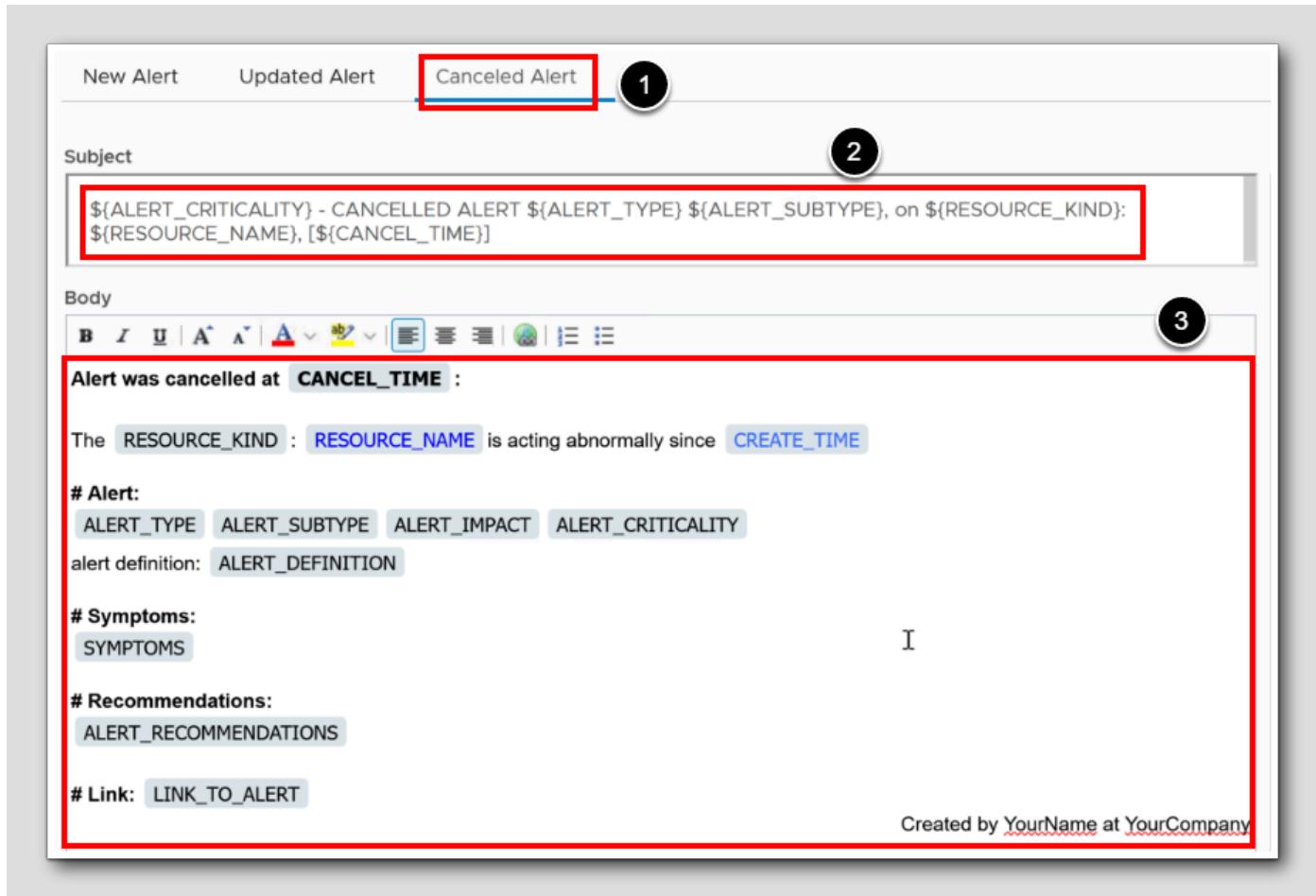
1. On the *Company Email Template*, click the ellipse
2. Choose **Edit**
3. In the *Edit Payload Template* page Click **Payload Details** (Not Shown)

## Changing the Updated Alert



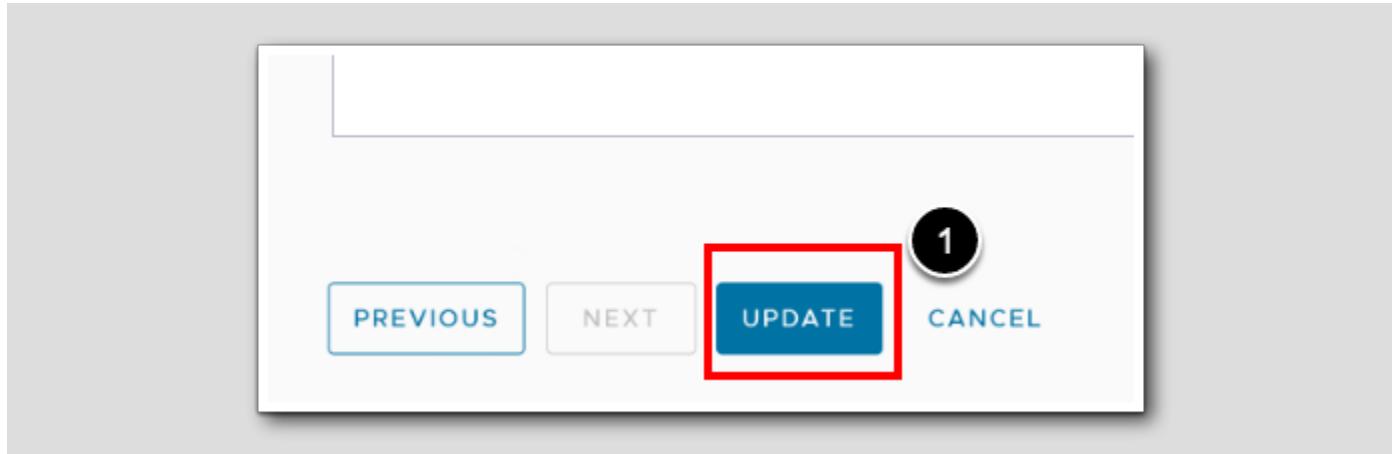
1. Make sure you are at the Updated Alert
2. Change the Subject to \${ALERT\_CRITICALITY} - UPDATED ALERT \${ALERT\_TYPE} \${ALERT\_SUBTYPE}, on \${RESOURCE\_KIND}: \${RESOURCE\_NAME}, [\${UPDATE\_TIME}]
3. Change the body by copying most of the Body from the New Alert to the Updated Alert Body. Edit the Body to mostly look like this image, it does not need to be perfect.

## Changing the Canceled Alert



1. Make sure you are at the Canceled Alert
2. Change the Subject to \${ALERT\_CRITICALITY} - CANCELLED ALERT \${ALERT\_TYPE} \${ALERT\_SUBTYPE}, on \${RESOURCE\_KIND}: \${RESOURCE\_NAME}, [\${CANCEL\_TIME}]
3. Change the body by copying most of the Body from the *Updated Alert Body* to the Canceled Alert Body. Edit the Body to mostly look like this image, it does not need to be perfect in this Lab

## Save, I mean Update



1. Remember to save the updates by clicking UPDATE

## Conclusion

## What did we do here?

Well, you are now prepared to make an alert system and send meaningful emails as New alerts (Something has happened to an object) and get updates (meaning the problem is still there, or has escalated) and see when the alert has been canceled (meaning the problem has gone away)

When you get back to the office, you can also edit and customize your own Payload template for the webhooks as well, depending if you would like more or less instant alerts or not.

## What happens in the next module?

In the next module we will create an **Alert Definition**, where we will define the conditions that indicate high CPU usage on a VM. For example, set a threshold of CPU usage exceeding 70-90% for a duration of 5 minutes and configure the severity level for the alert, such as "High" or "Critical," based on the impact of high CPU usage.

## Conclusion

- This module has equipped you with the essential skills to create notifications using webhooks and email. By mastering the customization through payload templates, you can design and deliver comprehensive information to external systems, enabling swift and informed actions.
- Real-time notifications facilitated by webhooks ensure timely alerts for prompt incident response, minimizing downtime and optimizing your IT operations.

- This lab emphasized the importance of leveraging notifications as a proactive measure, fostering collaboration, and continuously improving your environment. By embracing these techniques, you can create a proactive, integrated, and optimized system that enhances your overall productivity.

## You've finished Module 1

[50]

Congratulations on completing the lab module.

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

- VMware Product Public Page - Aria Operations: <https://docs.vmware.com/en/VMware-Aria-Operations/index.html>
- Aria Operations 8.12.1 - Release Notes: <https://docs.vmware.com/en/VMware-Aria-Operations/8.12.1/rn/vmware-aria-operations-8121-release-notes/index.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 2 - Creating a Custom Alert Definition (25 minutes) Intermediate

### Introduction

[52]

By the end of this guide, you'll have understanding of creating and managing custom alert definitions and notifications in Aria Operations, allowing for proactive monitoring, faster issue detection, and expedited response actions in your VMware infrastructure.

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

[53]

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

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

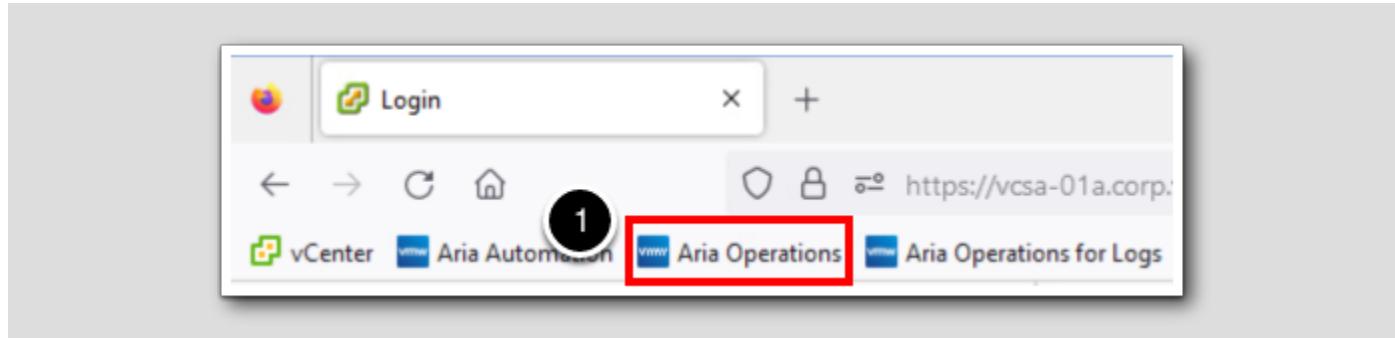
[54]



If the browser is not already open, launch Firefox.

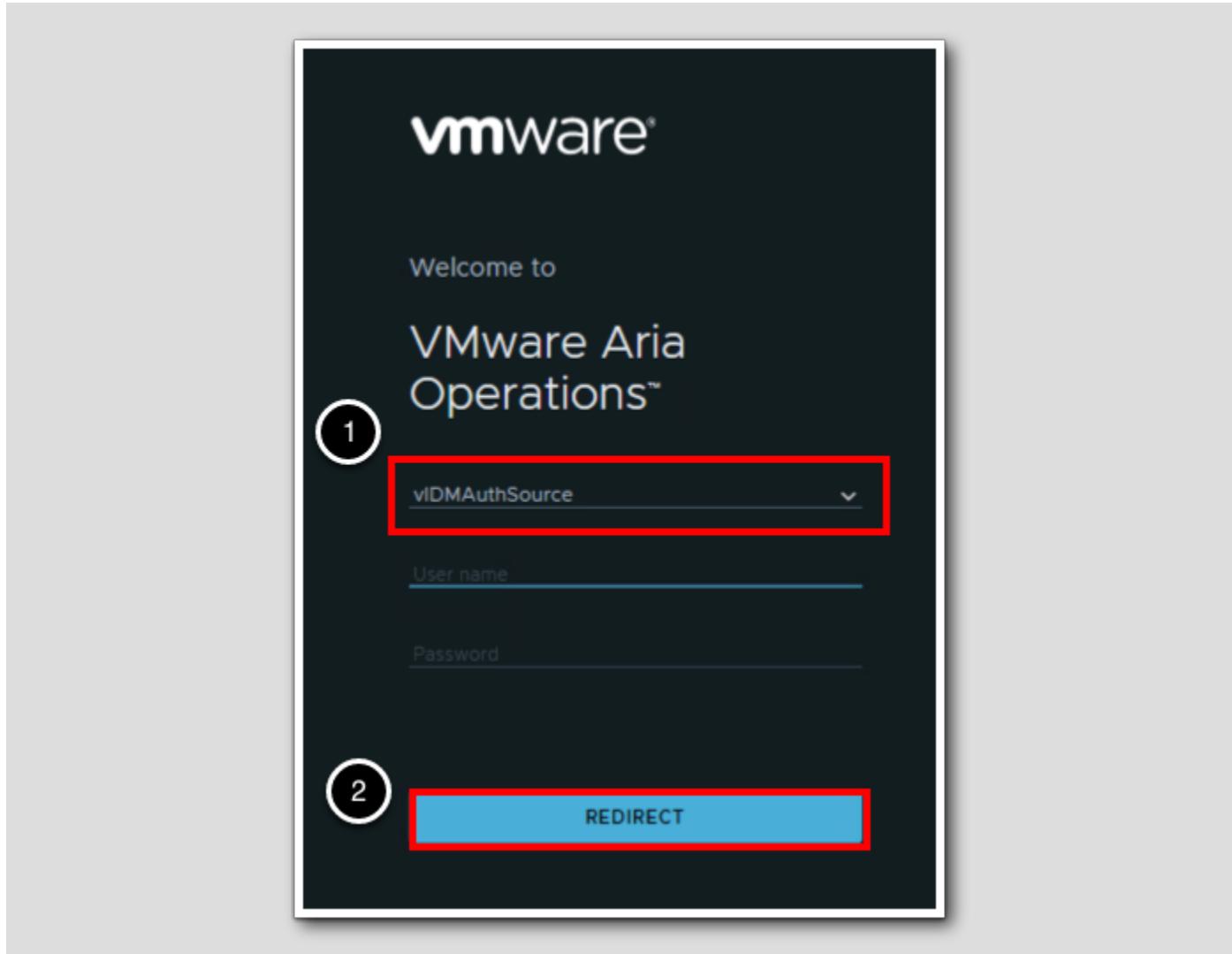
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

## 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 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.

## Custom Alert Definition

We will create a custom Alert sent via email using our Custom Payload we have created earlier. We will create an Alert definition with symptoms

## The holistic approach

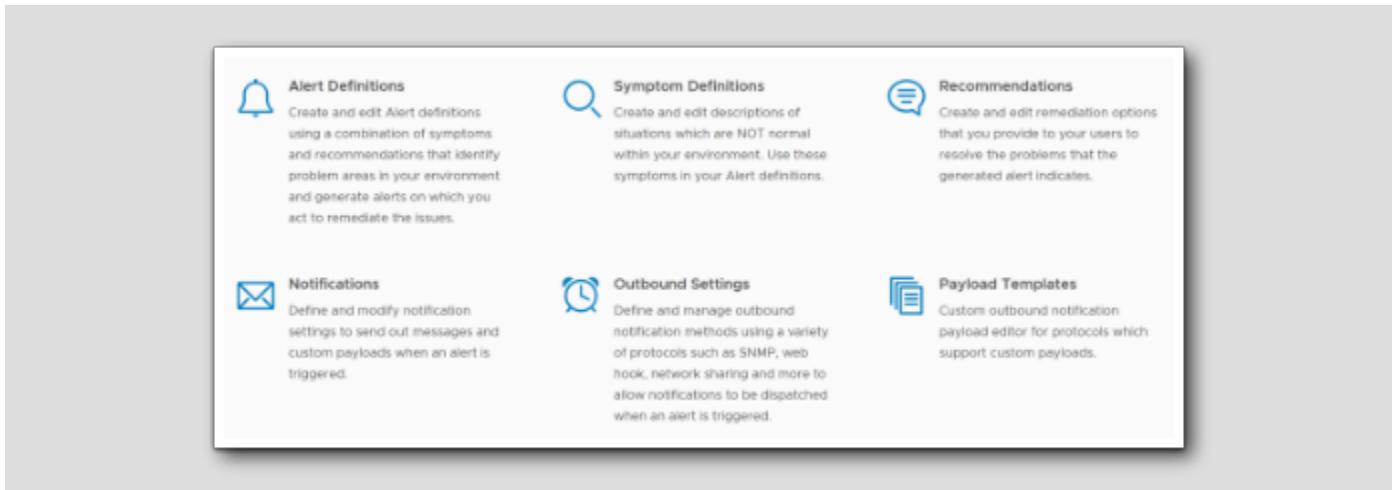
The screenshot shows the VMware Aria Operations interface. The left sidebar has 'Alerts' selected. The main area is titled 'Alerts' and contains four numbered sections:

- 1. Symptom Definitions**: Create and edit descriptions of situations which are NOT normal within your environment. Use these symptoms in your Alert definitions.
- 2. 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.
- 3. Notifications**: Define and modify notification settings to send out messages and custom payloads when an alert is triggered.
- 4. Recommendations**: Create and edit remediation options that you provide to your users to resolve the problems that the generated alert indicates.

By leveraging Symptom Definitions, Alert Definitions, Notifications, and Recommendations, Aria Operations enables IT operations teams to monitor, detect, and respond to potential issues or deviations from desired states in their VMware infrastructure. This holistic approach helps ensure efficient resource utilization, proactive problem management, and improved overall operational efficiency within the IT environment.

- 1. Symptom Definitions:** Define the specific metrics, conditions, or thresholds that indicate the presence of a problem or an abnormal behavior.
- 2. Alert Definitions:** Rules or conditions that determine when an alert should be triggered based on the occurrence or combination of specific symptoms.
- 3. Notifications**: Can be delivered through email, and are the means through which relevant stakeholders are informed about triggered alerts or events. When an alert is generated based on the defined criteria, we send notifications to administrators, IT teams, or other designated recipients.
- 4. Recommendations**: Provide actionable insights and guidance to address or resolve the issues identified by the monitoring system. These recommendations are based on VMware's knowledge base, best practices, and experience with similar situations to help with remediation steps to mitigate risks or resolve problems within the environment.

## Our Scenario



We need to create a custom Alert sent via email using our Custom Payload template from [Module 1 - Configuring and Managing Alert Notifications](#).

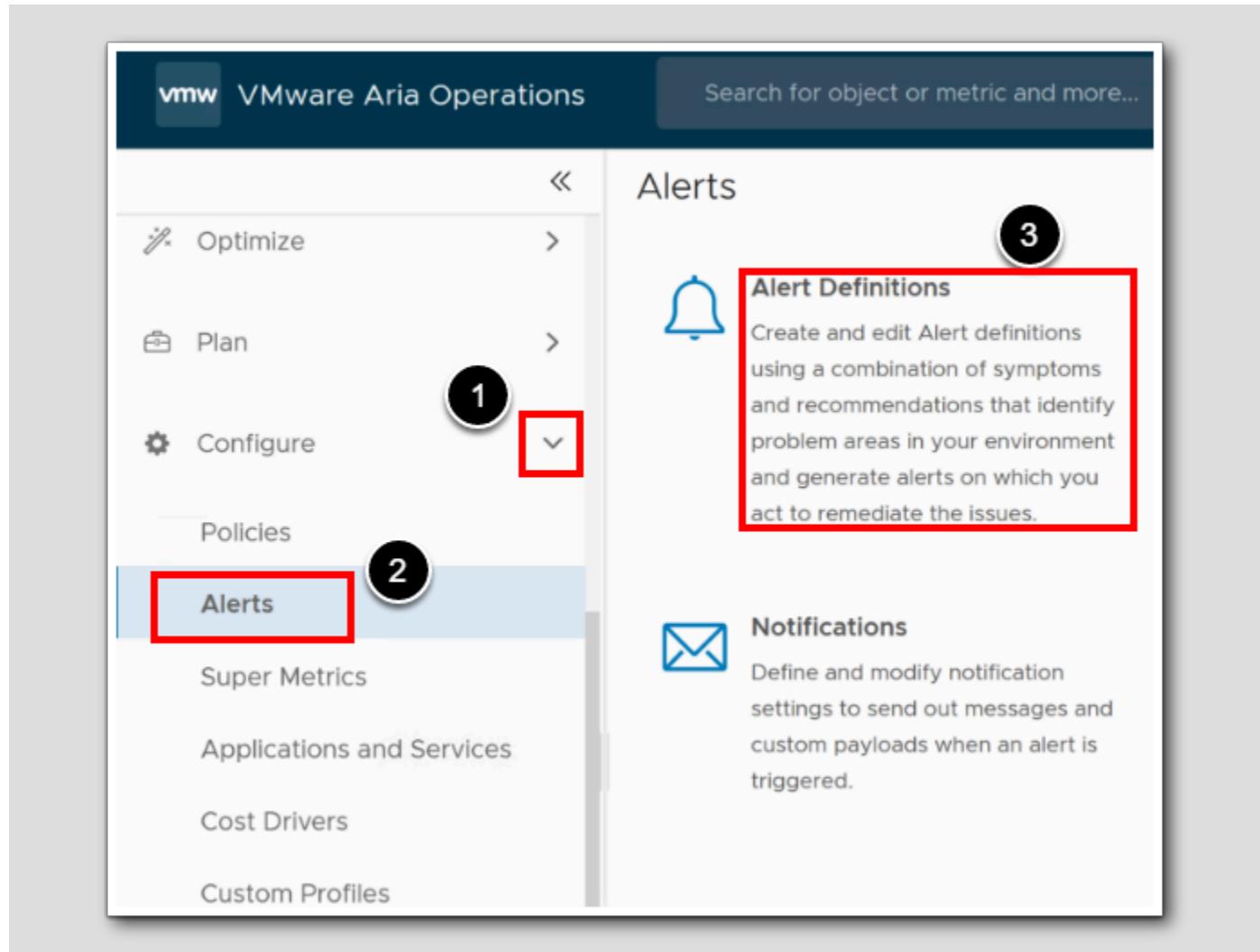
During this process we will use our own Symptoms and not utilize any Out of the box Symptom definitions. We will concentrate on the CPU Demand metric to tell us when Virtual Machines are working too hard. These are delicate servers and can not be overloaded, so by 'hard' we mean 70% is a warning, 80% is a immediate alert, and a 90% is a critical Alert. The VMs we're monitoring are connected to a specific policy.

CPU Demand(%) Is a metric that helps to understand how much of the CPU resources a virtual machine (VM) needs, regardless of any contention or limits. The key point to note here is that CPU Demand represents the 'need' for CPU resources, not the actual usage.

**Testing:** We will validate the configuration by simulating high CPU usage on the VMs. We will monitor the email system, as explained in the lesson [Start the email application](#) in module 1, to confirm that the alert is triggered, that our Payload Template works and that the defined symptom and conditions are correctly identified.

With this as a background, the next natural step is to create an Alert Definition!

Open Alert definition page



1. Click Configure
2. Click Alerts
3. Click Alert Definitions

## Review Out of the box content

The screenshot shows the 'Alert Definitions' page in vCenter. At the top left, there's a breadcrumb navigation: Home / Alerts / Alert Definitions. Below the header, there are two main sections: a toolbar with an 'ADD' button (circled with a red box and labeled '2') and a search bar containing the word 'demand' (circled with a red box and labeled '1'). The main area is a table listing alert definitions:

	Name	Adapter Type	Object Type	Alert Type	Alert Subtype	Criticality	Impact
<input type="checkbox"/>	: Pod is demanding more CPU than the configured limit	vCenter	Pod	Virtualization/Hyper...	Performance	<span style="color: yellow;">⚠</span>	<span style="color: blue;">Health</span>
<input type="checkbox"/>	: Virtual machine in a cluster is demanding more CPU than its entitlement	vCenter	Virtual M...	Virtualization/Hyper...	Performance	<span style="color: red;">⚡</span>	<span style="color: blue;">Health</span>
<input type="checkbox"/>	: Virtual machine is demanding more CPU than the configured limit	vCenter	Virtual M...	Virtualization/Hyper...	Performance	<span style="color: yellow;">⚠</span>	<span style="color: blue;">Health</span>
<input type="checkbox"/>	: Virtual machine in a DRS cluster is demanding more CPU than its entitlement	vCenter	Virtual M...	Virtualization/Hyper...	Performance	<span style="color: red;">⚡</span>	<span style="color: blue;">Health</span>
<input type="checkbox"/>	: Virtual machine is demanding more CPU than its entitlement	vCenter	Virtual M...	Virtualization/Hyper...	Performance	<span style="color: red;">⚡</span>	<span style="color: blue;">Health</span>

1. Let's search for Demand, in the Filter box type demand and press Enter

Notice the name of the Alert Definitions that explains what these Alert Definitions are about

2. To add a New Alert definition, Click ADD

## Edit Alert Definition

Edit Alert Definition      Virtual Machine

[/ Alerts / Alert Definitions](#)

1 - Alert      2 - Symptoms / Conditions

Name: OurCompany Custom Alert Definition 1

Description: Our Company Custom Alert definition. Set conditions that determine when an alert should be triggered based on high CPU Demand(%) meaning a high 'need' for CPU resources. 2

Base Object Type: Virtual Machine 3

Advanced Settings 4

Impact: Health

Criticality: Symptom Based 5

Alert Type & Subtype: Virtualization/Hypervisor : Perf

PREVIOUS      NEXT      UPDATE      CANCEL

1. Enter a new Name for our Alert Definition, OurCompany Custom Alert Definition
2. Enter a Description: Our Company Custom Alert definition. Sets the conditions that determine when an alert should be triggered based on high CPU Demand(%) meaning a high 'need' for CPU resources
3. As the Base Object Type choose Virtual Machine
4. Expand the Advanced section by clicking the arrow
5. Make sure the *Criticality* is based on the symptoms, choose Symptom Based
6. For the *Alert Type* we will change from Application Performance to Virtualization Performance, Choose Virtualization/Hypervisor Performance
7. Click NEXT

Add the metrics

[64]

The screenshot shows the 'Create Alert Definition' wizard at step 2 - Symptoms / Conditions. The alert is defined for a 'Virtual Machine' object. Three conditions are set up under 'Conditions' to trigger when CPU Demand reaches 70%, 80%, and 90% (marked as Info, Warning, and Critical respectively). A red box highlights the search bar in the 'Select Specific Object' panel, which contains a list of metrics. Two specific metrics are highlighted with red boxes: 'Demand (%)' under the CPU section and 'Demand (MHz)' under the CPU section. Red arrows point from the 'Demand (%)' metric in the search results to each of the three conditions in the alert definition.

1. In the Search Box, Type Demand, and press ENTER
2. To create a set of symptoms Drag and Drop the *CPU Demand (%)* metric 3x times

## Change the Symptoms conditions

Edit Alert Definition      Virtual Machine

Home / Alerts / Alert Definitions

1 - Alert      2 - Symptoms / Conditions

1. Self - Virtual Machine

The set is met when **Any** of the symptoms / conditions are true.

Conditions

1      2      3      4

If CPU Demand (%) >	mark as
70	Warning
80	Immediate
90	Critical

Drag an additional symptom / condition in to your set

Drag and drop metric to specify its condition or symptom into your alert here to create a new set

4

PREVIOUS      NEXT      UPDATE      CANCEL

1. Behind *The set is met when*, Change from All to Any
2. Set the *if CPU/Demand (%) > than respective, 70, 80, and 90 percent*
3. Behind *mark as*, choose warning, immediate, and Critical respectively
4. Click **Next**

## Adding Recommendations

[66]

Description ↑	Action	Defined By	Modified By
For best CPU performance set the ESXi power mana...	Power Off VM	vCenter	admin
For Production Virtual Machines, please assess the tr...	Power Off VM	User	holadmin@c...
If the host has 1 CPU, upgrade the host or use a host ...		vCenter	admin
If the load balancer CPU utilization is higher than syst...		NSX-T	admin
If the virtual machine has 1 vCPU, add an additional v...	Set CPU Count f...	vCenter	admin
If the virtual machine has multiple vCPUs, add an add...		vCenter	admin
If virtual machine CPU reservation is set, decrease th...	Set CPU Resour...	vCenter	admin
In the NSX UI, navigate to System   NSX Application ...		NSX-T	admin

1. Search for cpu related recommendations, in the search field type cpu and press enter
2. Drag recommendations into sets into your alert and order them by priority.
3. Click **Next**

Note: Pay notice to which recommendations that has Actions attached to them

## Attach policies

The screenshot shows the 'Create Alert Definition' wizard for a 'Virtual Machine'. The current step is '1 - Alert'. A red box highlights the list of policies under 'Select which policies you would like to activate this alert in. You may also customize thresholds per policy.' Three policies are selected: 'HOL Policy', 'HOL Test Policy', and 'vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM)'. Step 1 is circled with a number 1. Below the list are buttons for 'PREVIOUS', 'NEXT', 'CREATE' (which is highlighted with a red box and circled with a number 2), and 'CANCEL'.

Normally we would select a specific policy that were made for certain Application Servers, a business unit, or a grouping of objects. Policies are normally used for **Resource Allocation**, **Compliance** and **SLA Requirements**, **Business Priorities**, or **Experimentation and Testing**.

1. Tick the check mark on All policies
2. Click Create

**CONGRATULATIONS!**

We have now finished creating an alert definition with symptoms, the last task is to Create a Custom Notification that will use this Alert definition and also use the previously created *Payload templates* from Module 1, to send mail using the *Add outbound instance*

On to the next..

## Custom Notifications

Notifications can be delivered through email and are the means through which relevant stakeholders are informed about triggered

alerts or events. When an alert is generated based on the defined criteria, We send notifications to administrators, IT teams, or other designated recipients.

In this lesson we will utilize everything we have added to our Alerts until Now.

## Notifications Page

[69]

The screenshot shows the VMware Aria Operations interface. On the left, there's a sidebar with options like 'Optimize', 'Plan', 'Configure', 'Policies', and 'Alerts'. The 'Alerts' option is highlighted with a red box and a black circle containing the number '2'. Step 1 is indicated by a red box around the 'Configure' option. Step 2 is indicated by a red box around the 'Alerts' tab. Step 3 is indicated by a red box around the 'Notifications' section on the right, which is also enclosed in a larger red border.

**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.

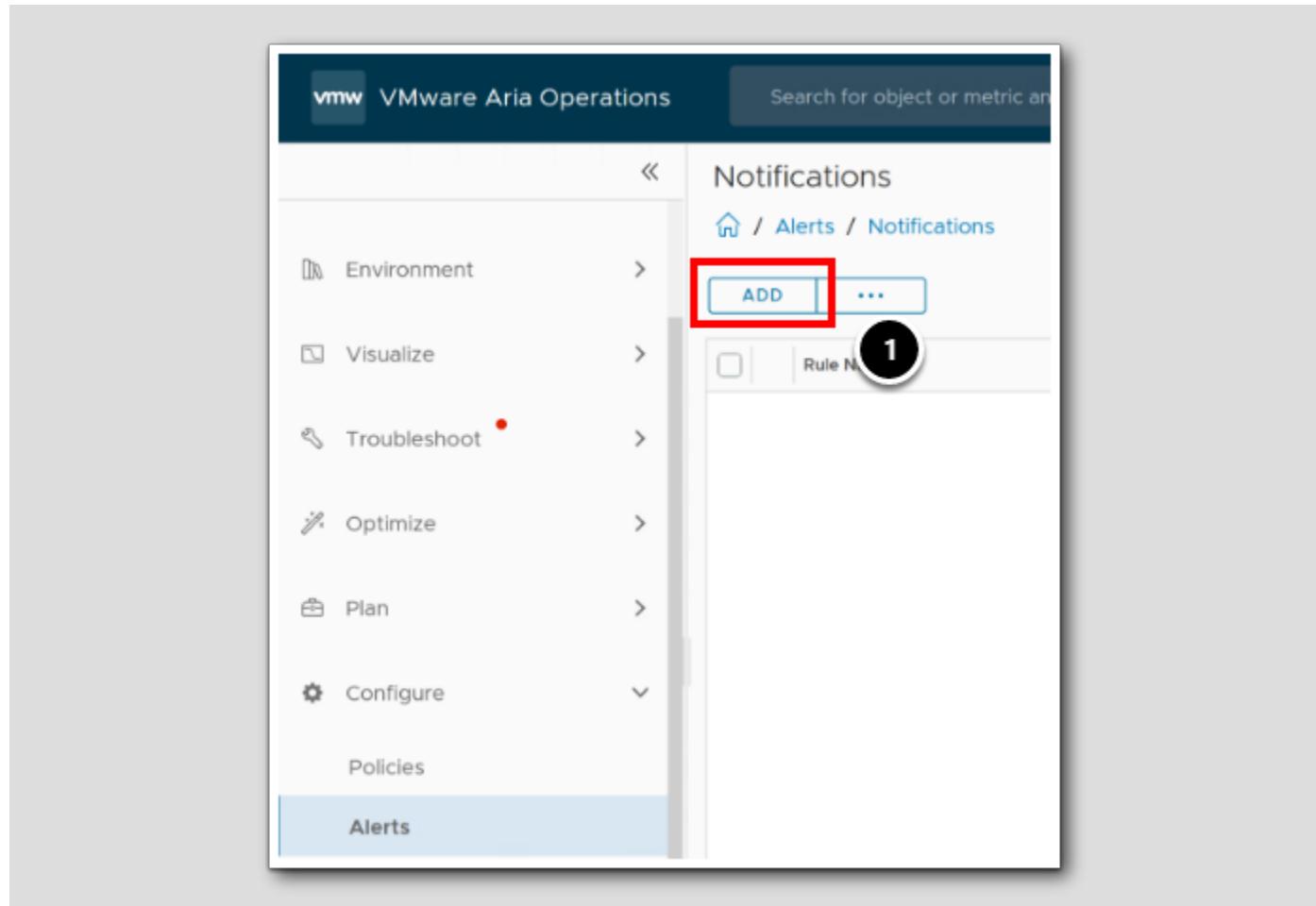
**Symptom Definitions**  
Create and edit descriptions of situations which are NOT normal within your environment. Use these symptoms in your Alert definitions.

**Actions**  
Create and edit actions to make changes to objects managed in your vCenter Server instances.

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

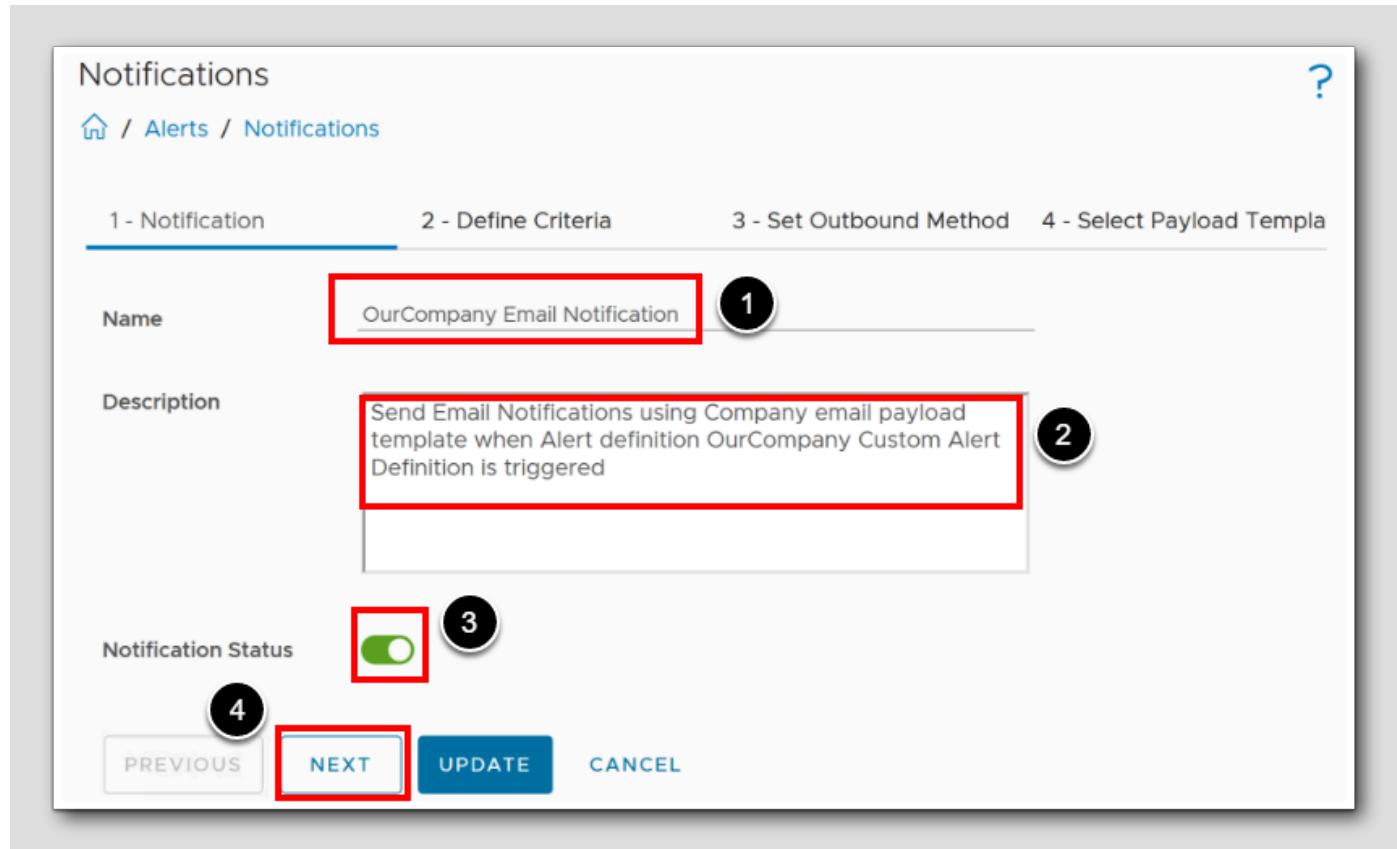
1. Click Configure
2. Click Alerts
3. Click Notifications

## Add Notification



1. On the Notifications page, Click ADD

## Notification properties



1. Since we already have used "OurCompany", In the Name box, Type OurCompany Email Notification
2. In the Description, type Send Email Notifications using Company email payload template when Alert definition OurCompany Custom Alert Definition is triggered
3. Make sure Notifications are activated as shown
4. Click NEXT

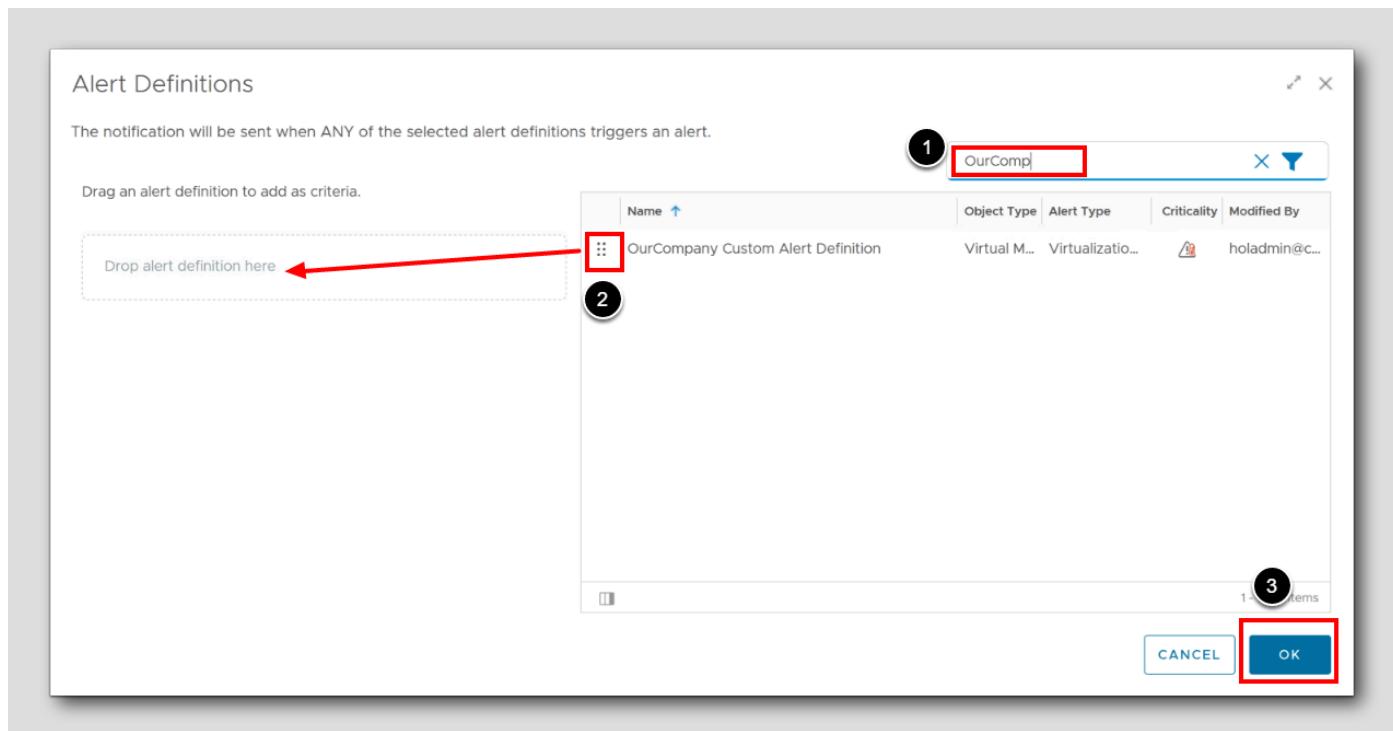
## Choosing Alert scope

The screenshot shows the 'Notifications' interface in VMware. The top navigation bar includes a home icon, 'Alerts', and 'Notifications'. Below the navigation, there are two tabs: '1 - Notification' and '2 - Define Criteria'. The '2 - Define Criteria' tab is active. The main area is titled 'Object Scope: Select set of Objects you would like to receive notifications about.' A dropdown menu labeled 'Criteria' shows 'All Objects' selected. The 'Alert Scope:' section is titled 'Select set of Alerts you would like to receive notifications about.' It contains three dropdown menus: 'Category' (set to 'All Alerts'), 'Criticality' (set to 'All States'), and 'Control State' (set to 'All States'). The 'Category' dropdown is expanded, showing options: 'All Alerts' (selected), 'Alert Type', 'Alert Impact', and 'Alert Definition'. The 'Alert Definition' option is highlighted with a red box and circled with a black number '1'. The 'Alert Type' option is circled with a black number '2'.

1. Under Alert Scope, Under Category, Click the Drop down box

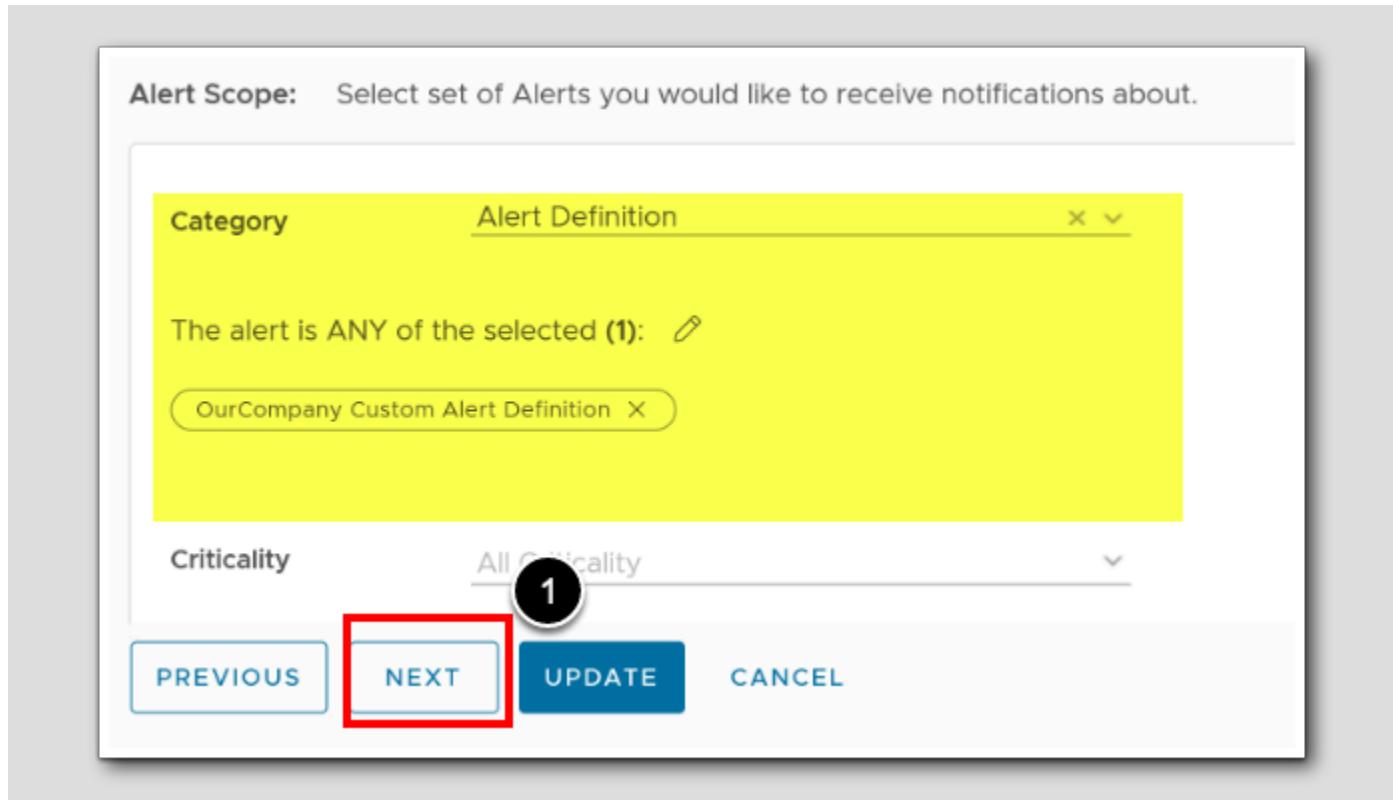
2. Change from All Alerts to Alert definition

## Adding our Alert Definition



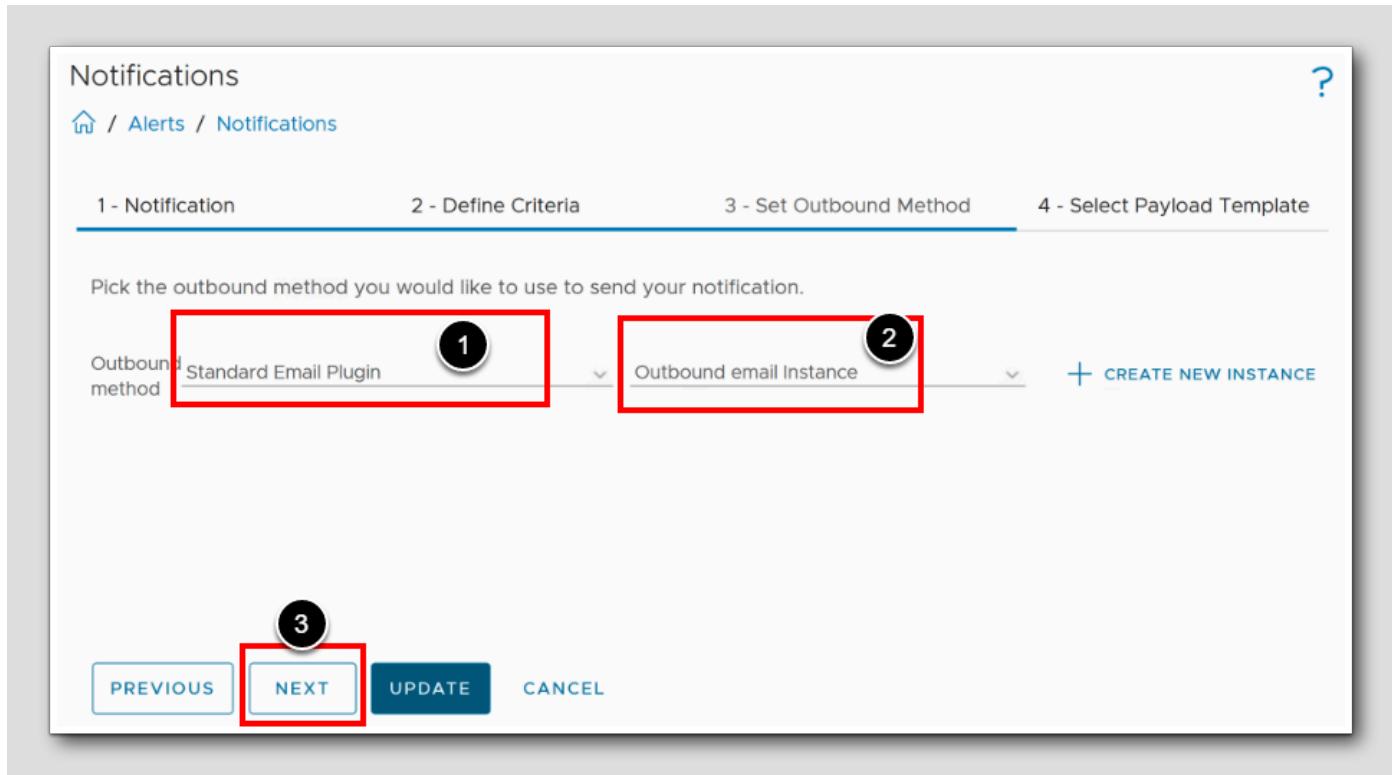
1. In the search box, type OurComp and Press ENTER
2. Drag and Drop the OurCompany Custom Alert Definition
3. Click OK

## Alert scope result



1. Click NEXT

## Outbound Method



1. For Outbound Method, Choose Standard Email Plugin
2. Choose our previously created Outbound email instance from Create New Outbound Instance in Module 1 - Configuring and Managing Alert Notifications
3. Click NEXT

## Select Payload Template

Notifications

Home / Alerts / Notifications

1 - Notification      2 - Define Criteria      3 - Set Outbound Methc

Pick a payload template to include in the notification. The template includes additional content about the alert or ob

**Payload Template** Company Email Template  
Company Email Template  
Default Email Template

> Company Email Template

Recipient(s) holadmin@corp.vmbeans.com  
Cc Recipients e.g. example@domain.com  
Bcc Recipients e.g. example@domain.com  
Notify again 1  
Max Notifications 5  
Delay to notify e.g. 15 (Optional)  
Description e.g. For Mr. Smith (Optional) Deprecated

PREVIOUS    NEXT    CREATE    CANCEL

1. Under Payload Template, Select the Company Email Template

Note: We created The Custom Payload Template in the Chapter Payload templates in Module 1 - Configuring and Managing Alert Notifications

2. Set the Recipient(s) to holadmin@corp.vmbeans.com
3. Set the Notify again to 1 minute
4. Set the Max Notifications to 5
5. Click CREATE

## Prepare for Alerts

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We are going to test our alerts for the next 10 minutes, but to narrow down the results, we will filter out what we don't need.

1. Click Troubleshoot
2. Click Alerts
3. Click the filter Icon
4. Impact select Health
5. Alert Type select Virtualization/Hypervisor
6. Alert Subtype select Performance
7. Status select Active
8. Click APPLY

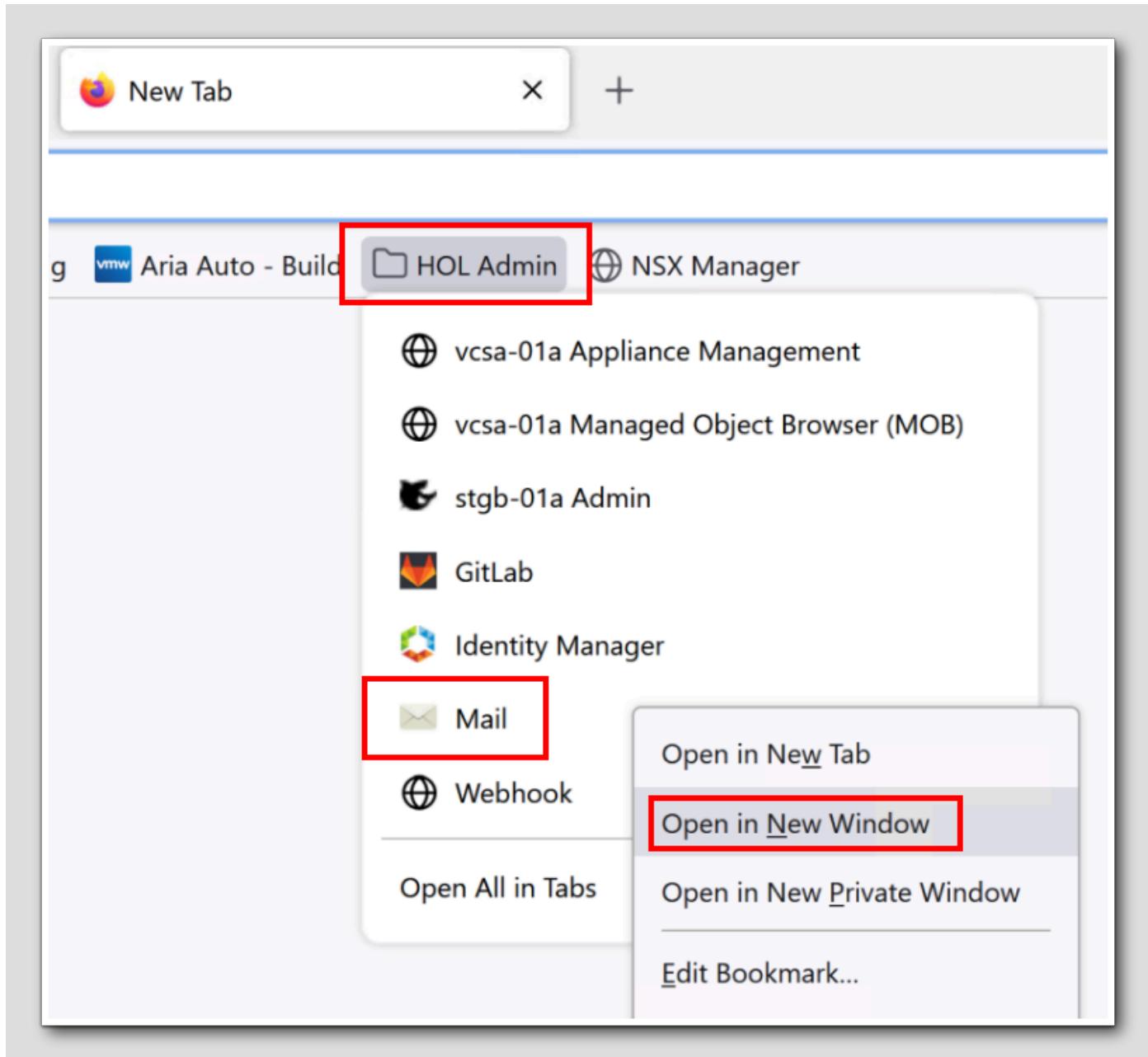
## Ready for alerts

The screenshot shows the 'All Alerts' page in Aria Operations. At the top, there is a search bar and a toolbar with icons for search, refresh (highlighted with a red box), notifications, and user profile. Below the toolbar, a message box displays a specific alert query: 'Impact:Health "Alert Type":Virtualization/Hypervisor "Alert Subtype":Perfc X ⚡'. The main table area is titled 'All Alerts' and has columns for 'Criticality', 'Alert', 'Triggered On', 'Created On', 'Status', 'Alert Type', 'Alert Subtype', and 'Importance'. A single alert entry is visible in the table, indicated by a circled '1'.

We are ready for our specific alerts. Remember that the alerts will take some 5-10 minutes to show up since Aria Operations have collection cycles every 5 minutes

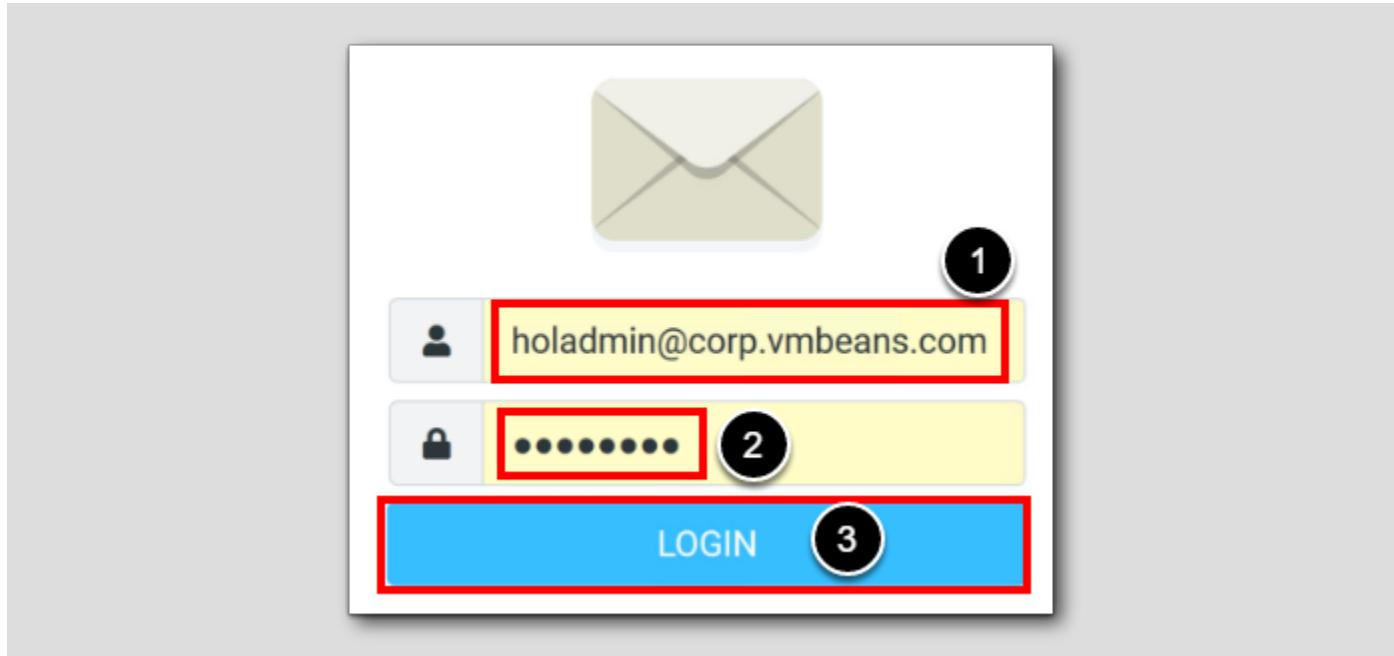
1. During our test, Refresh this page

## Preparing the Email client



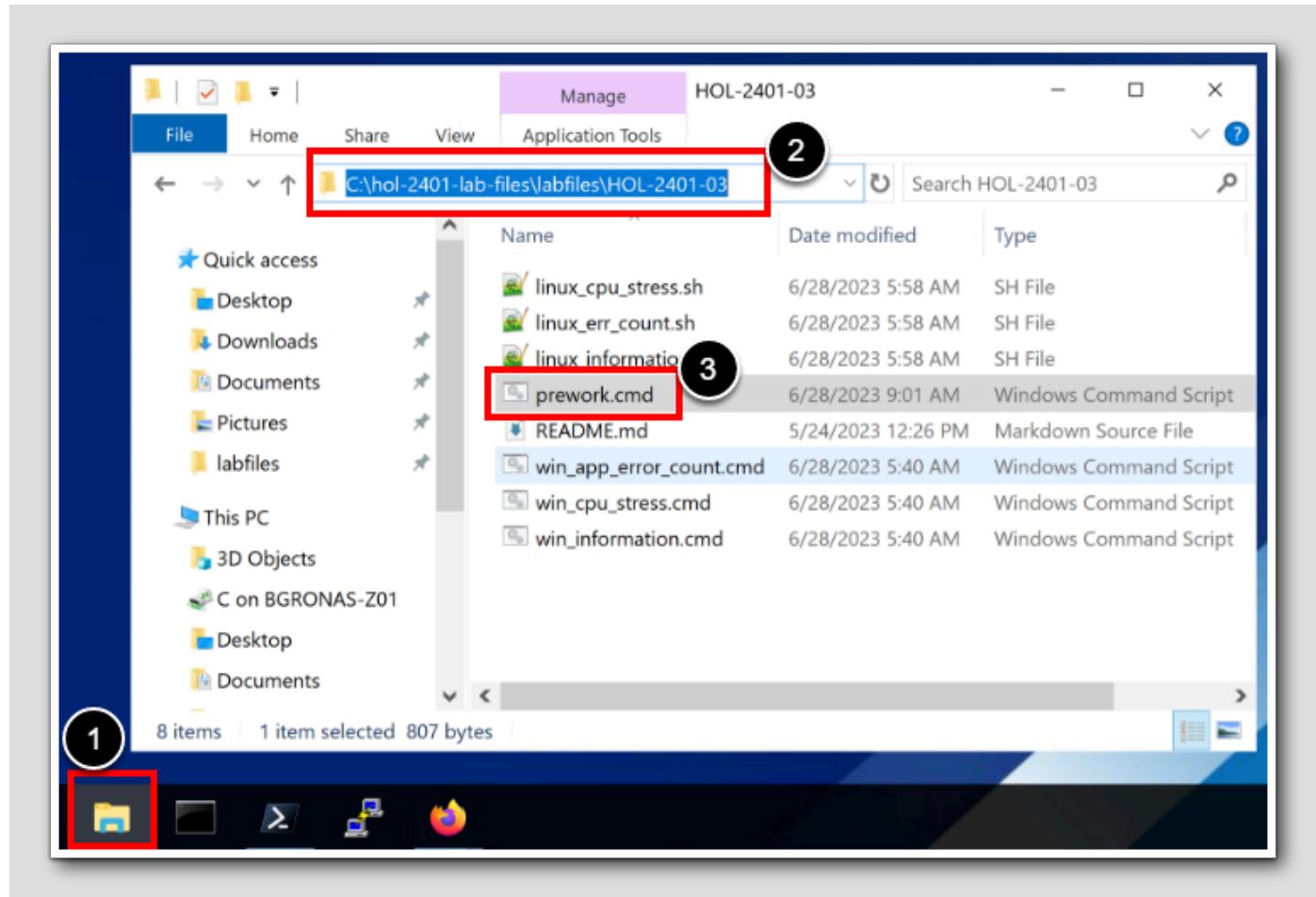
1. In the Browser, Click HOL Admin
2. Right Click on Mail
3. Choose Open In New Window

Log In to the email client



1. Type `holadmin@corp.vmbeans.com`
2. Type `VMware1!`
3. Click `LOGIN`

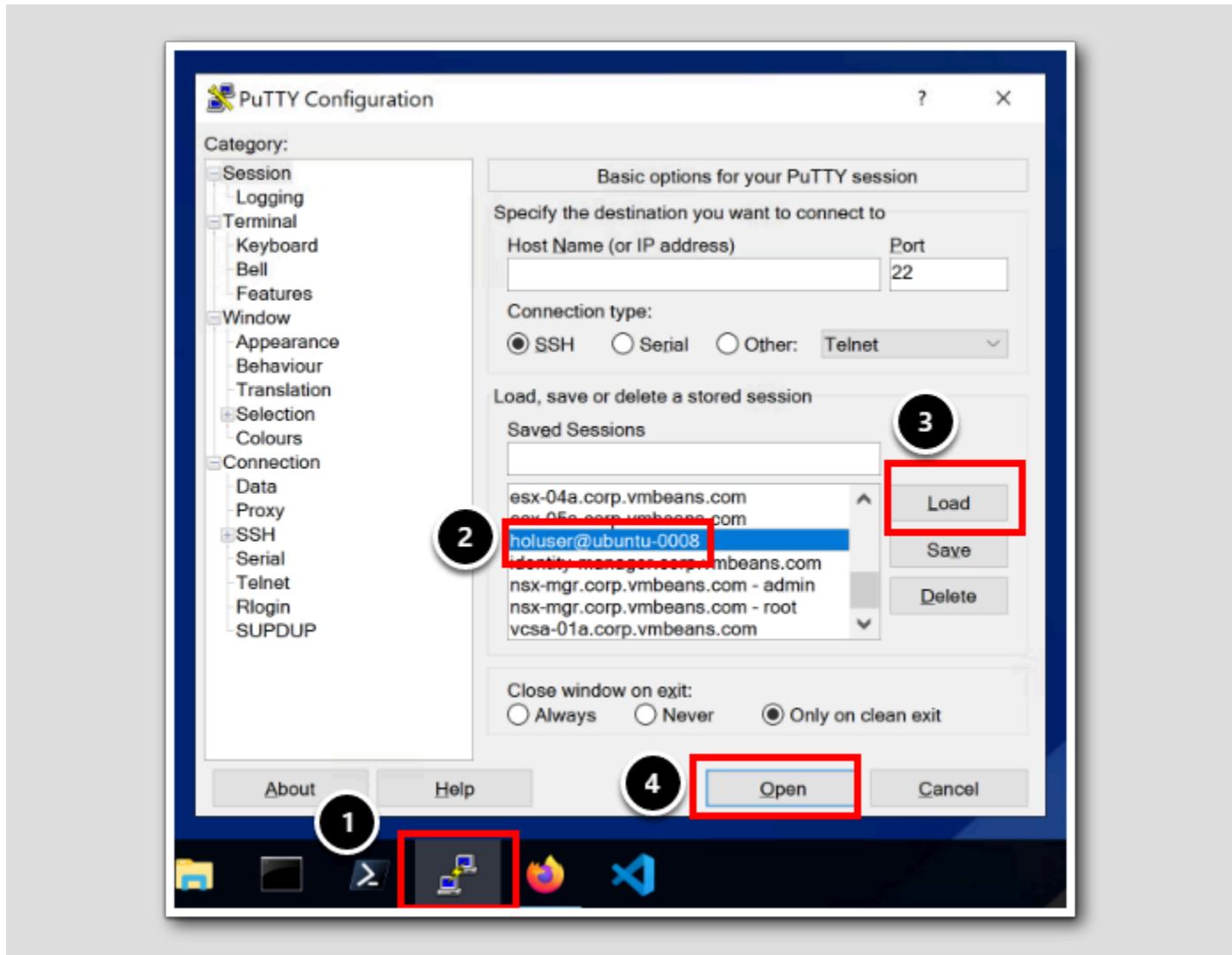
Prepare "the blast"



We will now copy some scripts over to an Ubuntu server to run a little CPU stress. The script: `linux_cpu_stress.sh` will help us create CPU load for approximately 10 minutes. During this time period, we will get e-mails and Aria Operations Alerts.

1. In the console, start a windows **explorer** window, click on the symbol on the taskbar
2. Go to the path; `C:\hol-2401-lab-files\labfiles\HOL-2401-03`
3. To start copying files, and transport them over to the `/root` folder on the Ubuntu VM called `ubuntu-008` Double-Click on the windows script file `prework.cmd`

## Use Putty



We will use putty to connect to the linux server to run the *CPU Stress* script.

1. In the Console, on the taskbar, start putty
2. Scroll to find holuser@ubuntu-0008
3. Click Load
4. Click Open

## Become root

The screenshot shows a terminal window with the following steps highlighted:

1. The user types `sudo su -` and presses ENTER.
2. The user enters the password `VMware1!` (hidden) and presses ENTER.
3. The user types `pwd` and presses ENTER.
4. The user types `ll` and presses ENTER.

The terminal output shows a long listing of files in the root directory. Three specific shell scripts are highlighted in green:  
- `linux_cpu_stress.sh*`  
- `linux_err_count.sh*`  
- `linux_information.sh*`

1. In the python console, type `sudo su -` and press ENTER
2. Enter the password `VMware1!` (hidden) and press ENTER
3. To ensure you are in the `/root` catalog, enter the command `pwd` and press ENTER
4. For a long listing (`ll`), Enter the command `ll` and press ENTER

Note: You should see the shell scripts we are going to use, listed in a horrifying green color (highlighted)

## Bring the noise

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

```
Last login: Wed Jun 28 09:30:14 2023 from 192.168.110.10
root@ubuntu-0008:~# pwd
/root
root@ubuntu-0008:~# ls
linux_cpu_stress.sh  linux_err_count.sh  linux_information.sh  snap
root@ubuntu-0008:~# ll
total 64
drwx----- 7 root root 4096 Jun 28 23:42 .
drwxr-xr-x 20 root root 4096 Jun 16 19:33 ../
-rw----- 1 root root 3943 Jun 28 13:19 .bash_history
-rw-r--r-- 1 root root 3582 Jan 12 2022 .bashrc
drwx----- 2 root root 4096 Oct 12 2021 .cache/
drwx----- 3 root root 4096 Jun 28 08:18 .config/
-rwxr-xr-x 1 root root 726 Jun 28 23:42 linux_cpu_stress.sh*
-rwxr-xr-x 1 root root 259 Jun 28 23:42 linux_err_count.sh*
-rwxr-xr-x 1 root root 939 Jun 28 23:42 linux_information.sh*
-rw-r--r-- 1 root root 161 Dec 5 2019 .profile
drwxr-xr-x 3 root root 4096 Oct 12 2021 snap/
drwx----- 2 root root 4096 Jun 16 19:36 .ssh/
drwxr-xr-x 2 root root 4096 Jun 19 23:34 .vim/
-rw----- 1 root root 11056 Jun 28 13:03 .viminfo
root@ubuntu-0008:~# ./linux_cpu_stress.sh
```

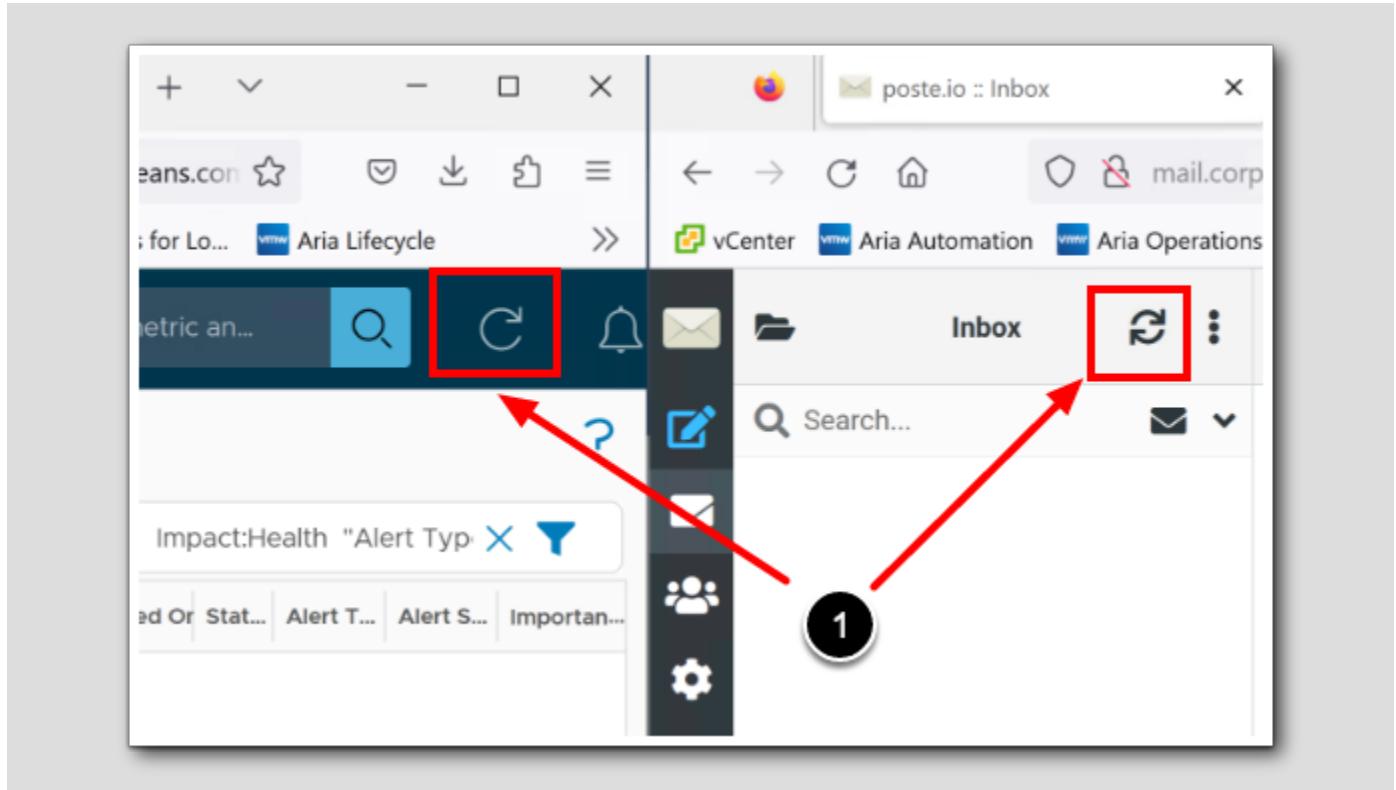
A red arrow points to the line "1 ./linux\_cpu\_stress.sh" with a circled "1" above it. The line "1 ./linux\_cpu\_stress.sh" is also highlighted with a red box.

Be ready with your mail client and Aria Operations alert page open. As soon as we start this script, it will generate CPU traffic for approximately 10 minutes, and then die.

1. Start the CPU Stress test by typing `./linux_cpu_stress.sh` and then hit ENTER

Note: You can use Alt+Tab to jump to your email client and Aria Operations to see what happens,

## The refreshing game



1. If we put both the ARIA Operations Alert Page and the mail client side by side, it is easier to click the Refresh button on both and monitor for alerts

NOTE: Since Aria Operations collects metrics every 5 minutes, we have to do a little waiting, but not for long. Now is a good time to take a sip of water, check your phone, send a nice text message to your loved ones, get update on the weather, and read the headlines on your favorite news page.

## Using email alerts to tweak our Custom Payload Templates

The screenshot shows an email client interface with a list of messages on the left and a detailed message view on the right.

**Left Panel (Message List):**

- Message 1: YourNameGoesHere - Today 17:20
  - warning - CANCELLED ALERT Virtualization/Hypervisor Performance
- Message 2: YourNameGoesHere - Today 17:19
  - warning - UPDATED ALERT Virtualization/Hypervisor Performance
- Message 3: YourNameGoesHere - Today 17:18
  - warning - UPDATED ALERT Virtualization/Hypervisor Performance
- Message 4: YourNameGoesHere - Today 17:17
  - warning - UPDATED ALERT Virtualization/Hypervisor Performance
- Message 5: YourNameGoesHere - Today 17:16
  - warning - UPDATED ALERT Virtualization/Hypervisor Performance
- Message 6: YourNameGoesHere - Today 17:15
  - warning - UPDATED ALERT Virtualization/Hypervisor Performance
- Message 7: YourNameGoesHere - Today 17:14
  - critical - New Virtualization/Hypervisor Performance Alert
- Message 8: YourNameGoesHere - Today 17:13
  - critical - New Virtualization/Hypervisor Performance Alert
- Message 9: YourNameGoesHere - Today 17:12
  - critical - New Virtualization/Hypervisor Performance Alert
- Message 10: YourNameGoesHere - Today 17:11
  - critical - New Virtualization/Hypervisor Performance Alert
- Message 11: YourNameGoesHere - Today 17:10
  - critical - New Virtualization/Hypervisor Performance Alert
- Message 12: YourNameGoesHere - Today 17:09
  - critical - New Virtualization/Hypervisor Performance Alert

**Right Panel (Message View):**

**Message Subject:** critical - New Virtualization/Hypervisor Performance, on Virtu... [Thu Jun 29 00:09:48 UTC 2023]

**From:** YourNameGoesHere on 2023-06-28 17:14  
**Details** Plain text

**Message Content:**

The VirtualMachine: [ubuntu-0008](#) is acting abnormally since [Thu Jun 29 00:09:48 UTC 2023](#)

**# Alert:**  
 Alert definition: OurCompany Custom Alert Definition

**# Symptoms:**  
 SYMPTOM SET - self Conditions -

Object Name	Object ID	Metric	Message Info
ubuntu-0008	ca492859-bd5c-4b0d-a772-583516c5ce	bCPU Demand (%)	> 90.0
ubuntu-0008	ca492859-bd5c-4b0d-a772-583516c5ce	bCPU Demand (%)	> 70.0
ubuntu-0008	ca492859-bd5c-4b0d-a772-583516c5ce	bCPU Demand (%)	> 80.0

**# Recommendations:**

- Check the applications running on the virtual machines in the cluster to determine whether they are using excessive CPU resources.
- Use vMotion to migrate some virtual machines with high CPU workload to other hosts that have available resources.
- Power Off this virtual machine to allow other virtual machines to use the CPU and memory resources more effectively.
- Review the symptoms listed and remove the number of vCPUs from the virtual machine as required.

**Link:** <https://192.168.110.70/ui/index.action#environment/object-browser/hierarchy/ca492859-bd5c-4b0d-a772-583516c5ce>

Our email looks and feel, will be exactly as we planned them, meaning they will look like the Custom Payload template we created in [Payload templates](#) in [Module 1 - Configuring and Managing Alert Notifications](#), here are some tips on how we could customize them:

1. First: We get 5 Critical alerts - We should tune the Payload Template to show the word critical with CAPITAL LETTERS. The second thing about this is "do we really want this to repeat 5 times?"
2. Second: We got updates as long as the error still were active and ongoing. But as the Linux server calmed down it changed from Critical to Warning, this is what actually fires off an update
3. Third: we get a CANCELED ALERT, this means the problem was either fixed or went away (the CPU load script ran for just 10 minutes)
4. Nicely underway, we got explanations and recommendations we needed to resolve the problem, or wait for the problem to settle down by itself. Which it does.

## Aria Operations Critical Alert

[87]

Criticality	Alert	Triggered On	Created On	Status	Alert Type	Alert Subtype	Importance
<span style="color: red;">■</span>	OurCompany Custom Alert Definition	ubuntu-0008	5:44 PM	<span style="color: yellow;">💡</span>	Virtualiz...	Performa...	Very High (1)

So firstly we get a red Critical alert. Notice the name is "ourCompany Custom Alert Definition". Maybe the alert definition name could be a little smarter. Review what we did in the [Custom Alert Definition](#) chapter. Now that we know what this alert is for, we can just rename it.

1. We can click the alert to investigate more

## Recommendation with an Action

The screenshot shows the vRealize Operations Management Cloud interface. At the top, it displays the virtual machine name "ubuntu-0008" and its start time "Started on: 5:44:48 PM". To the right, there are tabs for "Virtualization/Hypervisor" and "Pe". Below the header, there are three tabs: "Alert Details" (selected), "Related Alerts", and "Potential Evidence". Under "Alert Details", there is a section titled "Recommendations" with a counter "3 of 4" and a circled number "1". A red box highlights the "3 of 4" button. Below this, a message says "Power Off this virtual machine to allow other virtual machines to use the CPU and memory that is being wasted by this virtual ma" and a blue button labeled "POWER OFF VM". Further down, under "Alert Basis", it lists "1. Self - Virtual Machine" and "any". In the "Conditions" section, it states "The ! Critical condition CPUDemand (%) > 90 % has been met on ubuntu-0008" and a blue button labeled "TROUBLESHOOT WITH LOGS". At the bottom, there is a line graph titled "ubuntu-0008 - CPU Demand (%)" showing CPU usage over time from 12:00 PM to 06:00 PM, with two distinct peaks around 5:00 PM and 5:30 PM.

Remember when we set up that alert? We added four recommendations, and one of them lets us power off the VM with just a click! This capability enables us to swiftly respond and proactively address Alerts that arises, and stay ahead of the game.

1. To turn the pages of the four Recommendations, click the left and right Arrows

Go back to all the alerts (not shown)

## Warnings

The screenshot shows the 'All Alerts' interface. At the top, there are 'ACTIONS' and 'Group By Time' dropdowns. Below this, a filter bar shows '1 Hour' with a red exclamation mark icon and a '2' in a circle, indicating two alerts. The main table has columns: 'Criticality' (with yellow and red icons), 'Alert' (containing 'OurCompany Custom Alert Definition'), 'Triggered On' (with a timestamp and a green arrow icon), and 'Created On' (with a timestamp and a green arrow icon). The first alert in the 'Alert' column is highlighted with a red border. A black circle with the number '1' is positioned above the table.

Criticality	Alert	Triggered On ↑	Created On
Yellow	OurCompany Custom Alert Definition	ubuntu-0008 5:09 PM	
Red	OurCompany Custom Alert Definition	ubuntu-0008 5:44 PM	
Grey			

After a while, you will see the alert as yellow, meaning we went from a critical level to a warning level. In the picture I've deleted some of the filters to see more alerts from different create times.

1. Click the warning Alert

## Warning Alert

The screenshot shows a warning alert for VM **ubuntu-0008**. The alert is titled **OurCompany Custom Alert Definition** and was started on 5:09:48 PM and canceled at 5:19:48 PM. The alert details tab is selected. Under Recommendations, it says: "Check the applications running on the virtual machines in the cluster to determine whether high CPU workload is an expected behavior." The Alert Basis section shows a condition: "The **Warning** condition **CPUDemand (%) > 70 %** has been met on **ubuntu-0008**". A "TROUBLESHOOT WITH LOGS" button is present. Below is a line graph showing CPU Demand (%) over time from 12:00 PM to 6:00 PM, with two sharp peaks around 5:00 PM and 5:30 PM.

As you can see the **warning** alert is no different from the critical alert except for what it reports out of what we set as a symptom in our alert definition in the lesson [Change the Symptoms conditions](#).

## Conclusion

### Challenge

Try creating an Alert that will use the webhook instead of the email! It should be not be too hard.

### Alerts summarize

- While there are no ACTIVE alerts, The Alerts window is not showing anything since we
- When the Linux server CPU Load is a total ravage, the alert is showing as New, Red, Critical
- When the Linux server '*cools down*' we get an updated warning state
- When the alert is canceled, the alert window will not show an ACTIVE alert, but if we filter out to show all alert, not just active, we will see previous alerts as well.

This is the end of this lab.

## Conclusion

Harnessing the capability to customize alert definitions and notifications in Aria Operations plays an essential role in optimizing the monitoring and incident response mechanisms of your VMware infrastructure. This segment offered critical insights that facilitate the proficient customization of these features in alignment with your specific operational requirements. The implementation of such customizations equips us to uphold proactive monitoring, rapid issue detection, and prompt resolution, leading to an enhancement in IT operations management and overall infrastructure stability.

## You've finished Module 2

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 - Configuring Alerts and Actions:** <https://docs.vmware.com/en/VMware-Aria-Operations/8.12/Configuring-Operations/GUID-62D6F047-7743-4B1A-90EF-F97B15D2E408.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 3 - Application Monitoring with VMware Aria Operations (35 minutes) Advanced

### Introduction

[95]

Script execution enables task automation and data collection, while analyzing top processes enhances performance and resource efficiency. We will explore the significance of Aria Operations' script execution and top process analysis, providing insights for organizations aiming to achieve operational excellence.

- Script Execution: Automate tasks, collect data, and perform custom operations.
- Benefits: Streamline workflows, enhance productivity, and gain deeper insights.
- 
- Top Process Analysis: Identify resource consumption, optimize allocation, and troubleshoot performance issues.
- Benefits: Crucial for maintaining optimal performance and resource efficiency.

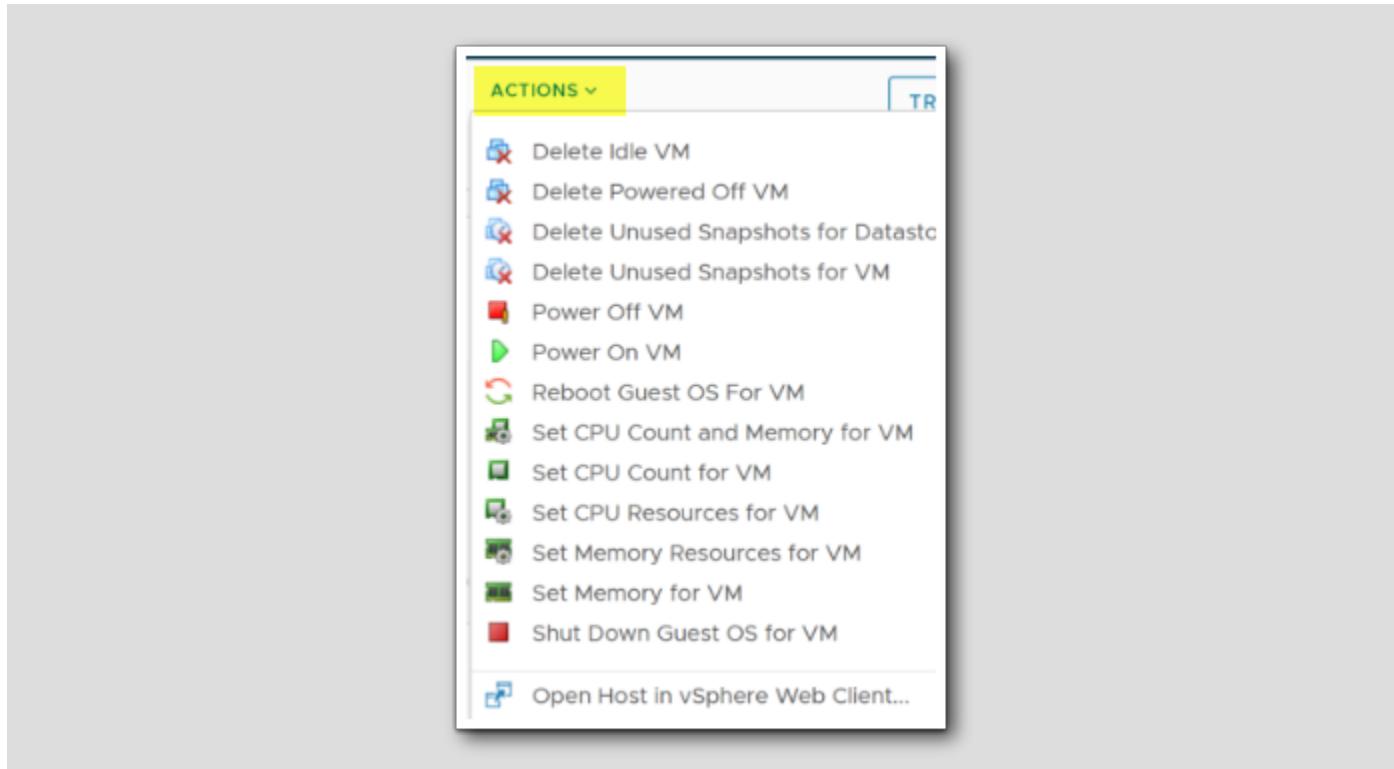
Lab Captain: Bengt Grønås, Senior Specialist Solution Engineer, Norway

## Introduction to Actions

[96]

## About Aria Operations Actions

[97]



"Actions" are tasks you can perform to either obtain data from, or modify, objects in the systems being monitored.

These tasks are generally added by "solutions" and are accessible from various locations within the user interface, including the object Actions menu, list and view menus, and some dashboard widgets. Actions can also be linked to alert definitions.

Actions can be divided into different categories.

**Read Actions:** These actions are used to extract data from the target objects.

**Update Actions:** These actions allow you to make changes to the target objects. For example, if an alert indicates a virtual machine is low on memory, you could set up a specific action to increase its memory, likely solving the problem.

**Ad Hoc Actions:** On-demand manual tasks such as powering a virtual machine on/off, snapshot deletion, or guest OS reboot.

**Recommendations/Automated Actions:** Suggestions for action based on vROps analysis, manually executable or automated per policy. These may include workload balancing or VM memory enhancement.

**Custom Actions:** User-defined actions built on vRealize Orchestrator scripts or workflows, manually or automatically triggered, such as provisioning a new VM on reaching capacity thresholds.

**Scheduled Actions:** Actions timed to occur at specific periods, useful for out-of-business-hours operations like maintenance tasks or batch jobs.

**Remediation Actions:** Actions meant to resolve triggered alerts, either manually executed or automated.

Note: Remember that the actions you can perform will depend on the permissions granted to your user account and the integrations set up in your Aria Operations environment. Always take care when running actions, especially when automating tasks. A poorly planned action can unintentionally impact your IT environment."

## Objects and Actions

[98]

Actions can be performed on a wide variety of objects that are part of your virtual or physical infrastructure, including but not limited to:

- **Virtual Machines (VMs):** for example powering on/off, migrating to a different host, increasing/decreasing memory or CPU, etc.
- **Hosts:** Entering/exit maintenance mode, power on/off, etc.
- **Datastores:** Enabling/disabling Storage DRS, changing the Storage DRS automation level, etc.
- **Clusters:** Enabling/disabling DRS or HA, changing the DRS automation level, etc.
- **Resource Pools:** Adjusting the CPU/memory resources.
- **Networks:** Modifying network settings.

The types of actions you can perform depend on your Aria Operations configuration and the solutions you have installed, and they require proper permissions, also, the actions might vary based on the versions of both Aria Operations and vSphere you are using.

## Log in to Aria Operations

[99]

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

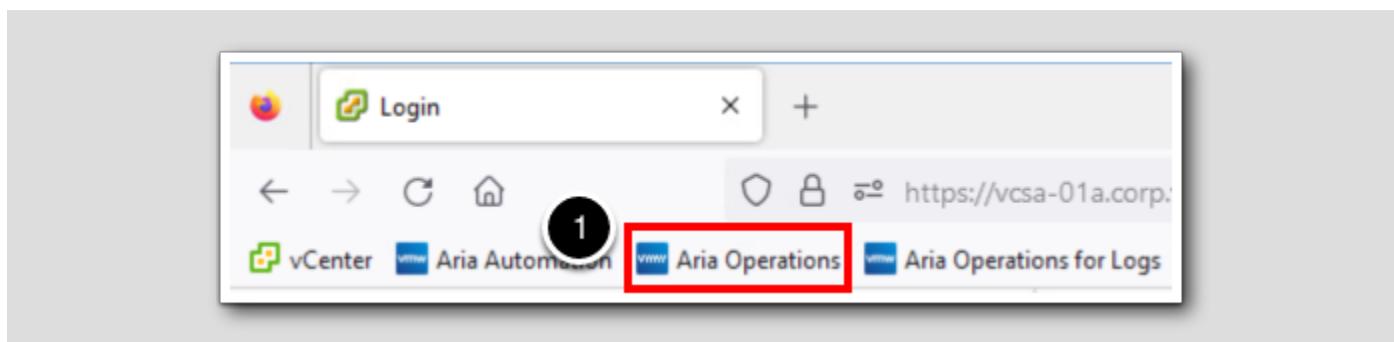
Open the Firefox Browser from the Windows Task Bar



If the browser is not already open, launch Firefox.

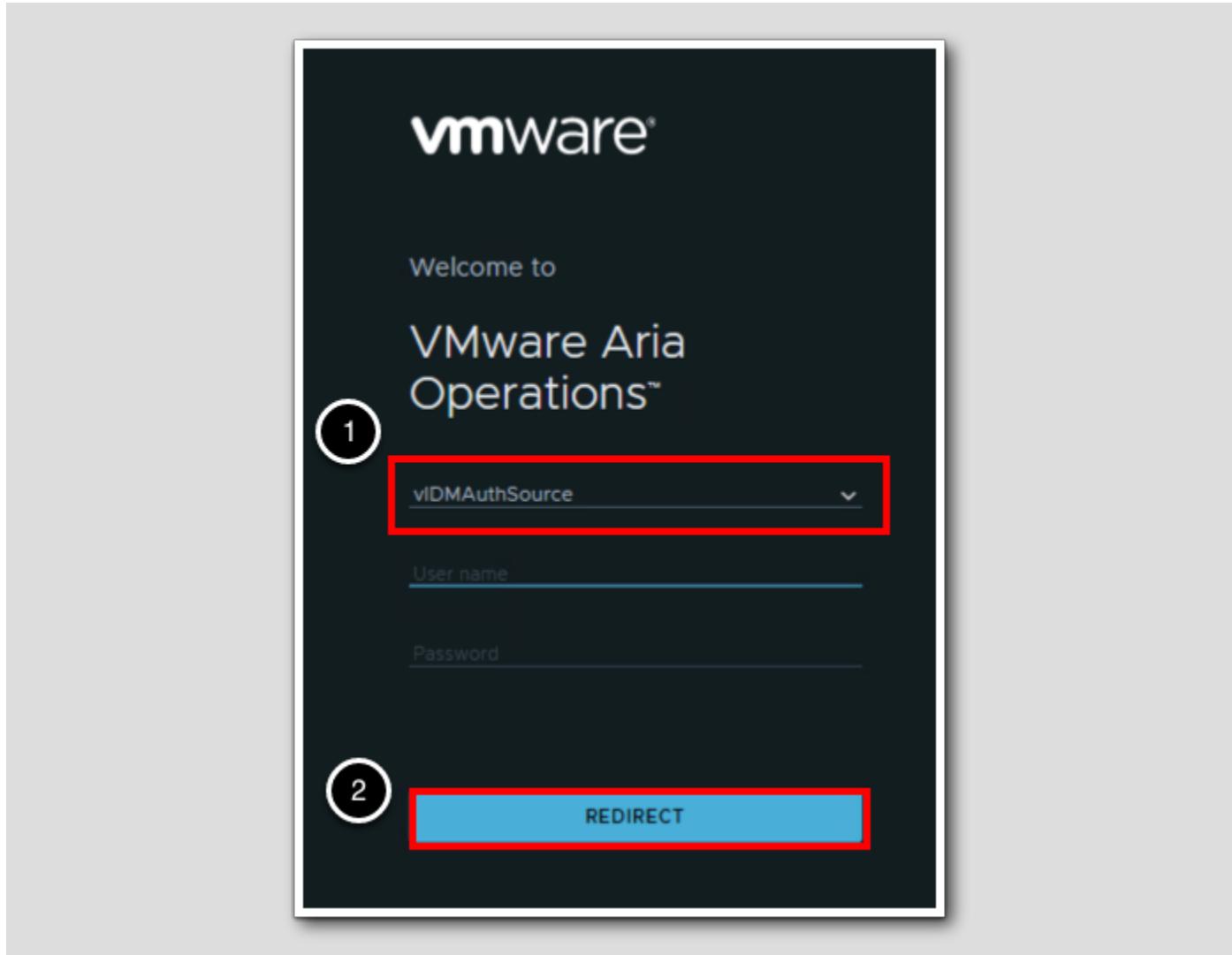
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

Navigate to Aria Operations



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

## Log in to Aria Operations

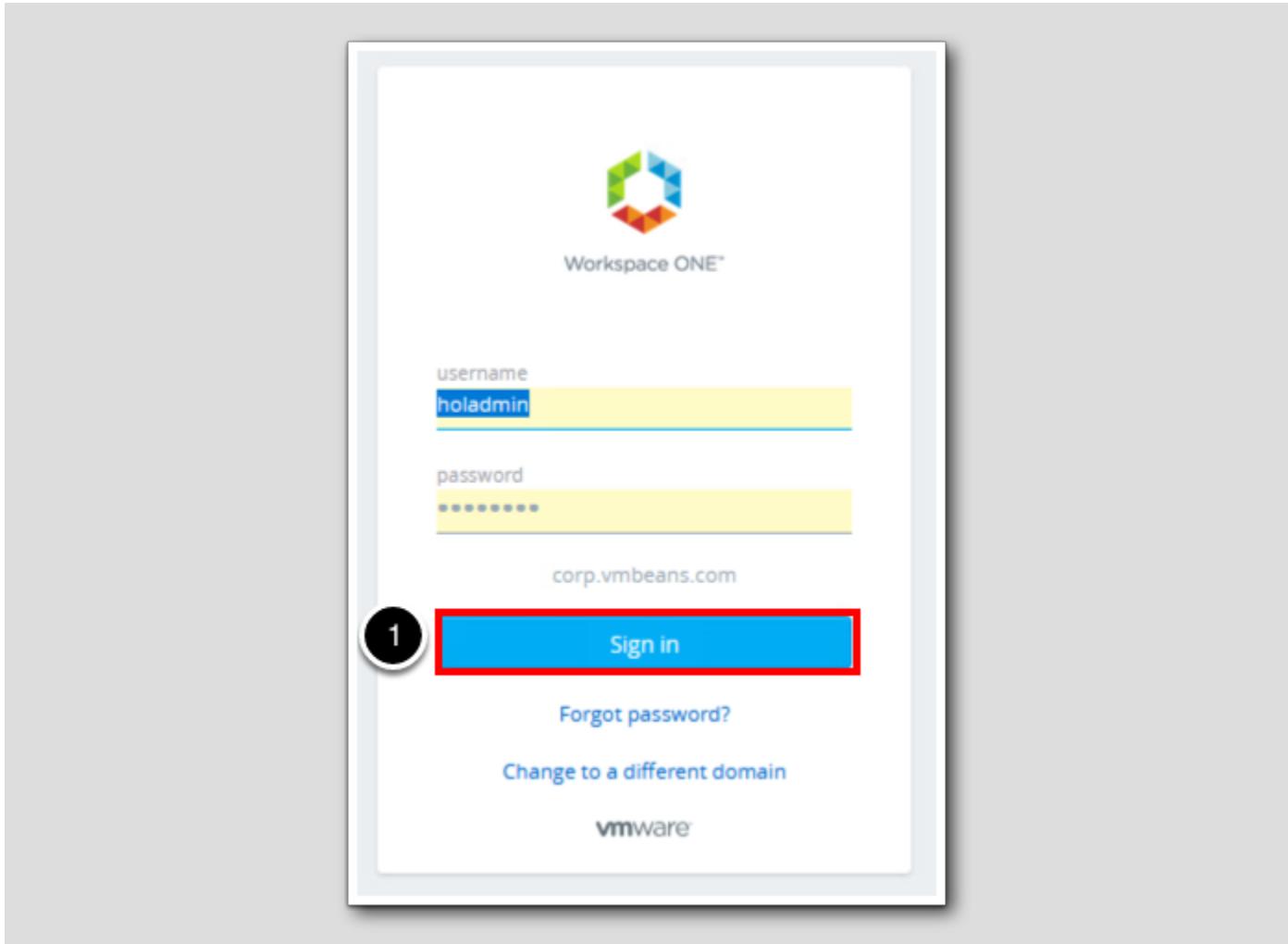


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

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.

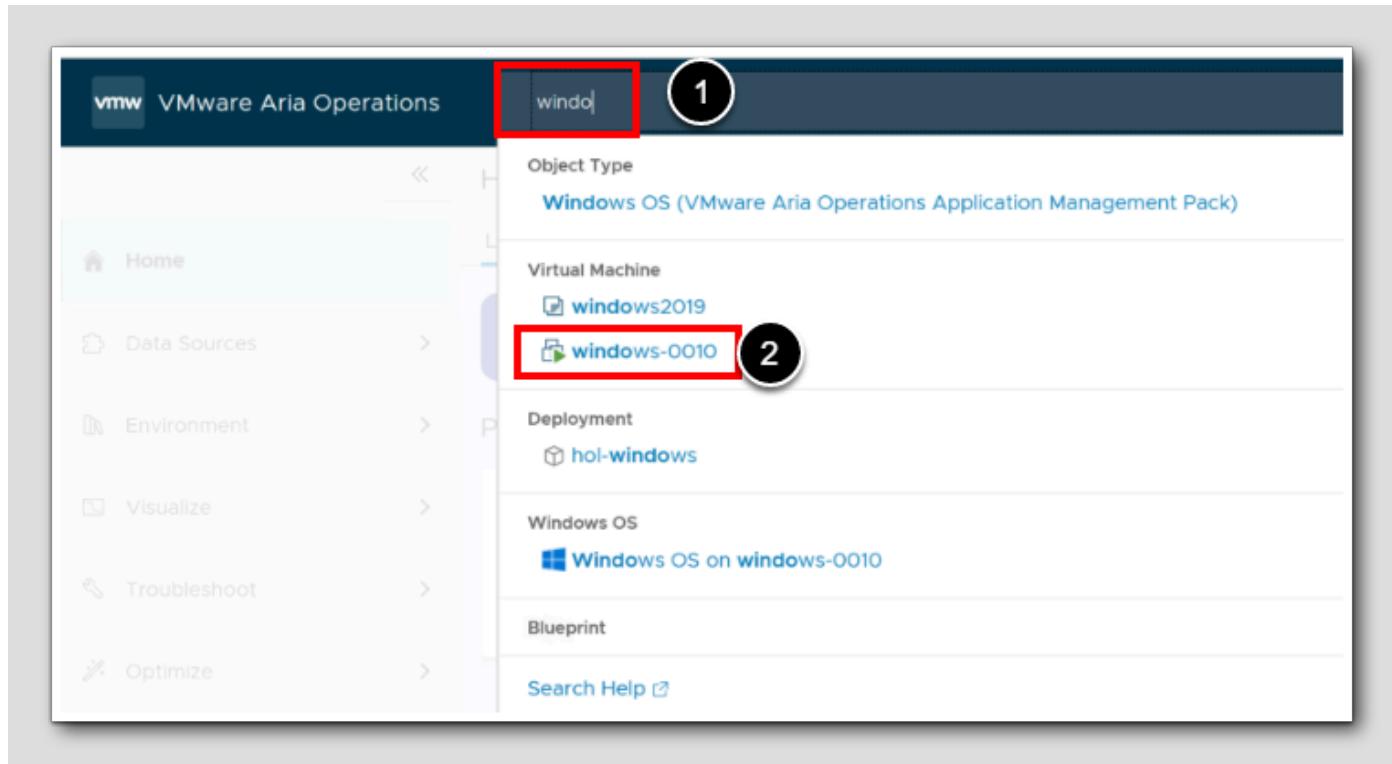
Credentials for the default user, holadmin, have already been provided.

1. Click Sign in

## Script Execution and Top Processes

In this section we will run actions on ESXi hosts and on Virtual Machines. With Virtual machines with the Telegraf agent installed, we will run in-guest actions to perform tasks remotely. First off we will run a Built In action.

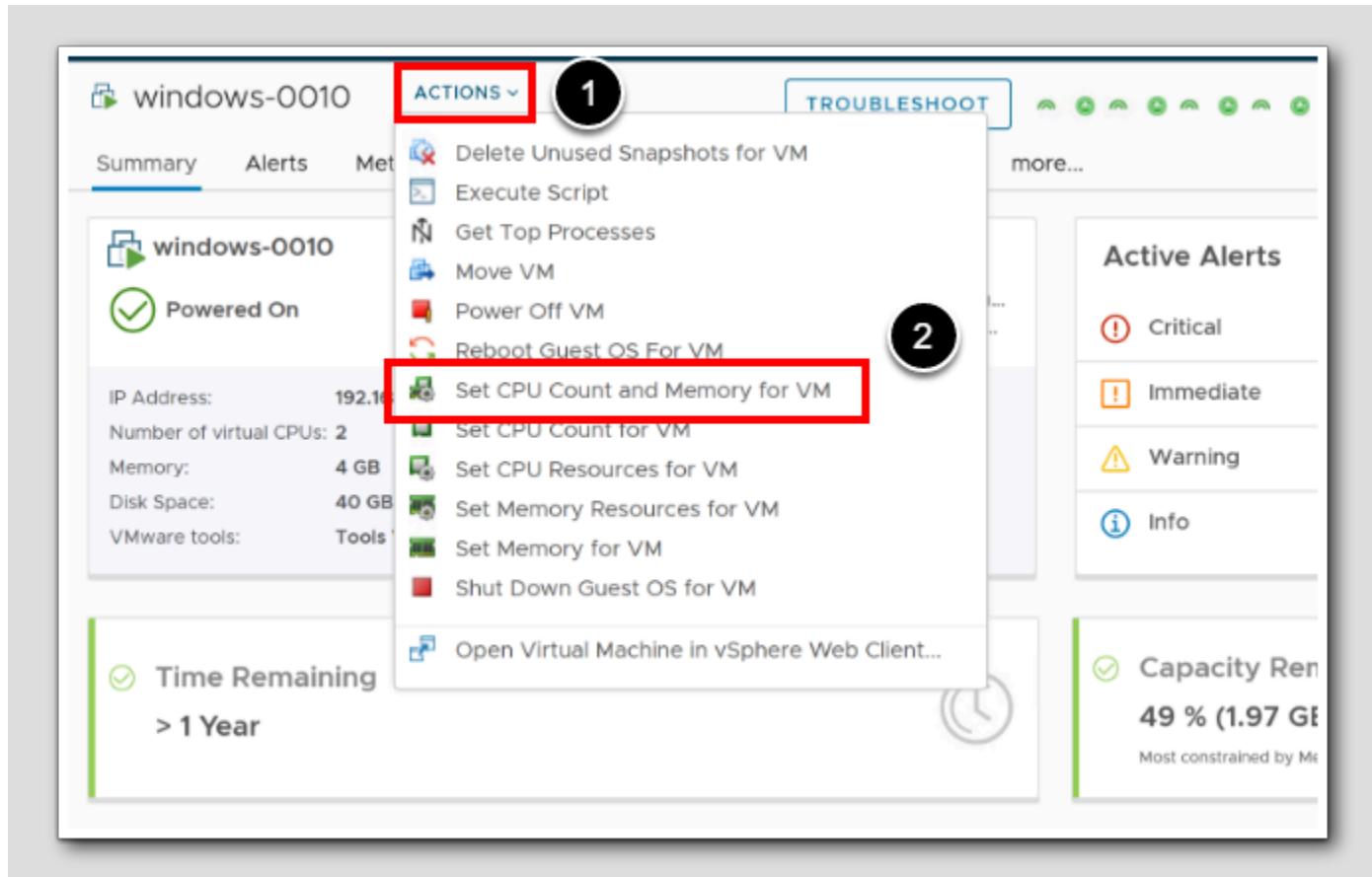
## Find a virtual machine



We are going to search for a Virtual machine to run actions on. We will sort out a windows machine we already know is online.

1. In the search field on top start searching by typing 'windo'
2. We will choose a windows machine that shows Powered On, choose windows-00xx (name can differ)

## Actions menu

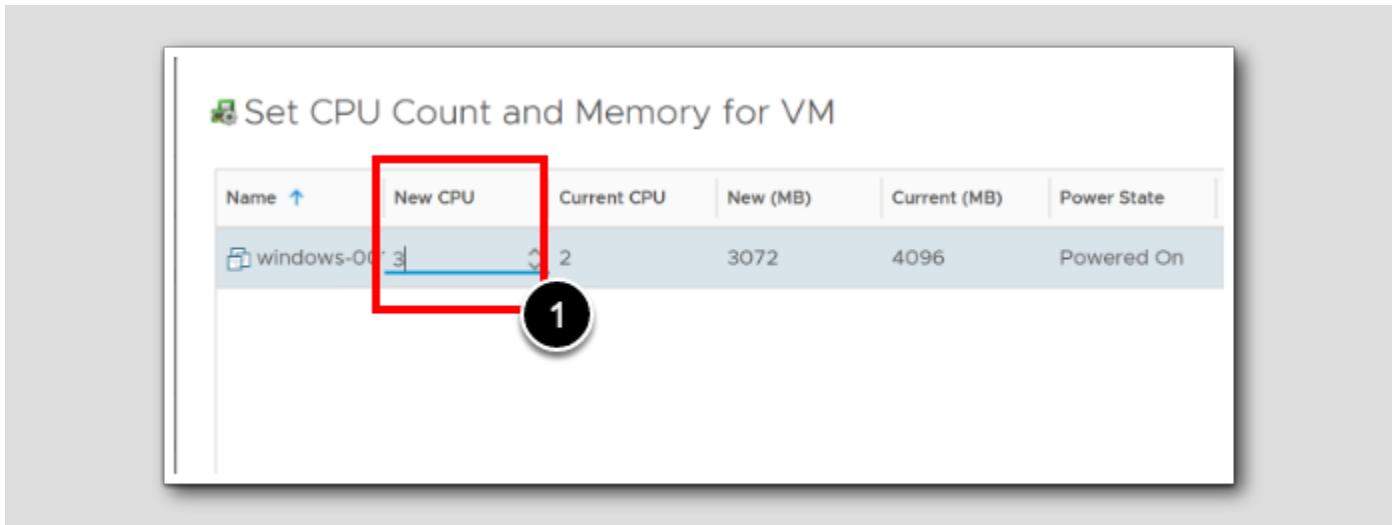


Note: Instead of searching for a specific VM, all the virtual machines would be located in Aria Operations under: Environment > Object Browser > All objects > vCenter > Virtual Machine.

During a performance troubleshooting and rightsizing scenario, we have found that this virtual machine needs more resources to perform efficiently. We know we have to add 1 more virtual CPU, and just 1 GB of RAM for this Virtual Machine to run without performance issues. (because Aria Operations told us so)

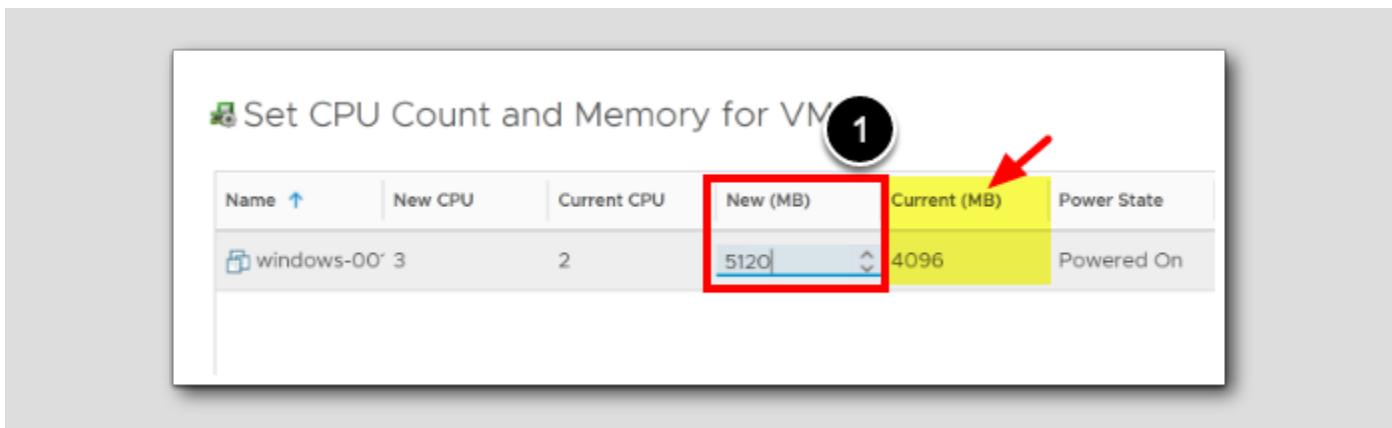
1. Pull down the Actions menu
2. Choose Set CPU Count and Memory for VM

## Add more CPU



1. Change the New CPU count from '2' to 3

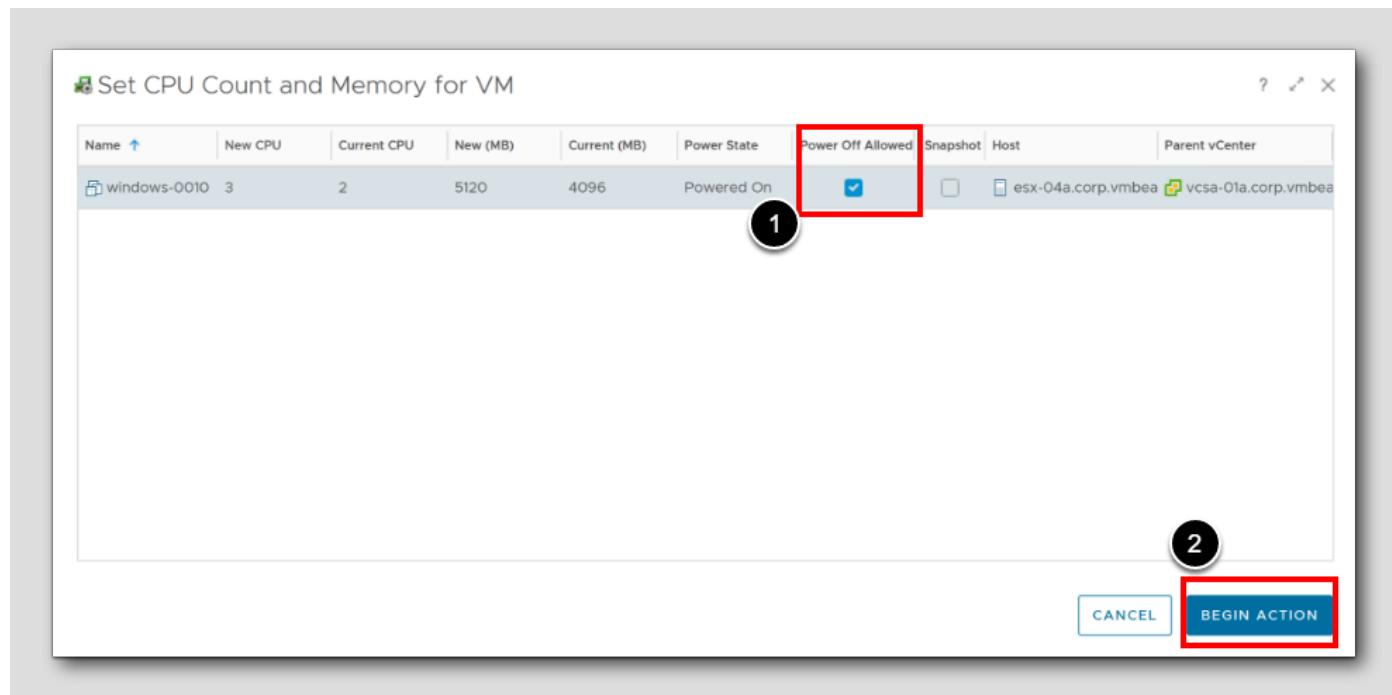
## Add more Memory



We are going to add 1024 MB memory to the Current (MB) memory. Which means  $4096 \text{ MB} + 1024 \text{ MB} = 5120 \text{ MB}$  in total.

1. Change New (MB) to 5120

## Allow power off



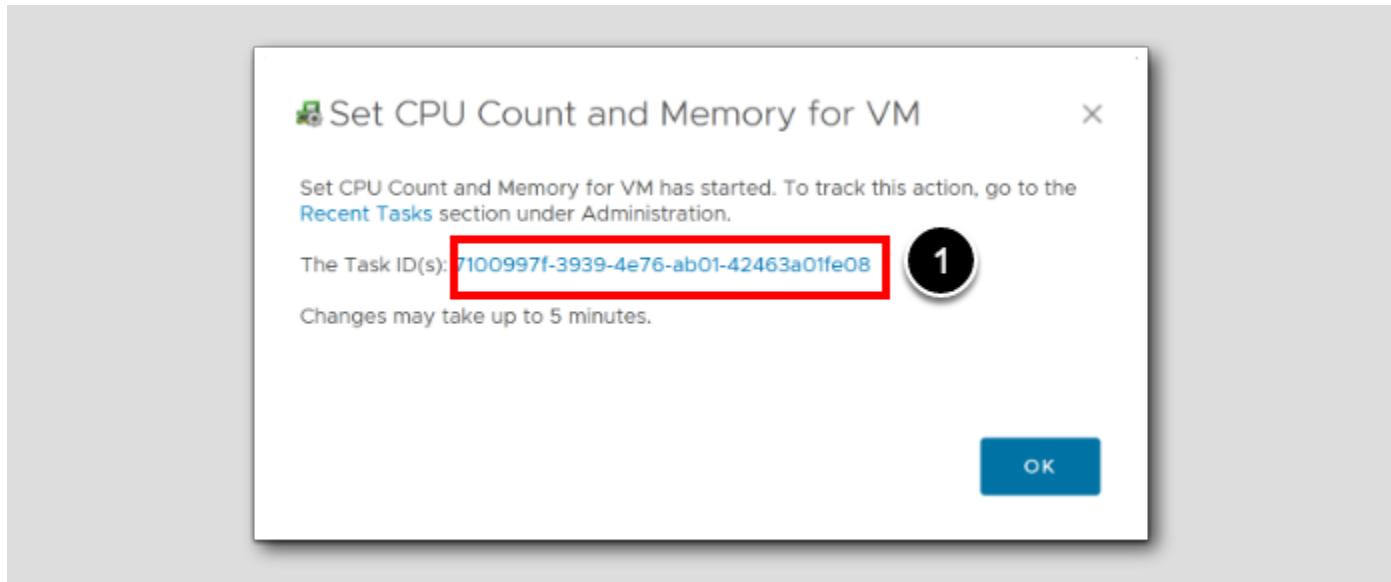
To complete this action, the machine would have to be powered off and on, in order to be reconfigured.

1. Check the checkmark Power Off Allowed

We will not take a snapshot before this action so leave it unchecked

2. Click BEGIN ACTION

Go to recent tasks



1. Click the Task ID

## Recent Tasks

Recent Tasks

Task Status Started Comp. Auto... Object Name

<input checked="" type="checkbox"/>	Set CPU Count and Memory for VM	Completed	9:2...	9:2...	No	windows-0010	Virt...	vID...	holo...	710...
<input type="checkbox"/>	Bootstrap virtual Machines	Completed	6/2...	6/2...	No	vcsa-01a.corp.vmbeans.com-ARC-ADAPTER-aria-ops-cp	VM...	vID...	holo...	Oe3...

Details of Task Selected

Associated Objects (Completed 1 from 1)

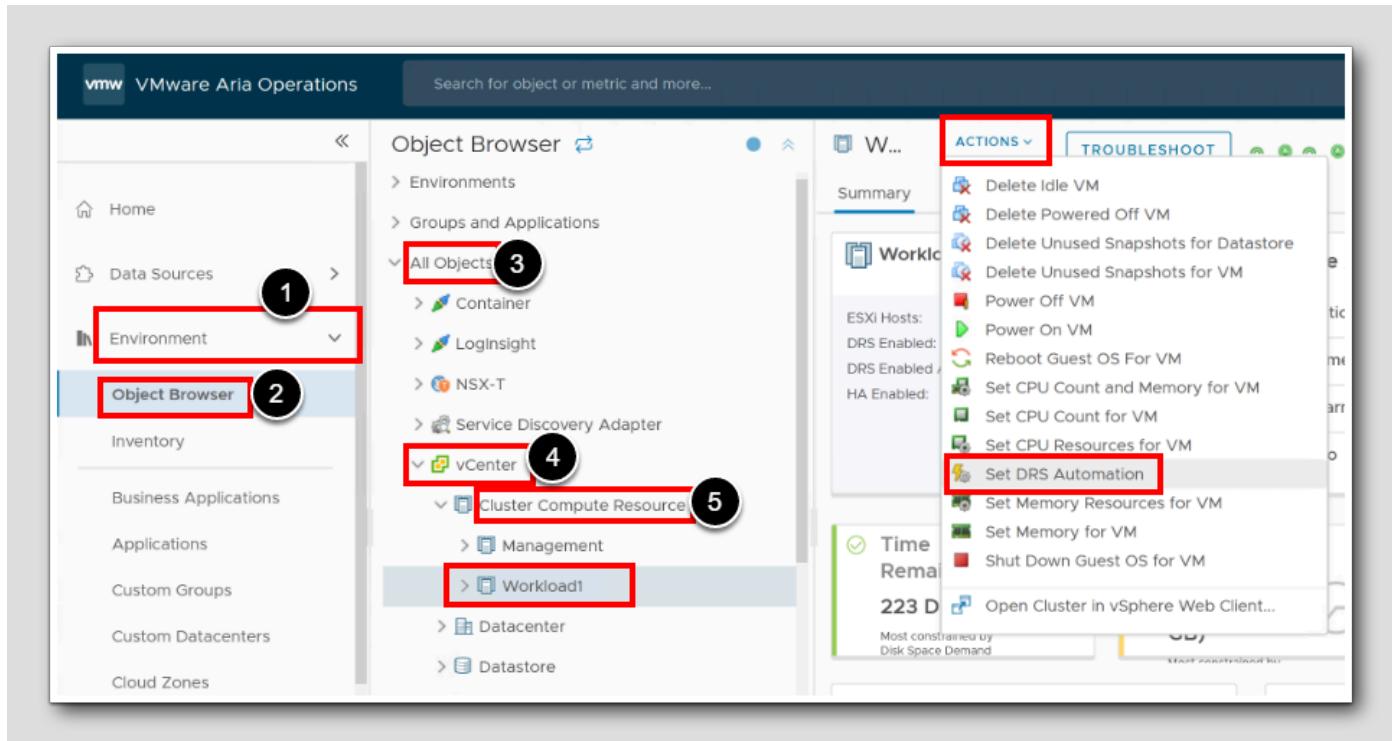
Object Name	Object Type	Status
windows-00...	Virtual Machine	Completed

Messages Severity: All

Severity	Time	Message
Info...	2023-07-05 ...	Current Cpu value: 2
Info...	2023-07-05 ...	Requesting increase Cpu value to 3
Info...	2023-07-05 ...	Current Memory (MB) value: 4096
Info...	2023-07-05 ...	Requesting increase Memory (MB) value to 5120
Info...	2023-07-05 ...	Power off required and allowed
Info...	2023-07-05 ...	Shutting down VM 'windows-0010'
Info...	2023-07-05 ...	VM 'windows-0010' is powered off
Info...	2023-07-05 ...	Processing request for VM reconfiguration

1. Unless it's already selected, from the top of the list, select our windows server Windows-00xx and our task Set CPU and Memory for VM
2. To see all the messages Scroll down
3. Observe that the messages shows the wanted results and that the status is Completed

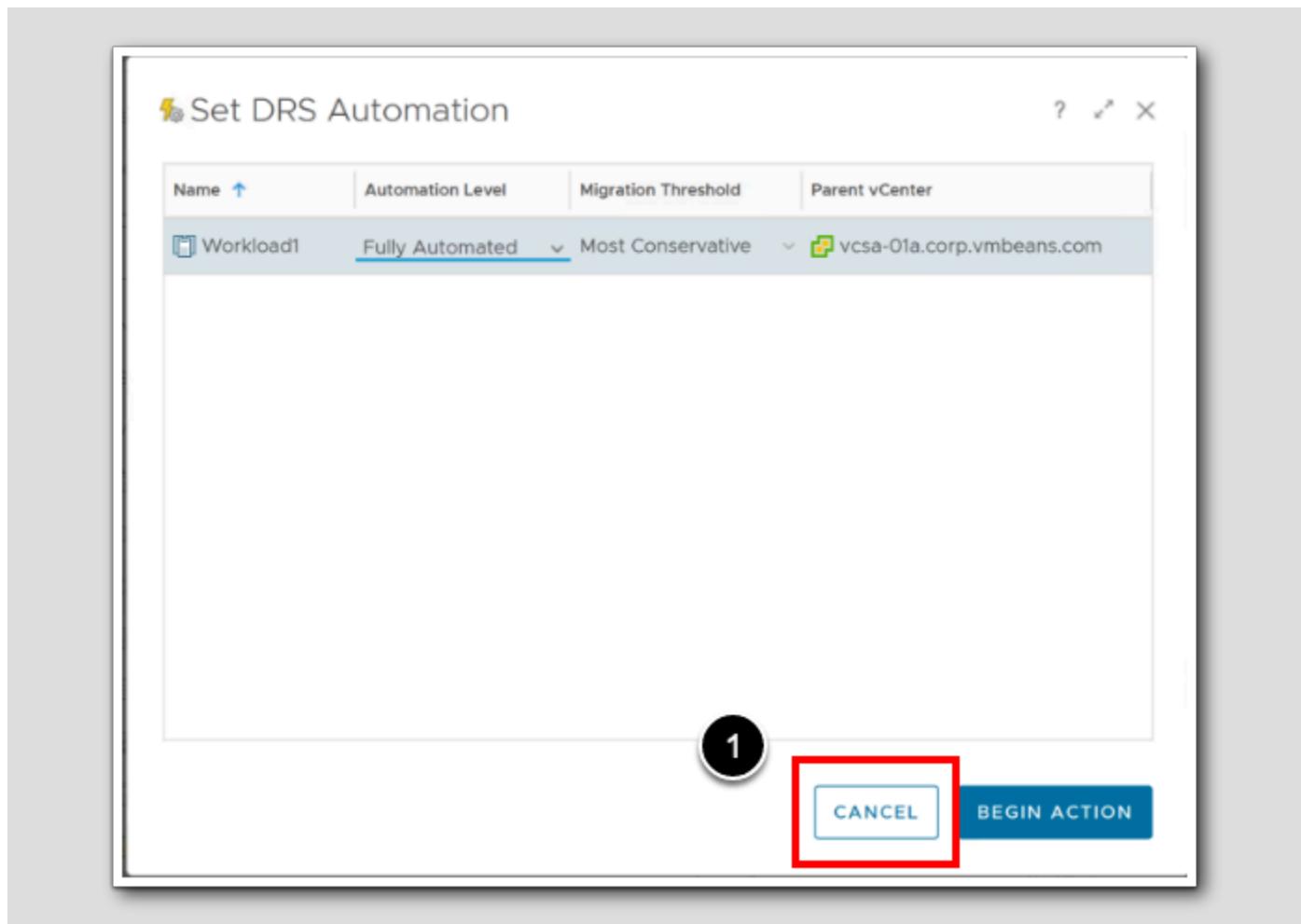
## Cluster action



Let us investigate what options we have for actions against another object, not just VM's.

1. Select Environment
2. Select Object Browser
3. Select All Objects
4. Select vCenter
5. Select Cluster Compute Resource
6. Select our workload cluster Workload1
7. Pull down the Action Menu
8. Choose Set DRS Automation

## Set DRS Automation

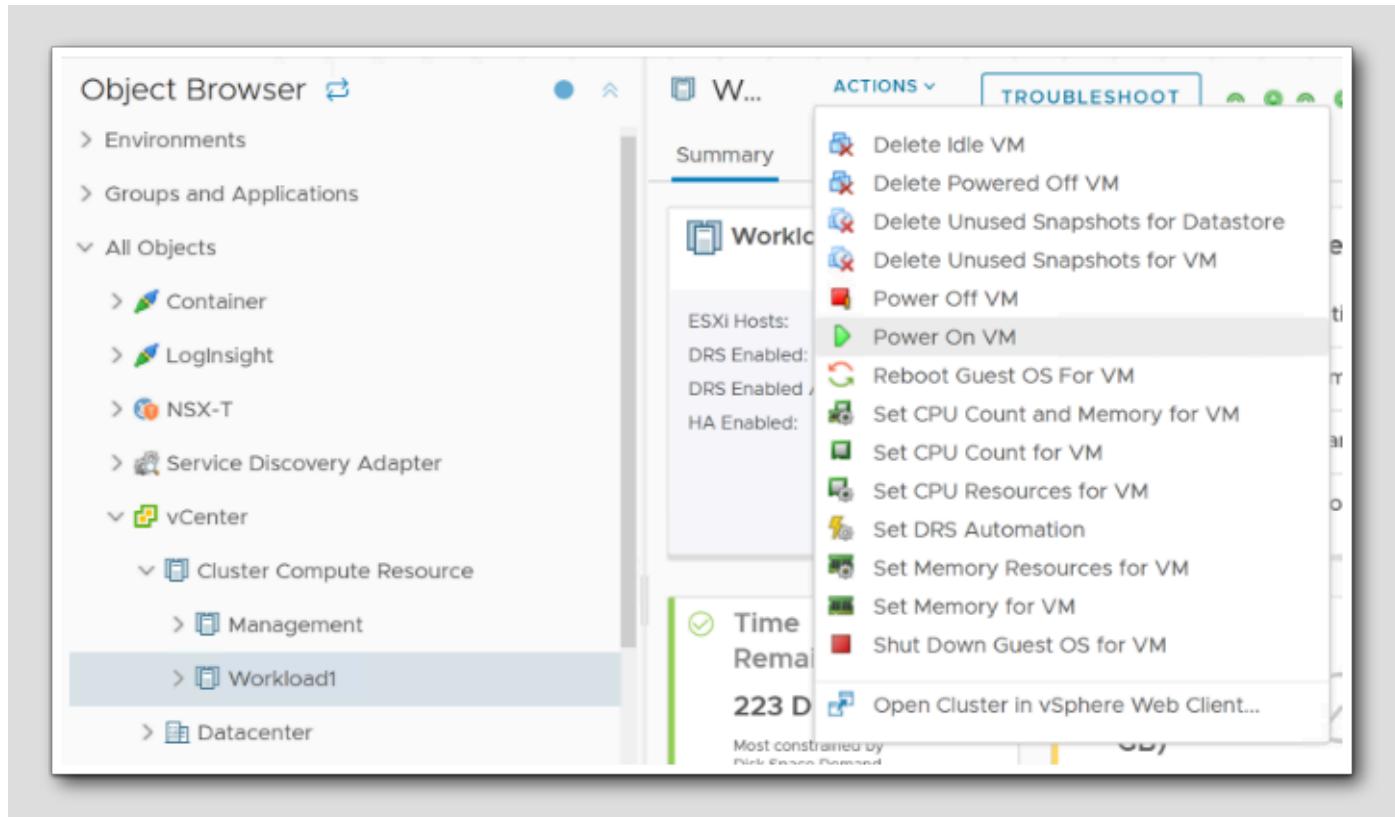


Right now we just wanted to explore that Actions can be run on many other objects

1. Click CANCEL

For more information about objects, have a look at the [Objects and Actions](#) in the [Introduction to Actions](#) in this module

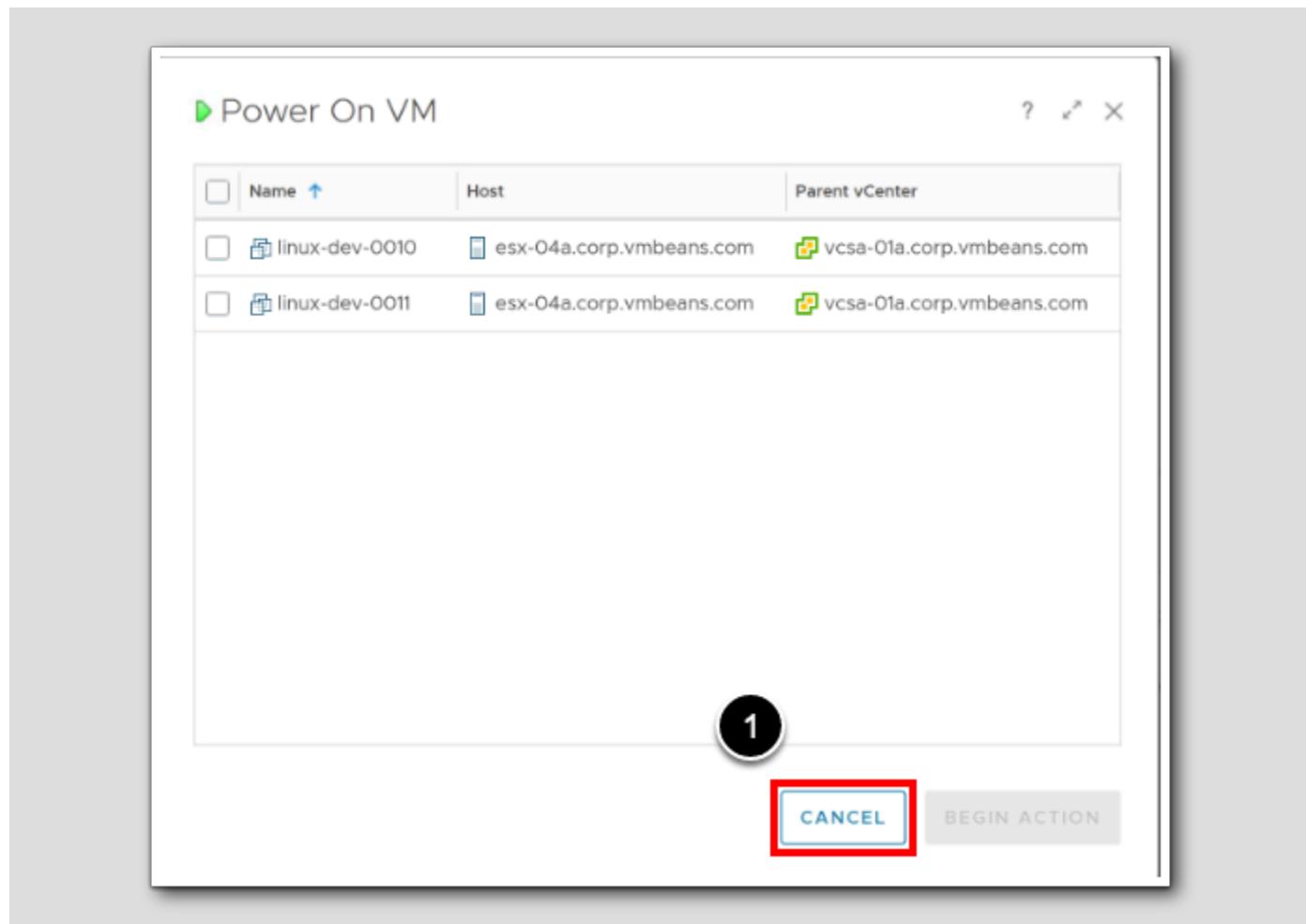
## Power On VMs



Just to see what happens if we choose a VM action while we are located on a Cluster or on a Host

1. Pull down ACTIONS
2. Choose Power On VM

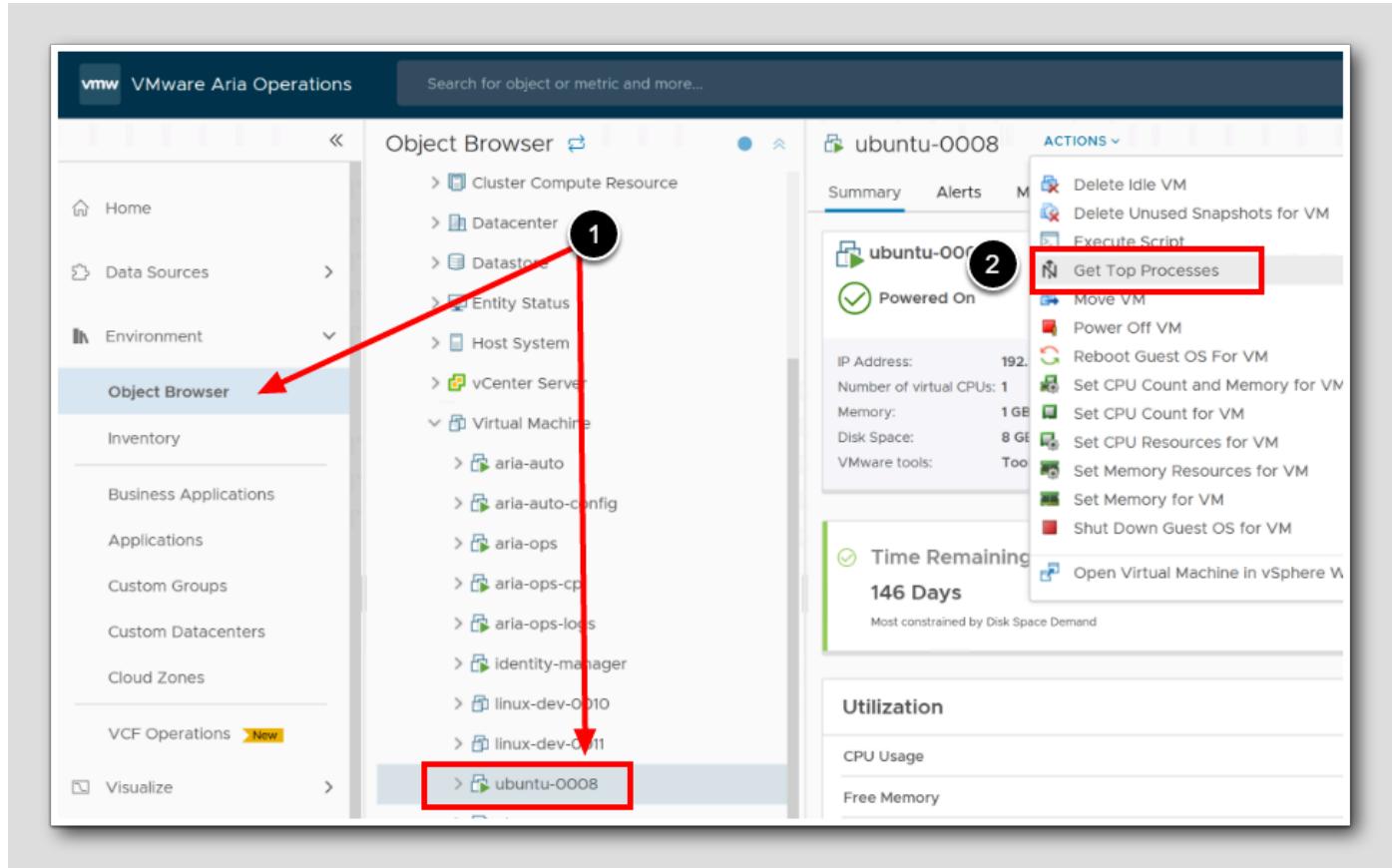
## Power on VMs in the cluster



NOTE: In this scenario, if we choose a cluster or host, the actions we take on the VMs will be applied to all VMs in that group. Specifically, if we select the esx-04 host instead of the Workload1 Cluster, any action performed will be applied to all VMs residing on that host. As a result, the situation would appear the same as if we had selected the Workload1 Cluster, since the two VMs in question are located on the esx-04 host in that cluster.

1. Click Cancel

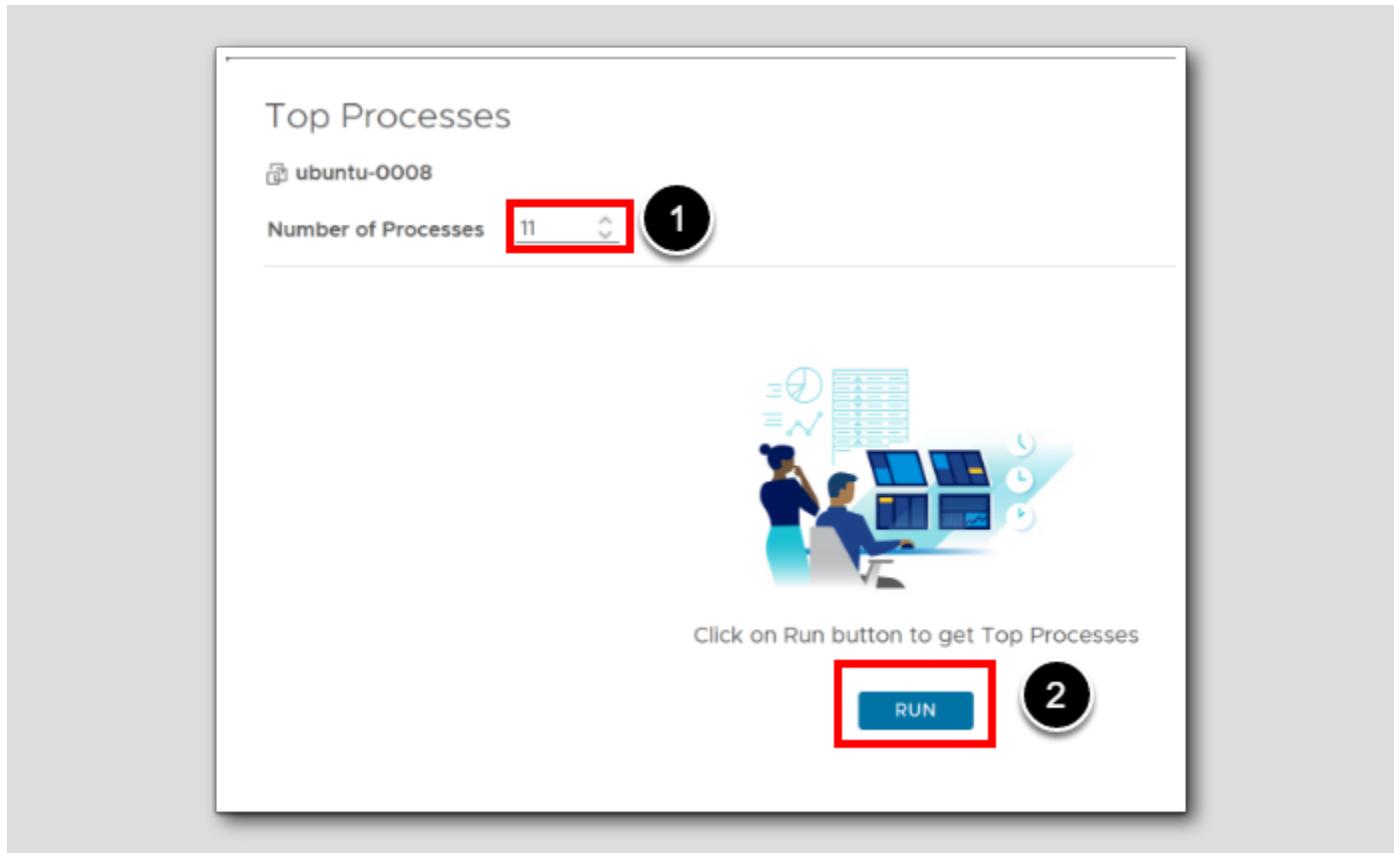
## Get Top Processes



Note: For the next section to work, a VM must be powered on and connected, have the VMware Tools installed and running, and Service discovery must be activated.

1. In the object browser, find and click **ubuntu-0008**
2. Pull down the Actions menu, and choose **Get Top Processes**

## Number of processes



1. Change the number of processes, type 11

2. Click Run

## Interpret 'top' results

The screenshot shows the 'Top Processes' interface. At the top left is the title 'Top Processes' and a user icon labeled 'ubuntu-0008'. To the right are three buttons: a red-bordered 'X' (callout 3), a blue-bordered 'REFRESH' button (callout 2), and a black-bordered 'X' (callout 1). Below these is a status message: 'Last time updated: Jul 5, 2023 10:12:46 PM'. The main area displays system statistics and a table of processes.

Number of Processes: 7

Last time updated: Jul 5, 2023 10:12:46 PM

REFRESH

3

2

1

COMMAND	PID	CPU (%)	MEM (%)	USER	STATUS
vmtoolsd	681	12.5	0.9	root	S
top	271391	6.2	0.4	holuser	R
rcu_gp	3	0	0	root	I
salt-mi+	783	0	3.5	root	S
kthreadd	2	0	0	root	S
kworker+	6	0	0	root	I
snapd	785	0	4.1	root	S

1. Change the number of processes to 7

2. Click REFRESH

The Get Top Processes action provides the status of our top 7 processes for the selected virtual machine. Observe that funny enough, the two processes causing this idling virtual machine to increase CPU (%) for a short while, is the VMware Tools that's providing the results remotely, and the 'Top' command that produces this list.

Note: Normally we would troubleshoot issues related to the resources that are affecting the applications in the virtual machine. We have the option to view the processes based on CPU and Memory.

3. Click the 'X' to Close

## Execute script

[119]

The screenshot shows the vSphere Web Client interface. On the left is the Object Browser with a tree view of various resources. In the center, a summary card for a virtual machine named 'ubuntu-0008' is displayed, showing it is 'Powered On'. Below the card, there is a section for 'Time Remaining' with a value of '146 Days'. To the right of the card is a large 'ACTIONS' menu. The 'Execute Script' option is highlighted with a red box and a black circle containing the number '1'.

1. From the actions menu click Execute Script

## Running commands

Execute Script

ubuntu-0008

Please exercise caution before executing any critical commands on the virtual machine, system will not check or restrict any kind of script execution. You must provide credentials before you execute any critical commands on the virtual machine.

Username  Password

Command  Upload File

`/bin/ps aux --sort=-%cpu | head -n 8`

Timeout 30 Seconds

Exit Code: 0

**STDOUT**

USER	PID	%CPU	%MEM	VSZ	RSS	TTY	STAT	START	TIME	COMMAND
root	681	0.2	0.8	312004	8964	?	Ssl	Jun29	25:42	/usr/bin/vmtoolsd
root	995	0.1	5.6	461980	56964	?	S1	Jun29	11:05	/usr/bin/python3 /usr/bin/salt-minion
root	265461	0.1	0.0	0	0	?	I	01:35	0:20	[kworker/0:0-events]
root	1	0.0	1.1	169396	11584	?	Ss	Jun29	0:47	/sbin/init maybe-ubiquity
root	2	0.0	0.0	0	0	?	S	Jun29	0:00	[kthreadd]
root	3	0.0	0.0	0	0	?	I<	Jun29	0:00	[rcu_gp]
root	4	0.0	0.0	0	0	?	I<	Jun29	0:00	[rcu_par_gp]

**STDERR**

A red arrow points from the "STDOUT" section to the command output, specifically highlighting the first few lines of the ps aux command results.

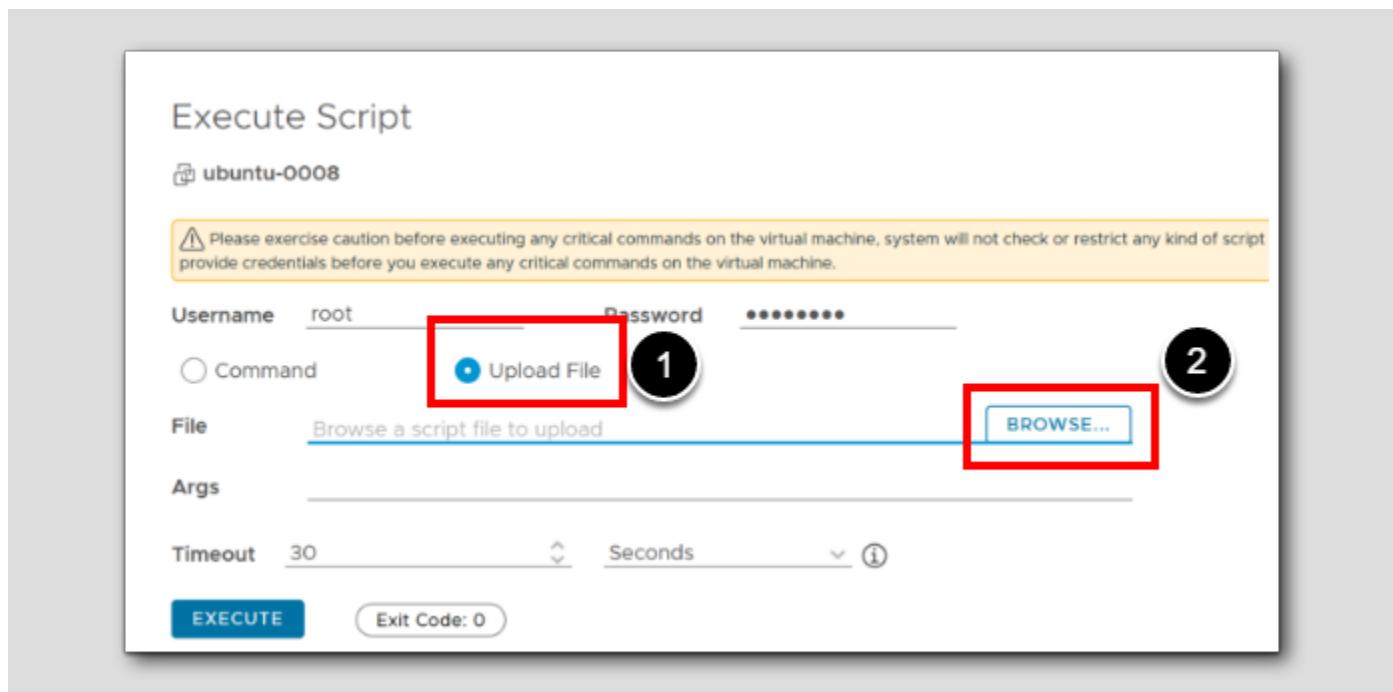
You can run a script by entering it directly or by uploading a script file. We will try to run directly by providing a Linux command. We need to Enter the VM credentials to authenticate.

1. username root
2. password VMware1!
3. Type `/bin/ps aux --sort=-%cpu | head -n 8`
4. Click EXECUTE

Not unlike the 'top' command this will give us the top 7 processes sorted on CPU%.

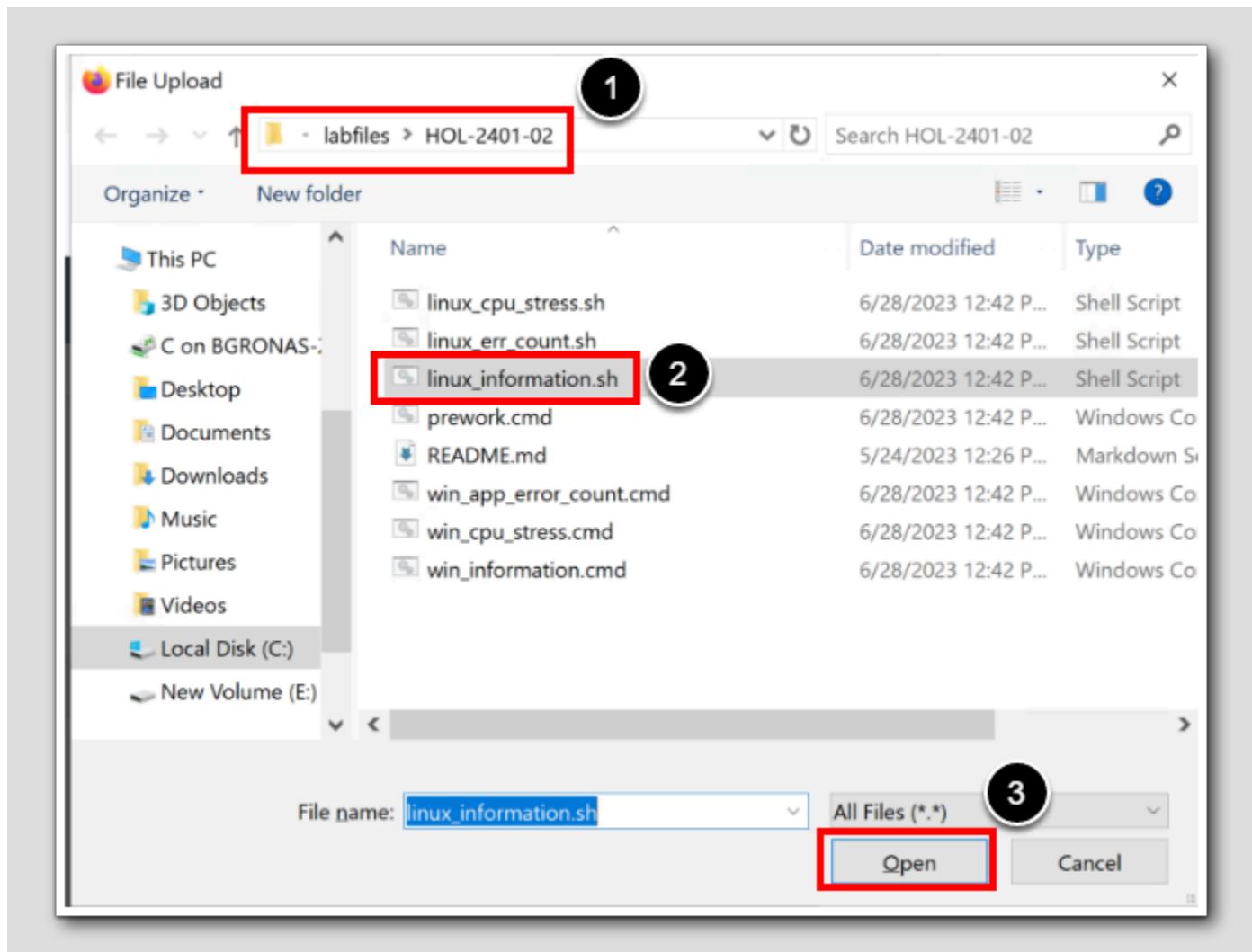
#### Browse for a command file

[121]



1. Leave the credentials as is, but click Upload File
2. Click BROWSE

## Select Command file



1. Browse to C:\hol-2401-lab-files\labfiles\HOL-2401-02
2. Select linux\_information.sh
3. Click Open

## Execute

Execute Script

ubuntu-0008

**⚠ Please exercise caution before executing any critical commands on the virtual machine, system will not check or restrict any kind of credentials before you execute any critical commands on the virtual machine.**

Username  Password

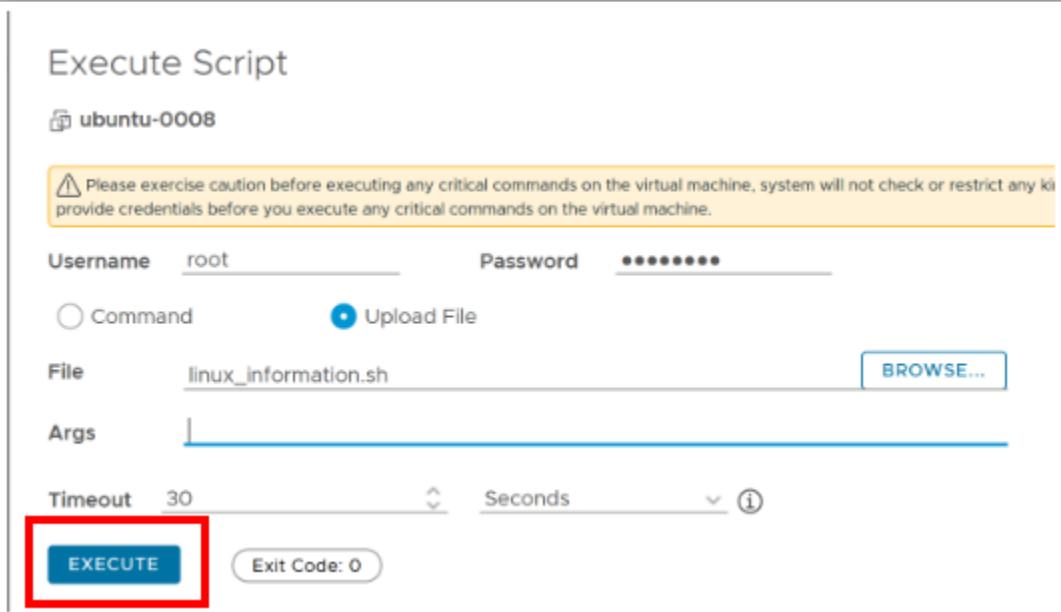
Command  Upload File

File

Args

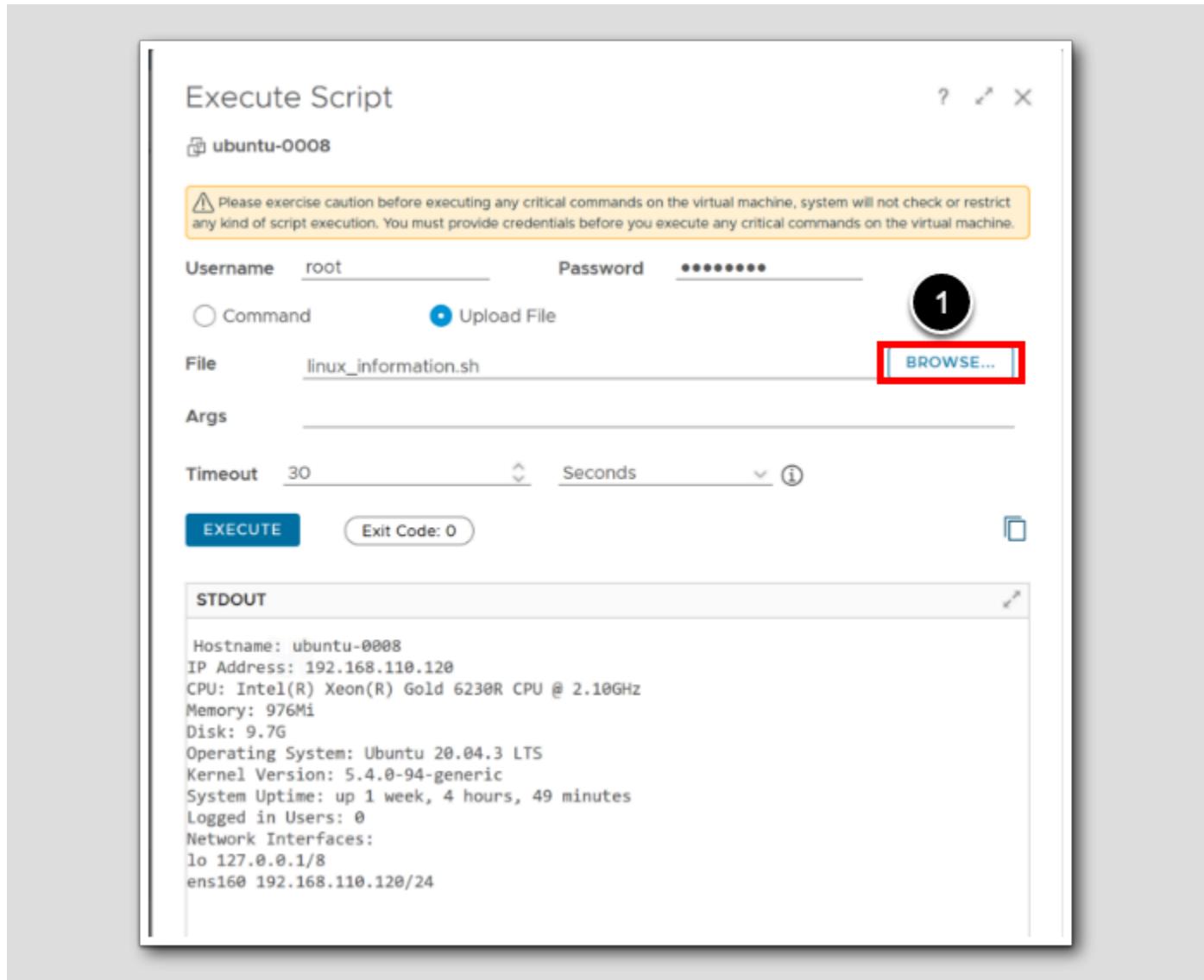
Timeout  Seconds  (i)

Exit Code: 0



1. Leave the Args blank, just click EXECUTE

## Useful information



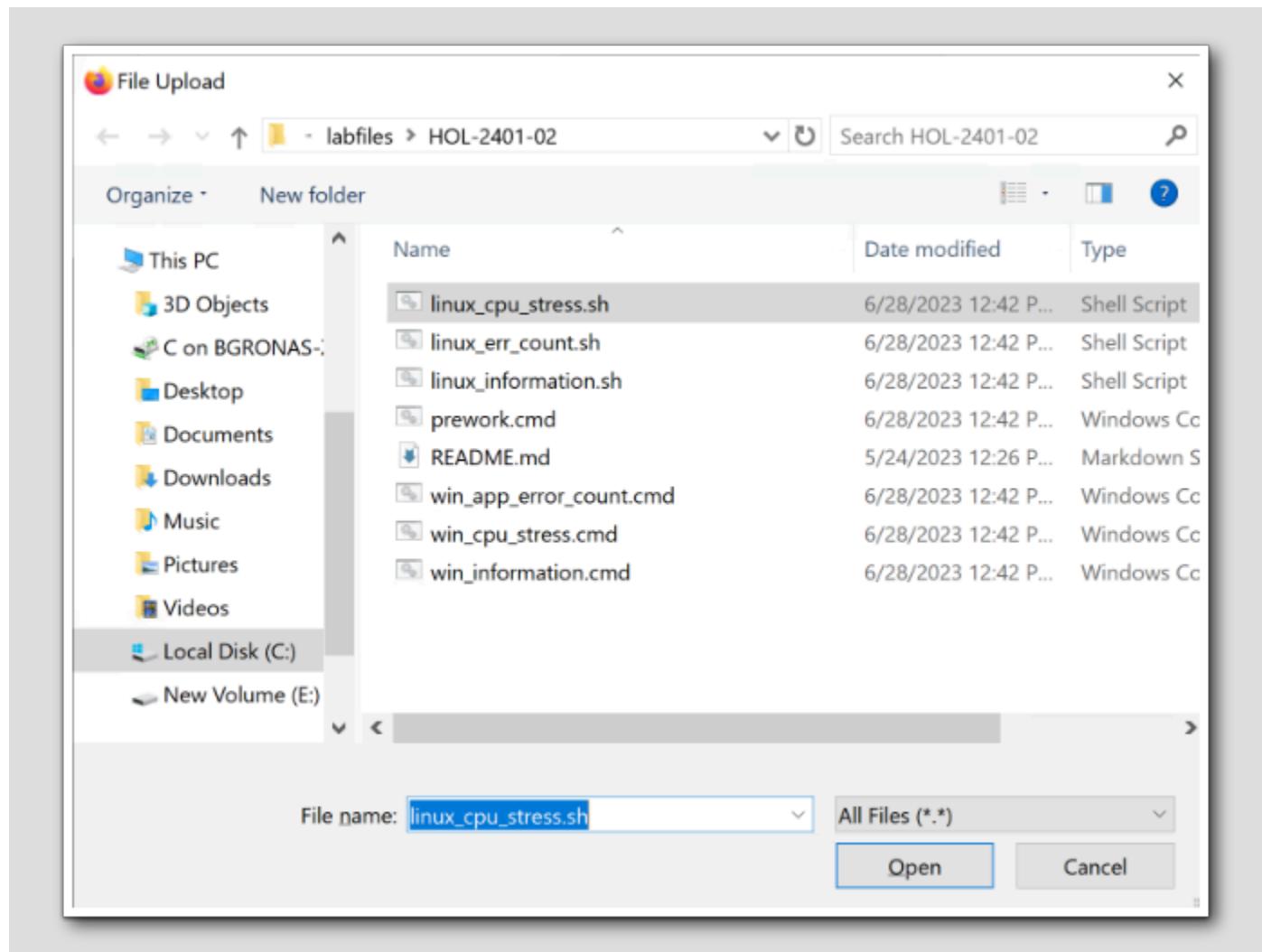
The script we provided returns useful information about the VM.

1. Let's choose another cool script-file we have made ready, click **Browse**

We have listed the Information script; *linux\_information.sh* here for your reference:

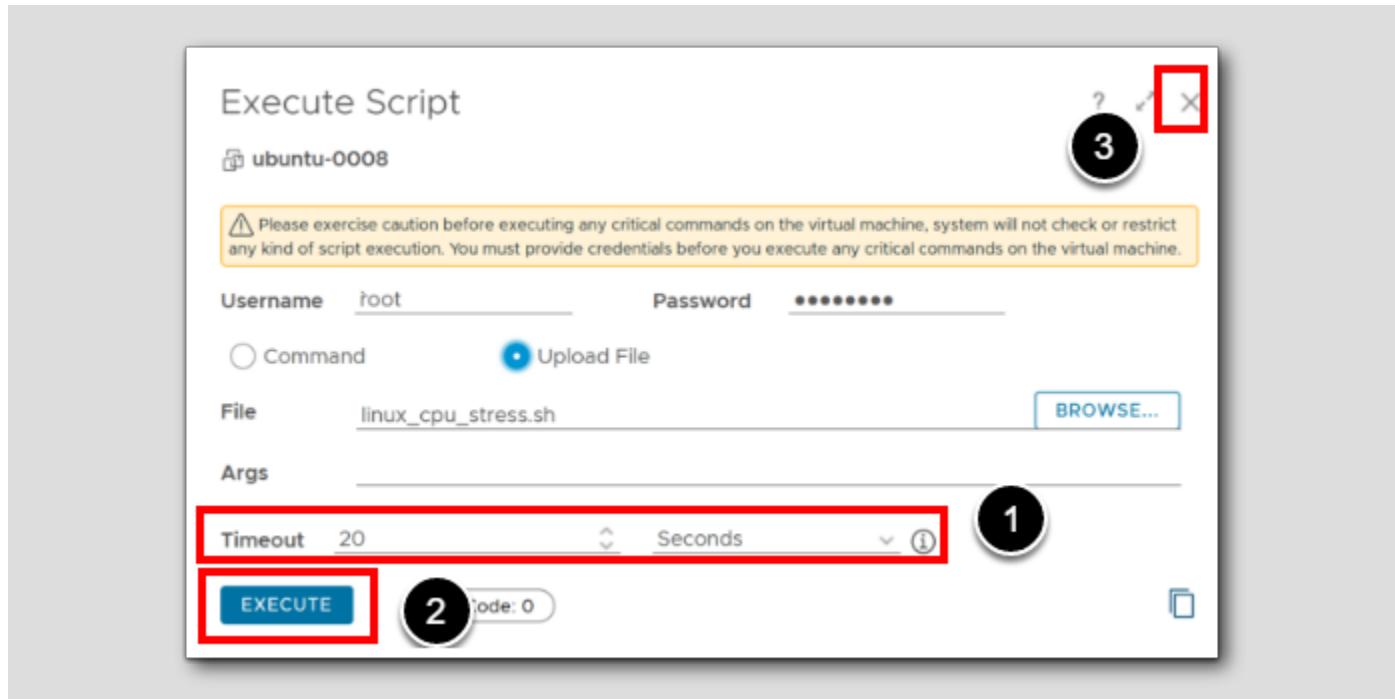
```
#!/usr/bin/bash
# Hostname
echo "Hostname: $(hostname)"
# IP Address
ip_address=$(hostname -I)
echo "IP Address: $ip_address"
# CPU
cpu_info=$(lscpu | grep "Model name" | awk -F ':' '{print $2}' | sed 's/^*[ \t]*//')
echo "CPU: $cpu_info"
# Memory
memory_info=$(free -h | awk '/Mem:/ {print $2}')
echo "Memory: $memory_info"
# Disk
disk_info=$(df -h --total | awk '/total/{print $2}')
echo "Disk: $disk_info"
# Operating System
os_info=$(lsb_release -d | awk -F ':' '{print $2}' | sed 's/^*[ \t]*//')
echo "Operating System: $os_info"
# Kernel Version
kernel_info=$(uname -r)
echo "Kernel Version: $kernel_info"
# System Uptime
uptime_info=$(uptime -p)
echo "System Uptime: $uptime_info"
# Logged in Users
users_info=$(who | awk '{print $1}' | sort | uniq | wc -l)
echo "Logged in Users: $users_info"
# Network Interfaces
interfaces_info=$(ip -o -4 addr show | awk '{print $2, $4}')
echo -e "Network Interfaces:\n$interfaces_info"
```

## Stress script



1. Browse to C:\hol-2401-lab-files\labfiles\HOL-2401-02
2. Select linux\_cpu\_stress.sh
3. Click Open

## Run the stress script

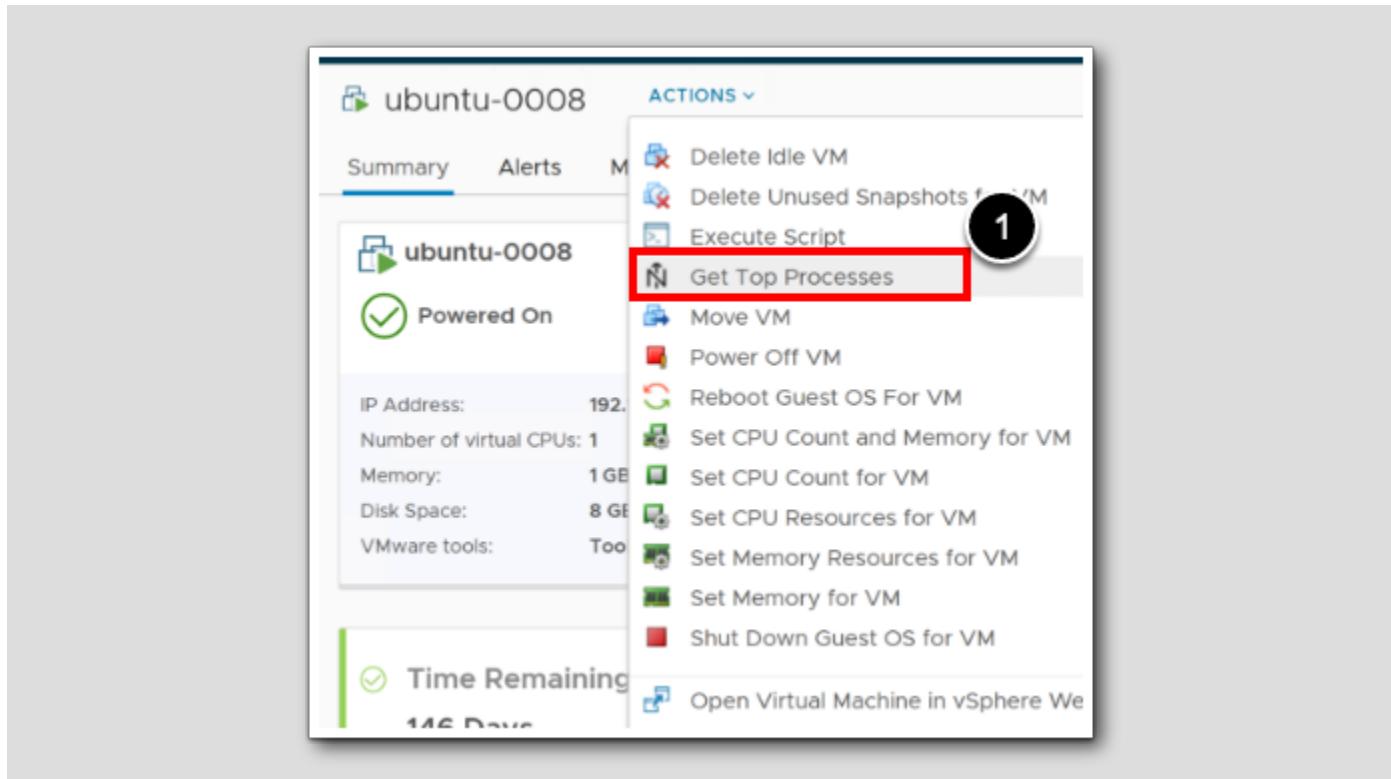


1. Set the timeout to 20 seconds
2. Click EXECUTE

After 20 seconds you will receive a "Task Execution failed. See details in Recent Tasks" - We will just accept the failure. The script will actually continue processes in the background.

3. Click 'X' to exit

Check top processes



1. From the Actions menu, select Get Top Processes

## Review Top Processes

Top Processes

ubuntu-0008

Number of Processes 10

Last time updated: Jul 5, 2023 11:45:33 PM REFRESH

1

COMMAND	PID	CPU (%) ↓	MEM (%)	USER	STATUS
script_+	274248	4.8	0	root	R
script_+	274244	4.8	0	root	R
script_+	274247	4.8	0	root	R
dd	274255	4.8	0.3	root	R
script_+	274233	2.4	0	root	R
script_+	274235	2.4	0	root	R
script_+	274232	2.4	0	root	R
script_+	274234	2.4	0	root	R
script_+	274231	2.4	0	root	R
script_+	274230	2.4	0	root	R

The screenshot shows a terminal window titled "Top Processes" for the host "ubuntu-0008". The window displays system statistics and a table of running processes. The table has six columns: COMMAND, PID, CPU (%), MEM (%), USER, and STATUS. The CPU column is sorted in descending order. A red arrow points to the PID of the "dd" process (274255), which is highlighted in yellow. Another red arrow points to the PID of the first "script\_+" process (274248). The top right corner of the window has a red box around the close button (X) and a circular badge with the number "1".

As we can see from the image, the Linux server in the Virtual Machine is busy with our script.

1. After we are done with our review, Click 'X' to close

The *linux\_cpu\_stress.sh* script creates 20 infinite loops for CPU stress and after 10 minutes it kills all the background processes and the stress test. Listed here for your reference:

```
#!/usr/bin/bash
# Function to create CPU load
generate_cpu_load() {
    # infinite loop
    while :
    do
        :
    done &
}
# Function to create memory load
generate_mem_load() {
    # Allocate 256MB memory in /dev/shm
    dd if=/dev/zero of=/dev/shm/stress_test bs=1M count=256 &
}
# Create CPU load
for i in `seq 1 20`;
do
    generate_cpu_load
done
# Create Memory load
for i in `seq 1 20`;
do
    generate_mem_load
done
# Sleep for 10 minutes
sleep 600
# Kill all background jobs when we're done
kill $(jobs -p)
```

## Summary

[129]

With Aria Operations we can run built-in Out of the box actions for such as Power On/Power Off, and resizing of VMs. Actions can be performed on different type of object types. We went through how to do it on a Cluster, Host, and VMs.

We carried out actions remotely to VMs without opening any Terminal Window or remote desktop on that VM. we checked the condition of a VM, and Executed scripts that we had stored locally by copying and running it on the VM.

## Conclusion

In this module, we examined Aria Operations ability to monitor processes, services, and applications, leveraging the Telegraf agent.

Native application monitoring is facilitated via the Aria Operations Telegraf Agent.

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.

Discover Services offers more configuration information, whereas Monitor Applications provides a wider range of performance metrics.

## You've finished the module

[131]

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

## Module 5 - Workload Placement – Running Host Based Optimization (35 minutes) Intermediate

### Introduction

[133]

The screenshot shows the VMware Aria Operations interface for Workload Placement. At the top, there are two cards: RegionA01 (Status: Not Optimized, 0 Days Remaining, US\$0 Cost Savings) and RegionA02 (Status: Optimized, > 1 Year Remaining, US\$0 Cost Savings). Below these are three main sections: Optimization Status (with tabs for Optimization Recommendation, Operational Intent, and Business Intent), History, and Optimization Potential. The Optimization Status section shows 'N/A' for Status and a note about VMware Aria Automation managed VMs. The Operational Intent section shows Utilization Objective: Moderate with icons for desktop, server, and database. The Business Intent section shows Intent Not Set with icons for Operating System, Environment, Tier, and Network, and a note to set up business intent for VM placement.

#### Workload placement with Business intent

**Business Intent** is a powerful feature that allows you to align your workload placement and balancing decisions with your organization's specific business needs. It is essentially a set of user-defined rules or policies that guide the automation and decision-making processes within the software.

Business Intent can help with:

- Compliance and Licensing
- Tag-Based Placement
- Separation of Workloads
- Optimizing Resource Utilization

The effectiveness of Business Intent in Aria Operations is dependent on how accurately the user-defined rules reflect the organization's operational needs and goals. Therefore, it's essential to plan and consider your specific business requirements before defining these rules.

The screenshot shows the 'Workload Placement' section of the Aria Operations interface. At the top, there are two cards: 'RegionA01' (0 Days Remaining, Not Optimized) and 'RegionA01' (> 1 Year Remaining, Optimized). Below these are tabs for 'Optimization Status', 'History', and 'Optimization Potential'. The 'Optimization Status' tab is selected, showing an 'N/A' status with a note about VMware Aria Automation managed VMs. The 'Optimization Potential' tab shows an 'EDIT' button. The 'Operational Intent' section has a 'Utilization Objective: Moderate' with icons for three servers. It lists 'Avoid Performance Issues' and 'As Few Moves as Possible'. The 'Business Intent' section has an 'Intent Not Set' status with icons for Operating System, Environment, Tier, and Network, and a note to set up business intent criteria.

## Log in to Aria Operations

[134]

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

## Open the Firefox Browser from the Windows Task Bar

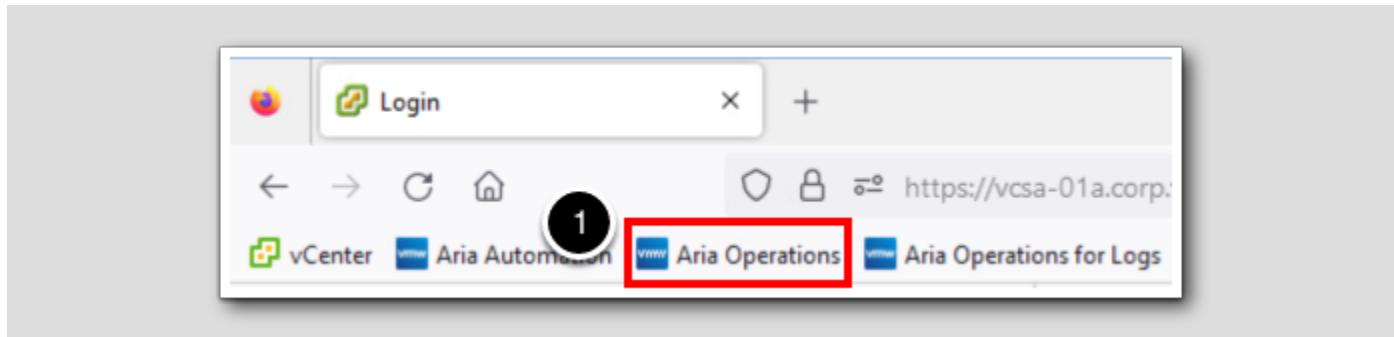
[135]



If the browser is not already open, launch Firefox.

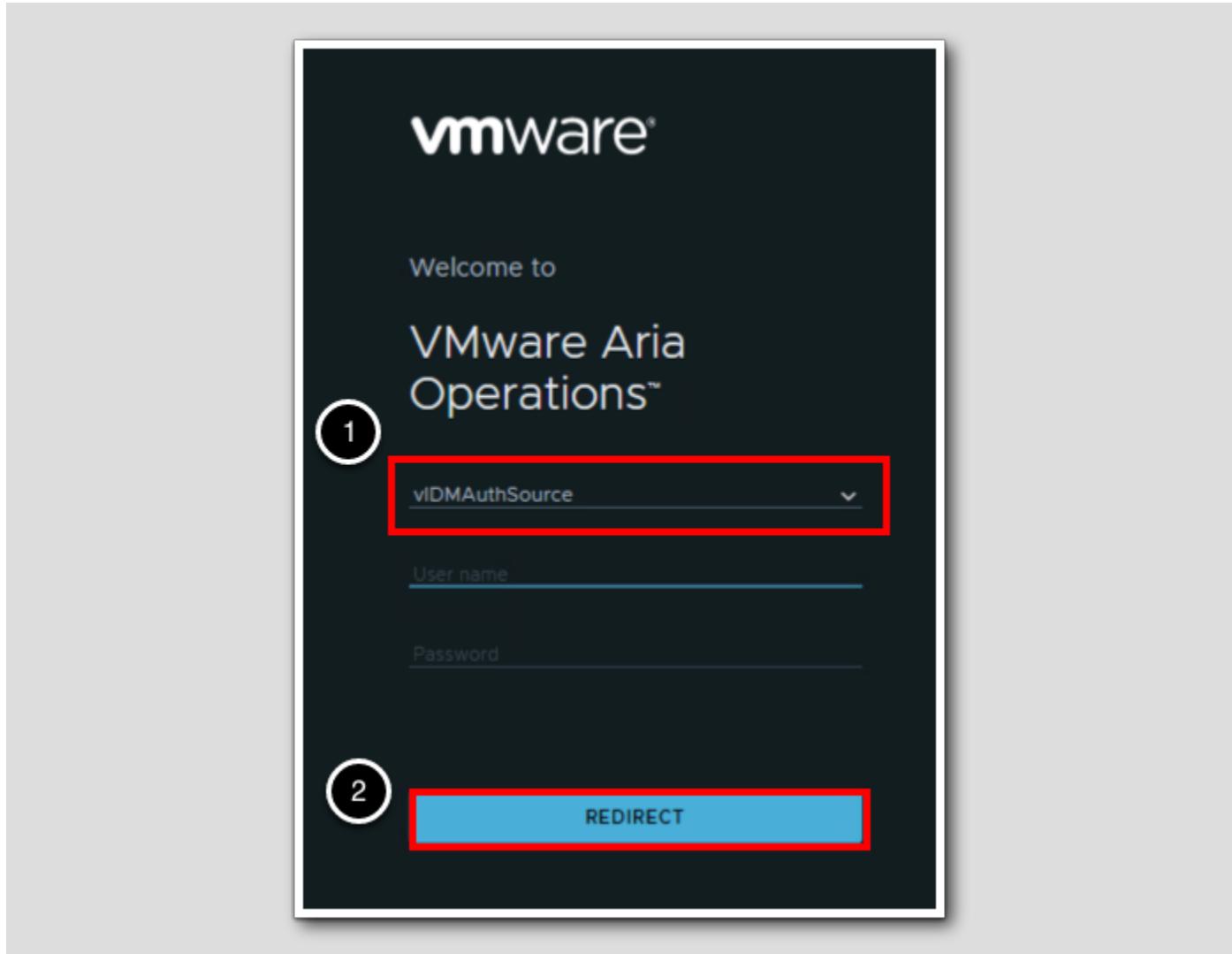
1. Click the Firefox icon in the Windows Quick Launch Task Bar at the bottom of the screen.

## Navigate to Aria Operations



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

## Log in to Aria Operations

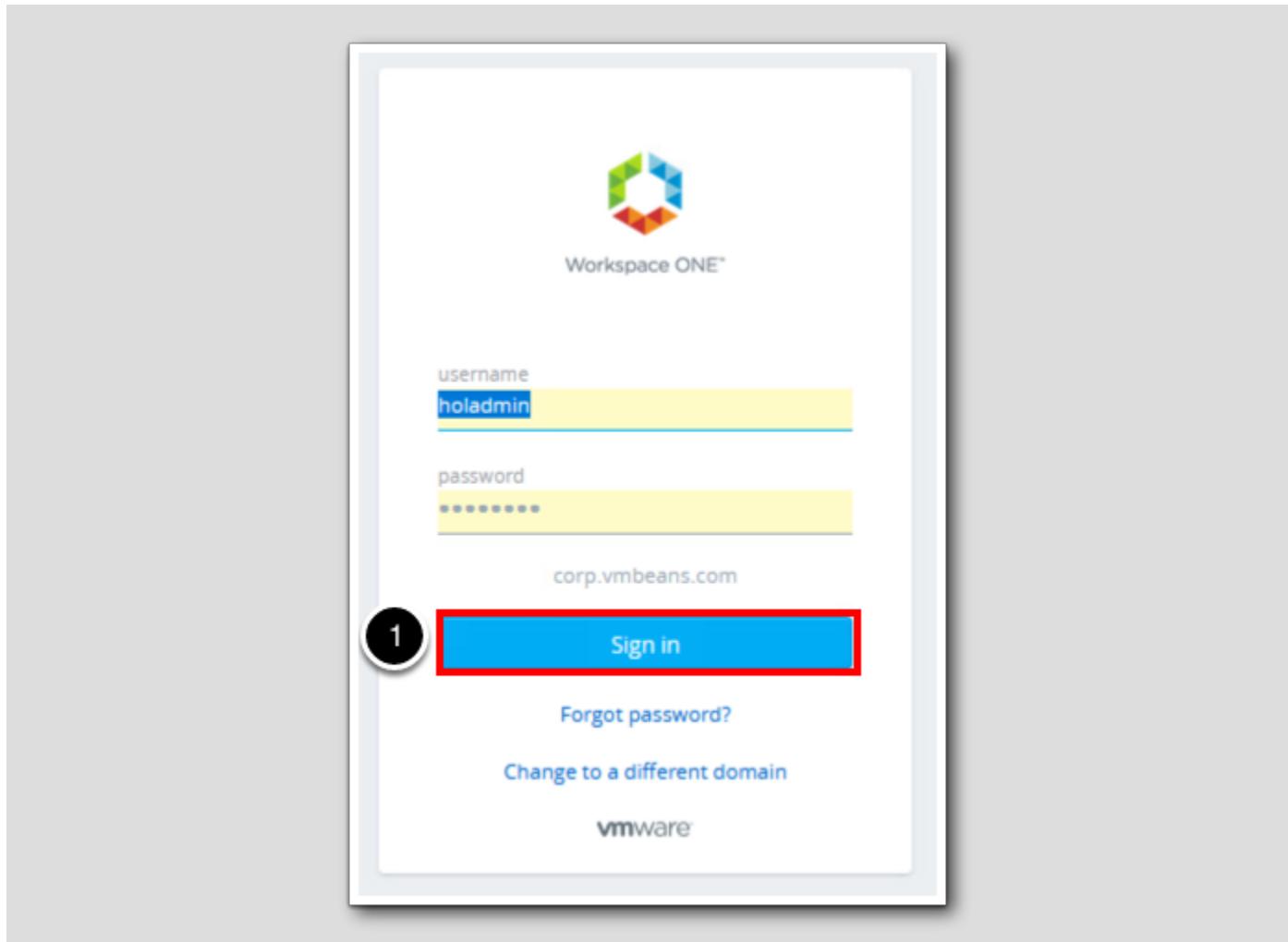


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

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



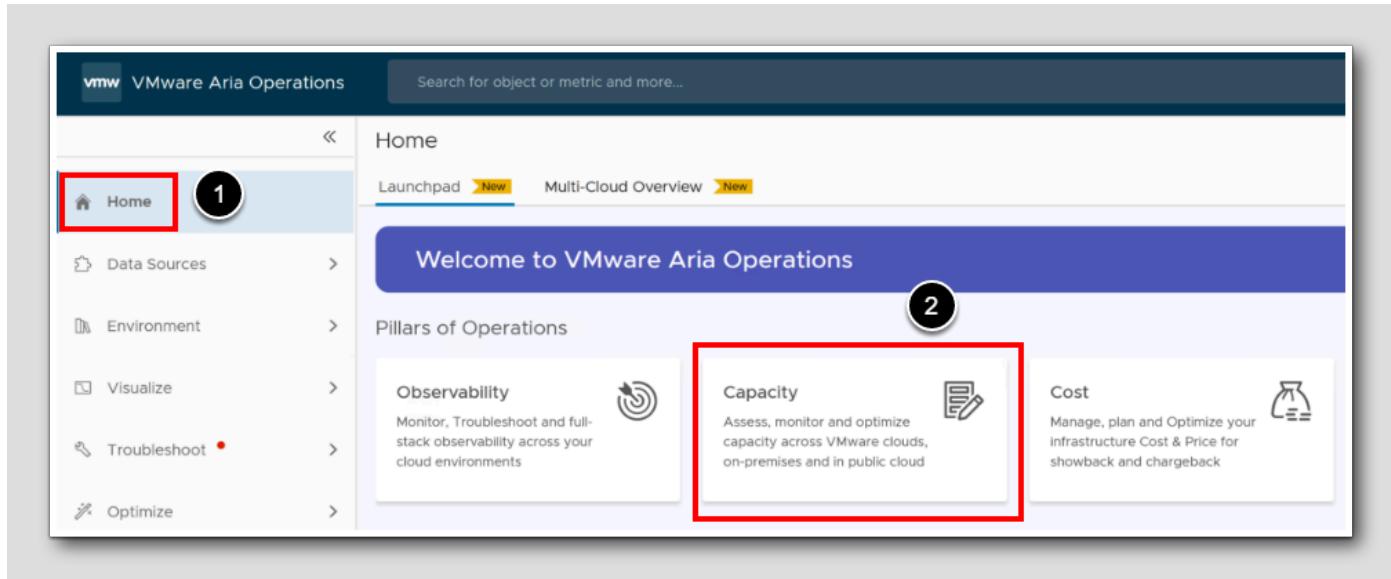
VMware Identity Manager acts as the identity provider for the Active Directory authentication source in this lab.

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

1. Click **Sign in**

## Business Intent

### Locating Workload Placement



There are several ways to take you to the Workload placement and the Business Intent. One way is to Select Workload Placement under Optimize in the left menu, or we can go via the Capacity:

1. Click on Home
2. Click on Capacity

## From Capacity to Workload Placement

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

The main content area is titled "Capacity" and includes a "Capacity" card with the following details:

- Capacity** icon: A cloud with two arrows.
- Description: Determine if there is sufficient capacity in your VMware Cloud environment for current and...
- Buttons: **VIEW** and **LEARN MORE**.

Below the Capacity card, there are three optimization cards:

- Rightsizing**: Rightsizes workloads to ensure performance and optimize utilization. Includes **VIEW** and **LEARN MORE** buttons.
- Reclaim**: Reduces waste by reclaiming unused resources. Includes **VIEW** and **LEARN MORE** buttons.
- Workload Optimization**: Optimizes the data center for optimal workload performance by ensuring your workloads... (1) (1). Includes a red box around the **VIEW** button and a red circle with the number 1 above it. This card also has a **VIEW** and **LEARN MORE** button.

Workload Optimization is a part of the process of optimizing datacenter for optimal workload performance. It works closely with DRS to ensure applications get required resources.

VMware Aria Operations monitors the environment and, when the datacenter deviates from its desired state, it will recommend the optimization actions to move it back to a desired state.

1. On the Workload Optimization, Click **VIEW**

## Workload Placement Page

The screenshot shows the VMware Workload Placement Page. At the top, there are two cards: 'RegionA01' (0 days remaining, Not Optimized) and 'RegionA01' (1 year remaining, Optimized). Below these are three main sections: Optimization Recommendation, Operational Intent, and Business Intent. In the Business Intent section, there is a note about setting up business intent for VM placement. The DRS Summary table lists two clusters: 'Workload1' and 'Management'. The 'Management' cluster is highlighted with a red box and circled number 1. A second circle with number 2 points to the 'SET DRS AUTOMATION' link in the table.

Name	Model	CPU Workload %	Memory Workload %	DRS Settings	Migration Threshold	Violated Tags	VM Name
Workload1	Demand	30%	83%	Deactivated	--	-	
Management	Demand	33%	78%	Partial Automated	Default	-	
	Allocation	Not Activated	Not Activated				

On the Workload Placement Page, we see three different cards:

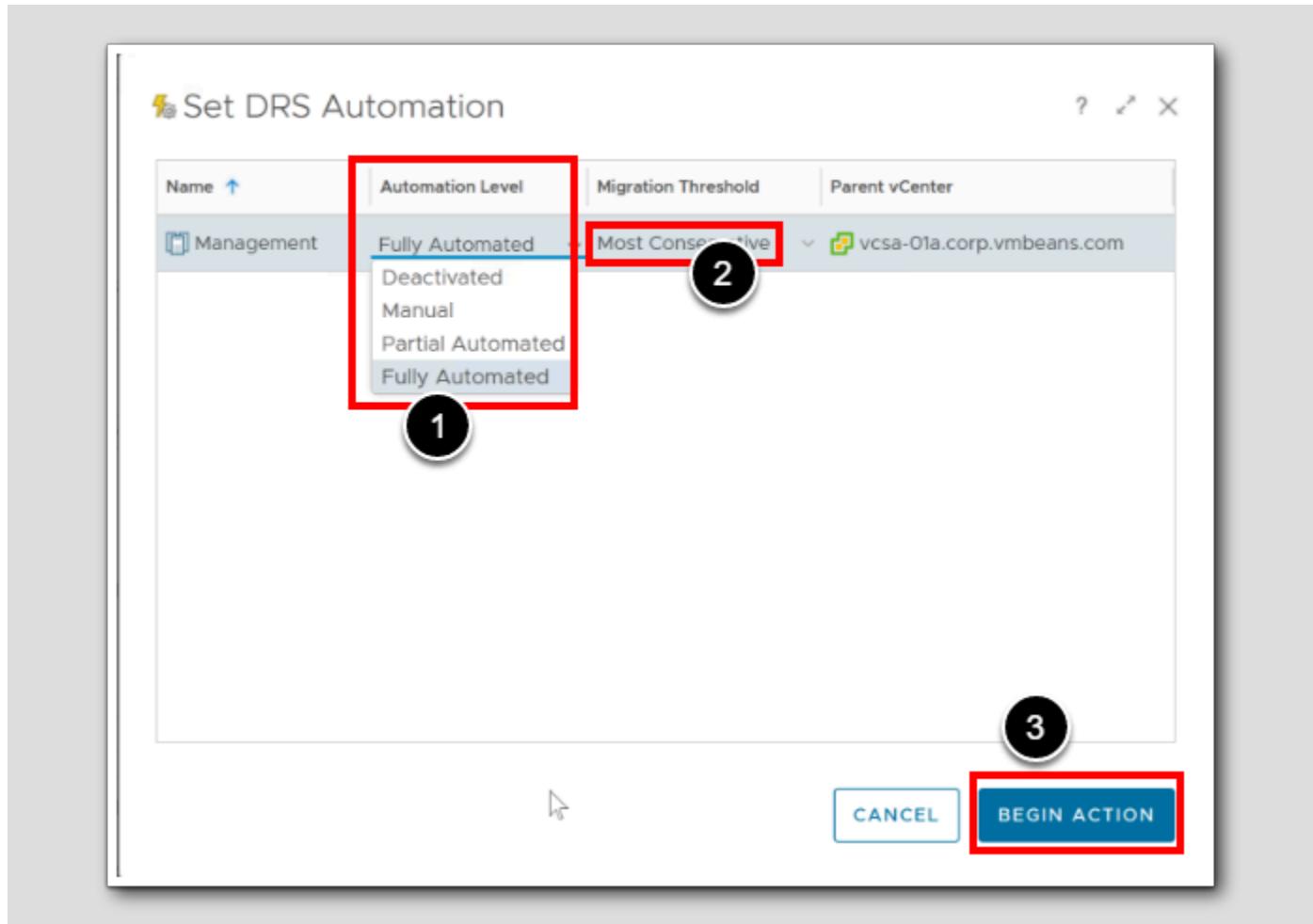
- The Optimization Recommendation Card
- The Operational Intent Card
- The Business Intent Card

In this session we will concentrate on the Business Intent Card. But before we do that, we will set the DRS (Dynamic Resource Scheduling) Automation on both of these clusters.

Note that clusters must be **fully automated** in order for workload optimization alerts to run actions set in the policies.

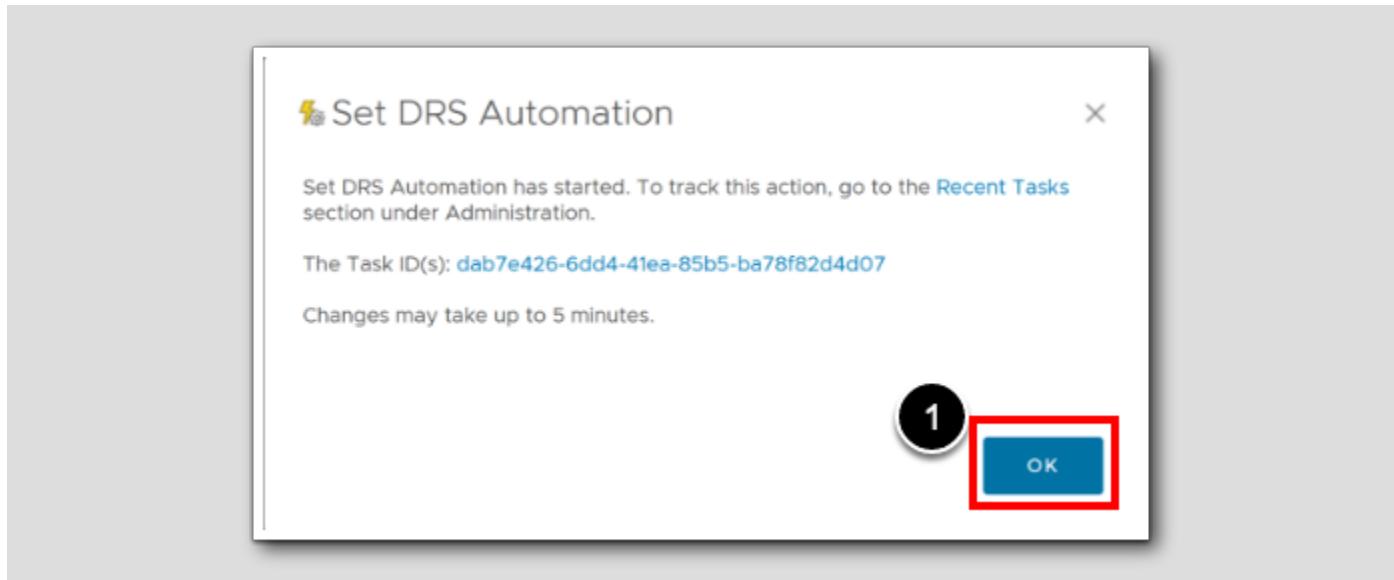
1. Select the Management Cluster, and click the link SET DRS AUTOMATION

## DRS Automation, first cluster



1. Set the Automation level to Fully Automated
2. Set the Migration Threshold to Most Conservative
3. Click BEGIN ACTION

## Confirming The action



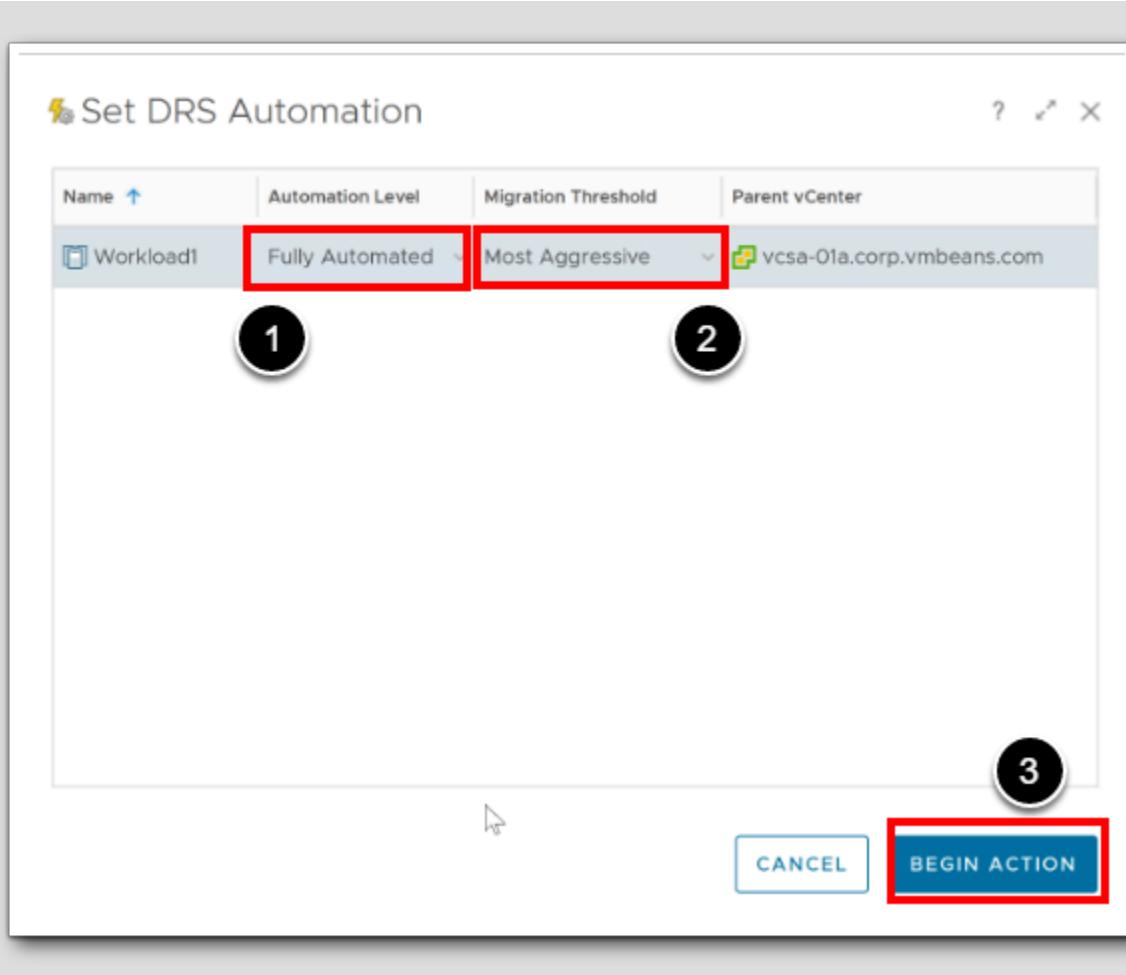
1. To confirm this action, Click OK

## DRS Automation, Second Cluster

Name	Model	CPU Workload %	Memory Workload %	DRS Settings	Migration
Workload1	Demand	30%	83%	Deactivated	--
	Allocation	Not Activated	Not Activated		
Management	Demand	33%	78%	Partial Automated	Default
	Allocation	Not Activated	Not Activated		

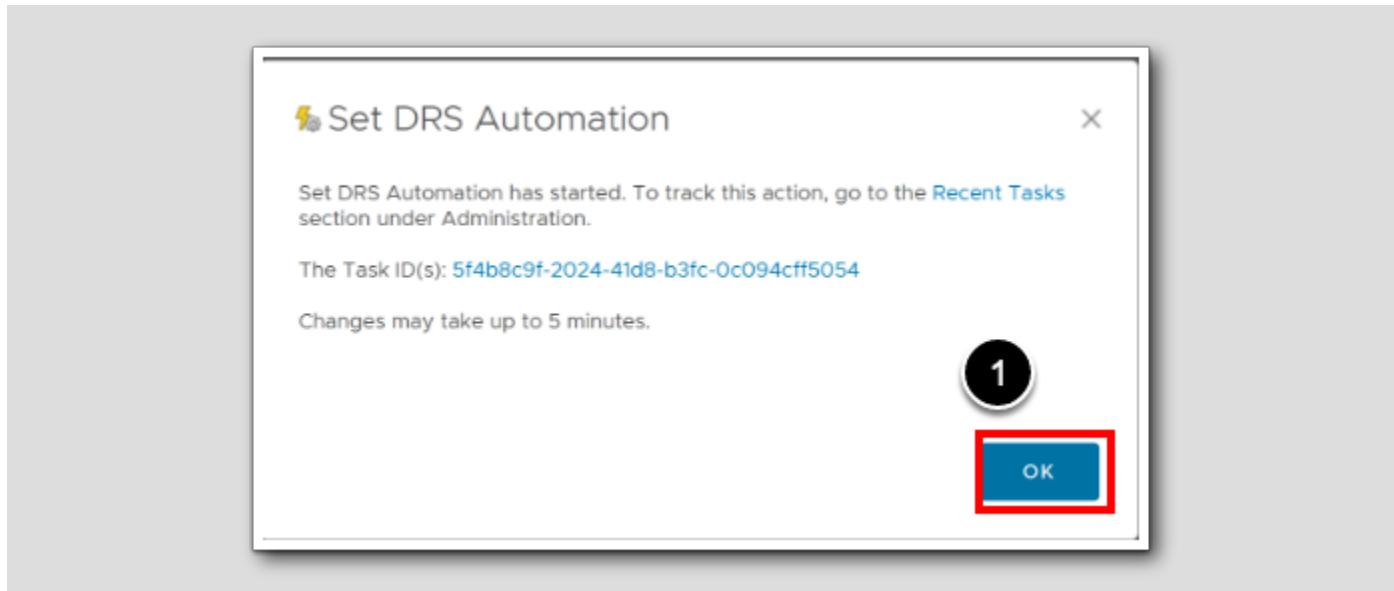
1. Select the Cluster named Workload1
2. Click SET DRS AUTOMATION

## Setting the DRS Automation



1. Set the Automation level to **Fully Automated**
2. Set the Migration Threshold to **Most Aggressive**
3. Click **BEGIN ACTION**

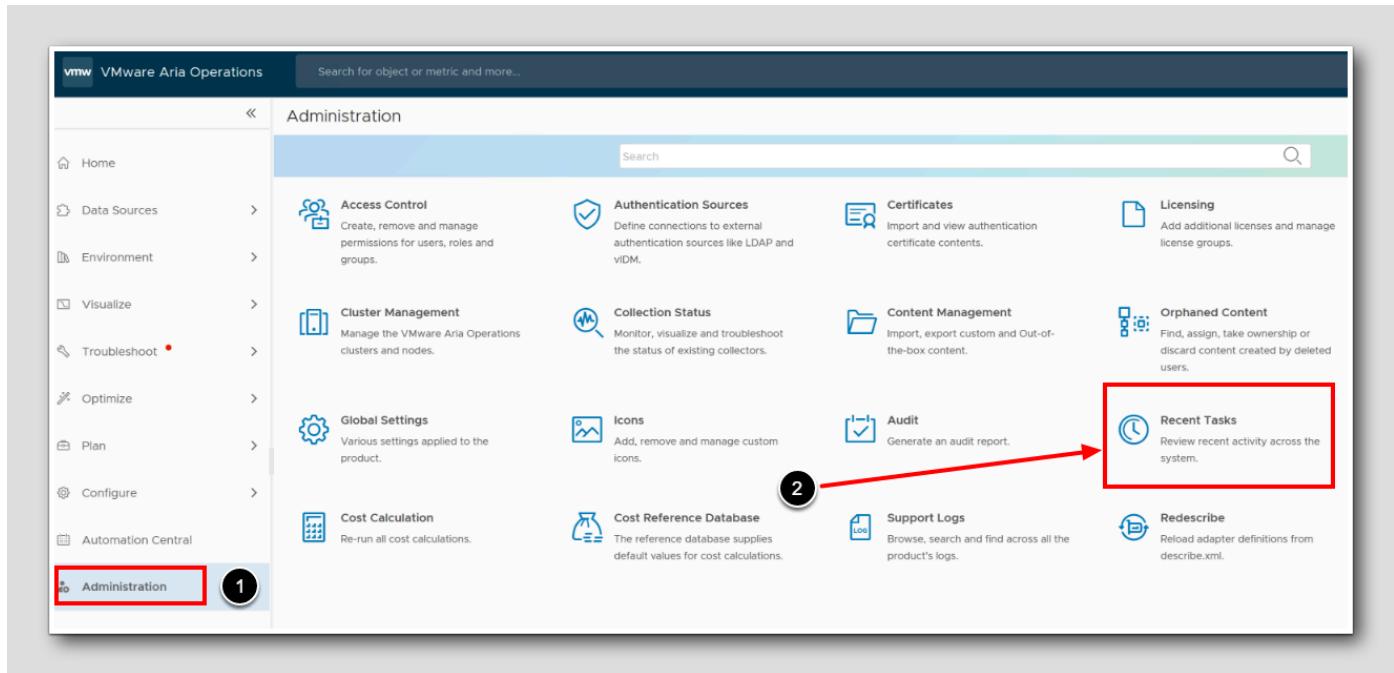
Confirm the action



1. In the Dialog, Click OK

There has been a reason why we haven't clicked on Recent Tasks or the Task ID in this dialog box. Next we will confirm that the DRS settings have been set.

## Recent tasks



1. In the left Pane, Click Administration

2. Click Recent Tasks

## DRS Automation Status Completed

**Recent Tasks**

Status: All

Task	Status	Started Time	Completed Time	Automated	Object Name
Set DRS Automation	Completed	12:54 PM	12:55 PM	No	Workload1
Set DRS Automation	Completed	12:47 PM	12:47 PM	No	Management
Set DRS Automation	Completed	12:47 PM	12:47 PM	No	Management

**Details of Task Selected**

Associated Objects (Completed 1 from 1)

Object Name	Object Type	Status
Management	Cluster Compute Resource	Completed

Messages Severity: All

Severity	Time	Message
Information	2023-06-26 12:47:29...	Task Id: dab7e426-6dd4-41ea-9...
Information	2023-06-26 12:47:35...	Executing 'ModifyDRSConfig'
Information	2023-06-26 12:47:35...	Parameters: mOR: domain-c120...
Information	2023-06-26 12:47:35...	Params: MethodParam{targetR...
Information	2023-06-26 12:47:53...	Return status: COMPLETED

1. Select The Management Cluster
2. Make sure the status is Completed
3. Note: Also make sure the Workload1 has it's DRS Automation setting to Completed

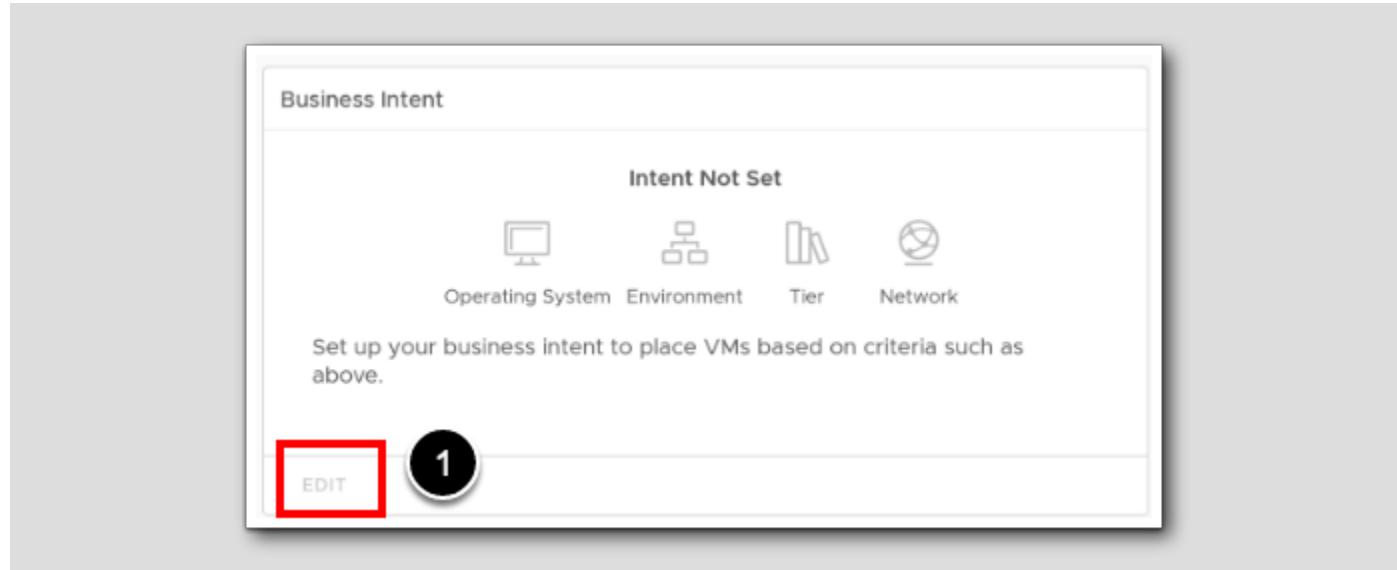
## Getting back to the Workload placement

Name	Model	CPU Workload %	Memory Workload %	DRS Settings	Migration Threshold
Workload1	Demand	29%	82%	Fully Automated	Most Aggressive
	Allocation	Not Activated	Not Activated		
Management	Demand	31%	78%	Fully Automated	Most Conservative

Here is the other way of getting back to Workload placement

1. Click Optimize
2. Click Workload Placement

## The 'Grayed out' Business Intent



1. Our next step to configure a Business Intent is to click EDIT

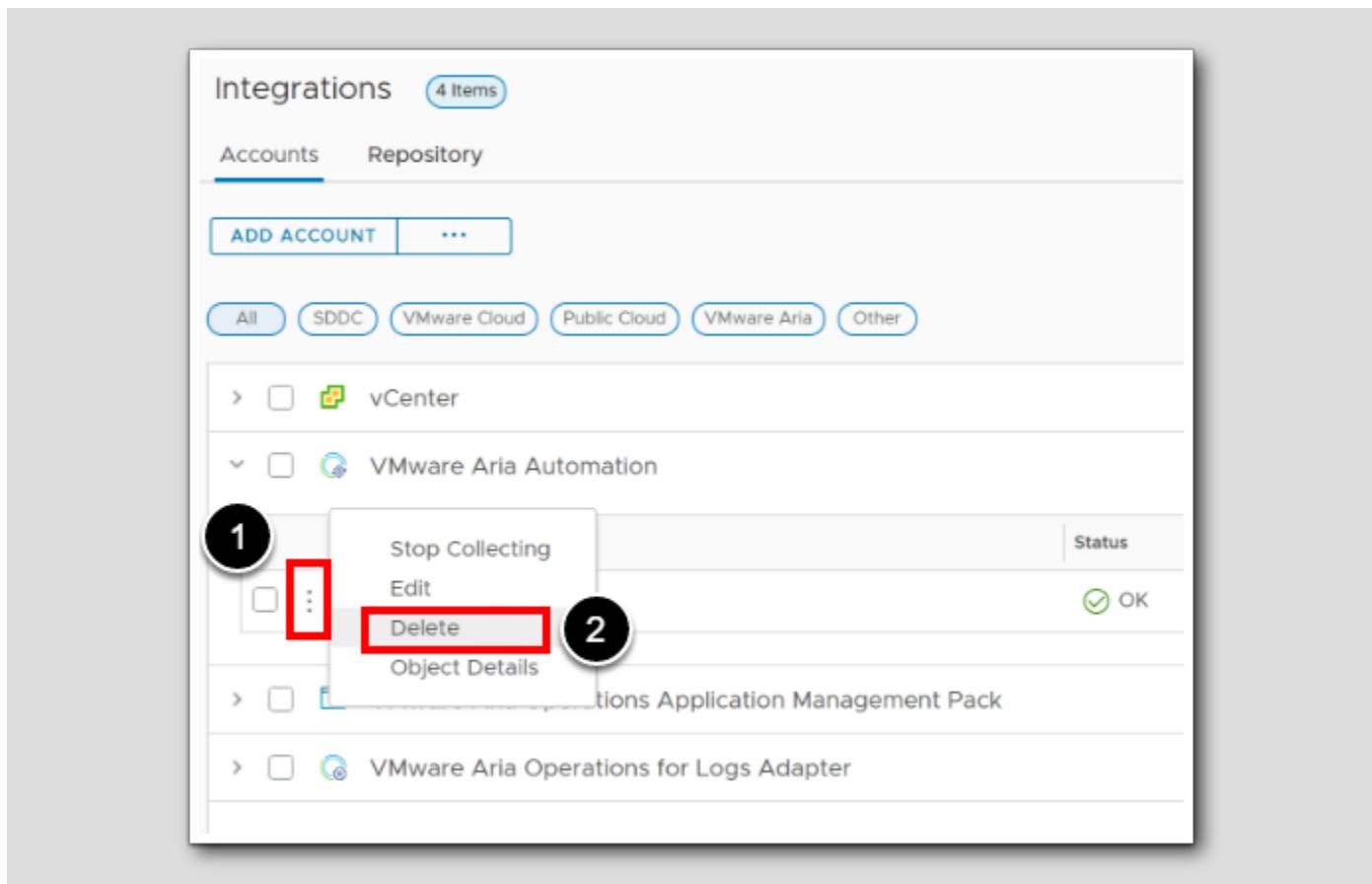
As you can see The EDIT button is grayed out and we can't continue. The reason for this is that we need to break the co-operation between the two State of the art tools to be able to use the Place

## Find the Automation integration

The screenshot shows the VMware Aria Operations interface. On the left, there is a navigation sidebar with the following items: Home, Data Sources, Integrations (which is highlighted with a red box), Cloud Proxies, Environment, and Visualize. Under Data Sources, there is a dropdown menu with an arrow pointing down. Below the navigation sidebar, the main content area has a title 'Integrations' with a sub-count '4 items'. It includes tabs for 'Accounts' (selected) and 'Repository'. There is a 'ADD ACCOUNT' button and a '...' button. Below these are several filter buttons: All, SDDC, VMware Cloud, Public Cloud, VMware Aria (which is selected and highlighted with a red box), and Other. The main list shows two entries: 'vCenter' and 'VMware Aria Automation'. The 'VMware Aria Automation' entry is expanded, showing a table with one row: 'CAS Adapter Instance' under 'Name' and 'OK' under 'Status'. The entire 'Integrations' section is also highlighted with a red box.

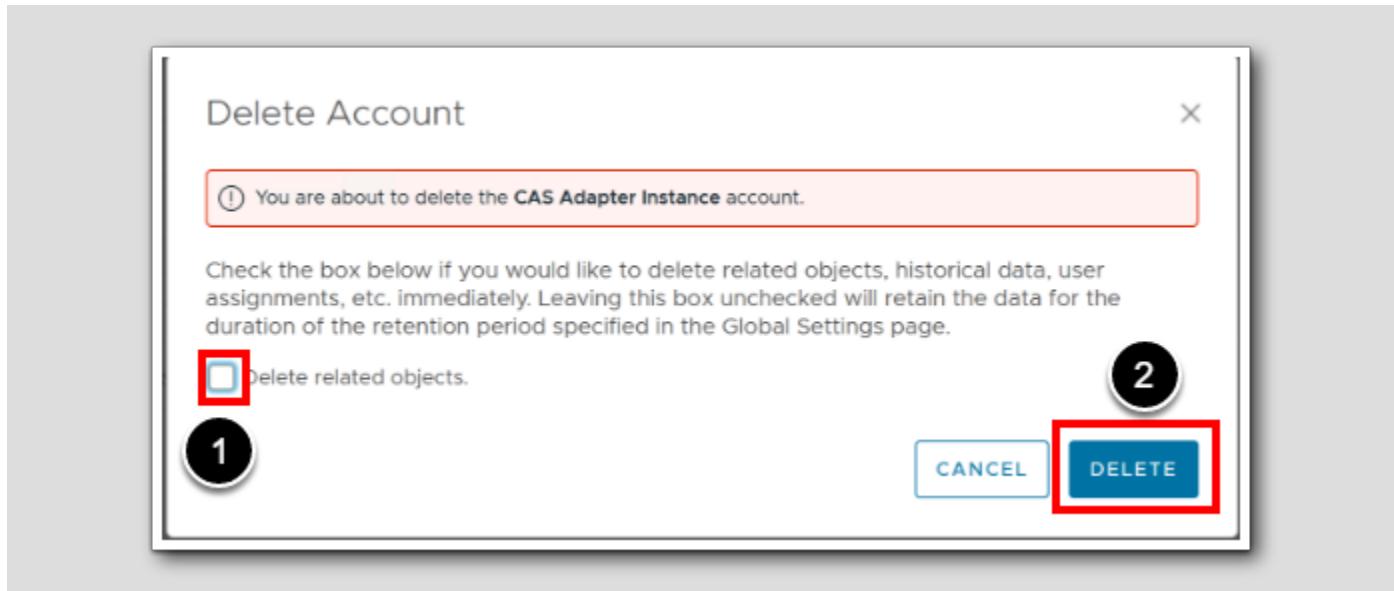
1. Expand Data Sources
2. Click on Integrations
3. Expand VMware Aria Automation

## Deleting the integration



1. Click the ellipsis
2. Select Delete

## Confirm the delete



1. Make sure the Delete Related Objects is **unchecked**

2. Click **Delete**

## Check the result

The screenshot shows the VMware Aria Operations interface under the "Workload Placement" section. On the left, there's a navigation sidebar with options like Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Capacity, Reclaim, Workload Placement (which is selected and highlighted in blue), Rightsize, and Compliance. The main content area is titled "Workload Placement" and "OPTIMIZATION SCHEDULES". It displays a card for "RegionA01" showing "0 Days Remaining" and "US\$0 Cost Savings". This card is highlighted with a yellow box and has a red arrow pointing to it from the left. Below this, there's a detailed view for "RegionA01" with tabs for "Optimization Status" (selected), "History", and "Optimization Potential". The "Optimization Status" section shows "Status: Not applicable" and "N/A". A note says "VMware Aria Automation managed VMs in this environment can not be relocated." Below this are buttons for "OPTIMIZE NOW", "SCHEDULE", and "AUTOMATE". To the right, there are sections for "Operational Intent" (Utilization Objective: Moderate, Avoid Performance Issues, As Few Moves as Possible) and "Business Intent" (Intent Not Set, Operating System, Environment, Tier, Network). A red arrow points from the "Edit" button in the Business Intent section down towards the bottom right of the screen.

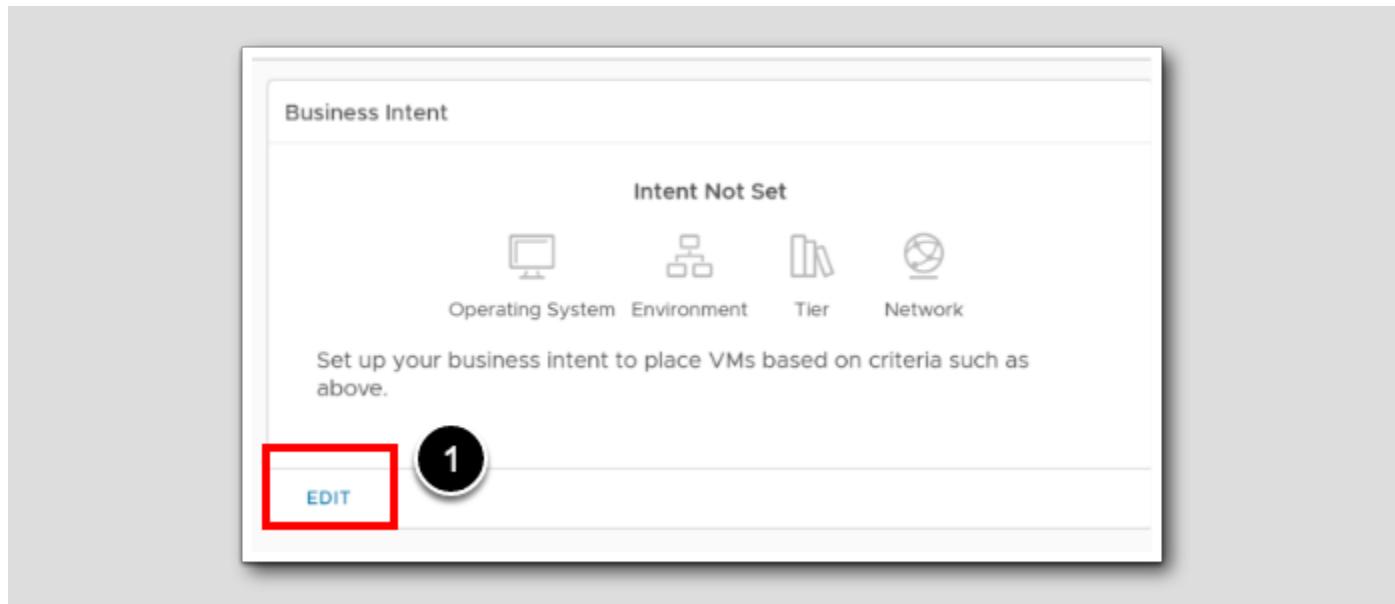
What happened?

First of all the representation of our RegionA01 datacenter through Aria Automation disappeared

Second The Business Intent opened up, and the Grayed out Edit button became available

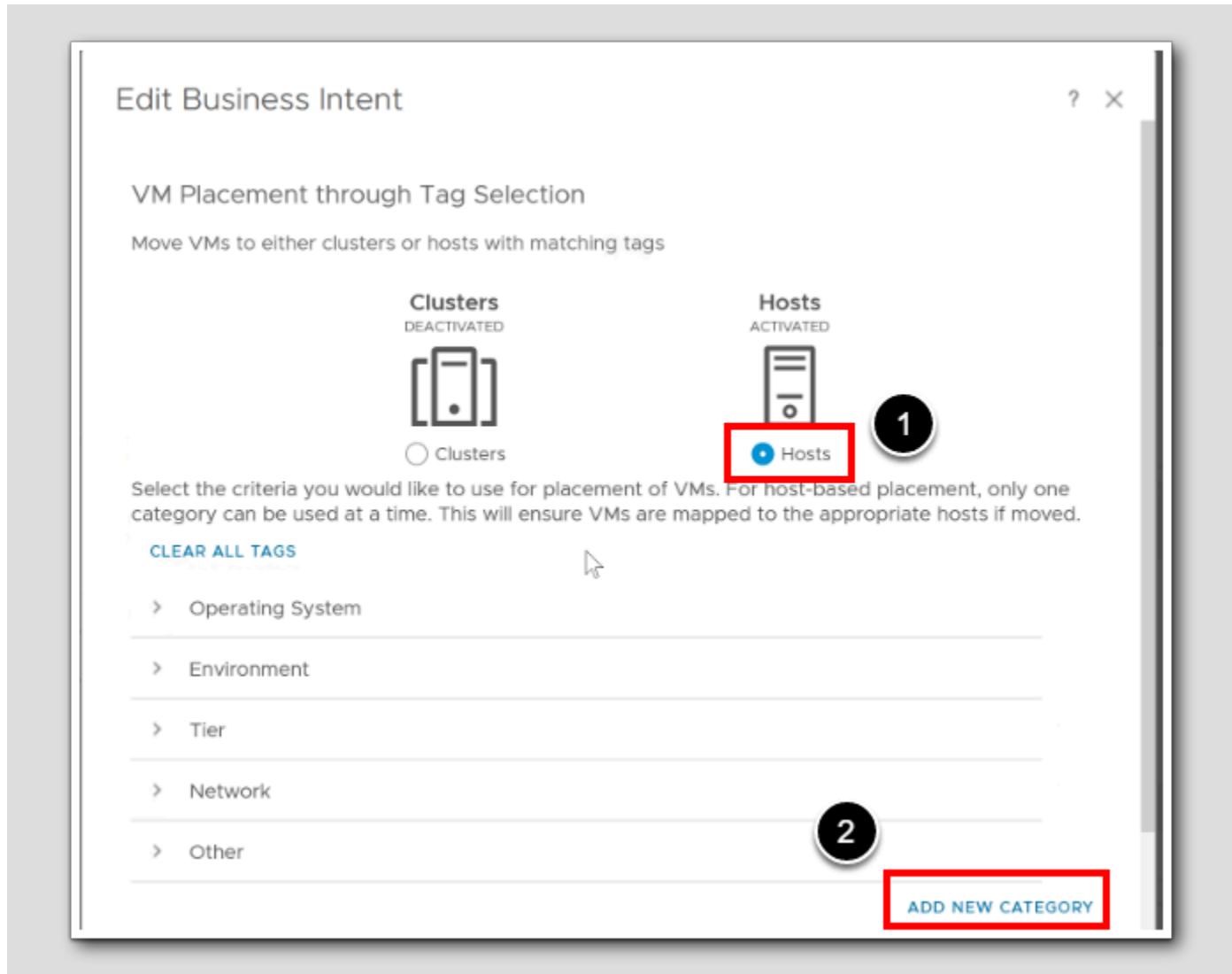
## Edit Business Intent

[156]



1. In the Business Intent Card, Click EDIT

## Cluster Based, or Host Based?

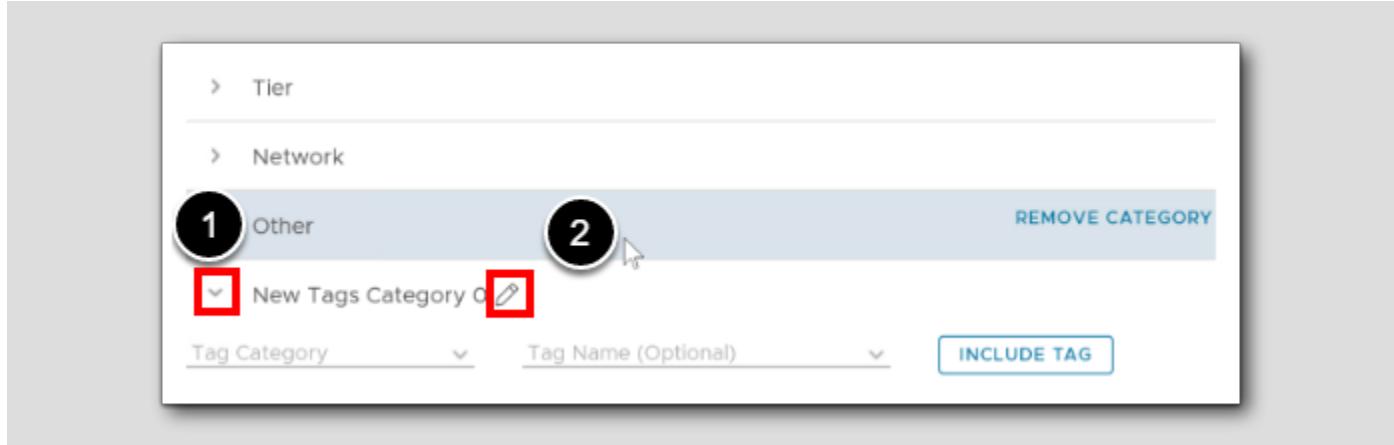


**Cluster Based**, will Move VMs to clusters with matching tags. We could select the criteria we would like to use for placement of VMs to ensure VMs are mapped to the appropriate clusters if moved. Only one category can be prioritized at a time. VM with higher priority tags will be moved last.

**Host based**, will place VMs through Tag Selection onto hosts with matching tags. Select the criteria you would like to use for placement of VMs. Also for host-based placement, only one category can be used at a time. This will ensure VMs are mapped to the appropriate hosts if moved.

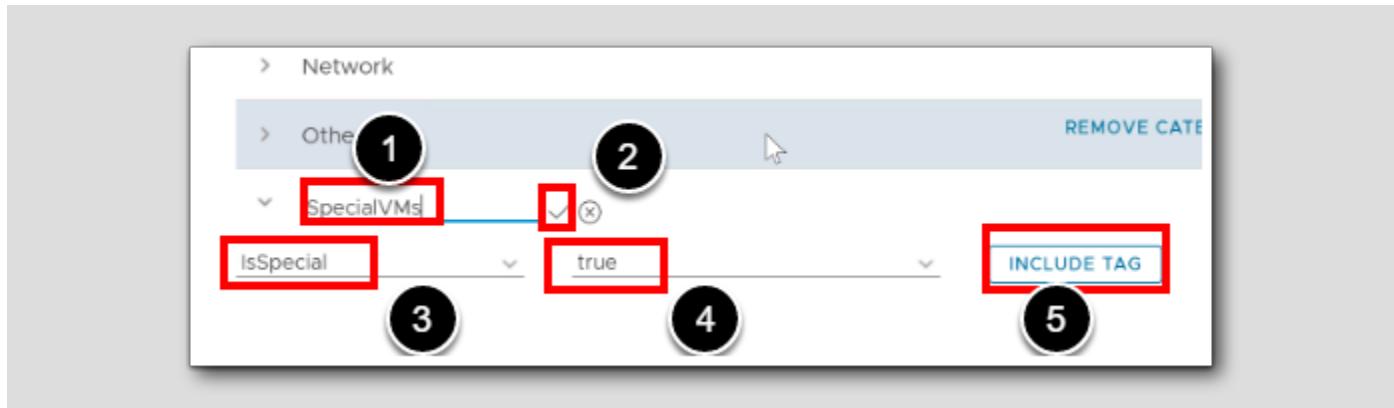
1. Select Hosts
2. Click Add New Category

## Renaming the category



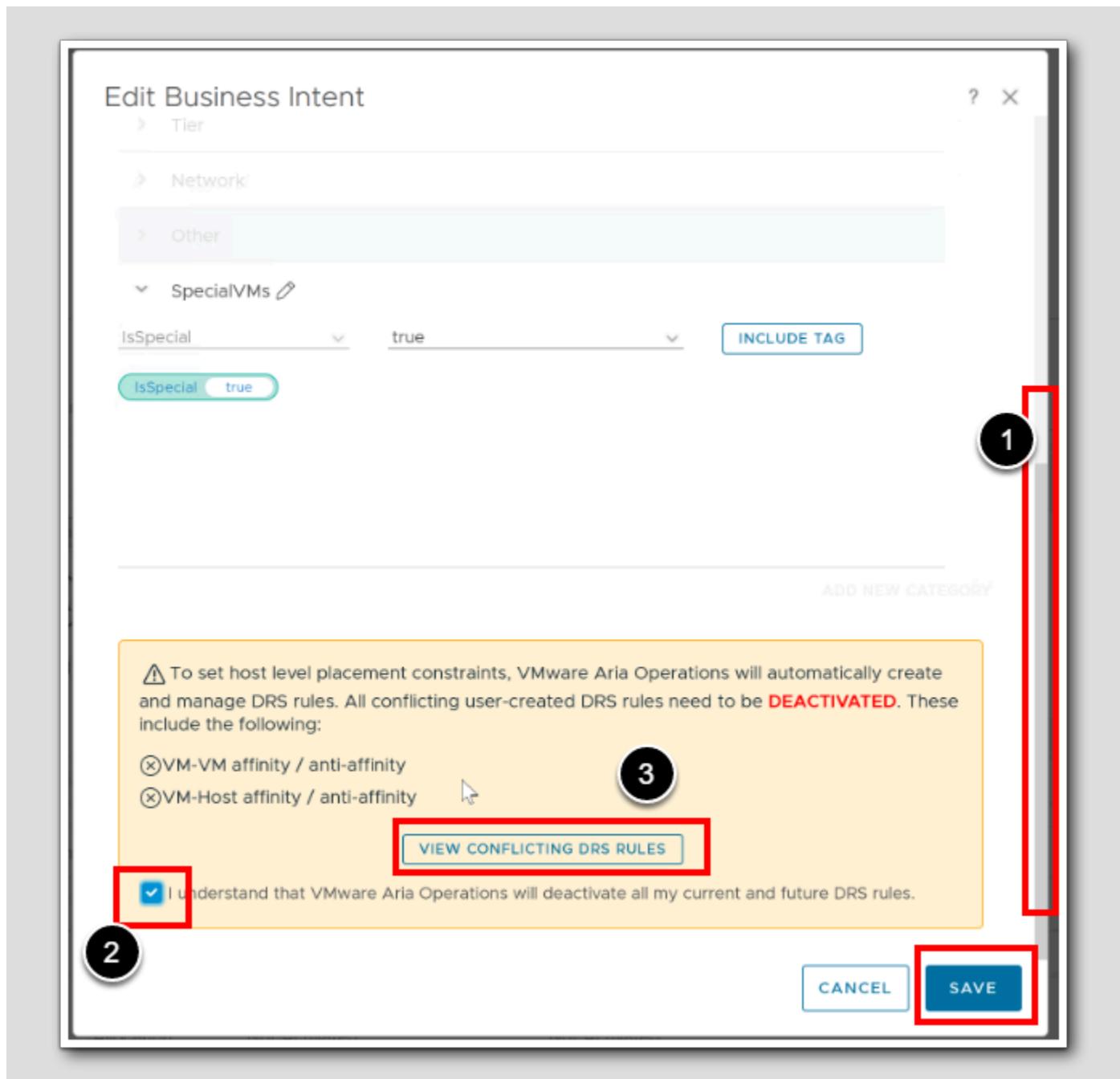
1. Click to expand the New Category
2. Edit the name by Clicking the pencil

## Adding the name



1. Rename the category to SpecialVMs
2. Click the confirm Icon
3. Add a Tag Category called IsSpecial
4. Set the Tag Name to true
5. Click the Include Tag

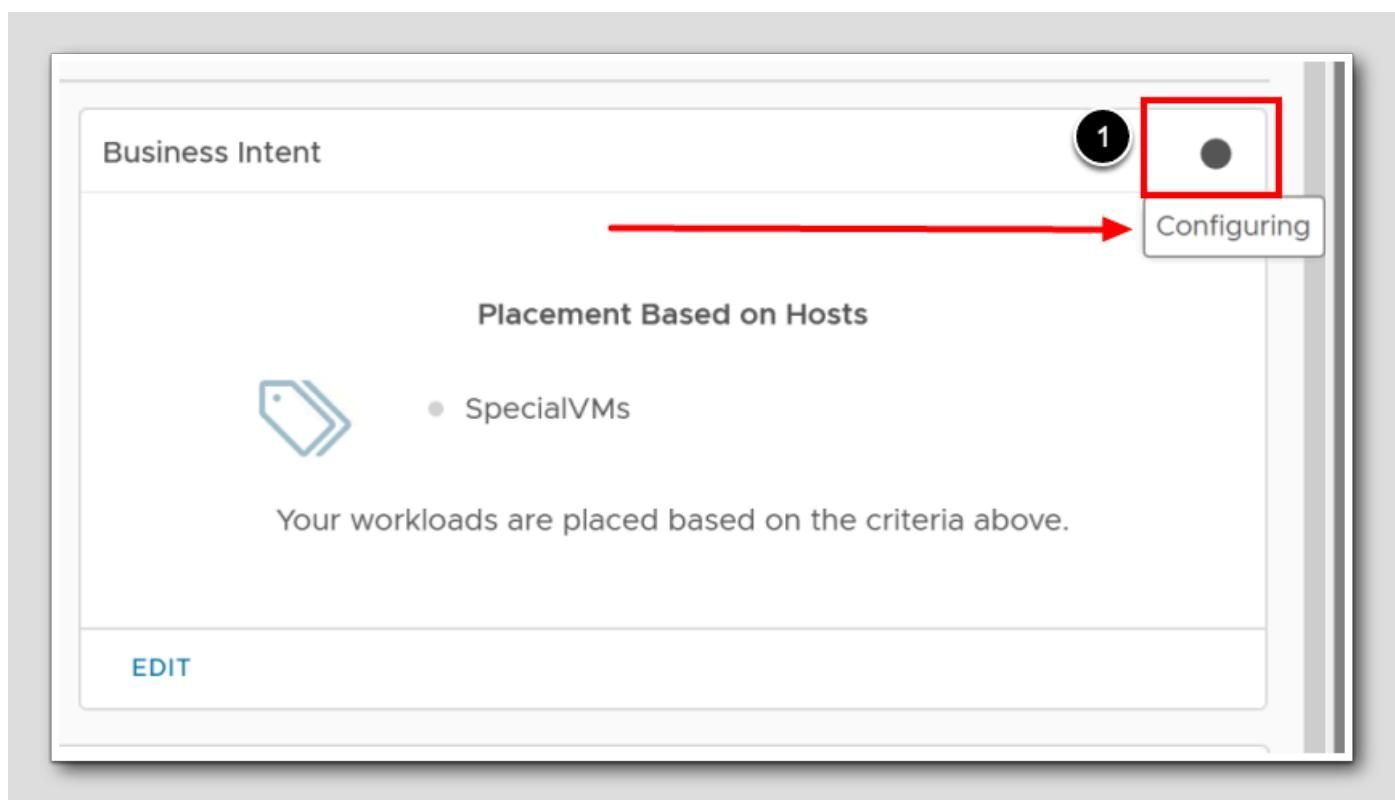
## Confirm Affinity



1. In the dialog, Scroll down to the bottom of the page
2. Click "I understand that VMware Aria Operations will deactivate all my current and future DRS rules."
3. Click **VIEW CONFLICTING DRS RULES**  
Observe if there are any. Note: It will state that "*0 user-created DRS Rule(s) will be deactivated across clusters in this datacenter*"
4. Click **SAVE**

## Configuring and Configured states

[161]



1. First the state will be "Configuring", you will see this if you **hover with the mouse over the black dot**

When you refresh a couple of times with the top right refresh button, this black dot will turn green, at it will say "Configured" when you hover the button. (not shown)

Next step is to test. We will Tag a host and VMs in vSphere using vCenter.

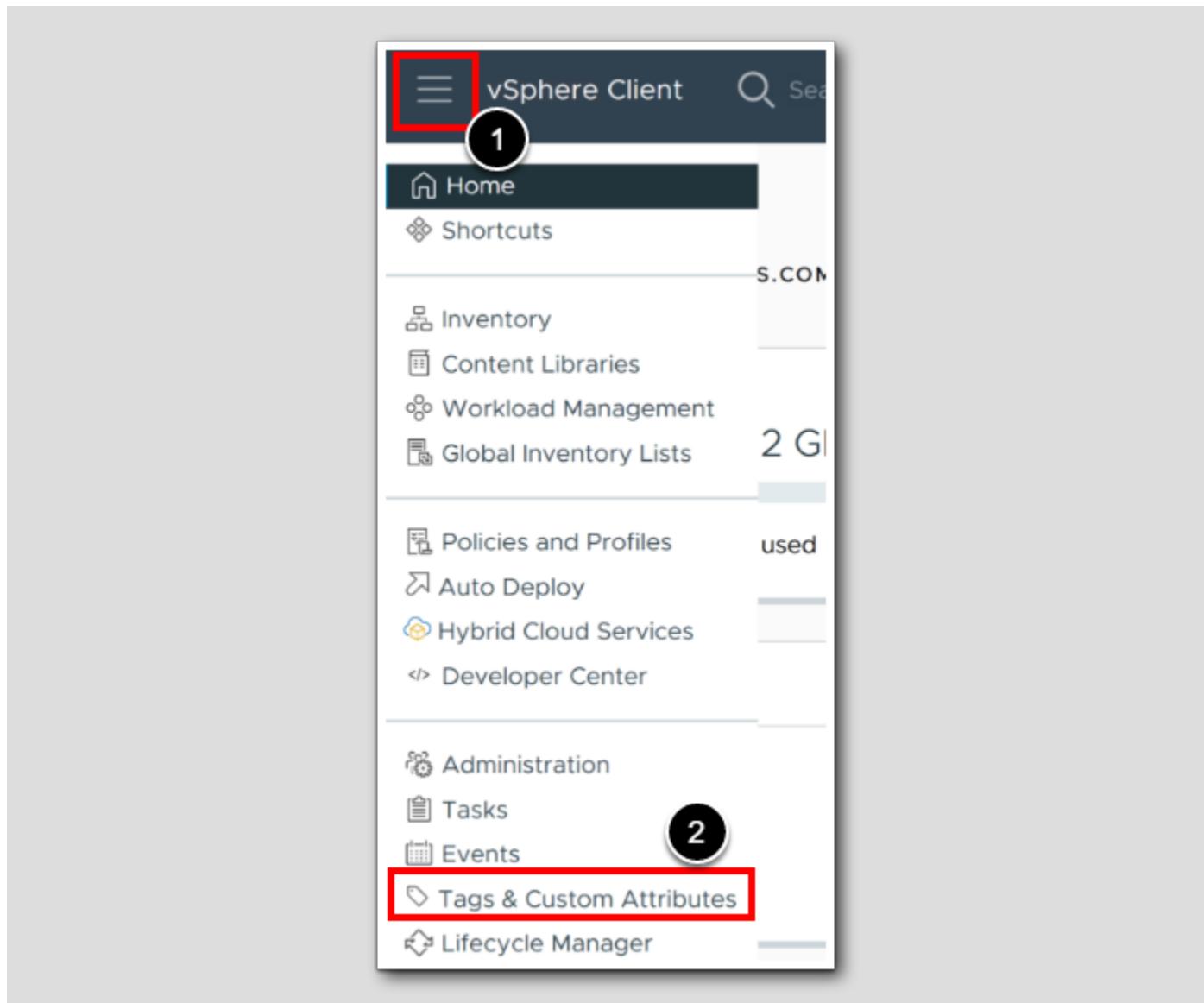
Start and log in to vCenter



1. Hold CTRL and press T (ctrl+T) to open a New Tab (not shown)
2. Click vCenter
3. Check the "Use Windows session authentication" checkbox
4. Click Login

## Find Tags

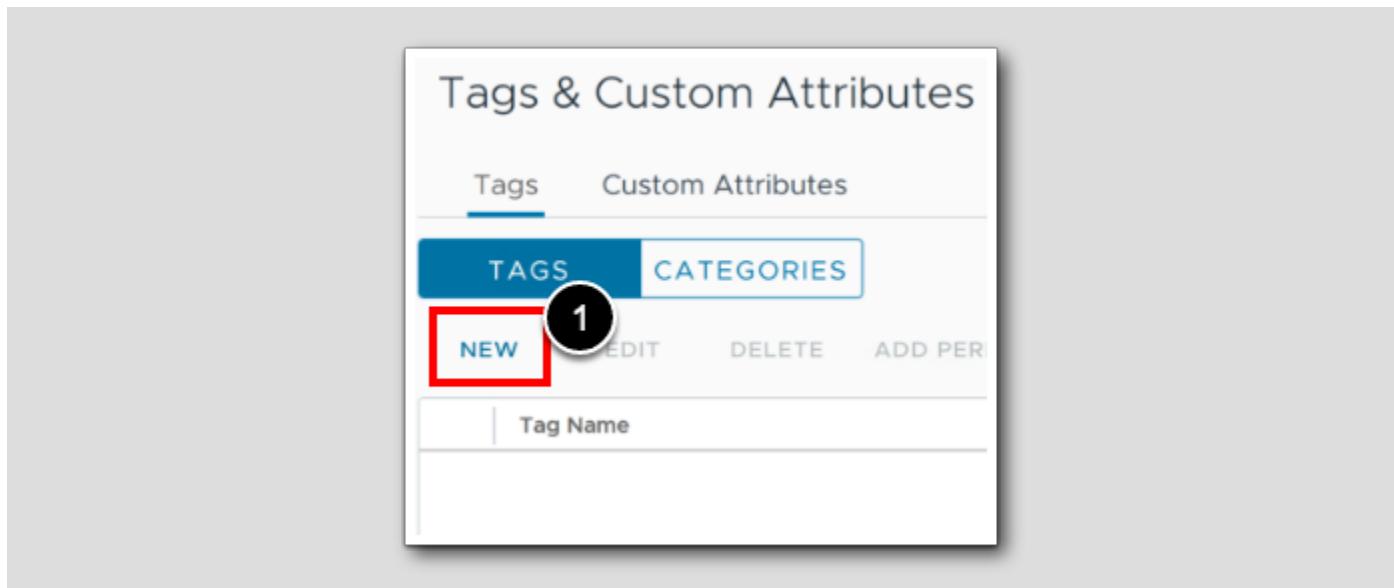
[163]



1. In the vSphere Client click the Ellipsis Menu
2. Choose Tags & Custom Attributes

Create a new tag

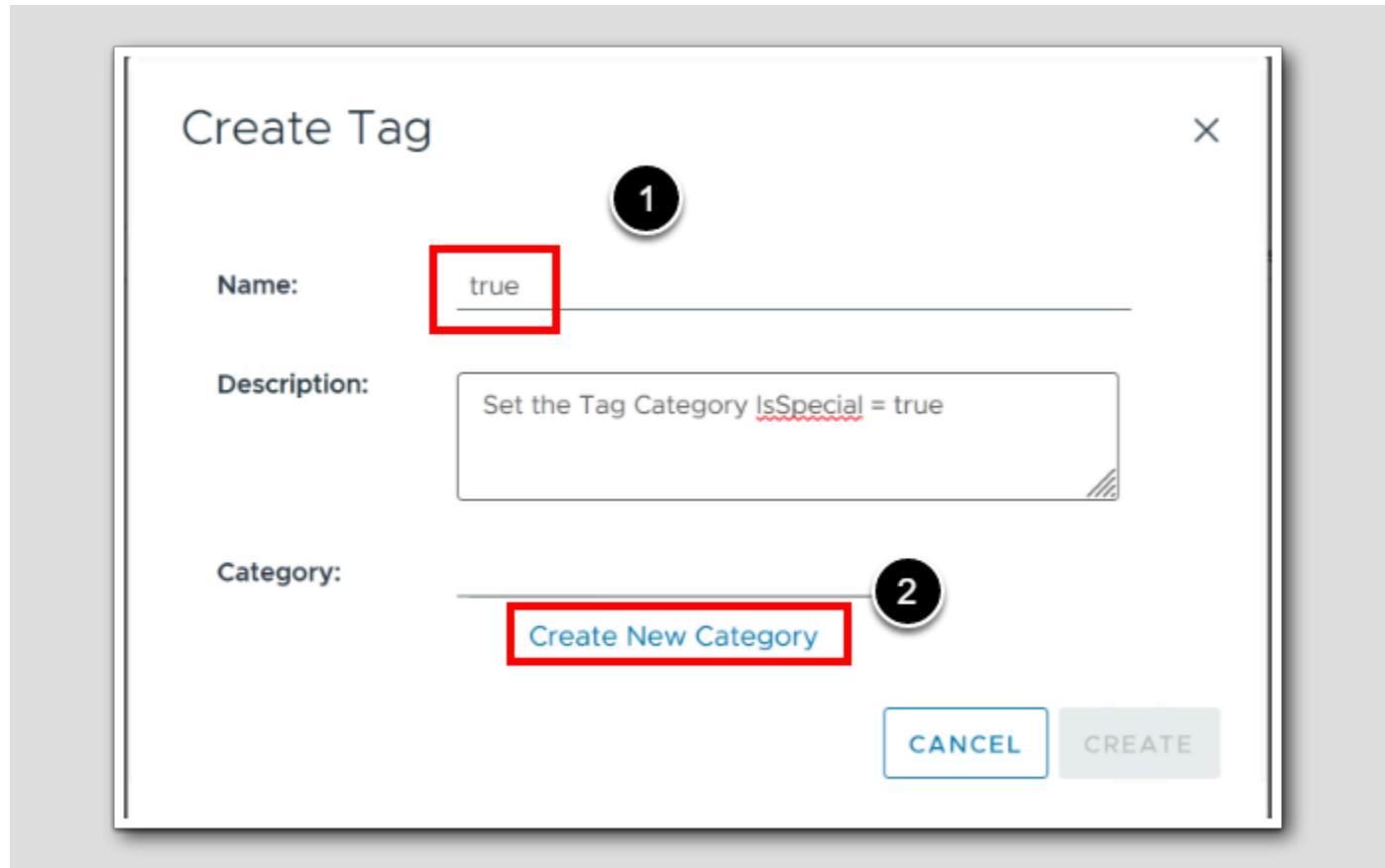
[164]



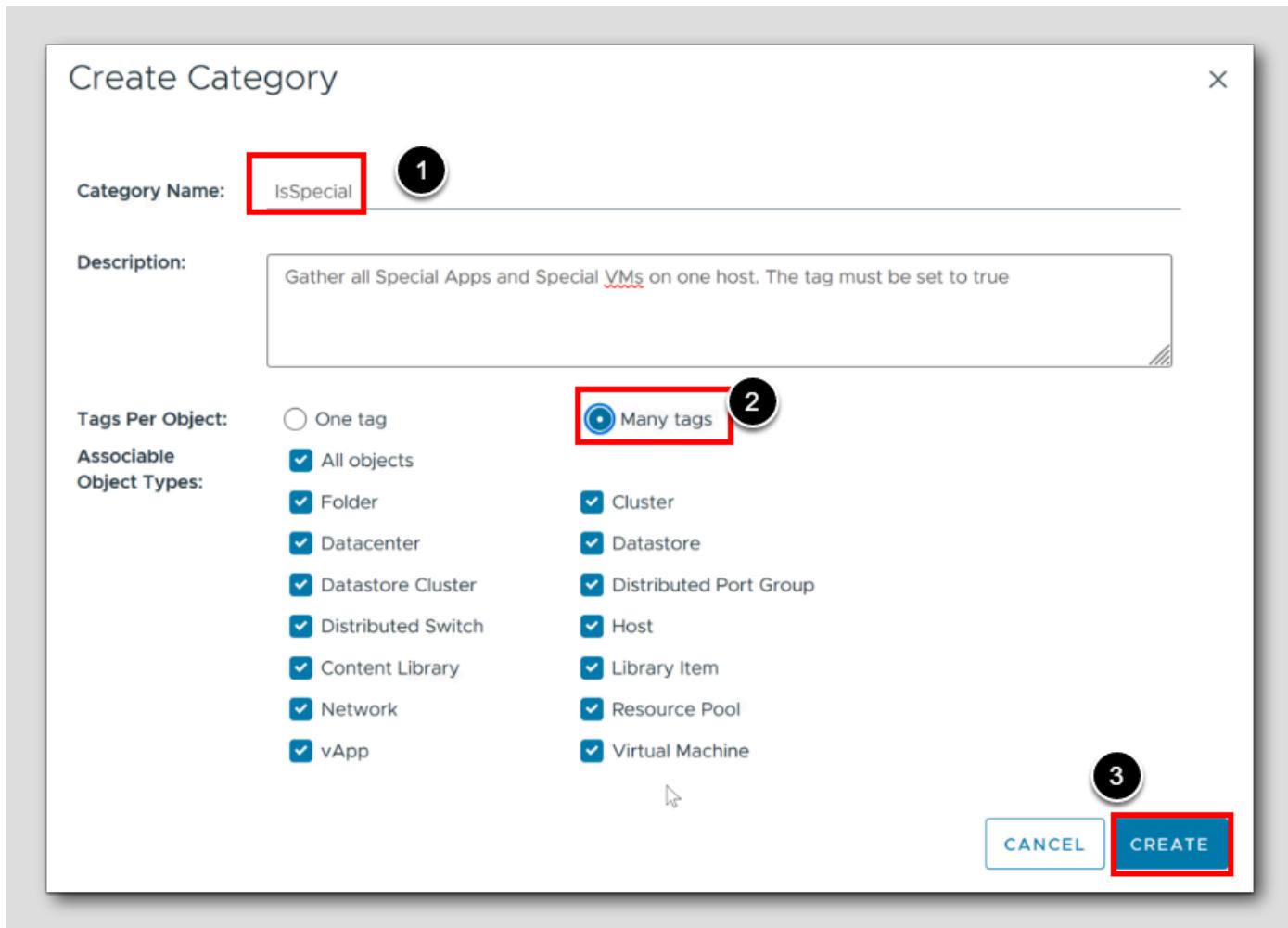
Nearly there.

1. To create a Tag and a Tag category, Click **New**

## A new Tag and Tag Category



1. Set the tag Name to true
2. Click Create New Category

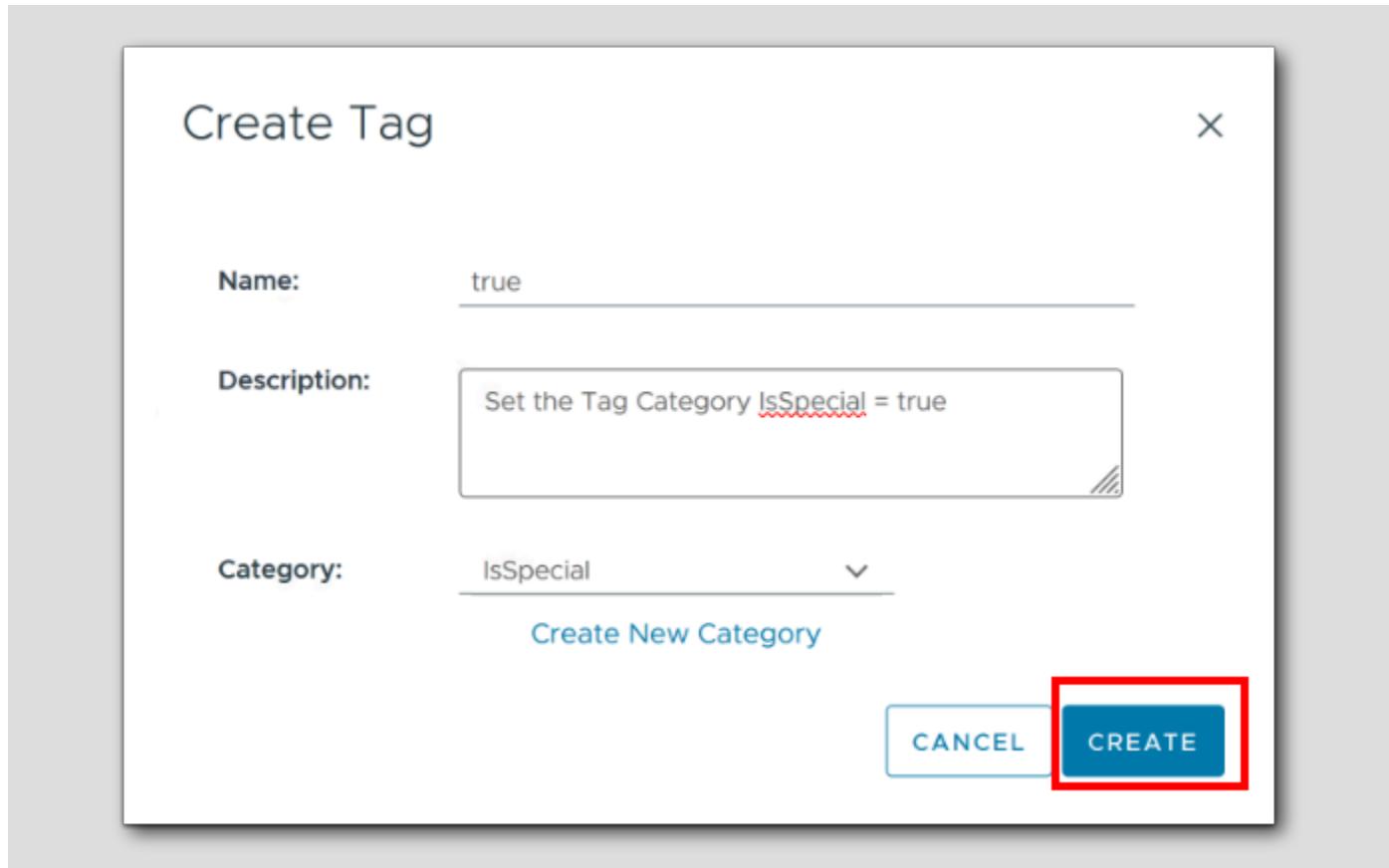


1. Set the Category Name to IsSpecial

2. Click on Many Tags

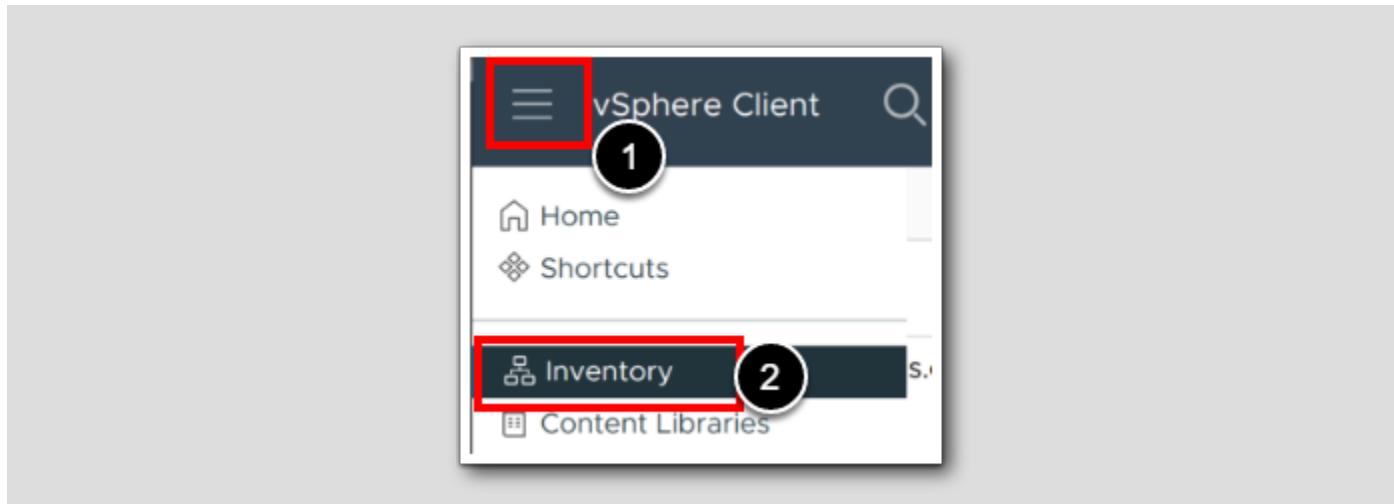
3. Click Create

## Finish the Tag Creation

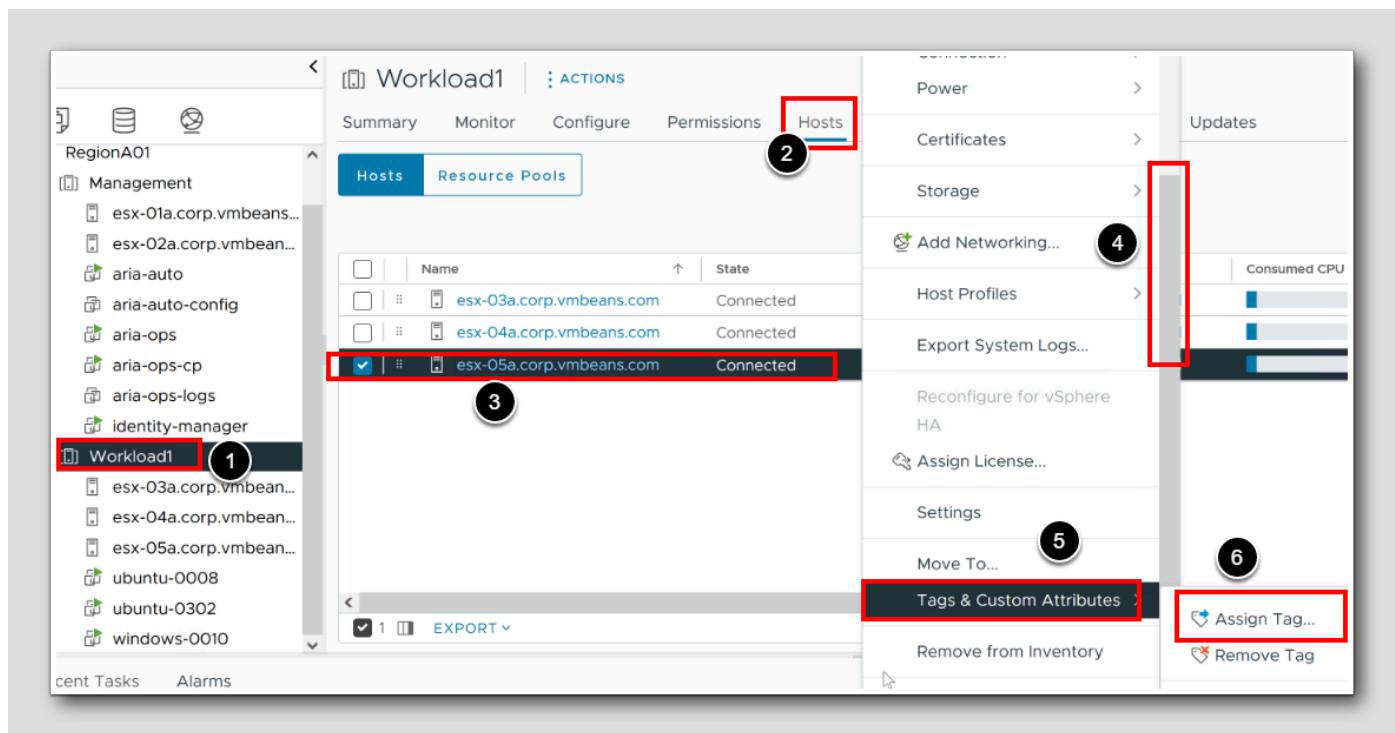


Click Create

Go to inventory



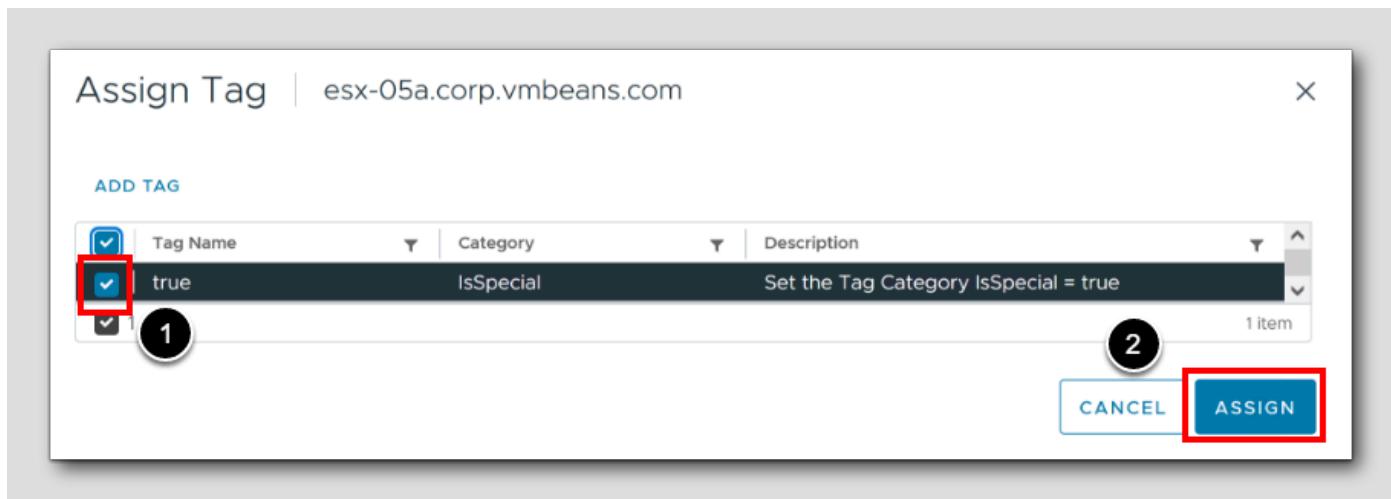
1. Click the ellipsis menu
2. Choose Inventory



We are going to assign our new tag to one specific host: esx-05a.corp.vmbeans.com

1. Select the **Workload1** Cluster
2. Click on **Hosts**
3. Right Click the ESXi Host **esx-05a.corp.vmbeans.com**
4. Scroll down
5. Click **Tags & Custom Attributes**
6. Click **Assign Tag**

## Assign the Tag

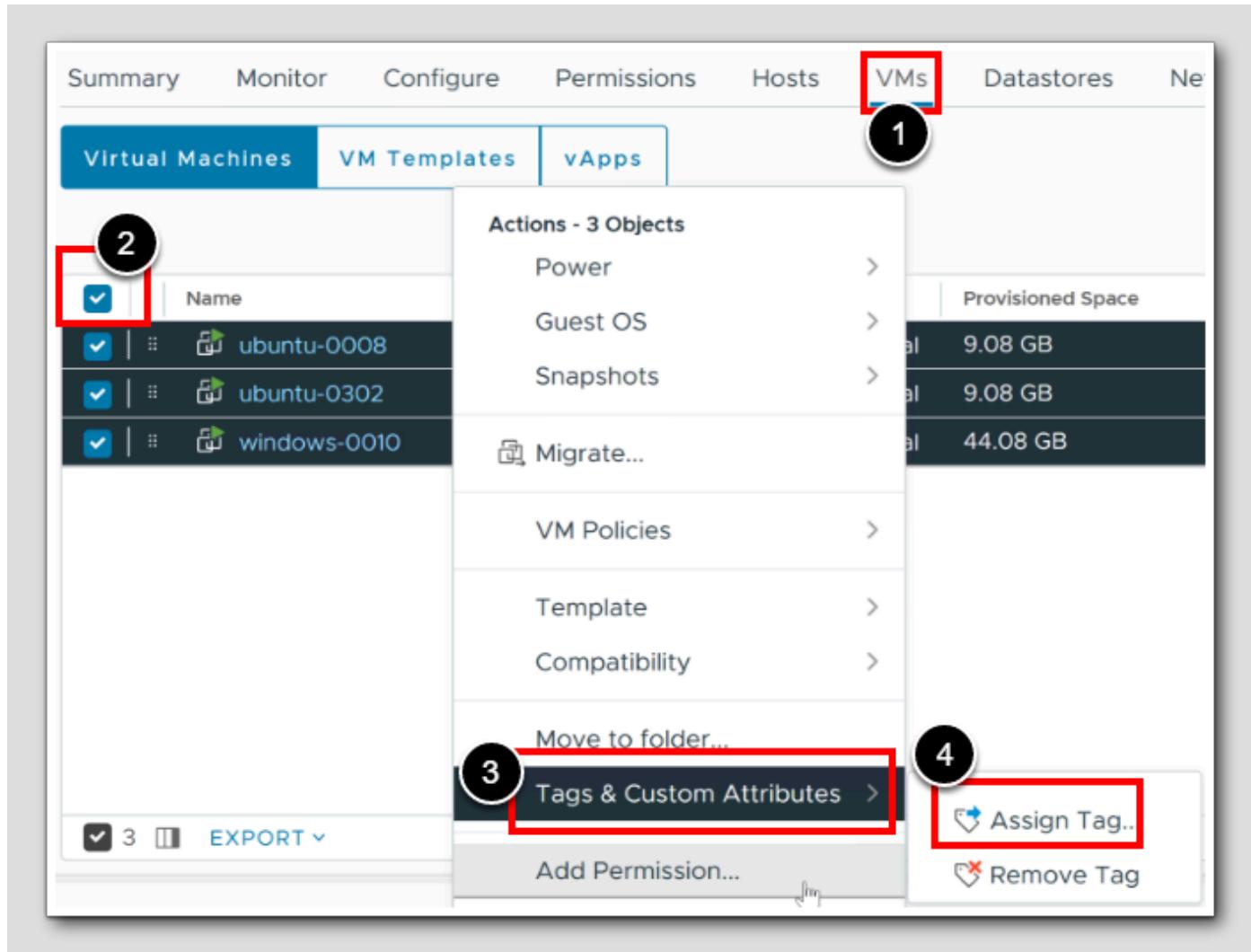


1. Click on the checkbox

2. Click Assign

Now we need to do the same with some VMs!

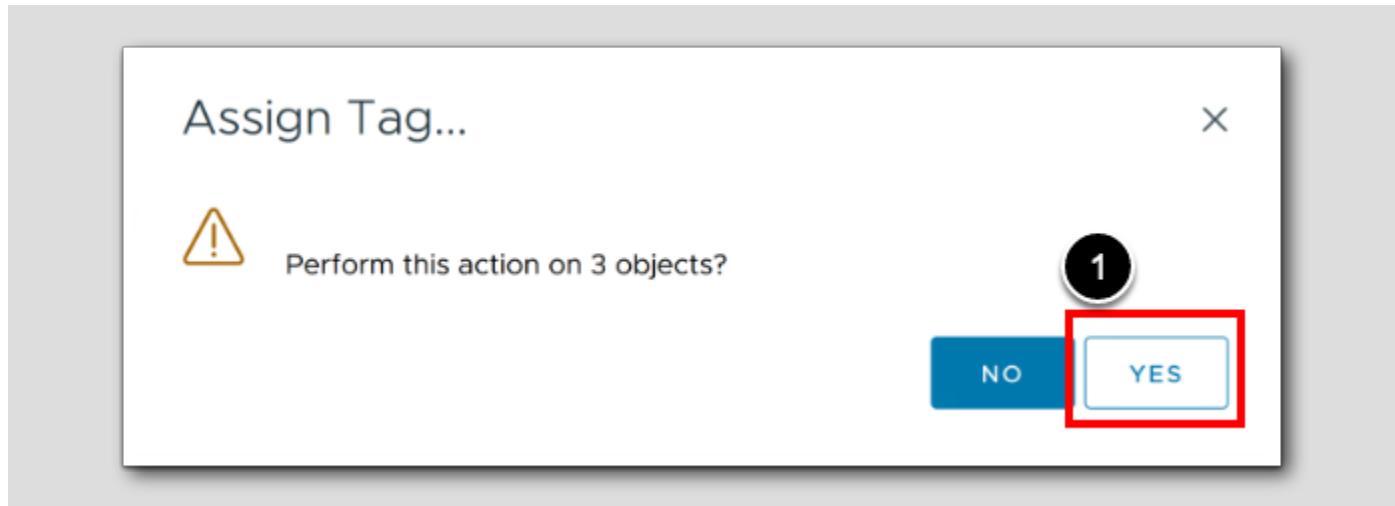
## Assign VMs



Using the same method we will assign tags to all visible VMs in this cluster. Note: Remember this is just a test

1. Click VMs
2. Select all VMs
3. Click on Tags & Custom Attributes
4. Click Assign Tag

Confirm



1. Click YES

## Confirming the VM/Hosts groups

The screenshot shows the vSphere Web Client interface for managing a host named /csa-01a.corp.vmbeans.com. The left sidebar lists various hosts and management entities. The entity 'Workload1' is selected and highlighted with a red box and the number 1. In the top navigation bar, the 'Configure' tab is selected and highlighted with a red box and the number 2. On the right, the 'VM/Host Groups' section is open, showing a list of existing groups. One group, 'vROps\_IsSpecial\_true\_VG', is selected and highlighted with a red box and the number 4. The list also includes other groups like 'vROps\_IsSpecial\_true\_HG' and 'ubuntu-0008'. The 'ADD...' and 'DELETE' buttons are visible at the top of the list.

Aria Operations will make sure that Virtual Machines that are members of a VM Group must run on hosts that are members of a Host Group. Let's Check the VM group.

1. Click the Cluster Workload1
2. Click Configure
3. Click VM/Host Groups
4. To check the members, Click VM group vROps\_IsSpecial\_true\_VG

Observe that we've got all the VMs as members.

Note: Check the hosts group as well to see if the only member is esx-05a.corp.vmbeans.com (not shown).

Next we will confirm the VM/Hosts rules

Confirm the Hosts/VM rules

[174]

Name	Type	Enabled	Conflicts
vROps_IsSpecial_true_AR	Run VMs on Hosts	Yes	0

**VM/Host Rule Details**

Virtual Machines that are members of the VM Group must run on hosts that are members of the Host Group.

ADD...	REMOVE	ADD...	REMOVE
<input type="checkbox"/> vROps_IsSpecial_true_VG Group Members		<input type="checkbox"/> vROps_IsSpecial_true_HG Group Members	
<input type="checkbox"/> ubuntu-0008		<input type="checkbox"/> esx-05a.corp.vmbeans.com	
<input type="checkbox"/> ubuntu-0302			
<input type="checkbox"/> windows-0010			

1. Continue by clicking VM/Host Rules
2. Select the New rule vROps\_IsSpecial\_true\_AR

Observe Both the the VM Group members and Host Group Members

*This Concludes this Module*

## Conclusion

[175]

In summary, Business Intent is the key to unlocking efficiency, streamlined operations, and software alignment with our business objectives.

By leveraging user-defined rules, we can drive automation and informed decision-making, ensuring workload decisions are in sync with our business needs. The advantages we gain include compliance, tag-based placement, workload separation, and optimized resource utilization.

## You've finished Module 5

[176]

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>

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 - Report Generation in VMware Aria Operations (15 minutes) Basic

### Introduction

[178]

With the VMware Aria Operations reporting functions, you can generate a report to capture details related to current or predicted resource needs. You can download the report in a PDF or CSV file format for future and offline needs.

### Log in to Aria Operations

[179]

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

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

[180]

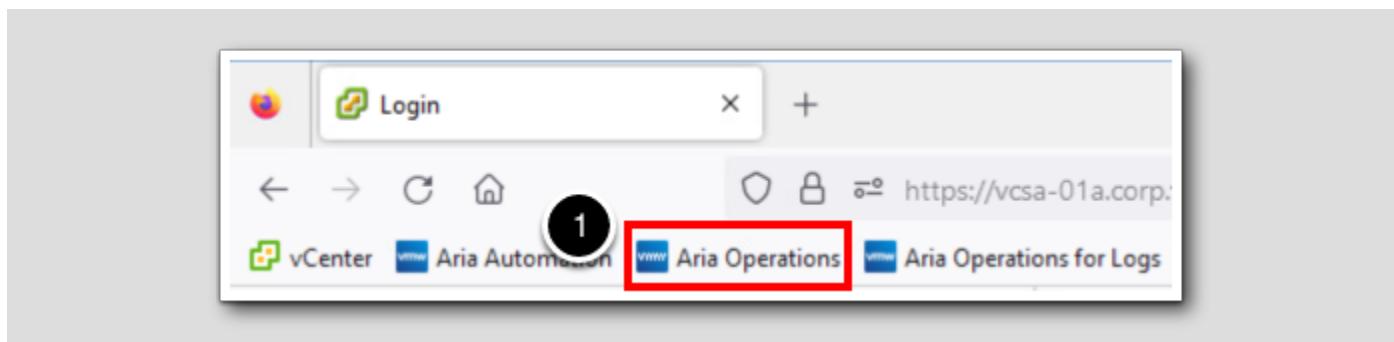


If the browser is not already open, launch Firefox.

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

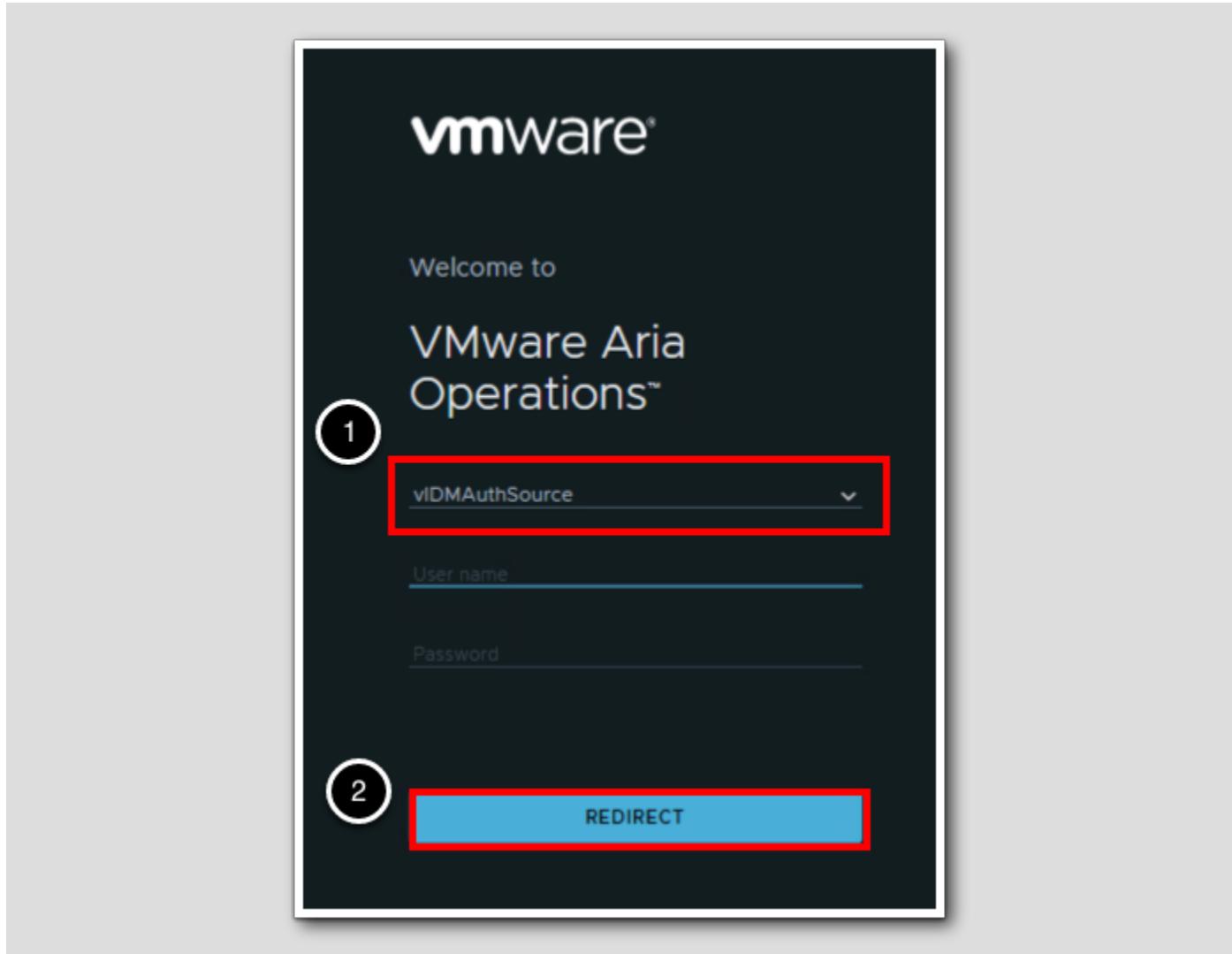
### Navigate to Aria Operations

[181]



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

## Log in to Aria Operations

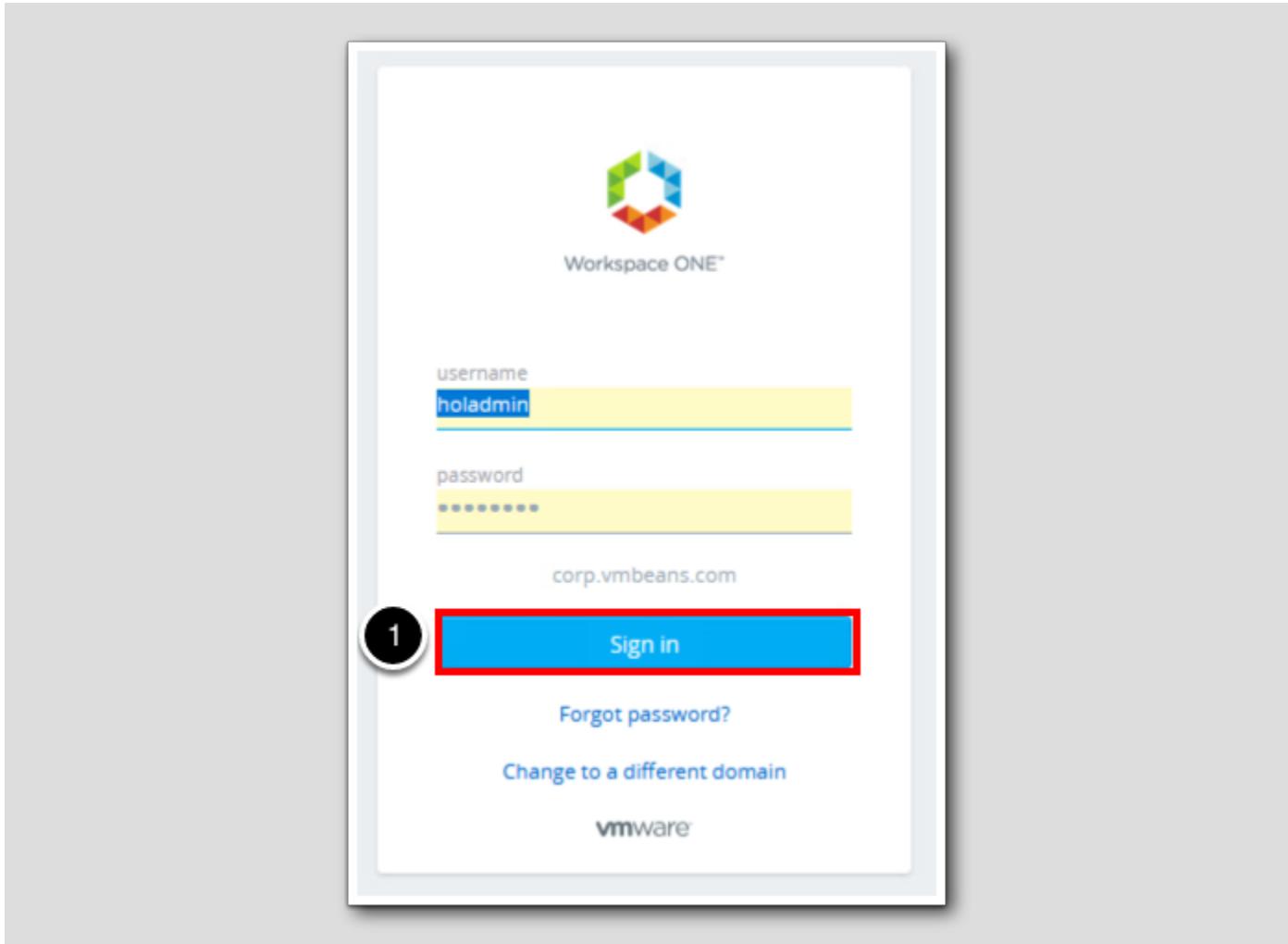


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

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.

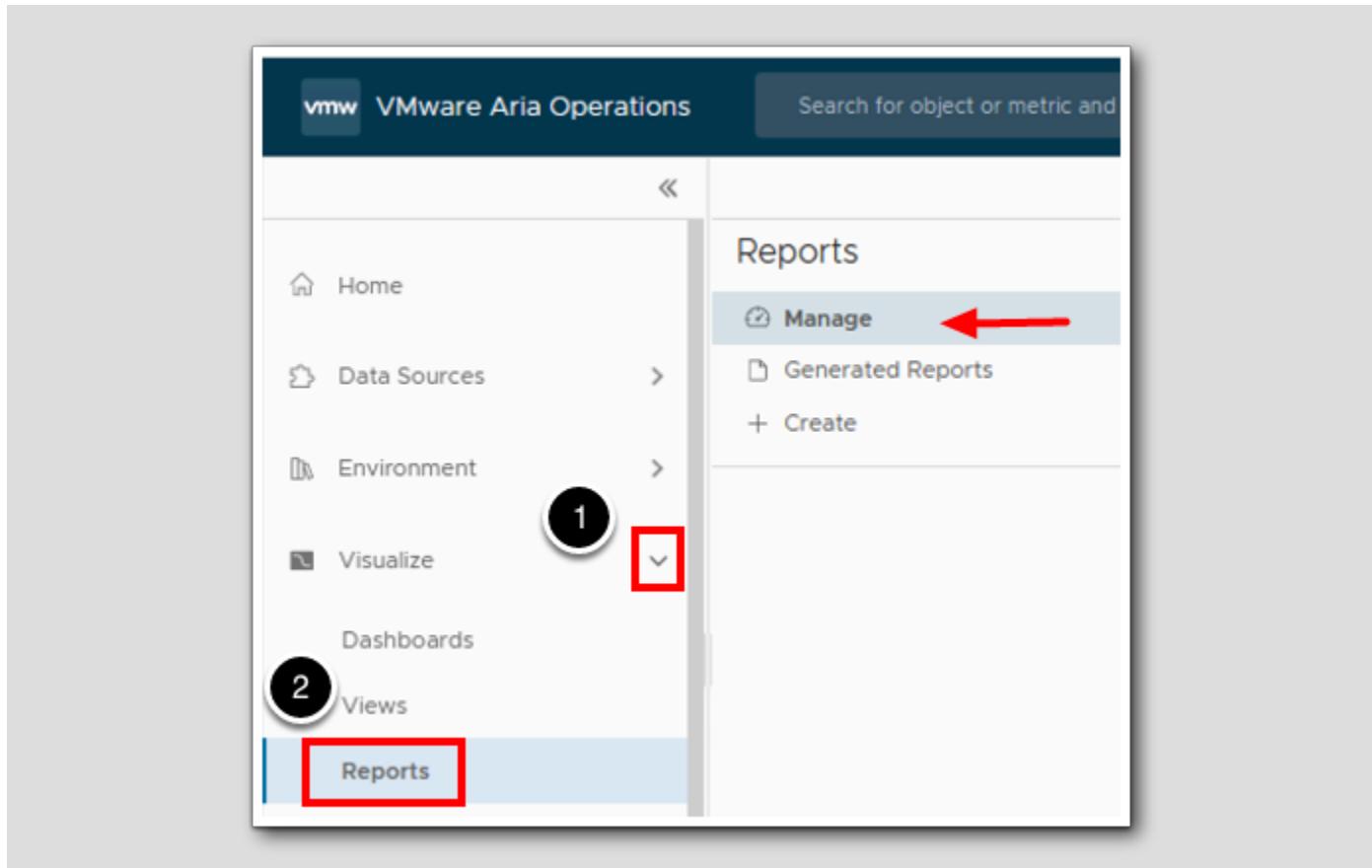
Credentials for the default user, holadmin, have already been provided.

1. Click Sign in

## Introduction to Reports

In this lesson we will run some reports and build a custom report to familiarize how the reporting function works in Aria Operations.

## Open Reports



1. Expand Visualize.

2. Click on Reports.

Notice that **Manage** is selected by default.

## Report Templates

[186]

Report Templates

ADD ... Type here to apply filters ?

	Name ↑	Description	Subject	Generat...	Schedul...	Last Modi...	Last run	Modified ...
<input checked="" type="checkbox"/>	Capacity Report - Datastores	This report provid...	Cluster Compute ...	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Capacity Report - Distributed Port	This report provid...	vSphere Distribute...	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Capacity Report - Distributed Swi...	This report provid...	vSphere Distribute...	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Capacity Report - Environment	This report provid...	Cluster Compute ...	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Capacity Report - Pods	This report provid...	Cluster Compute ...	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Capacity Report - Virtual Machine	This report provid...	Cluster Compute ...	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Capacity Report - vSphere Cluster	This report provid...	Cluster Compute ...	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Capacity Report - vSphere Cluster	This report provid...	Cluster Compute ...	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Capacity Report - vSphere Hosts	This report provid...	Host System	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Cluster Cost Report	Report that contai...	Cluster Compute ...	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Compliance Report - vSphere Secu...	This report shows ...	Symptom	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Configuration Report - Datastores	This report helps t...	Datastore	0	0	6/16/23 10 -		admin

1 - 50 of 68 items < 1 2 >



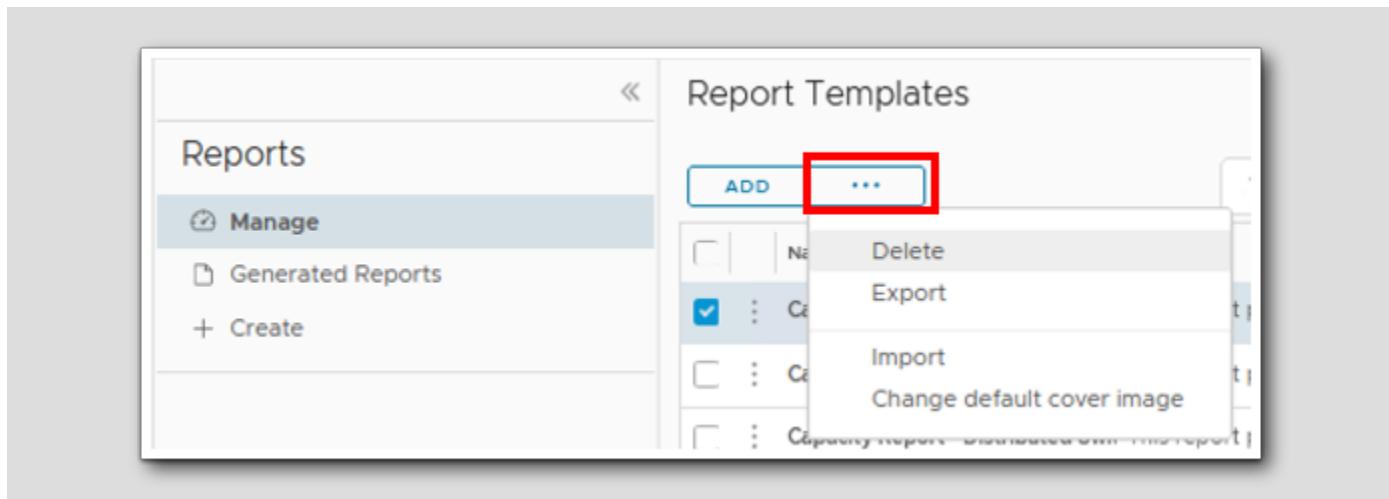
The Manage Reports list shows all of the available reports within vSphere. Notice that there are 68 reports delivered out of the box and are arranged by categories.

The delivered report types are:

- Capacity Reports
- Cluster Cost Reports
- Compliance Reports
- Configuration Reports
- Inventory Reports
- Optimization Reports
- Performance Reports
- Reclamation Reports
- Server Cost Reports
- Utilization Reports
- Virtual Machine Reports
- vSphere Optimization Assessment (VOA) Reports

## More Actions Menu

[187]



1. Click on the ... to open the More Actions menu.

Notice here, with a report selected (blue checkbox), you can Delete, Export, Import or Change default cover image. Changing the default cover allows you to personalize the report cover page reflecting your companies branding.

## Virtual Machine Reports

The screenshot shows a 'Report Templates' interface with a search bar at the top containing the text 'virtual machine'. A red box highlights the search bar. Below the search bar, there is a table with columns: Name, Description, Subject, and a checkbox column. The table lists seven report types, with the first one checked:

	Name ↑	Description	Subject
<input checked="" type="checkbox"/>	Capacity Report - Virtual Machine	This report provid...	Cluster Compute ...
<input type="checkbox"/>	Configuration Report - Virtual Mac	This report helps t...	Virtual Machine
<input type="checkbox"/>	Inventory Report - Virtual Machine	This report provid...	Virtual Machine
<input type="checkbox"/>	Optimization Report - Idle Virtual	Idle VMs Report.	Virtual Machine
<input type="checkbox"/>	Optimization Report - Oversized V	Oversized VMs Re...	Virtual Machine
<input type="checkbox"/>	Optimization Report - Powered Of	Powered Off Virtu...	Virtual Machine
<input type="checkbox"/>	Optimization Report - Undersized	Undersized VMs R...	Virtual Machine

1. In the Search Bar type virtual machine and hit the Enter key.

Searching by virtual machine we filter down the report list to the 12 delivered virtual machine report types.

## The Undersized Report

	Name	Description	Subject	Generat...	Schedul...	Last Modi...	Last run	Modified ...
<input type="checkbox"/>	Capacity Report - Virtual Machine	This report provid...	Cluster Compute ...	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Configuration Report - Virtual Mac	This report helps t...	Virtual Machine	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Inventory Report - Virtual Machine	This report provid...	Virtual Machine	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Optimization Report - Idle Virtual   Idle VMs Report.	Idle VMs Report.	Virtual Machine	0	0	6/16/23 10 -		admin
<input checked="" type="checkbox"/>	Optimization Report - Idle Virtual   Idle VMs Report.	t - Oversized VMs Re...	Virtual Machine	0	0	6/16/23 10 -		admin
<input checked="" type="checkbox"/>	Optimization Report - Idle Virtual   Idle VMs Report.	t - Powered Off Virtu...	Virtual Machine	0	0	6/16/23 10 -		admin
<input checked="" type="checkbox"/>	Optimization Report - Idle Virtual   Idle VMs Report.	t - Undersized VMs R...	Virtual Machine	0	0	6/16/23 10 -		admin
<input checked="" type="checkbox"/>	Optimization Report - Idle Virtual   Idle VMs Report.	t - Virtual Macs Virtual Machines ...	Virtual Machine	0	0	6/16/23 10 -		admin
<input checked="" type="checkbox"/>	Optimization Report - Idle Virtual   Idle VMs Report.	Virtual Machine This report provid...	Virtual Machine	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Virtual Machine Cost Report	Report that contai...	Virtual Machine	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Virtual Machines with service disco	List of VM's on wh...	Virtual Machine	0	0	6/16/23 10 -		admin
<input type="checkbox"/>	Virtual Machines with successful s	List of VM's from ...	Virtual Machine	0	0	6/16/23 10 -		admin

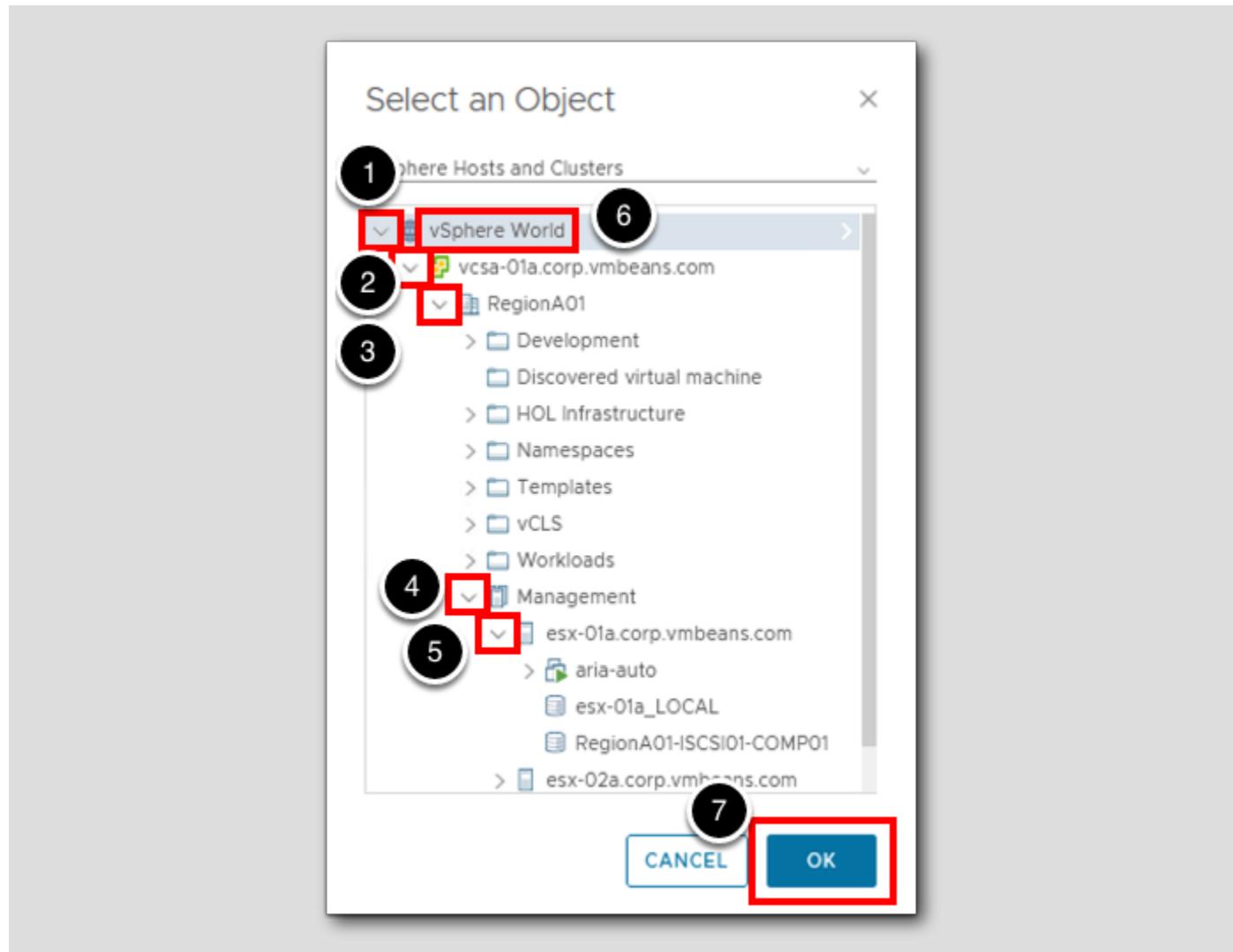
1 - 12 of 12 items

1. Click on the vertical 3 dots next to the Optimization Report - Undersized Virtual Machines.

2. Select Run.

## Select an Object

In the Select an Object window, you need to select what Object level you want your report to pull information from. By default, vSphere World is displayed unexpanded. If you expand vSphere World out you have the ability to choose a subordinate Object like a (in descending order) vCenter, Datacenter, Folder, Cluster, Host, VM or Datastore. For this lesson we will choose the top level, vSphere World.



Steps 1-5 are expanding the Object list to show the hierarchy of Objects. If you are familiar with the hierarchy, skip to step 6.

1. Expand vSphere World.
2. Expand the vCenter, vcsa-01a.corp.vmbeans.com.
3. Expand the Datacenter, RegionA01.
4. Expand the Cluster, Management.
5. Expand the Host, esx-01a.corp.vmbeans.com.
6. Click vSphere World.
7. Click OK.

## The report ran, where did it go?

You are now returned to the Manage page and there is a subtle message next to the report that says running... and will disappear when the report is finished running. Many will expect the report to open by default and wonder what is happening. To see the report you just ran it is needed to switch to the Generated Reports tab.

A screenshot of the vSphere Web Client interface. On the left, a sidebar titled 'Reports' contains three items: 'Manage' (with a circled '1' above it), 'Generated Reports' (which is highlighted with a red box and has a circled '1' to its right), and '+ Create'. To the right is a main panel titled 'Generated Reports' containing a table with one row. The table has columns for 'Completion Date/T' and 'Report Name'. The first row shows 'a minute ago' and 'Optimization Report - Undersiz...'. At the bottom of the table is a 'View' button. The entire interface is set against a light grey background.

1. Click on the Generated Reports tab.

## Open the PDF

A screenshot of the 'Generated Reports' table from the previous screen. The second column, 'Report Name', contains a small PDF icon with a red box drawn around it. A circled '1' is placed over the top right corner of the red box. The rest of the table and interface are identical to the previous screenshot.

1. Click on the red PDF icon.

## Report Data

Optimization Report - Undersized Virtual Machines

### 1. Undersized Virtual Machines

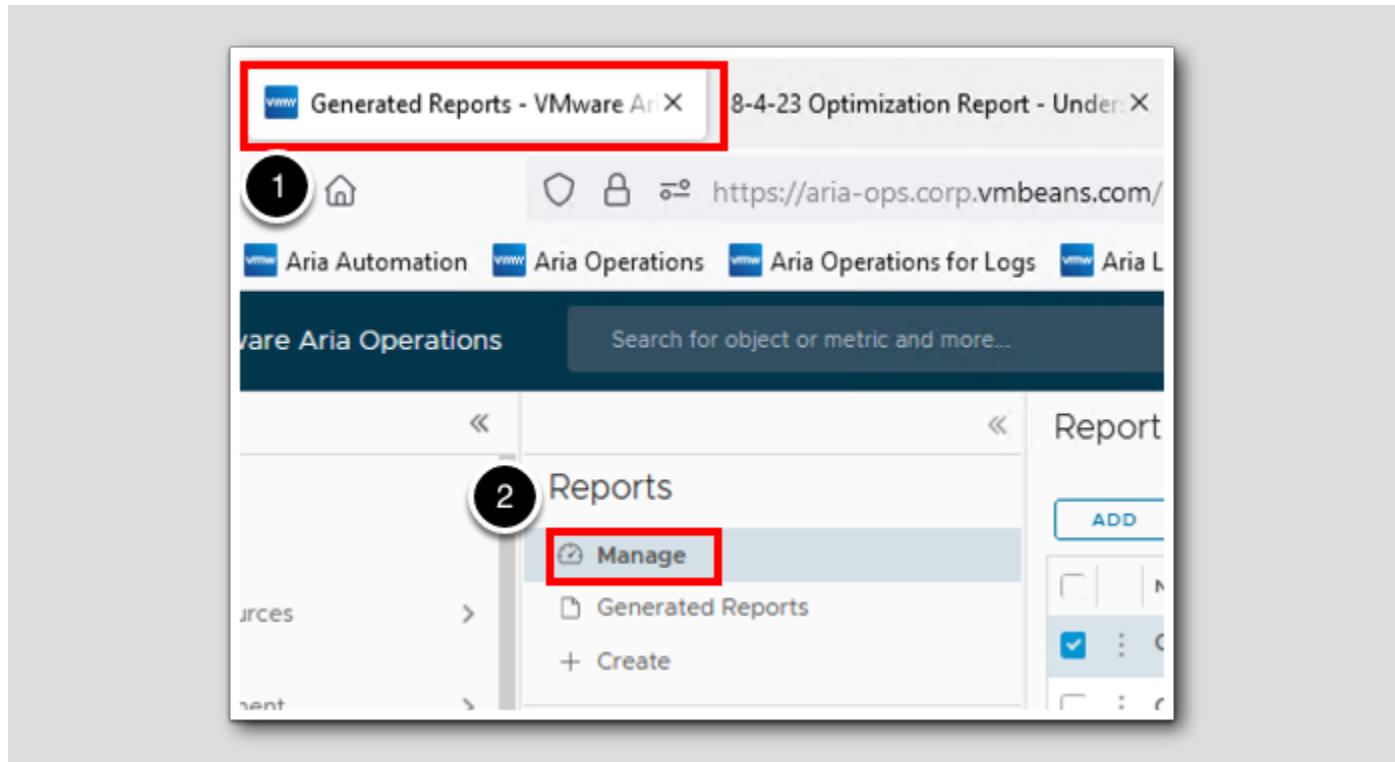
List of the virtual machines which are marked undersized. In order to ensure stability and performance, increase or investigate the high utilization of resources.

Jun 05, 2023 11:02 AM - Aug 04, 2023 11:02 AM (GMT+00:00)

Name	Configured vCPU	Recommended vCPU(s) to Add	Configured Memory (GB)	Recommended Memory to Add
aria-auto	12	0	48 GB	2 GB
Total	12	0	48 GB	2 GB

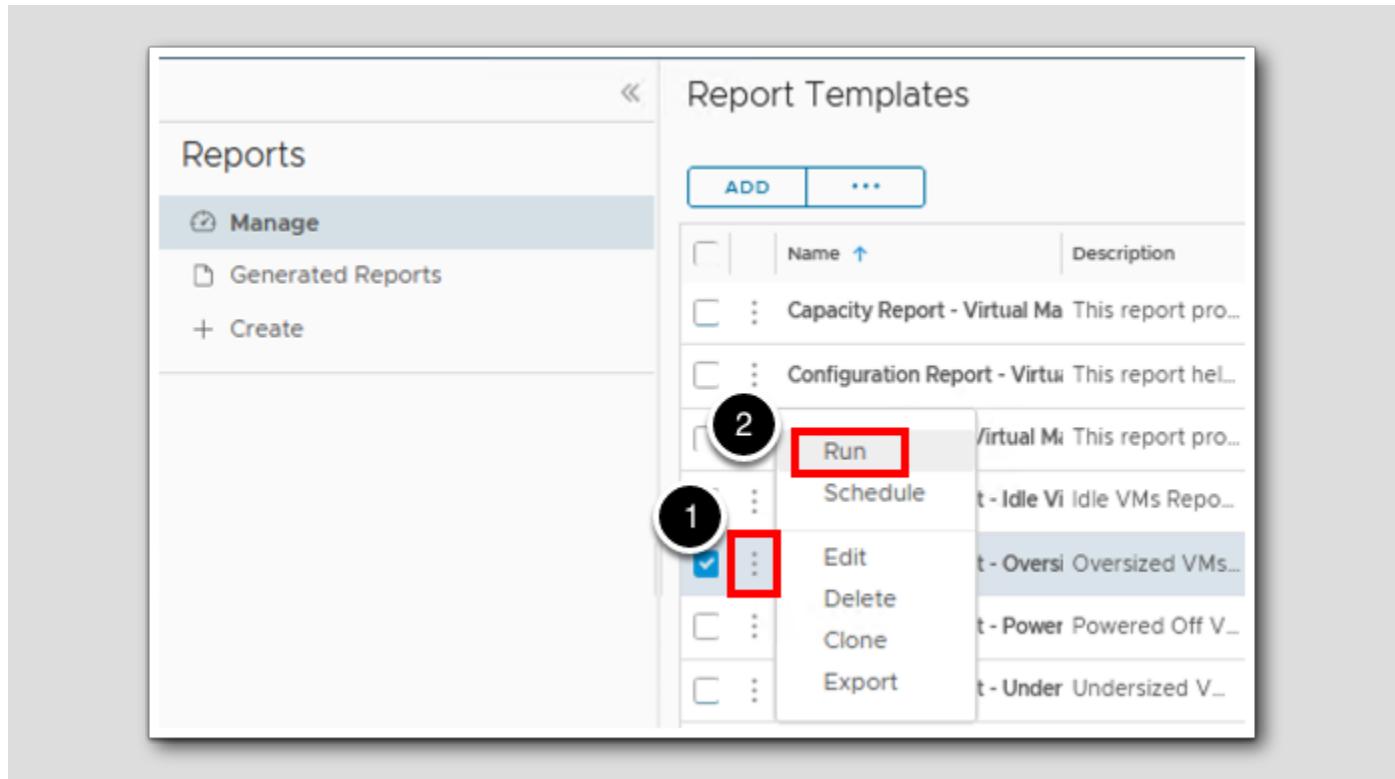
The PDF should open in its own tab, let's take a look at the data. You will need to scroll down past the cover page. We only have one VM that made the Undersized report, *aria-auto*. It is configured with 12 virtual CPUs, the report is suggesting we don't need to add any vCPUs so this means this VM is not CPU constrained. However, this VM has 48GB of virtual RAM and the report is suggesting that it gets another 2GB added to it. This indicates that this VM is Memory constrained.

Now lets look at Oversized VMs



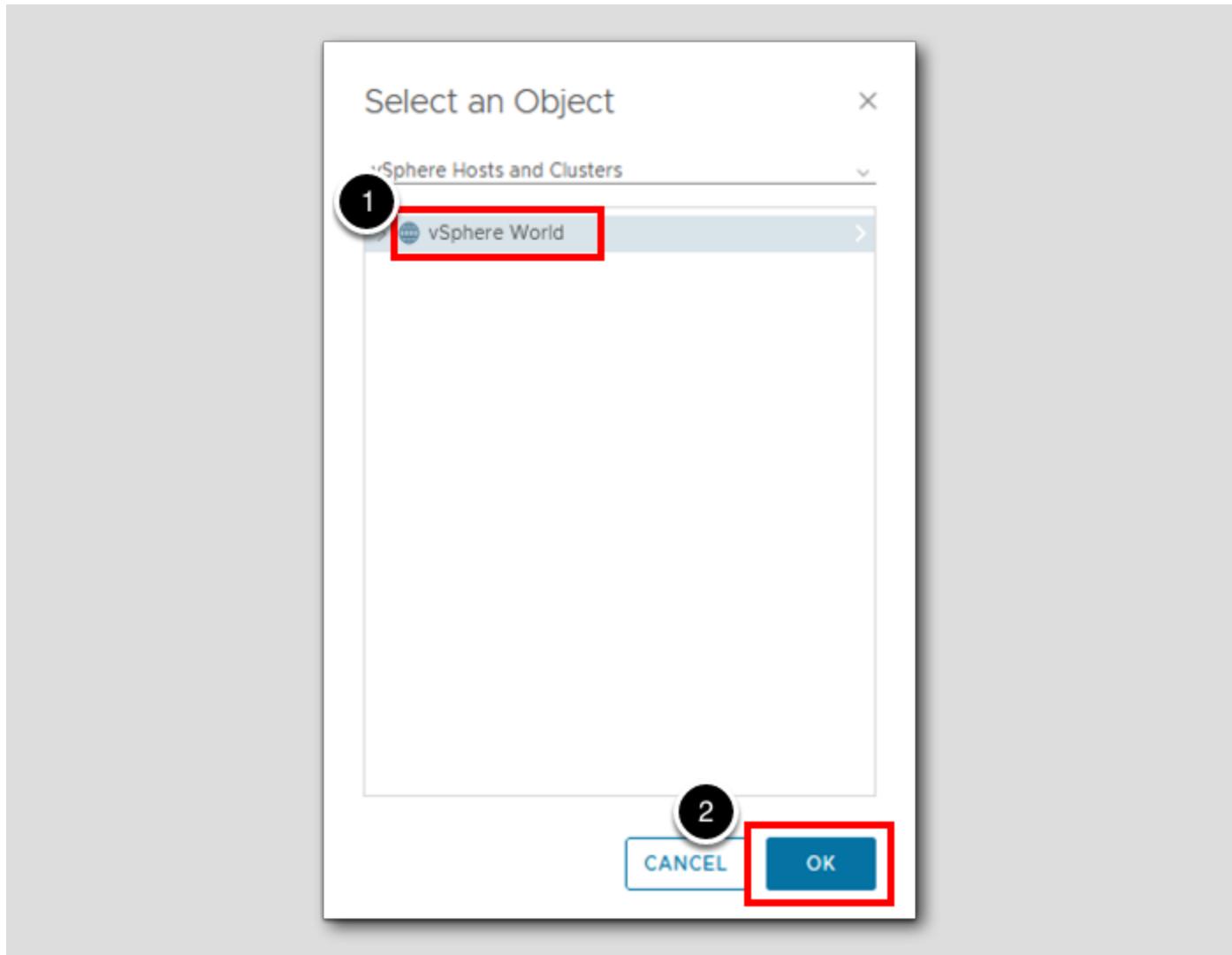
1. Click back into the Aria Operations browser tab.
2. Click on **Manage**.

## Run the Oversized report



1. Click on the vertical 3 dots next to the Optimization Report - Oversized Virtual Machines.
2. Select Run.

## Select vSphere World



1. Select vSphere World.
2. Click OK.

## Go to Generated Reports

	Completion Date	Report Name	Subject	Owner	Executed for	Status	ACTIONS
<input type="checkbox"/>	5 seconds ago	Optimization Report - Ov...	Virtual Ma...	holadmin@...	vSphere W...	Completed	
<input checked="" type="checkbox"/>	23 minutes ago	Optimization Report - Un...	Virtual Ma...	holadmin@...	vSphere W...	Completed	

1. Click on the Generated Reports tab.

## Open the Oversized PDF report

In the Generated Reports tab, our first report may be highlighted by default. Please ensure to open the Oversized Report that was just run. You can see this by looking at the Completion Date/Time column.

	Completion Date	Report Name	Subject	Owner	Executed for	Status	ACTIONS
<input type="checkbox"/>	5 seconds ago	Optimization Report - Ov...	Virtual Ma...	holadmin@...	vSphere W...	Completed	
<input checked="" type="checkbox"/>	23 minutes ago	Optimization Report - Un...	Virtual Ma...	holadmin@...	vSphere W...	Completed	

1. Click on the red PDF icon for the report we just ran.

## Many more VMs in this report

We should now have both the Undersized and Oversized reports open in two different tabs. Lets dive into this data starting out with, why is aria-auto in both reports. You will need to scroll down past the cover page again.

**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.

Jun 05, 2023 11:25 AM - Aug 04, 2023 11:25 AM (GMT-07:00)

Name	Configured vCPU	Reclaimable vCPU(s)	Configured Memory	Reclaimable Memory
aria-auto	12	6	48 GB	0 GB
aria-ops-logs	4	2	8 GB	0 GB
identity-manager	6	2	10 GB	2 GB
aria-auto-config	4	2	12 GB	6 GB
SupervisorControlPlane VM (3)	2	0	8 GB	3 GB
SupervisorControlPlane VM (1)	2	0	8 GB	3 GB
dev-project-worker-llbmm-5b97766579-572gg	2	0	4 GB	2 GB
dev-project-rz5gx-4tgb2	2	0	4 GB	2 GB

A VM that is in both undersized and oversized report

[200]

Below are isolated screenshots of the aria-auto VM showing up in both reports. This highlights that a VM can be oversized in either vCPU or vMemory yet be undersized in its other resource of vMemory or vCPU. Below shows that aria-auto is oversized with vCPUs by 6 vCPUs and at the same time undersized with the amount of vMemory by 2GB.

**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.  
Jun 05, 2023 11:25 AM - Aug 04, 2023 11:25 AM (GMT-07:00)

Name	Configured vCPU	Reclaimable vCPU(s)	Configured Memory	Reclaimable Memory	Parent vCenter
aria-auto	12	6	48 GB	0 GB	vcsa-01a.corp.vmbeans.com

**1. Undersized Virtual Machines**  
List of the virtual machines which are marked undersized. In order to ensure stability and performance, increase or investigate the high utilization of resources.  
Jun 05, 2023 11:02 AM - Aug 04, 2023 11:02 AM (GMT-07:00)

Name	Configured vCPU	Recommended vCPU(s) to Add	Configured Memory (GB)	Recommended Memory to Add	Parent vCenter
aria-auto	12	0	48 GB	2 GB	vcsa-01a.corp.vmbeans.com
Total	12	0	48 GB	2 GB	-

Data in the moment vs your knowledge of your infrastructure.

[201]

Looking at the remaining data in this report we can see that there are places that we can reclaim vCPUs on some VMs and reclaim vMemory on others and even some VMs that we can reclaim both vCPUs and vMemory. Aria Operations will report on the historical performance of each VM underneath the chosen object (vSphere World in this case) however it cannot bring knowledge of the business to bare. For example, your company has a finance VM that runs numbers, and is stressed, once a quarter. There is a high chance that the Oversized Report will flag this VM for reclamation due to it being idle for most of the quarter. This is an example where knowledge of your environment combined with data from Aria Operations will be critical to dial in capacity efficiency.

The screenshot shows a web browser window with three tabs open:

- Generated Reports - VMware Aria
- 8-4-23 Optimization Report - Oversized (selected)
- 8-4-23 Optimization Report - Underutilized

The main content area displays the '8-4-23 Optimization Report - Oversized' report. The URL in the address bar is `file:///C:/Users/Administrator/Downloads/8-4-23 Optimization Report - Oversized`. The report title is '1. Oversized Virtual Machines'. It includes a timestamp: 'Jun 05, 2023 11:25 AM - Aug 04, 2023 11:25 AM (GMT-07:00)'. Below the title is a table listing eight virtual machines with their configuration details:

Name	Configured vCPU	Reclaimable vCPU(s)	Configured Memory	Reclaimable Memory
aria-auto	12	6	48 GB	0 GB
aria-ops-logs	4	2	8 GB	0 GB
identity-manager	6	2	10 GB	2 GB
aria-auto-config	4	2	12 GB	6 GB
SupervisorControlPlane VM (3)	2	0	8 GB	3 GB
SupervisorControlPlane VM (1)	2	0	8 GB	3 GB
dev-project-worker-llbmm-5b97766579-572gg	2	0	4 GB	2 GB
dev-project-rz5gx-4tgb2	2	0	4 GB	2 GB

Lesson End

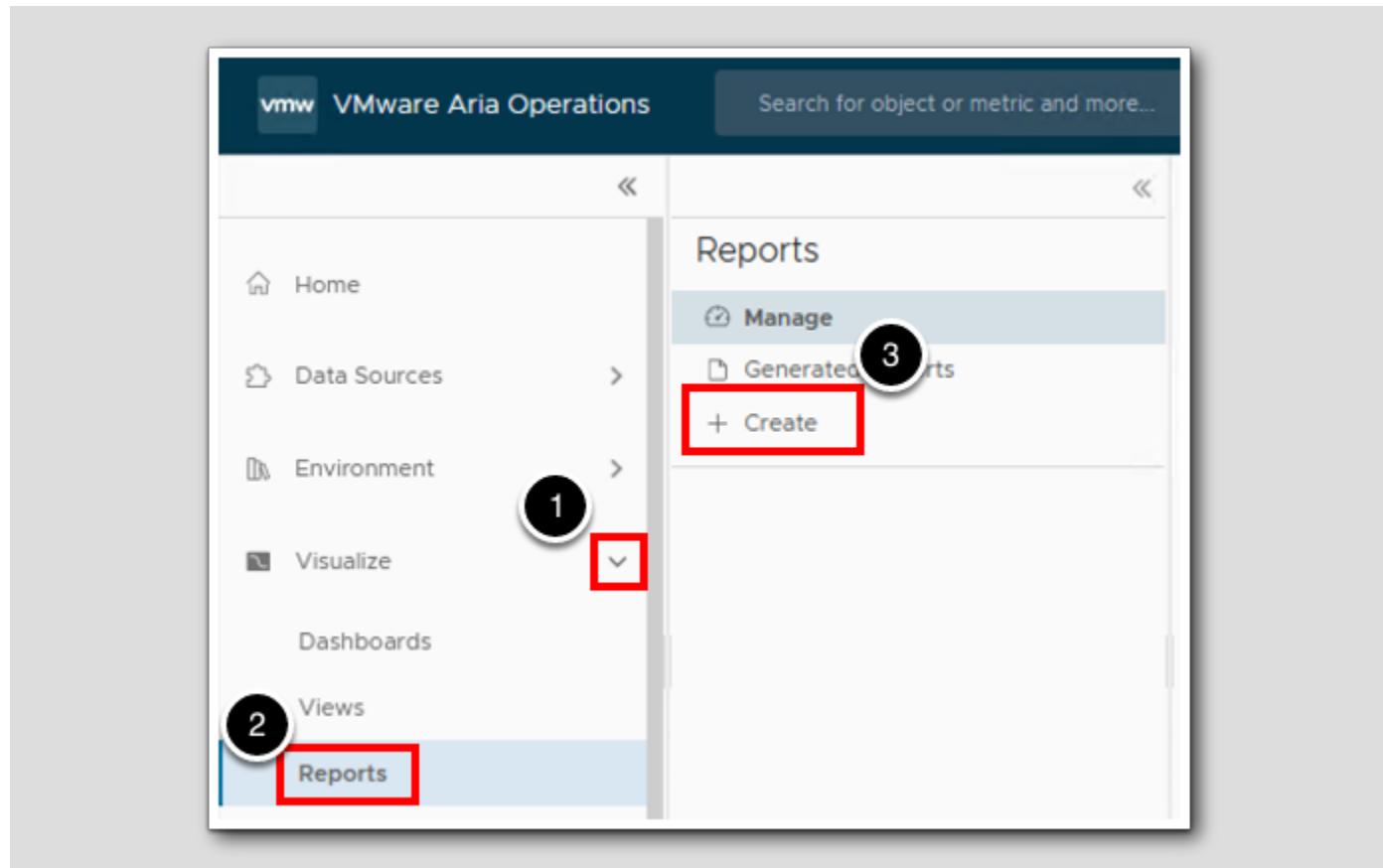
[202]

This lesson highlighted how to run and view reports and how to analyze the data Aria Operations provides.

## Creating Custom Reports

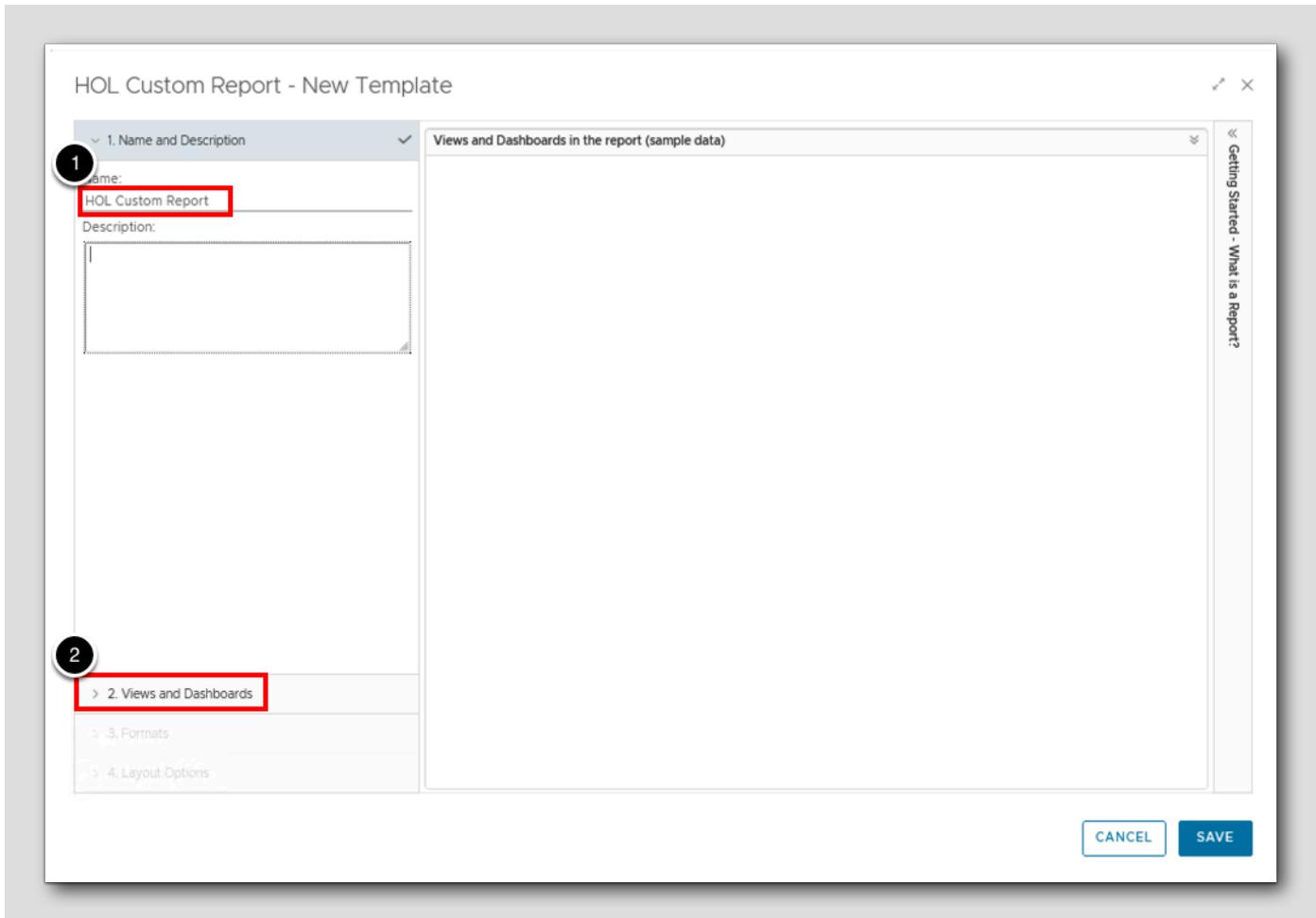
In this lesson we will create a custom report and show how to setup the Standard Email Plugin so we can distribute the report

### Open Reports



1. Expand Visualize.
2. Click Reports.
3. Click + Create.

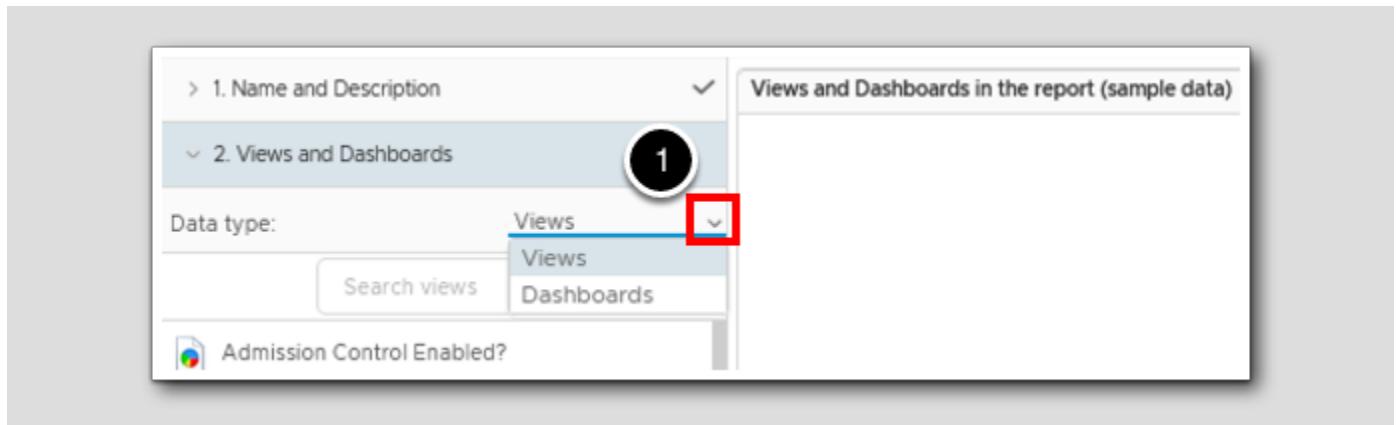
## Name the Report



1. In the Name: field type HOL Custom Report.
2. Click 2. Views and Dashboards.

## Data type

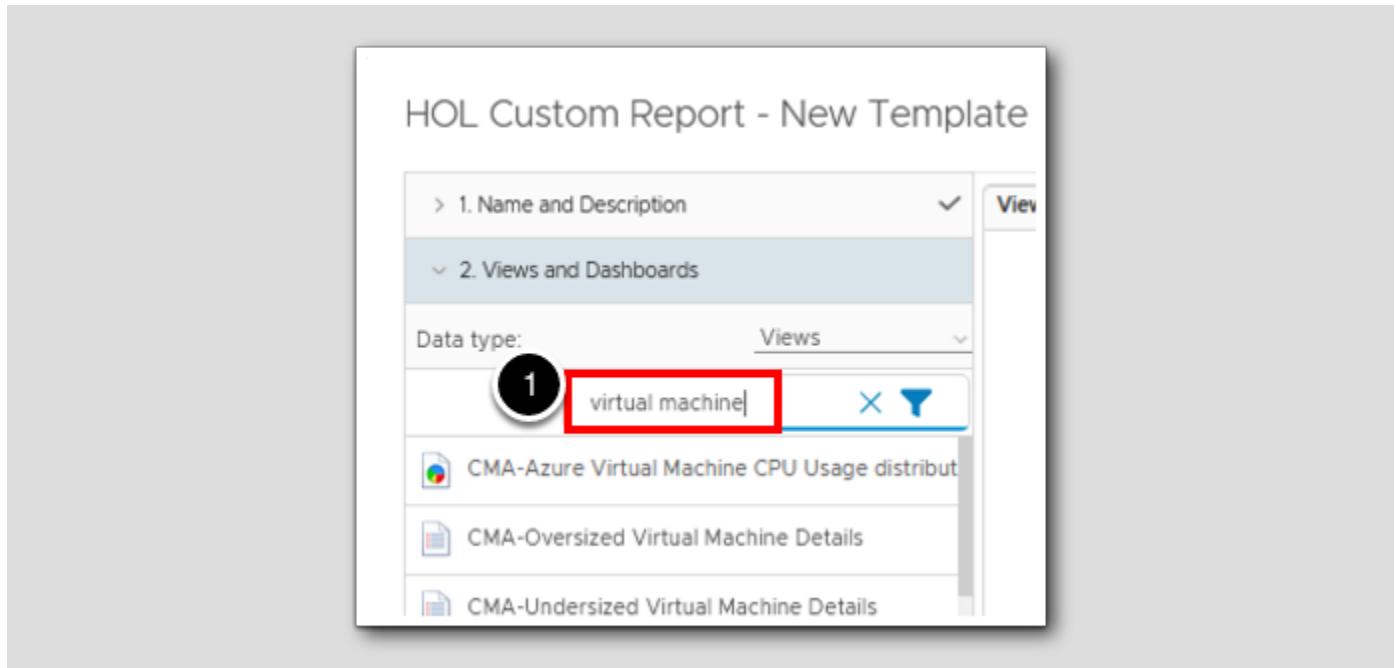
In the 2. Views and Dashboards tab you can choose a Data type of either Views or Dashboards to build out your custom report.



1. Click on the > for the Data type: field. Notice this is where you can select to build a report with Views or with Dashboards. For this lesson we will use Views.

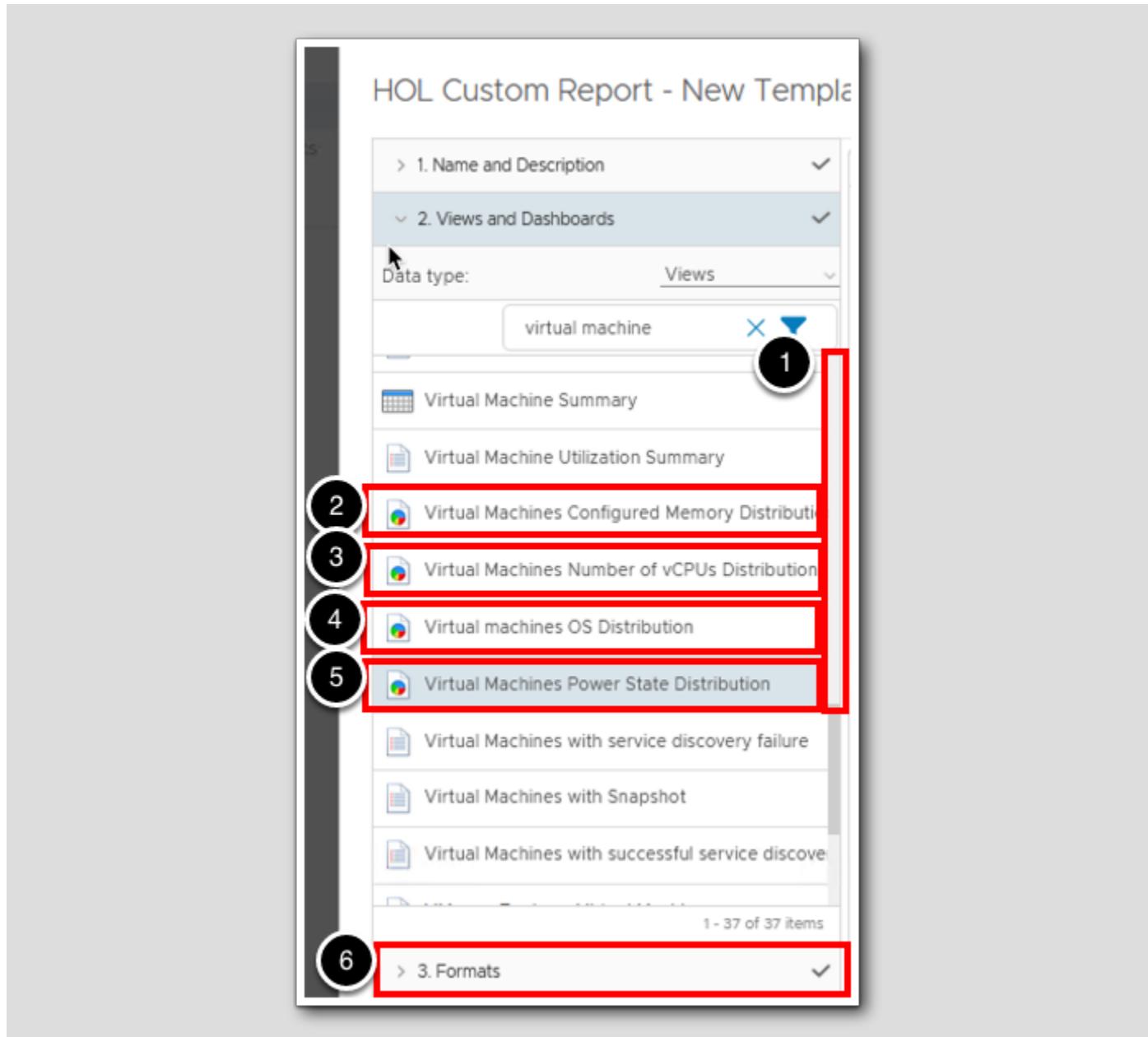
## Filter for Virtual Machines

[207]



1. Click into the filter search bar, type virtual machine and hit Enter.

## Distribution Pie Graphs

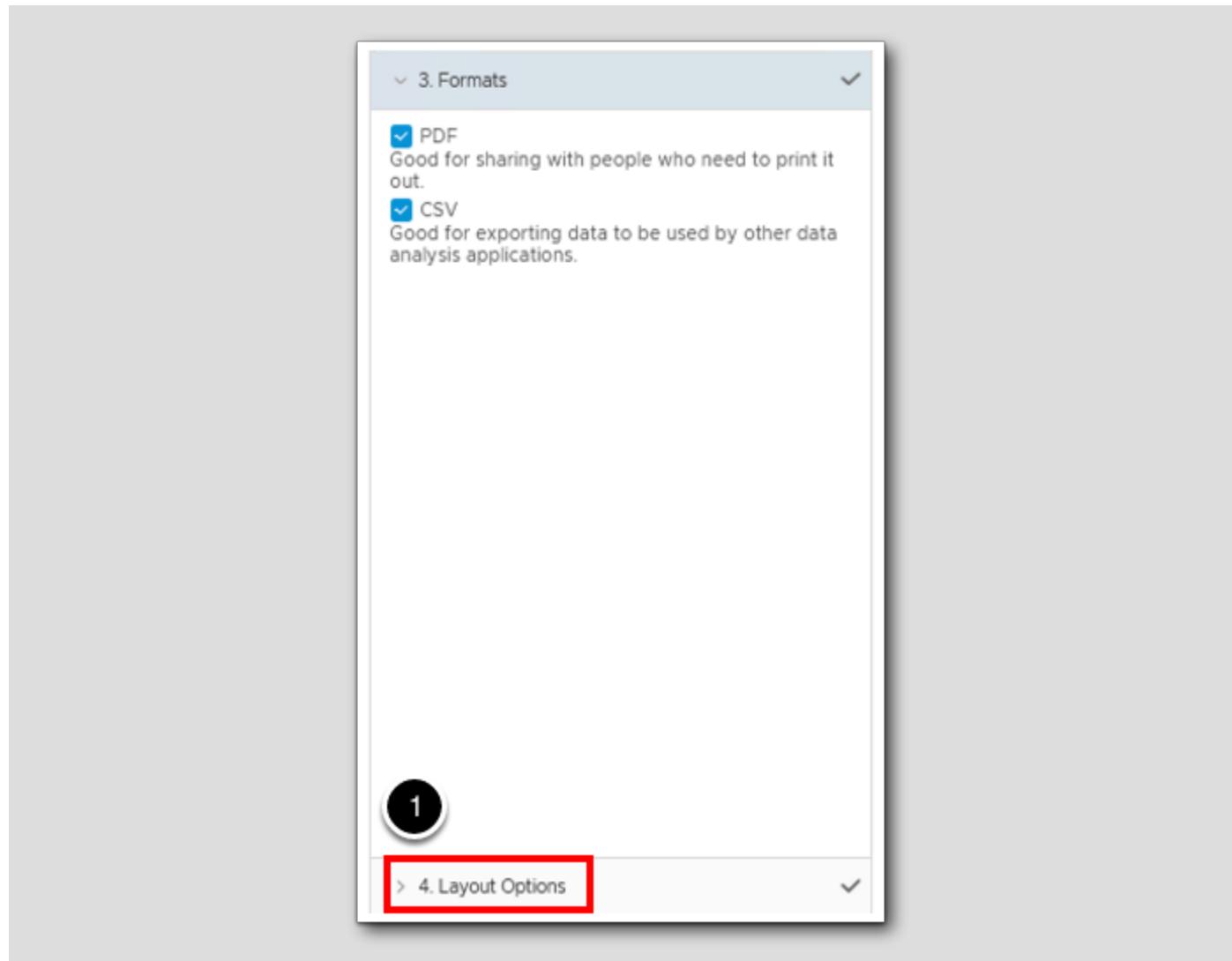


1. Scroll down until you see the 4 Distribution pie graph views shown above.
2. Double click on **Virtual Machines Configured Memory Distribution**.
3. Double click on **Virtual Machines Number of vCPUs Distribution**.
4. Double click on **Virtual Machines OS Distribution**.
5. Double click on **Virtual Machines Power State Distribution**.
6. Click on **3. Formats**.

## Formats

[209]

In the **3. Formats** tab you have the ability to chose which export formats you would like to have for the customer reports. The choices are PDF and/or CSV. For this lesson we will leave both selected.

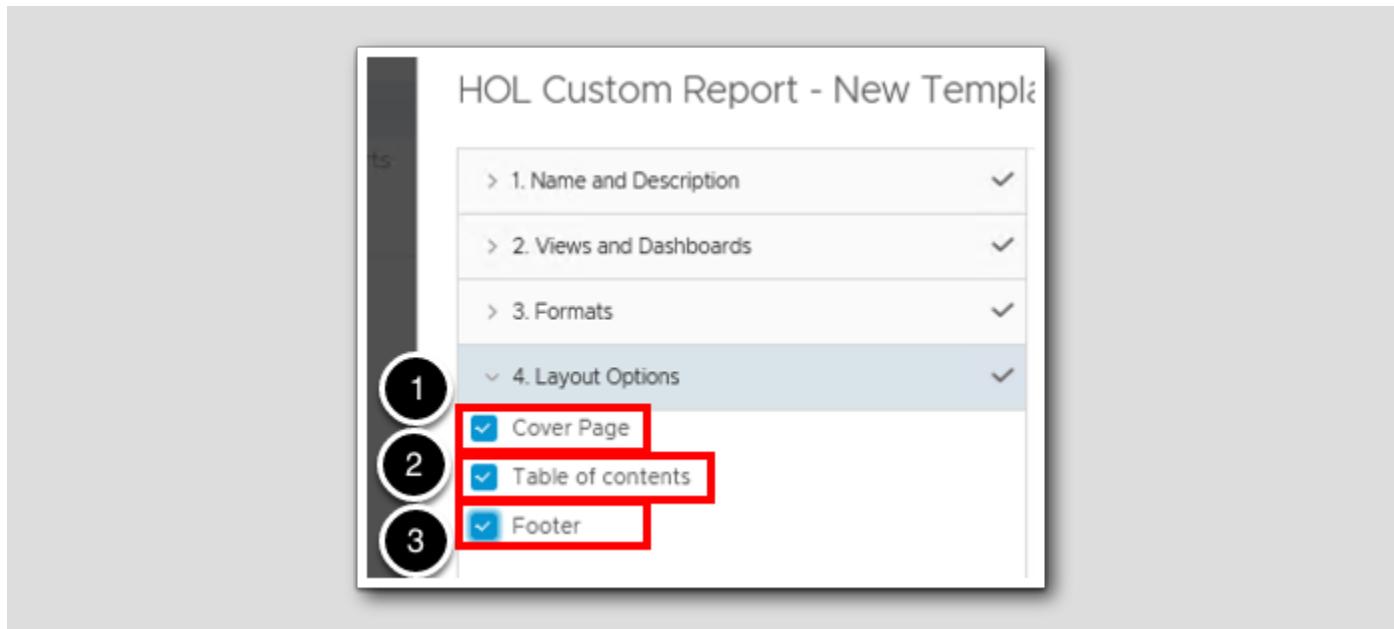


1. Select 4. Layout Options.

## Layout Options

[210]

In the 4. Layout Options you have the ability to add a Cover Page with the option to upload an image, a Table of contents and a Footer.



1. Click on the box for Cover Page.
2. Click on the box for Table of contents.
3. Click on the box for Footer.

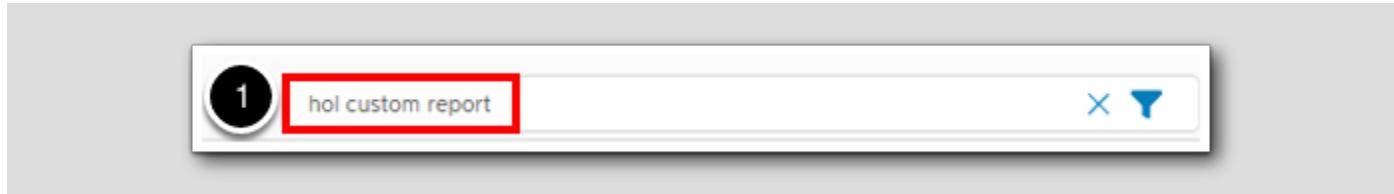
Save the Report

[211]



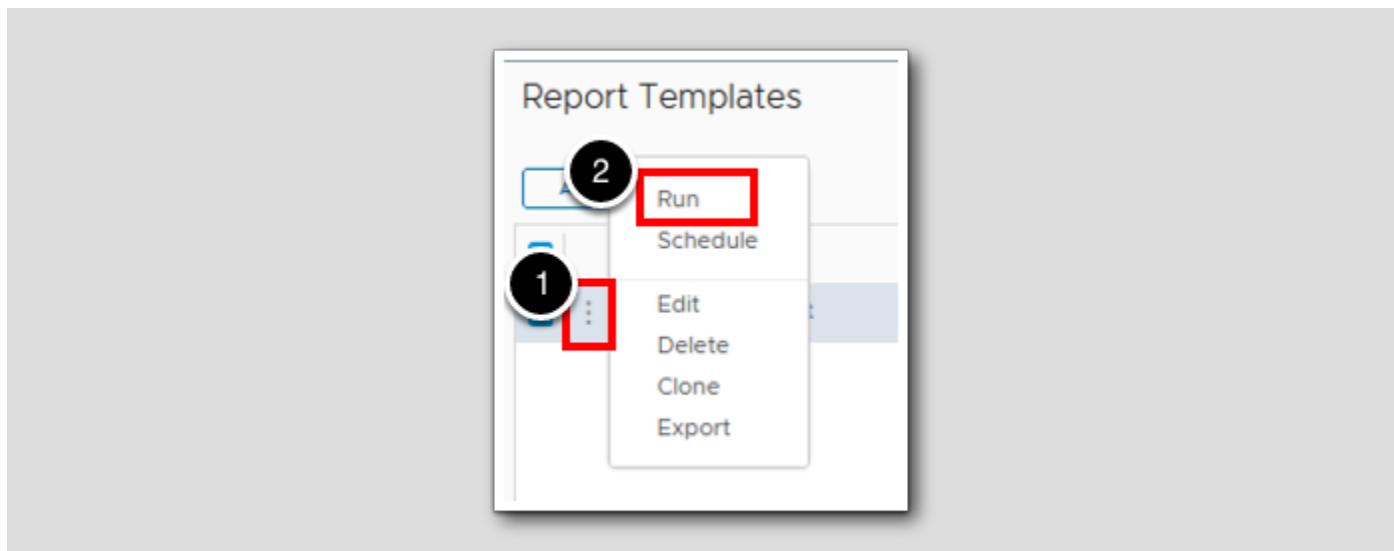
1. Click SAVE.

Lets take a look at what we just built



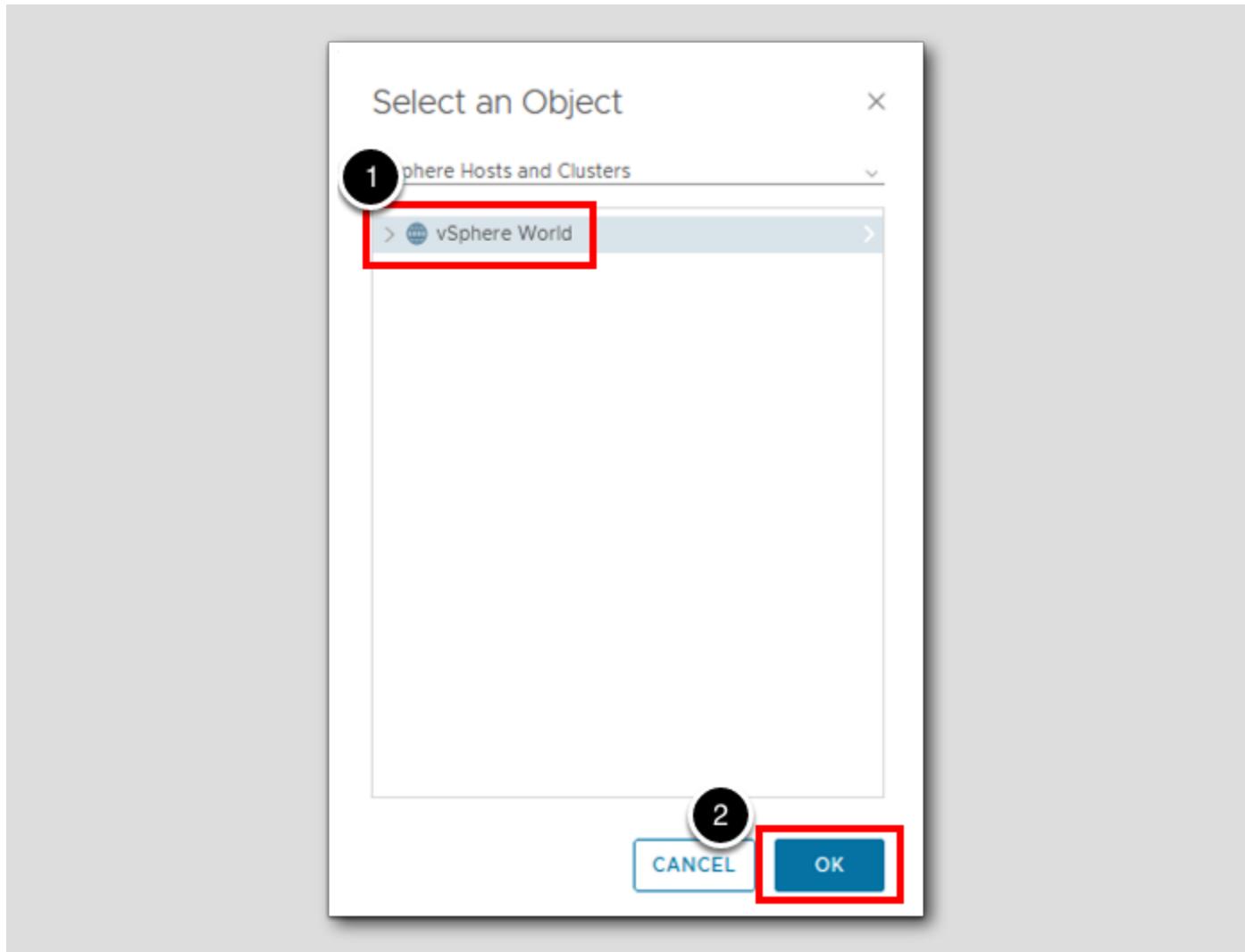
1. In the top right search bar type hol custom report and hit Enter.

Run the Report



1. Click the 3 vertical dots next to the HOL Custom Report name.
2. Click Run.

## Select an Object

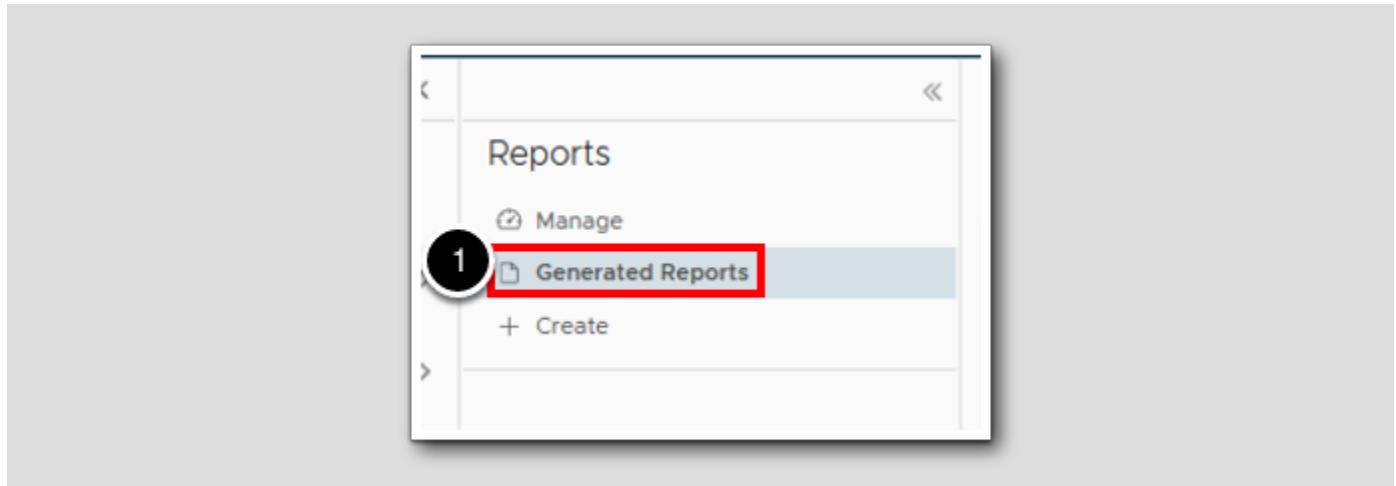


1. Click on vSphere World.

2. Click on OK.

## Generated Reports

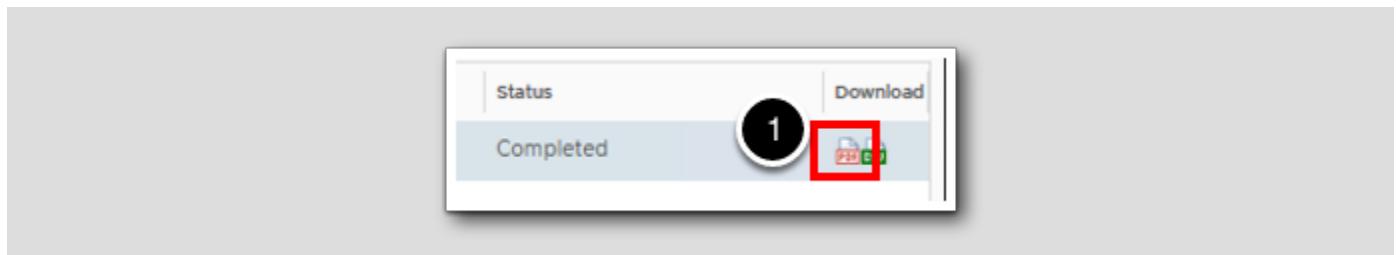
This report may take longer to run than the Undersized and Oversized reports.



1. Click on Generated Reports.

PDF

[216]

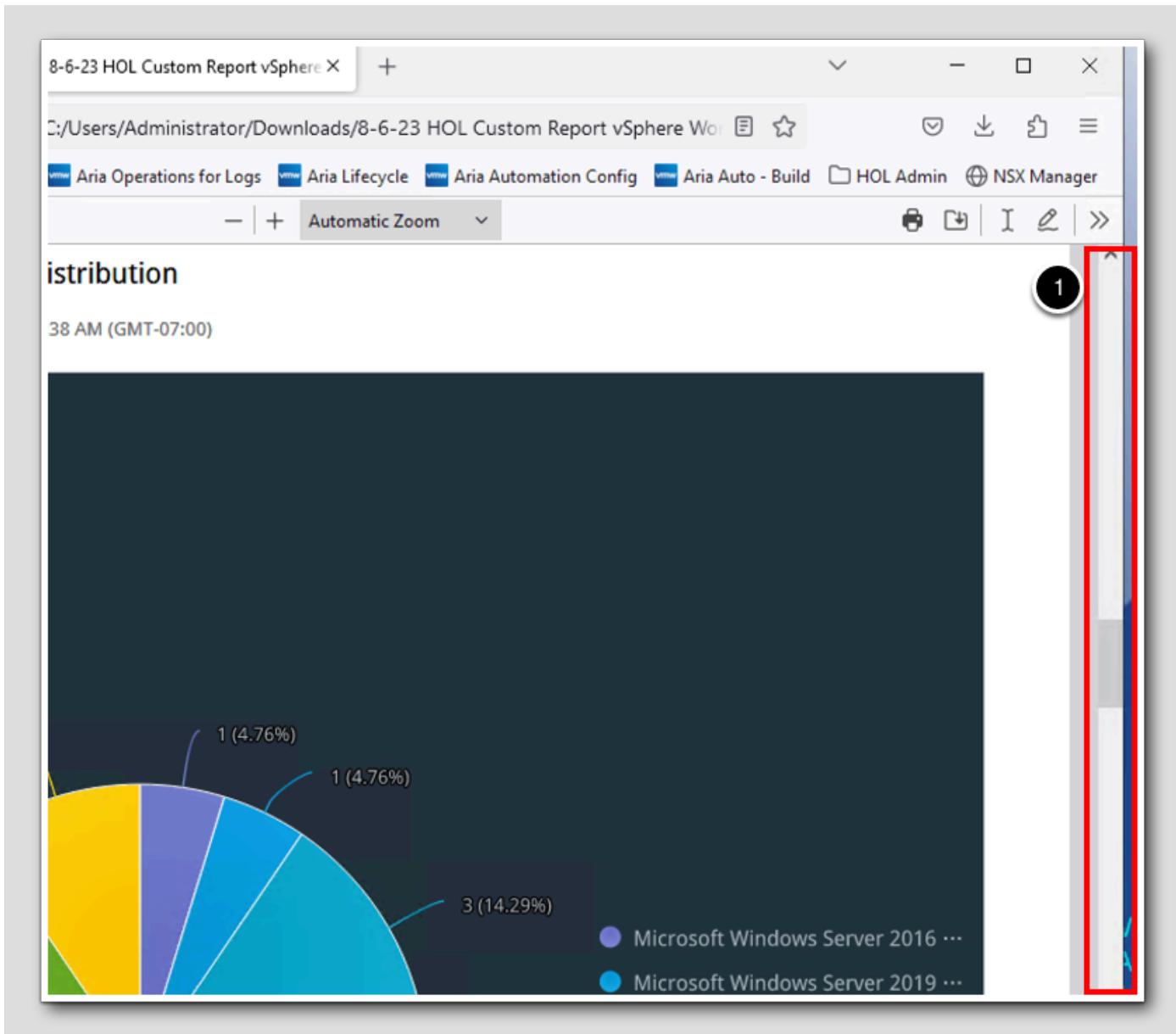


1. Click on the red PDF icon to open the report in a new browser tab.

That was easy

[217]

As you can see it is very easy to create a custom report in Aria Operations with the help of using Views and Dashboards. With just a few clicks, we've created a virtual machine distribution report for OS, Memory, vCPUs and Power State.



1. Scroll down on the right side of the new browser tab that opened by default to review the report results.

Notice that the Cover Page, Table of contents and that each page has a Footer.

## Configure SMTP Outbound

To have the ability to email reports out we need to setup a Standard Email Plugin.

The screenshot shows the VMware Aria Operations web interface. The browser title bar is labeled "Alerts - VMware Aria Operations X". The URL in the address bar is "https://aria-ops.corp.vnw". The navigation bar includes links for vCenter, Aria Automation, Aria Operations, Aria Operations for Logs, and other services. The main header says "VMware Aria Operations" and has a search bar. The left sidebar lists Home, Data Sources, Environment, Visualize, Troubleshoot, Optimize, Plan, Configure, Policies (which is highlighted with a red box), and Alerts. The right panel is titled "Alerts" and contains two sections: "Alert Definitions" and "Outbound Settings". The "Outbound Settings" section is also highlighted with a red box. Numbered callouts point to various elements: 1 points to the browser title bar; 2 points to the "Configure" link in the sidebar; 3 points to the "Policies" link in the sidebar; and 4 points to the "Outbound Settings" section in the main panel.

1

2

3

4

1. Click on the Aria Operations browser tab.
2. Expand Configure.
3. Click on Alerts.
4. Click on Outbound Settings.

## Add an Outbound Instance

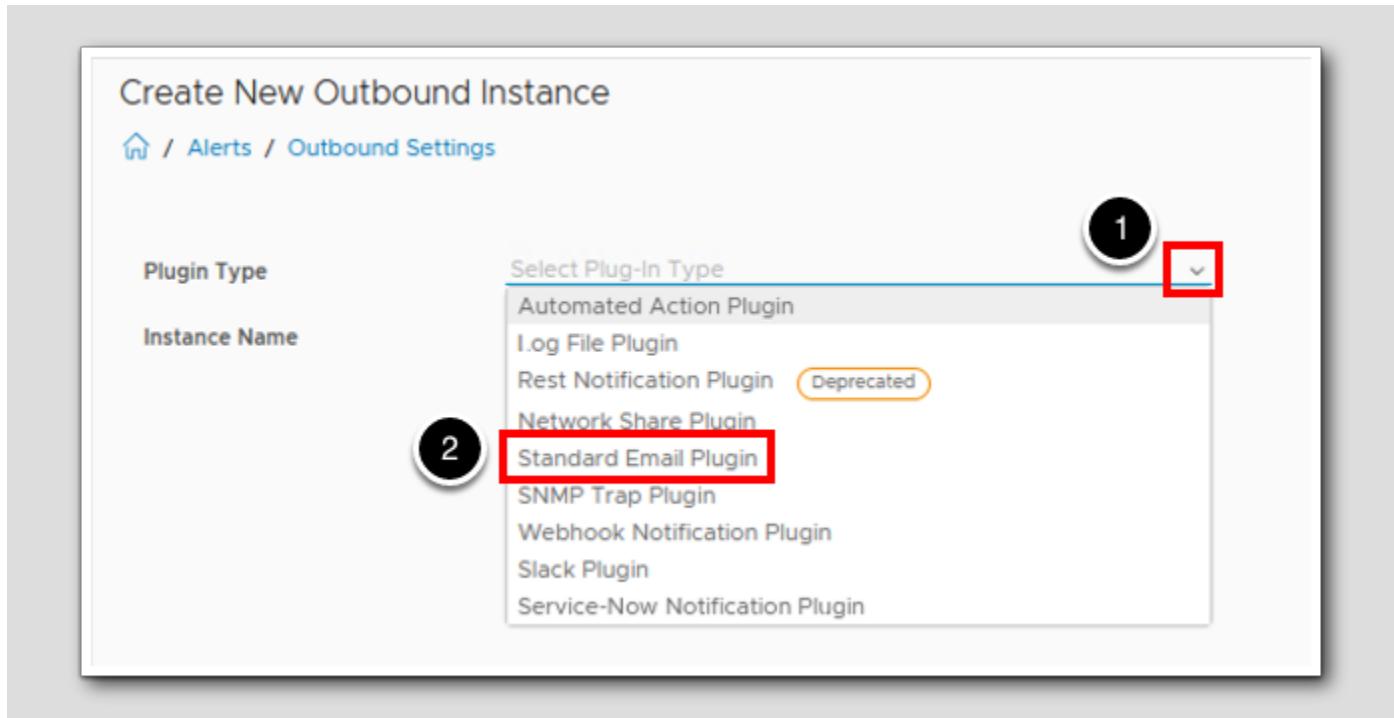
[219]

The screenshot shows the 'Outbound Settings' page in Aria Operations. At the top, there is a breadcrumb navigation: Home / Alerts / Outbound Settings. Below the breadcrumb, there are two tabs: 'Outbound Instances' (which is selected and has a black circle with the number '1' over it) and 'HTTP Proxy for Outbound Settings'. In the center, there is a table with two columns: 'Instance Name' and 'Plugin Type'. One row is visible, showing 'Automated Actions' under 'Instance Name' and 'Automated' under 'Plugin Type'. At the bottom left of the table area, there is a blue 'ADD' button, which is highlighted with a red box and also has a black circle with the number '1' over it. To the right of the 'ADD' button is a blue '...' button.

Instance Name	Plugin Type
Automated Actions	Automated

1. Click ADD.

## Standard Email Plugin



1. Expand the Plugin Type dropdown.
2. Click on Standard Email Plugin.

## SMTP Settings

These values are specific to the HOL environment. For your organization, you will need to gather your SMTP server details and requirements.

### Create New Outbound Instance

[Home](#) / [Alerts](#) / [Outbound Settings](#)

Plugin Type: Standard Email Plugin

Instance Name: **HOL Email**

Use Secure Connection:

Requires Authentication:

SMTP Host: mail.corp.vmbeans.com

SMTP Port: 25

Secure Connection Type:

Sender Email Address: administrator@corp.vmbeans.com

Sender Name: Administrator

Credential type: No Credential

Receiver Email Address: holadmin@corp.vmbeans.com

**TEST** **SAVE** **CANCEL**

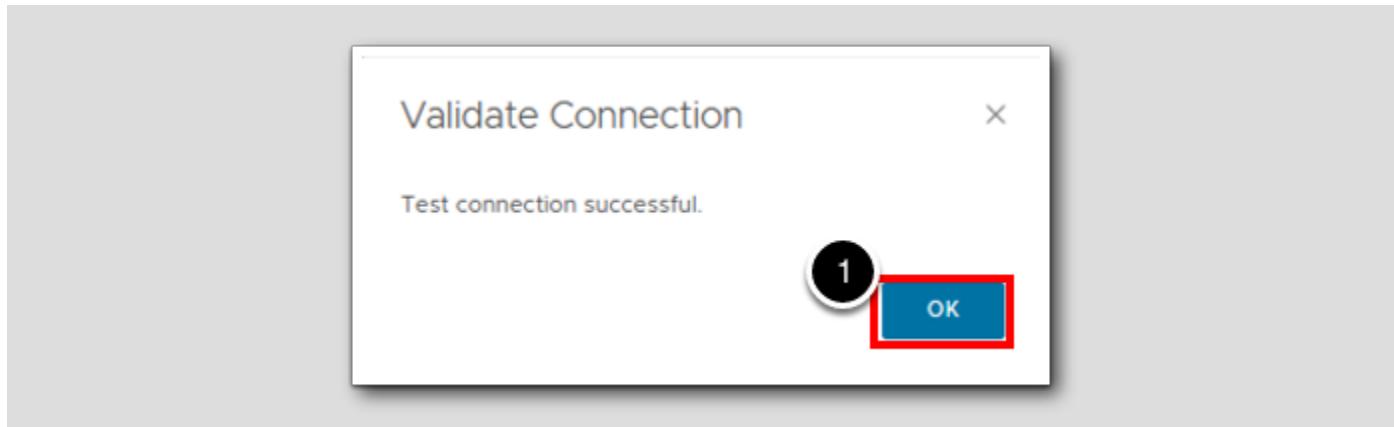
8

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).

## Validate Connection

[222]

Hopefully you see the screenshot below, if not then re-verify that the above data has been entered correctly and re=test.



1. Click OK.

Save

[223]

### Create New Outbound Instance

[Home](#) / [Alerts](#) / [Outbound Settings](#)

Plugin Type	Standard Email Plugin
Instance Name	HOL Email
Use Secure Connection	<input checked="" type="checkbox"/>
Requires Authentication	<input type="checkbox"/>
SMTP Host	mail.corp.vmbeans.com
SMTP Port	25
Secure Connection Type	
Sender Email Address	administrator@corp.vmbeans.com
Sender Name	Administrator
Credential type	No Credential
Receiver Email Address	holadmin@corp.vmbeans.com

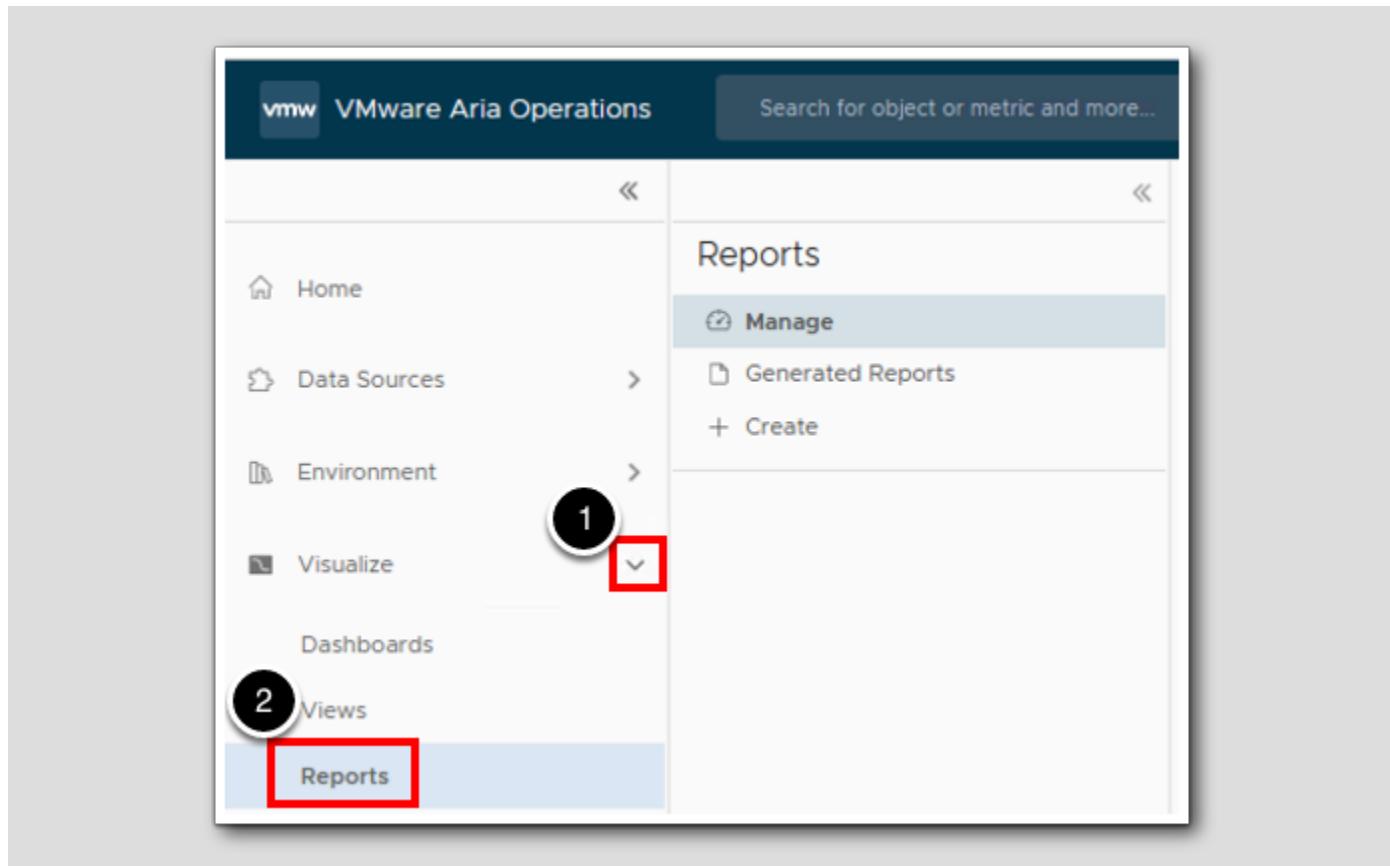
1

**TEST** **SAVE** **CANCEL**

1. Click SAVE.

Return to Reports

[224]



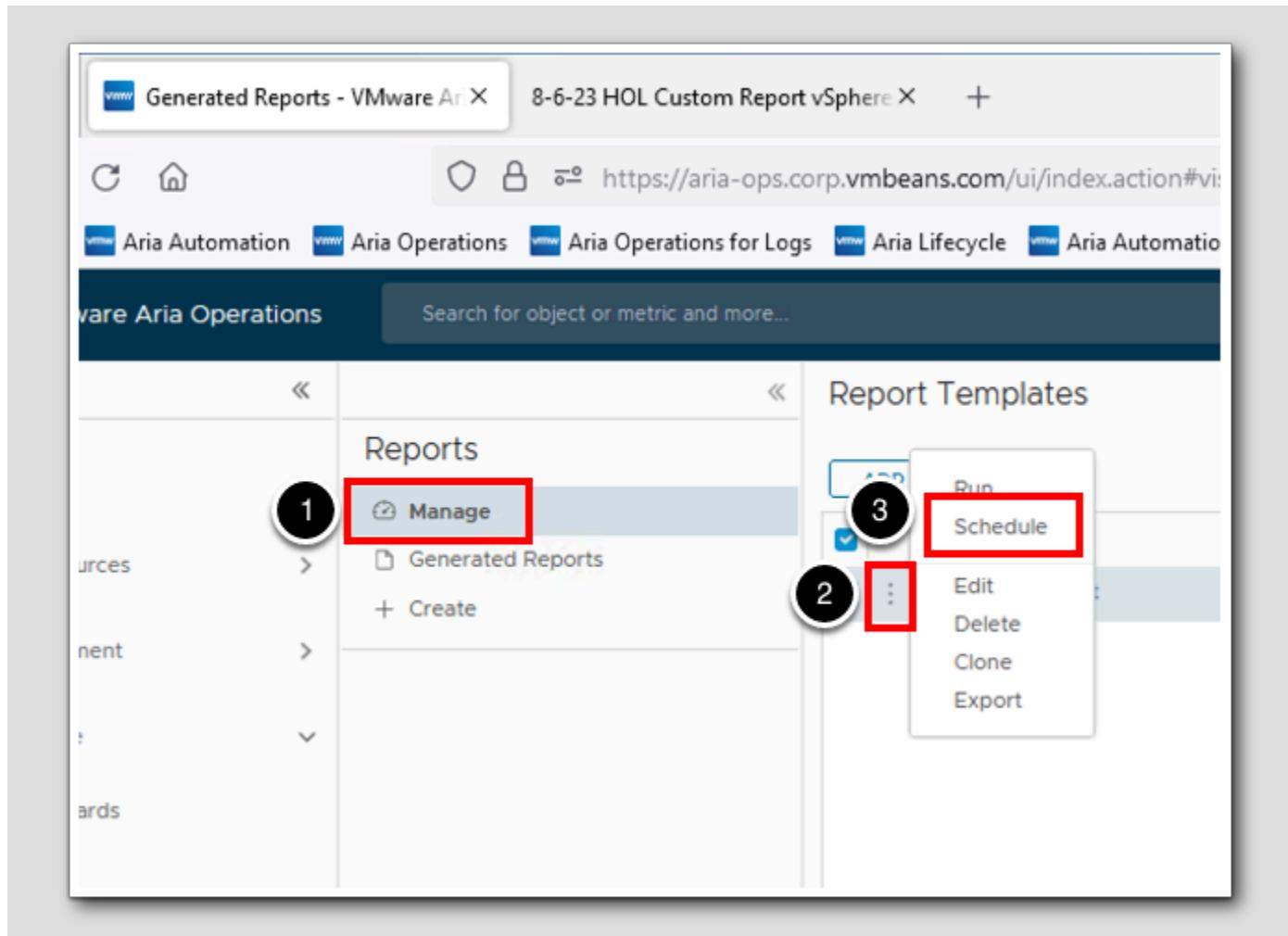
1. Expand Visualize.

2. Click on Reports.

Scheduling a Report

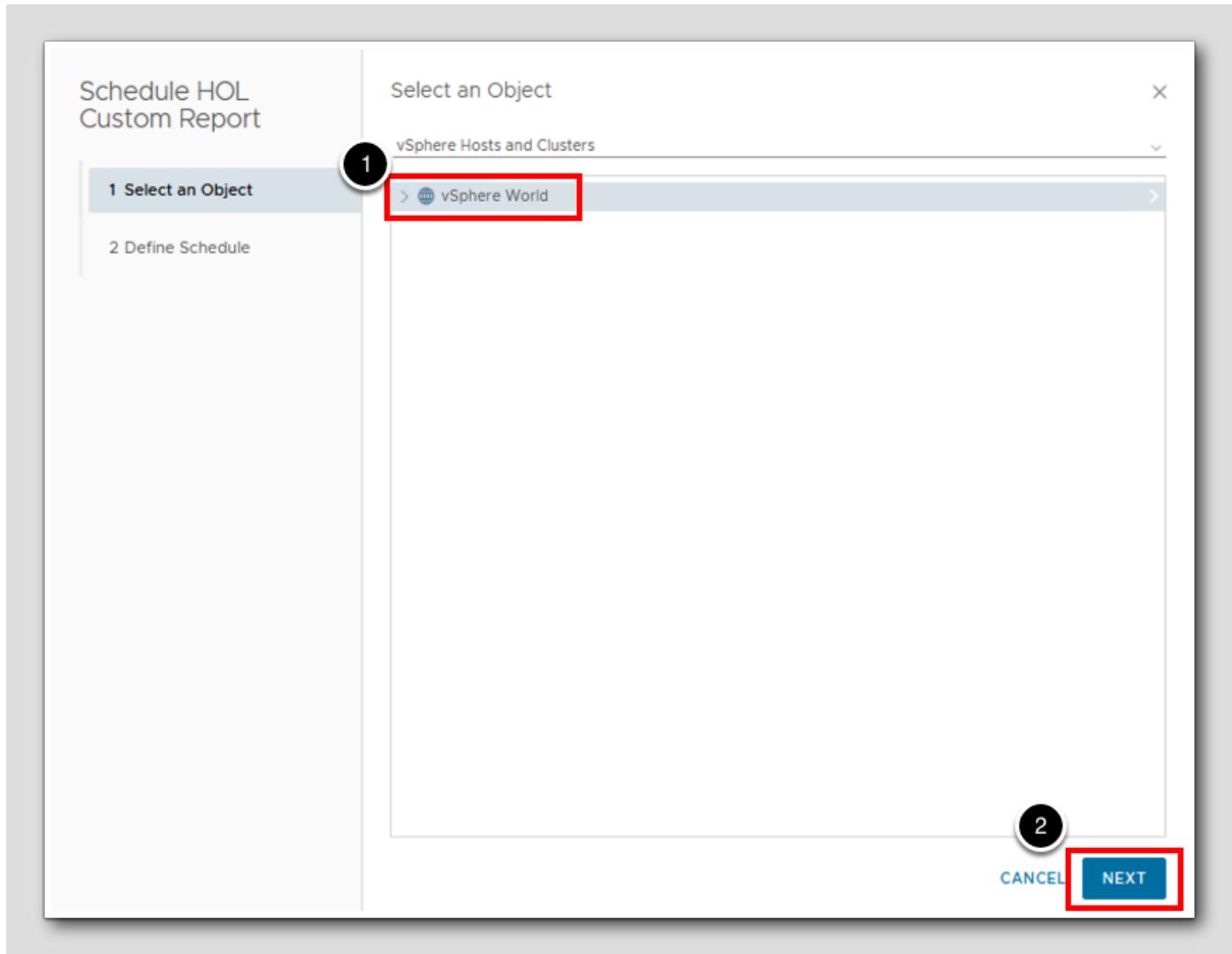
[225]

The hol custom report filter should still be active. If it is not, research for hol custom report and hit enter.



1. Click on **Manage**.
2. Click on the 3 vertical dots next to the HOL Custom Report.
3. Click on **Schedule**.

## Define the Object level



1. Click on the vSphere World object.
2. Click NEXT.

## Define Schedule

Here we can see how to schedule a report to run Daily, Weekly or Monthly. The Recurrence fields will change with what is selected in this dropdown.

Schedule HOL Custom Report

1 Select an Object

2 Define Schedule

### Define Schedule

Set the recurrence and publishing criteria for this report

**Recurrence**

Time zone: --Select--  
Start hour: 8 00 AM  
Start date: 8/7/23  
Recurrence: **Weekly**  Daily  Weekly  Monthly  
 Thursday  Friday  Tuesday  Wednesday  Saturday

**Publishing**

Email report  
Email addresses: Separate addresses with a comma or a semicolon. Cc Bcc  
Select an outbound rule: --Select--

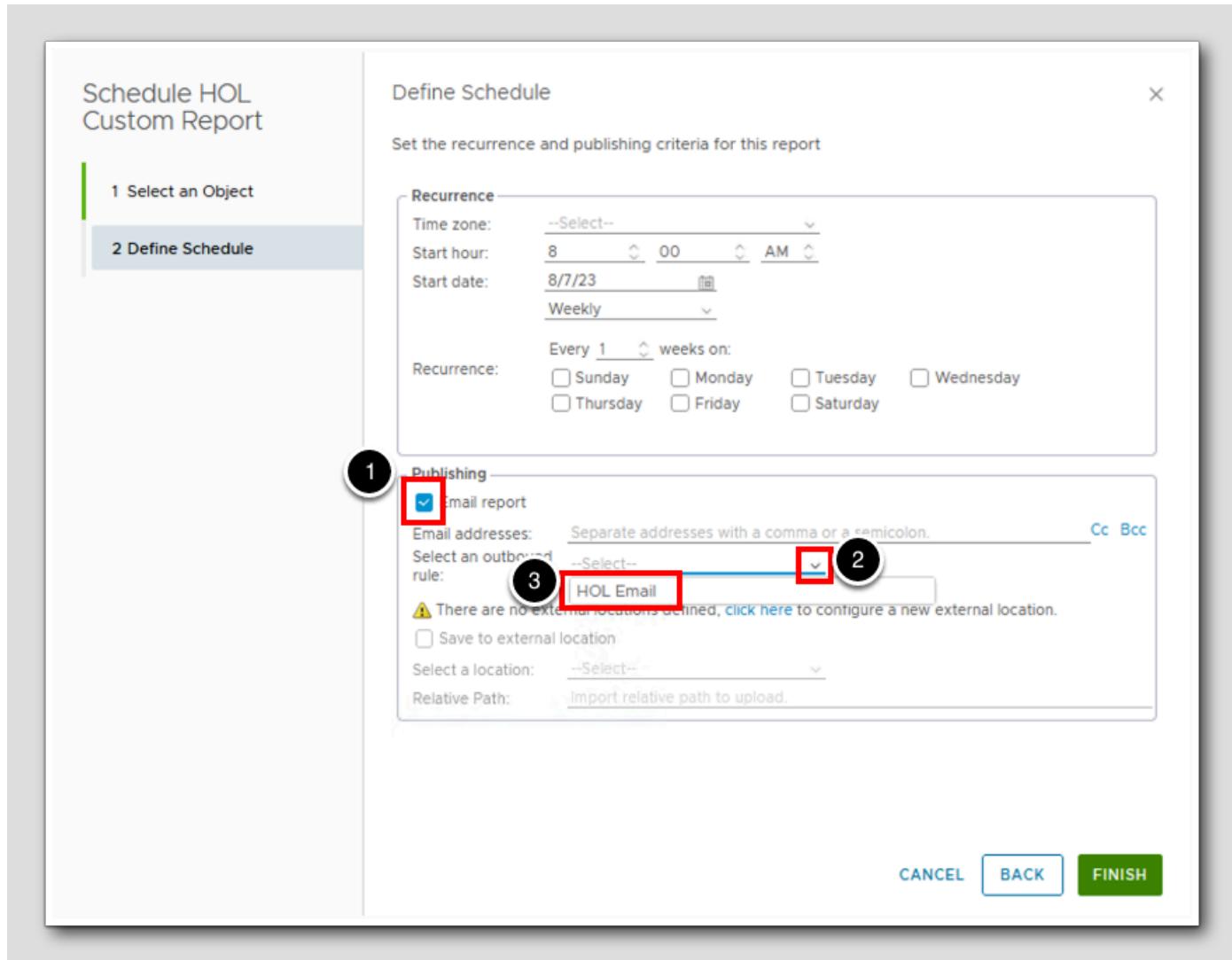
**⚠ There are no external locations defined, click here to configure a new external location.**

Save to external location  
Select a location: --Select--  
Relative Path: Import relative path to upload.

CANCEL BACK FINISH

## Publishing

[228]



1. In the Publishing box, click the Email report checkbox.
2. Expand the Select an Outbound rule: dropdown.
3. Click on the newly created outbound rule HOL Email.

## Add Outbound Instance

[229]

If you would prefer to have the reports saved to a network share, you can configure a Network Share Plugin here. For this lesson we will only highlight the fields that are needed to configure this.

Schedule HOL Custom Report

1 Select an Object

2 Define Schedule

Define Schedule

Set the recurrence and publishing criteria for this report

**Recurrence**

Time zone: --Select--  
Start hour: 8 00 AM  
Start date: 8/7/23 Weekly  
Recurrence: Every 1 weeks on:  
 Sunday  Monday  Tuesday  Wednesday  
 Thursday  Friday  Saturday

**Publishing**

Email report  
Email addresses: Separate addresses with a comma or a semicolon. Cc Bcc  
Select an outbound rule: HOL Email 1  
**⚠ There are no external locations defined. [click here](#) to configure a new external location.**  
 Save to external location  
Select a location: --Select--  
Relative Path: Import relative path to upload.

CANCEL BACK FINISH

1. Click on [click here](#).

## Network Share Plugin

[230]

Below you can see the details to configure a Network Share that Aria Operations can save reports to.

Add/Edit Outbound Instance

Plugin Type: Network Share Plugin

Instance Name:

Domain:  Required

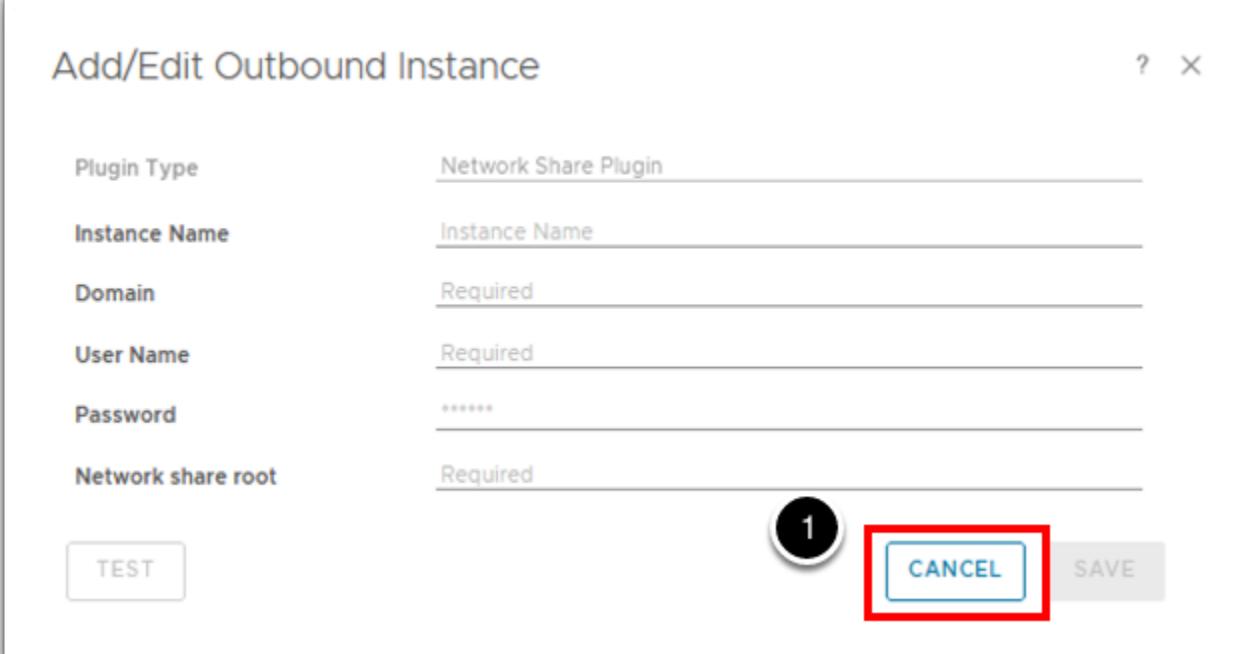
User Name:  Required

Password:  \*\*\*\*\*

Network share root:  Required

**TEST**

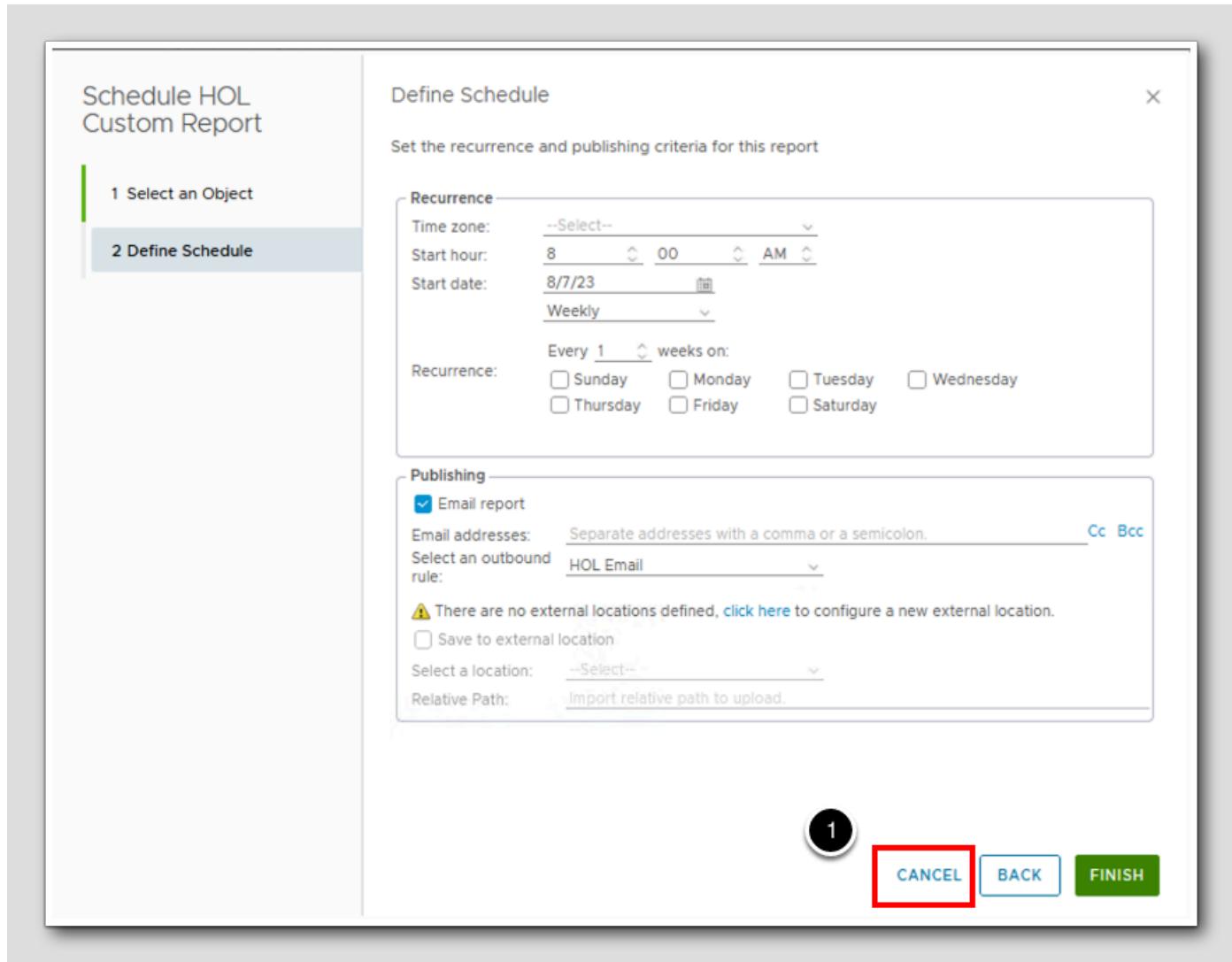
1 **CANCEL** **SAVE**



The screenshot shows a dialog box titled "Add/Edit Outbound Instance". It contains fields for "Plugin Type" (set to "Network Share Plugin"), "Instance Name", "Domain" (marked as required), "User Name" (marked as required), "Password" (represented by a series of asterisks), and "Network share root" (marked as required). Below the fields are three buttons: "TEST", "CANCEL", and "SAVE". The "CANCEL" button is highlighted with a red rectangular border.

1. Click CANCEL.

## Cancel out of Define Schedule



1. Click CANCEL.

## Lesson End

[232]

In this lesson we created a custom report using 4 different pie chart views and learned how to setup a Standard Email Plugin so we can email the report out on a schedule.

## Conclusion

In this module, we reviewed how to run, create and schedule reports. How to setup a Standard Email Plugin and reviewed the Network Share Plugin.

### 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 7 - Creating Custom Dashboards for VMware Aria Operations (15 minutes) Basic

### Introduction

[236]

Understanding how to create custom dashboards is a very powerful skill to have with Aria Operations. Being able to create a custom window into your infrastructure, purpose built for an OS admin or management or an application administrator... will help to run a lean and efficient infrastructure and save the company money in the long run.

### Log in to Aria Operations

[237]

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

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

[238]

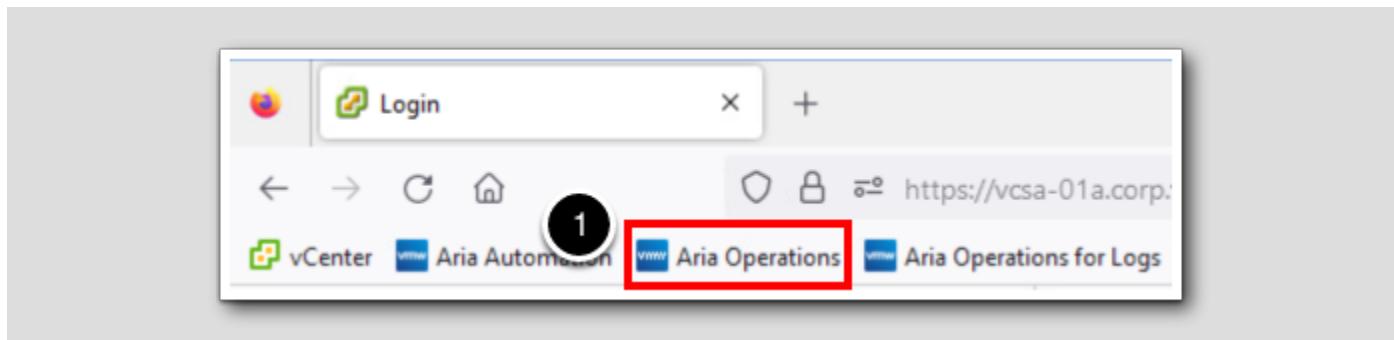


If the browser is not already open, launch Firefox.

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

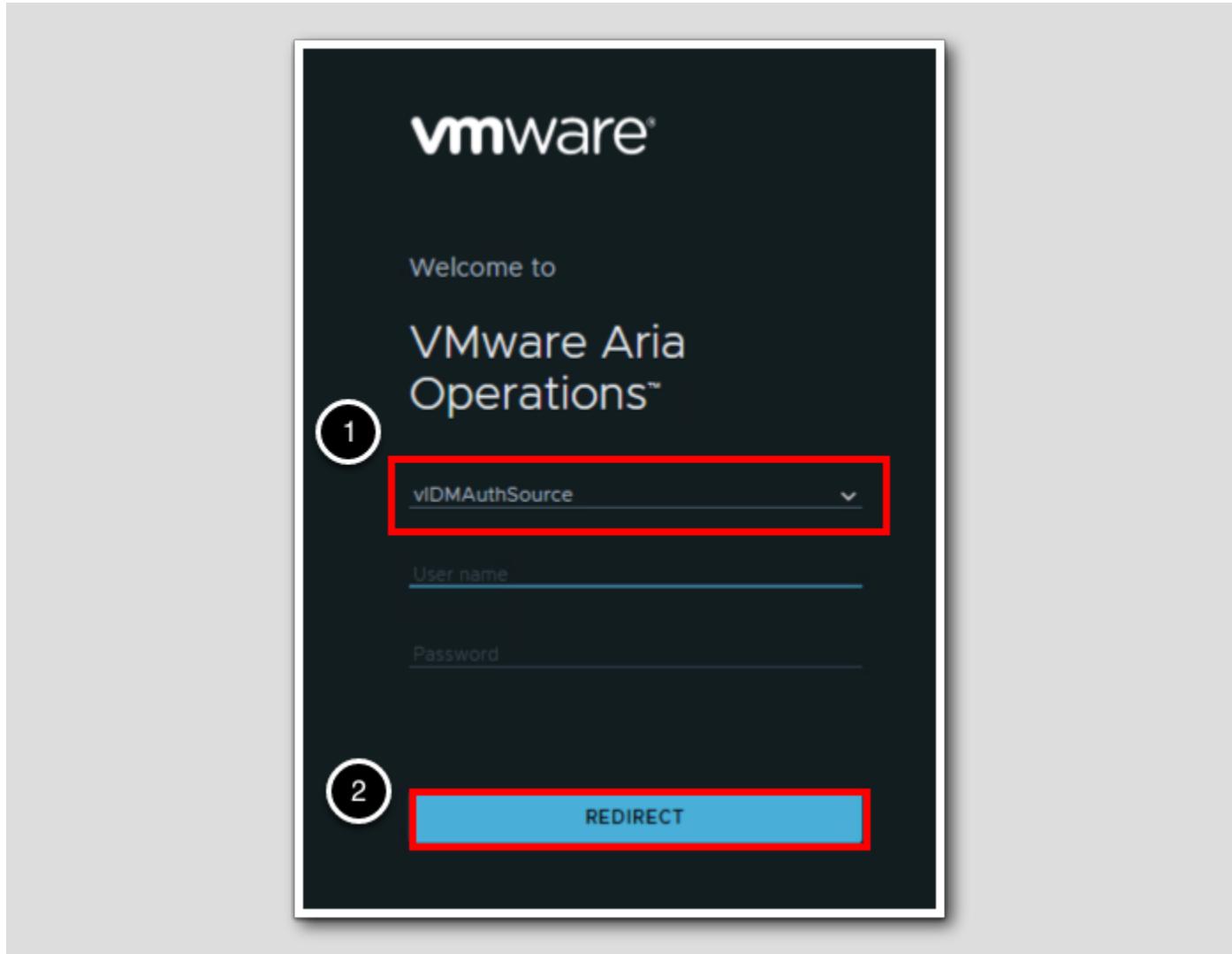
### Navigate to Aria Operations

[239]



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

## Log in to Aria Operations

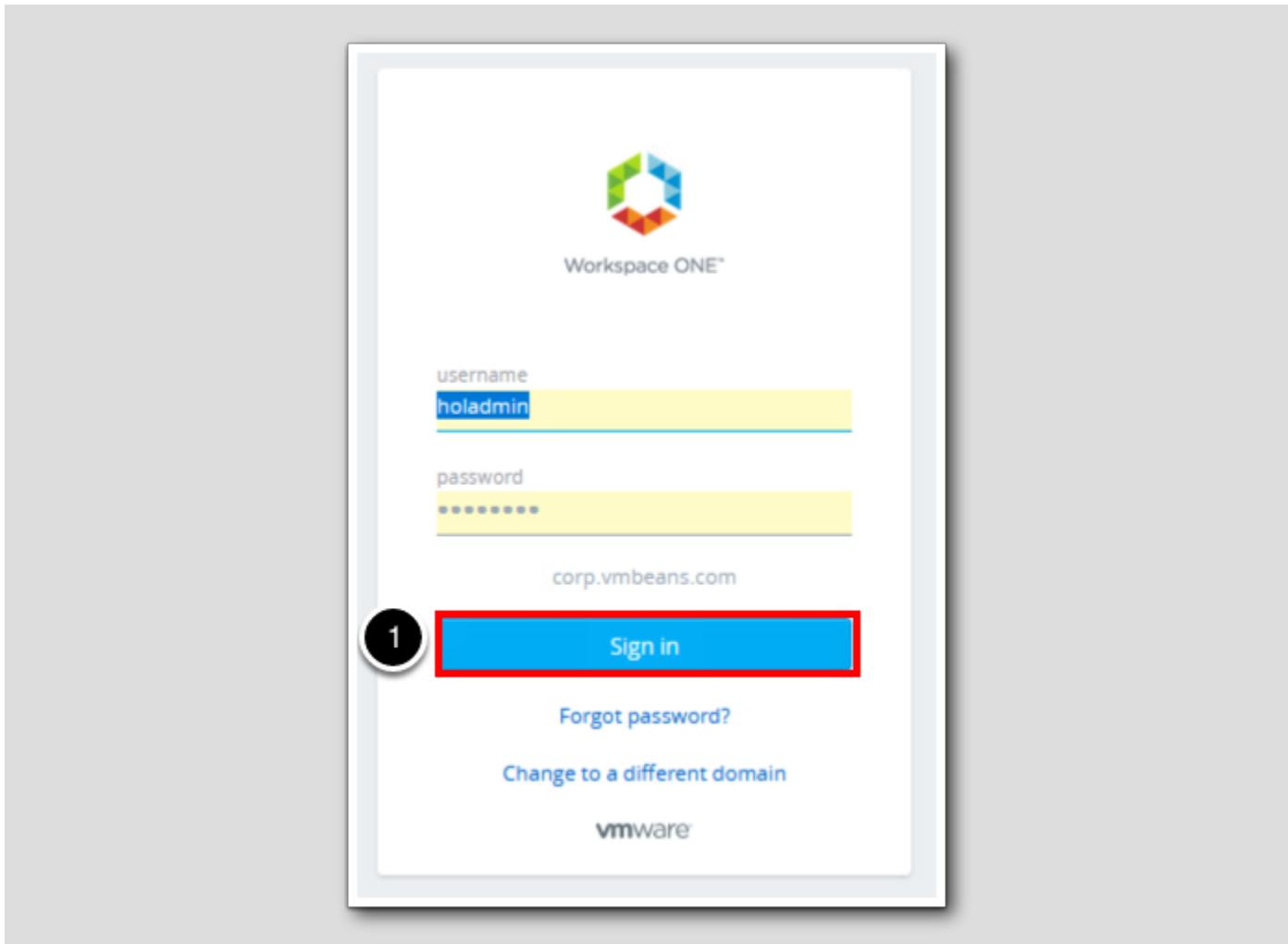


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

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

## Clone and Modify Existing Dashboards

In this lesson we will clone an existing dashboard and modify it to add more views to enrich the existing dashboard.

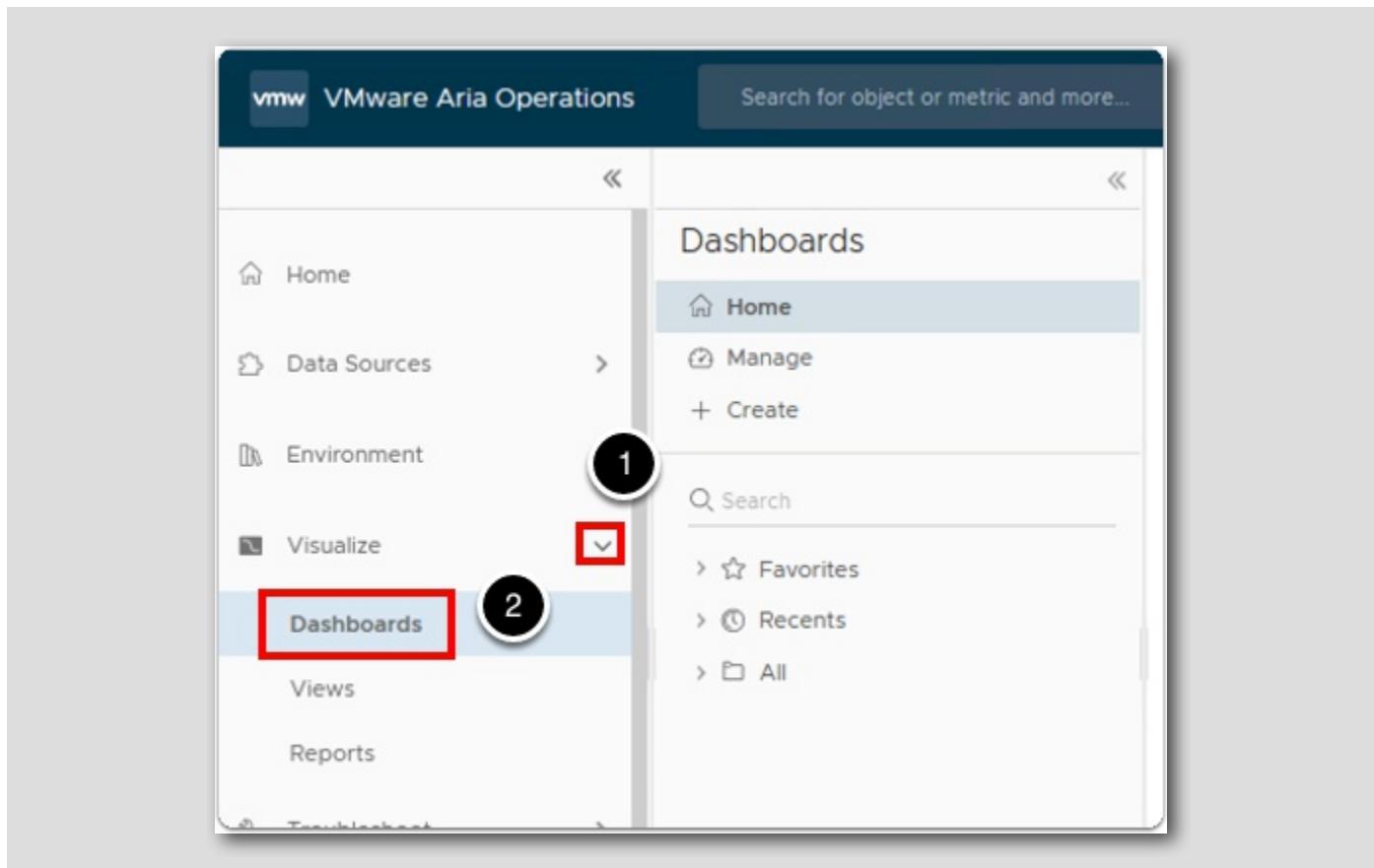
## Dashboards

In this lesson, we will learn how to clone an existing dashboard and modify it to make it our own.

Aria Operations has numerous out-of-the-box dashboards that were created by industry experts who have a deep understanding of Aria Operations as well as the characteristics and behavior of the underlying objects being managed. However, personalizing a Dashboard to fit a specific role or consolidate other information into a single view is a common use case for most administrators.

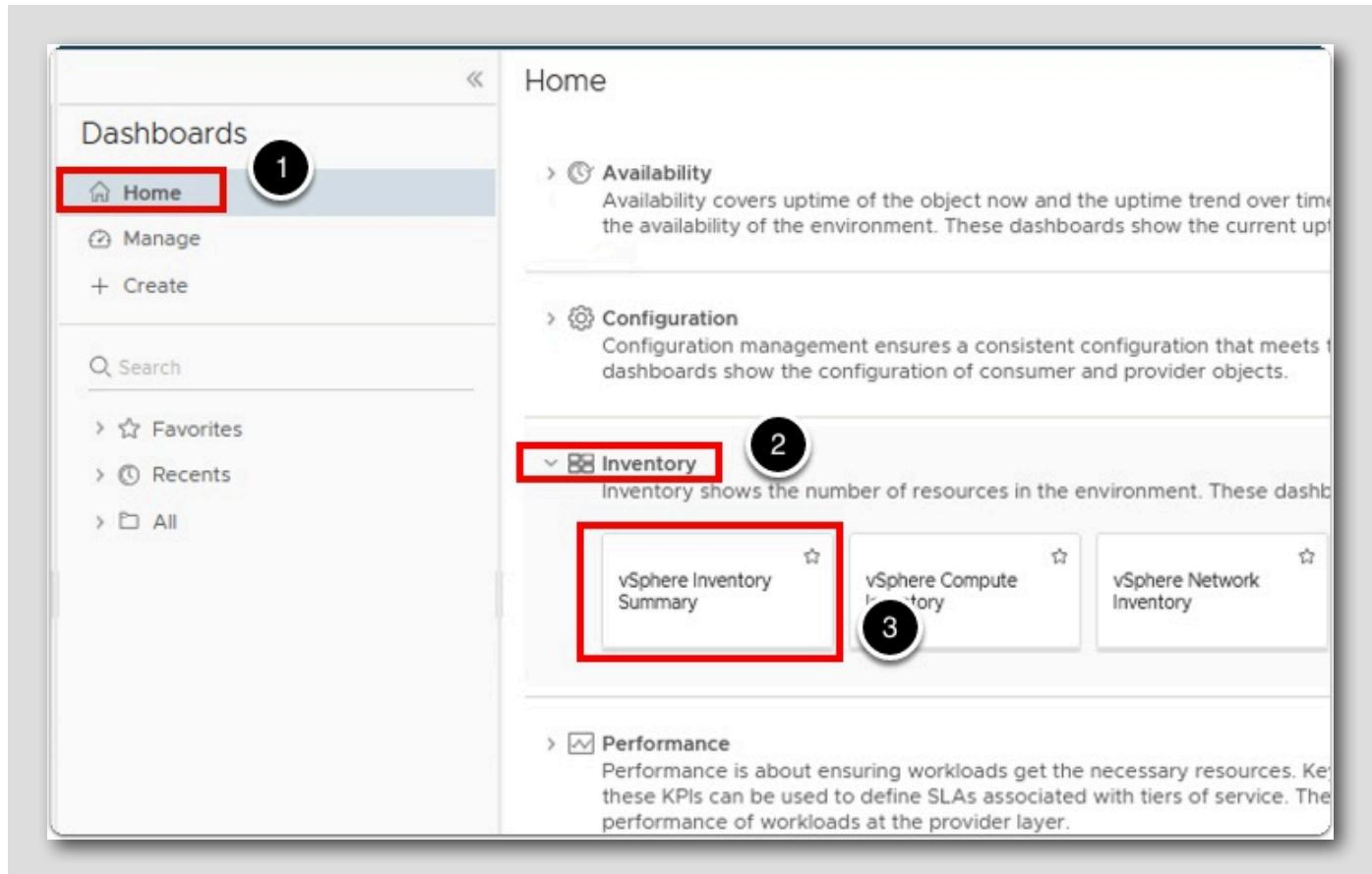
To start, we will clone and make some simple changes to create a custom Overview Dashboard for our administrators. For this example, we will clone an existing dashboard and add the Scoreboard Health, Object relationship and Top Alerts widgets. We will also minimize the three Top-15 widgets that are in the existing dashboard so we will have more screen real estate in the dashboard.

Cloning an existing dashboard to create a new or modified dashboard is considered a best practice to ensure your custom content is not affected during an upgrade of Aria Operations.



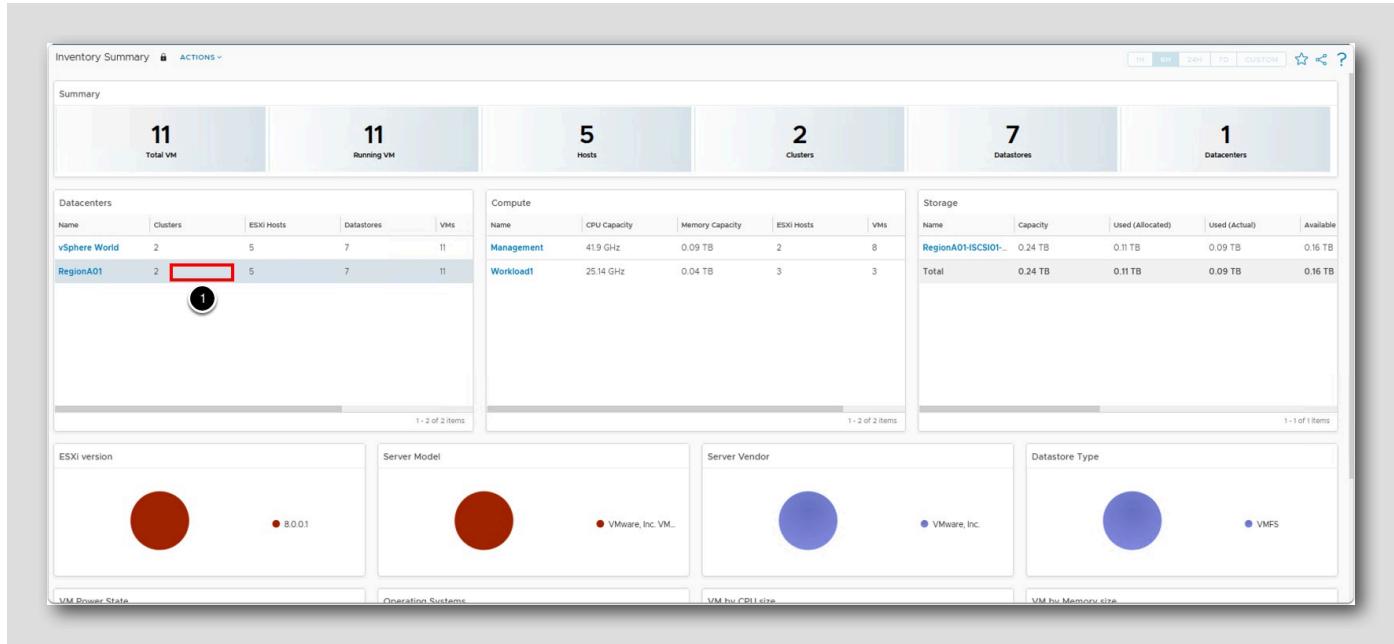
1. Expand **Visualize**.
2. Click on **Dashboards** in the menu bar at the left of the user interface.

## vSphere Inventory Summary



1. Under Dashboards, Click on Home. to expand the Dashboards menu.
2. Expand Inventory.
3. Click on vSphere Inventory Summary.

## vSphere Inventory Summary

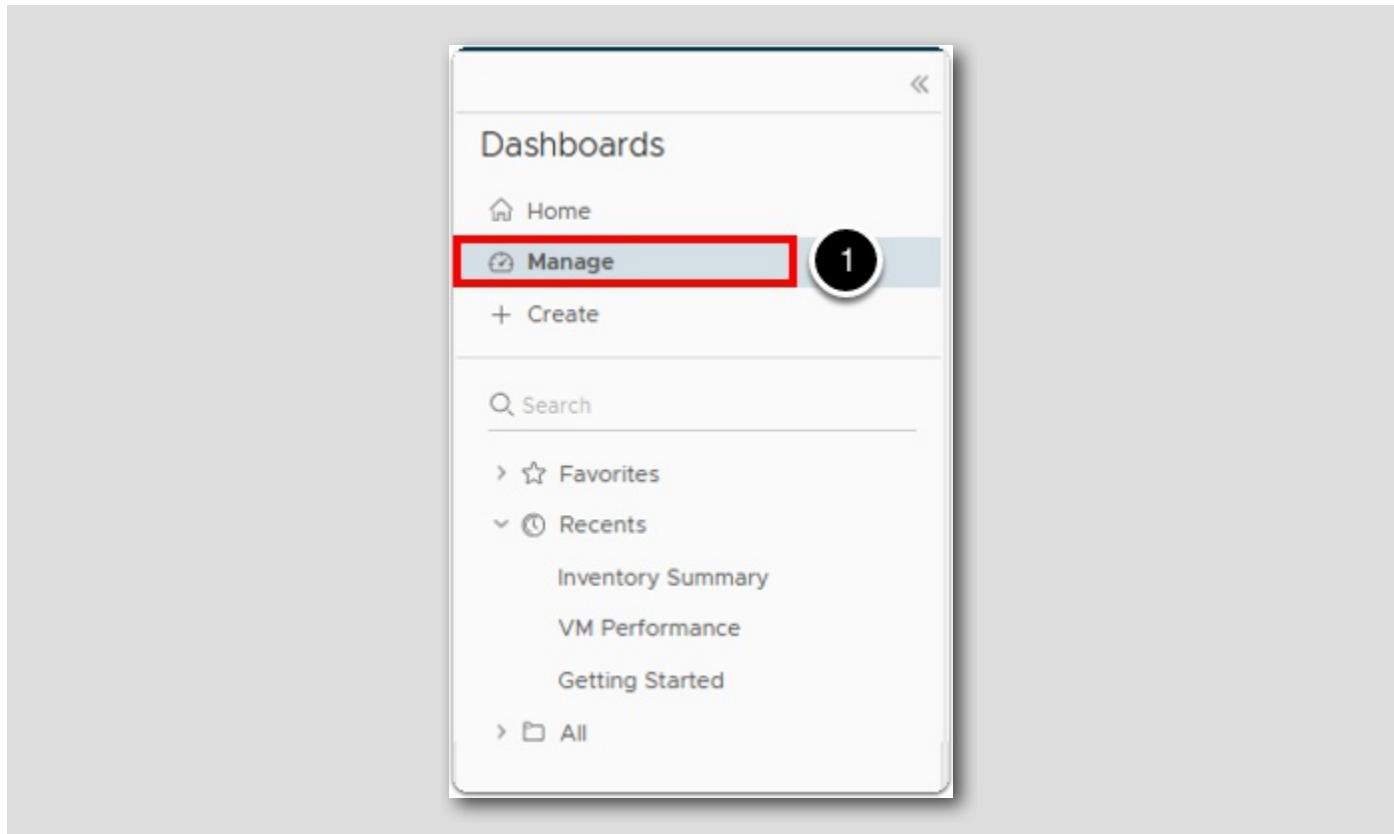


We can now see the Inventory Summary dashboard, which will be the basis for our own customized version of this dashboard. In order to modify this or any other existing dashboard, we will first want to "clone" it and then modify the cloned version. We do not want to edit any master or default out-of-the-box dashboards so we don't potentially break the content and flow. We ALWAYS want to clone a dashboard and edit the clone or just create a brand new custom dashboard from scratch as a best practice!

1. Click on an empty space in the RegionA01 row. Notice how the boxes below populate based on what is selected in the Datacenter box.

If you click on the Datacenter text it will take you to that object in Object Browser.

## Manage Dashboards



1. Click on **Manage** under the **Dashboards**.

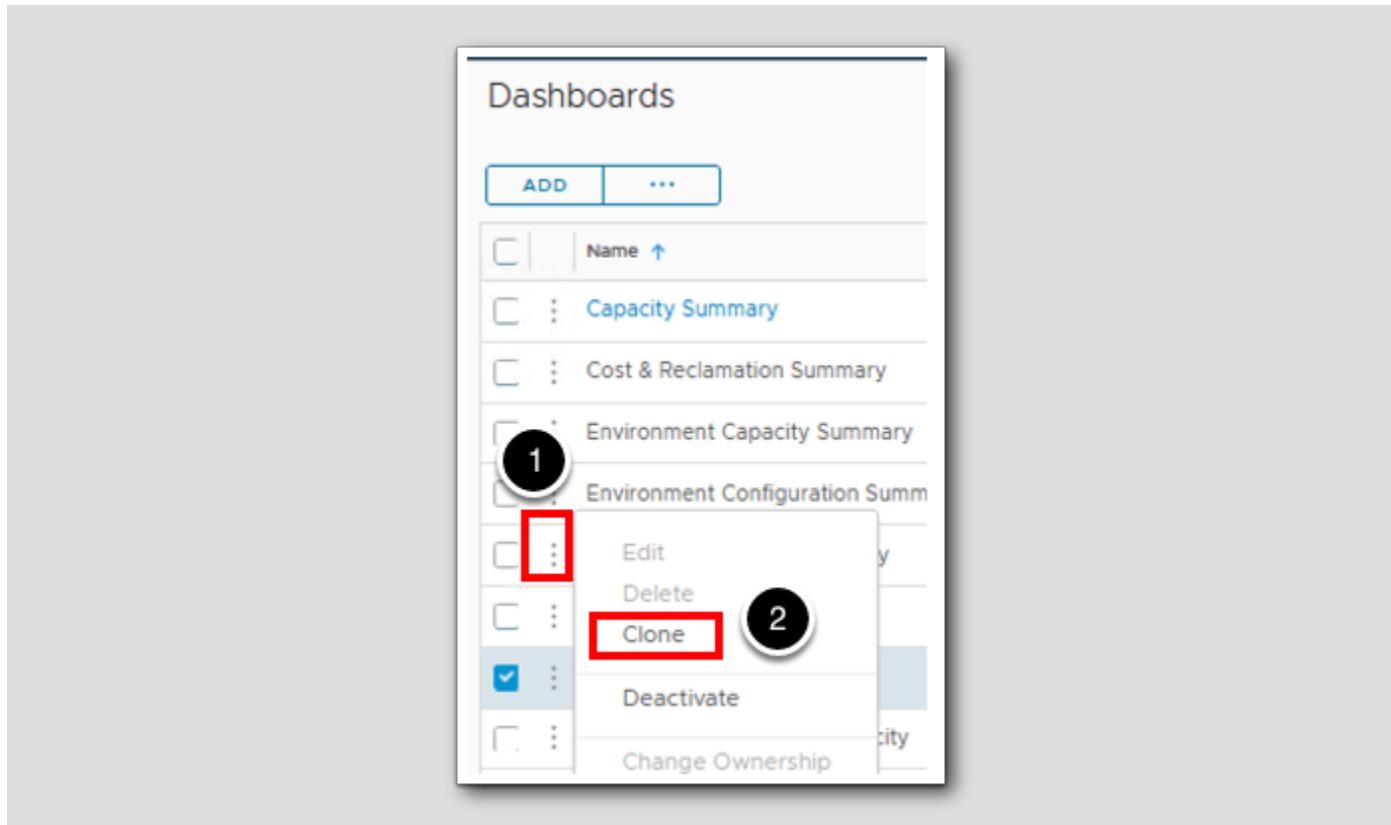
## Filter for Inventory Summary Dashboard

The screenshot shows the 'Dashboards' section of the vSphere Web Client. On the left, there's a sidebar with links like Home, Manage (which is selected), Create, Search, Favorites, Recents (VM Performance, Environmental Impact of Idle VMs, VM Configuration, Inventory Summary), and a plus sign. The main area lists dashboards with columns for Name, Folder, Description, Activation status, URL, and Share. A red box highlights the search bar at the top right with the word 'summary'. A blue box highlights the checkbox next to the 'Inventory Summary' row, which is also highlighted in blue.

	Name	Folder	Description	Activat.	URL	Shar...
<input type="checkbox"/>	Capacity Summary	Dashboard Library > Ex...	An example of dashbo...	✓	-	🔒
<input type="checkbox"/>	Cost & Reclamation Summary		Analyze the costs of r...	∅	-	🔒
<input type="checkbox"/>	Environment Capacity Summary			∅	-	🔒
<input type="checkbox"/>	Environment Configuration Summary		Used in Report : Confi...	∅	-	🔒
<input type="checkbox"/>	Environment Health Summary			∅	-	🔒
<input checked="" type="checkbox"/>	Inventory Summary	Dashboard Library > Ex...	An example of dashbo...	✓	-	🔒
<input type="checkbox"/>	VOA Report Summary Capacity	VMware Aria Operation...		∅	-	🔒

1. Type summary into the Quick filter field and then hit the ENTER key on our keyboard to search for dashboards with the word environ in the title.
2. Click the checkbox next to Inventory Summary report.

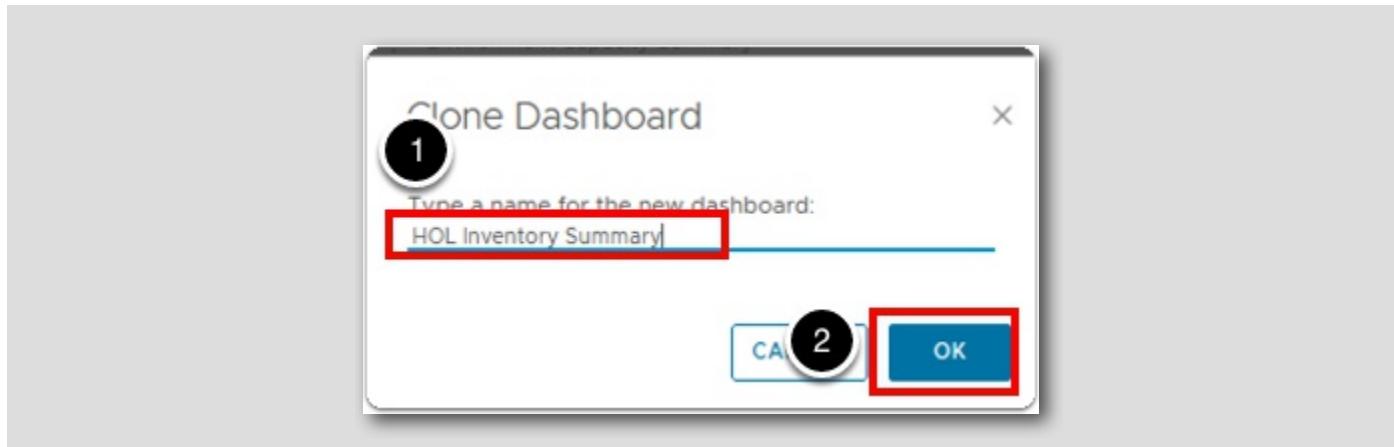
## Clone Dashboard



1. Click on the 3 dots to the right of the checkbox on the **Inventory Summary** Dashboard row to open the actions menu.
2. Then click **Clone** to start the cloning process.

To emphasize again, never modify a delivered Dashboard. ALWAYS Clone when you want to modify a Dashboard.

## Clone Dashboard - Name the New Dashboard



1. Type HOL Inventory Summary into the name text field.
2. Then click on the OK button to save the name.

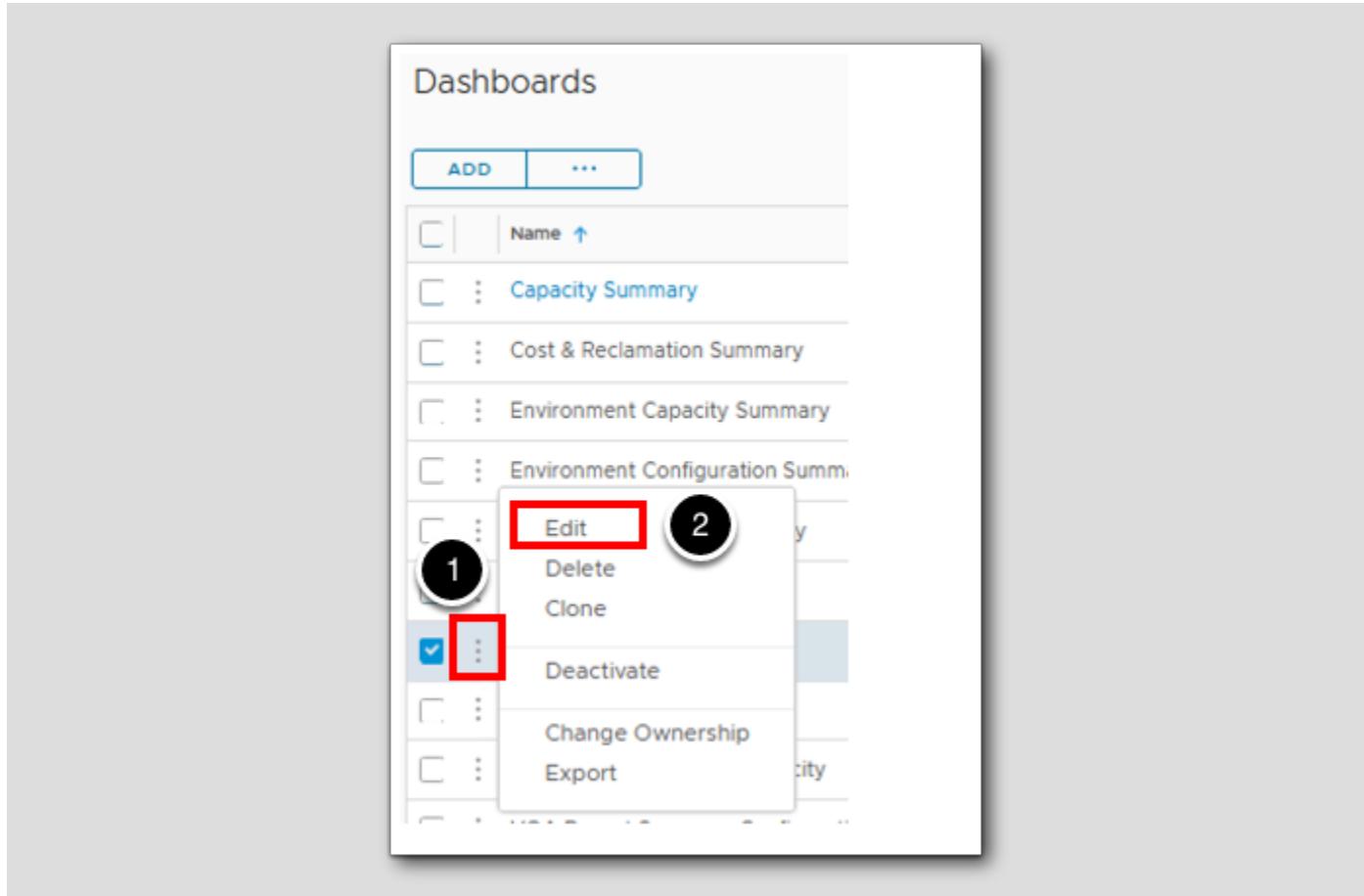
## Change to the Cloned Dashboard

The screenshot shows the 'Dashboards' section of the vSphere Web Client. On the left, there's a sidebar with links like Home, Manage (which is selected), Create, Search, Favorites, Recents (with items like VM Performance, Environmental Impact of Idle VMs, VM Configuration, Inventory Summary, and Getting Started), and All. The main area is titled 'Dashboards' and contains a table with columns for Name, Type, and Folder. The table includes rows for Capacity Summary, Cost & Reclamation Summary, Environment Capacity Summary, Environment Configuration Summary, Environment Health Summary, Environment Summary, HOL Inventory Summary (with a checked checkbox, circled with a black circle labeled '1'), Inventory Summary (with an unchecked checkbox, circled with a red box labeled '2'), VOA Report Summary Capacity, and VOA Report Summary Configuration.

	Name ↑	Folder
<input type="checkbox"/>	Capacity Summary	Dashboard Library :
<input type="checkbox"/>	Cost & Reclamation Summary	
<input type="checkbox"/>	Environment Capacity Summary	
<input type="checkbox"/>	Environment Configuration Summary	
<input type="checkbox"/>	Environment Health Summary	
<input type="checkbox"/>	Environment Summary	
<input checked="" type="checkbox"/>	HOL Inventory Summary	
<input type="checkbox"/>	Inventory Summary	Dashboard Library :
<input type="checkbox"/>	VOA Report Summary Capacity	
<input type="checkbox"/>	VOA Report Summary Configuration	

1. Check the box next to the new cloned dashboard HOL Inventory Summary.
2. Uncheck the box next to the original Inventory Summary Dashboard.

## Manage Dashboards - Edit Dashboard



1. Click on the 3 dots next to the right of the checkbox on the HOL Inventory Summary Dashboard row to open the actions menu.
2. Then click **Edit**.

## Edit Dashboard - Add Widgets

In this lesson we are going to add three Top-N widgets and configure them to show the top-5 CPU, Memory and Storage IOPS consumers.

**HOL Inventory Summary**

**ACTIONS** **SHOW INTERACTIONS**

Cancel **SAVE**

Select the widget source with an interaction or through the self-provider configuration.

VM Power State

Select the widget source with an interaction or through the self-provider configuration.

Operating Systems

Select the widget source with an interaction or through the self-provider configuration.

VM by CPU size

Select the widget source with an interaction or through the self-provider configuration.

VM by Memory size

Select the widget source with an interaction or through the self-provider configuration.

Search \_\_\_\_\_

Views **Widgets**

Health Chart

Object Relationship

Object Relationship (Advanced)

Top Alerts

Top-N

1. Scroll down to the bottom of the top window.
2. Scroll down in the bottom window until you see the Top-N widget.

## Edit Dashboard - Add Widgets (continued)

[253]

**HOL Inventory Summary**

**VM Power State**

**Operating Systems**

**VM by CPU size**

**VM by Memory size**

1

Views  Widgets

Search

Health Chart

Object Relationship

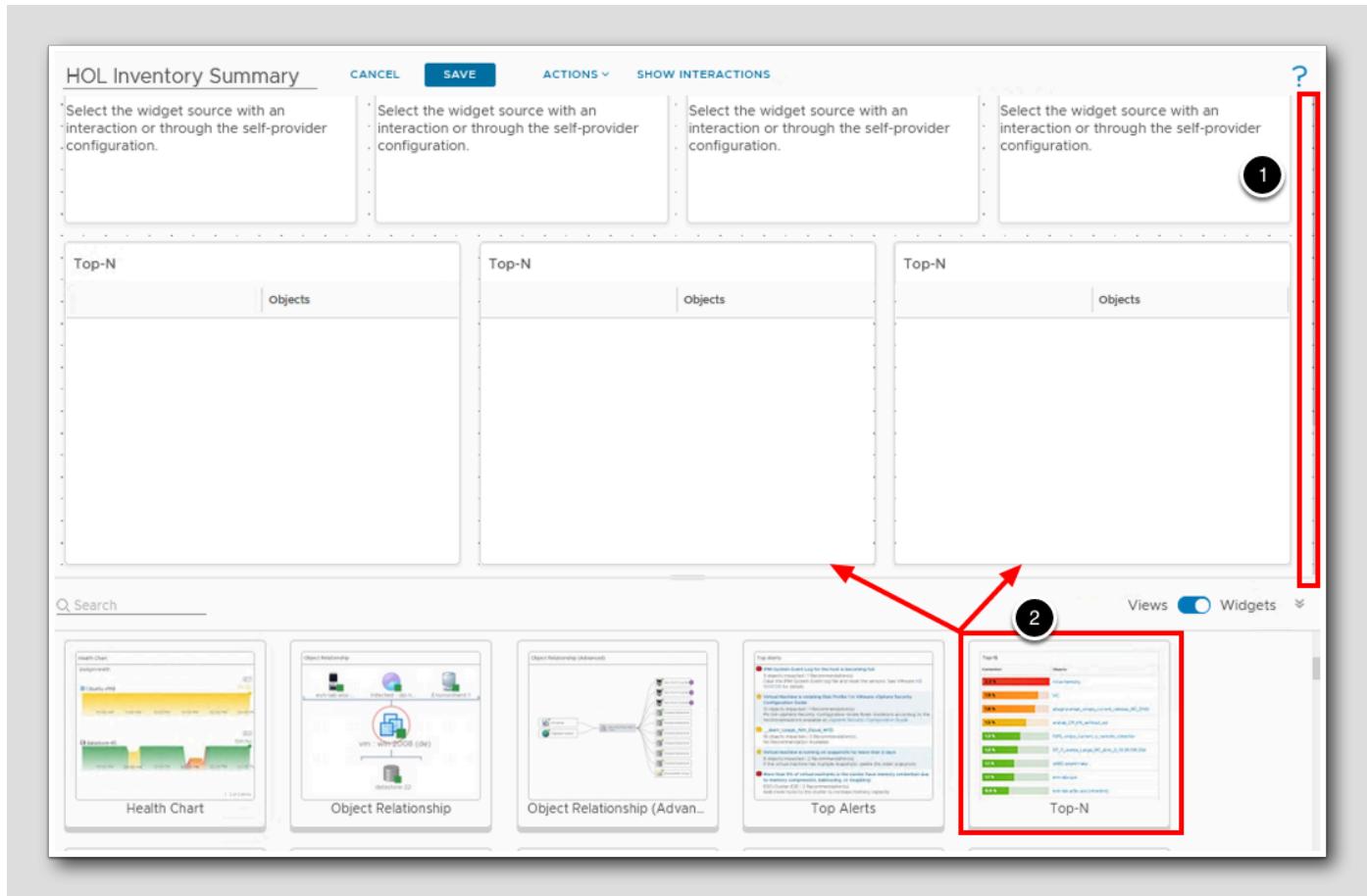
Object Relationship (Advanced)

Top Alerts

Top-N

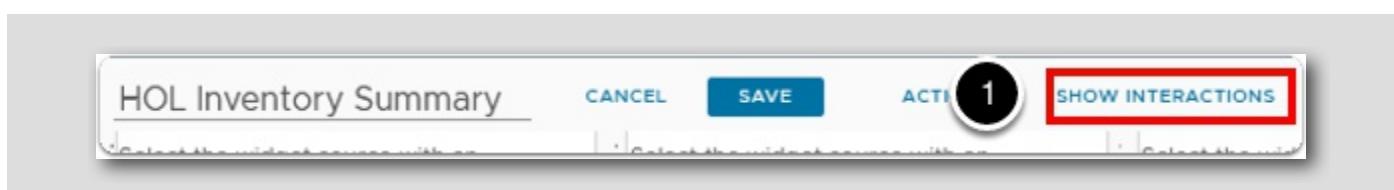
1. Drag and drop one Top-N widget into the space just below the VM Power State widget.

## Edit Dashboard - Add Widgets (continued)



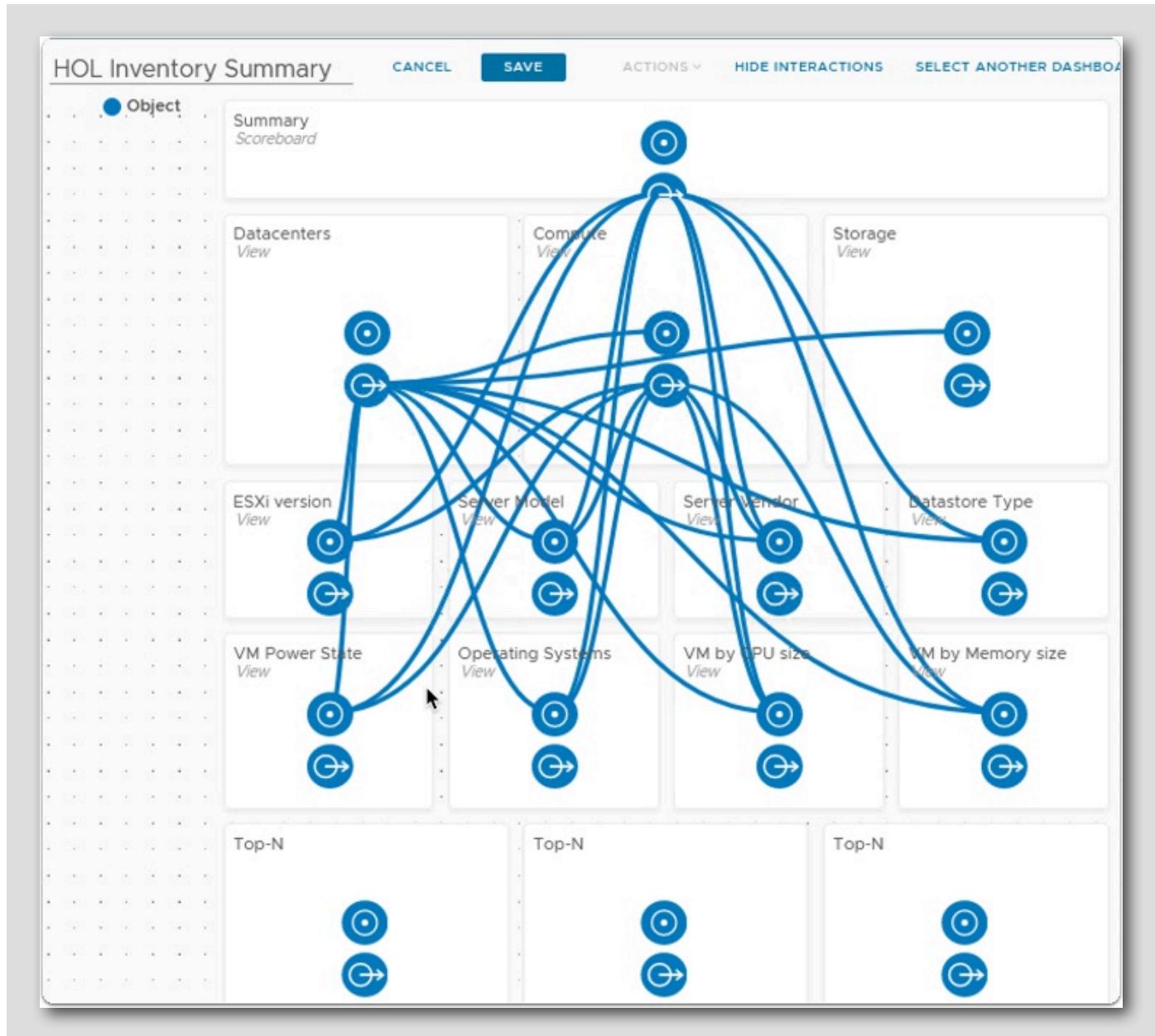
1. Scroll down again in the top box to expose the Top-N widget we just added.
2. Drag and drop two more Top-N widgets. Adjust the widgets as needed so it looks like the screenshot above.

## Edit Dashboard - Show Interactions



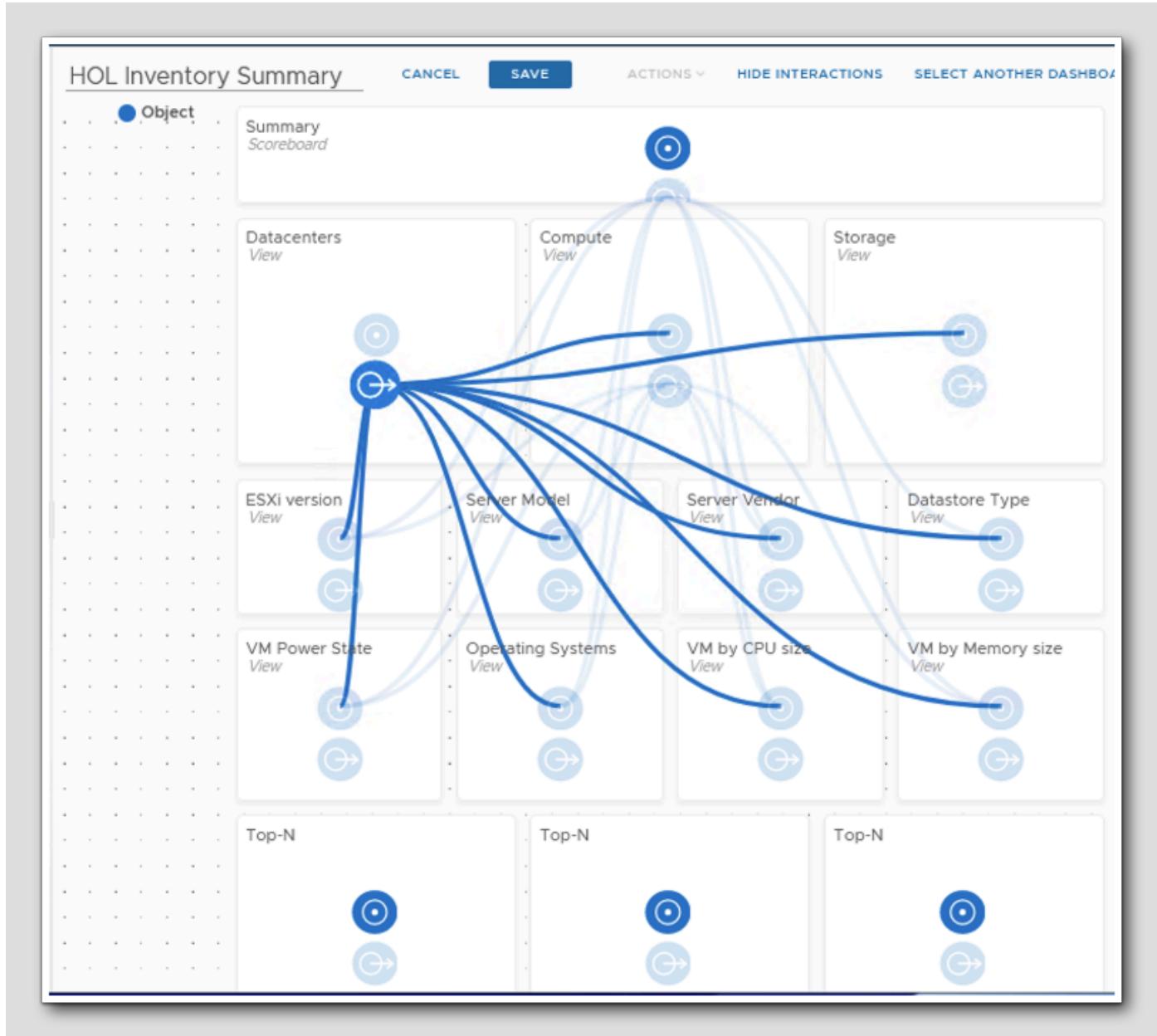
1. Click on the Show Interactions text link at the top of the window.

## Edit Dashboard - Connected Relationships



We see that since we cloned an existing dashboard, there are already relationships created from the "Datacenters View". There are circles with an arrow and circles with a dot in the middle. The circles with an arrow are the driving control and connect to a circle with a dot in the middle, receiving control.

Hover over the Datacenters controlling object

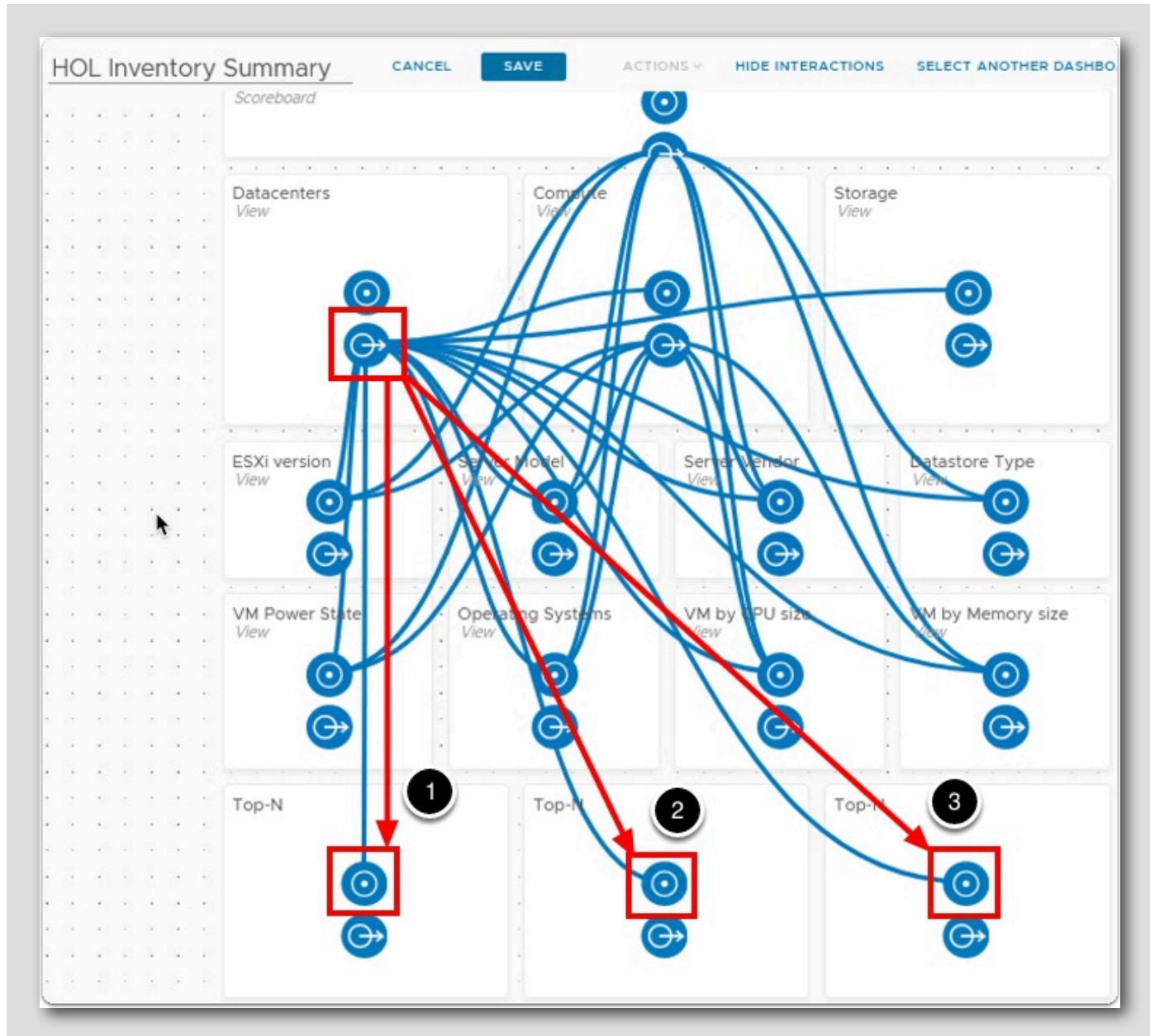


If you hover your mouse over the Datacenters driving control, you can see that it controls every widget in this dashboard except the top Summary Scoreboard. It is critical to understand widget interactions to get your dashboards to display the correct information.

Now we will get the Datacenters View to drive our new Top-N widgets we added.

## Edit Dashboard - Connecting Relationships

[258]

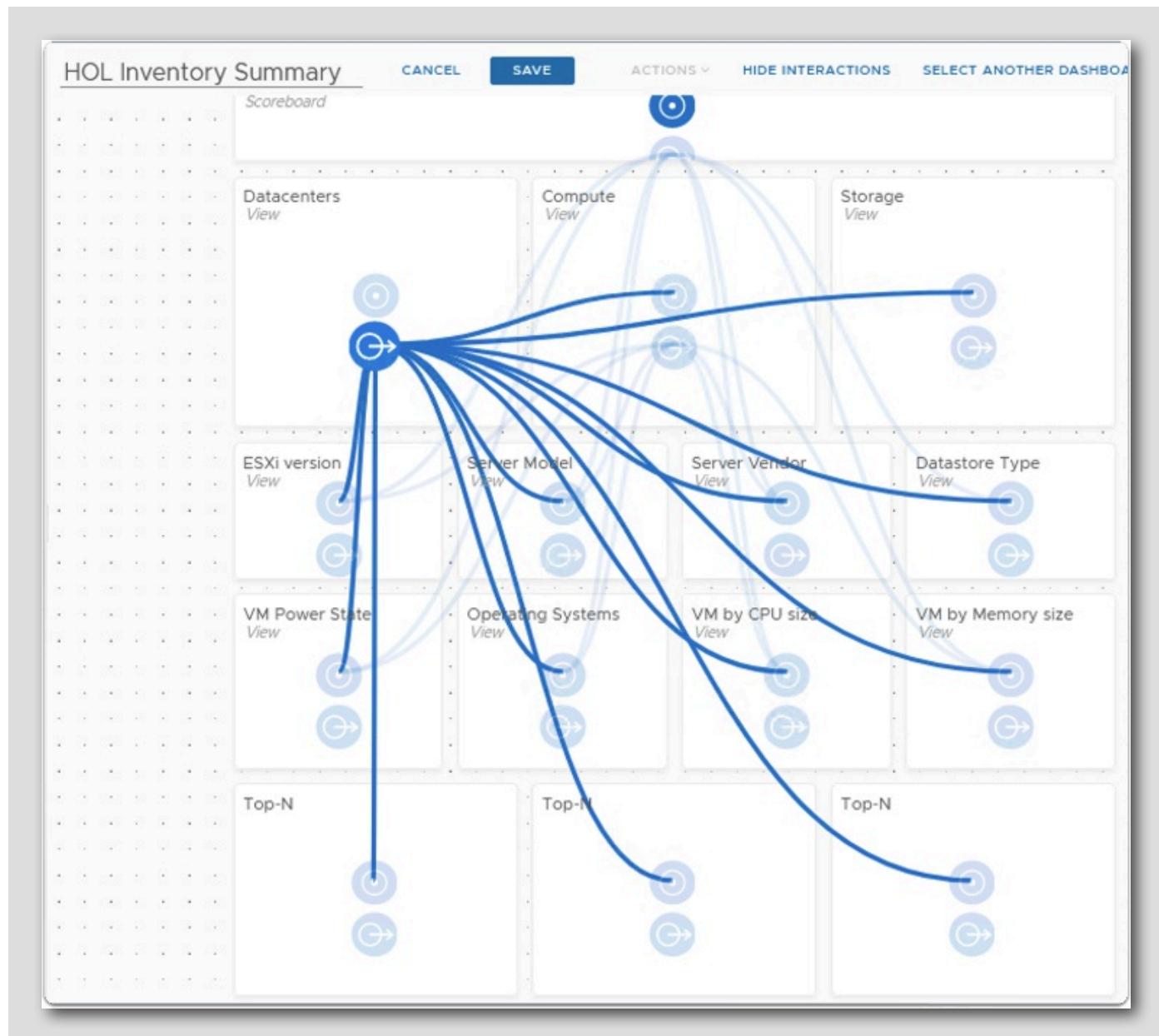


Here is where we need to connect and create the relationships between the "Datacenter View" widget and the three new Top-N widgets we have added. We will do this by dragging and dropping from the "Datacenter View" icon to each of the three icons in the new Top-N widgets we added.

1. Click on the circle with an arrow icon in the Datacenter View widget and drag it on top of the circle with the dot icon in the 1st Top-N widget.
2. Click on the circle with an arrow icon in the Datacenter View widget and drag it on top of the circle with the dot icon in the 2nd Top-N widget.
3. Click on the circle with an arrow icon in the Datacenter View widget and drag it on top of the circle with the dot icon in the 3rd Top-N widget.

## Edit Dashboard - Completed Relationships

[259]



Hover your mouse over the circle with an arrow in the Datacenters View and we should now see the lab environment match the screen capture.

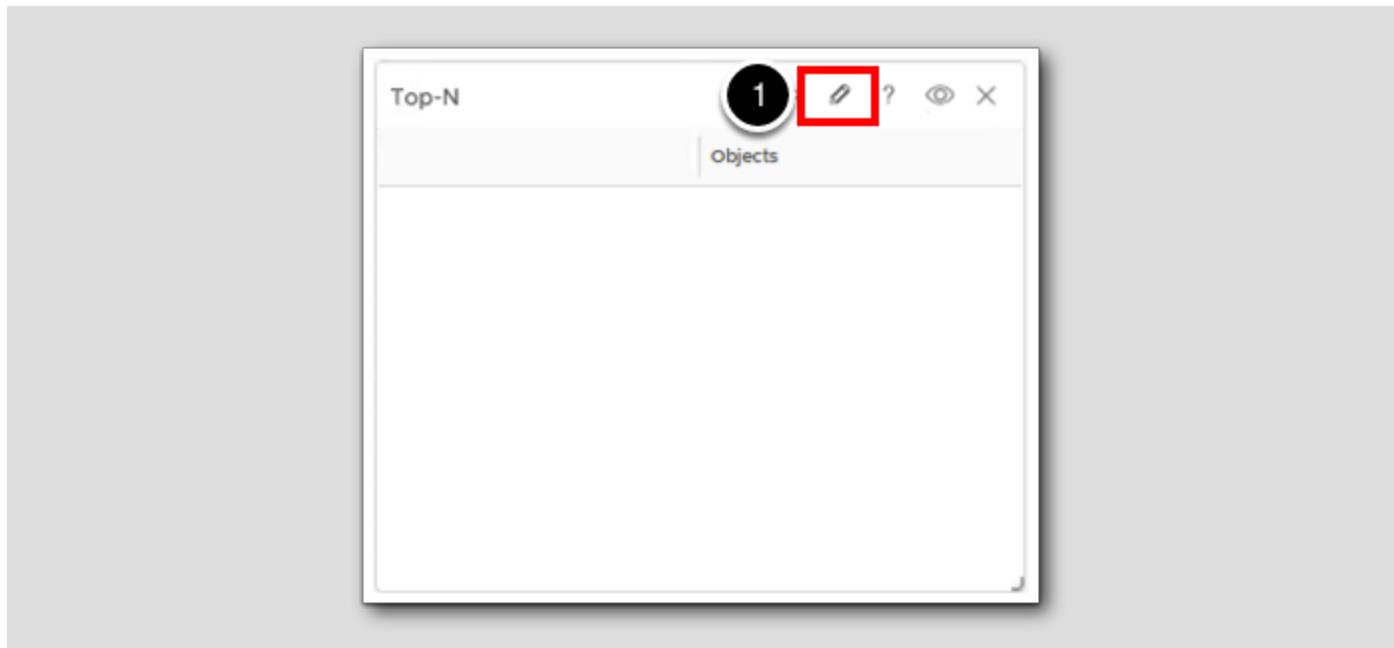
As we see here, we have connecting relationship lines from the Datacenters View widget to each of the 3 new widgets we added.

## Hide Interactions



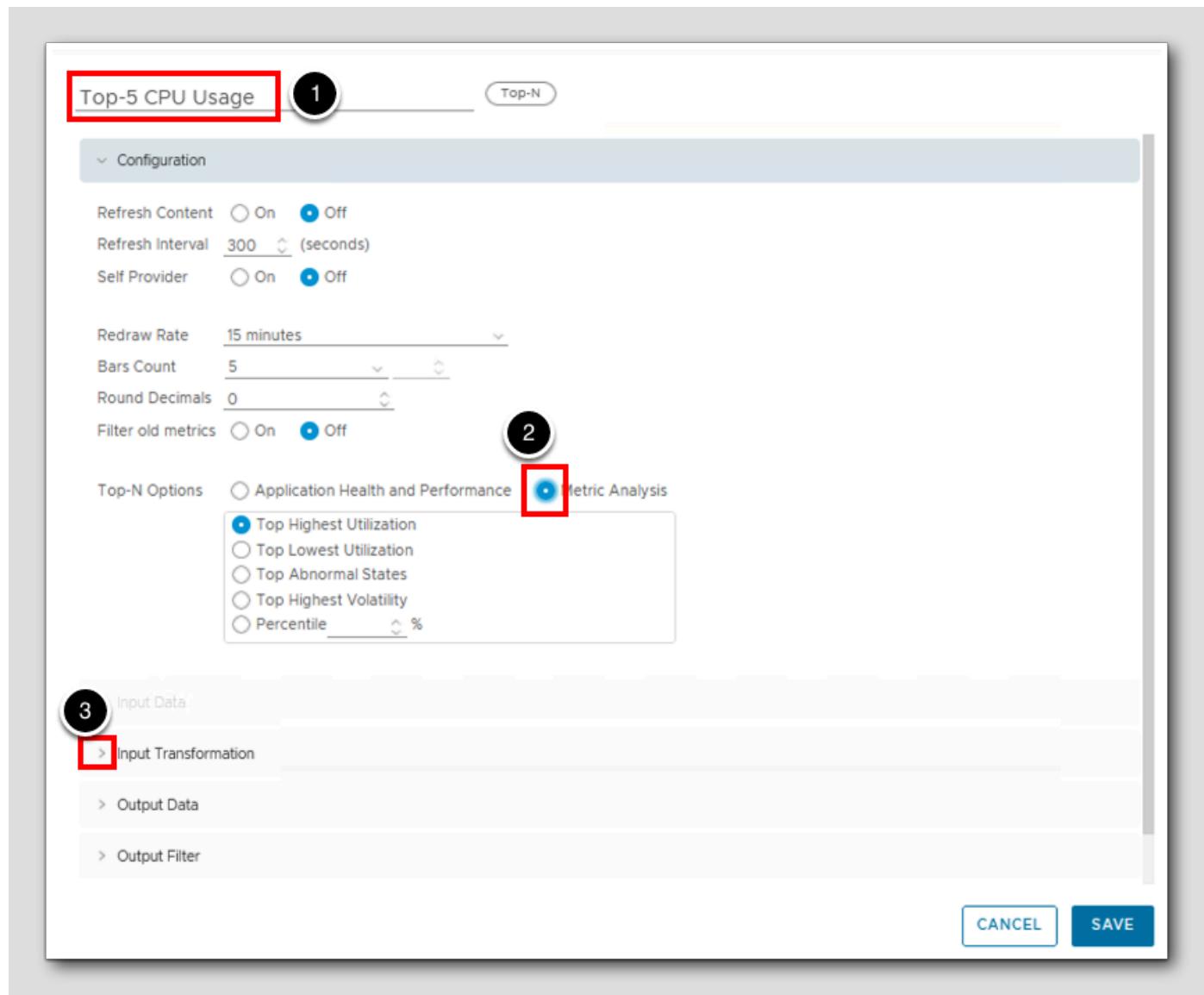
1. Click on HIDE INTERACTIONS to return to the Dashboard building page.

## Configure the Top-N widgets - CPU



1. Hover over the left most Top-N widget and click on the pencil icon when it appears.

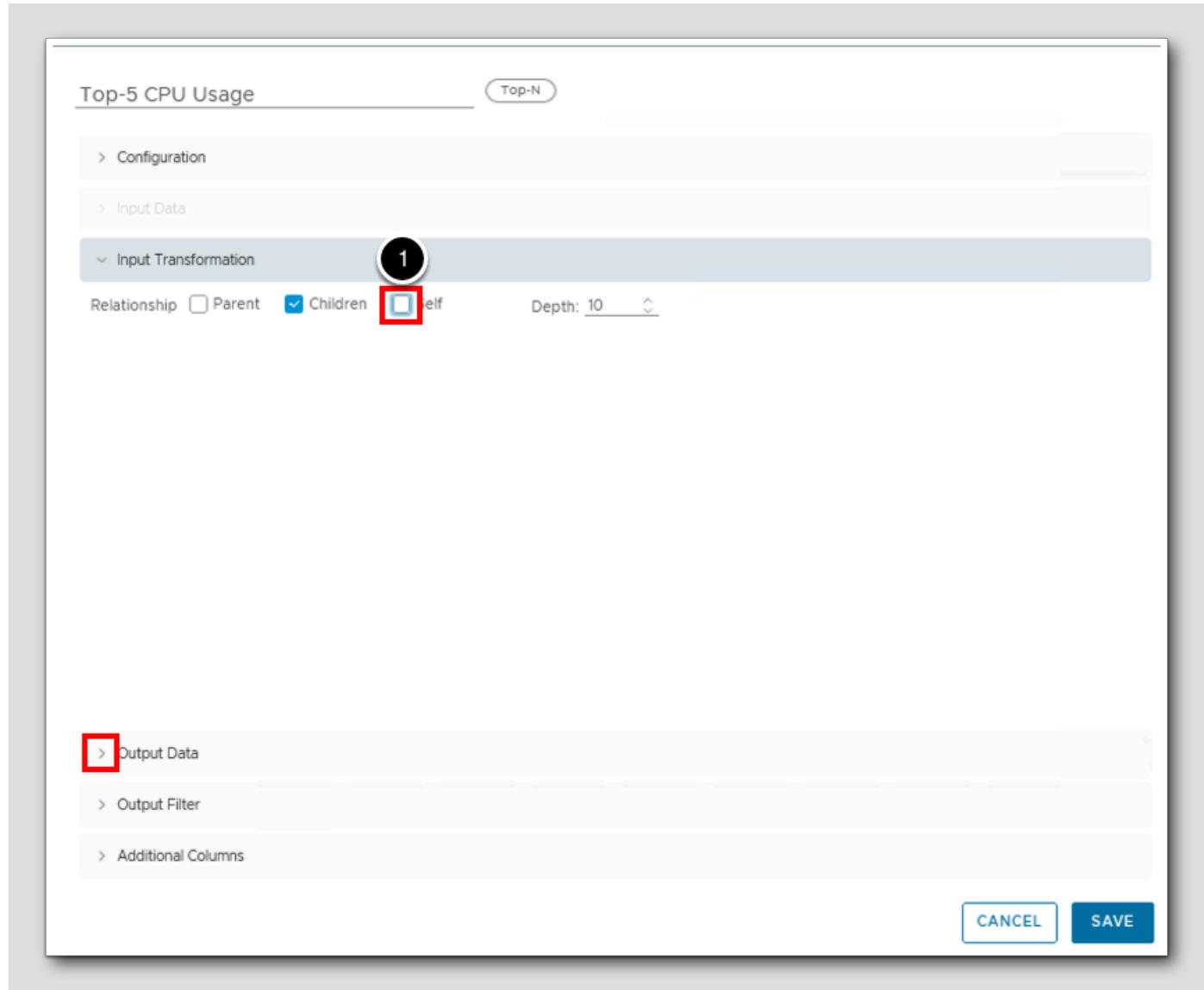
## Configure the Top-N widgets - CPU (Continued)



1. Change the top name to Top-5 CPU Usage.
2. Check the Metric Analysis radio button because we want to display the CPU Usage (%) metric in this widget.
3. Expand Input Transformation.

## Input Transformation

Input Transformation will drive the data that is shown in the widget itself. Since we are driving data from the Datacenters View and want to show VM information, we need to specify that we want to show the Children Relationship as a datacenter is a parent of a VM.



1. Uncheck the Self Input Transformation.
2. Expand Output Data.

## Output Data

Top-5 CPU Usage Top-N

> Configuration

> Input Data

> Input Transformation

**1 Output Data**

**[+]** × ✓ ✖

Object Type

Metric Please select a metric for object types above ✖

Label

Unit

Maximum None ▼

Color Method

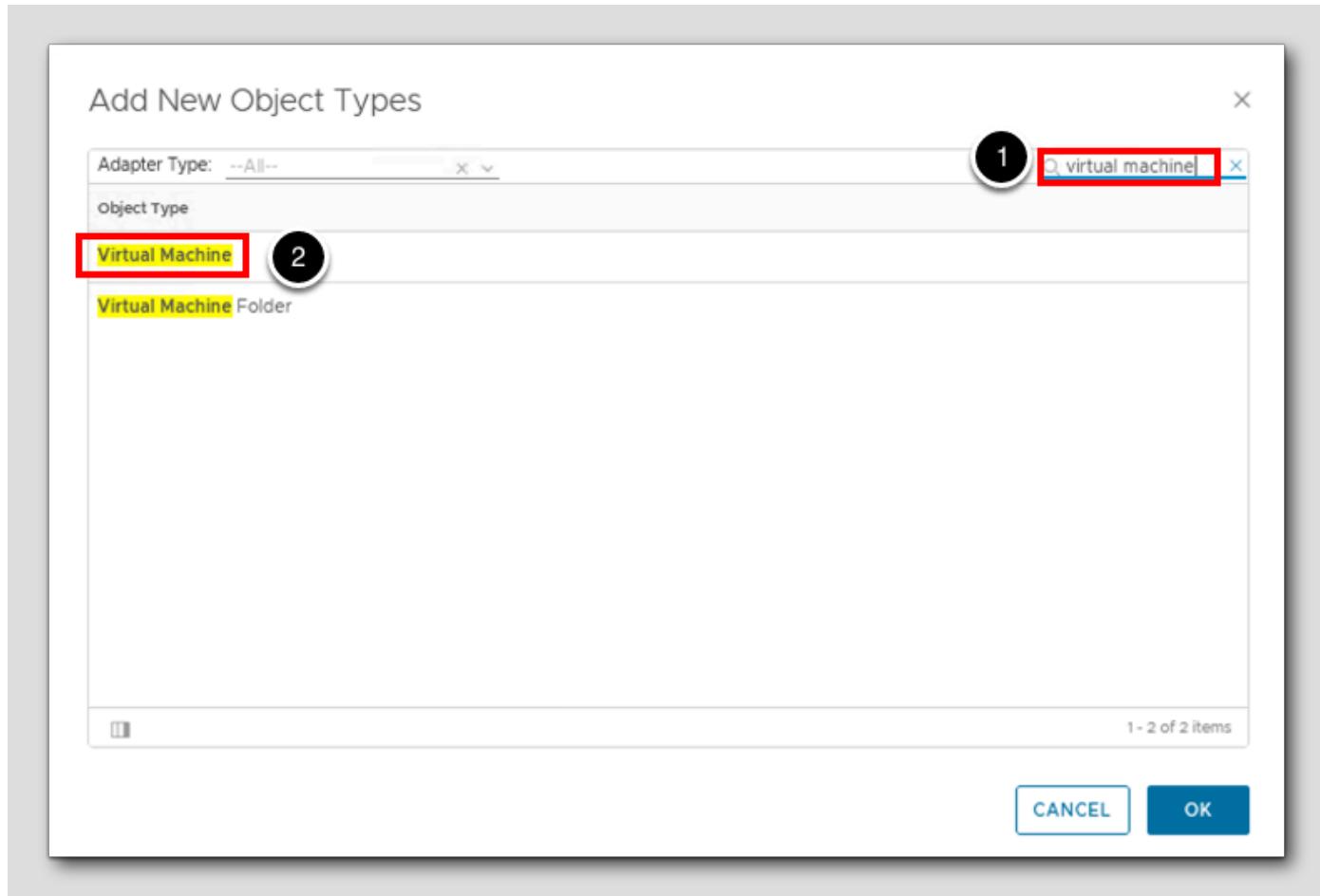
> Output Filter

> Additional Columns

Cancel Save

1. Click the + icon to add an Object Type.

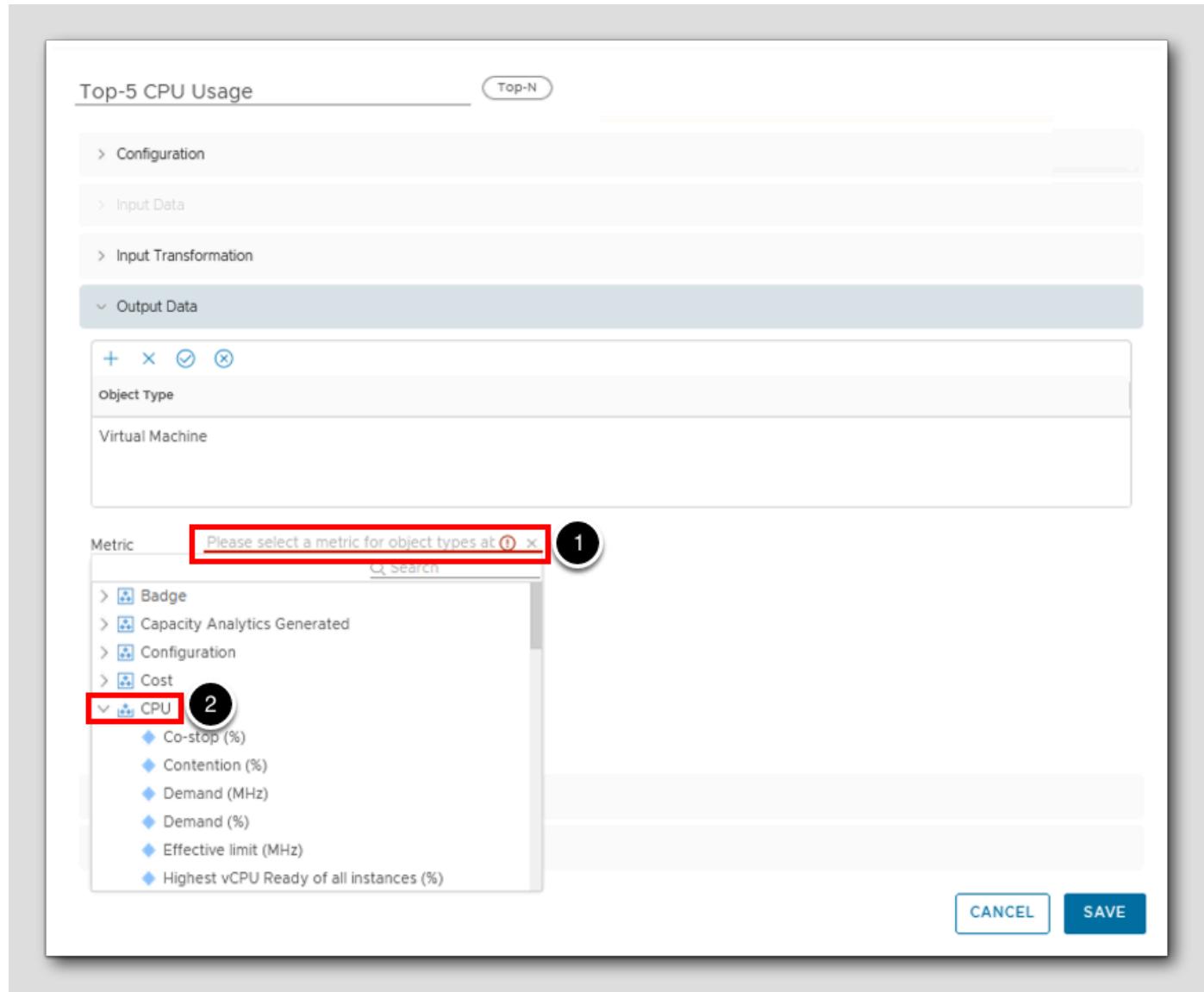
## Add Virtual Machine Object Type



1. Type virtual machine in the top right search bar and hit Enter.

2. Double click on Virtual Machine.

## Add CPU Usage (%)



1. Click into the Metric search line.

2. Expand CPU.

## Add CPU Usage (%) (Continued)

The screenshot shows a software interface titled "Top-5 CPU Usage". In the top navigation bar, there is a "Top-N" button. Below the title, there are several sections: "Configuration", "Input Data", "Input Transformation", and "Output Data". The "Output Data" section is currently active, indicated by a grey background. It contains a toolbar with icons for adding (+), deleting (x), and saving (checkmark). A dropdown menu is open under "Object Type", showing "Virtual Machine" as the selected item. At the bottom of the screen, there is a large modal dialog box. The dialog has a header "Metric" and a message "Please select a metric for object types at ⓘ x". It includes a search bar labeled "Q Search". A list of metrics is provided, with "Usage (%)" highlighted by a red box and circled with a black number 2. The list also includes: Overlap (ms), Provisioned vCPU(s) (vCPUs), Ready (%), Run (ms), Swap wait (%), Total Capacity (MHz), Usage (MHz), Usage average Daily (MHz), vCPU Usage Disparity (%), and Workload (%). At the bottom right of the dialog are "CANCEL" and "SAVE" buttons.

1. Scroll down until you see the **Usage (%)** metric.
2. Double click on the **Usage (%)** metric.

## Add CPU Usage (%) (Continued)

Top-5 CPU Usage Top-N

> Configuration

> Input Data

> Input Transformation

< Output Data

+ × ✓ ✗

Object Type

Virtual Machine

Metric: CPUUsage (%) 1

Label: CPU Usage 2

Unit: % 3

Unit: 100 4

Maximum: Custom 5

Color Method: 75 6

Color Method: 85 7

Color Method: 95 8

Yellow Bound: 75

Orange Bound: 85

Red Bound: 95

> Output Filter

> Additional Columns

CANCEL SAVE

1. Metric: CPUUsage (%)

2. Label: CPU Usage

3. Unit: %

4. Maximum: 100

5. Color Method: 75

6. Color Method: 85

7. Color Method: 95

8. Maximum: Custom

1. Enter **CPU Usage** for the Label.
2. Change the unit to **%**.
3. Enter **100** for the **Maximum** value, this will set the graph bar to max out at a value of 100.
4. Change **Color Method** to **Custom**.
5. Enter **75** for **Yellow Bound**.
6. Enter **85** for **Orange Bound**.
7. Enter **95** for **Red Bound**.
8. Expand Output Filter.

## Output Filter

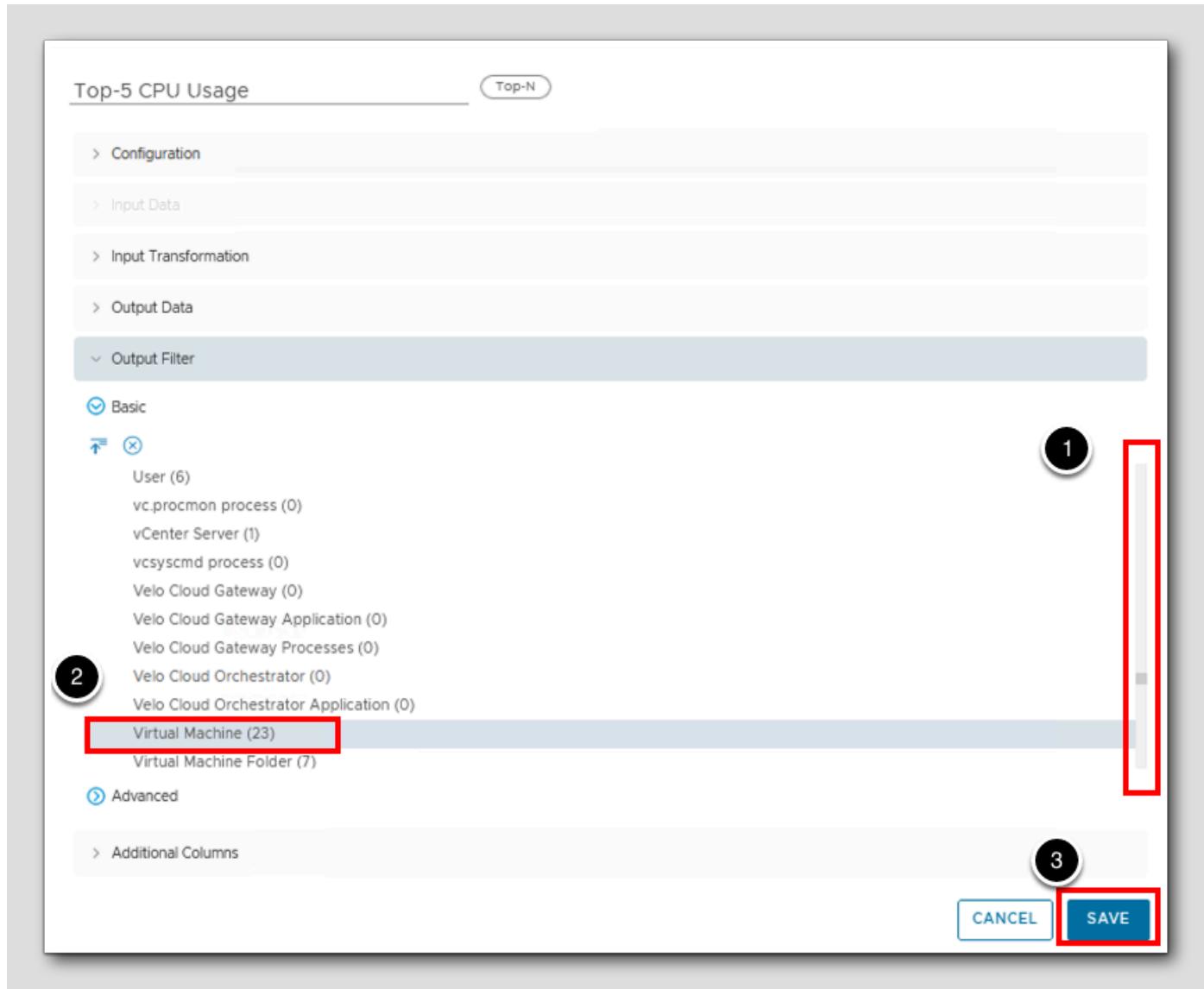
[269]

For consistency sake, we will add Virtual Machine as the Output Filter.

The screenshot shows a configuration interface for 'Top-5 CPU Usage'. At the top, there's a header bar with the title and a 'Top-N' button. Below the header is a sidebar with several sections: Configuration, Input Data, Input Transformation, Output Data, and Output Filter. The 'Output Filter' section is expanded, revealing 'Basic' and 'Advanced' tabs. Under 'Basic', there are sections for Collectors (Full Set), Business Applications (Full Set), Adapter Types, Adapter Instances, and Object Types. A red box highlights the 'Object Types' section, which is further expanded to show Active Directory, Active Directory Application, Active Directory Database, Active Directory DFS Replication, Active Directory DFSN, and Active Directory DNS, all with a count of 0. The 'Advanced' tab is also visible. At the bottom right are 'CANCEL' and 'SAVE' buttons.

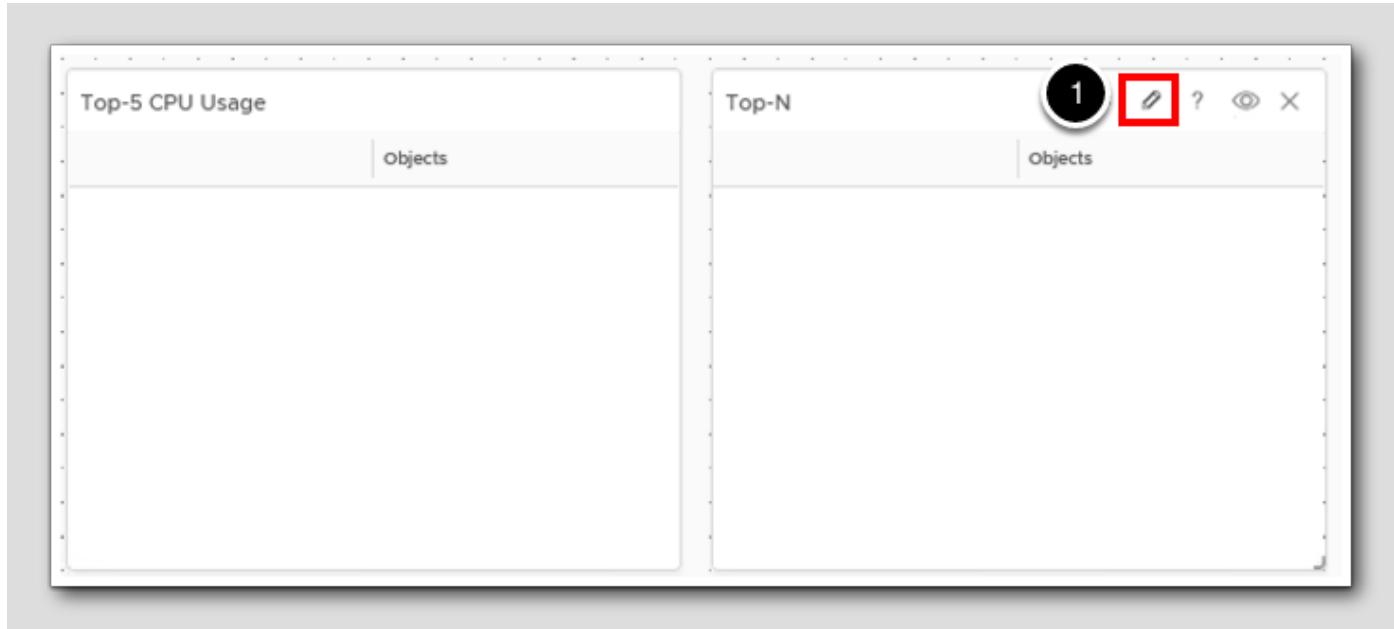
1. Expand Object Types.

## Output Filter (Continued)



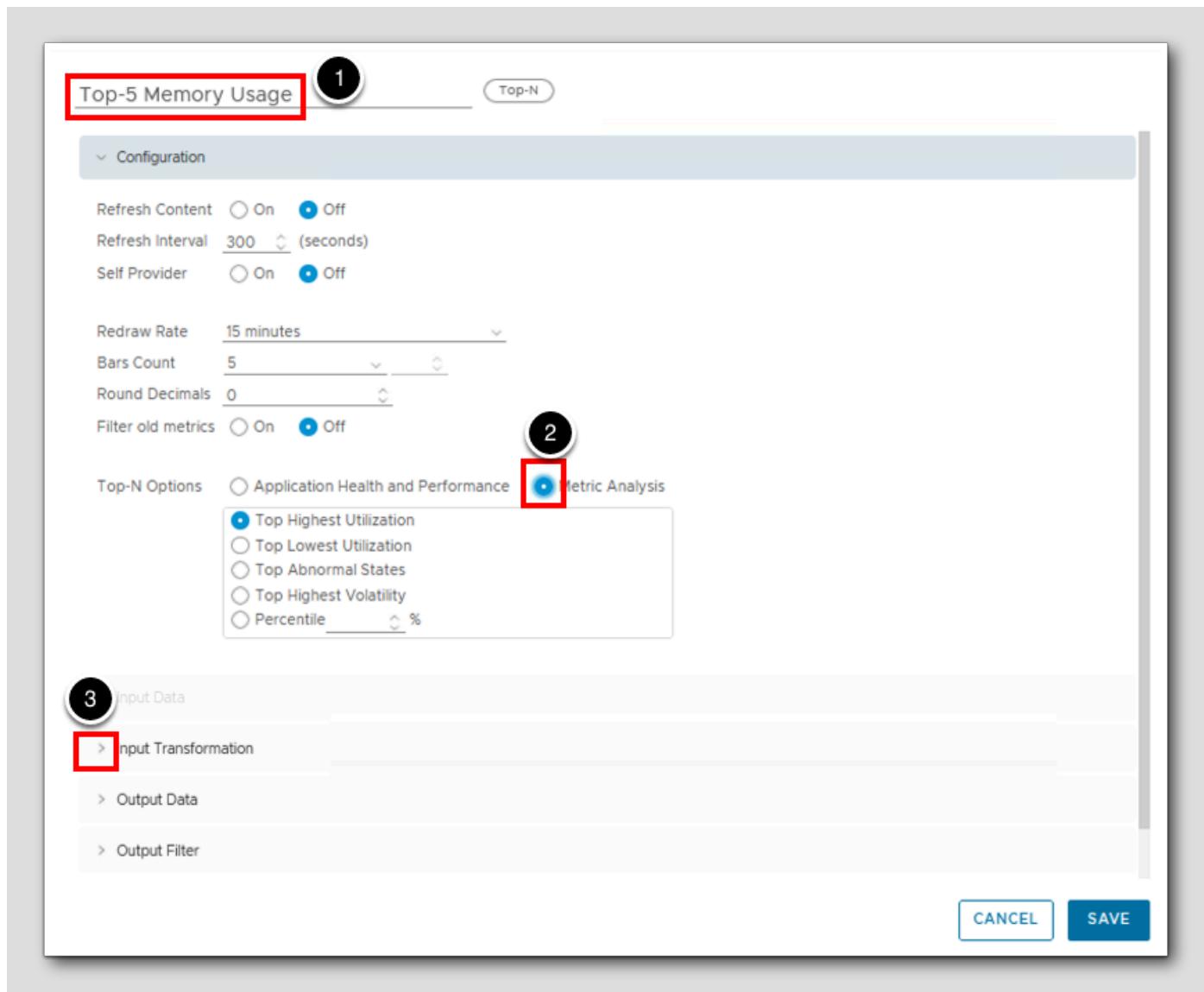
1. Scroll down until you see Virtual Machine in the Object Type list.
2. Single click on Virtual Machine Object Type.
3. Click SAVE.

## Add Memory Usage (%)



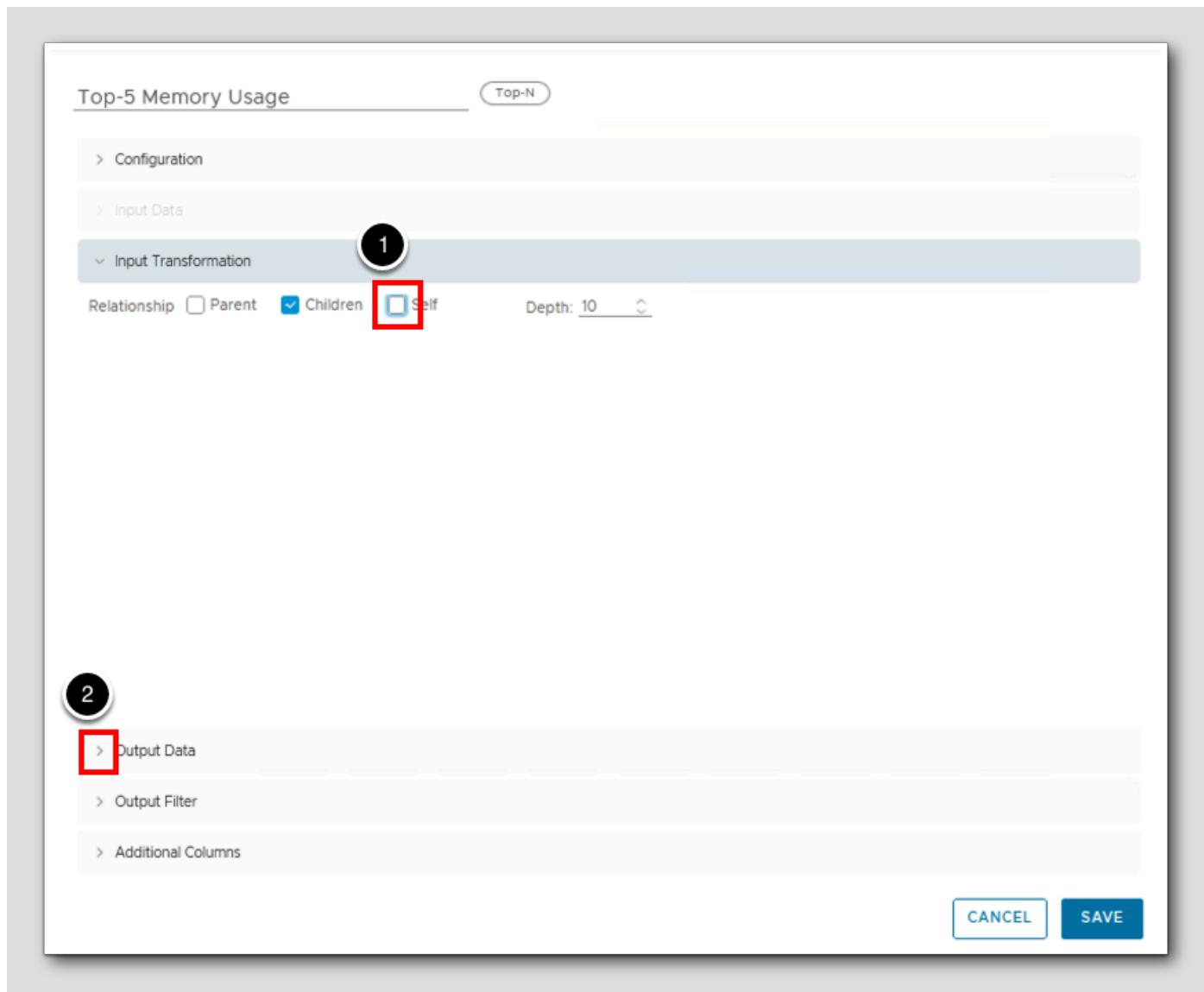
1. Hover over the middle Top-N widget and click on the pencil icon when it appears.

## Add Memory Usage (%) (Continued)



1. Change the top name to Top-5 Memory Usage.
2. Check the Metric Analysis radio button because we want to display the Memory Usage (%) metric in this widget.
3. Expand Input Transformation.

## Input Transformation



1. Uncheck the Self Input Transformation.

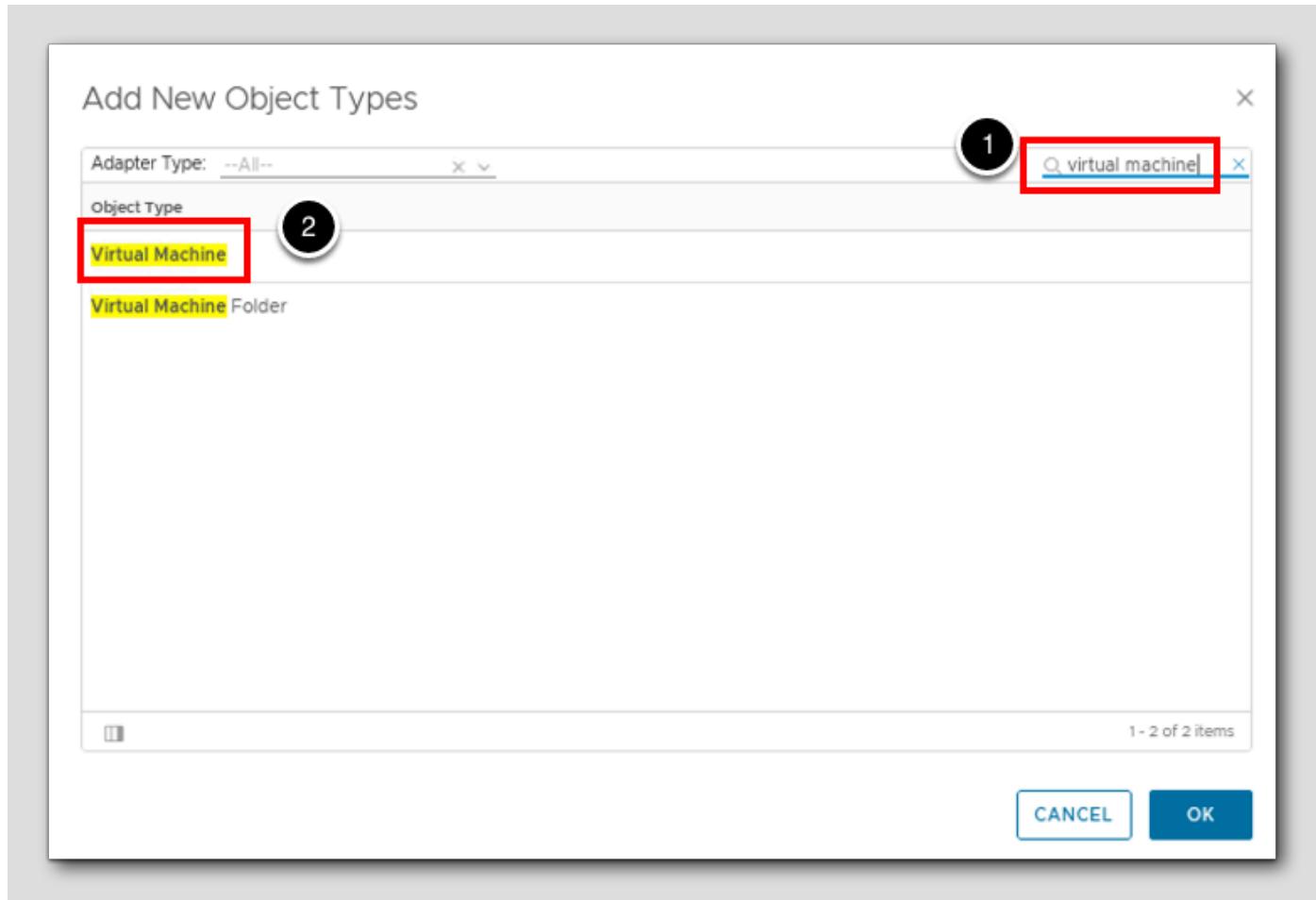
2. Expand Output Data.

## Output Data

The screenshot shows a software interface for configuring a report titled "Top-5 Memory Usage". The top navigation bar includes "Top-N" and a "Top-5 Memory Usage" section header. Below the header, there are several tabs: "Configuration", "Input Data", "Input Transformation", and "Output Data". The "Output Data" tab is currently selected, indicated by a blue background and a white "1" icon in a circle above it. A red box highlights the "+" icon in the toolbar below the tabs, which is used to add new object types. The main content area contains fields for "Metric" (with a placeholder "Please select a metric for object types above x"), "Label", "Unit", "Maximum", and "Color Method". At the bottom, there are "Output Filter" and "Additional Columns" sections, and buttons for "CANCEL" and "SAVE".

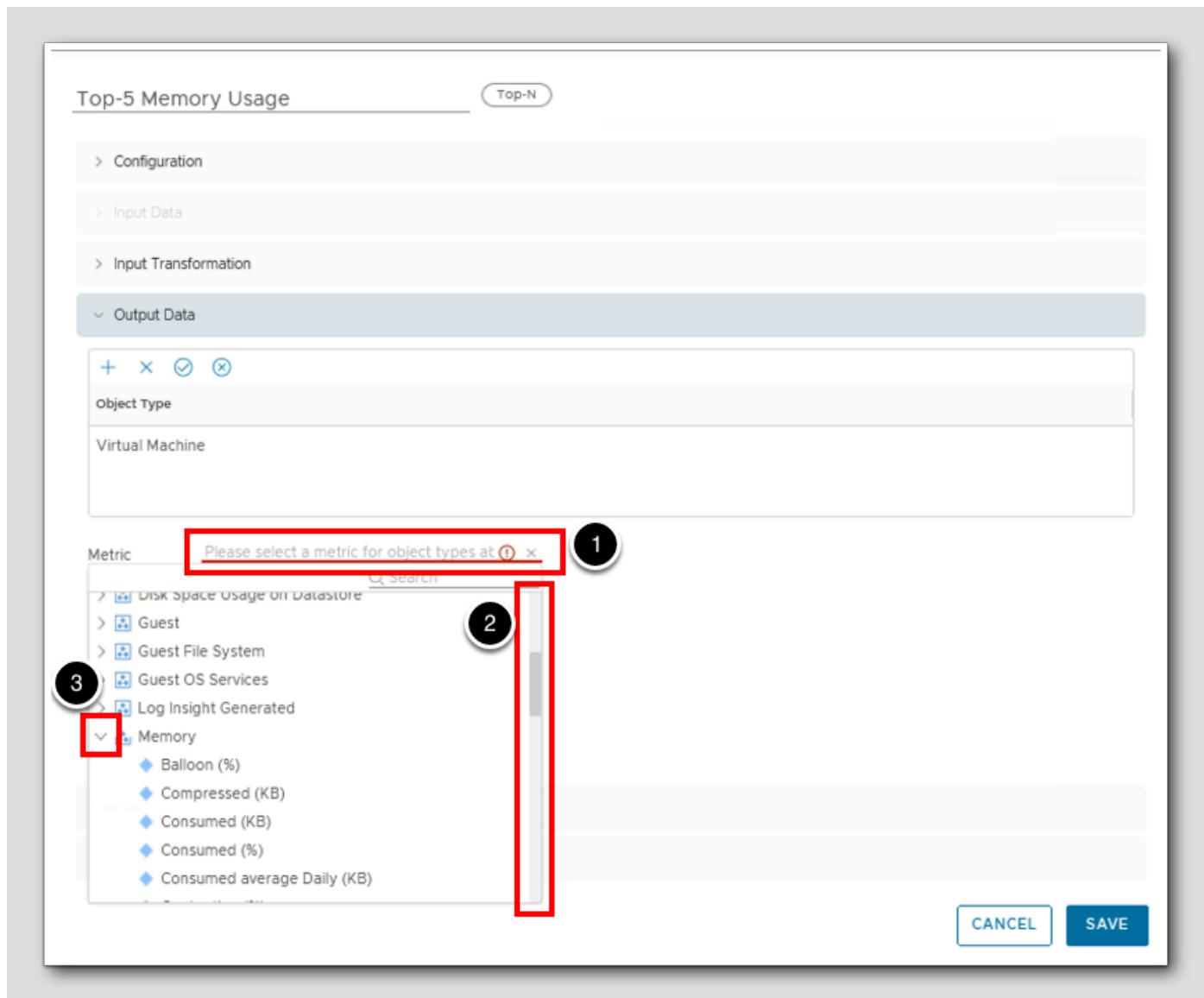
1. Click the + icon to add an Object Type.

## Add Virtual Machine Object Type



1. Type virtual machine in the top right search bar and hit Enter.
2. Double click on Virtual Machine.

## Add Memory Usage (%) (Continued)



1. Click into the Metric search line.
2. Scroll down until you see the **Memory** metric list.
3. Expand the **Memory** metric list.

## Add Memory Usage (%) (Continued)

The screenshot shows a configuration interface for 'Top-5 Memory Usage'. The 'Output Data' section is selected. A dropdown menu is open under 'Object Type' with 'Virtual Machine' listed. Below this, a list of metrics is shown, with 'Usage (%)' highlighted by a red box and a red circle labeled '2'. A red vertical rectangle labeled '1' highlights the scroll bar area of the dropdown menu.

Top-5 Memory Usage

Object Type

Virtual Machine

Metric Please select a metric for object types at ① x

- Host Demand (KB)
- Non Zero Active (KB)
- Overhead (KB)
- Overhead Max (KB)
- Reservation Used (KB)
- Swap In Rate (Kbps)
- Swap Out Rate (Kbps)
- Swapped (KB)
- Total Capacity (KB)
- Usage (%)**
- Utilization (KB)

CANCEL SAVE

1. Scroll down until you see the Usage (%) metric.
2. Double click on the Usage (%) metric.

## Add Memory Usage (%) (Continued)

Top-5 Memory Usage Top-N

> Configuration

> Input Data

> Input Transformation

< Output Data

+ × ○ ✖

Object Type

Virtual Machine

Metric: MemoryUsage (%) 1

Label: Memory Usage 2

Unit: % 3

Unit: 100 4

Maximum: Custom 5

Color Method: 75 6

Color Method: 85 7

Color Method: 95 8

9 Output Filter

> Additional Columns

CANCEL SAVE

1. Enter **Memory Usage** for the **Label**.
2. Change the unit to **%**.
3. Enter **100** for the **Maximum** value, this will set the graph bar to max out at a value of 100.
4. Change **Color Method** to **Custom**.
5. Enter **75** for **Yellow Bound**.
6. Enter **85** for **Orange Bound**.
7. Enter **95** for **Red Bound**.
8. Expand **Output Filter**.

## Output Filter

The screenshot shows a configuration interface for 'Top-5 Memory Usage'. On the left, there's a sidebar with several sections: Configuration, Input Data, Input Transformation, Output Data, and Output Filter. The 'Output Filter' section is expanded, revealing 'Basic' and 'Advanced' tabs. Under 'Basic', there are sections for Collectors, Business Applications, Adapter Types, Adapter Instances, and Object Types. The 'Object Types' section is expanded, showing Active Directory, Active Directory Application, Active Directory Database, Active Directory DFS Replication, Active Directory DFSN, and Active Directory DNS, all with a count of 0. A red box highlights the 'Object Types' section, and a circled '1' is placed over the 'Collectors' section. At the bottom right are 'CANCEL' and 'SAVE' buttons.

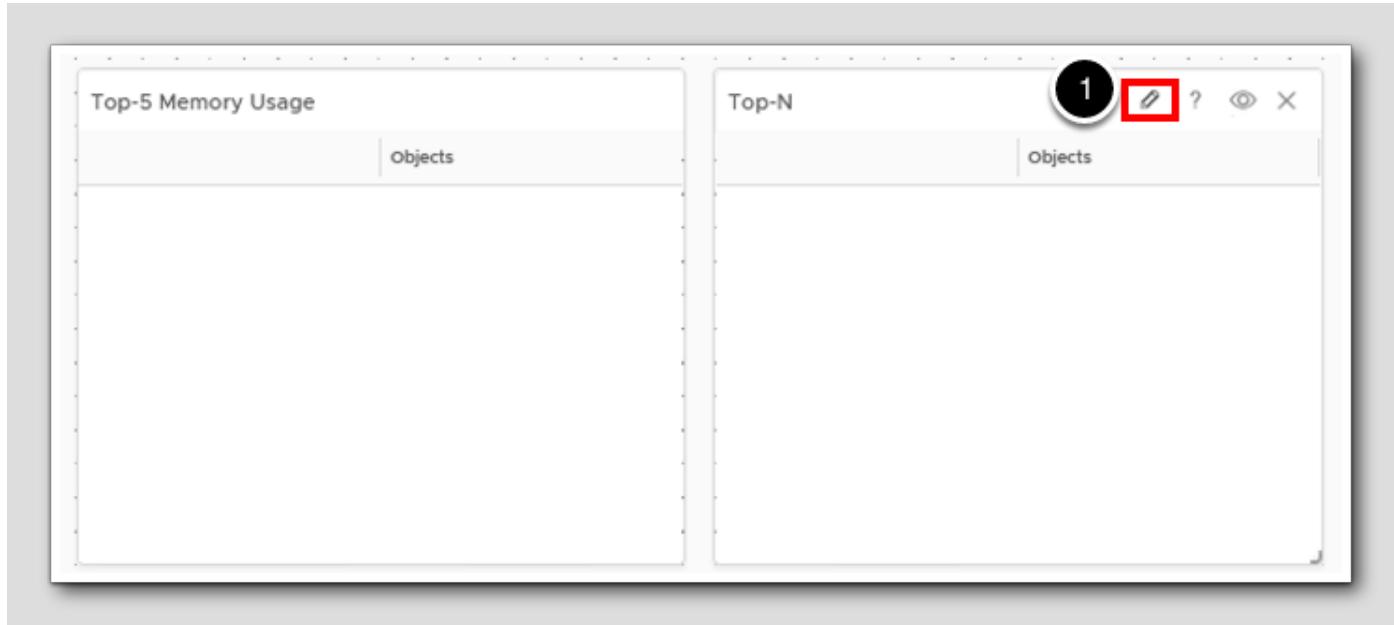
1. Expand Object Types.

## Output Filter (Continued)

The screenshot shows a configuration dialog titled "Top-5 Memory Usage" with a "Top-N" button. The "Output Filter" section is expanded, showing the "Basic" tab selected. Under "Basic", there is a list of object types with their counts: vCenter Server (1), vcsyscmd process (0), Velo Cloud Gateway (0), Velo Cloud Gateway Application (0), Velo Cloud Gateway Processes (0), Velo Cloud Orchestrator (0), Velo Cloud Orchestrator Application (0), Virtual Machine (23), Virtual Machine Folder (7), and VMC Organization (0). The "Virtual Machine" item is highlighted with a blue selection bar. Below the list, the "Advanced" tab is shown with the "Additional Columns" option. At the bottom right are "CANCEL" and "SAVE" buttons.

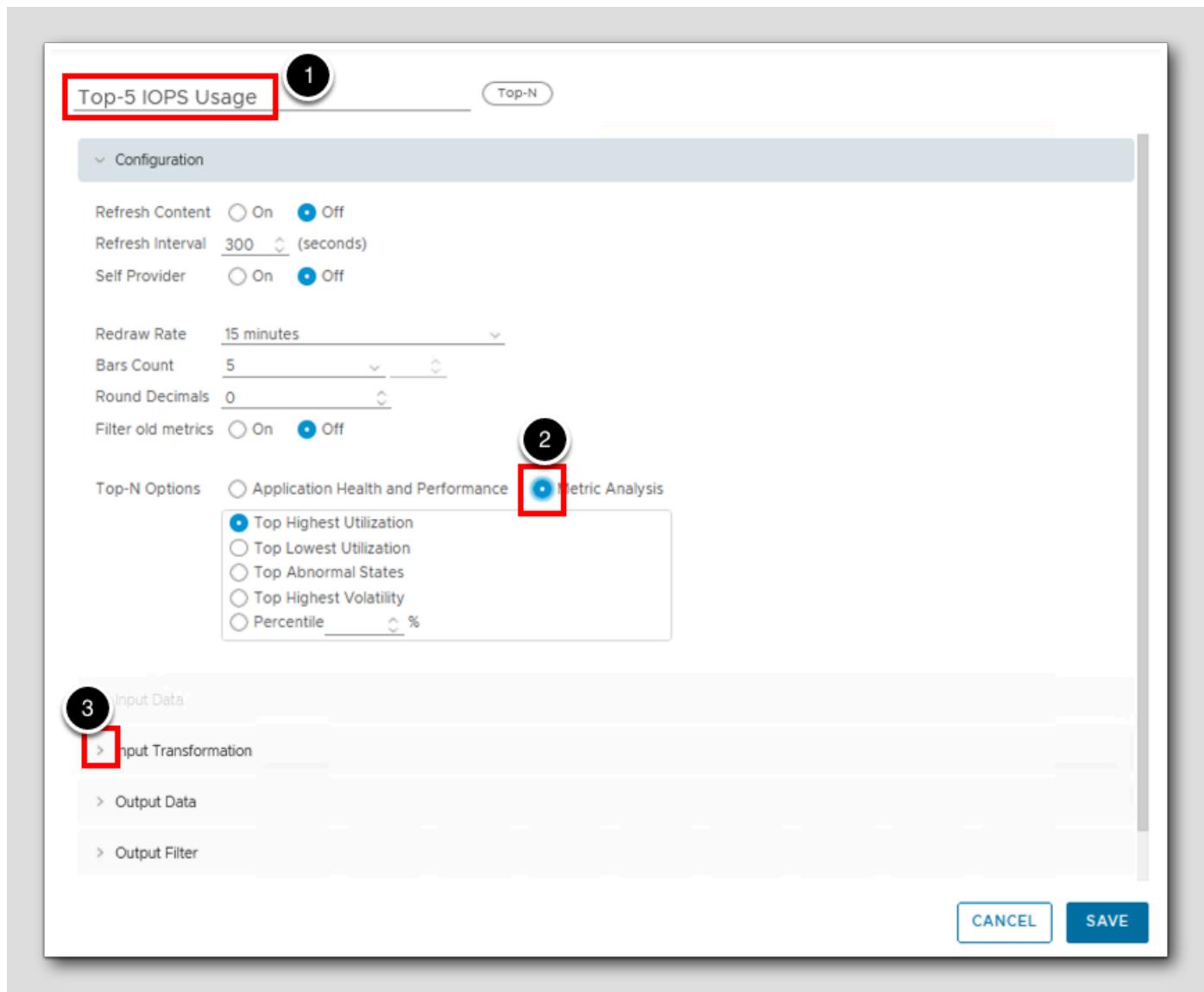
1. Scroll down until you see Virtual Machine in the Object Type list.
2. Single click on Virtual Machine Object Type.
3. Click SAVE.

## Configure Top-5 Storage Usage



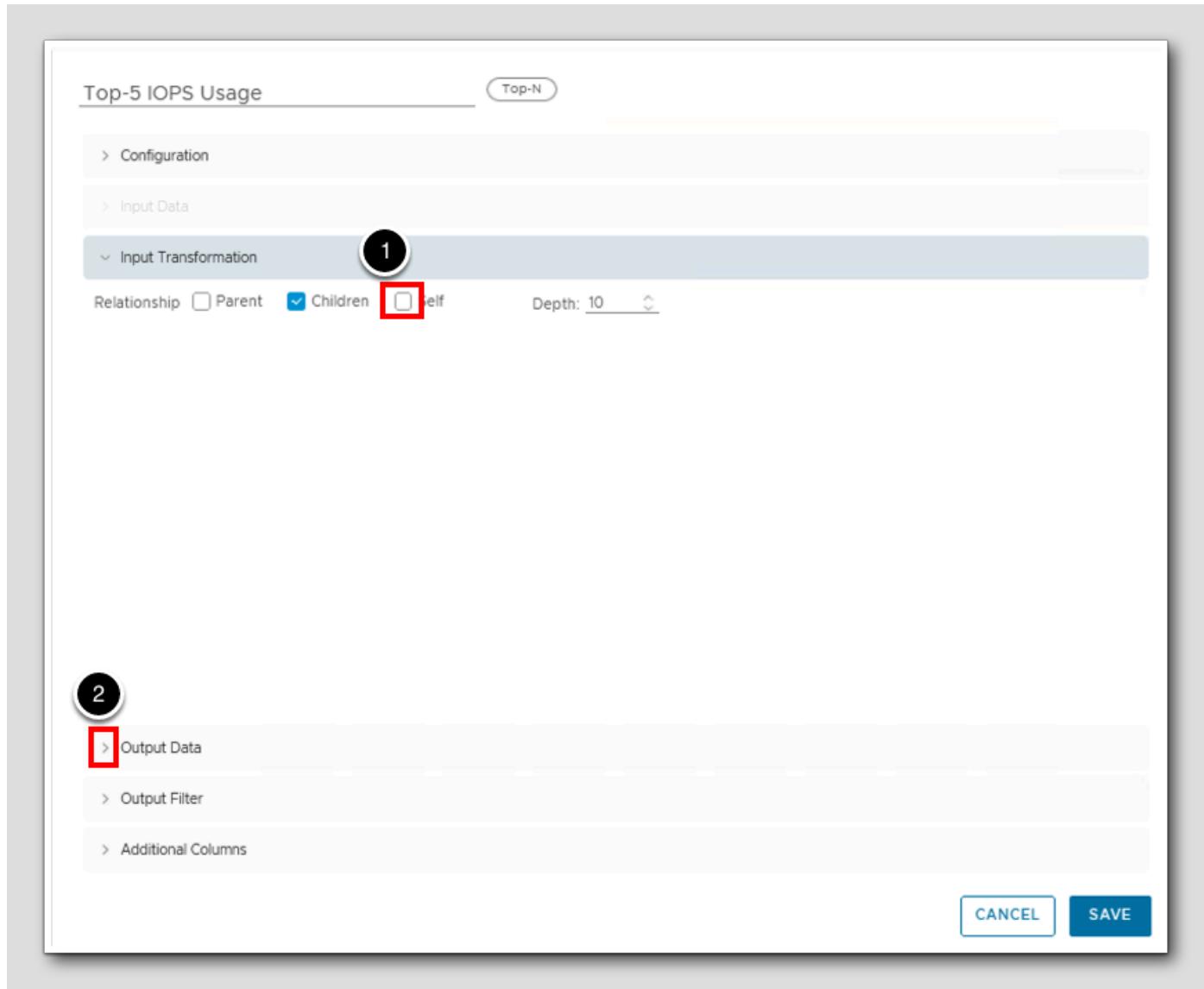
1. Hover over the far right Top-N widget and click on the pencil icon when it appears.

## Add Storage IOPS



1. Change the top name to Top-5 IOPS Usage.
2. Check the Metric Analysis radio button because we want to display the Highest IOPS of all instances metric in this widget.
3. Expand Input Transformation.

## Input Transformation



1. Uncheck the Self Input Transformation.

2. Expand Output Data.

## Output Data

Top-5 IOPS Usage Top-N

> Configuration

> Input Data

> Input Transformation

1 > Output Data

**Object Type**

**Metric** Please select a metric for object types at ①

Label

Unit

Maximum

Color Method

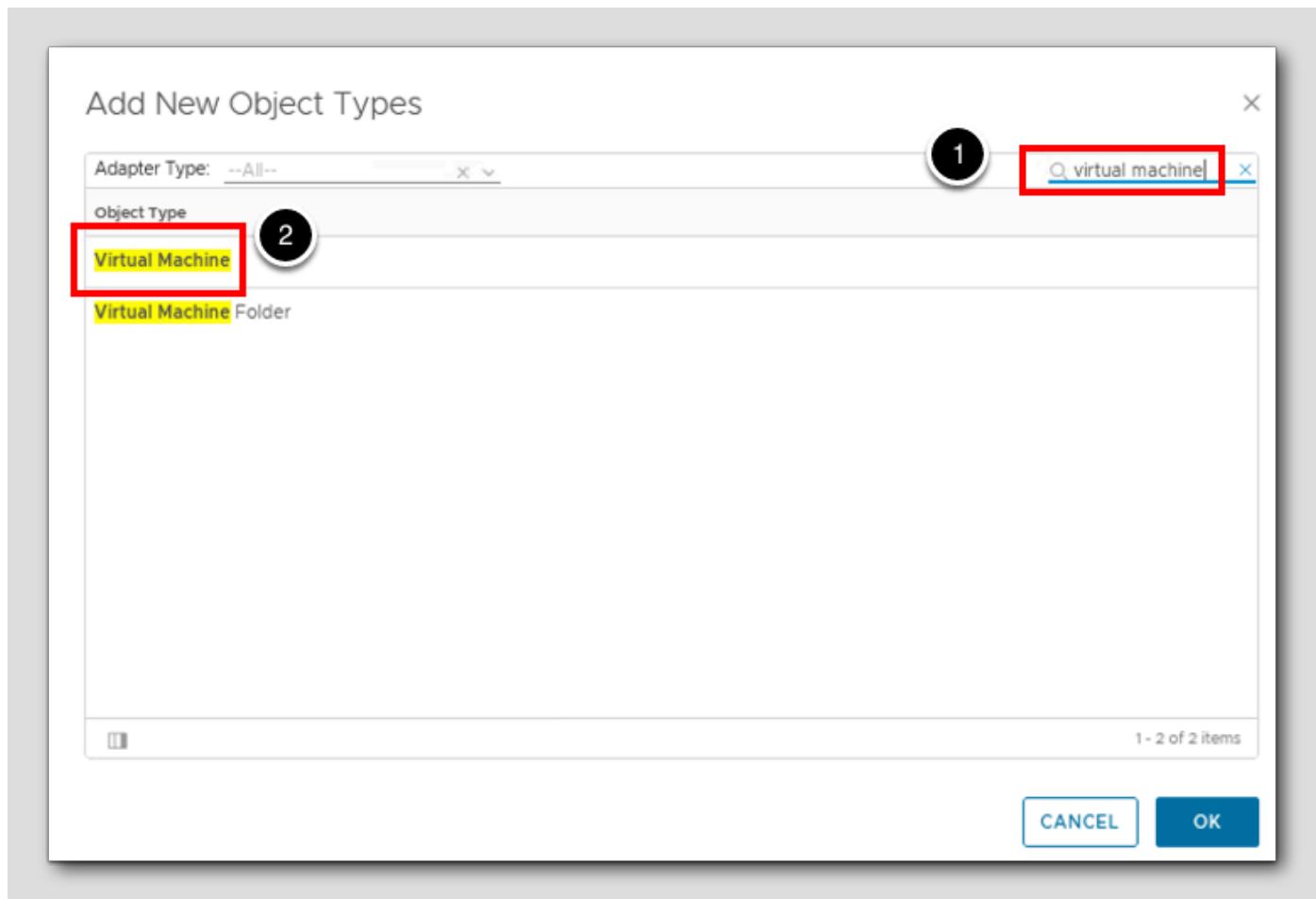
> Output Filter

> Additional Columns

CANCEL SAVE

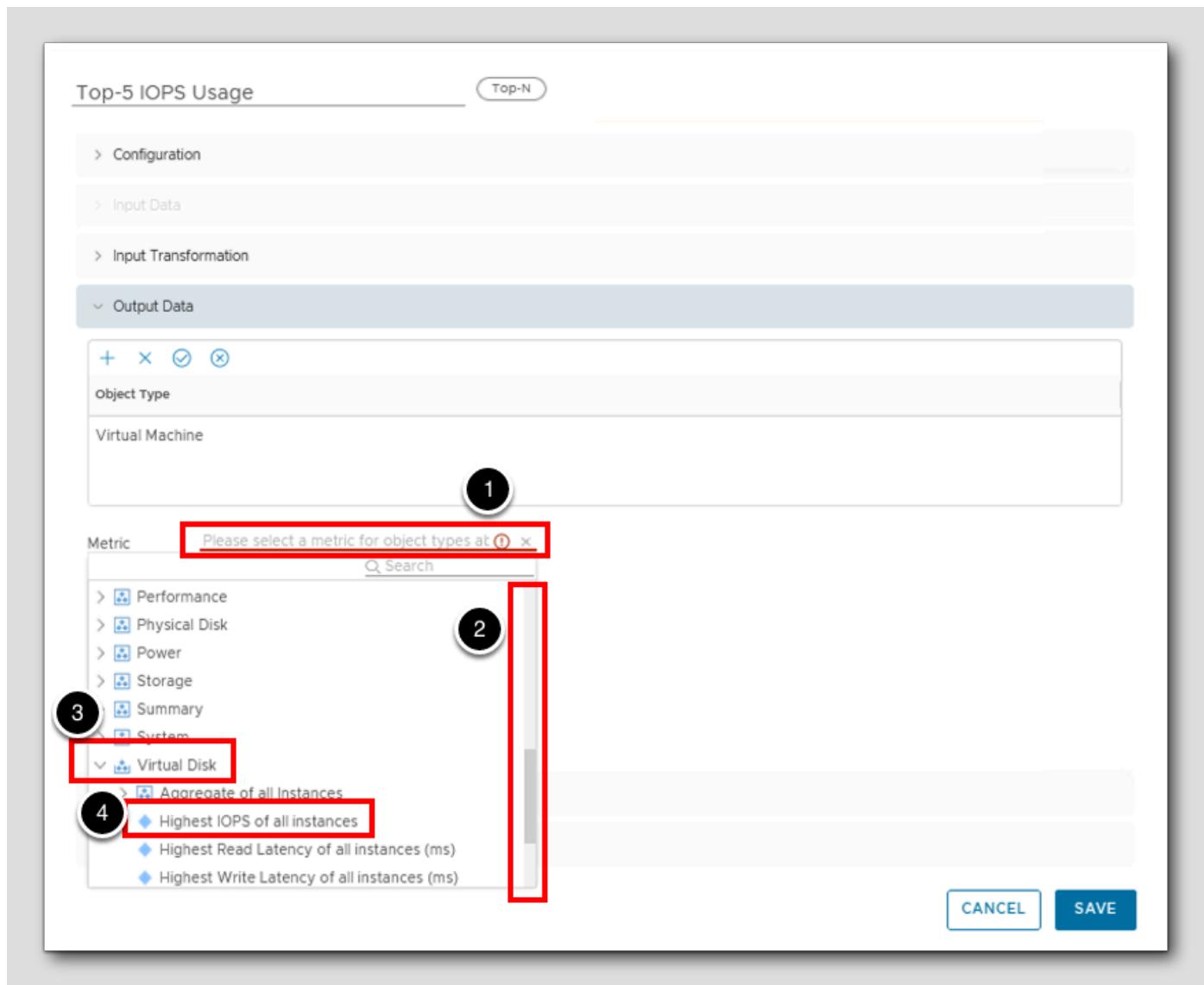
1. Click the + icon to add an Object Type.vir

## Add Virtual Machine Object Type



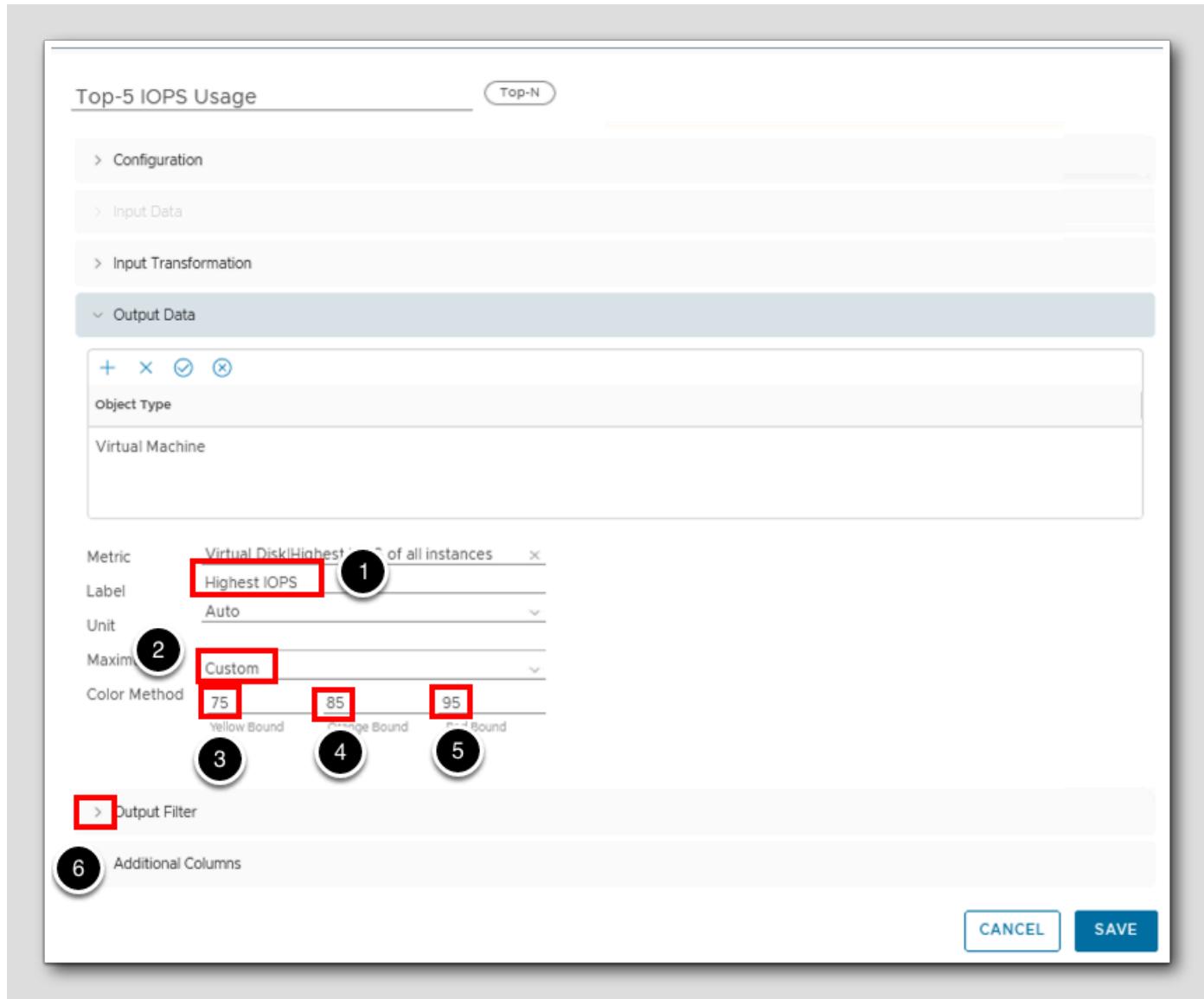
1. Type virtual machine in the top right search bar.
2. Double click on Virtual Machine.

## Add Storage IOPS (Continued)



1. Click into the Metric search line.
2. Scroll down until you see the Virtual Disk metric list.
3. Expand the Virtual Disk metric list.
4. Double click on the Highest IOPS of all instances metric.

## Add Storage IOPS (Continued)



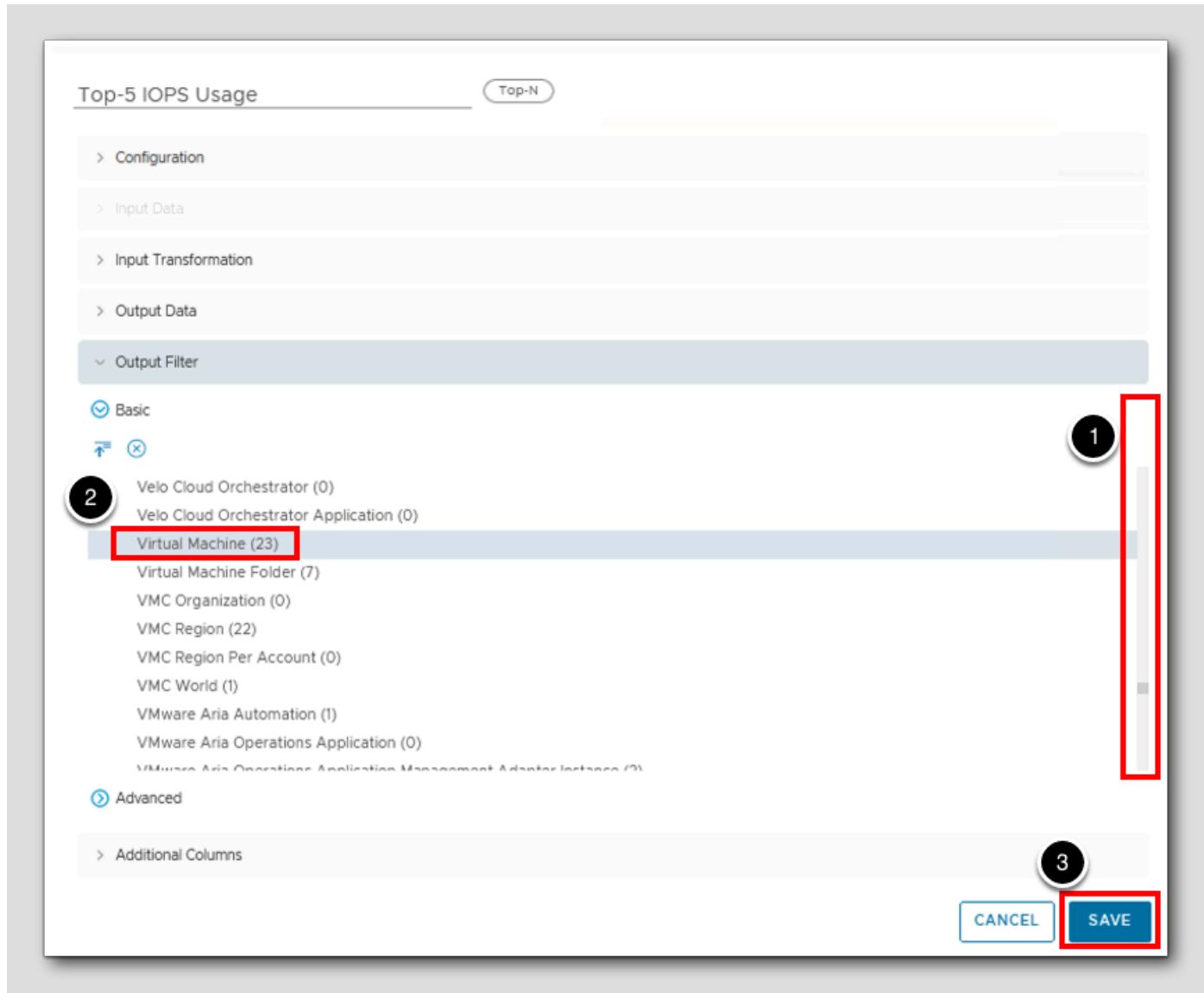
1. Enter Highest IOPS for the Label.
2. Change Color Method to Custom.
3. Enter 75 for Yellow Bound.
4. Enter 85 for Orange Bound.
5. Enter 95 for Red Bound.
6. Expand Output Filter.

## Output Filter

The screenshot shows a software interface for managing IOPS usage. At the top, it says "Top-5 IOPS Usage" and "Top-N". The left sidebar has several sections: Configuration, Input Data, Input Transformation, Output Data, and Output Filter (which is expanded). Under Output Filter, there are two tabs: Basic (selected) and Advanced. In the Basic tab, there are sections for Collectors (Full Set), Business Applications (Full Set), Adapter Types, Adapter Instances, and Object Types. A red box highlights the "Object Types" dropdown, which is currently set to "Active Directory (0)". Other options listed include Active Directory Application (0), Active Directory Database (0), Active Directory DFS Replication (0), Active Directory DFSN (0), and Active Directory DNS (0). At the bottom right are "CANCEL" and "SAVE" buttons.

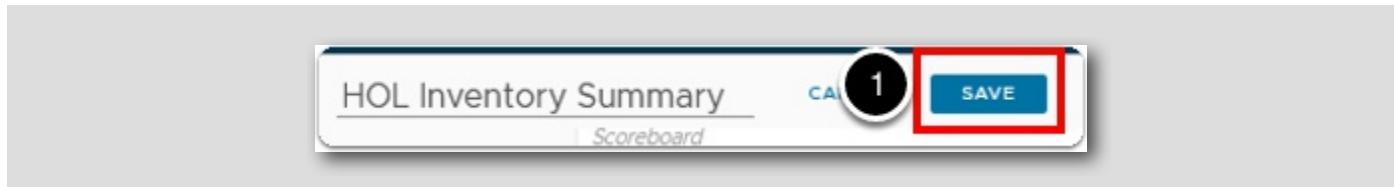
1. Expand Object Types.

## Output Filter (Continued)



1. Scroll down until you see Virtual Machine in the Object Type list.
2. Single click on Virtual Machine Object Type.
3. Click SAVE.

Edit Dashboard - Save



1. Click on the **SAVE** button at the top of the dashboard to save our changes to the dashboard.

## HOL Inventory Summary - Modified Dashboard

[291]

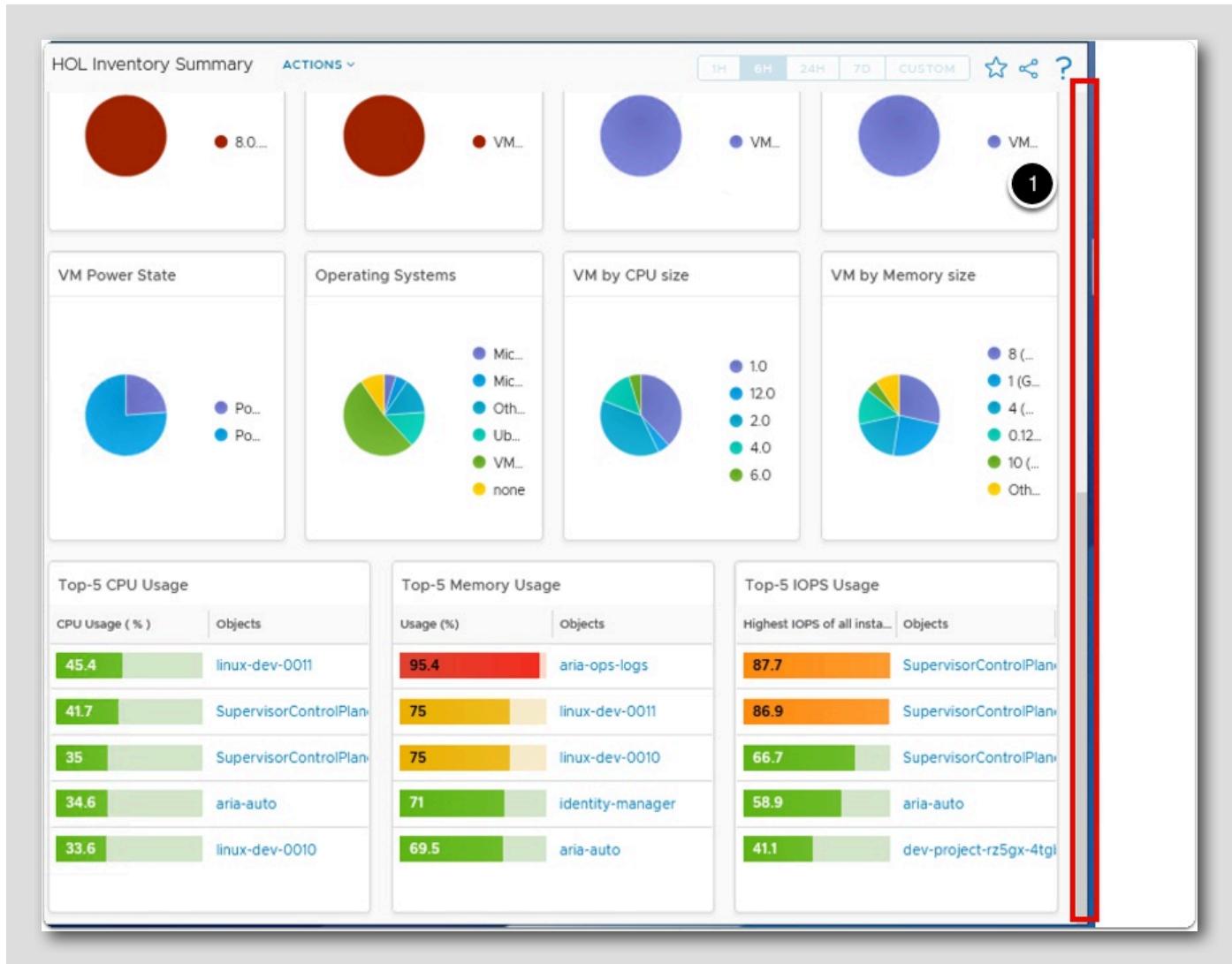
The screenshot displays the HOL Inventory Summary - Modified Dashboard. At the top, there's a summary section with counts for Total VM (18), Running VM (16), Hosts (5), Clusters (2), Datastores (7), and Datacenters (1). Below this are three main sections: Datacenters, Compute, and Storage, each containing detailed tables.

- Datacenters:** Shows two rows: "vSphere World" with 2 clusters and "RegionA01" with 2 clusters. The "RegionA01" row is highlighted with a red box and a red circle labeled '2'.
- Compute:** Shows two rows: "Management" with 41.9 GHz CPU Capacity and "Workload1" with 25.14 GHz CPU Capacity.
- Storage:** Shows one row: "RegionA01-ISCSI01" with 0.24 TB capacity.

At the bottom, there are four donut charts representing ESXi version (8.0...), Server Model (VM...), Server Vendor (VM...), and Datastore Type (VM...).

1. Scroll to the top of the HOL Inventory Dashboard.
2. Click on the RegionA01 row (not on the RegionA01 text).

## Completed Dashboard



1. Drag the scroll bar down to the very bottom of the dashboard.

We can now see the Top-N widgets we added each showing the top consumers of CPU, Memory and IOPS.

## Lesson End

Congratulations, we just completed the **Clone and Modify Existing Dashboards** lesson!

In this lesson, we started out by cloning the Inventory Summary dashboard and then customized the cloned dashboard. We added three Top-5 widgets to show the top CPU, Memory and IOPS troublemakers.

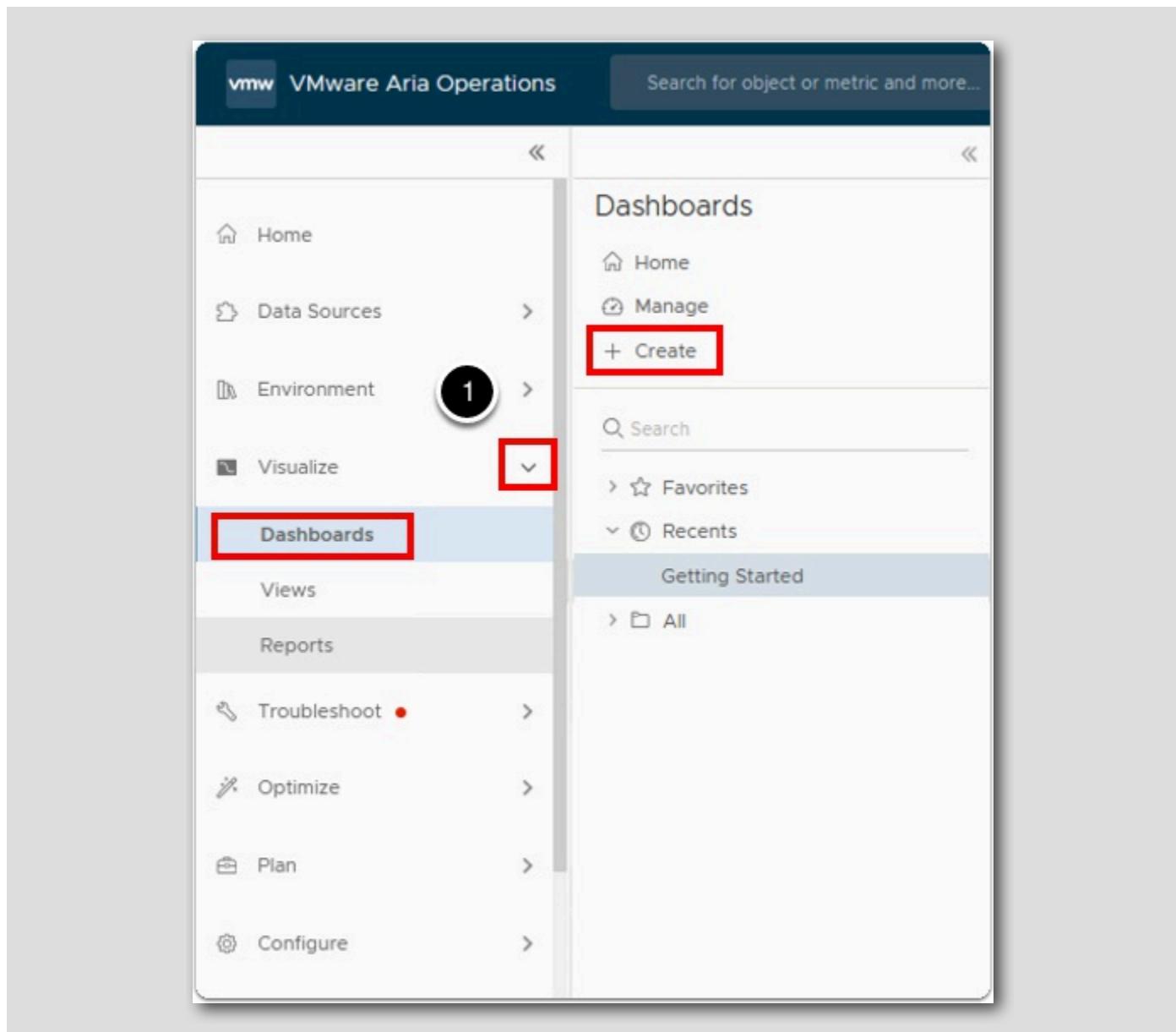
## Creating a New Custom Dashboard

In this lesson, we will learn how to create a new dashboard from scratch.

We will create a brand new dashboard from scratch that will contain an Object List for a list of virtual machines. We will then add the following widgets to the dashboard as well:

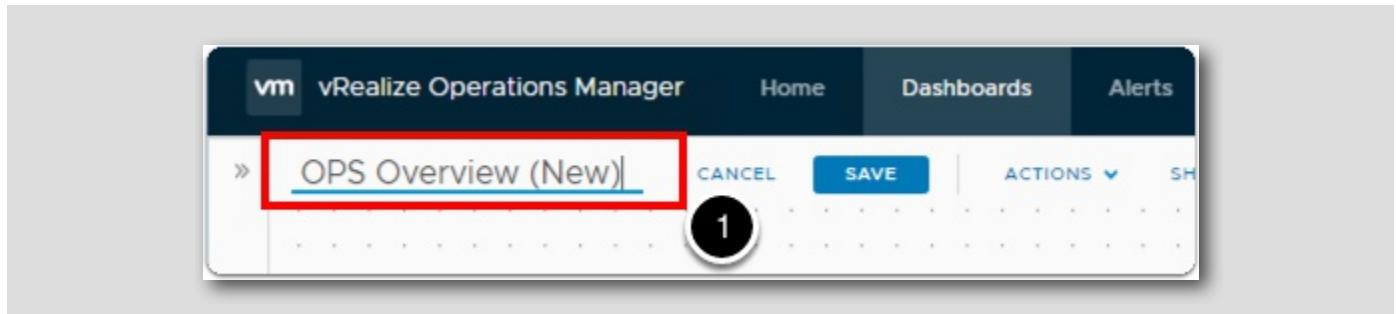
- Object Relationship Topology
- Top Alerts
- Health Heat Map
- Top-N for CPU
- Top-N for Memory
- Top-N for Disk Space

## Dashboards



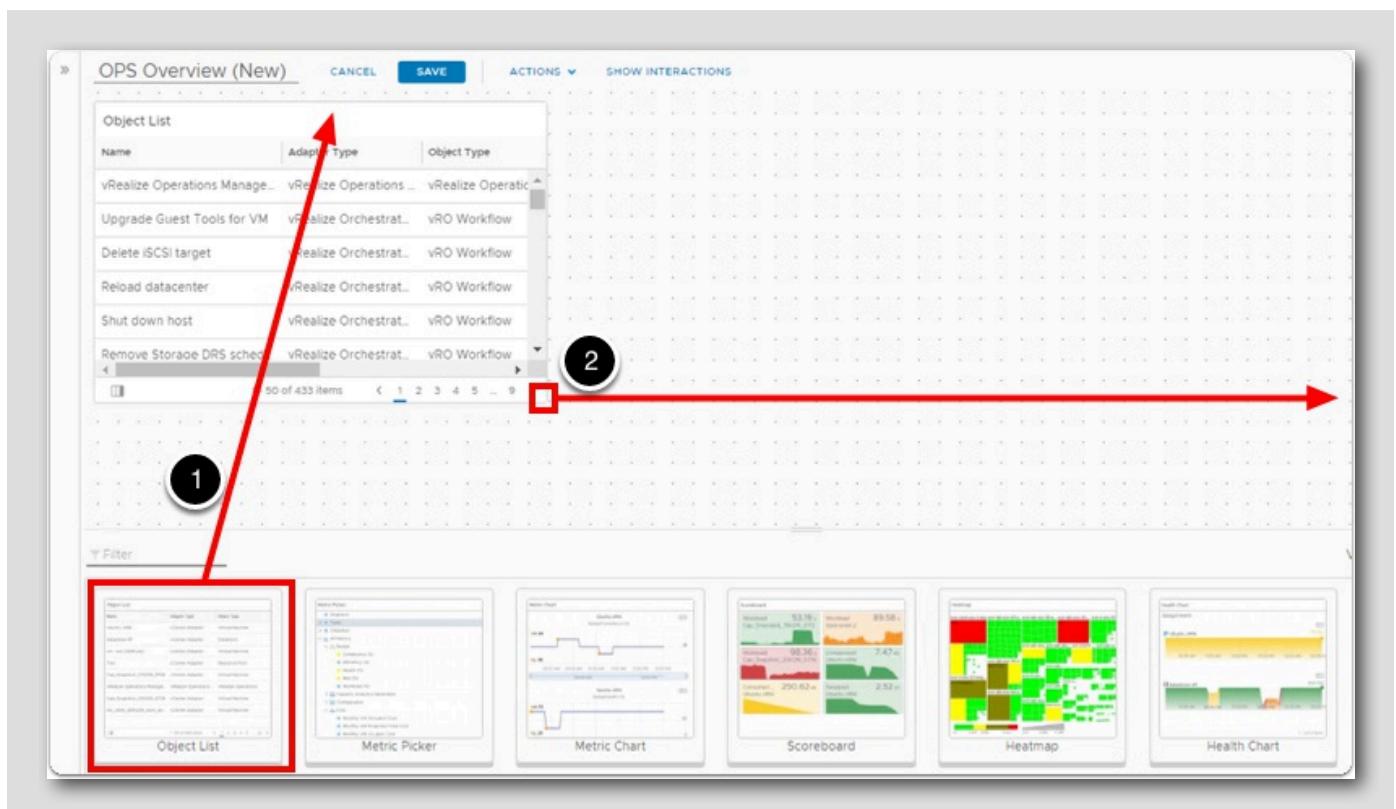
1. Expand **Visualize** from the left hand toolbar.
2. Click on **Dashboards**.
3. Click **+ Create**.

## Create Dashboard - Name



1. Replace the New Dashboard text with OPS Overview (New) in the name text field.

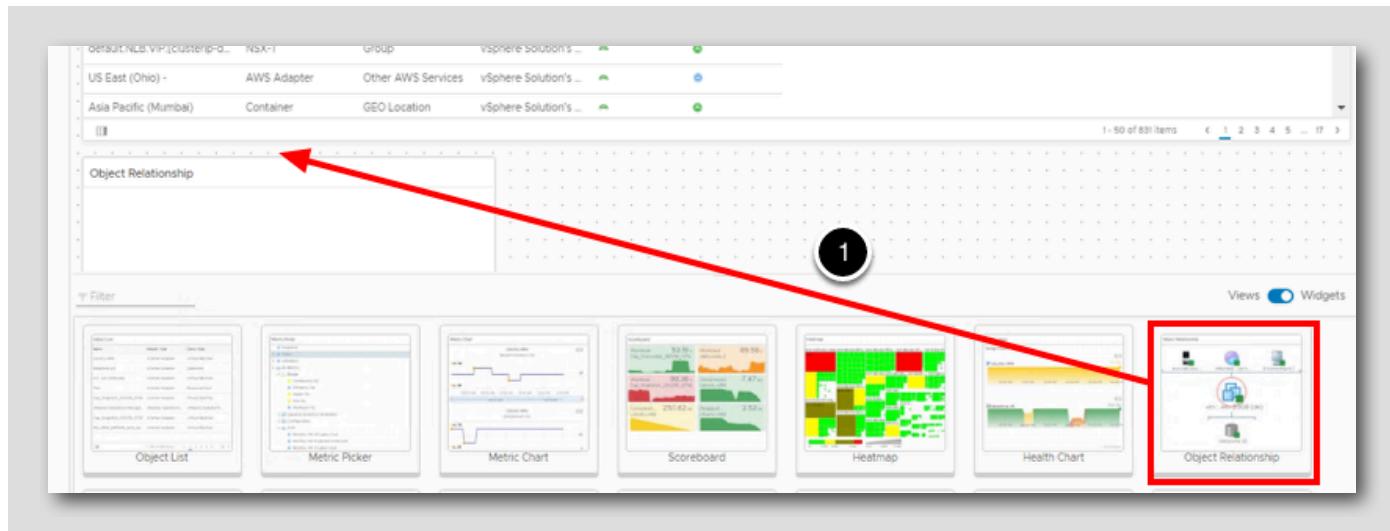
## Create Dashboard - Object List



1. Click on and drag the Object List widget to the left side of the open space.
2. Click on the lower right-hand corner of the widget and drag it all the way to the right of the dashboard interface.

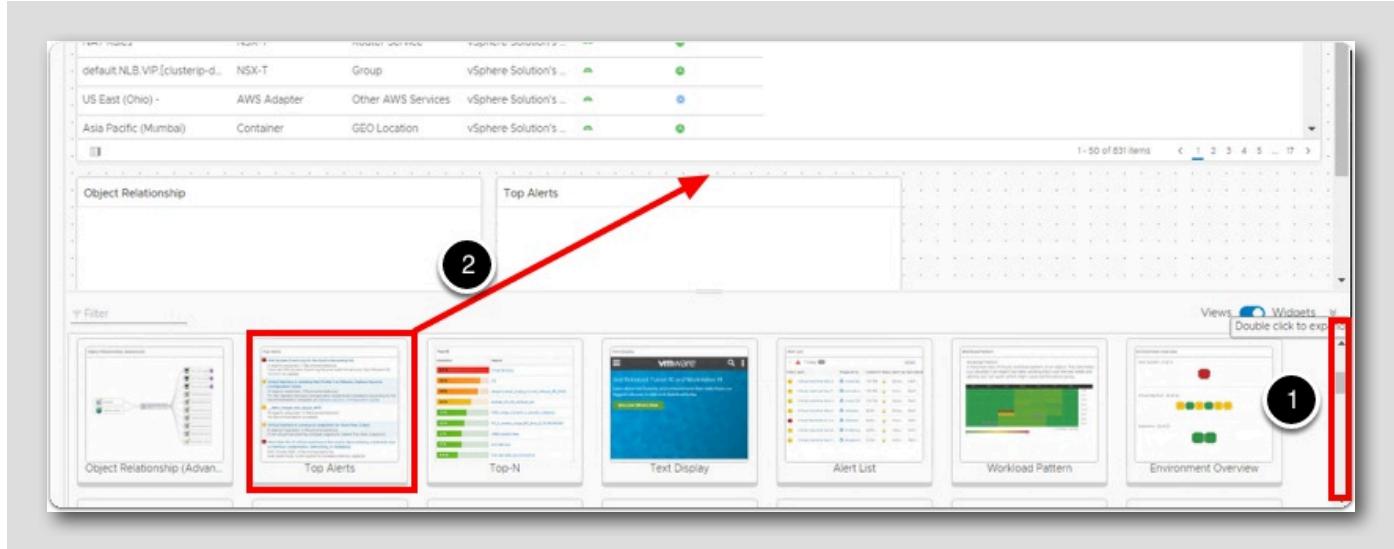
## Create Dashboard - Object Relationship

[298]



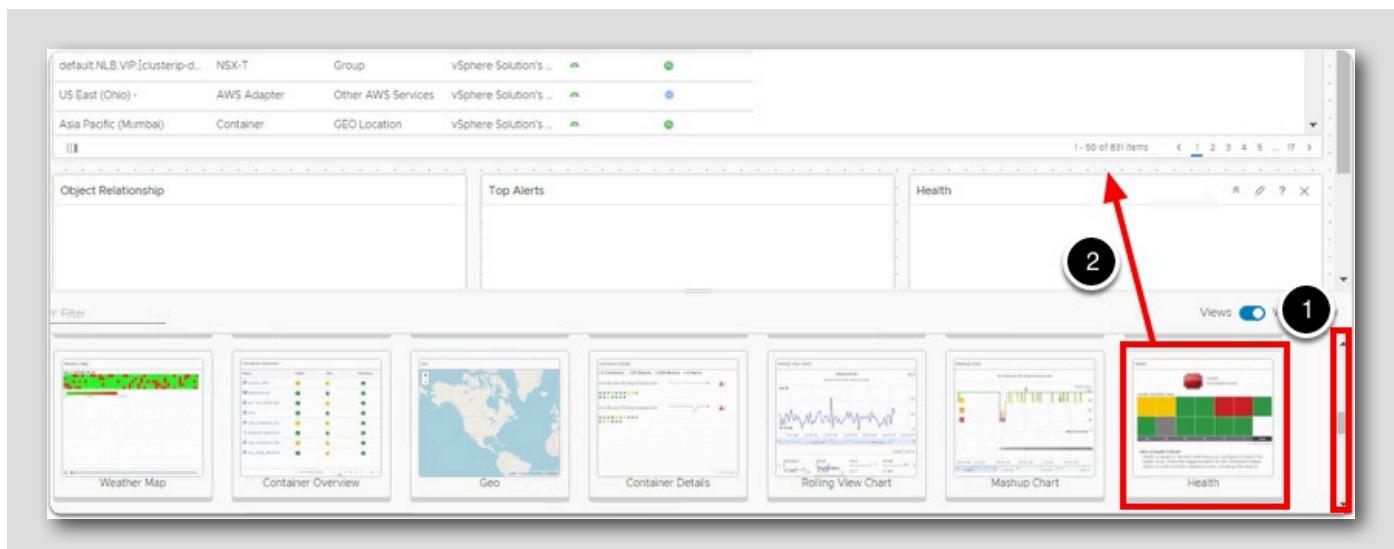
1. Click on and drag the Object Relationship widget to the left most column in the open space below the Object List widget. (You may need to scroll down a level to see it.)

## Create Dashboard - Top Alerts



1. Drag the scroll bar down until we see the Top Alerts widget in the list. (*should be the second row of new widgets*)
2. Click on and drag the Top Alerts widget to the middle column in the open space below the Object List widget.

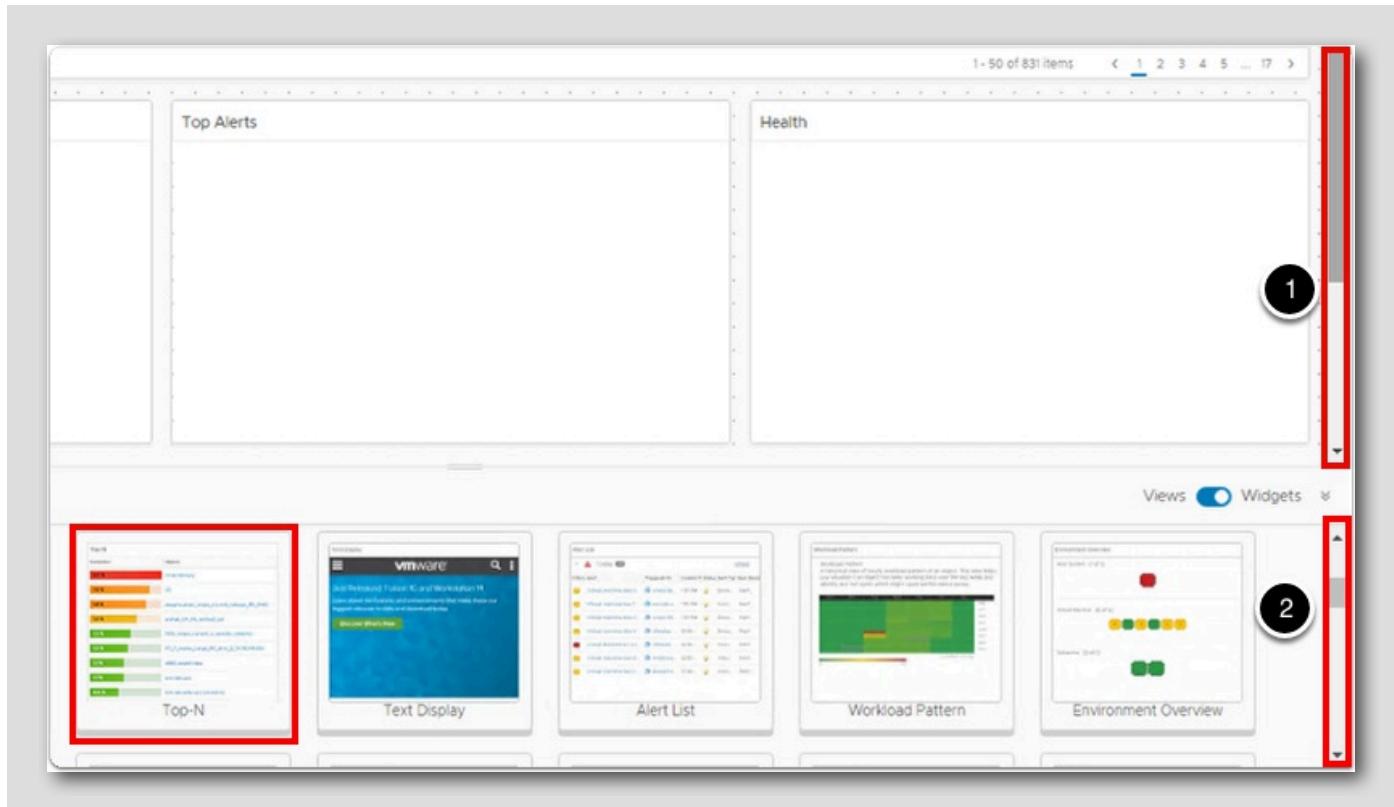
## Create Dashboard - Health



1. Drag the scroll bar down until we see the Health widget in the list. (*should be on the fourth or fifth row of new widgets*)
2. Click on and drag the Health widget (*not the Scoreboard Health widget*) to the far right column in the open space below the Object List widget.

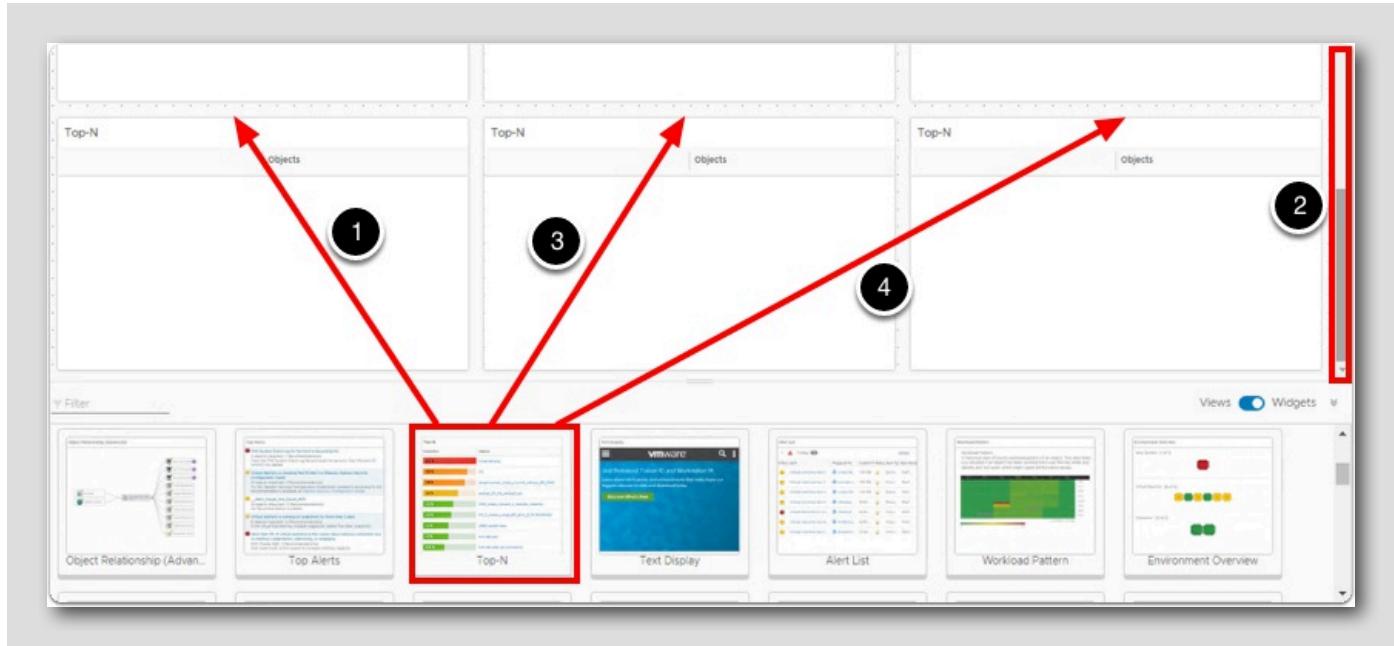
## Create Dashboard - Top-N

[301]



1. Drag the scroll bar all the way down to the bottom.
2. Drag the widgets scroll bar up until we can see the Top-N widget in the second row of widgets.

## Create Dashboard - Top-N



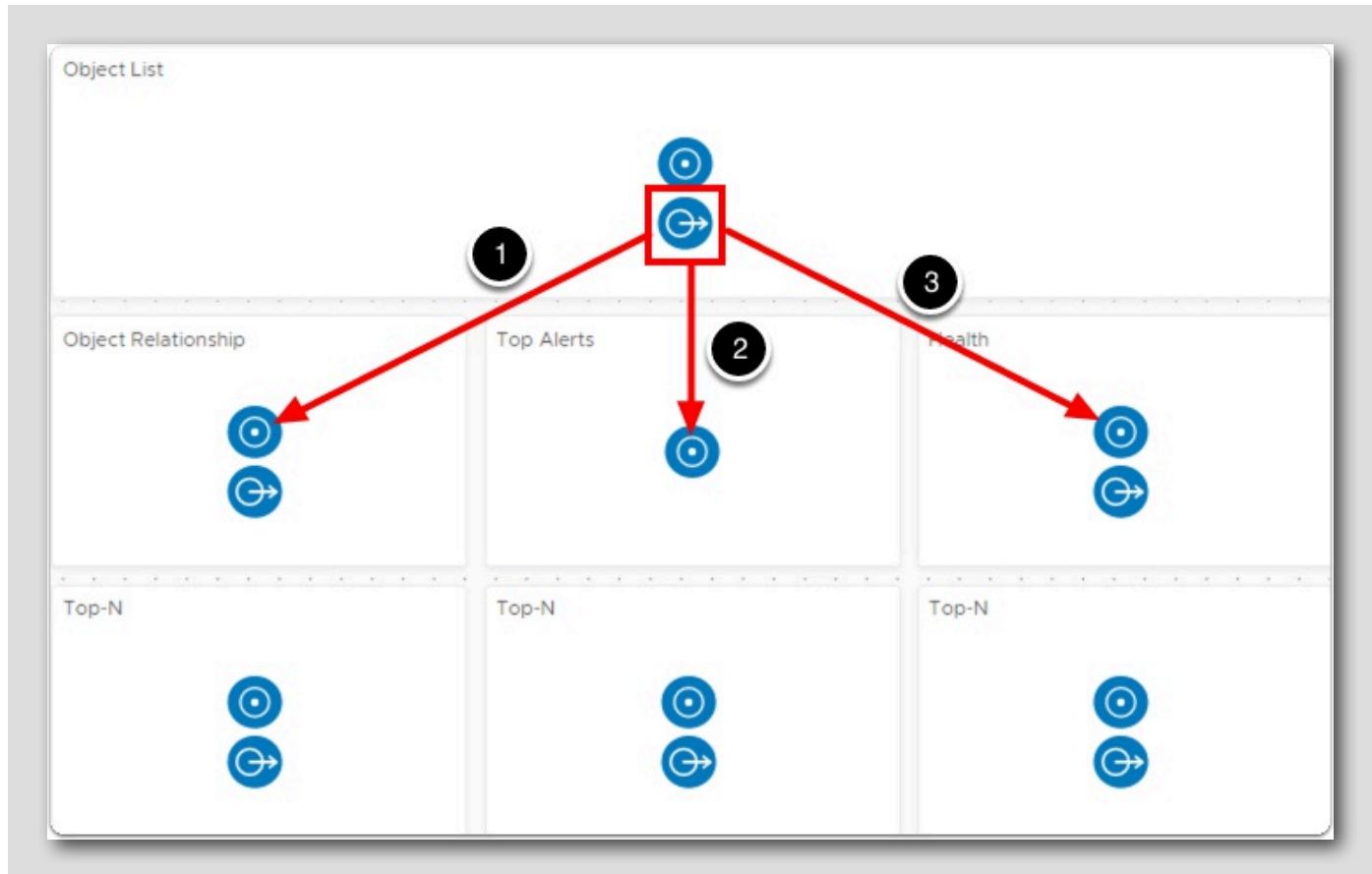
1. Click on the Top-N view and drag it to the left column.
2. Drag the scroll bar all the way down to the bottom so we can see the new Top-N view.
3. Click on the Top-N view and drag it to the middle column.
4. Click on the Top-N view and drag it to the right column.

## Create Dashboard - Show Interactions



1. Click on SHOW INTERACTIONS text link at the top of the user interface.

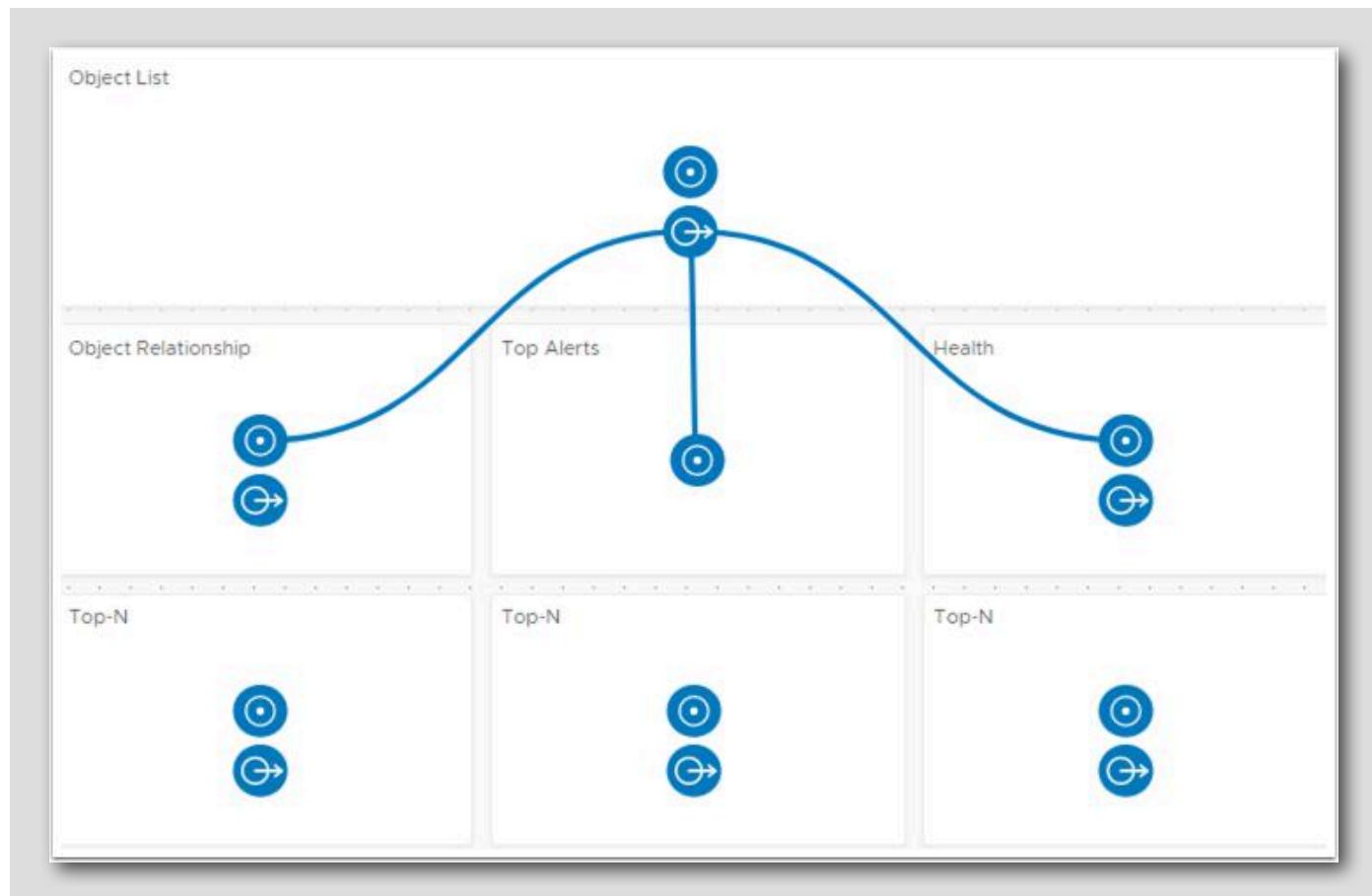
## Create Dashboard - Create Relationships



We now have to create the relationships between the widgets. We want to be able to click on a virtual machine in the Object List widget and have the rest of the widgets present the data associated with what we selected in the Object List.

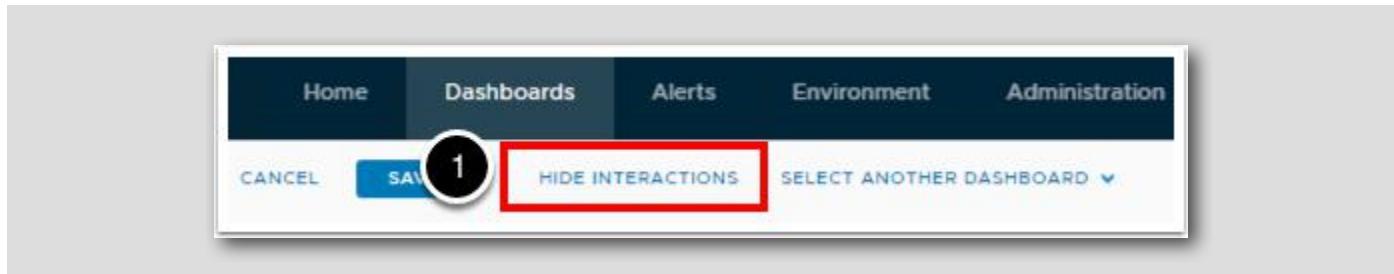
1. Click on the circle and arrow icon in the Object List widget and drag it to the circle with a dot icon in the Object Relationship widget.
2. Click on the circle and arrow icon in the Object List widget and drag it to the circle with a dot icon in the Top Alerts widget.
3. Click on the circle and arrow icon in the Object List widget and drag it to the circle with a dot icon in the Health widget.

## Create Dashboard - Create Relationships (continued)



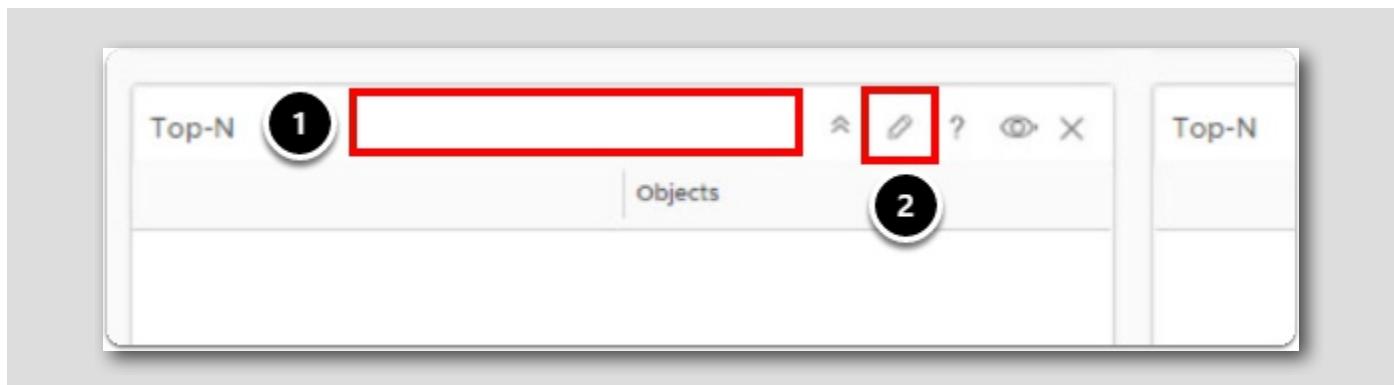
After completing the previous steps, we should now see the connecting line from the Object List to the Object Relationship, Metric Chart and Health widgets. We will not be connecting the Object List to the (3) Top-N widgets since we want them to show the Top 10 virtual machines with contention for CPU, Memory and Disk Space. We will see this later once we are done configuring the entire dashboard.

## Create Dashboard - Show Interactions



1. Click on HIDE INTERACTIONS text link at the top of the user interface.

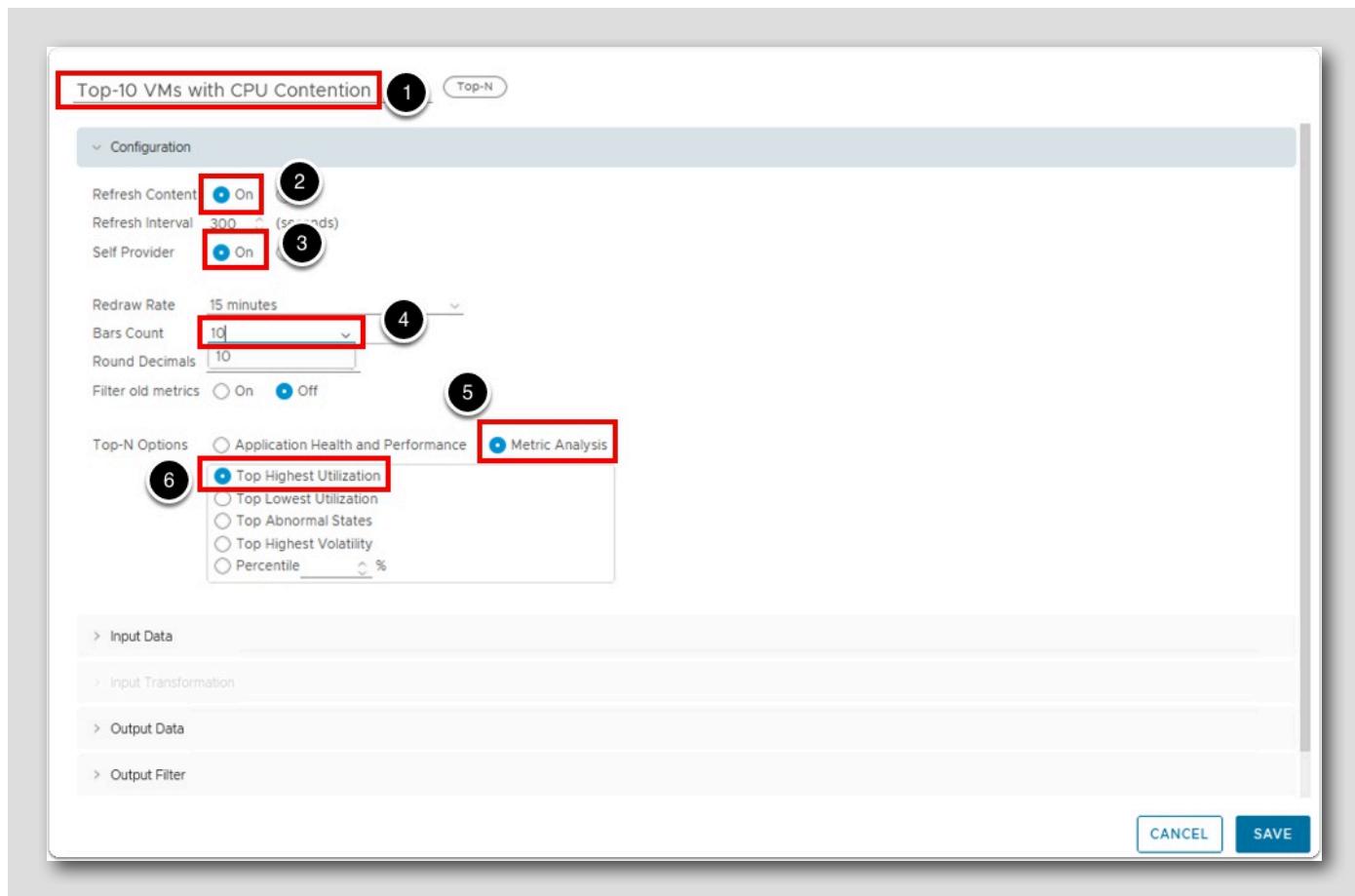
## Configure Top-N Widget - Menu



We now need to go into the settings of the widgets to make some configuration changes so that they will present the appropriate data in each of the widgets.

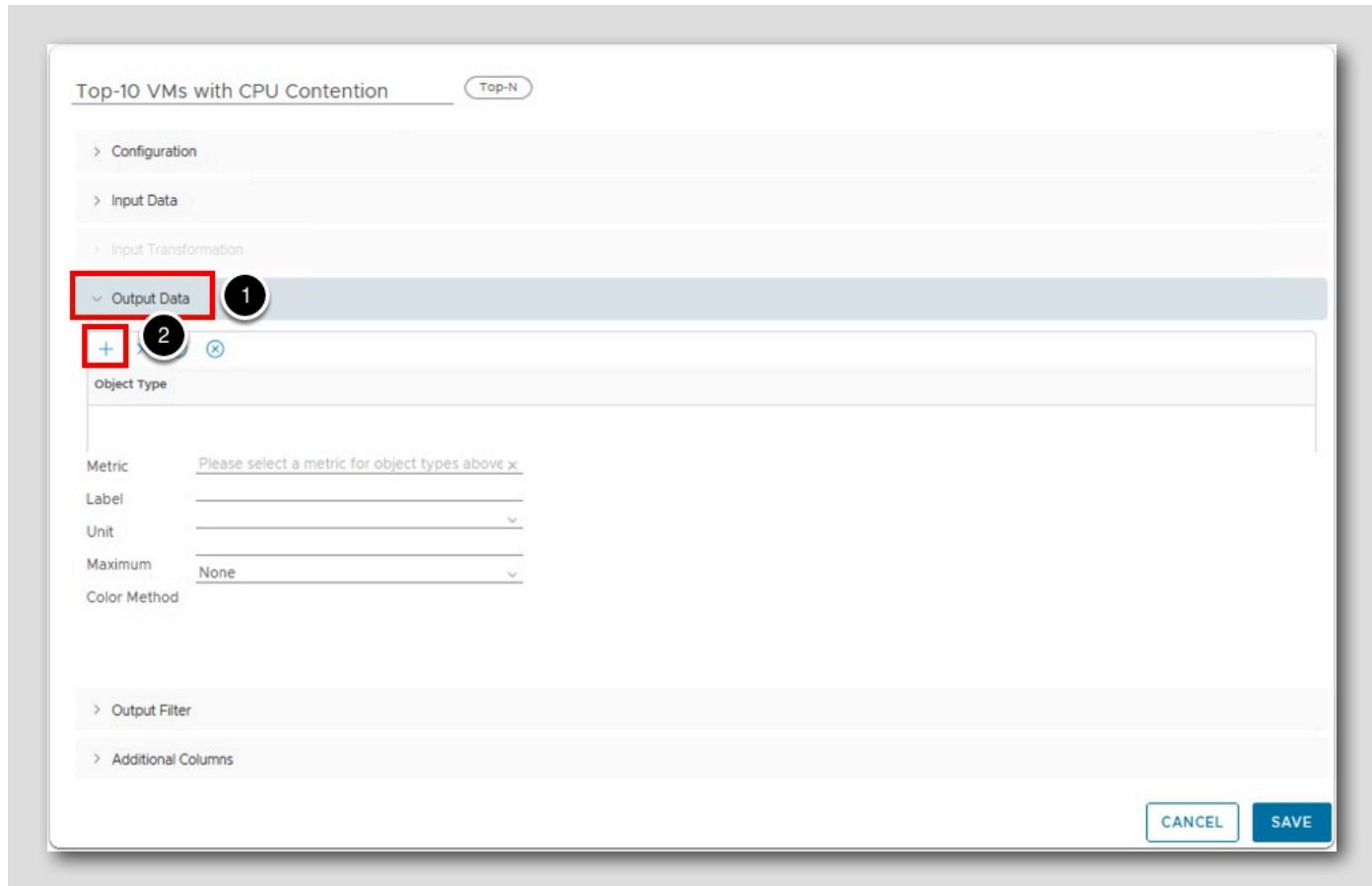
1. Hover the mouse over the top of the 1st Top-N widget in the widget to expose the hidden menu.
2. Click on the Edit Widget (*pencil*) icon to edit the widget.

## Configure Top-N Widget - Change Name



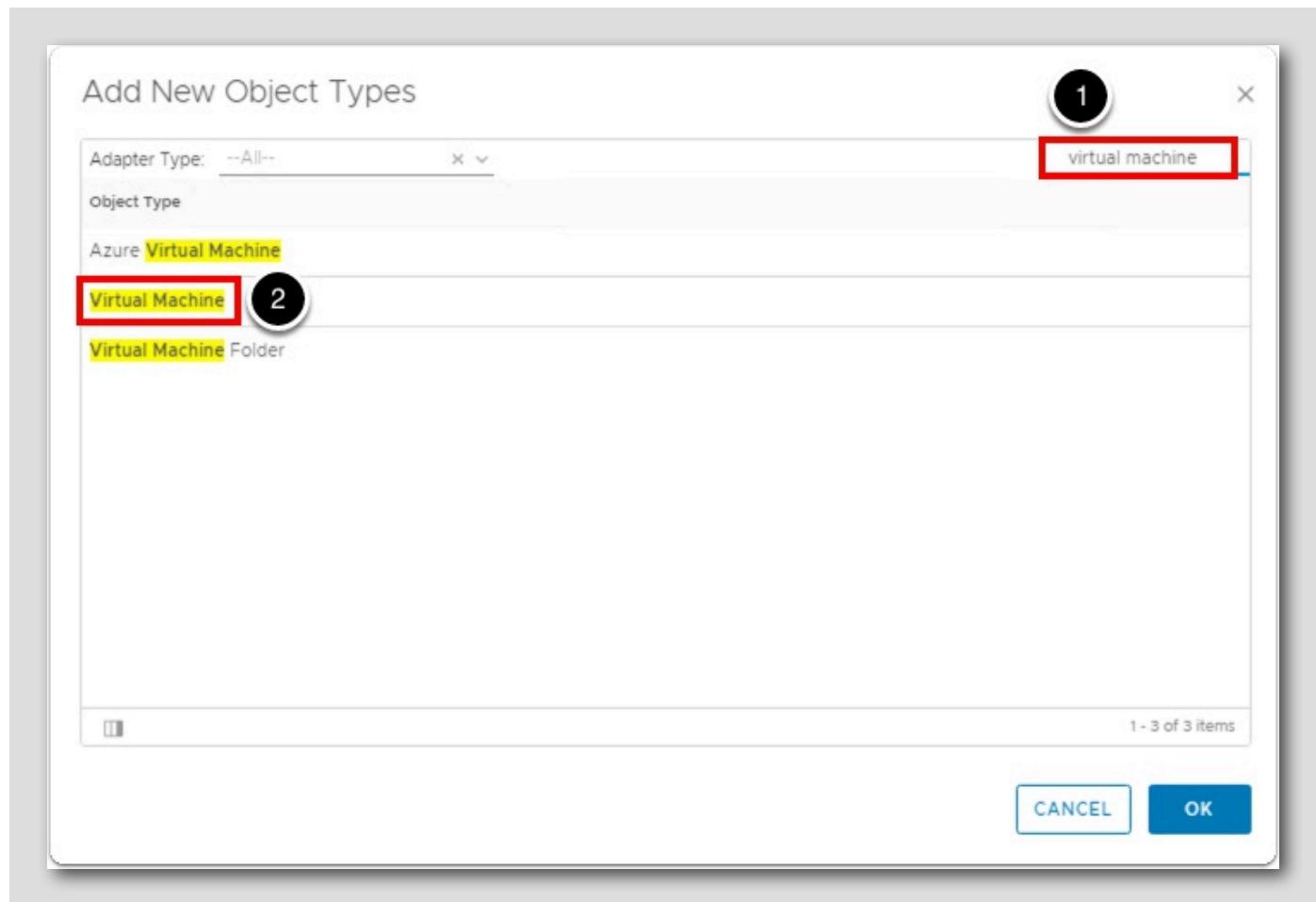
1. Replace the text Top-N with Top-10 VMs with CPU Contention.
2. Click on the On radio button next to Refresh Content.
3. Click on the On radio button next to Self Provider.
4. Change Bars Count to 10.
5. Click on the Metric Analysis radio button next to Top-N Options.
6. We see that it automatically selected the Top Highest Utilization radio button for us.

## Configure Top-N Widget - Object Types



1. Click on the Output Data selection to expand it.
2. Click on the Add Object Type (*plus sign*) to add an object type.

## Configure Top-N Widget - Virtual Machine



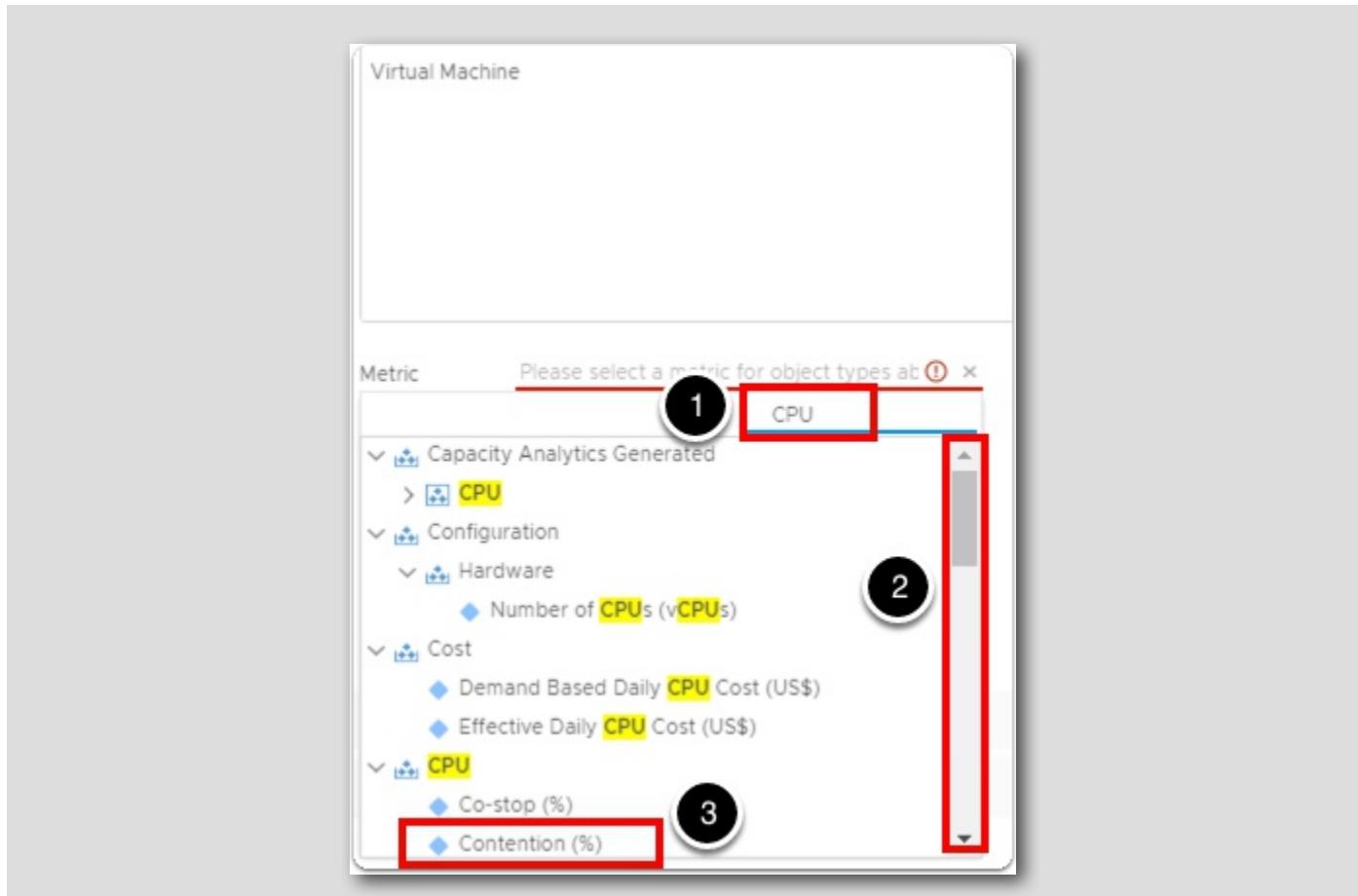
1. Type virtual machine into the Filter text field and hit the ENTER key on the keyboard.
2. Double click on Virtual Machine.

## Configure Top-N Widget - Widget

The screenshot shows a configuration interface for a 'Top-10 VMs with CPU Contention' widget. The 'Output Data' section is active, displaying a dropdown menu for selecting a metric. The 'Badge' option is highlighted with a red box and circled '1'. The 'Metric' input field contains the placeholder text 'Please select a metric for object types at [ ]'. The dropdown menu lists various metrics including Badge, Capacity Analytics Generated, Configuration, Cost, CPU, CPU Utilization for Resources, Datastore, Disk Space, Disk Space Usage on Datastore, Guest, and Guest File System. At the bottom right of the interface are 'CANCEL' and 'SAVE' buttons.

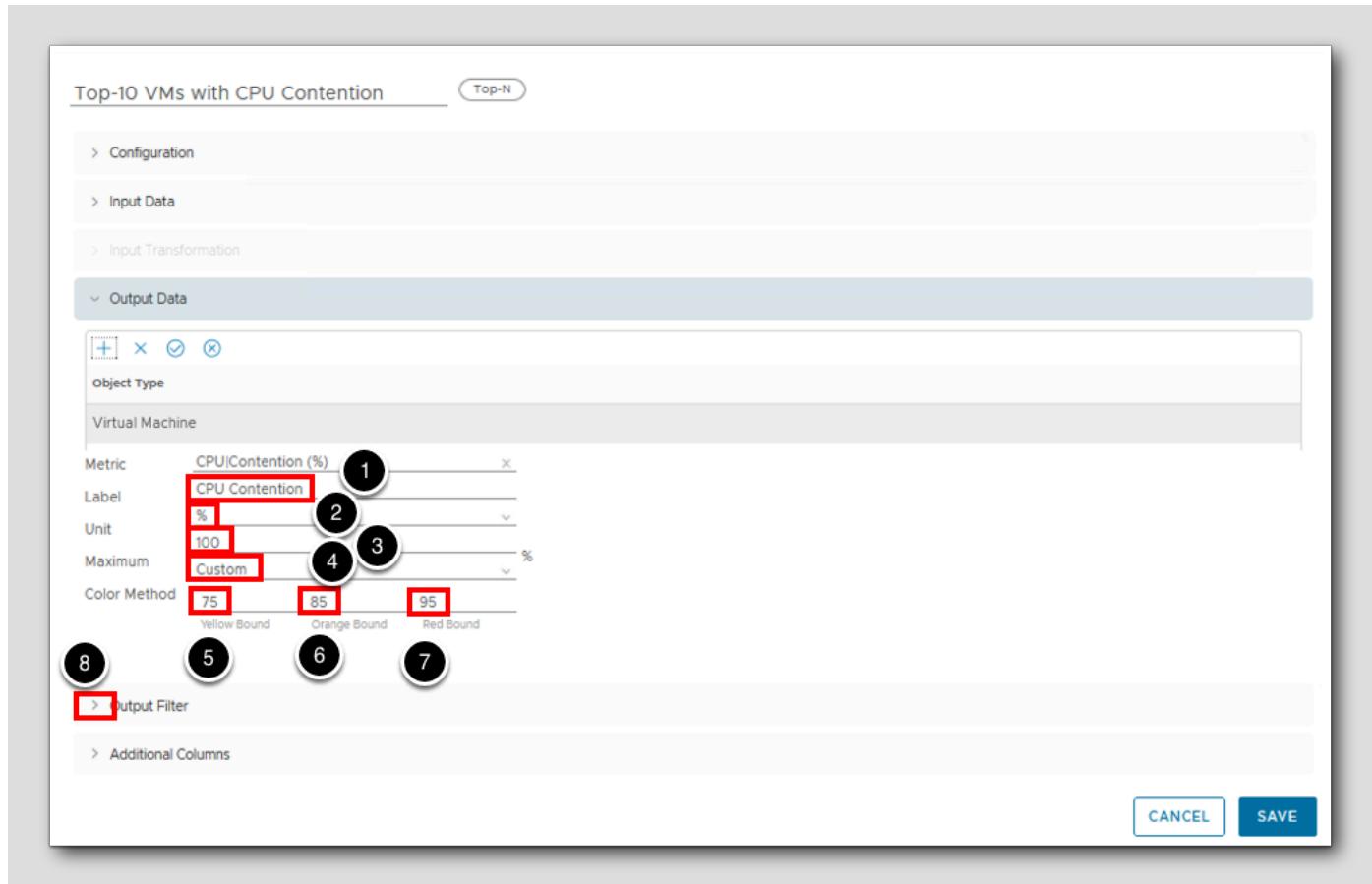
1. Click anywhere inside the Metric text field in order to expose the filter option.

## Configure Top-N Widget - CPU Contention (%)



1. Type CPU into the Metric text field and hit ENTER on the keyboard to filter for it.
2. Drag the scroll bar down (*if needed*) until we can see Contention (%) (*CPU > Contention*) in the drop-down list.
3. Double-Click on Contention (%).

## Output Data



1. Enter CPU Contention for the **Label**.
2. Change the unit to **%**.
3. Enter 100 for the **Maximum** value, this will set the graph bar to max out at a value of 100.
4. Change **Color Method** to **Custom**.
5. Enter 75 for **Yellow Bound**.
6. Enter 85 for **Orange Bound**.
7. Enter 95 for **Red Bound**.
8. Expand **Output Filter**.

## Output Filter

The screenshot shows a configuration interface for 'Top-10 VMs with CPU Contention'. At the top, there's a 'Top-N' button. Below it is a tree view under 'Output Filter':

- Configuration
- Input Data
- Input Transformation
- Output Data
- Output Filter (selected, indicated by a grey background)

Under 'Output Filter', the 'Basic' tab is selected (indicated by a checked checkbox icon). The 'Object Types' node is expanded, showing:

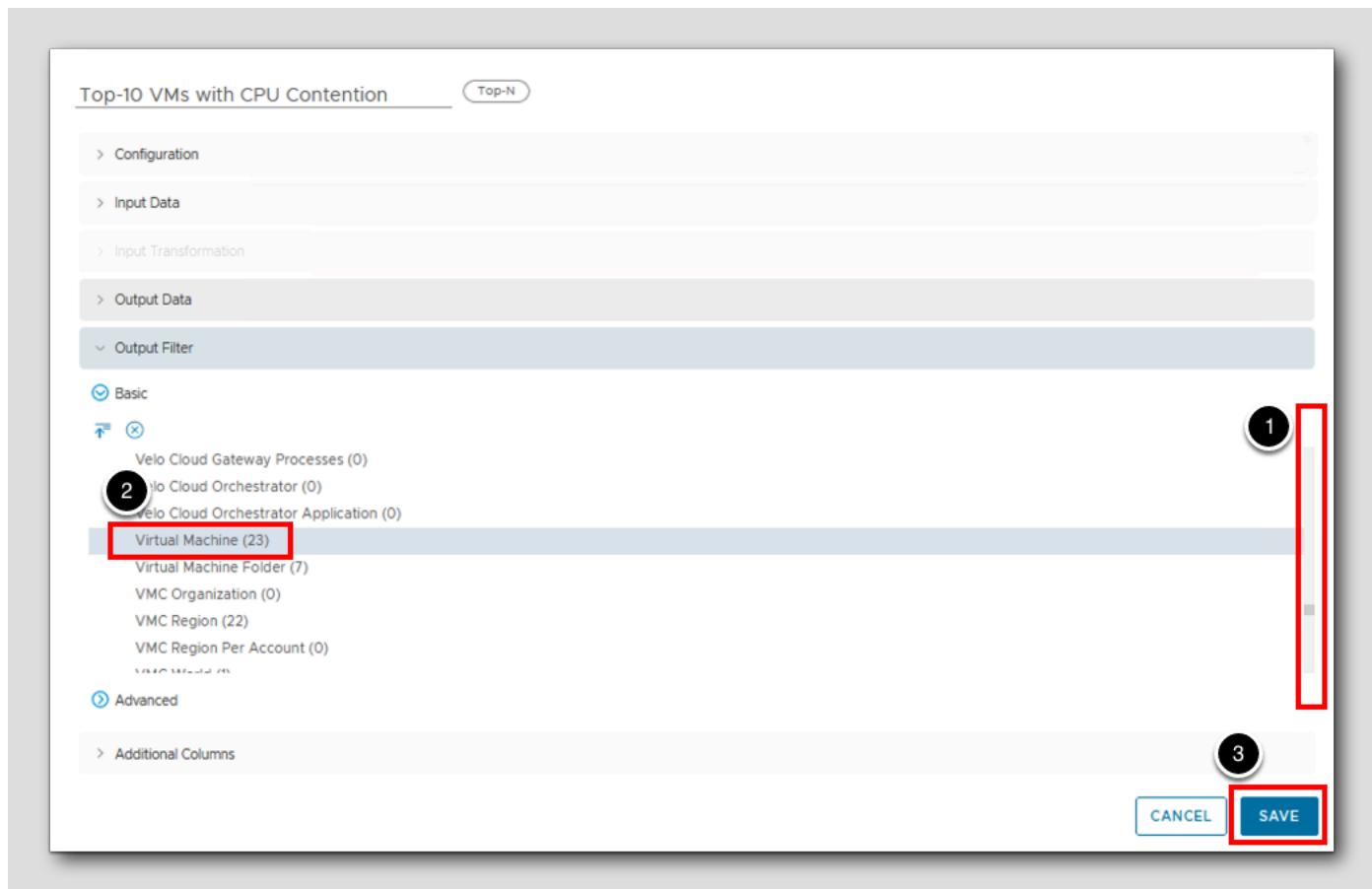
- Collectors (Full Set)
- Business Applications (Full Set)
- Adapter Types (1)
- Adapter Instances
- Object Types (1)
  - Active Directory (0)
  - Active Directory Application (0)
  - Active Directory Database (0)
  - Active Directory DCC Definition (0)

Below 'Object Types', the 'Advanced' tab is shown with an 'Additional Columns' option.

At the bottom right are 'CANCEL' and 'SAVE' buttons.

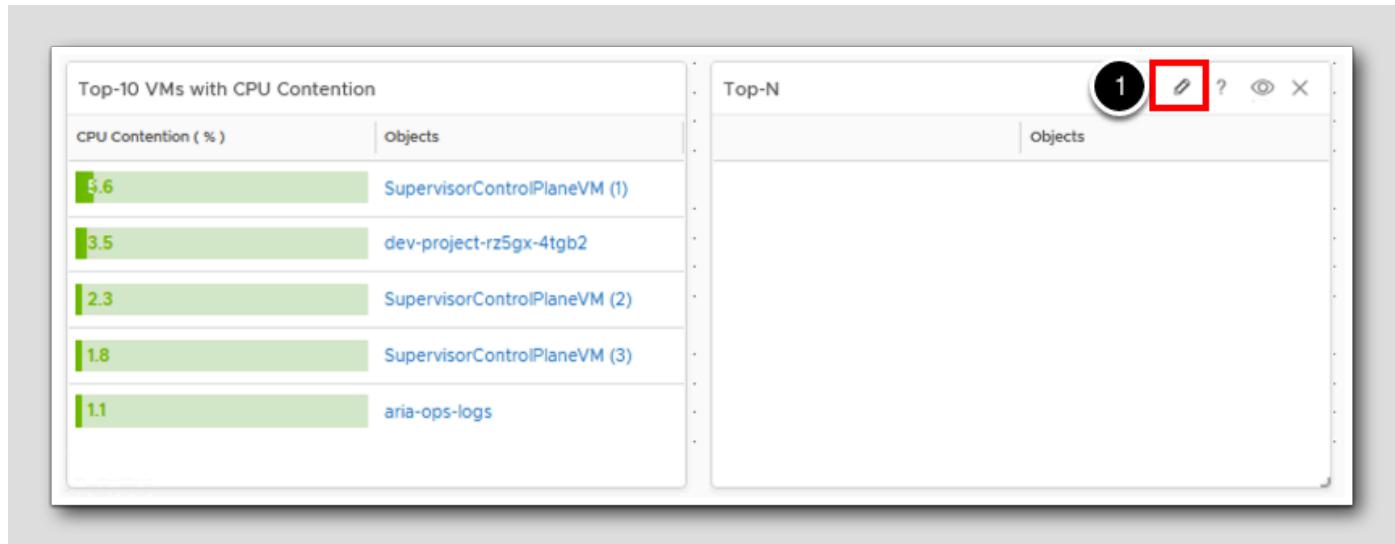
1. Expand Object Types.

## Output Filter (Continued)



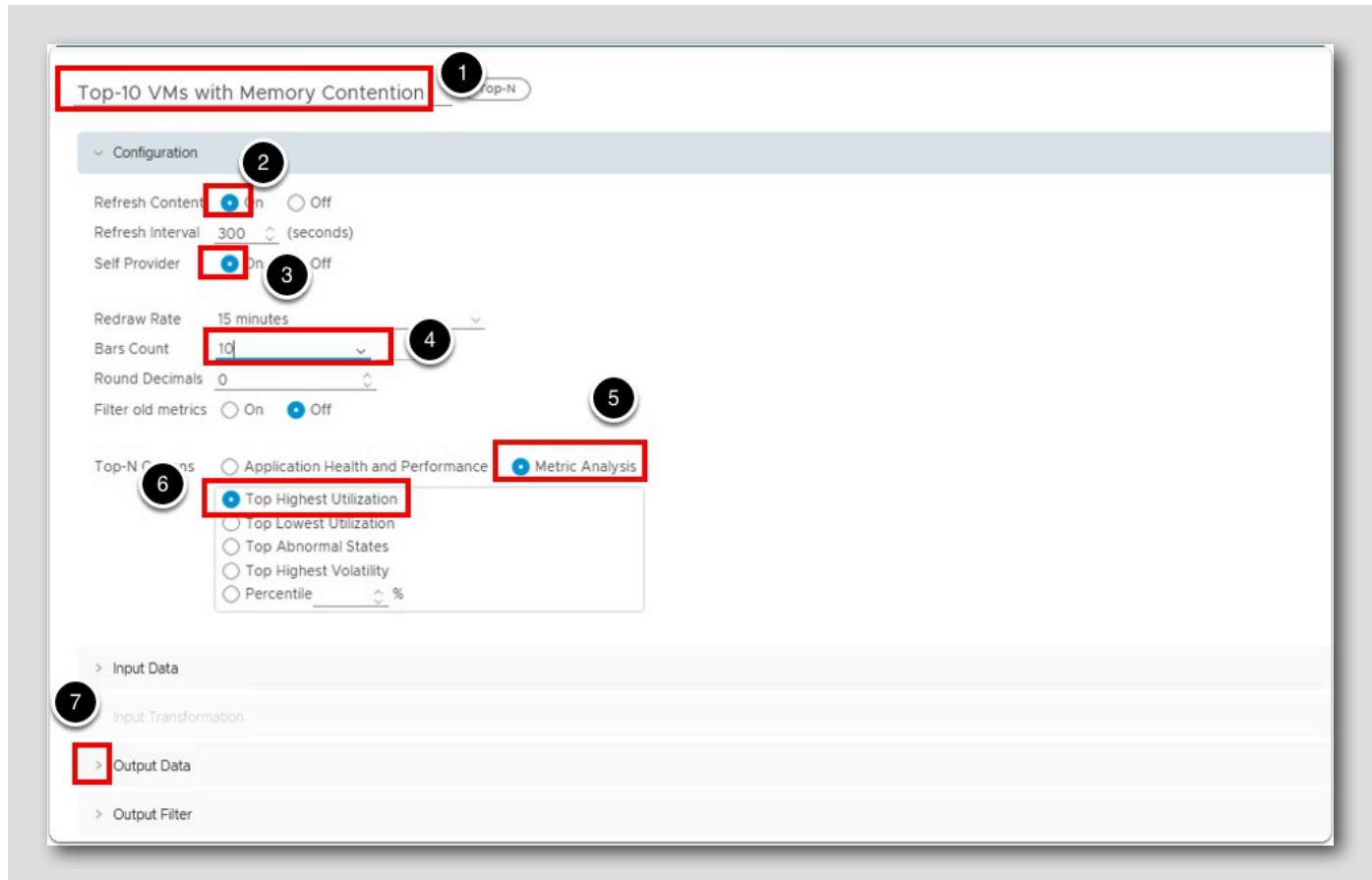
1. Scroll down until you see Virtual Machine in the Object Type list.
2. Single click on Virtual Machine Object Type.
3. Click SAVE.

## Configure Top-N Widget - Top-N



1. Hover over the second Top-N widget and click on the Edit Widget (*pencil*) icon when it appears.

## Configure Top-N Widget - Change Name



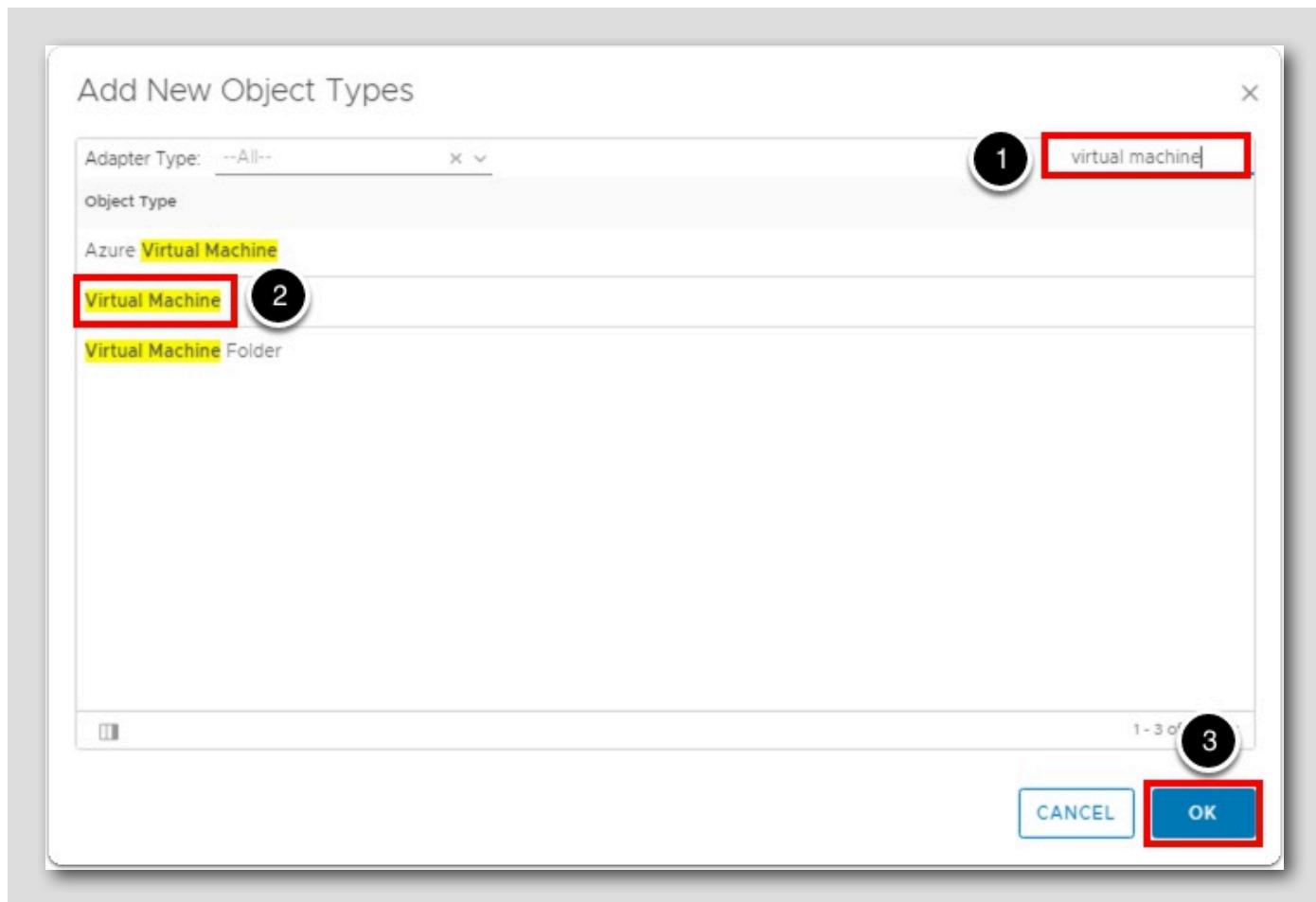
1. Replace the text Top-N with Top-10 VMs with Memory Contention.
2. Click on the On radio button next to Refresh Content.
3. Click on the On radio button next to Self Provider.
4. Change Bars Count to 10.
5. Click on the Metric Analysis radio button next to Top-N Options.
6. We see that it automatically selected the Top Highest Utilization radio button for us.
7. Click on the Output Data selection to expand it.

## Configure Top-N Widget - Object Types

The screenshot shows a configuration interface for a 'Top-10 VMs with Memory Contention' widget. The 'Output Data' tab is active, displaying a list of object types. A red box highlights the 'Add Object Type' button (a plus sign icon). Below the list are input fields for Metric, Label, Unit, Maximum, and Color Method. At the bottom, there are tabs for 'Output Filter' and 'Additional Columns', and buttons for 'CANCEL' and 'SAVE'.

1. Click on the Add Object Type (*plus sign*) to add an object type.

## Configure Top-N Widget - Virtual Machine

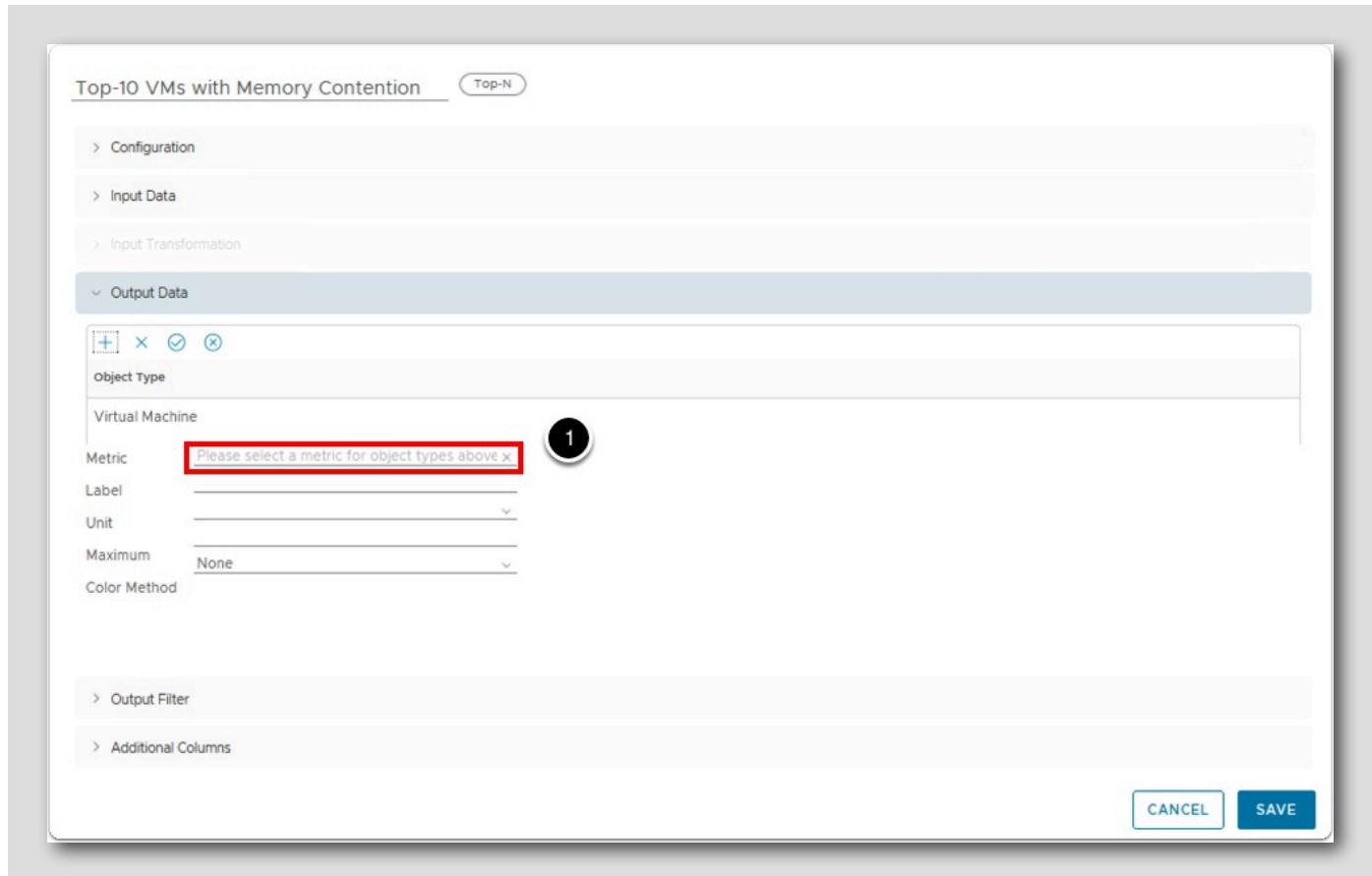


1. Type virtual machine into the Filter text field and hit the ENTER key on the keyboard.

2. Click on Virtual Machine in the list to select it.

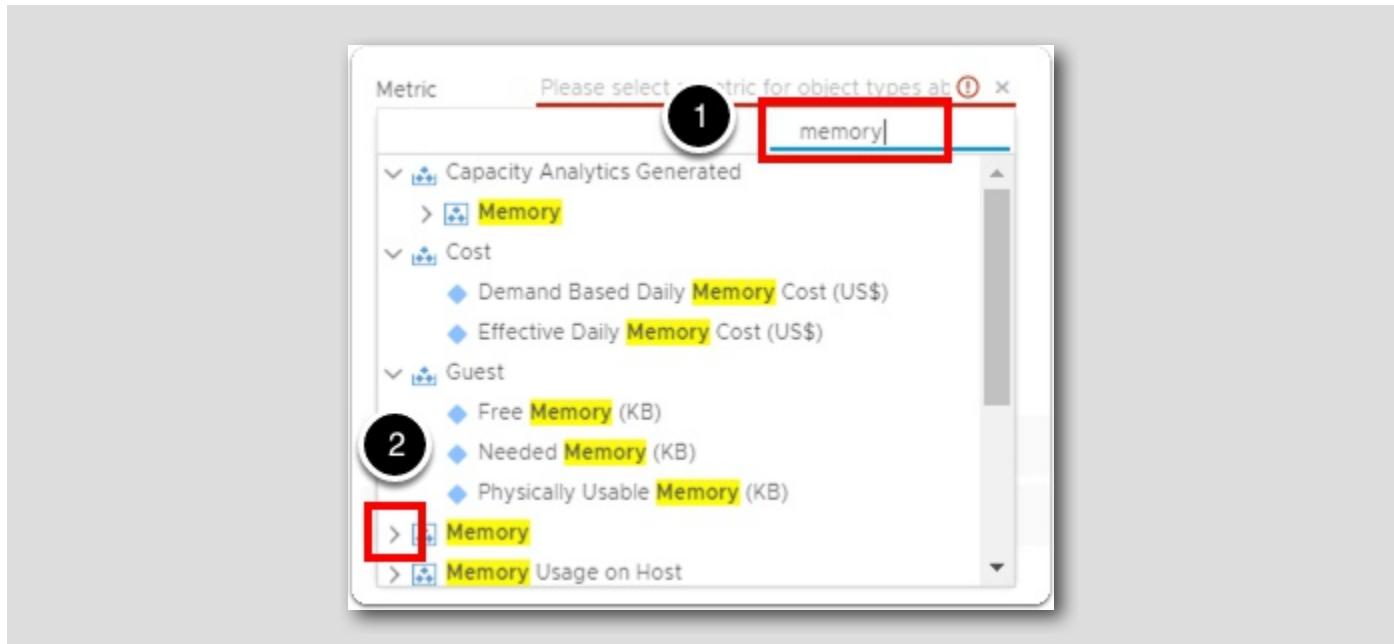
3. Then click on the OK button.

## Configure Top-N Widget - Metric



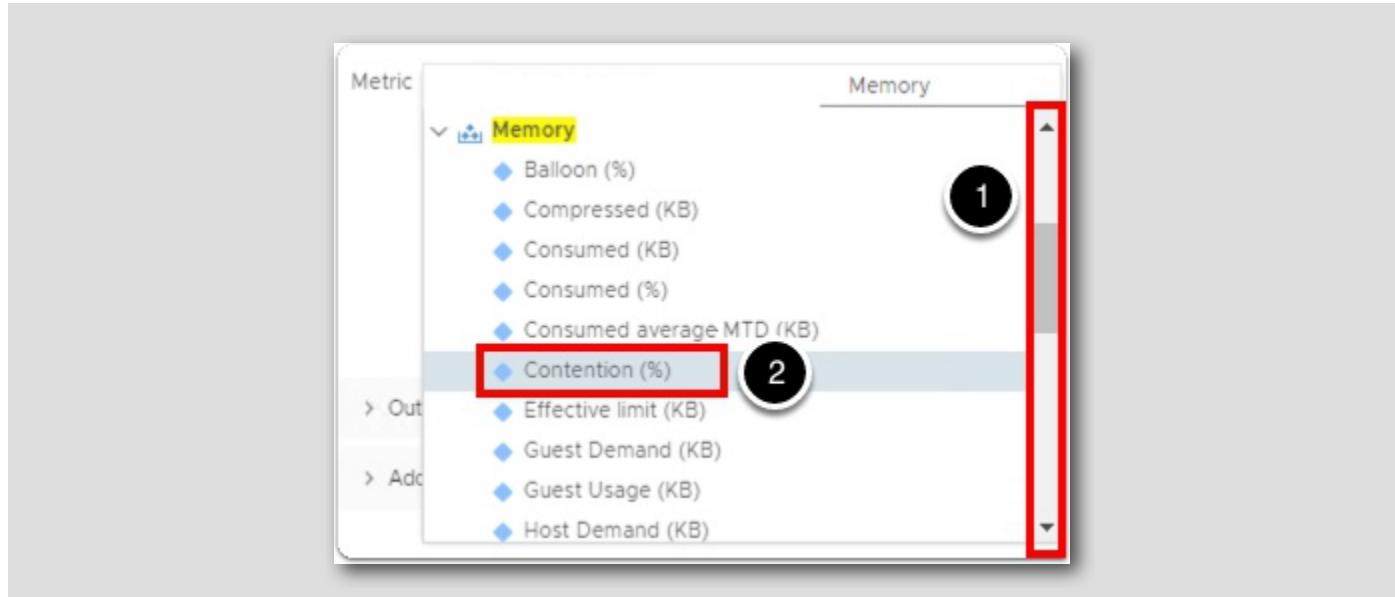
1. Click anywhere inside the **Metric** text field in order to expose the filter option.

## Configure Top-N Widget - Memory



1. Type **Memory** into the filter text field and hit **ENTER** on the keyboard to filter for it.
2. Then click on the **arrow** next to **Memory** to expand its drop-down menu.

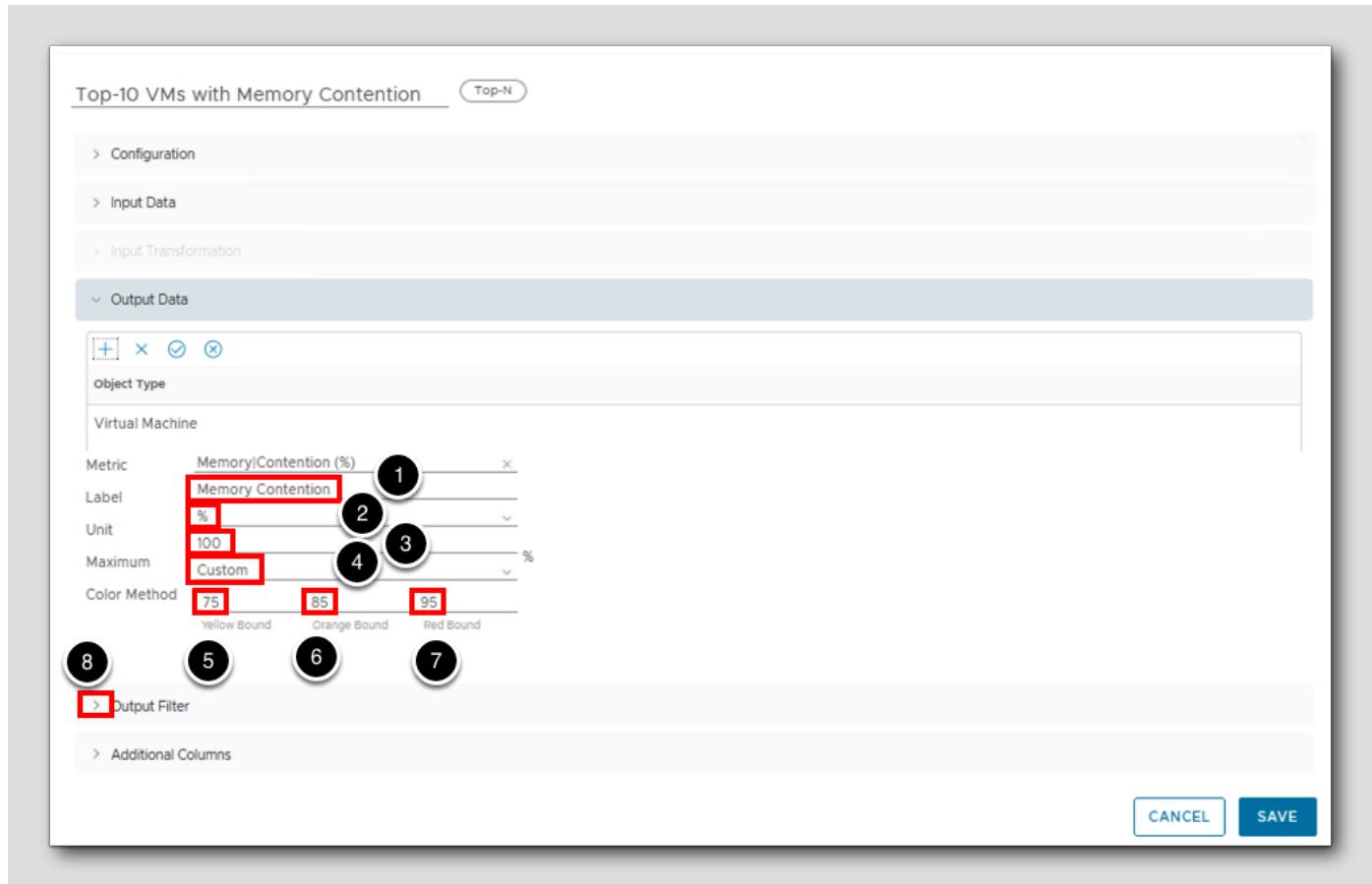
## Configure Top-N Widget - Memory Contention (%)



1. Drag the scroll bar down until we can see Contention (%) in the drop-down list.
2. Double-Click on Contention (%).

## Configure Top-N Widget - Memory Contention (%) (Continued)

[323]



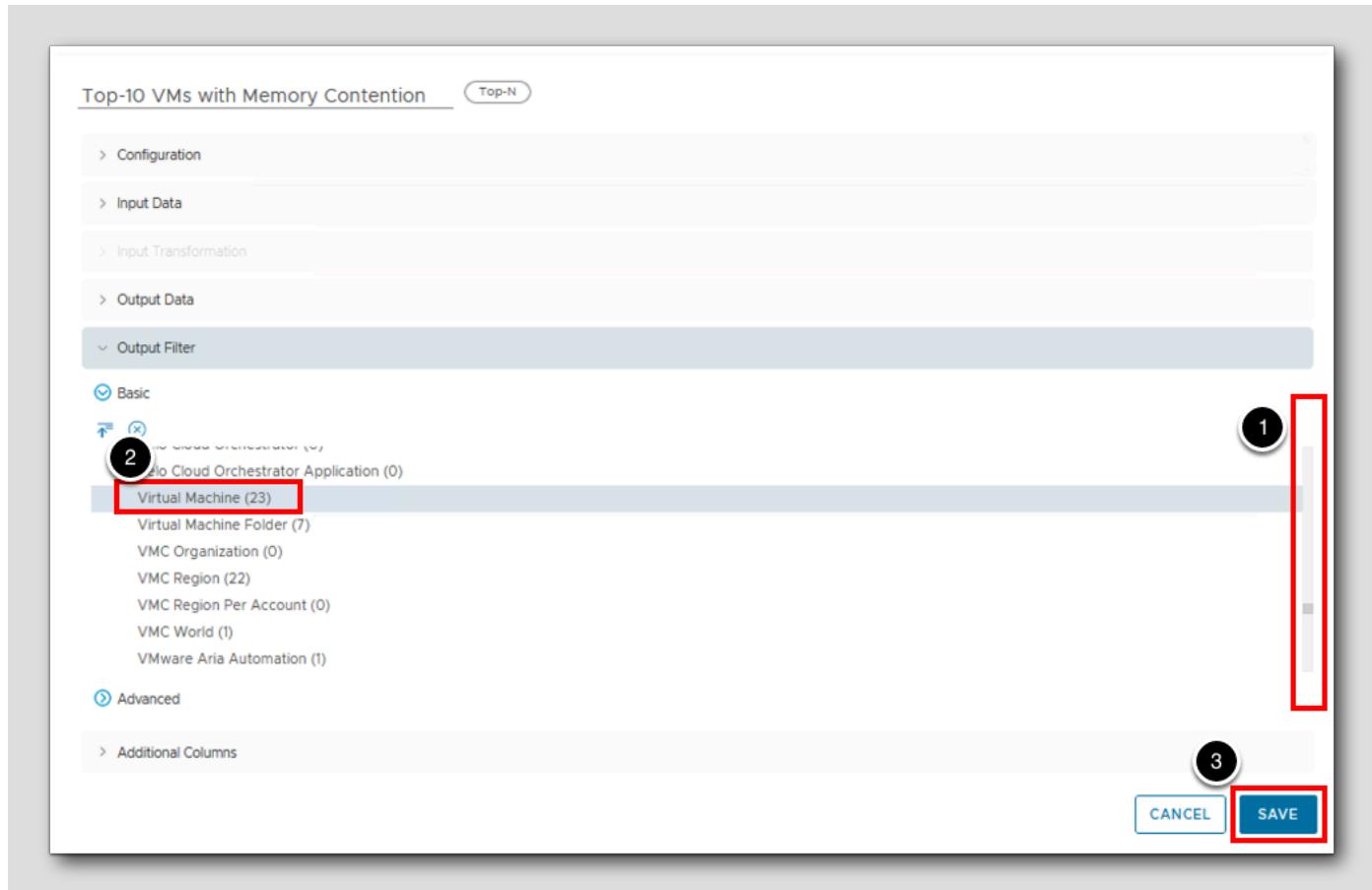
1. Enter Memory Contention for the Label.
2. Change the unit to %.
3. Enter 100 for the Maximum value, this will set the graph bar to max out at a value of 100.
4. Change Color Method to Custom.
5. Enter 75 for Yellow Bound.
6. Enter 85 for Orange Bound.
7. Enter 95 for Red Bound.
8. Expand Output Filter.

## Output Filter

The screenshot shows a configuration interface for 'Top-10 VMs with Memory Contention'. The left sidebar has sections: Configuration, Input Data, Input Transformation, Output Data, and Output Filter (which is expanded). Under Output Filter, there are two tabs: Basic (selected) and Advanced. In the Basic tab, under Object Types, 'Object Types (0)' is highlighted with a red box and a circled '1'. Below it are listed Active Directory (0), Active Directory Application (0), Active Directory Database (0), and Active Directory DSO Definition (0). At the bottom right are CANCEL and SAVE buttons.

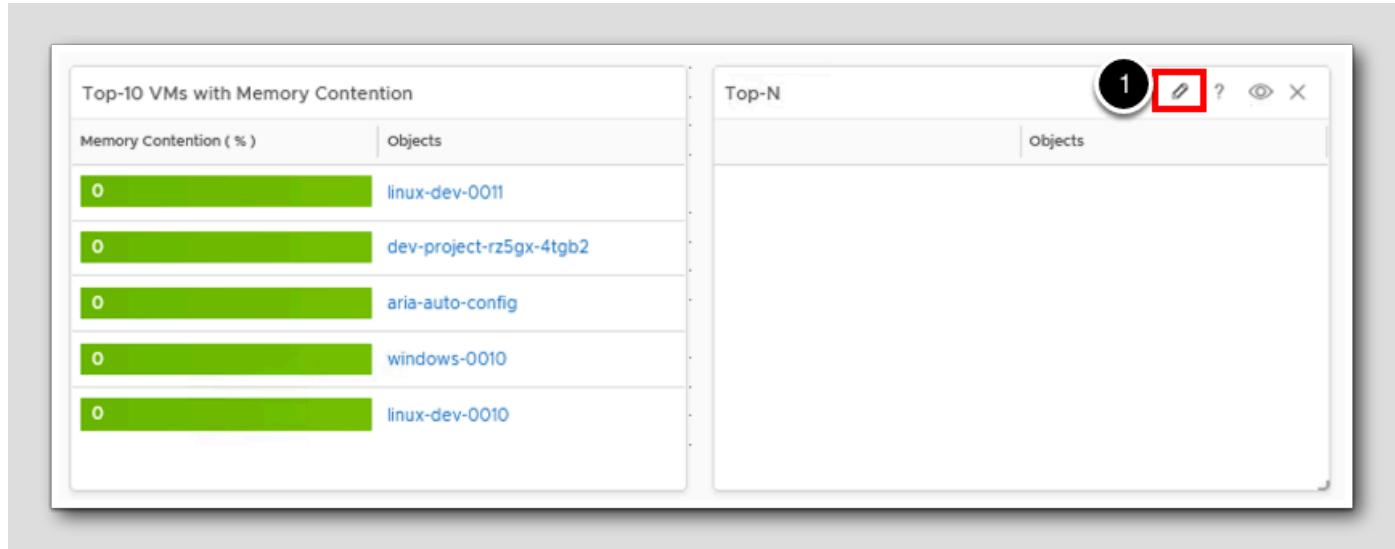
1. Expand Object Types.

## Output Filter (Continued)



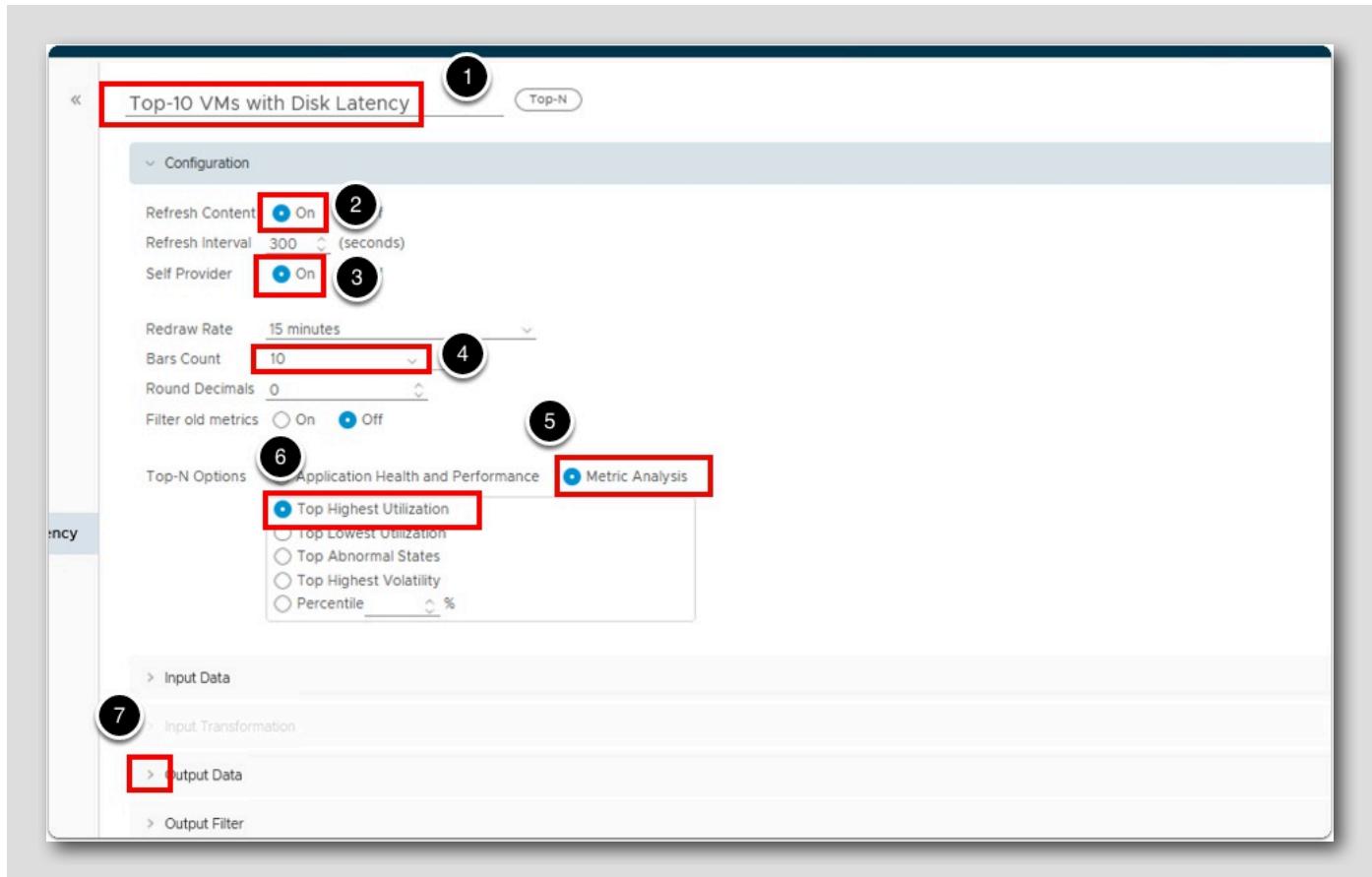
1. Scroll down until you see Virtual Machine in the Object Type list.
2. Single click on Virtual Machine Object Type.
3. Click SAVE

## Configure Top-N Widget - Top-N



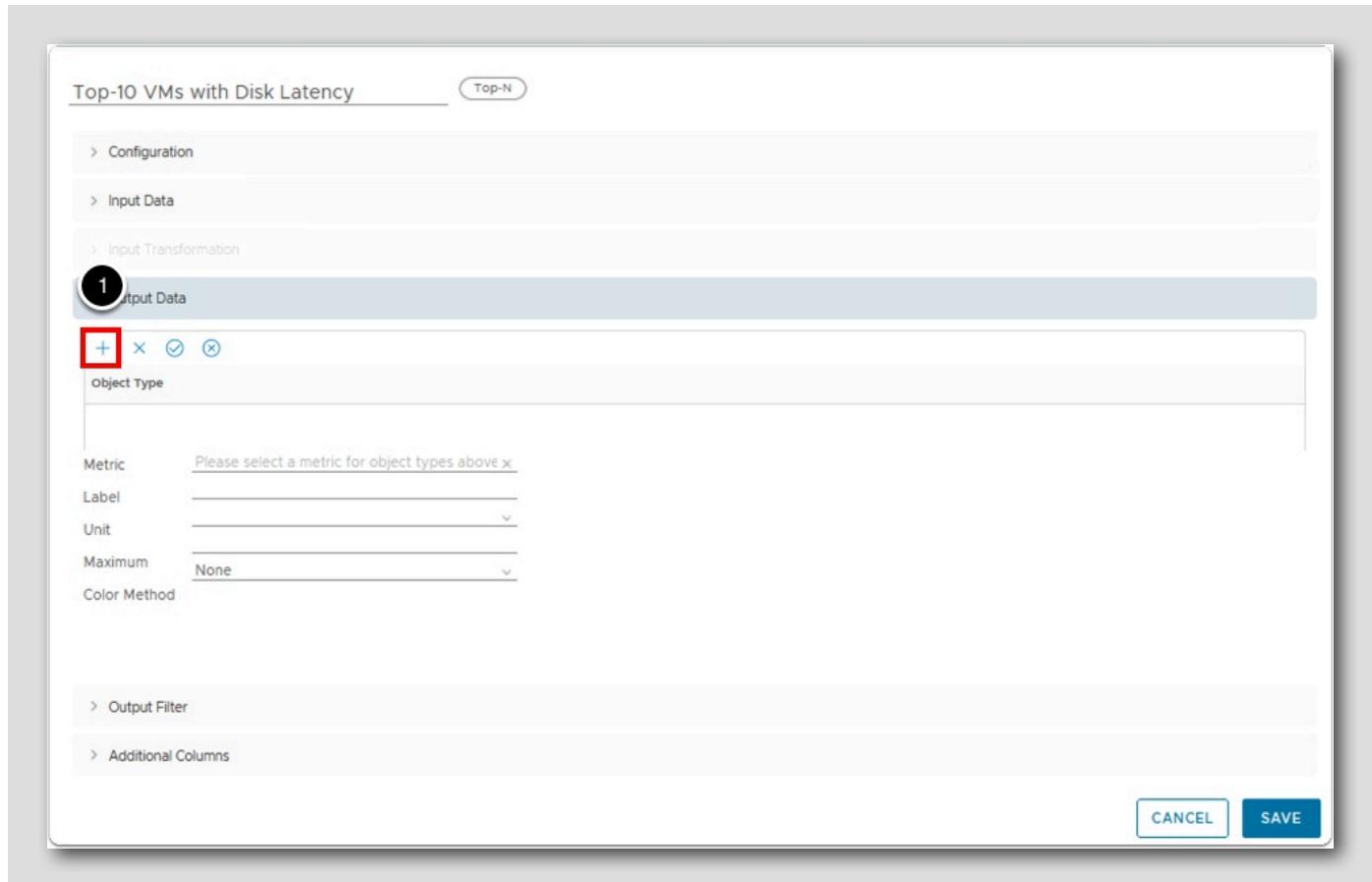
1. Hover over the right most Top-N widget and click on the Edit Widget (*pencil*) icon when it appears.

## Configure Top-N Widget - Change Name



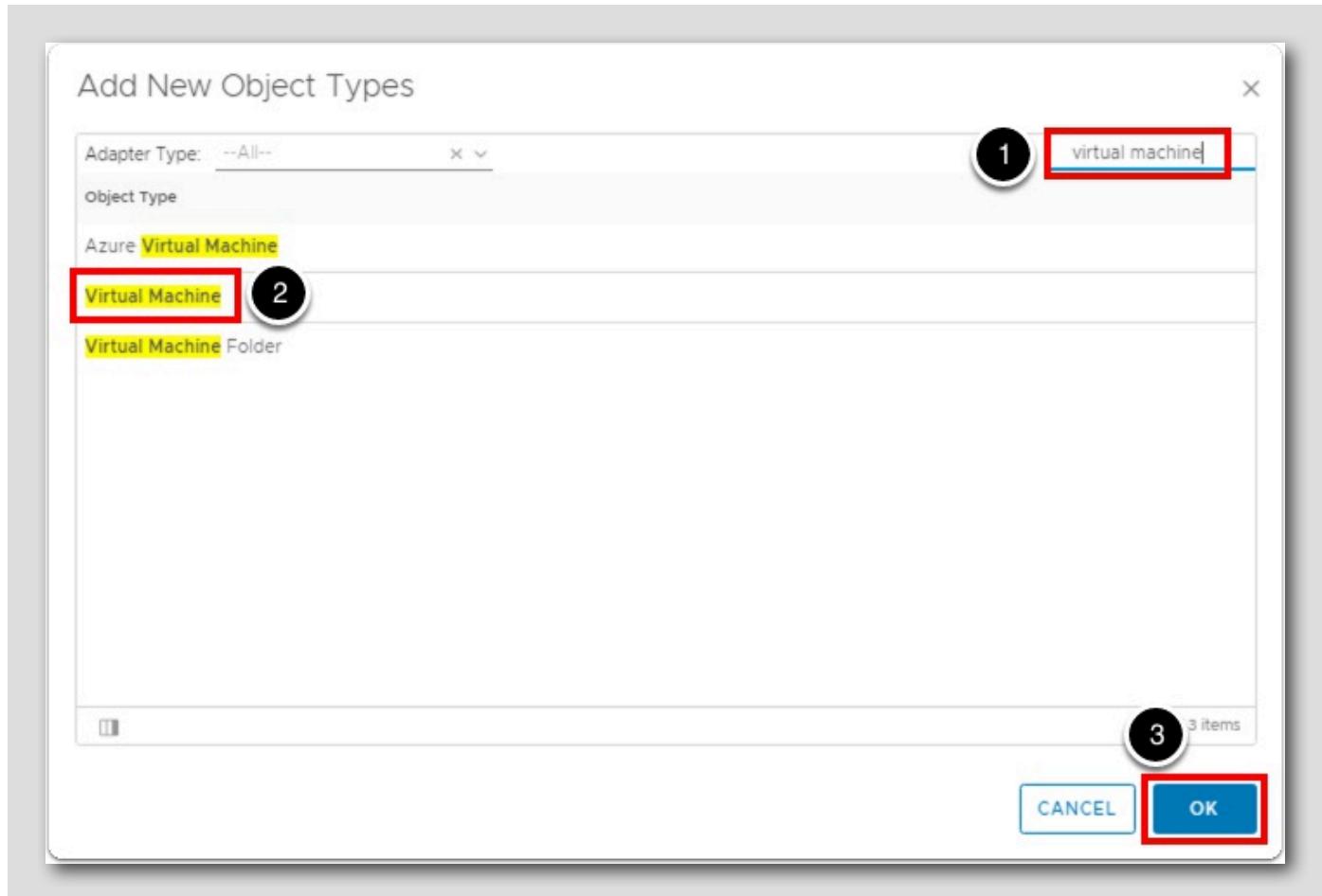
1. Replace the text Top-N with Top-10 VMs with Disk Latency.
2. Click on the On radio button next to Refresh Content.
3. Click on the On radio button next to Self Provider.
4. Change Bars Count to 10.
5. Click on the Metric Analysis radio button next to Top-N Options.
6. We see that it automatically selected the Top Highest Utilization radio button for us.
7. Click on the Output Data selection to expand it.

## Configure Top-N Widget - Object Types



1. Click on the Add Object Type (*plus sign*) to add an object type.

## Configure Top-N Widget - Virtual Machine



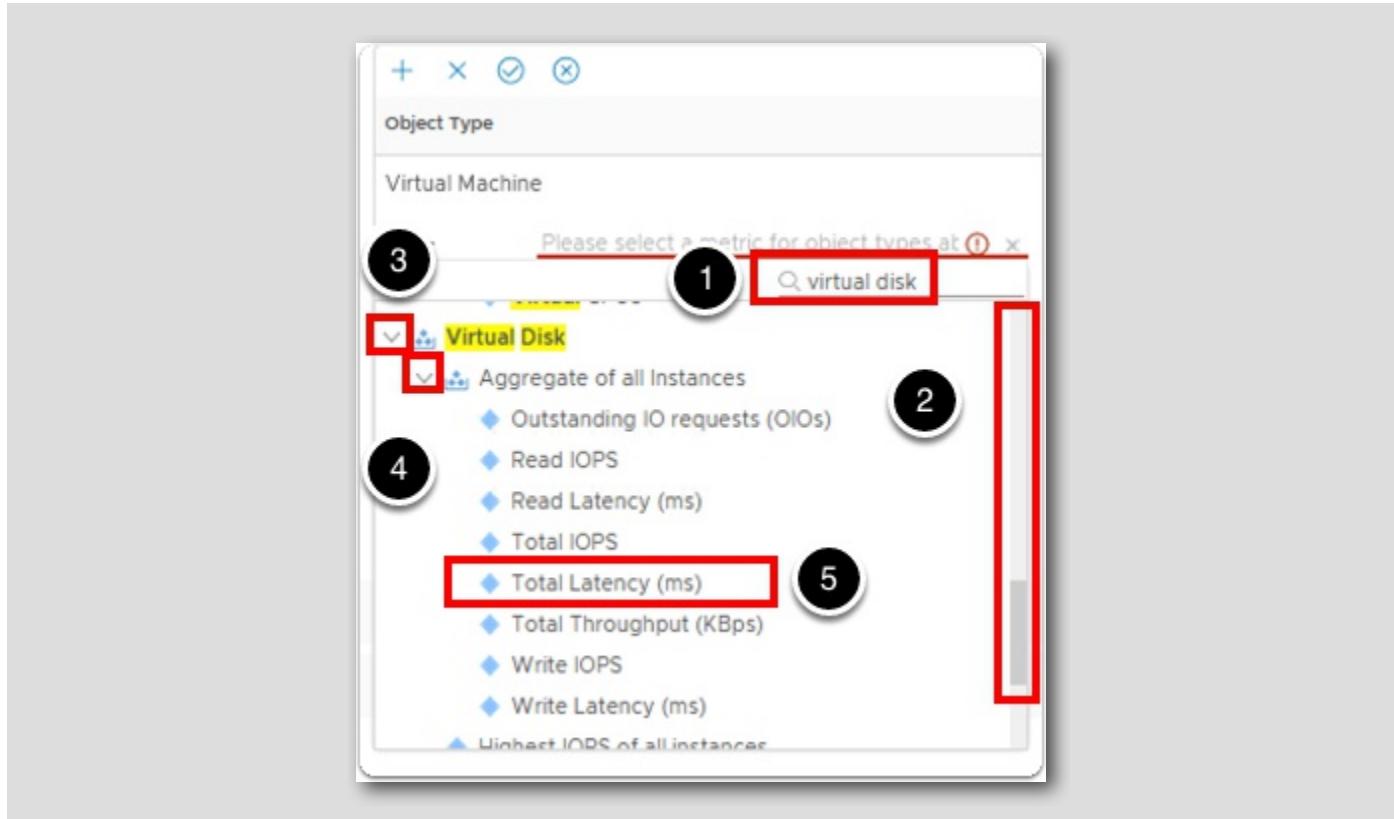
1. Type **virtual machine** into the Filter text field and hit the **ENTER** key on the keyboard.
2. Click on **Virtual Machine** in the list to select it.
3. Then click on the **OK** button.

## Configure Top-N Widget - Metric

The screenshot shows a configuration interface for a 'Top-N' widget. The title bar says 'Top-10 VMs with Disk Latency' and 'Top-N'. The left sidebar has sections: Configuration, Input Data, Input Transformation, and Output Data (which is expanded). In the Output Data section, there's a table-like interface for defining metrics. The first row has columns for 'Object Type' (Virtual Machine), 'Metric' (text input field with placeholder 'Please select a metric for object types above x.'), 'Label' (dropdown), 'Unit' (dropdown), and 'Maximum' (dropdown set to 'None'). There are also '+' and '-' buttons for adding or removing rows. Below this table are sections for Output Filter and Additional Columns. At the bottom right are 'CANCEL' and 'SAVE' buttons.

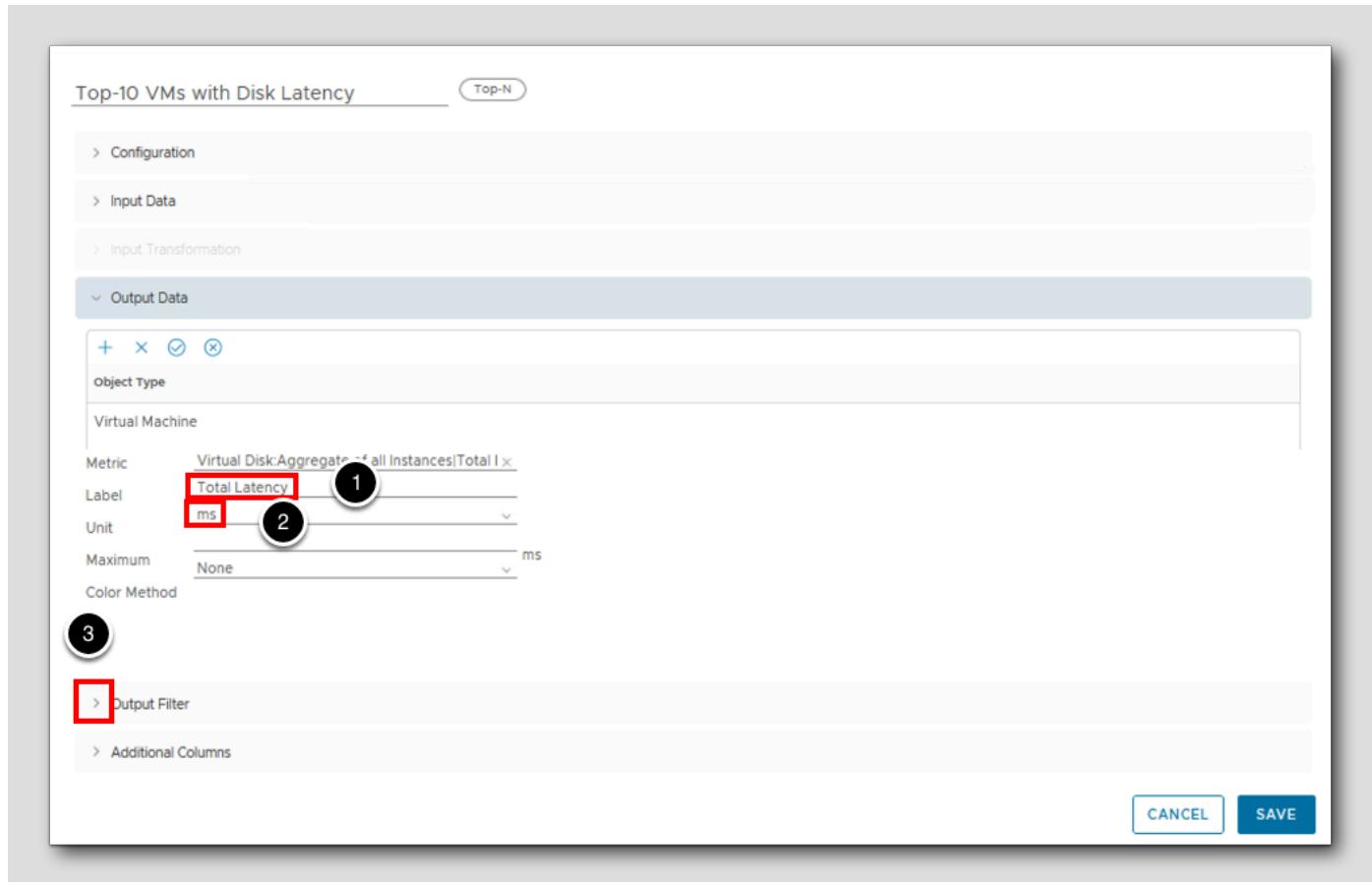
1. Click anywhere inside the Metric text field in order to expose the filter option.

## Configure Top-N Widget - Virtual Disk Total Latency (ms)



1. Type **virtual disk**: into the Metric text field and hit **ENTER** to filter for it.
2. Scroll Down to the bottom of the list to see **Virtual Disk**.
3. Click on the Chevron beside **Virtual Disk** to expand it.
4. Click on the Chevron beside **Aggregate of all Instances** to expand it (You may need to scroll down more in the list to see it).
5. Double-Click on **Total Latency (ms)**.

## Configure Top-N Widget - Virtual Disk Total Latency (ms) (Continued)



1. Type Total Latency for the Label.

2. Change the Unit to ms.

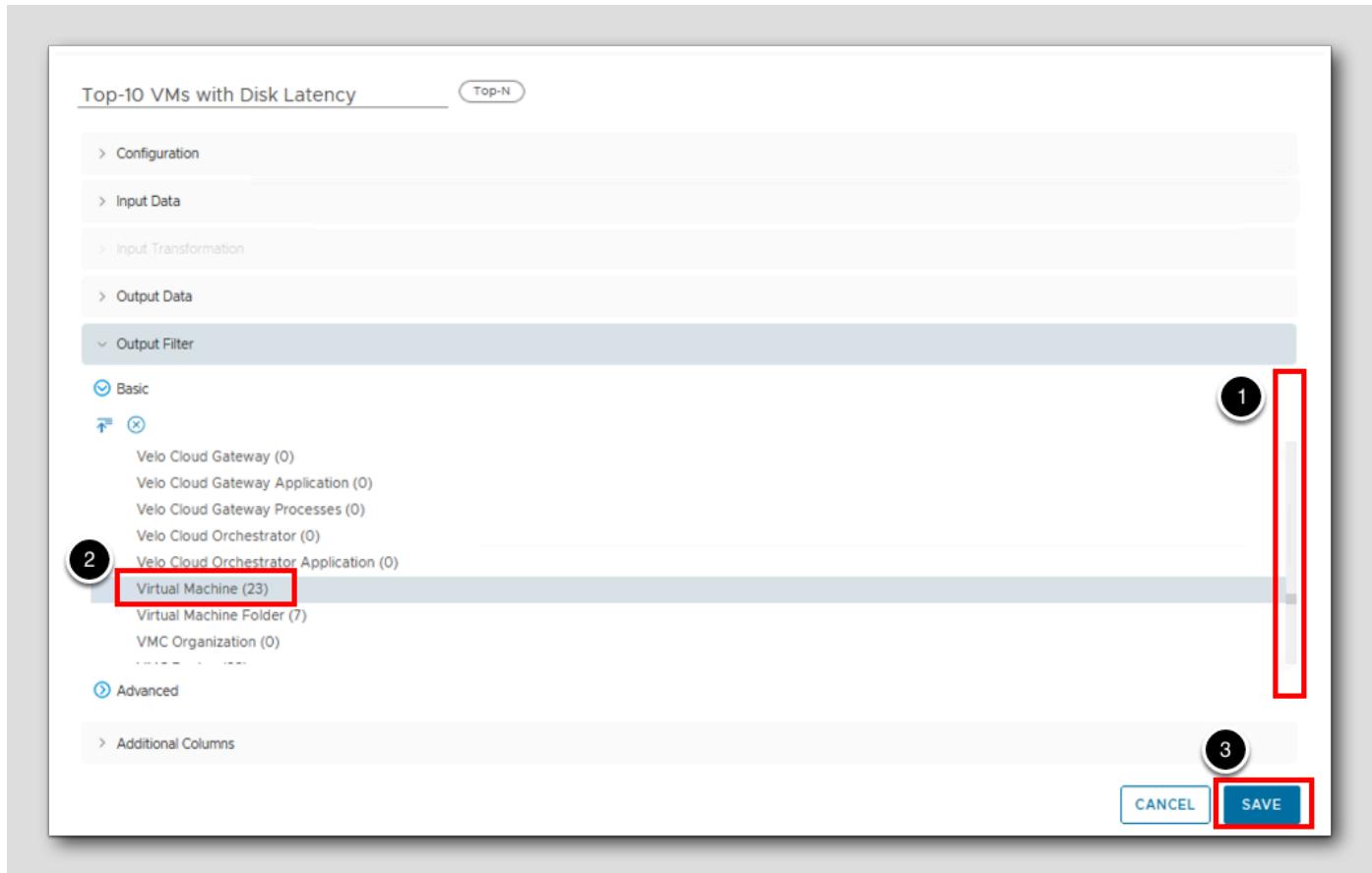
3. Expand Output Filter.

## Output Filter

The screenshot shows a configuration interface for 'Top-10 VMs with Disk Latency'. The left sidebar lists several sections: Configuration, Input Data, Input Transformation, Output Data, and Output Filter. The 'Output Filter' section is expanded, revealing 'Basic' and 'Advanced' tabs. Under 'Basic', there are sections for Collectors, Business Applications, Adapter Types, Adapter Instances, and Object Types. The 'Object Types' section is expanded, showing Active Directory, Active Directory Application, Active Directory Database, and Active Directory DCC Definition. A red box highlights the 'Object Types' section, and a circled '1' is placed next to it. At the bottom right are 'CANCEL' and 'SAVE' buttons.

1. Expand Object Types.

## Output Filter (Continued)



1. Scroll down until you see **Virtual Machine** in the Object Type list.
2. Single click on **Virtual Machine** Object Type.
3. Click **SAVE**

## Configure Object List

OPS Overview (New)

Name	Adapter Type	Object Type	Policy	Collection State	Collection Status
windows2019	vCenter	Virtual Machine	vSphere Solution's D...	<span>Green</span>	<span>Green</span>
aria-ops-logs	vCenter	Virtual Machine	vSphere Solution's D...	<span>Green</span>	<span>Green</span>
identity-manager	vCenter	Virtual Machine	vSphere Solution's D...	<span>Green</span>	<span>Green</span>
vCLS-60d30ce4-2d77-4340...	vCenter	Virtual Machine	vSphere Solution's D...	<span>Green</span>	<span>Green</span>

1. Scroll back up to the top of the dashboard.
2. Hover over the Object List widget and click on the Edit Widget (*pencil*) icon when it appears.

## Configure Object List - Change Name

Virtual Machines

Object List

Configuration

Refresh Content:  On  Off

Refresh Interval: 300 seconds

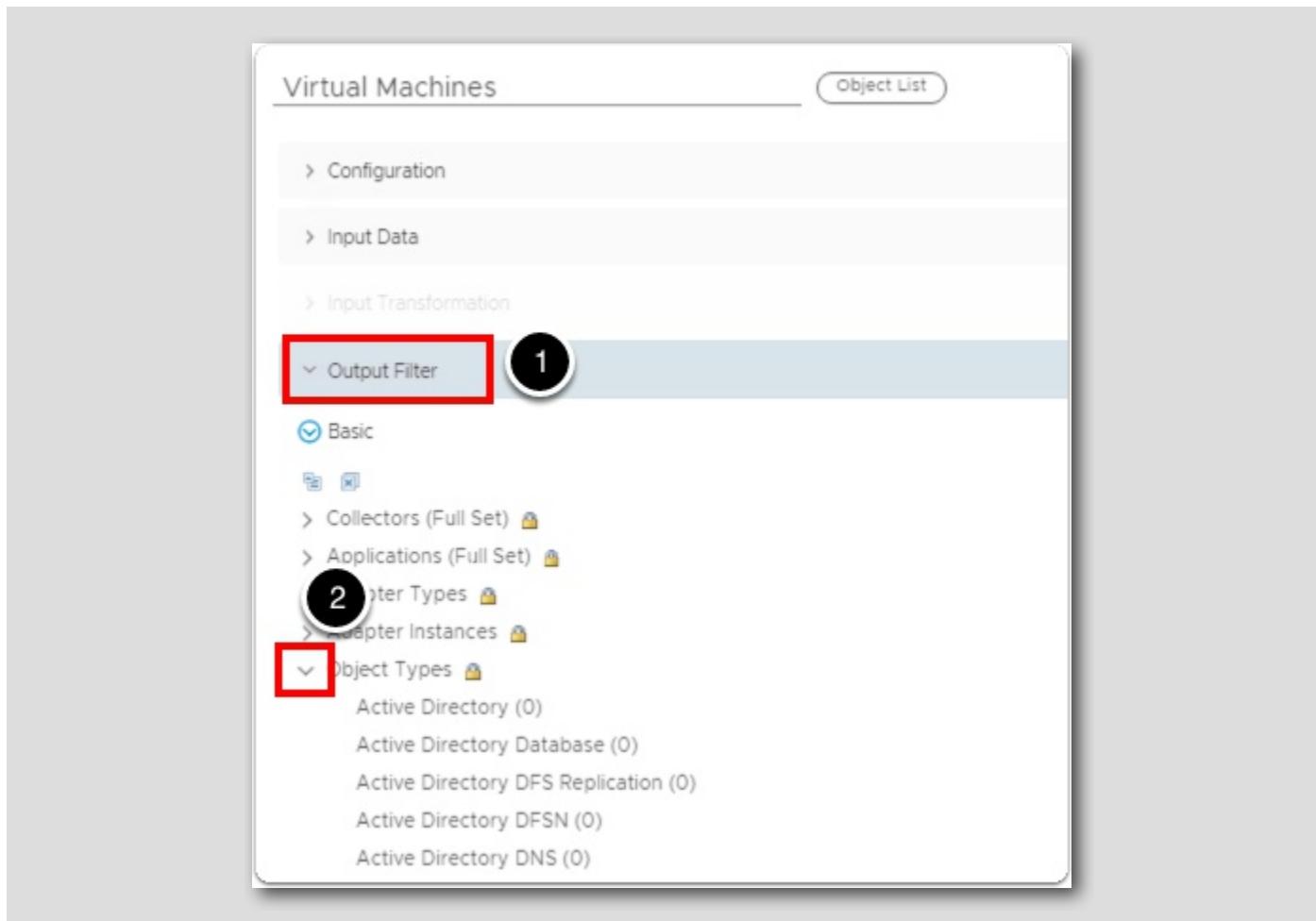
Self Provider:  On

Auto Select First Row:  On

1. Type Virtual Machines into the Name text field.
2. Click on the On radio button to the right of Refresh Content.
3. Click on the On radio button to the right of Self Provider.
4. Click on the On radio button to the right of Auto Select First Row.

## Configure Object List - Output Filter

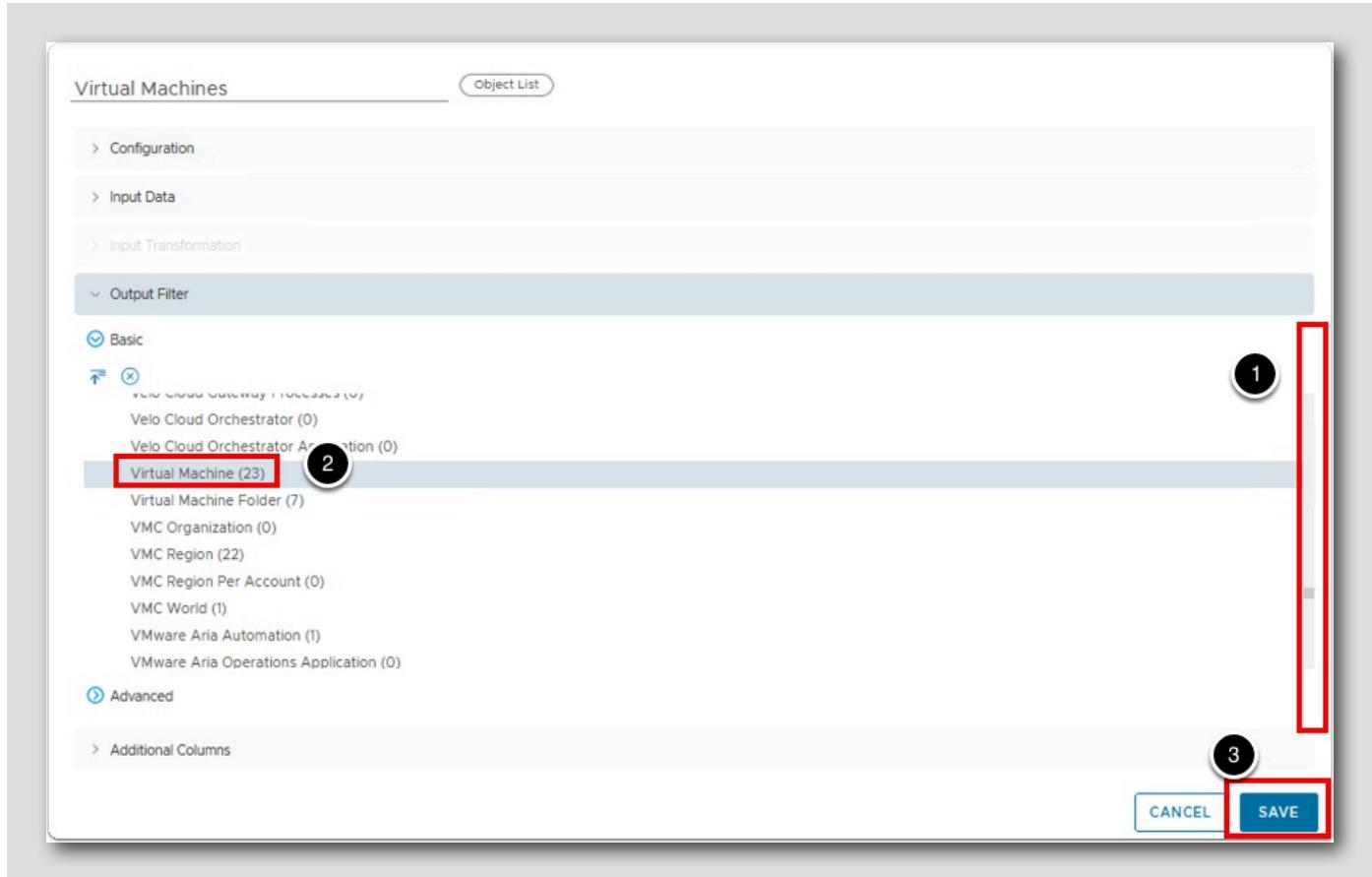
[337]



1. Click on Output Filter.
2. Then click on the arrow next to Object Types to expand its menu.

## Configure Object List - Virtual Machine

[338]



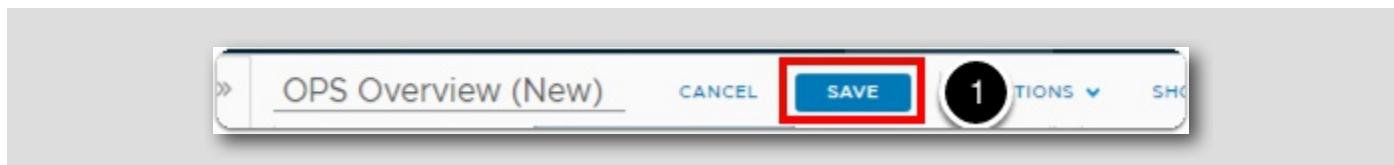
1. Drag the scroll bar down until we can see Virtual Machine in the drop-down list.

2. Then click on Virtual Machine.

3. Click SAVE.

## Save Dashboard

[339]



1. Click on the SAVE button to save our Dashboard.

## Review Dashboard

The screenshot shows the 'Ops Overview (New)' dashboard. At the top, there are time selection buttons: 1H, 6H, 24H, 7D, and CUSTOM. Below these are three small icons: a star, a share symbol, and a refresh symbol.

**Virtual Machines** table:

Name	Adapter Type	Object Type	Policy	Collection State	Collection Status
dev-project-rz5gx-4tgb2	vCenter	Virtual Machine	vSphere Solution's D...	<span style="color: green;">green</span>	<span style="color: green;">green</span>
aria-auto-config	vCenter	Virtual Machine	vSphere Solution's D...	<span style="color: green;">green</span>	<span style="color: green;">green</span>
windows-0010	vCenter	Virtual Machine	vSphere Solution's D...	<span style="color: green;">green</span>	<span style="color: green;">green</span>
linux-dev-0010	vCenter	Virtual Machine	vSphere Solution's D...	<span style="color: green;">green</span>	<span style="color: green;">green</span>
ubuntu-0008	vCenter	Virtual Machine	vSphere Solution's D...	<span style="color: green;">green</span>	<span style="color: green;">green</span>
aria-auto	vCenter	Virtual Machine	vSphere Solution's D...	<span style="color: green;">green</span>	<span style="color: green;">green</span>

Below the table is a vertical scroll bar, with the number 1 circled at the top. To the right of the scroll bar is a vertical red box, with the number 2 circled at the top. The scroll bar itself has the number 3 circled near its bottom.

**Object Relationship** widget (highlighted with a red box):

This widget shows a network of objects: VM-RegionA..., host-ubuntu, esx-00a.corp..., Workloads, and RegionA01-I... connected to a central VM named ubuntu-0008, which is highlighted with a green checkmark.

**Top Alerts** widget (highlighted with a red box):

This widget displays the message "No Issues" and is numbered 4.

**Health** widget (highlighted with a red box):

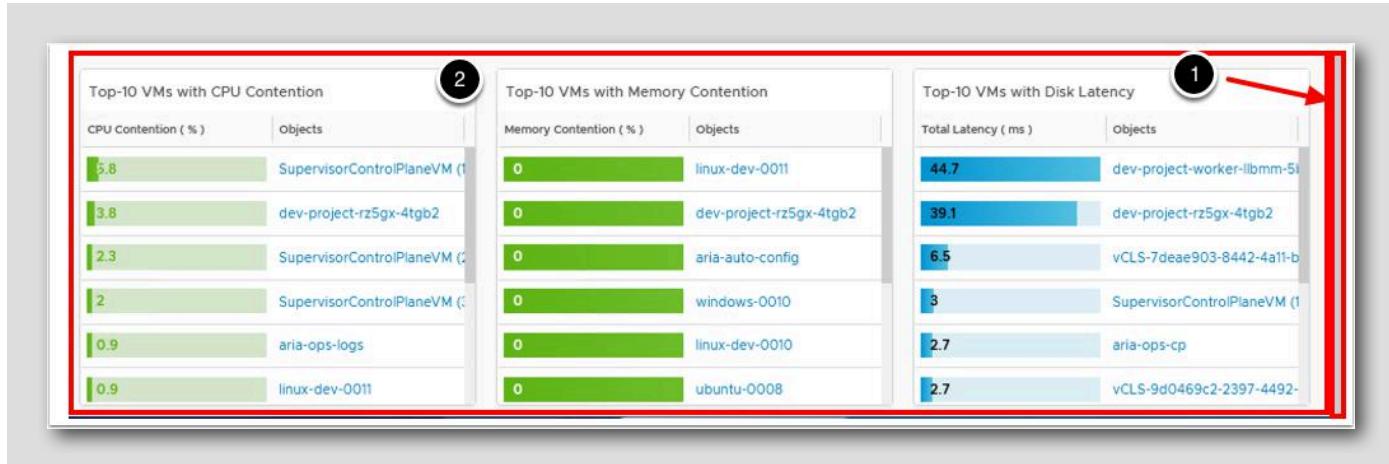
This widget shows a green icon and the word "Health". It includes a "Health Trend" chart (a blue gradient bar) and a section titled "Why is health Good?" with the text: "Health is based on the alert definitions you configure to impact the health score. Check the triggered alerts for the configured".

**Bottom Widgets**:

- Top-10 VMs with CPU Contention
- Top-10 VMs with Memory Contention
- Top-10 VMs with Disk Latency

1. Drag the scroll bar all the way to the top of the new dashboard.
2. Drag the scroll bar in the Virtual Machines widget until you see ubuntu-0008.
3. Click on the the VM ubuntu-0008 to view the stats for that object (You may need to scroll down a little in the list of VMs to see it).
4. We now see that the three widgets (Object Relationship, Top Alerts and Health) now are populated with metrics related to the ubuntu-0008 virtual machine.

## Review Dashboard (continued)



1. Drag the scroll bar all the way to the bottom of the dashboard.
2. We see that we have the (3) Top-10 VMs widgets based on CPU Contention, Memory contention and Disk latency.

## Lesson End

Congratulations, we have completed the lesson on **Creating a New Custom Dashboard!**

In this lesson, we created a brand new custom dashboard that contained an Object List of virtual machines that had relationships to all the other widgets. However, we did not create the relationship from the virtual machine in the Object List widget to the Top-N widgets. This ensures that no matter which virtual machine we selected from the Object List widget, the Top-N widgets will always show the Top-10 VMs with CPU contention, Memory contention and Disk latency.

## Importing New Dashboards

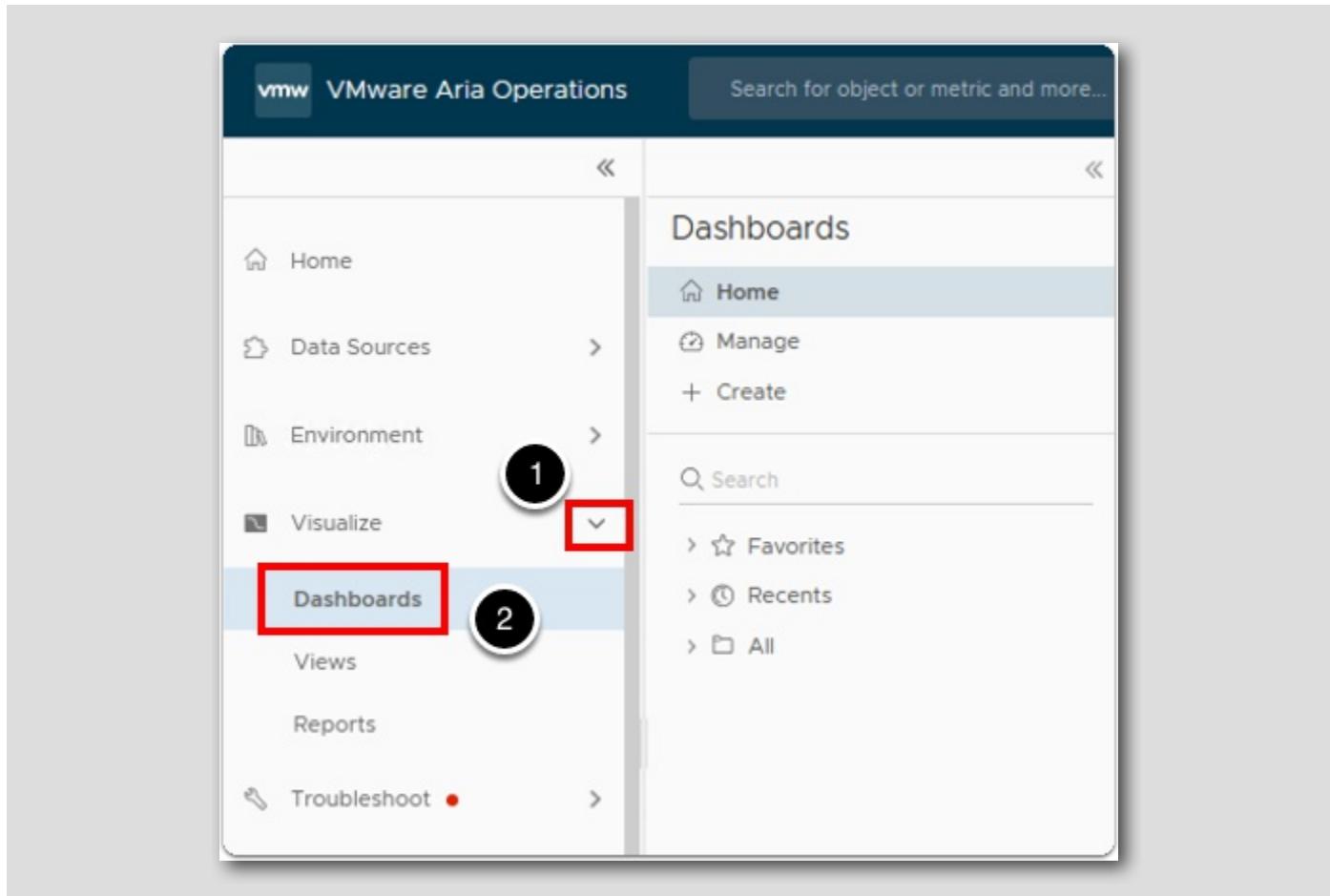
In this lesson, we will learn how to import new dashboards into Aria Operations.

Perhaps you have multiple Aria instances and you need to import a dashboard that one of your teammates has created on a different Aria instance. This could be very useful and is very common when we have multiple Aria Operations instances or we have a Development instance that we use to develop and test our custom content.

We also have a great website to download and contribute cool dashboards we have made called the Dashboard Exchange. We can get to the VMware Aria Operations Sample Exchange quickly by visiting this site at <https://aria.vmware.com/sample-exchange/vmware-aria-operations-sample-exchange>

In this lesson, we'll highlight some downloadable community content that is available for use to use in vRealize Operations and we'll show how to access and import that content.

## Dashboards



1. Expand Visualize.
2. Click on the Dashboards.

## VMware Aria Operations Sample Exchange

[345]

As we mentioned, we have a Dashboard Exchange that we can use to download community content. However, for this lab environment, we will use your browser to access that page instead of going through the Lab Environment UI due to firewall/proxy set up in the lab pod.

[Click here](#) to open the Aria Operations Sample Exchange in your browser.

## Aria Operations Sample Exchange

[346]

The screenshot shows a web browser window displaying the [VMware Aria Operations Sample Exchange](https://aria.vmware.com/sample-exchange/vmware-aria-operations-sample-exchange) page. The page title is "vmware® Product Walkthroughs". The main content area features three sample dashboard cards:

- Cluster Cores per CPU Super Metric**  
Published by: BROCK PETERSON  
Tags: VREALIZE OPS SUPER METRICS, VROPS, ARIA OPERATIONS, VROPS  
Downloads: 127 | Created: A month ago | Updated: A month ago  
Download button
- VMware Aria Operations Custom Energy Data Dashboards**  
Published by: THOMAS KOPTON  
Tags: VREALIZE OPERATIONS MANAGER, ARIA OPERATIONS, VREALIZE OPS DASHBOARD, SUSTAINABILITY, DASHBOARDS  
Downloads: 88 | Created: 2 months ago | Updated: 2 months ago  
Download button
- VM Folder Super Metric**  
Published by: BROCK PETERSON  
Tags: (partially visible)  
Download button

Everything in the Sample Exchange is community provided content and can be downloaded free of charge. If you login with your MyVMware account, you can also submit content that you've created to share with other users as well.

1. Hover over All Samples to show the different types of content that are available.

## Sample Types

[347]

The screenshot shows a search results page titled "Optimize Operations with Sam Community" displaying 359 results. A dropdown menu is open under the "Tags" heading, specifically for "All Samples". The menu contains the following items, each preceded by a checked checkbox:

- All Samples
- vRealize Ops Dashboard
- vRO Package
- vRealize Ops Super Metrics
- vRealize Ops Outbound Webhook

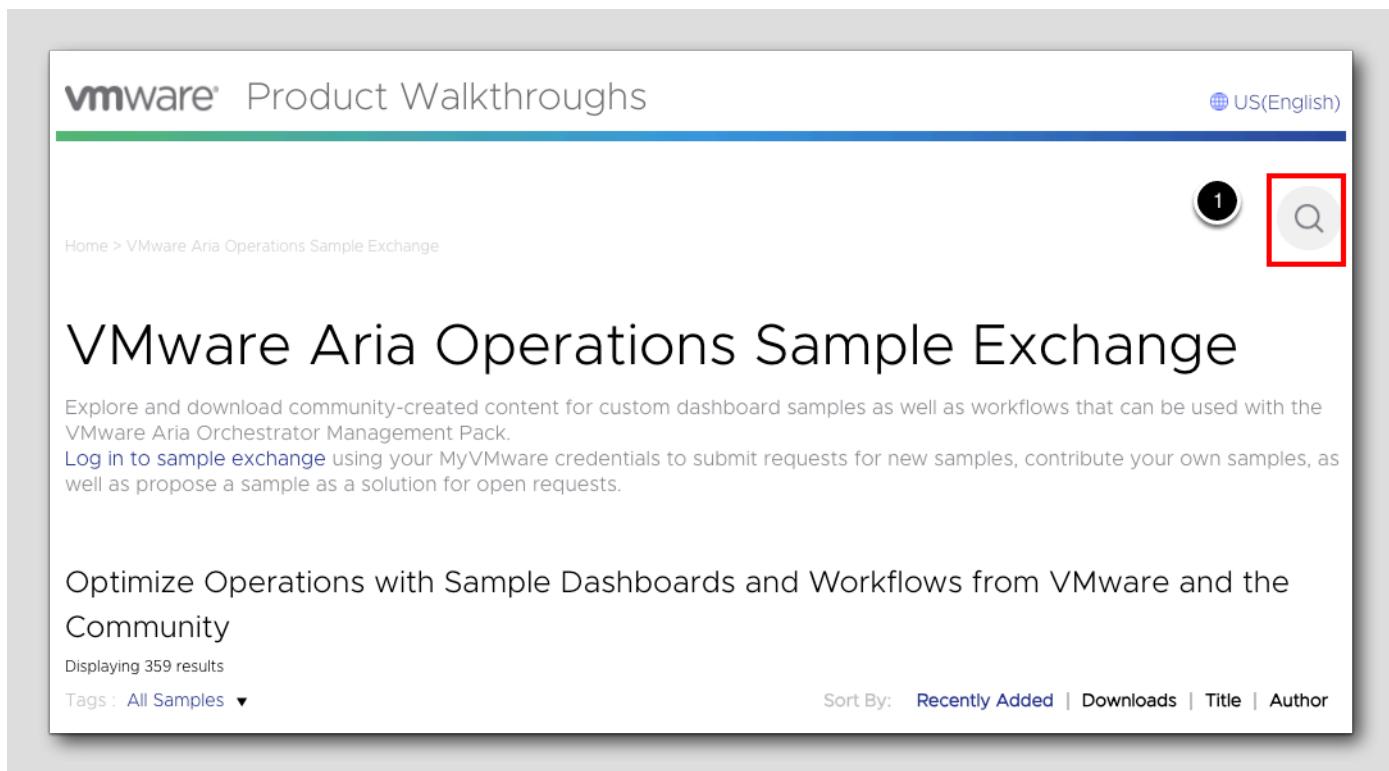
Below the dropdown menu, there are three tabs: "VREALIZE OPS SUPER METRICS", "VROPS", and "ADLA OPS".

Here we can see the different types of content we can download from the sample exchange.

- vRealize Ops Dashboard - Dashboards, as we have covered in previous lessons, are great ways to quickly see a summary of various parts of your environment. There are many great dashboards built-in to Aria Operations, but the customization options are endless and they can be easily modified to suit your needs.
- vRO Package - Aria Orchestrator (vRO) packages can be used to further integrate Aria Operations into other products into the Aria Suite. For example, we can use a Aria Orchestrator package to allow us to assign a vRO workflow as a recommended action inside of a Aria Operations alert which greatly extends the capabilities of recommendations and/or automated actions inside of Aria Operations.
- vRealize Ops Super Metrics - Super Metrics are a way to create custom metrics inside of Aria Operations to discover metrics about your environment that the built in metrics won't cover. Note, HOL-2201-09-CMP will cover these super metrics in more detail.
- vRealize Ops Outbound Webhook - A webhook, which can also be called a HTTP push API, is a way for Aria Operations to provide other applications with data or information. The webhooks in the sample exchange provide examples of webhooks to some popular applications that you may want to receive data from Aria Operations.

## Search for our Sample Dashboard

[348]



The screenshot shows a web browser displaying the "vmware Product Walkthroughs" website. The URL in the address bar is "https://www.vmware.com/go/walkthroughs". The page title is "VMware Aria Operations Sample Exchange". The main content area features a large heading "VMware Aria Operations Sample Exchange" and a sub-headline "Explore and download community-created content for custom dashboard samples as well as workflows that can be used with the VMware Aria Orchestrator Management Pack." Below this, there is a call-to-action "Log in to sample exchange using your MyVMware credentials to submit requests for new samples, contribute your own samples, as well as propose a sample as a solution for open requests." At the bottom of the content area, there is a section titled "Optimize Operations with Sample Dashboards and Workflows from VMware and the Community" with a sub-subtitle "Displaying 359 results". To the right of this, there is a "Sort By" dropdown menu set to "Recently Added" and a link "Tags : All Samples ▾". The top right corner of the page shows a user icon with a '1' notification and a magnifying glass search icon, which is highlighted with a red box.

Let's search for a dashboard to use for this lesson.

1. Click the Search Icon on the sample exchange.

## Search for Environment Summary Dashboard

[349]

The screenshot shows a search results page within the vSphere Web Client. At the top, there is a search bar containing the query "environment summary dashboard". To the right of the search bar is a "Cancel" button. Below the search bar, the text "SAMPLE EXCHANGE" is displayed, followed by "Displaying 3 search results". Three search results are listed in a vertical stack:

- Clean Executive Summary Dashboard**  
PUBLISHED BY: MATT BRADFORD  
Home > sample-exchange > Clean Executive Summary Dashboard
- VMware Summary Dashboard**  
PUBLISHED BY: BROCK PETERSON  
Home > sample-exchange > VMware Summary Dashboard
- VMware Environment Summary Dashboard V2**  
PUBLISHED BY: BROCK PETERSON  
Home > sample-exchange > VMware Environment Summary Dashboard v2

Each result card has a blue square icon with white code brackets (⟨⟩) on its left side. A red box highlights the search bar and the third search result card. A black circle with the number "1" is positioned above the first result, and a black circle with the number "2" is positioned to the right of the third result.

In this example, we will be selecting a dashboard that we can use in a Network Operations Center (NOC) to give us a good high level visual overview about the health of our environment. This search will return several results - a count this is continually increasing as people add additional content to this community sample exchange.

1. In the search box, enter **environment summary dashboard**, and hit Enter.
2. Scroll down or use your browser's search function (Ctrl-F) to search for **environment summary dashboard** and select the VMware Environment Summary Dashboard v2 once you find it.

Alternately, you can use this [direct link](#) to find the dashboard.

## Download Dashboard

[350]

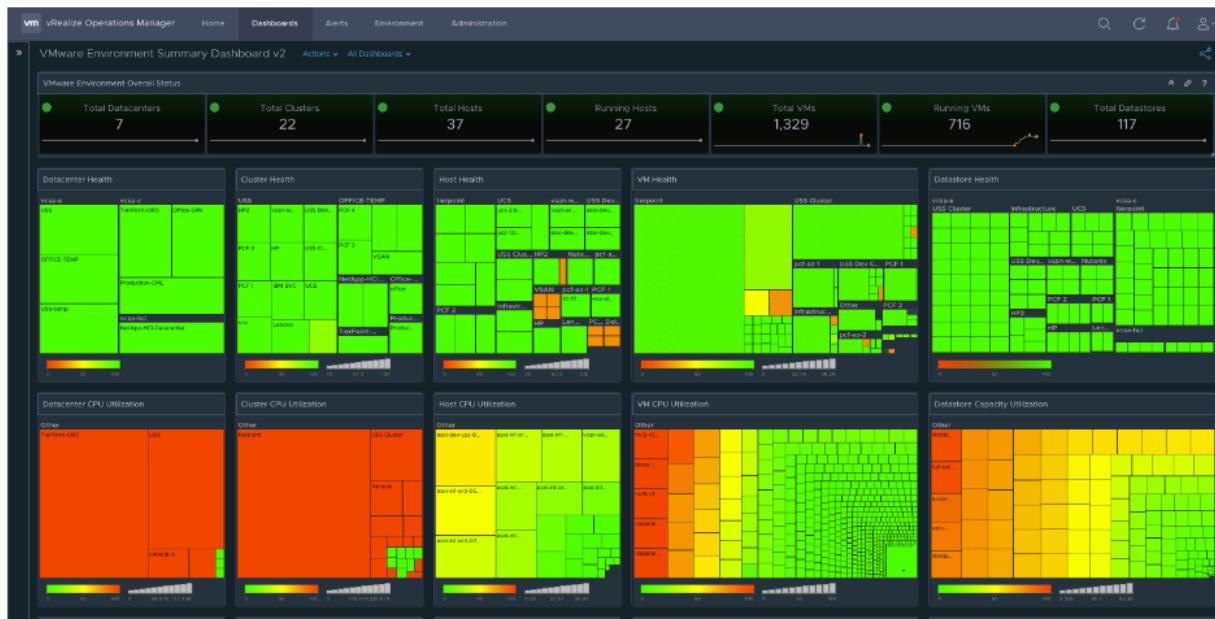
### VMware Environment Summary Dashboard v2

PUBLISHED BY: BROCK PETERSON    DOWNLOADS 744    UPDATED 56 MONTHS AGO

VREALIZE OPS DASHBOARD    VMWARE    VROPS    VROPS

[DOWNLOAD](#)

This dashboard was developed in vROps 7.0 and is a riff on the original NOC dashboard from Luciano Da Silveira Gomes (<https://code.vmware.com/samples/4722/noc-dashboard?h=NOC>). It is designed to show important vSphere objects (metrics): Datacenters (CPU and Memory), Clusters (CPU and Memory), ESXi Hosts (CPU and Memory), VMs (CPU and Memory), and Datastores (Capacity and Latency).



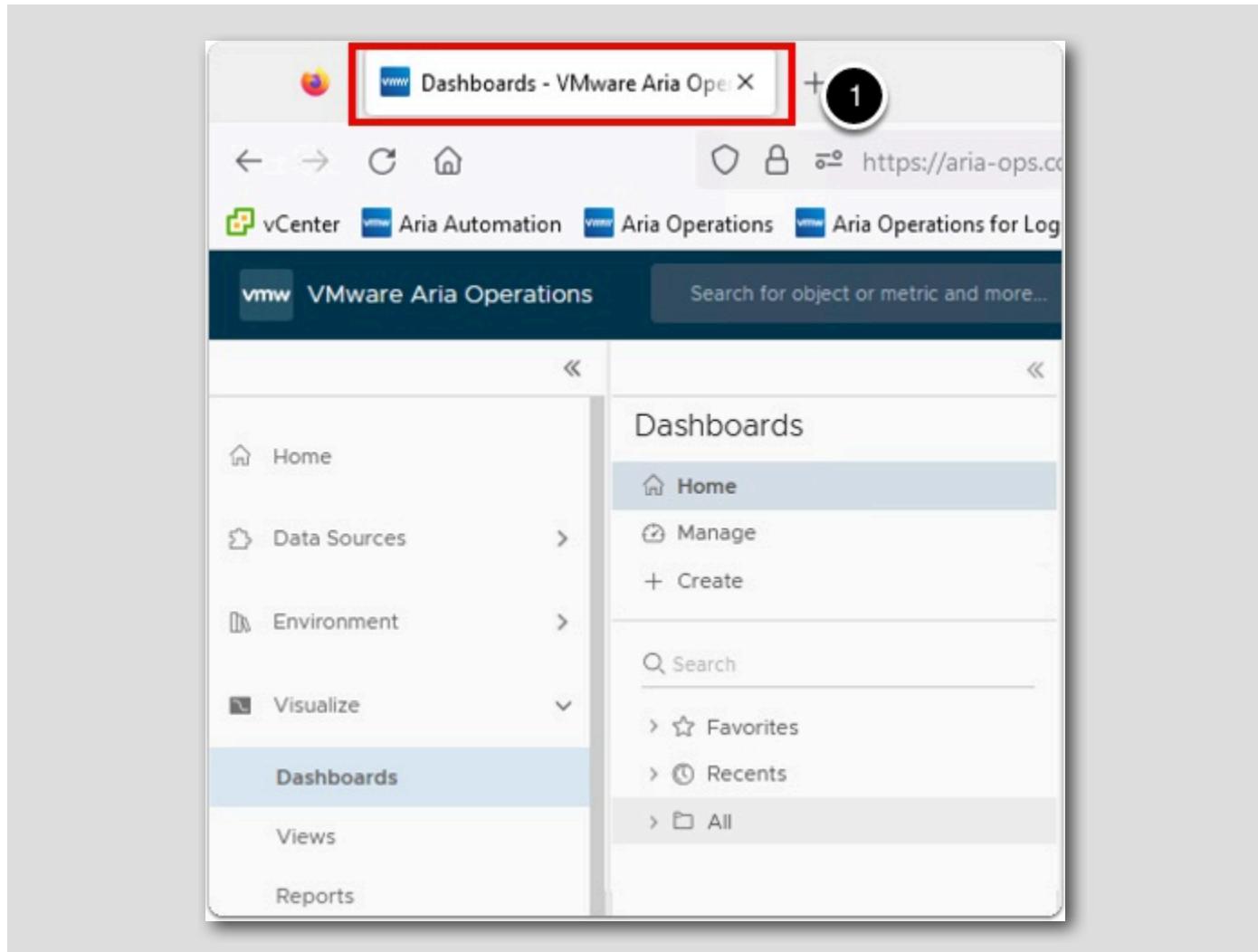
On this page we can see details about the dashboard. Some dashboards samples will also include screenshots of the dashboard showing what data it will include.

1. If you wanted to download the dashboard file, you would click on the DOWNLOAD button. However, we already have a copy of the file in our lab pod.

You can download the file and view the json if you want to see how a dashboard is stored as code for portability.

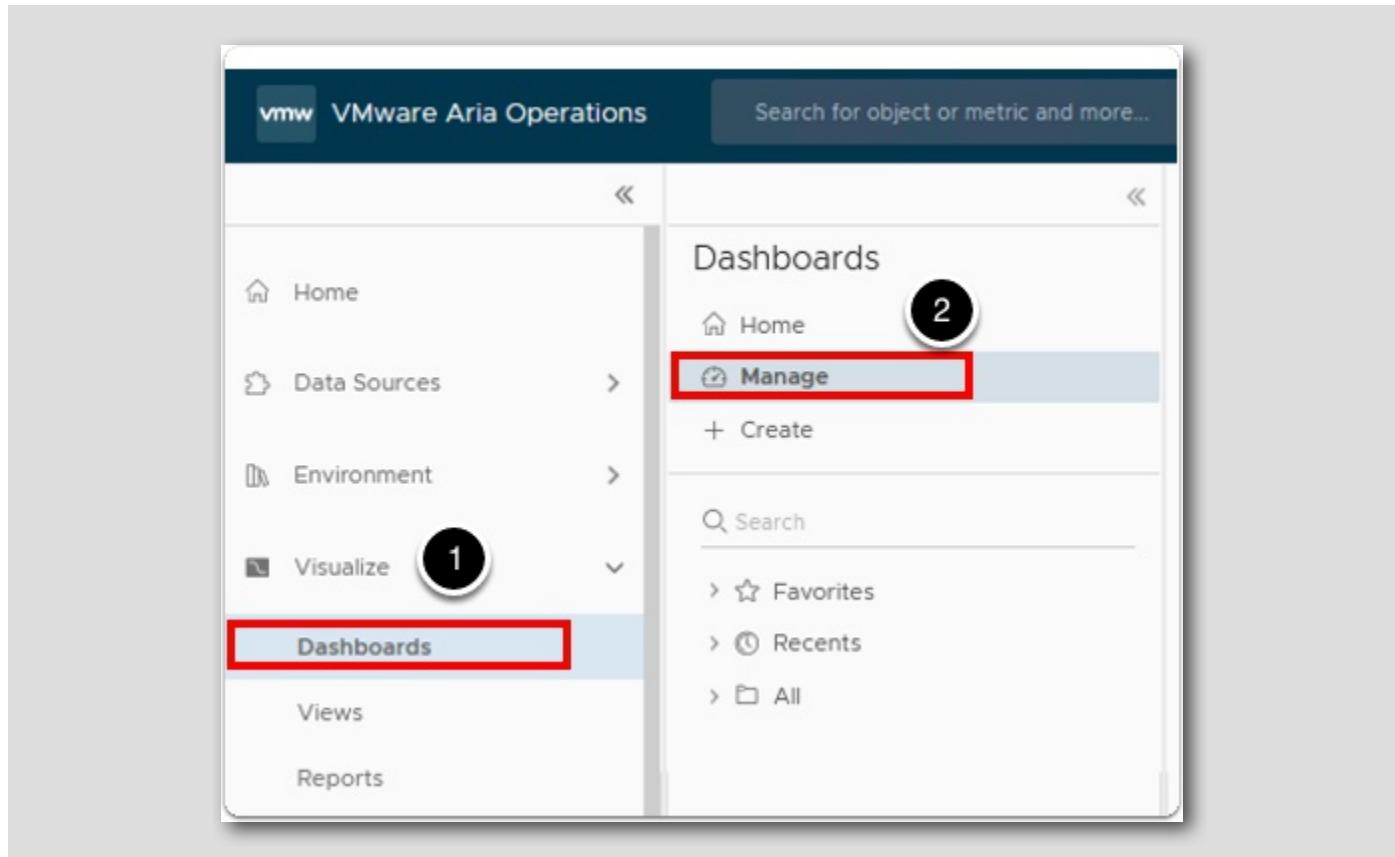
Return to vRealize Operations

[35]



1. Return to the vRealize Operations Manager tab in your lab console.

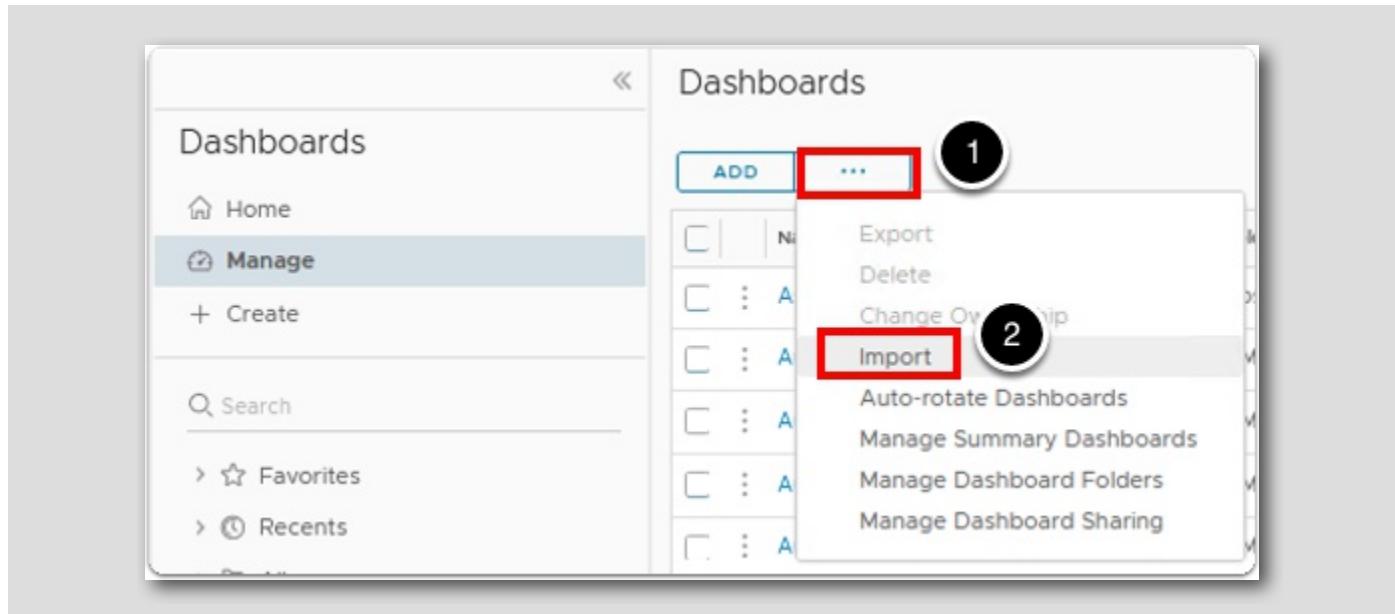
## Manage Dashboards



1. Click on **Dashboards**.

2. Click on **Manage**.

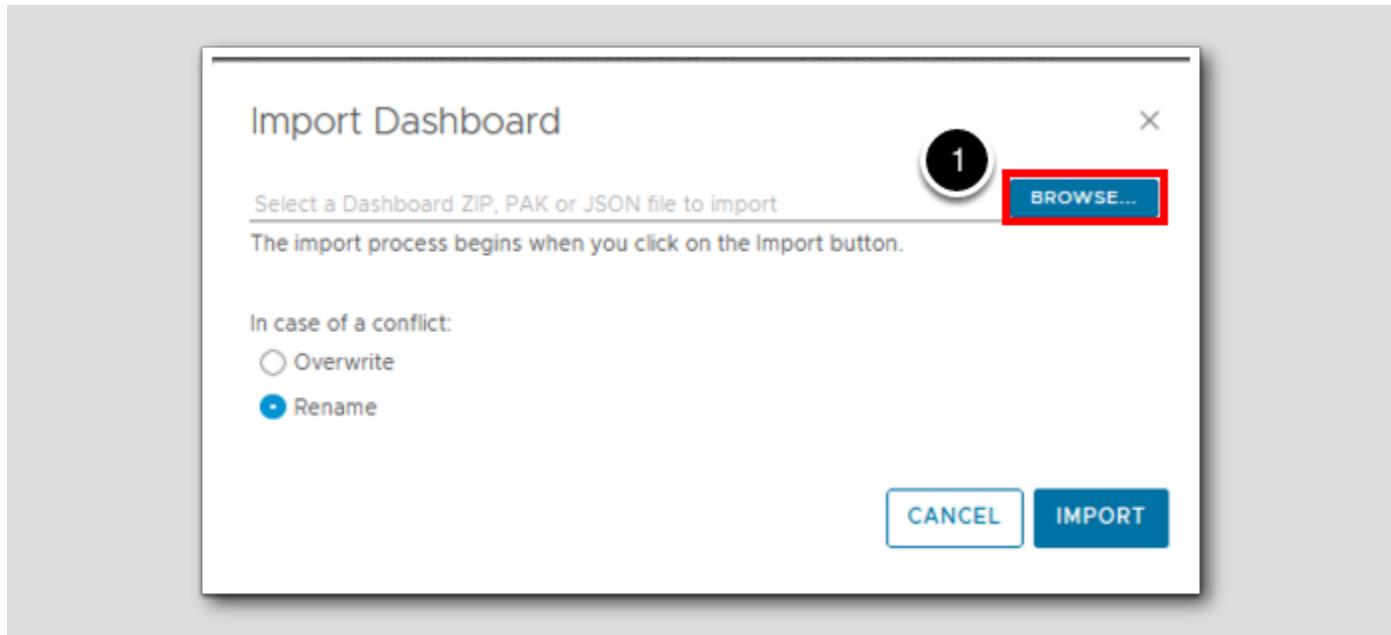
## Import Dashboard



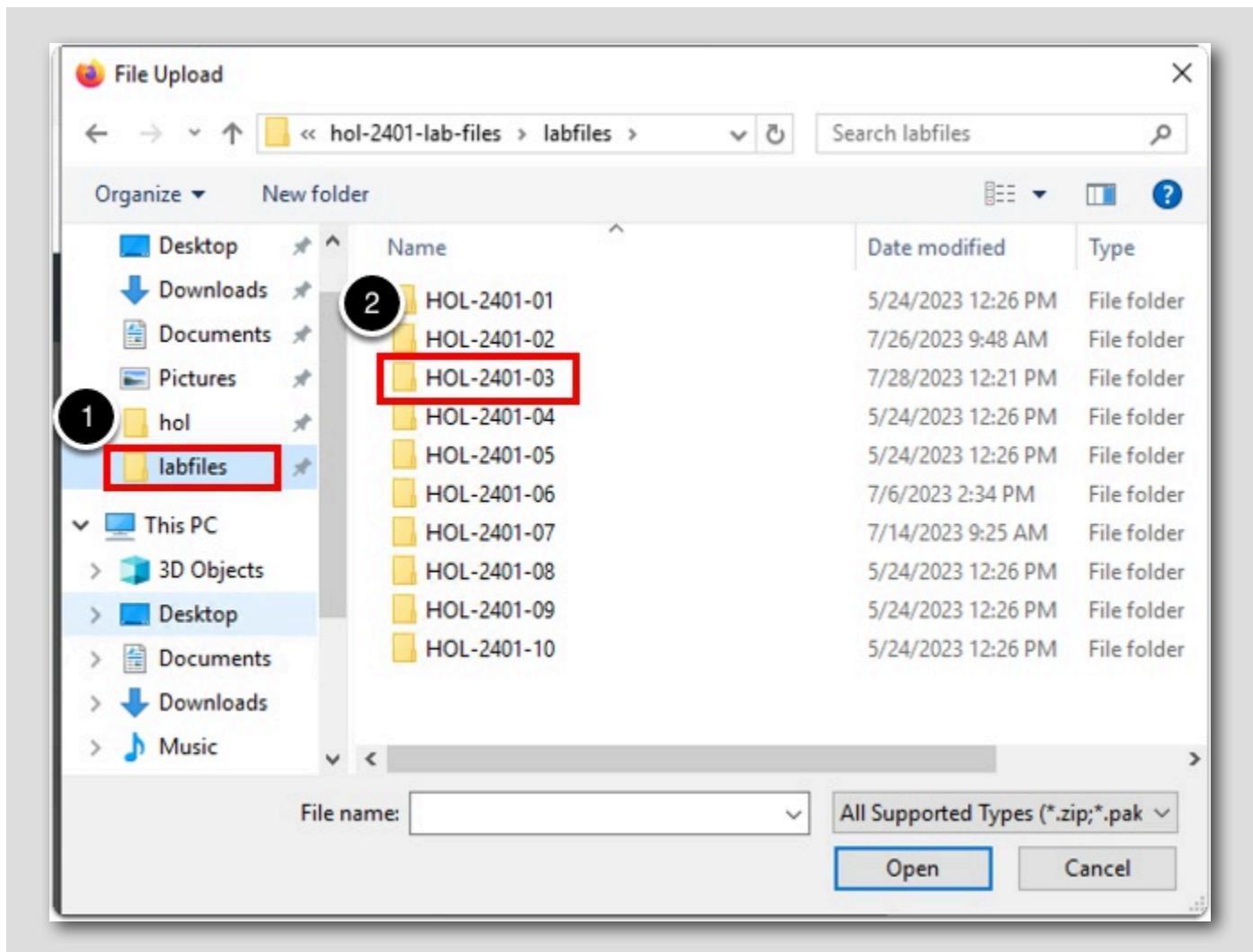
1. On the Dashboards page, click the bottom with 3 dots to open the action menu.
2. Then click **Import** to start the import process.

Browse to the Dashboard to import

[354]



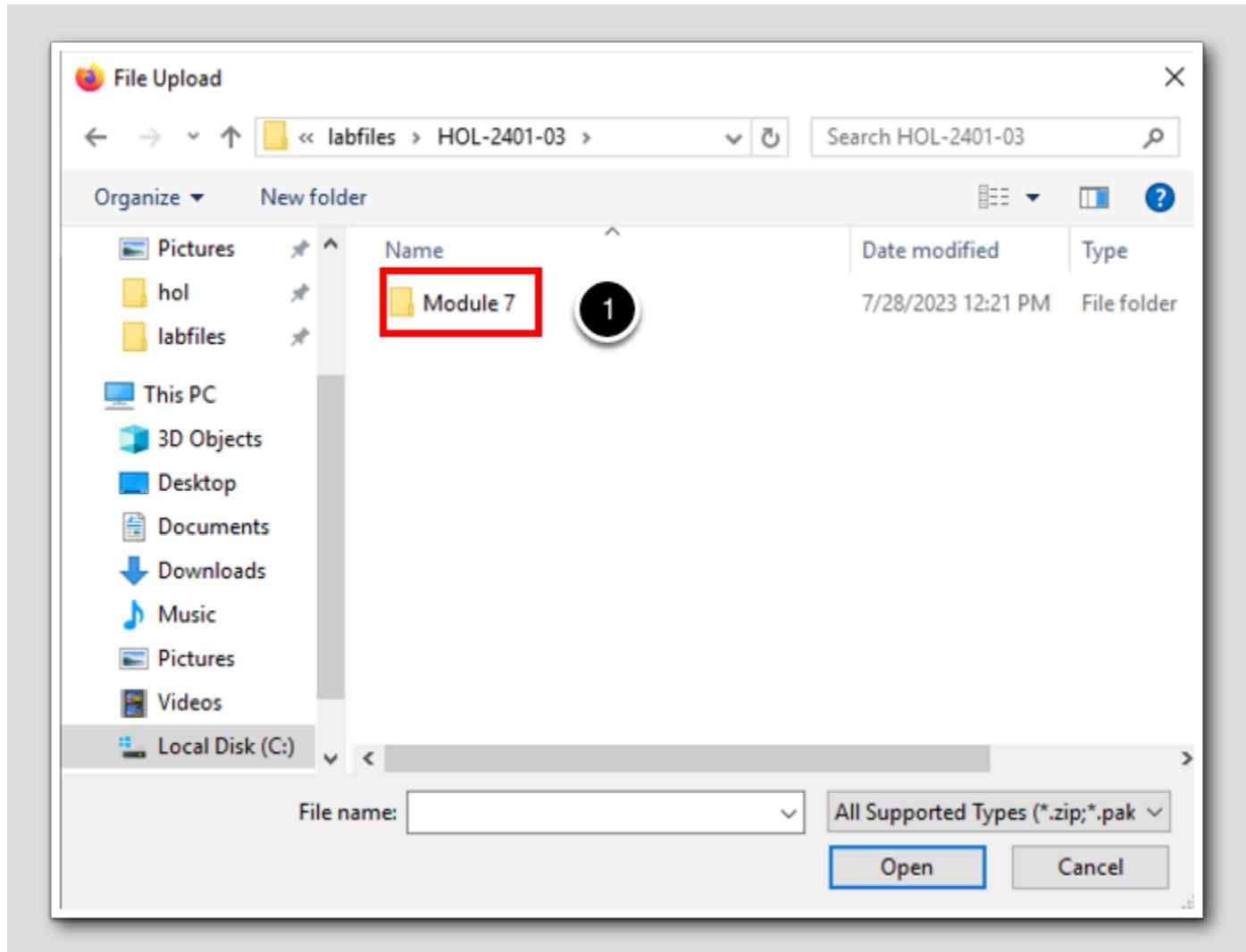
## Import Dashboard File



Note: We have already downloaded the dashboard file for you. It is in the Lab Files --> HOL-2401-03 --> Module 7 directory on your Main Console VM in the lab environment.

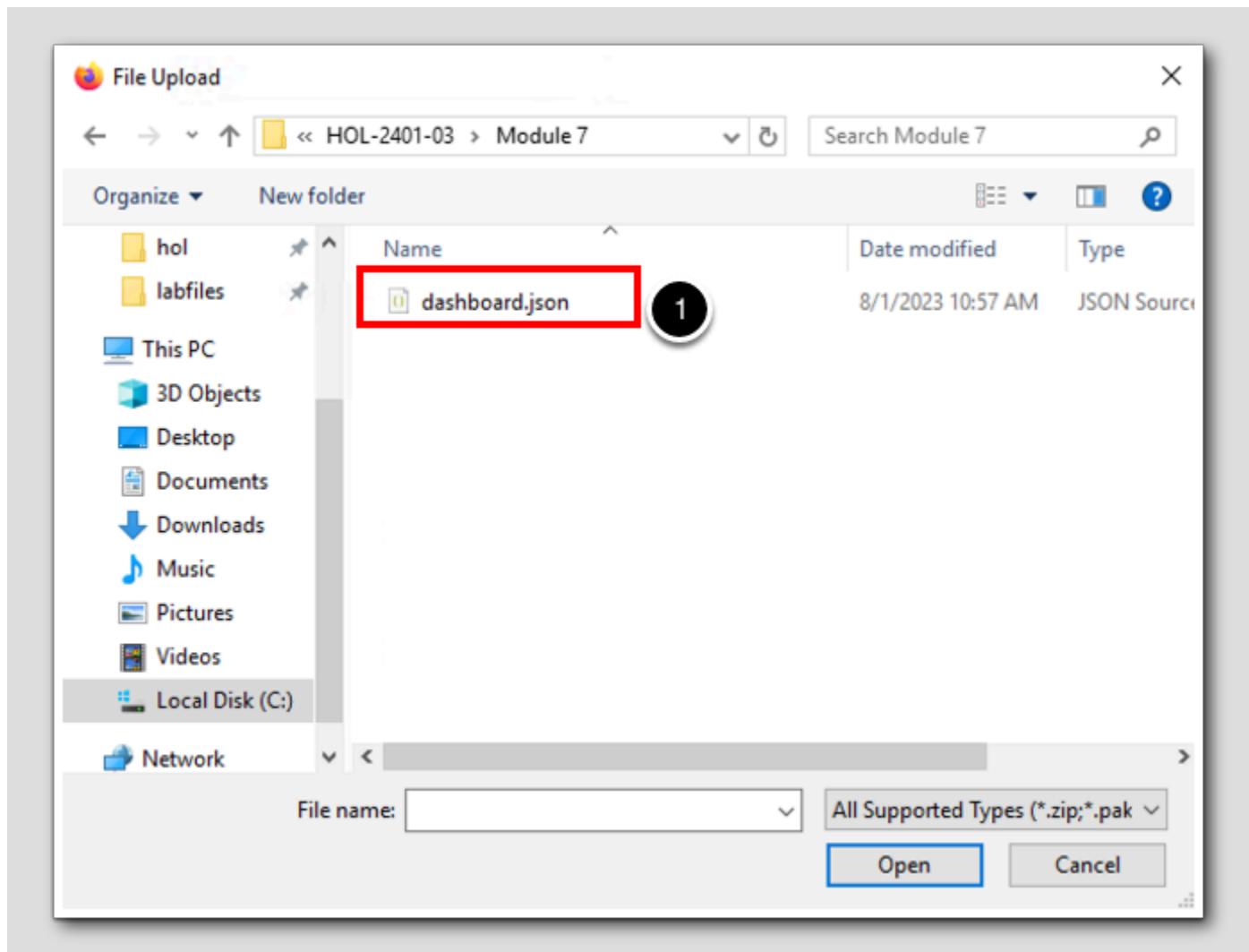
1. In the next window, click Lab Files
2. Double Click HOL-2401-03.

## Module 7



1. Double click on Module 7.

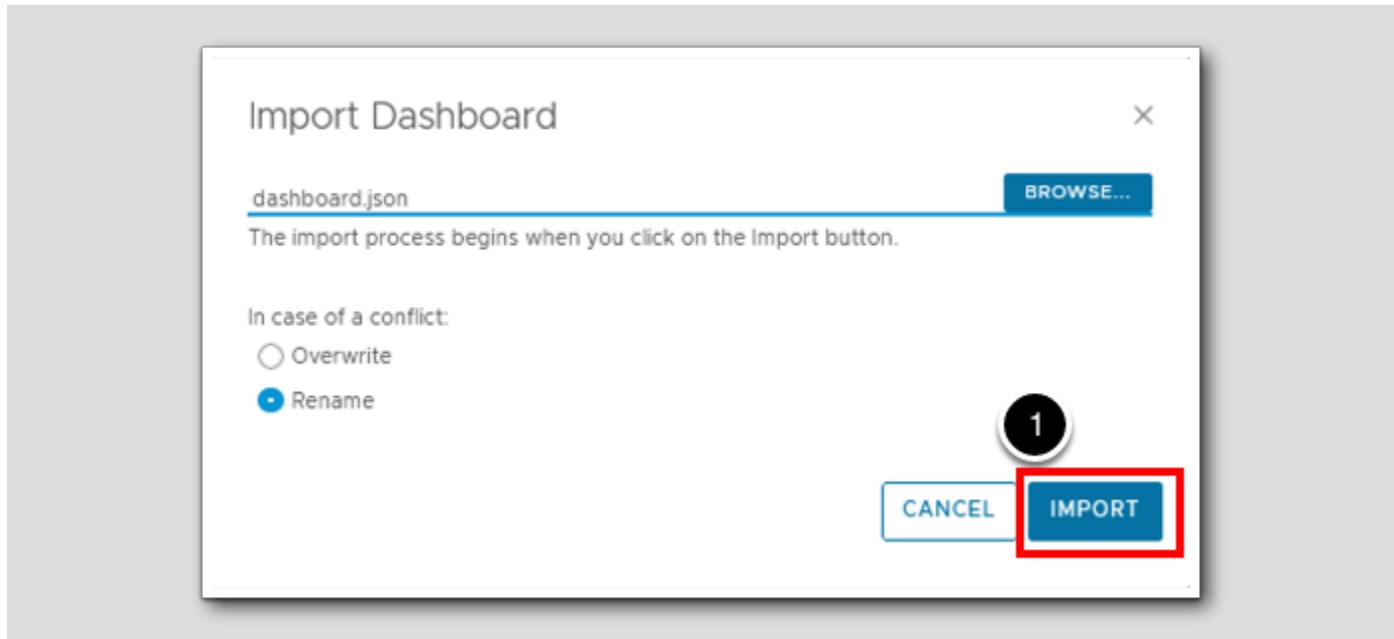
## Import Dashboard.json



1. Double click on the file Dashboard.json.

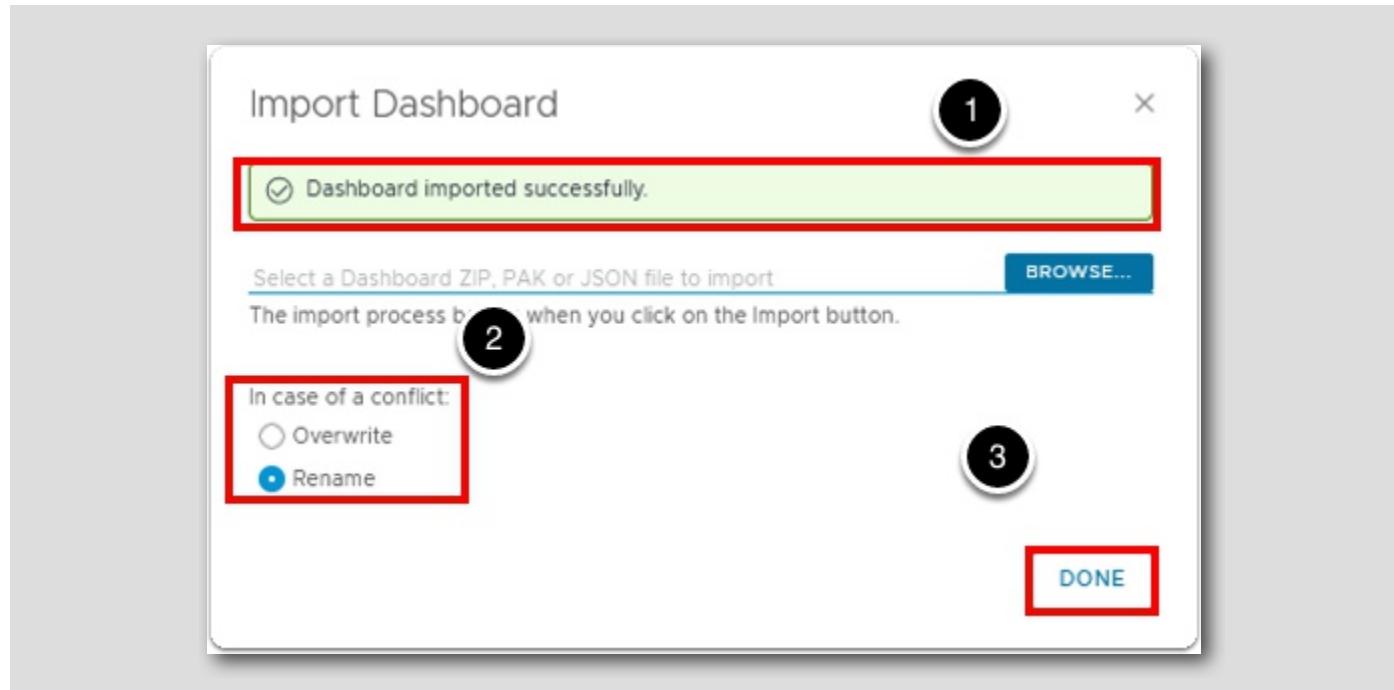
## Import

[358]



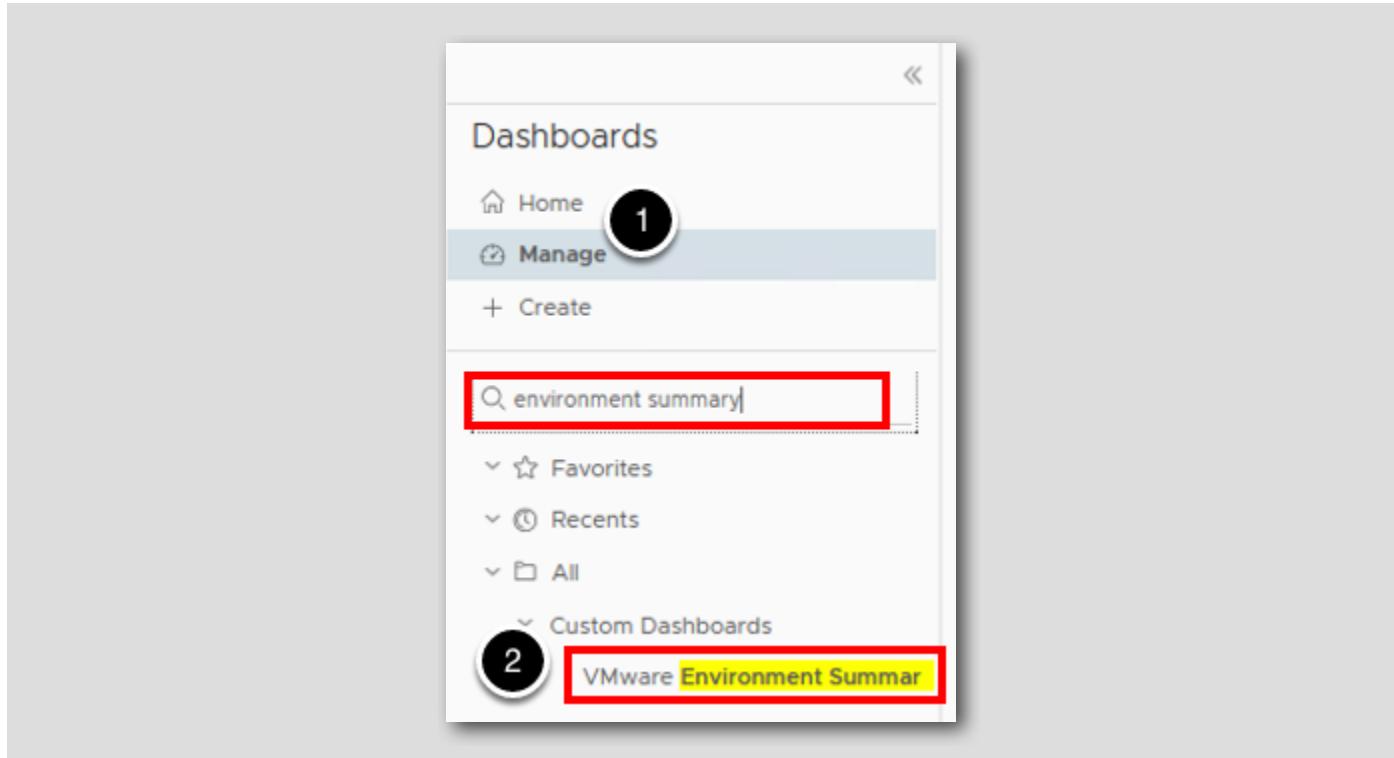
1. Click IMPORT.

Dashboard Imported Successfully



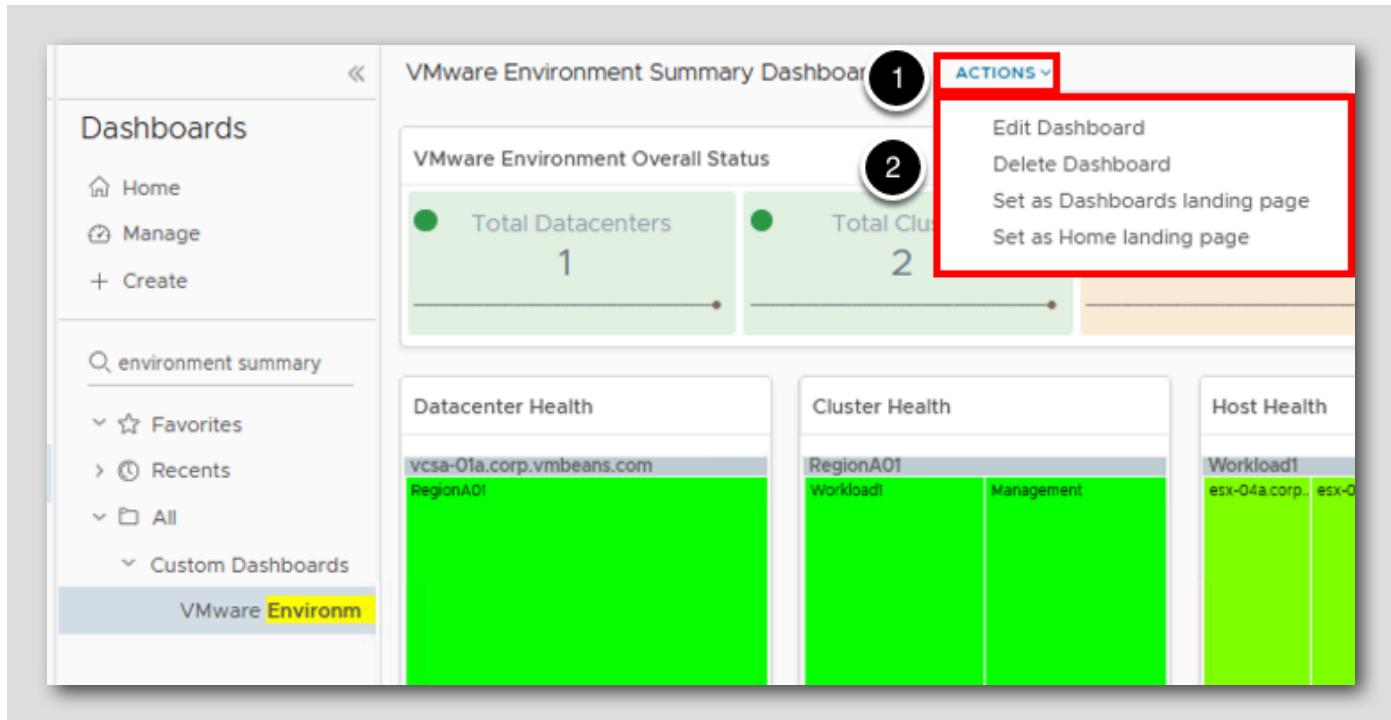
1. Here we can see the dashboard was successfully imported.
2. Notice here also that we have the option to either overwrite any existing dashboards that may have the same name as what you're importing. Or we can choose to rename the newly imported dashboard instead of overwriting existing content.
3. Click DONE to close this window.

Find our Imported Dashboard



1. To find our imported dashboard, type **environment summary** in the search box and hit Enter.
2. Click on **VMware Environment Summary Dashboard V2**.

## Dashboard Actions



Now we can see our imported dashboard! As a final step, let's look at some of the available options.

1. Select ACTIONS beside the dashboard name.
2. Here we can see the available options for this newly imported dashboard to further integrate it into our environment.

## Lesson End

Congratulations, we have just completed the Importing Dashboards lesson.

In this lesson, we learned how to import dashboards into Aria Operations. We also learned about the Sample Exchange, which is a website where we can find some great ready-to-use content that we can use to easily extend the power of Aria Operations.

## Sharing Dashboards

In this lesson, we will learn how to share the numerous dashboards available in Aria Operations.

There are several very useful options for administrators to share dashboards to other personnel in their company. Now we can share a dashboard using a URL that can be given to ANYONE in our organization and they don't even need to be able to access our Aria Operations environment. This is a super useful feature when we need to share performance or capacity information to others in the organization, but don't want them logging into our Aria Operations instance.

We will see that we can also set an expiration time frame for the shared dashboard to be available. This is also really useful when you just want to give someone a view into a specific portion of the infrastructure for a limited period of time.

We can also share a dashboard through an email just by selecting the correct SMTP instance we have already set up in Aria Operations and entering the email of the recipient you want to have your new dashboard. Like with the other sharing options, we can also put an expiration time frame for the email as well.

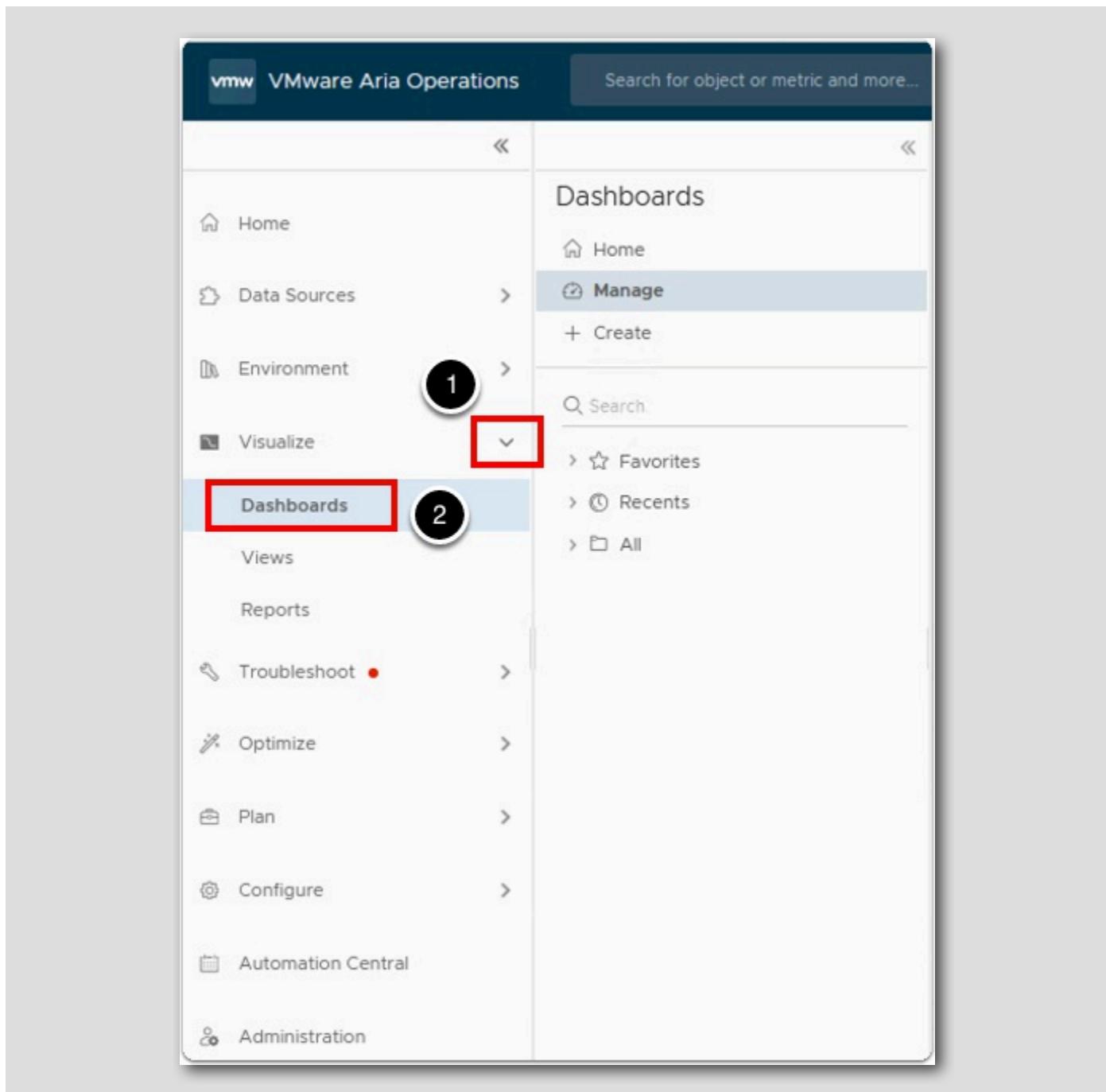
We can even embed the dashboard into any other web page by simply copying the HTML code provided and pasting it into any system like Confluence or our own internal intranet portal.

Group sharing is simply giving dashboard access to any group that currently is set up through the authentication source we already have configured in Aria Operations.

The final option gives us the ability to export the dashboard and move it to any other Aria Operations environment. This is very useful when we have multiple Aria Operations instances or we have a Development instance that we use to develop and test our custom content.

We have commonly seen the (NOC) Network Operations Center of an IT organization share dashboards on their large monitors in their NOC. They have created web pages that contain various bits of information from various monitoring systems in order to minimize the amount of monitors they have to have in the NOC. We can easily give them what they need by providing them an embedded link to the dashboard in which they can embed into their existing web portal. That way they don't have to add an additional monitor to house the Aria Operations dashboard. We will use this scenario in this lesson to learn how to share out the VMware Environment Summary Dashboard to them.

## Dashboards



1. Expand Visualize.
2. Click on Dashboards.



## VMware Environment Summary Dashboard

The screenshot shows the VMware Aria Operations interface. The left sidebar contains navigation links: Home, Data Sources, Environment, Visualize, Dashboards, Views, Reports, Troubleshoot, Optimize, Plan, Configure, Automation Central, Administration, and Developer Center. The 'Dashboards' link is highlighted. The main panel has a search bar at the top with the placeholder 'Search for object or metric and more...'. Below the search bar is a 'Manage' button, which is circled with a black circle labeled '1'. To the right of the manage button is a search input field containing 'ops overview', which is also circled with a black circle labeled '2'. Below the search input field is a list of items under 'All': Favorites, Recents, and Ops Overview (New). The 'Ops Overview (New)' item is highlighted with a yellow box and circled with a black circle labeled '3'.

In our example, we want to share a dashboard with the (NOC) Network Operations Center, so let's go to the Environment Summary dashboard.

1. Click on **Manage**.
2. In the search bar type **ops overview**.
3. Then click on **Ops Overview (New)**.

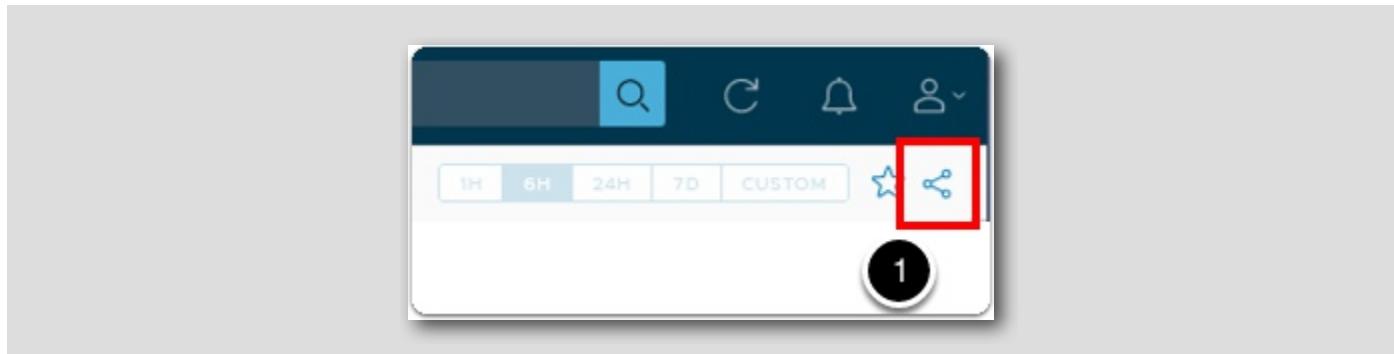
## Ops Overview (New) Dashboard Review

[366]

The screenshot displays the 'Ops Overview (New)' dashboard. At the top, there is a table titled 'Virtual Machines' listing several VMs with their names, adapter types, object types, policies, collection states, and collection statuses. Below this is a 'Object Relationship' diagram showing the hierarchy of 'Templates', 'VM-RegionA...', 'windows2019', and 'RegionA01-...'. A red circle highlights the 'windows2019' node. To the right, there are three main sections: 'Top Alerts' (No Issues), 'Health' (Green icon, Immediate issues, Health Trend bar, Why is health Good? note), and 'Top-10 VMs with CPU Contention' (CPU Contention (%), Objects). The bottom section shows 'Top-10 VMs with Memory Contention' (Memory Contention (%), Objects) and 'Top-10 VMs with Disk Latency' (Total Latency (ms), Objects).

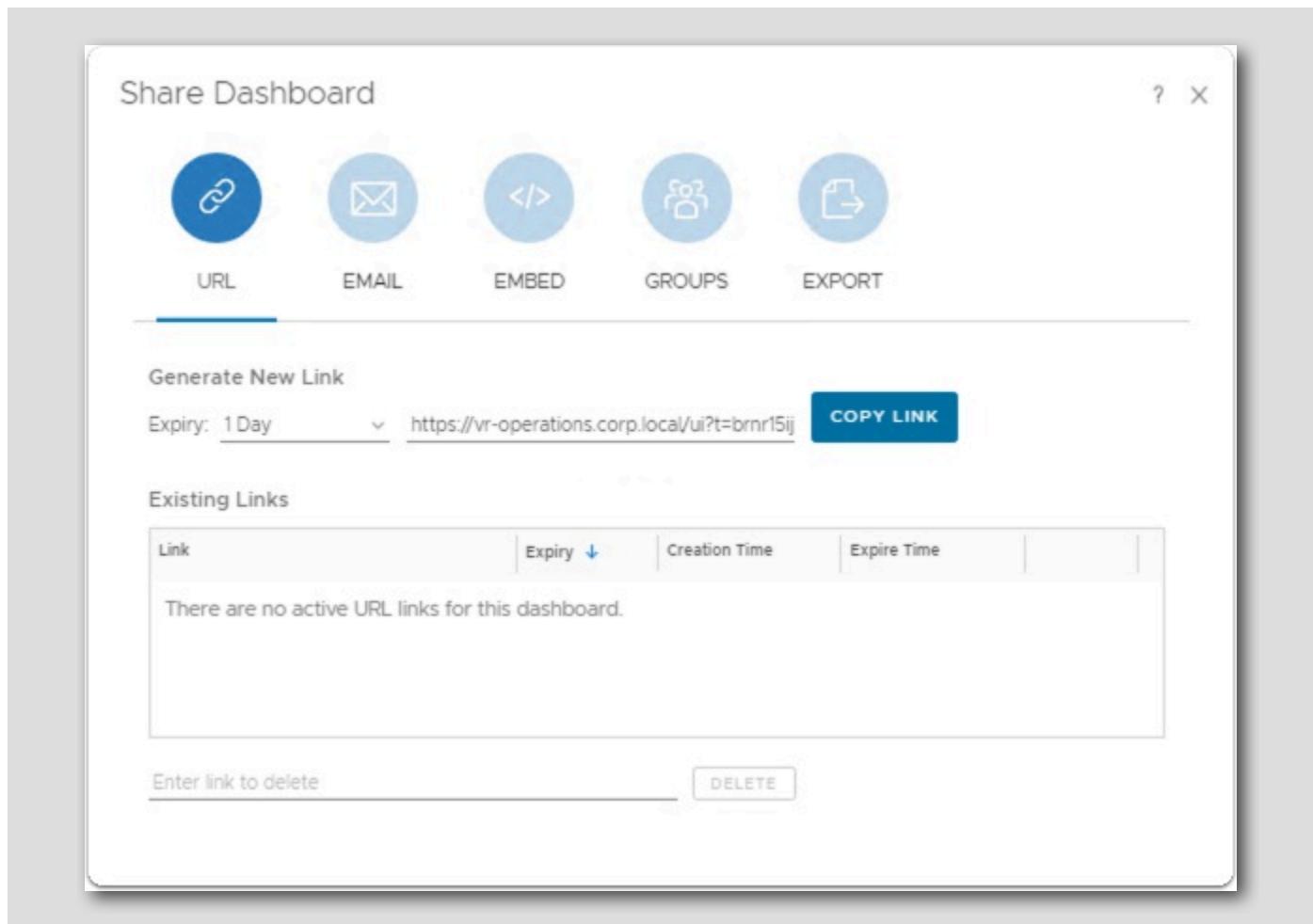
To recap this scenario, the NOC personnel want to have the new Ops Overview (New) Dashboard in the NOC at all times so they can monitor the troublemaking virtual machines after hours. We need to share this dashboard with them, but remember they have a web portal that they use. Therefore, we will need to provide them the embedded link that they can simply add to their existing web portal.

## Share Dashboard



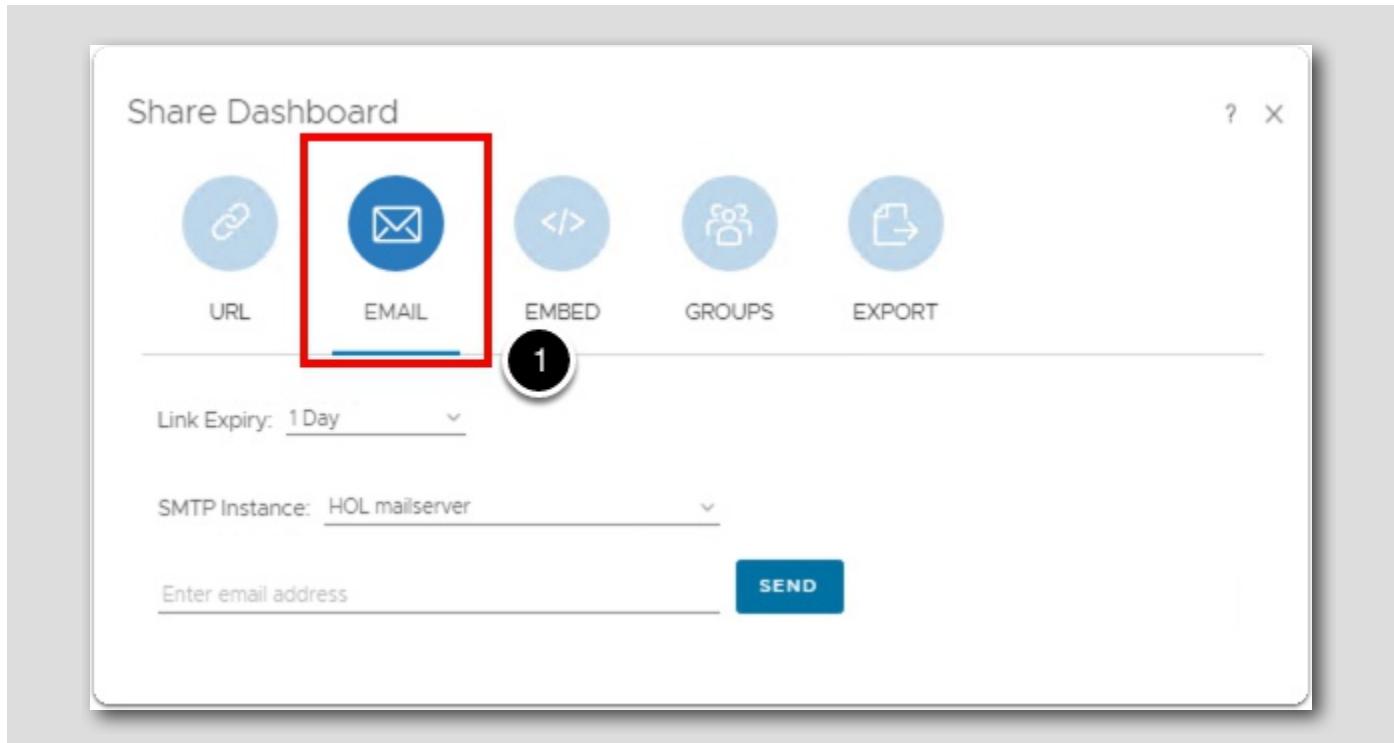
1. Click on the Share Dashboard (three connected circles) icon in the upper right-hand side of the VMware Environment Summary Dashboard.

## Share Dashboard - URL



In this example we can simply create a URL to provide to anyone so they can view the dashboard. For Link Expiry, we have the options to select (1) Day, (1) Week, (1) Month, (3) Months and Never Expire. We see that the link to the dashboard is already filled in. We would then click on the COPY LINK button to copy it to the computer's clipboard allowing us to copy it into a file, email, etc.

## Share Dashboard - Email

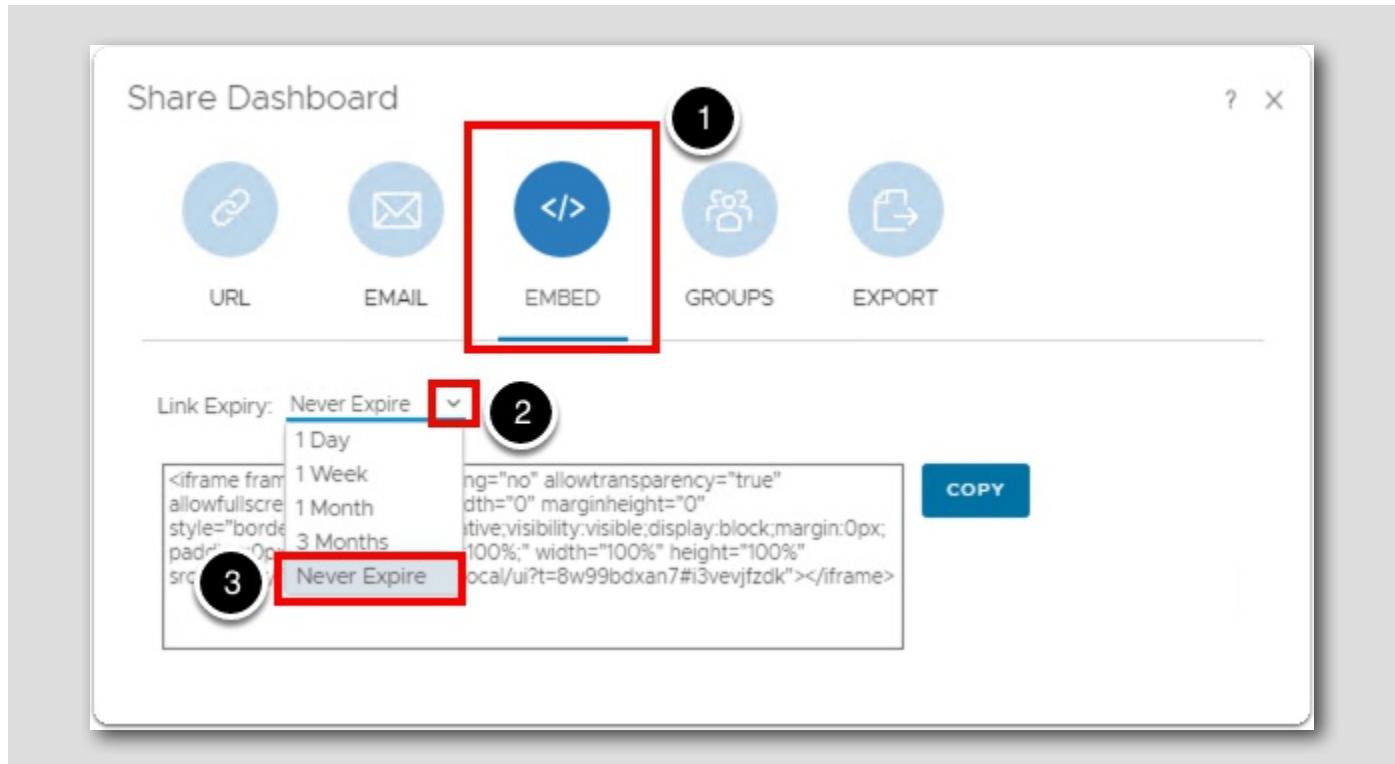


In this example, we want to send the dashboard link to someone via an email address directly from the Aria Operations interface. As a note, we won't actually be sending the link to the dashboard to an email address. We will just run through the steps as though we are going to.

1. Click on the EMAIL icon to select email as an option to send the link.

Again, we have the options to select (1) Day, (1) Week, (1) Month, (3) Months and Never Expire. In this lab environment, we do not have an SMTP instance configured. In a production environment, we would configure this with the company email server information by clicking on the CONFIGURE button if it wasn't already configured within Aria Operations. Then we would type the email address of the individual we are sending the link to. Finally, we would click the SEND button to send the email with the link to the dashboard to the receiver.

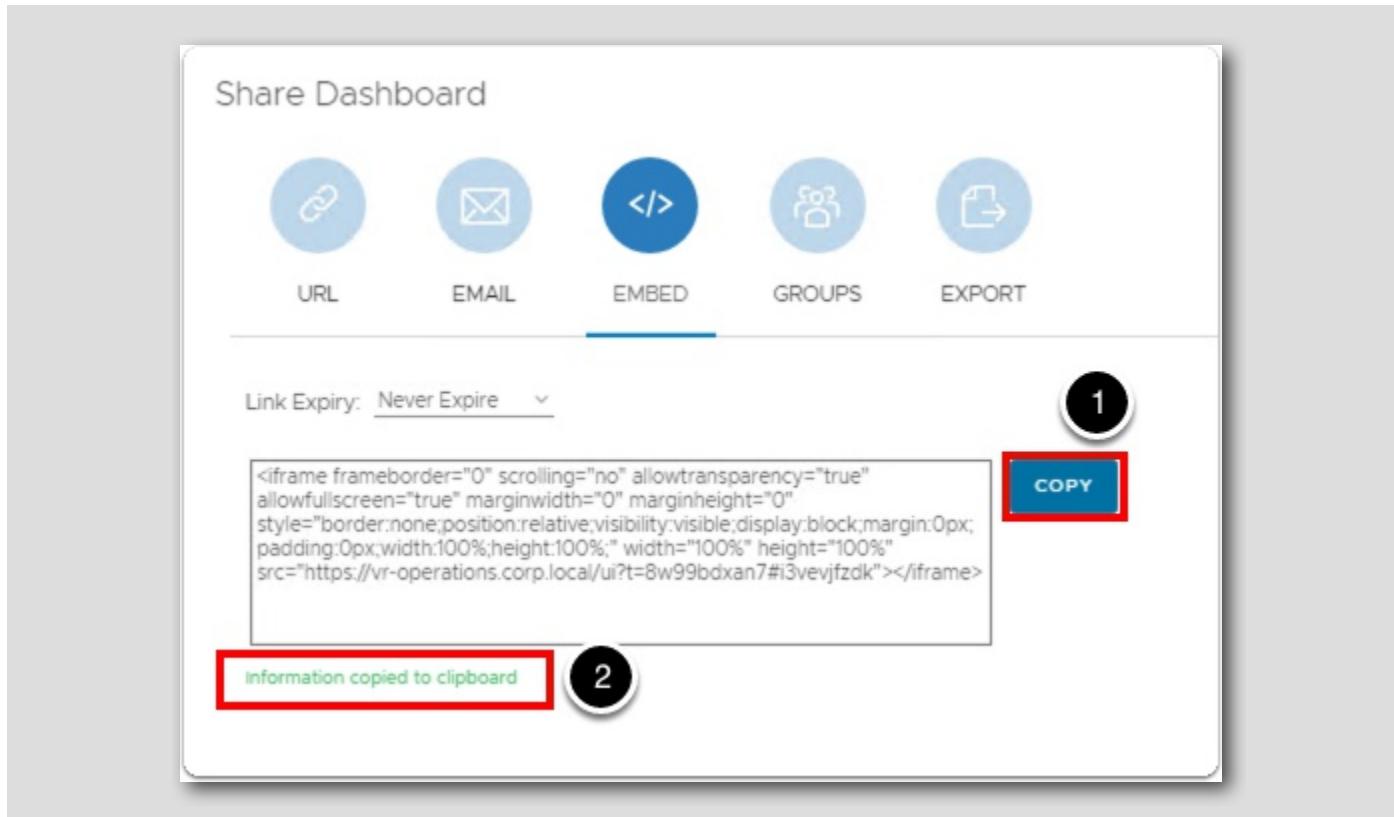
## Share Dashboard - Embed



In the introduction of this lesson, we discussed the scenario of the (NOC) Network Operations Center having a web page that they wanted to embed the Ops Overview (New) Dashboard in. We will now go through the steps associated to accomplish providing them the embedded dashboard.

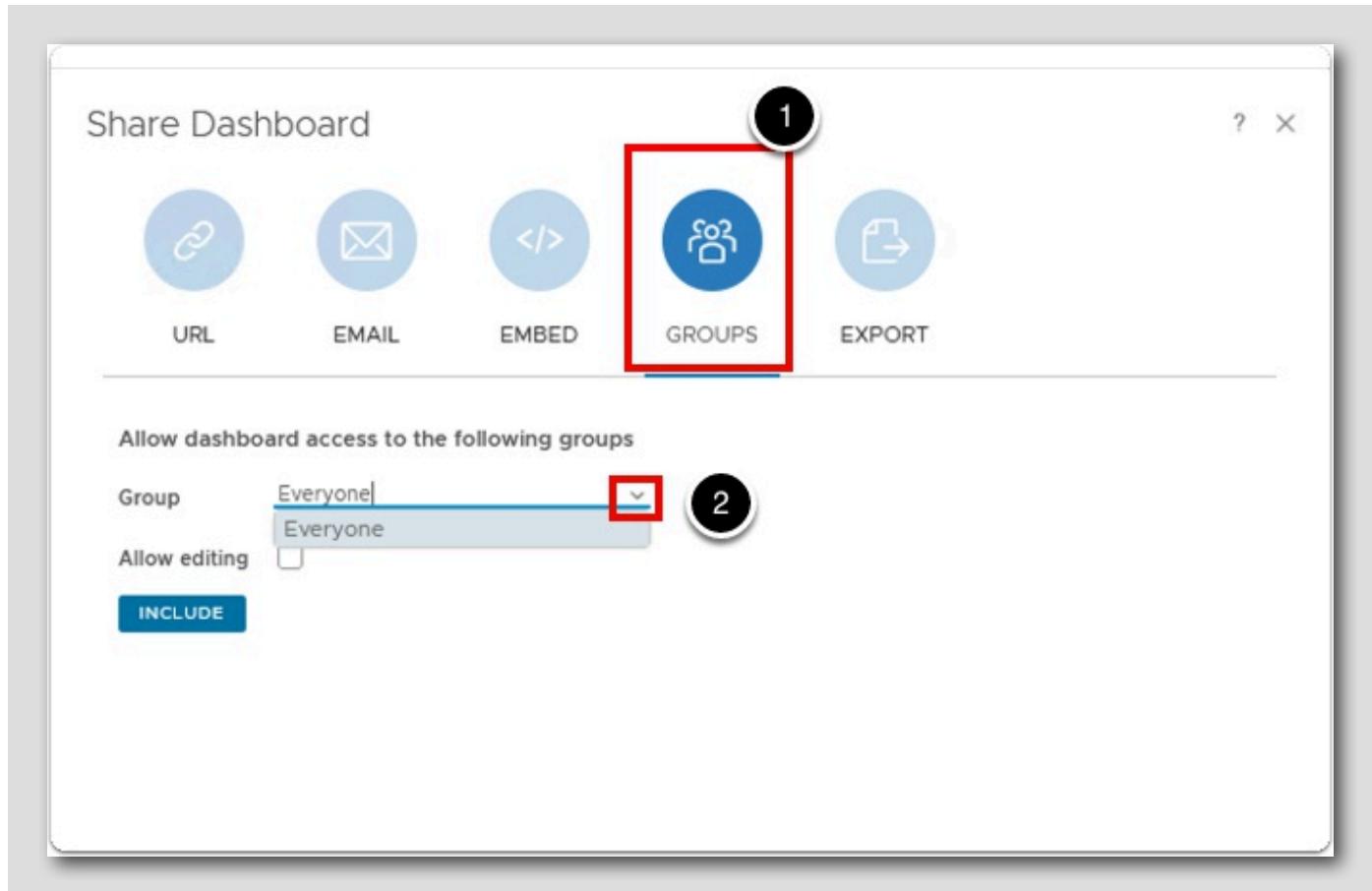
1. Click on the EMBED icon in the Share Dashboard pop-up window. We want this selection since they want the dashboard included in their existing web portal in the NOC.
2. Next click on the arrow next to Link Expiry: to expand its drop-down menu.
3. Click on Never Expire since we want this for the NOC and do not want their access to expire.

## Share Dashboard - Copy to Clipboard



1. Click on the COPY button.
2. We see that by clicking the COPY button, that the embedded link has been successfully copied to the clipboard. It is now ready to be copied into an email or some other method in which we can provide the NOC the link to use in their web portal.

## Share Dashboard - Groups



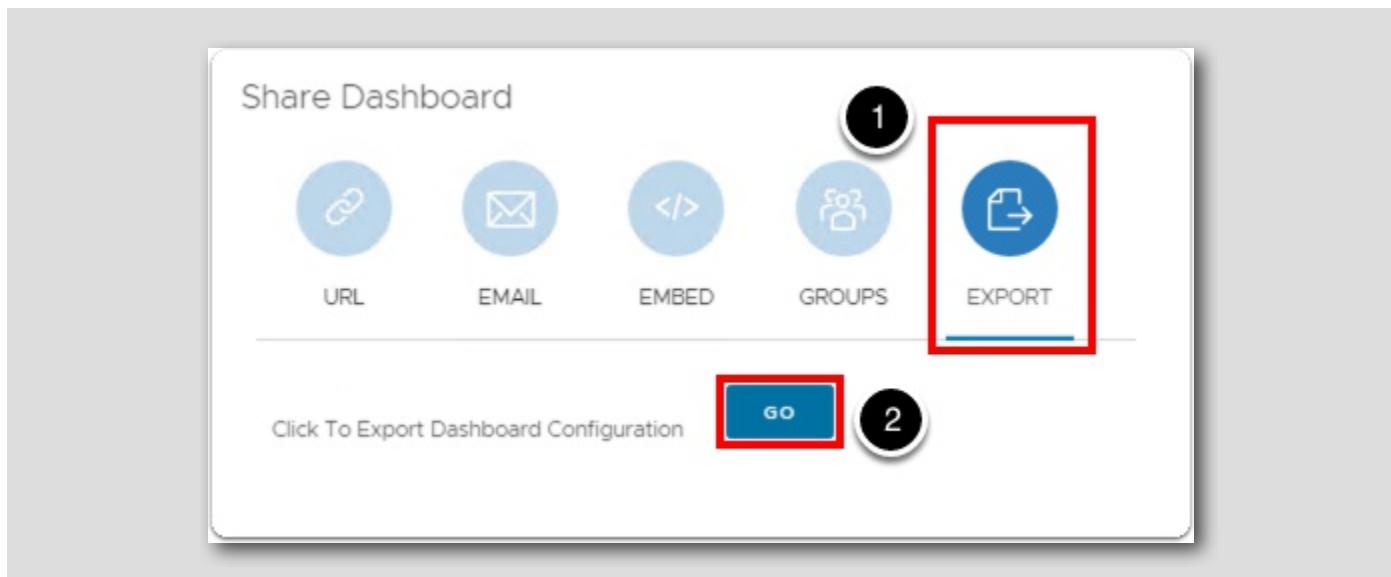
In this example, we need to authorize only a previously established security group in Aria Operations access to this dashboard. Currently the Everyone group has access to this dashboard.

1. Click on the GROUPS icon in the pop-up window.
2. Click on the arrow to the left of the INCLUDE button. We see that we only have two options configured in this environment.

This list will vary from one environment to another based on what groups have been configured within Aria Operations.

We would then click on the INCLUDE button to give this group(s) access to the dashboard.

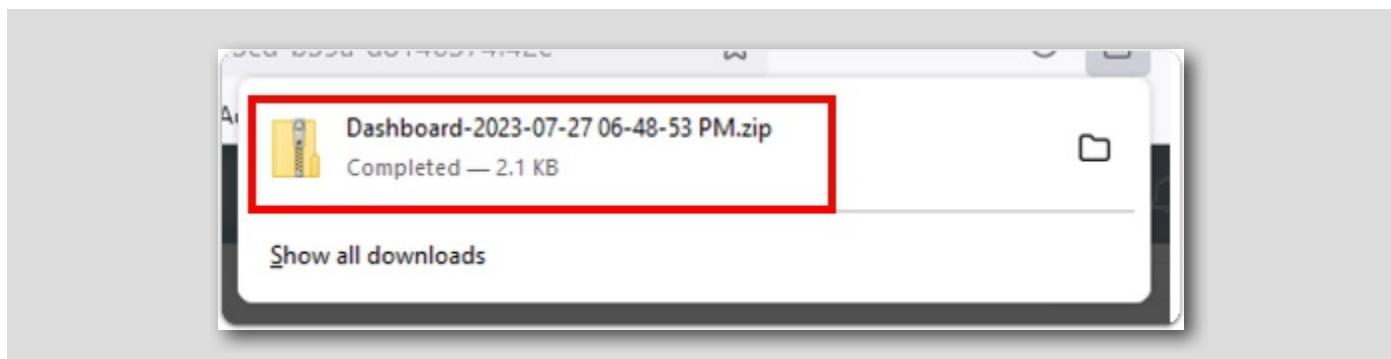
## Share Dashboard - Export



Remember, this Ops Overview (New) dashboard we are currently in is a custom dashboard is not a default out-of-the-box dashboard. We want to export this dashboard because we have another instance of Aria Operations in a (DR) Disaster Recovery datacenter and want to have the same dashboard in that instance as well. So we need to export the dashboard and then import it into the instance in the DR datacenter.

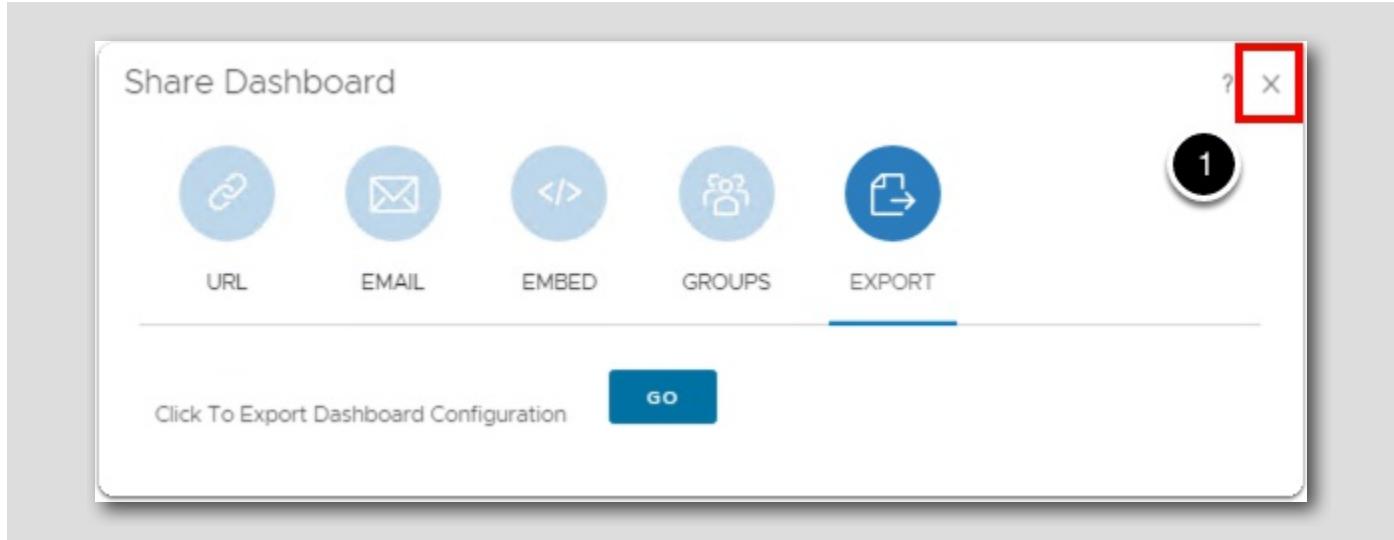
1. Click on the EXPORT button in the pop-up window.
2. Then click on the GO button to export it into a ZIP file format.

## Share Dashboard - Download File



We see that it will download the dashboard as a ZIP file. We could then copy this ZIP file over the DR site and then import it into that Aria Operations instance.

## Share Dashboard - Exit



That's it, we have gone through all the options for sharing dashboards in Aria Operations!

1. Click on the X in the upper right-hand corner of the Share Dashboard pop-up window to close it.

## Lesson End

Congratulations, we have just completed the **Sharing Dashboards** lesson which is the last lesson of **Creating and Managing Dashboards**!

In this lesson, we learned how to share Aria Operations dashboards through various methods. We can share them via a URL, Email, Embedded file, Groups or Export the dashboard to import into another instance of Aria Operations.

## Conclusion

In this module, cloned an existing Dashboard, built a Dashboard from scratch and learned how to share Dashboards with other groups.

## 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 8 - Enhancing depth of VMware Aria Operations with Super Metrics (15 minutes) Basic

### Introduction

[380]

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

[381]

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

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

[382]

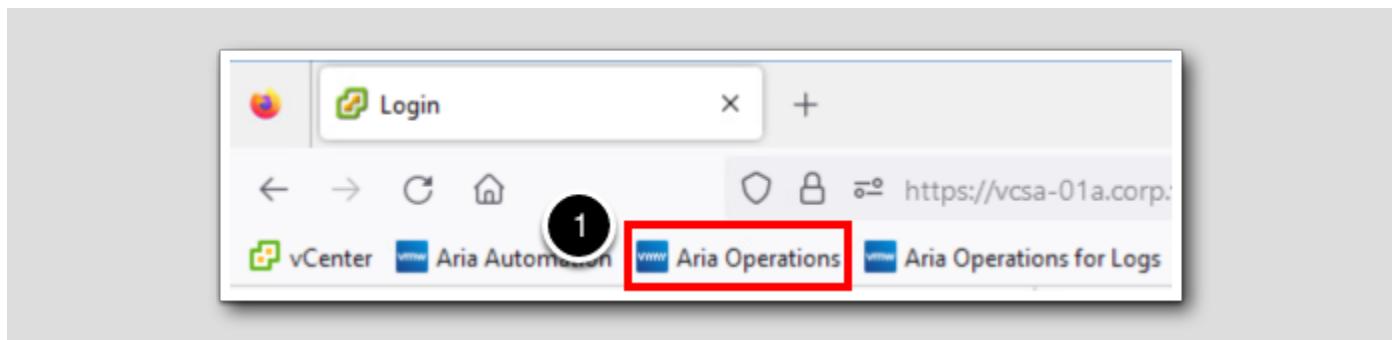


If the browser is not already open, launch Firefox.

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

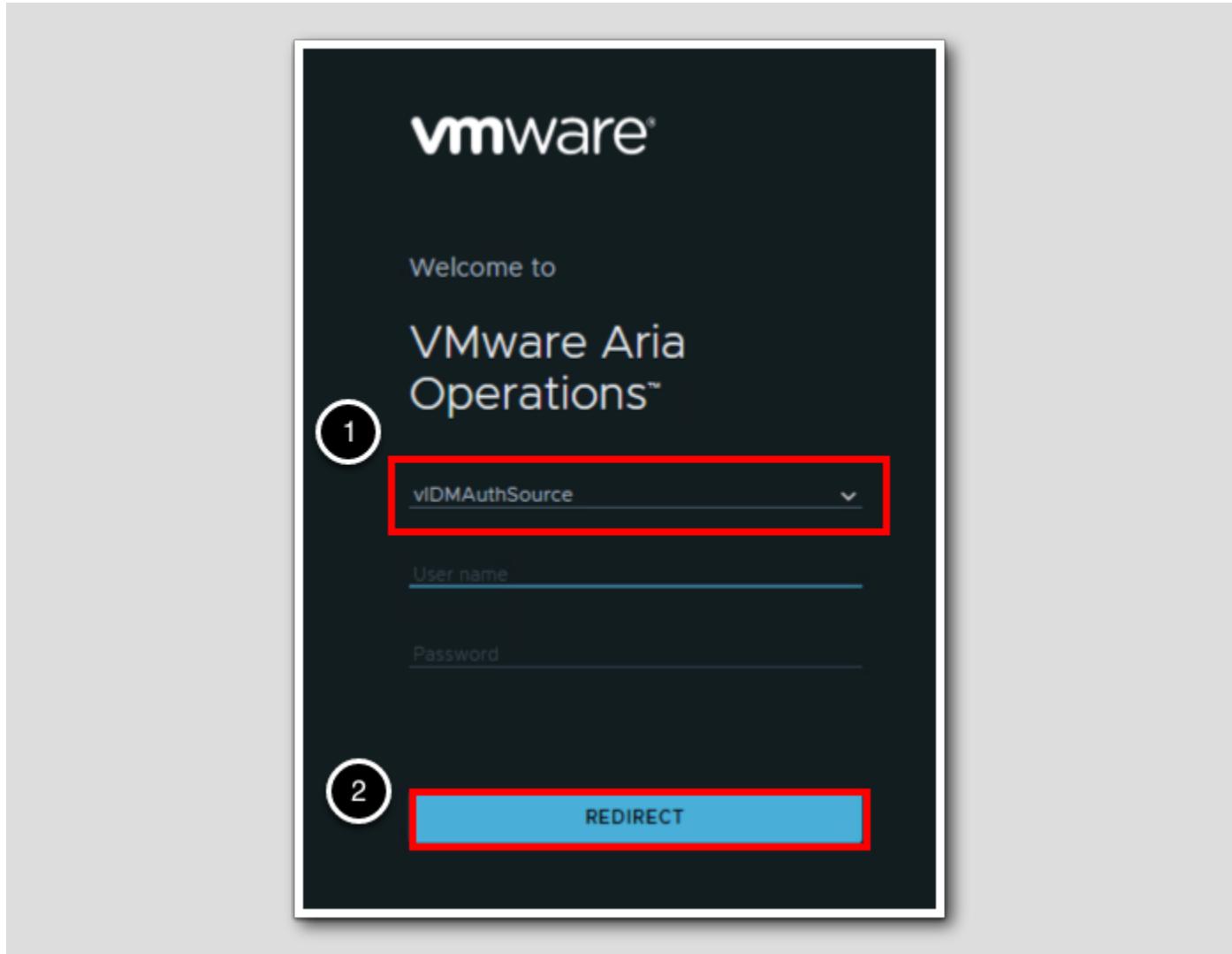
### Navigate to Aria Operations

[383]



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

## Log in to Aria Operations

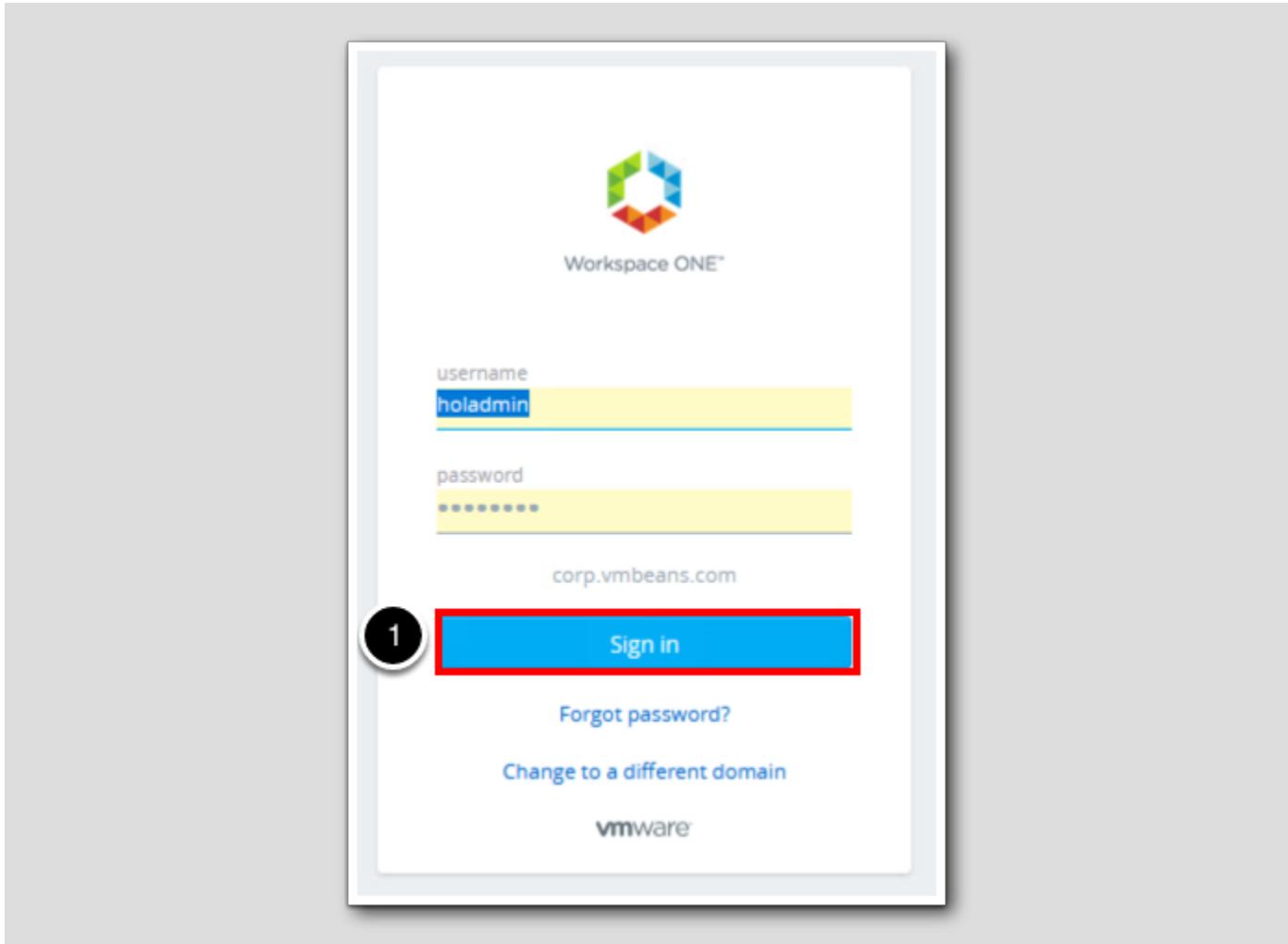


Aria Operations is integrated with VMware Workspace ONE Assist (also known as VMware Identity Manager) in this lab. This integration is listed as vIDMAuthSource in our live lab environment.

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

## Understanding Hierarchical Relationships in Aria Operations

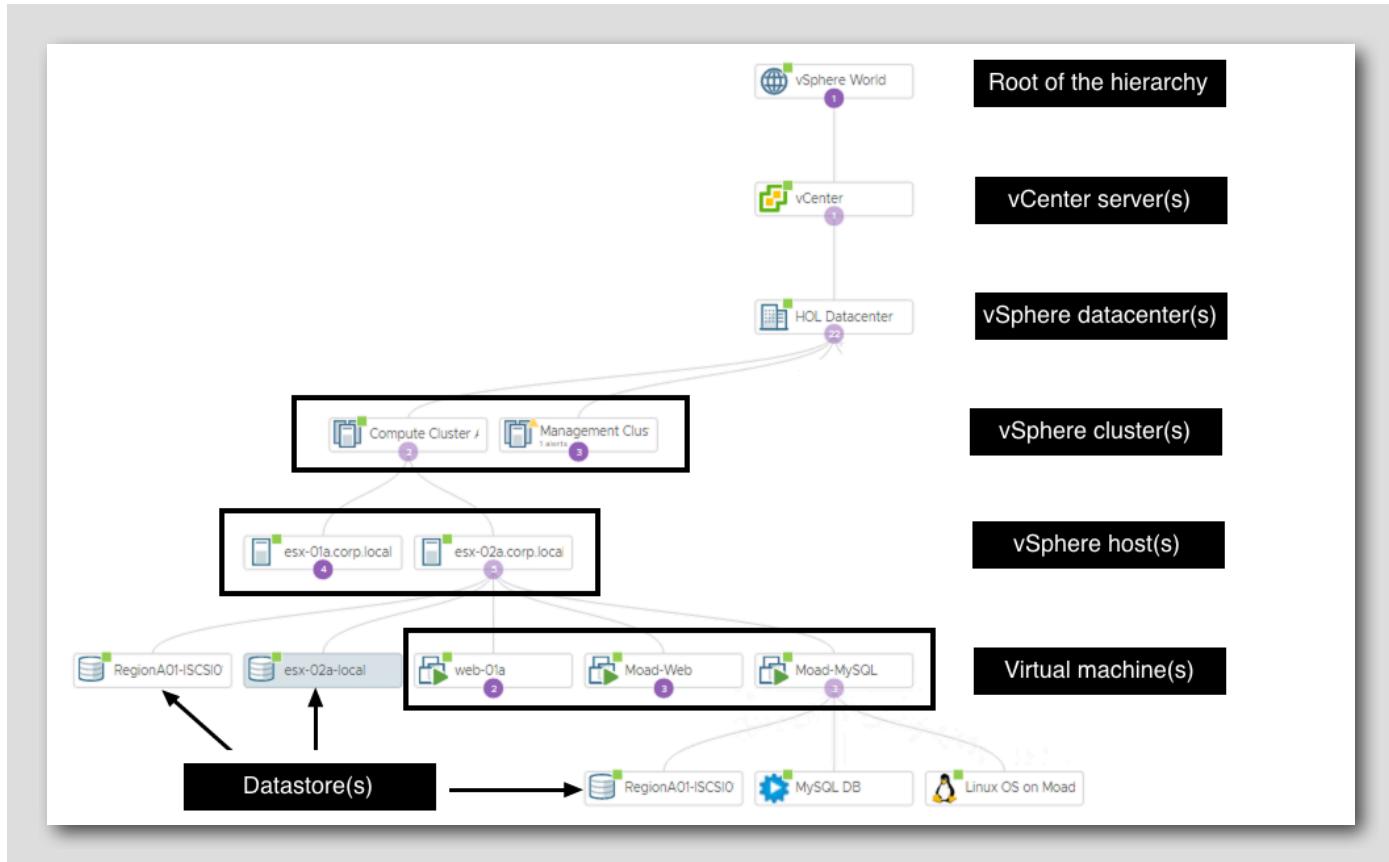
Before we jump into creating super metrics, it is first important to understand that Aria Operations maintains several hierarchical relationship trees. And whenever you install additional management packs for extensibility, each management pack will add at least one additional hierarchy in Aria Operations.

This is important to understand in the context of super metrics because unless you are creating a new metric on an object or object type

that is based only on metrics from that same object/object type you will need to know where in the hierarchy the related object types are. For example, in the vSphere Hosts and Clusters hierarchy, a virtual machine is a child of a host. If you want to create a super metric for hosts that shows the average CPU usage across all virtual machines that are running on a given host, you need to write your super metric formula with the proper syntax to look one level down from the host to the virtual machines for the metric inputs to the super metric.

## vSphere Hosts and Clusters Hierarchy

[387]



We will focus here on the vSphere Hosts and Clusters hierarchy because that's the one we will be using for the examples in this lab module. The hierarchy is shown in the graphic. There would also be other object types in the hierarchy if they existed in our lab vCenter server (for example, resource pools).

For this hierarchy you can see that virtual machines are two levels below clusters. And that vSphere hosts are one or two levels above datastores (this dual relationship can be found in other places as well). In the super metric formulas, the relationship distance (number of hops) is represented by the **depth** parameter and we will use that parameter in some examples later in this module.

## Object Browser

[388]

The screenshot shows the VMware Aria Operations interface. The left sidebar has a red box around the 'Object Browser' button (1). Below it are buttons for 'Inventory' (2) and 'VCF Operations' (3). The main area is titled 'Object Browser' and contains a search bar. It displays a hierarchical tree of objects under 'Environments' > 'vSphere' > 'vSphere Hosts and Clusters'. A red box highlights this entire section. The tree includes nodes for 'vSphere World', 'vcsa-01a.corp.vmbeans.com', 'RegionA01' (with sub-nodes for 'Development', 'HOL Infrastructure', 'Namespaces', 'Templates', 'vCLS', 'Workloads', and 'Discovered virtual machine'), 'Management', 'Workload1' (with sub-nodes for 'Namespaces', 'esx-03a.corp.vmbeans...', 'esx-04a.corp.vmbeans...', 'esx-05a.corp.vmbeans...', 'esx-05a\_LOCAL', 'RegionA01-ISCSI01-C...', 'dev-project-rz5gx-4t...', 'linux-dev-0010', and 'SupervisorControlPI...').

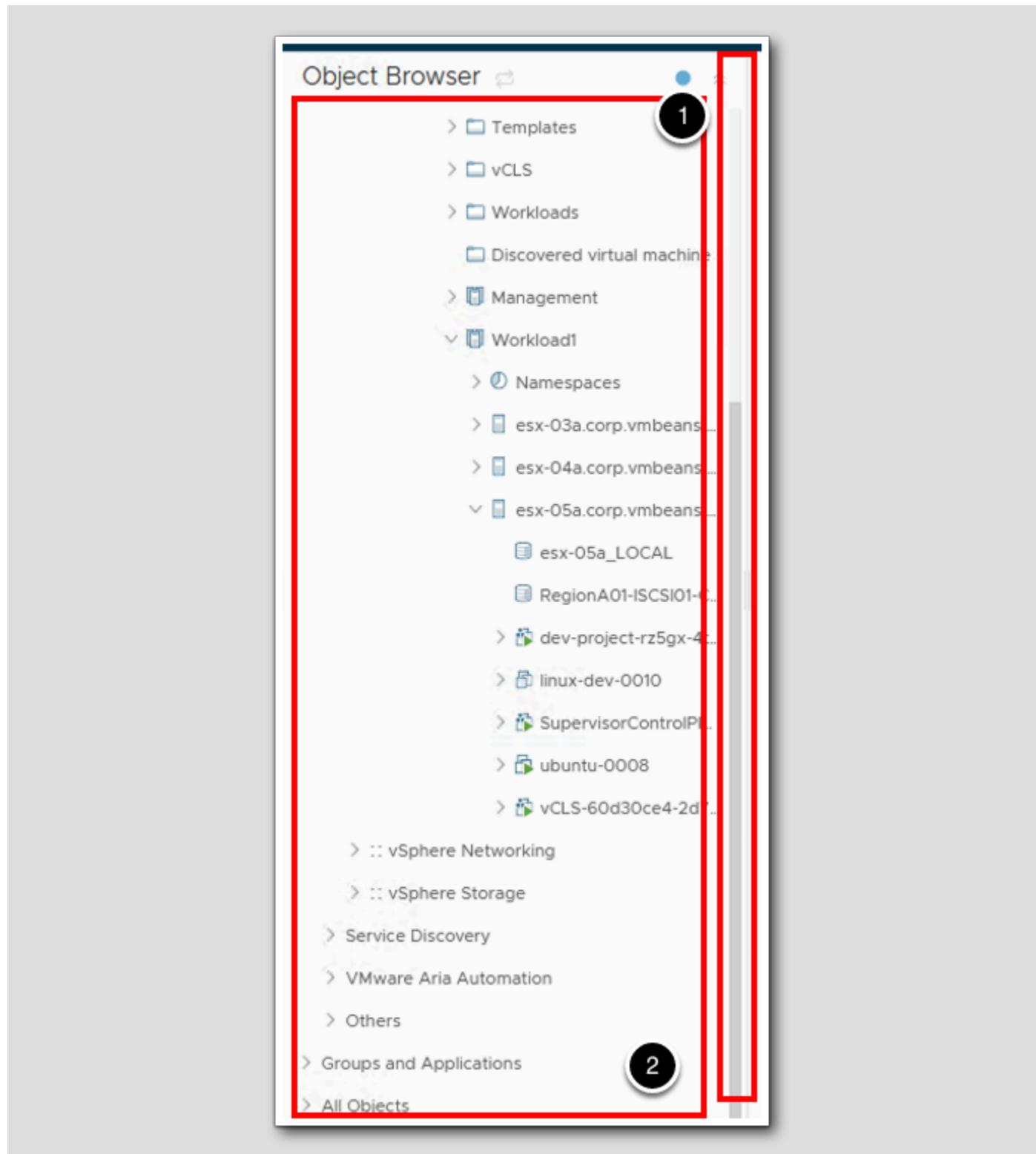
To see another way of looking at the vSphere Hosts and Clusters hierarchy within Aria Operations:

1. Expand **Environment** on the left menu bar.
2. Click **Object Browser**.
3. Expand the vSphere Hosts and Clusters hierarchy by clicking the > arrows

The levels of indentation in this view indicate the relative depth of each object type.

## Object Hierarchies

[389]

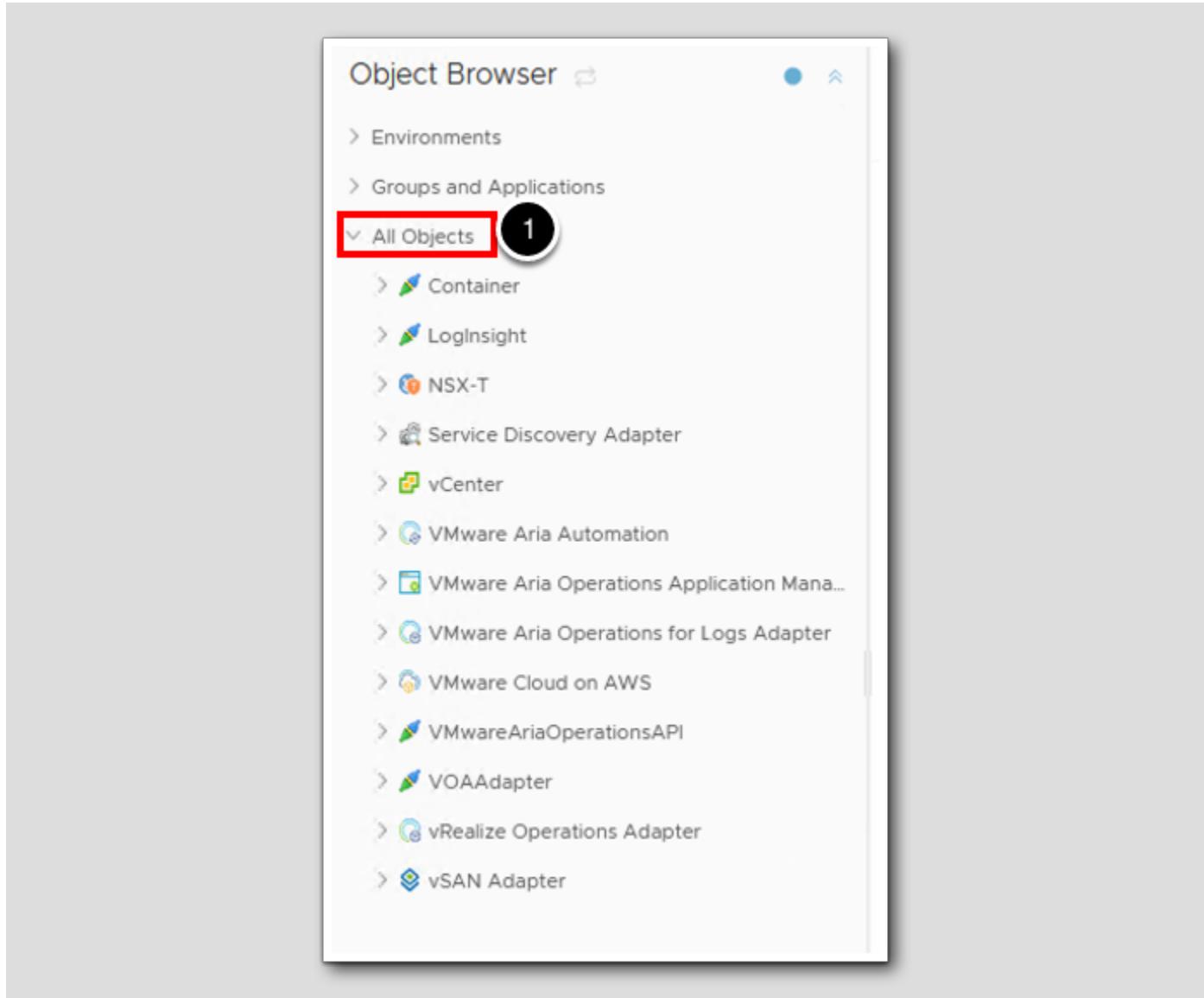


To see the available hierarchies within Aria Operations:

1. Scroll down in the Object Browser.
2. Note all of the available hierarchies in this Aria Operations instance.

## All Objects

[390]



1. Expand All Objects.

As stated earlier, if additional management packs were installed for extensibility (for example, NetApp or Dell EMC storage) hierarchies for those objects would also be here.

## Lesson End

[391]

You should have an understanding of vSphere hierarchy and structure of objects.

## Create Your First Super Metric

[392]

When you think "Super Metric", think metric math that will use some kind of a formula to get the desired outcome. In this first example, we will create a simple super metric and explore the depth parameter in a super metric formula.

Your first assignment is to create a super metric that will calculate the average memory utilization across all virtual machines running on a vSphere host or in a vSphere cluster. This is an example of creating a metric on an object (host or cluster) that is based on metrics from related objects (virtual machines).

## The Hierarchical Relationship

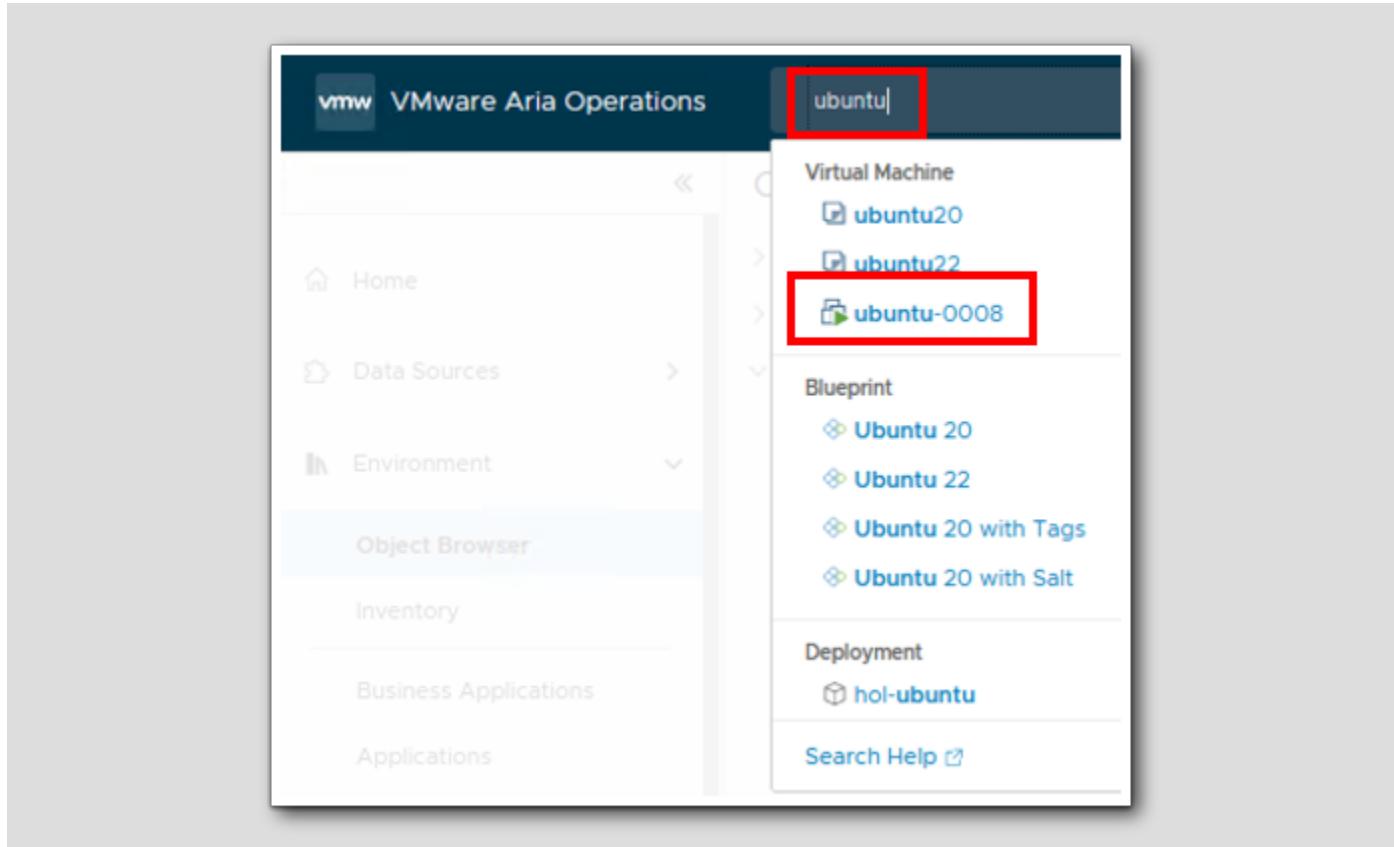
[393]

The below screenshot is not applicable to the current environment you are using but is being used because it is a good illustration of an object's hierarchy (parent and child objects).



If you recall from a previous lesson, we learned that virtual machines are children of hosts and "grandchildren" of clusters in the vSphere Hosts and Clusters hierarchy. So if we create a super metric on the cluster object type and on the host object type and have it look one or two levels down the hierarchy to create the sum of the metric representing memory usage on virtual machines, we will have completed the assignment for this lesson.

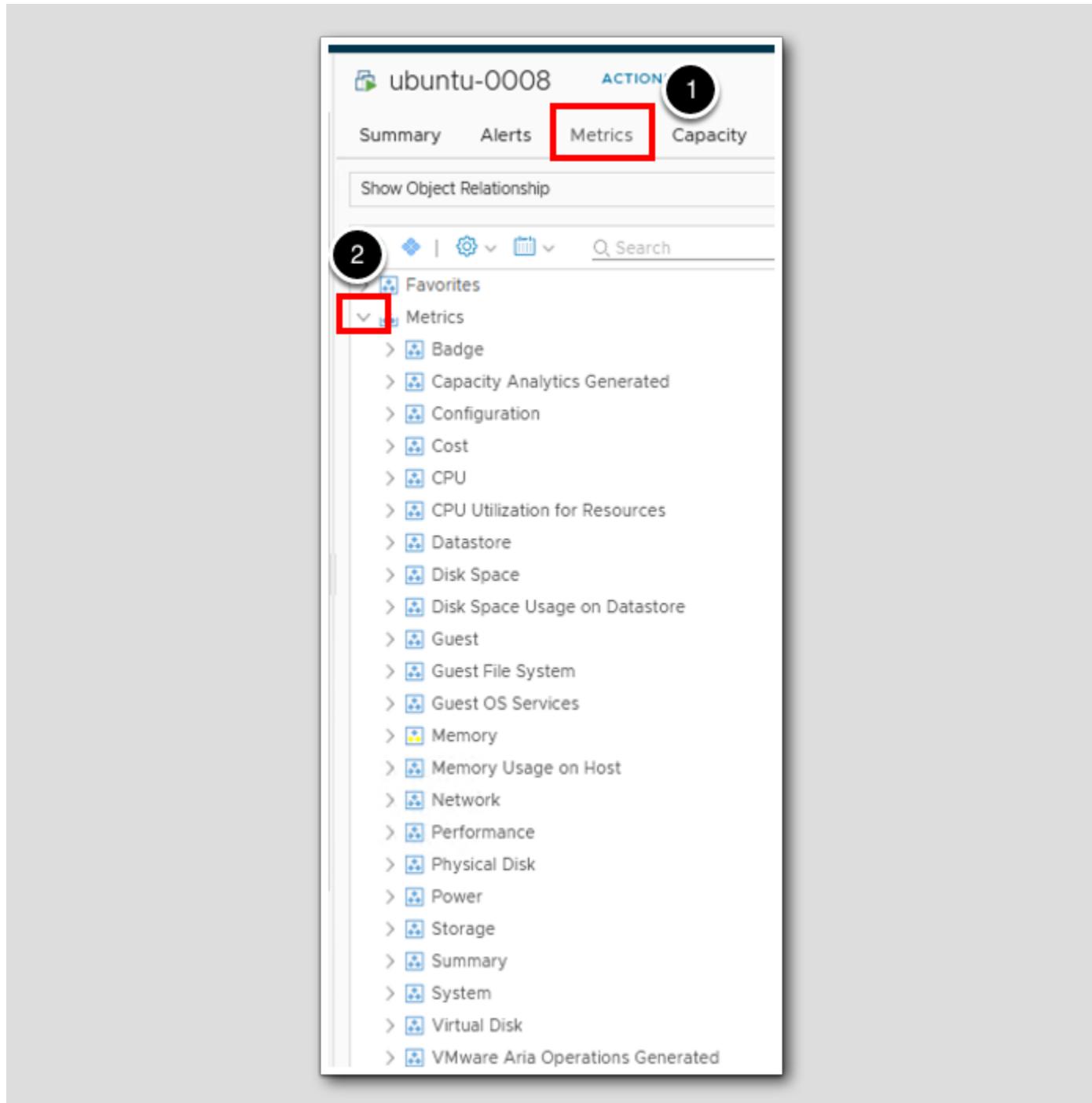
## Which Metric Will We Be Using?



Before we get started with the super metric, let's understand which virtual machine metric we will be using for this lesson. Since we want to average a vm metric (memory utilization), let's go find a vm to see what metrics are available. We will take a look at the ubuntu-0008 virtual machine.

1. In the search box, type **ubuntu**
2. Click the **ubuntu-0008** link under the Virtual Machine object type

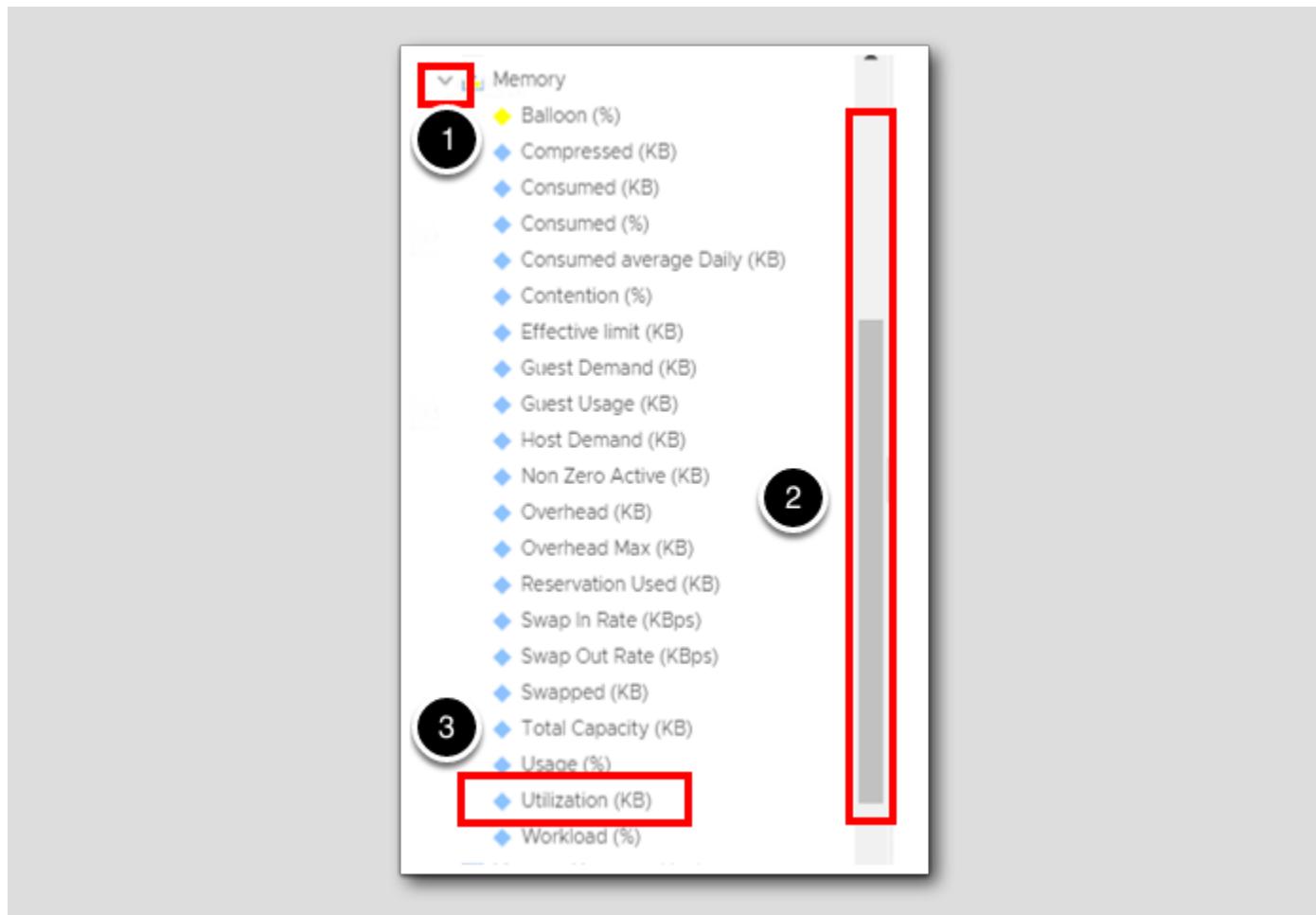
## Expand the All Metrics Tree



1. On the ubuntu-0008 object page, click the Metrics tab.
2. Click the > to expand the Metrics section.

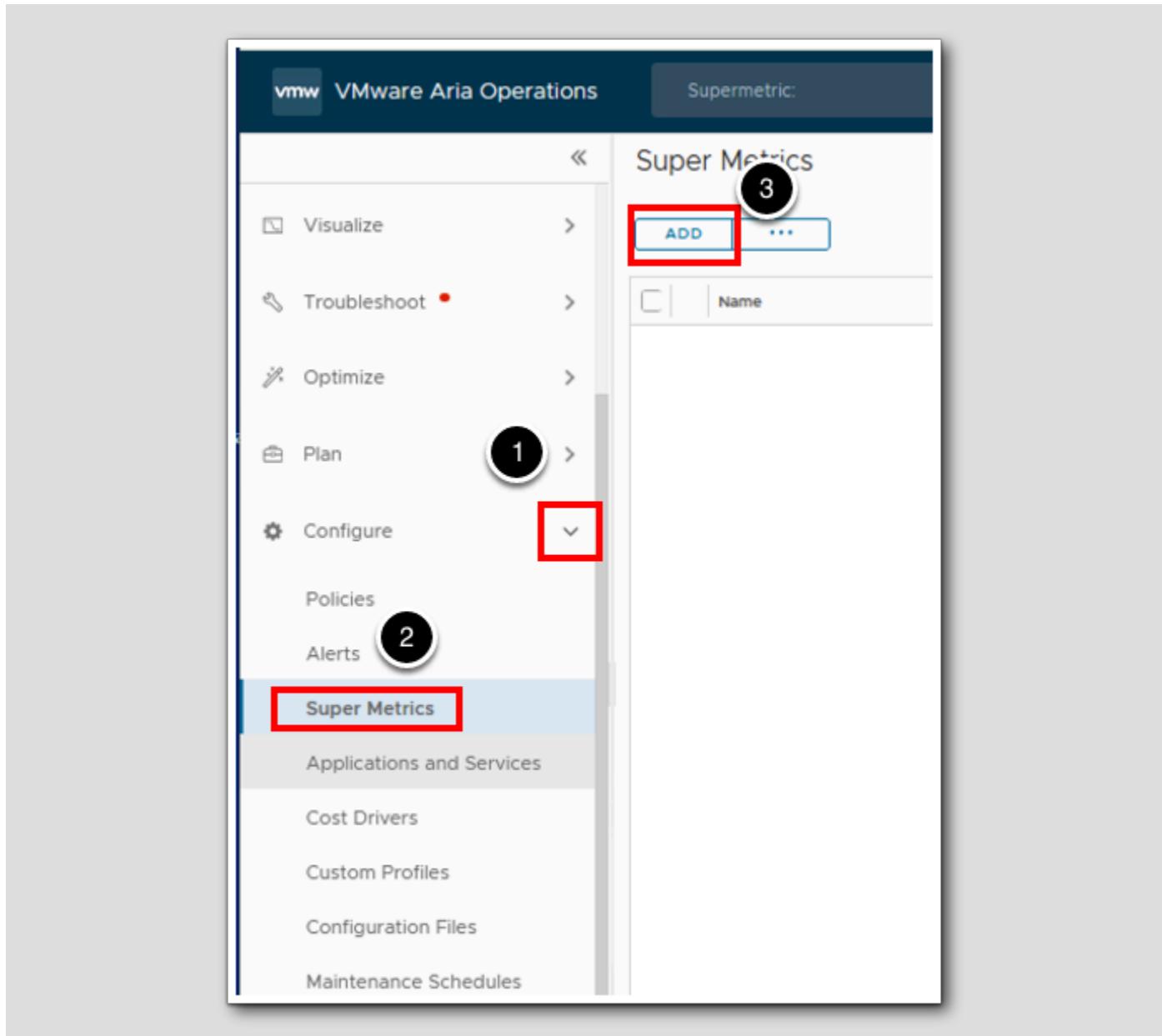
### Expand the Memory Metric

[396]



1. Click the > to expand the Memory section.
2. Scroll down to see the list of available memory metrics.
3. Note the Utilization (KB) metric - this is the metric we will be using to create our super metric.

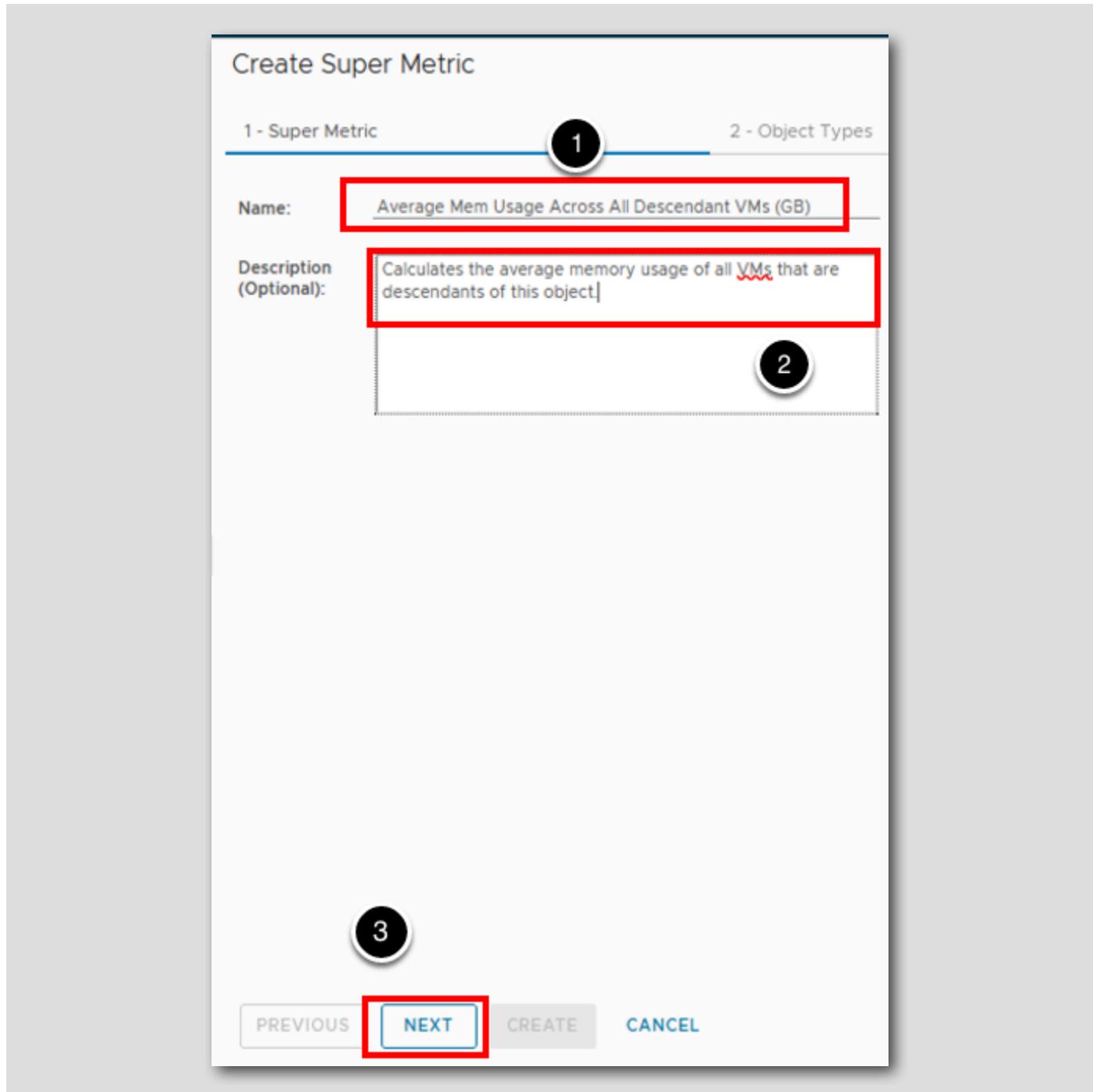
## Create The Super Metric



Now that we know which virtual machine metric we will be using, let's navigate to the new super metric editor window. The new super metric workspace can be found in the Configure section of Aria Operations.

1. Expand the Configure.
2. Click Super Metrics.
3. Click ADD to create a new super metric

## Super Metric tab



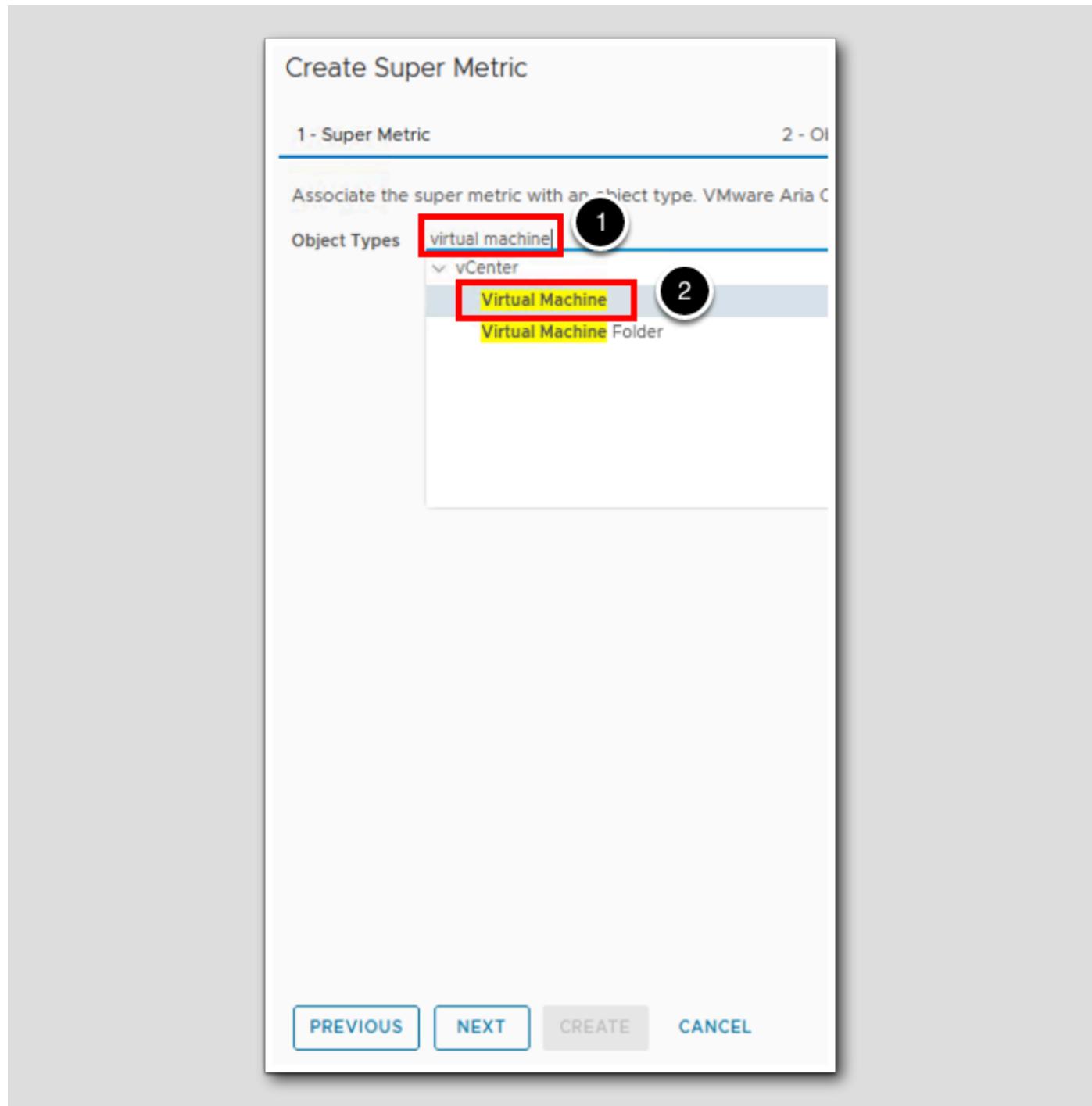
Let's enter some basic information about the super metric. You want to create a name that is descriptive enough so you or others will understand what it is calculating when you use it later in dashboards or reports or alert definitions. It is also a good idea to include the unit of measure in the metric name - in this case we will calculate the value in gigabytes (GB).

1. In the Name field, type **Average Mem Usage Across All Descendant VMs (GB)**
2. In the Description field, type **Calculates the average memory usage of all VMs that are descendants of this object.**
3. Click the **NEXT** button.

## Object Types

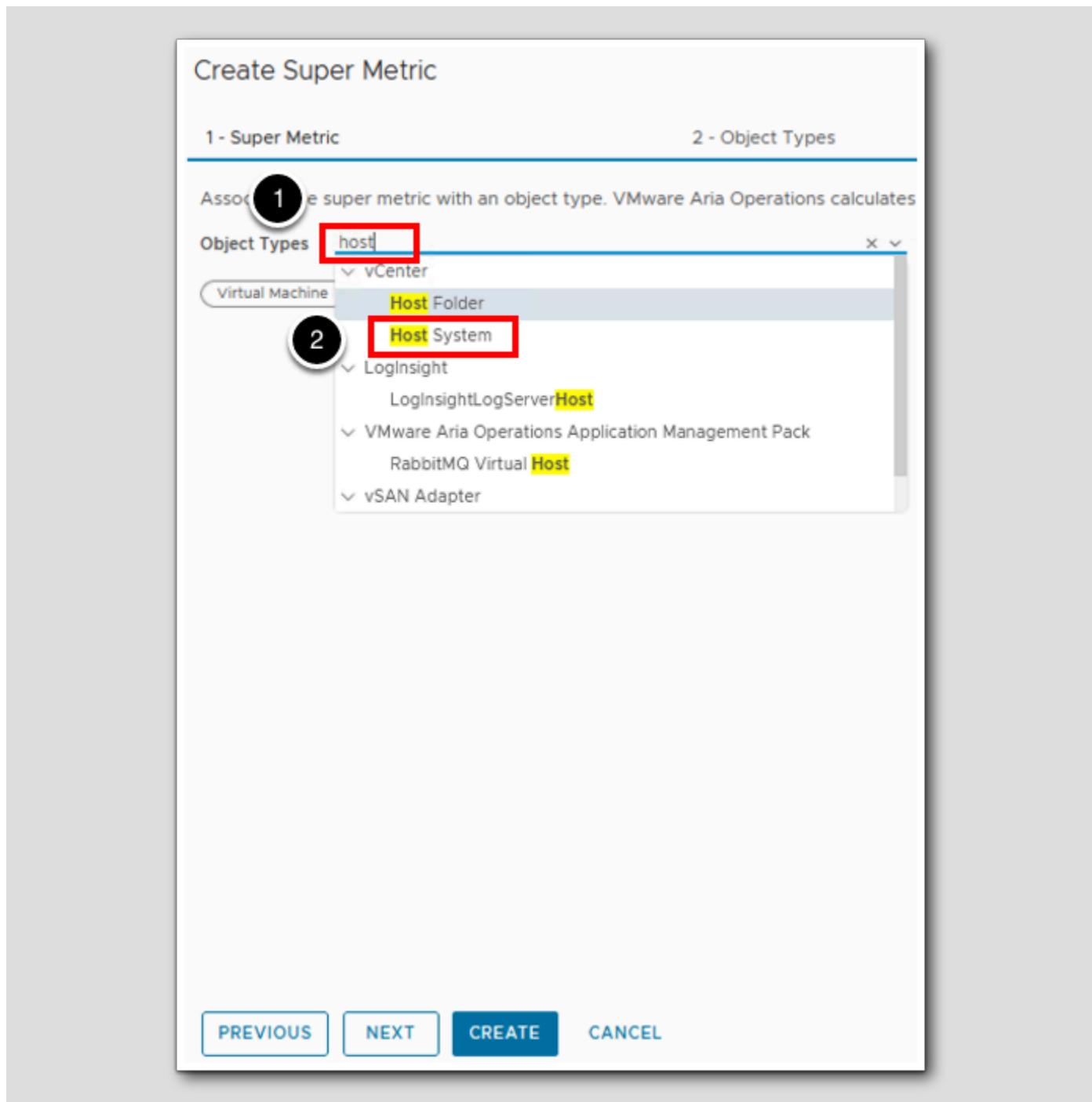
[399]

Since we will be getting the average VM memory usage across multiple objects we will add 3 Object Types.



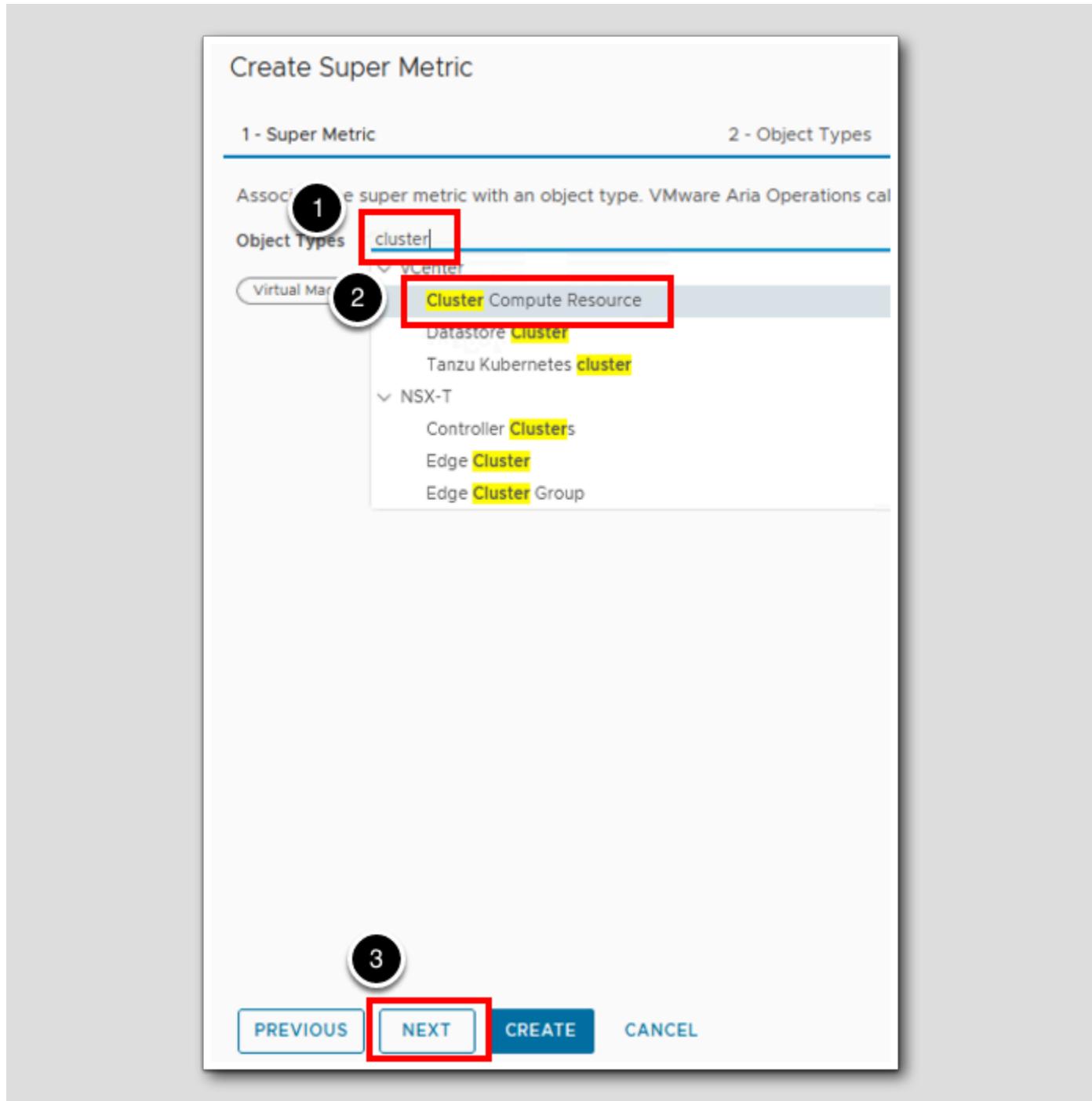
1. In the Object Types search line, type Virtual Machine.
2. Single click on Virtual Machine to add Virtual Machine as an Object Type.

## Object Types (Continued)



1. In the Object Types search line, type host.
2. Single click on Host System to add Hosts as an Object Type.

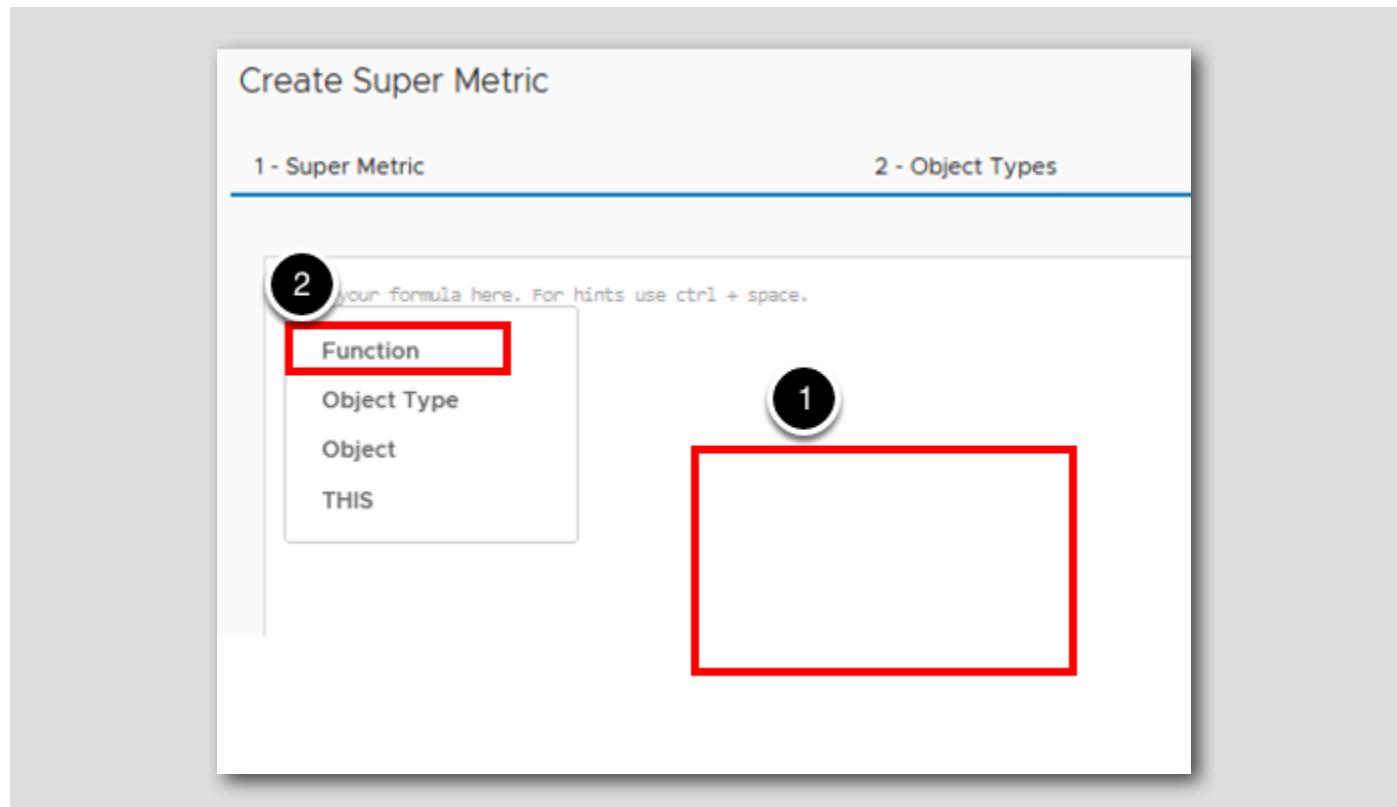
## Object Types (Continued)



1. In the Object Types search line, type cluster.
2. Single click on Cluster Compute Resource to add Clusters as an Object Type.
3. Click NEXT.

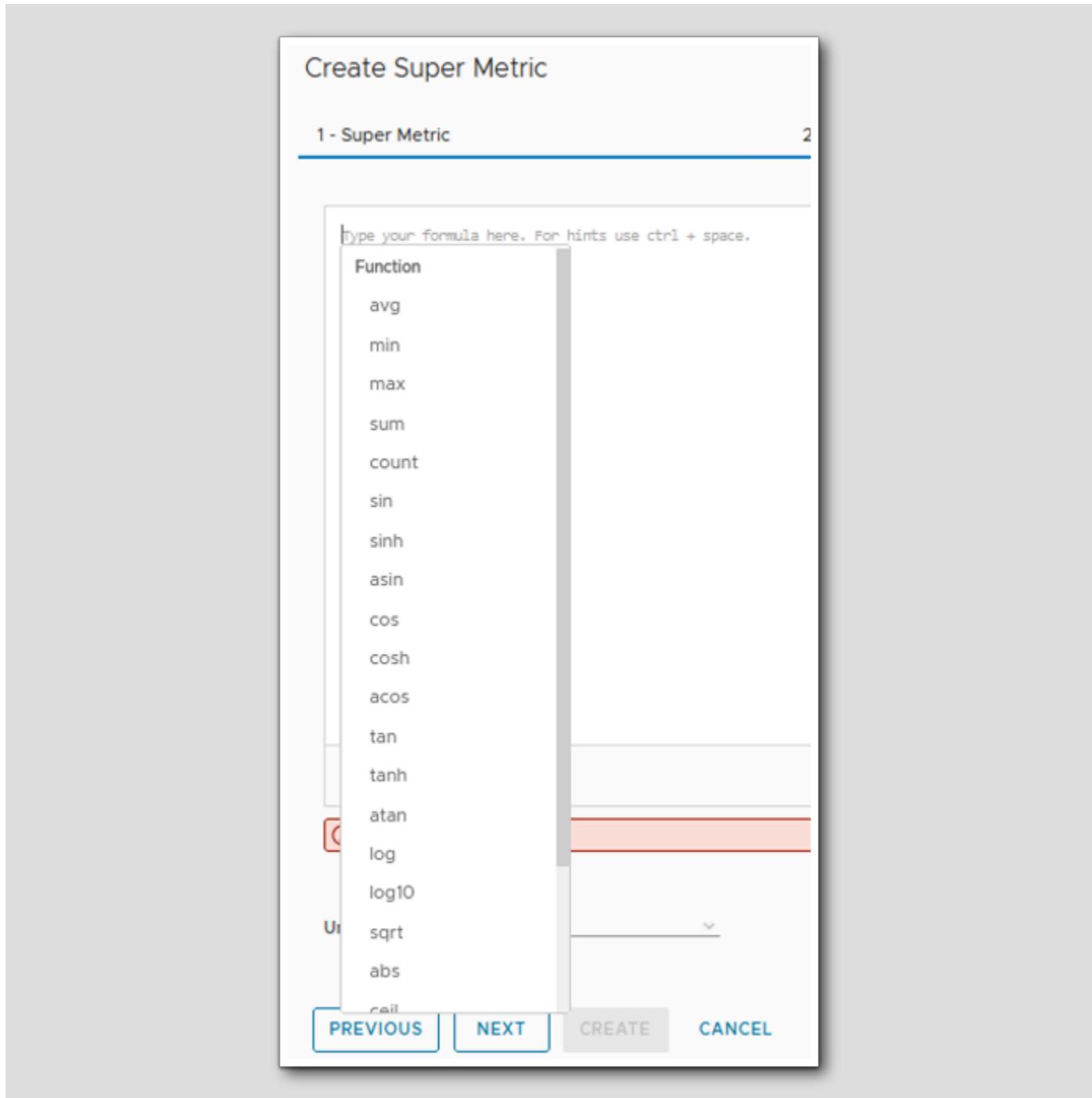
## Formula Functions

[402]



1. Click anywhere in the empty formula box.
2. Click the Functions drop-down to see a list of all available functions.

## Formula Functions (Continued)



The list includes looping functions (avg, combine, count, max, min and sum) that work on more than one input value and can return either a single value or a set of values depending on the formula syntax. The remainder of the functions are single functions. They work on only a single value or a single pair of values.

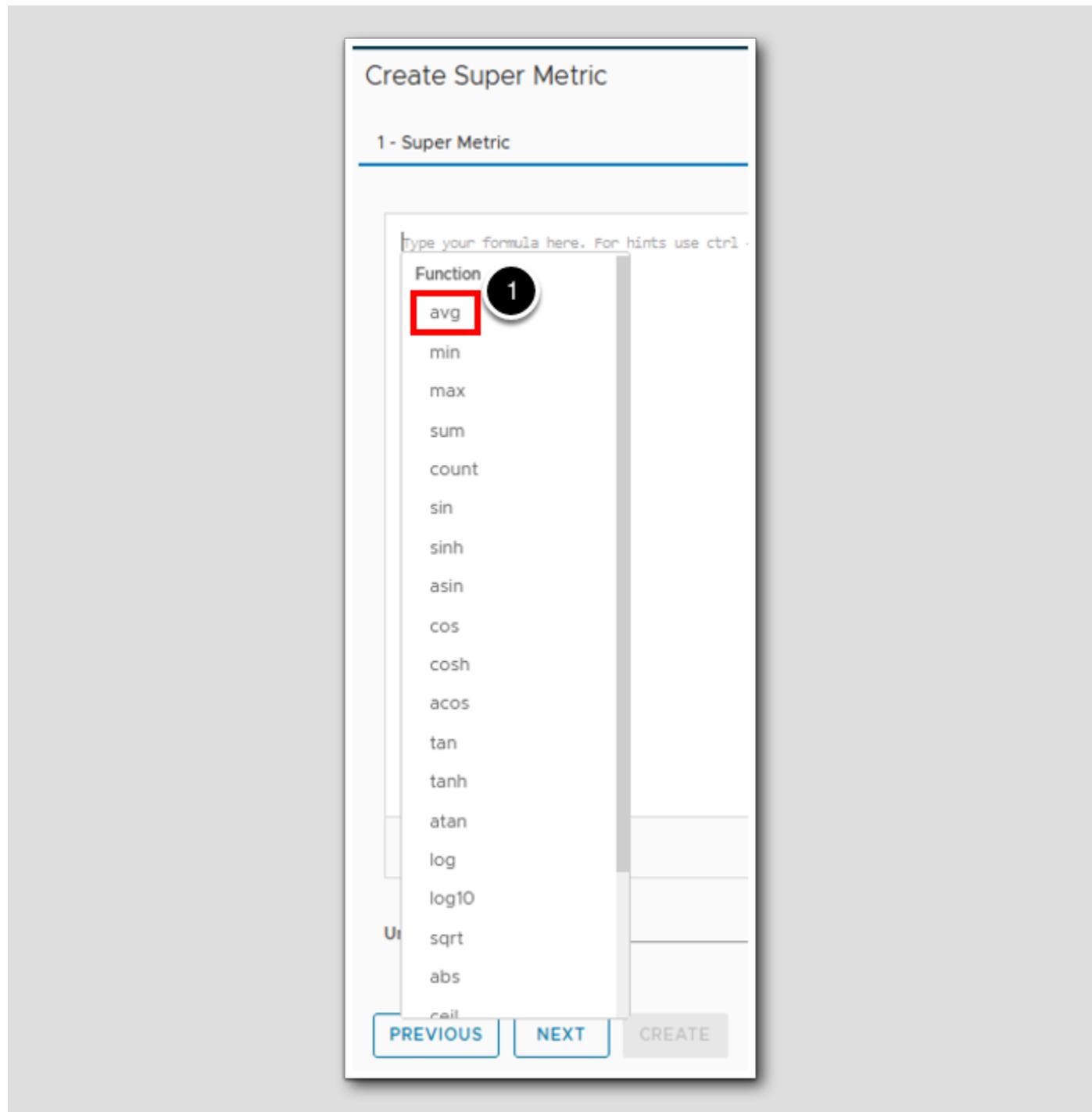
To better understand the concept of looping functions, think about the example metric we are going to create in this lesson. We want to look for all descendant virtual machines (could be one or could be many), get the value for memory usage for each of those virtual machines, and then calculate an average of those values which we will then store a single super metric on our object (in this case a vSphere host or cluster). In the process, we will use a looping function to "loop through" all of the descendant virtual machines to get the memory usage metric value for each one.

Note: The product documentation for super metric functions and operators can be found [here](#).

## Create a formula

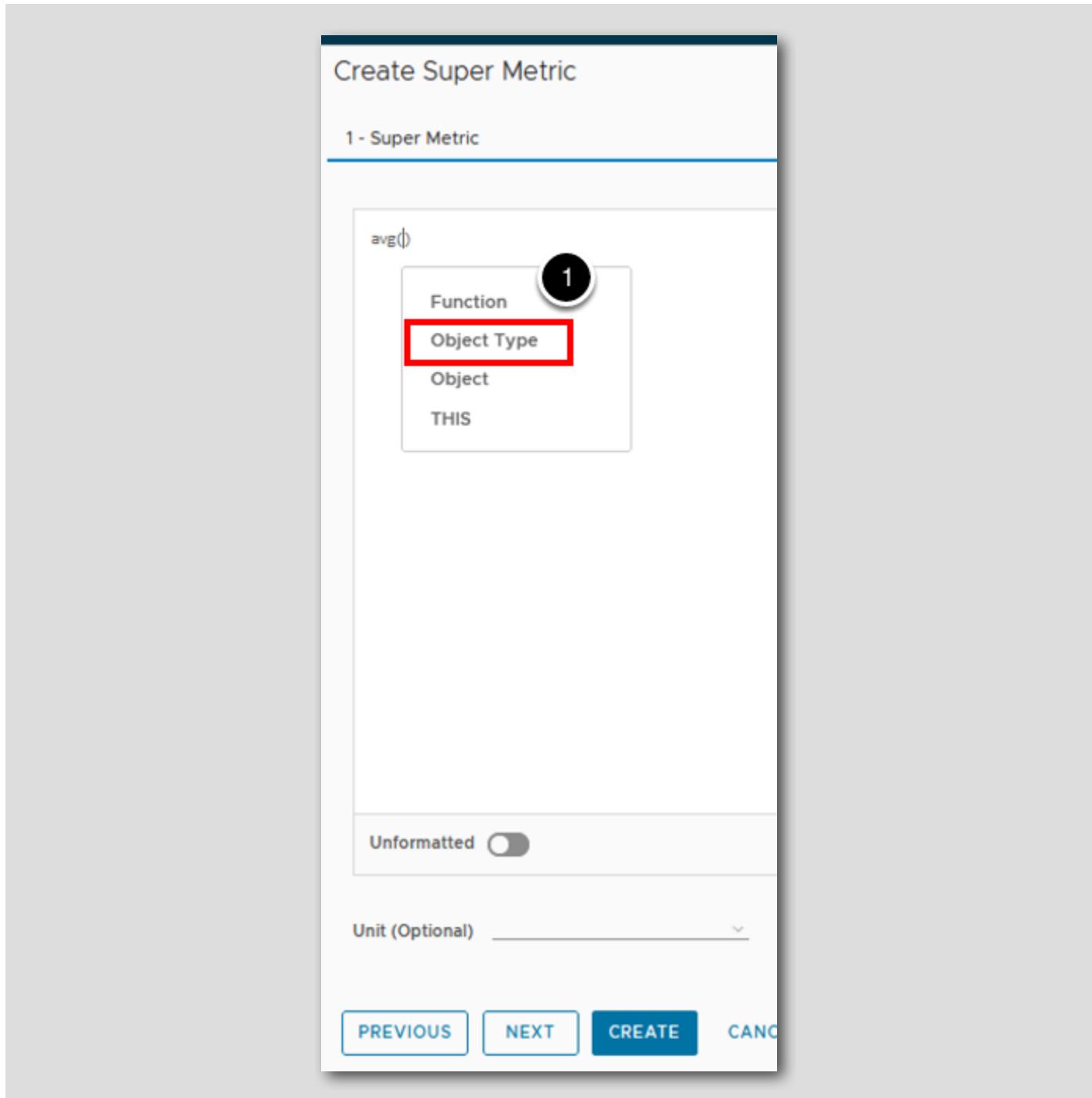
[404]

Recall that we want to create an average of the memory usage across all virtual machines on our host or in our datacenter so let's start by adding the avg function to our formula.



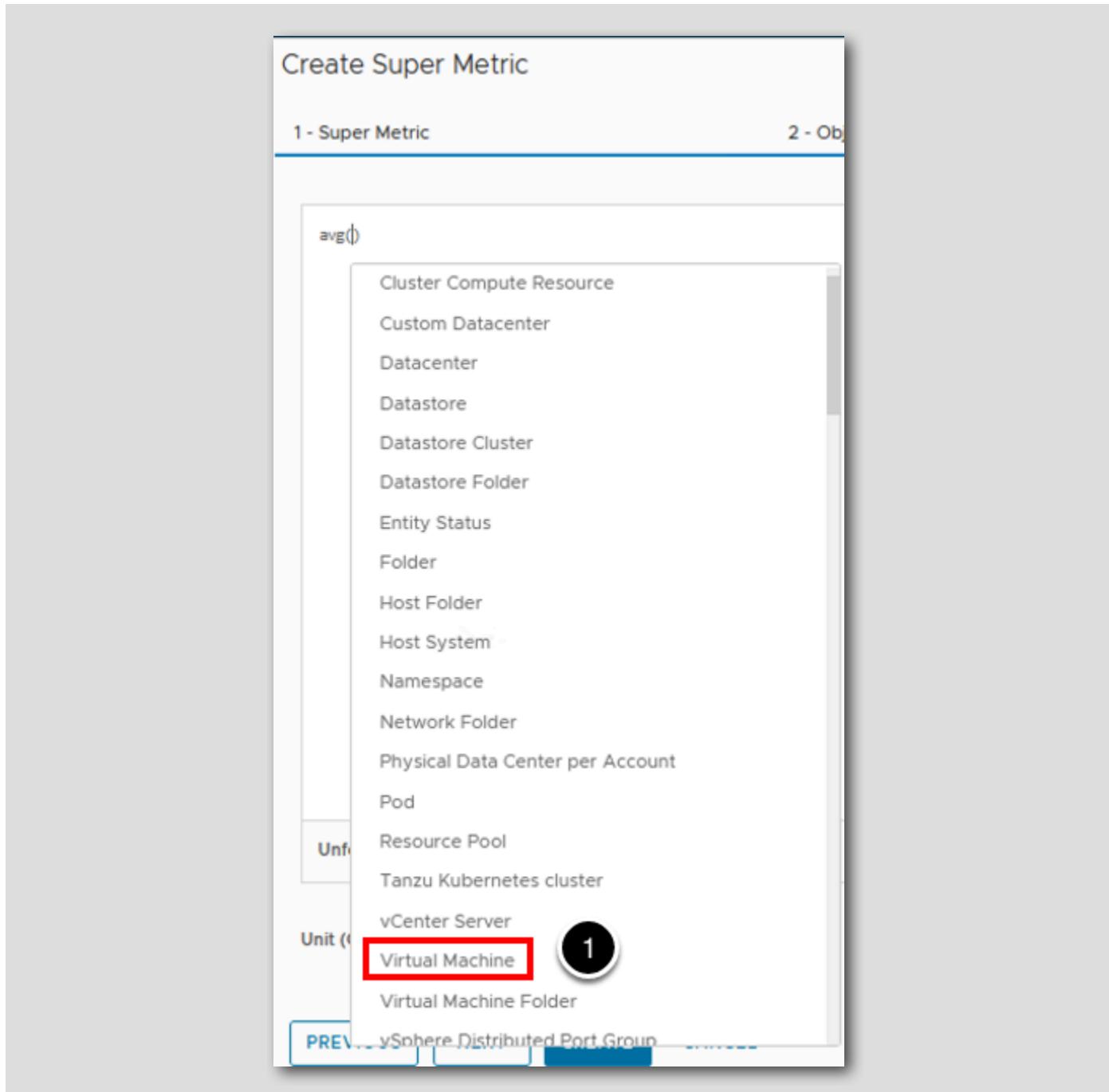
1. Click on **avg** in the Function list.

## Start Creating the Super Metric Formula



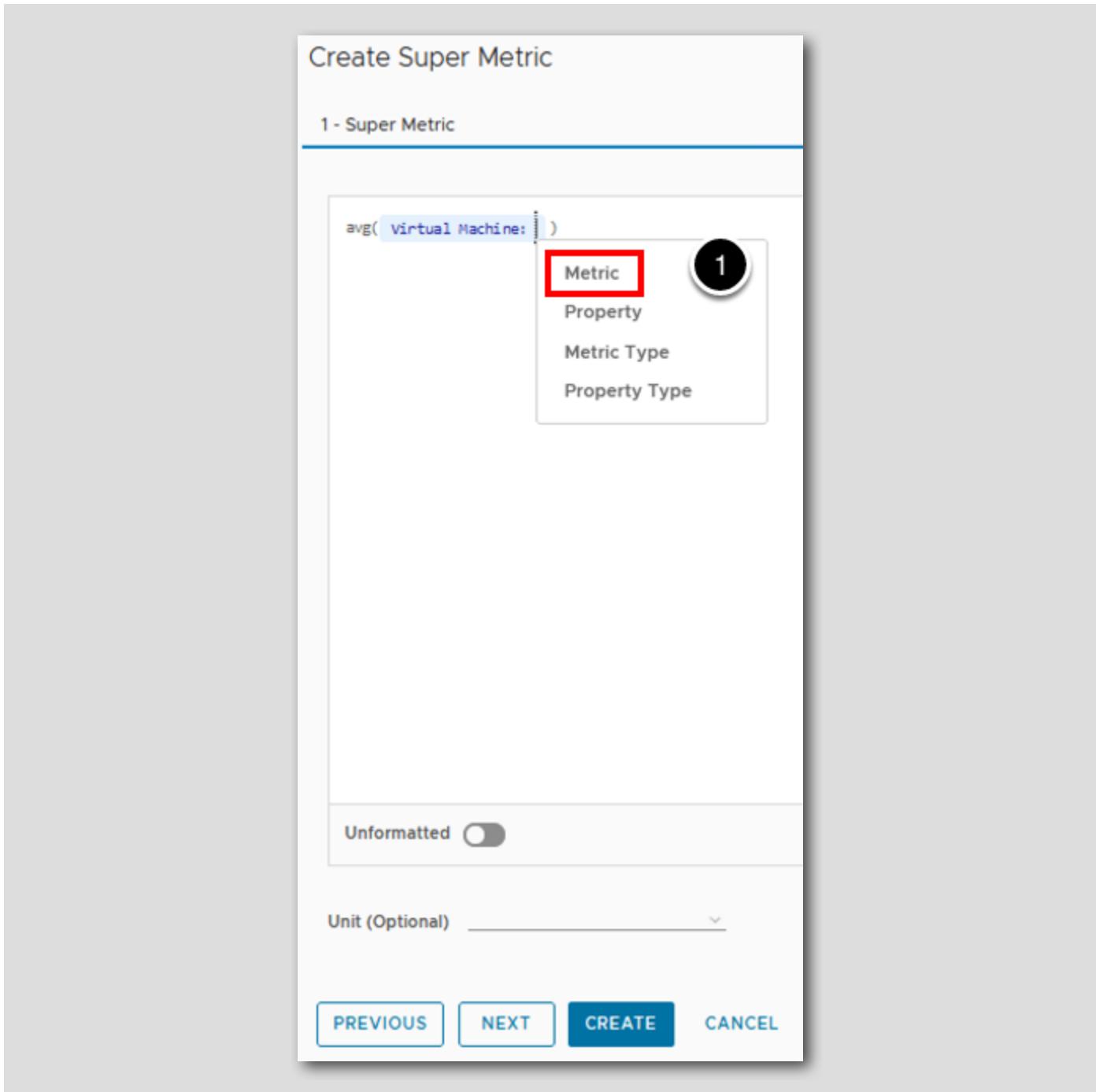
1. Click on **Object Type** to select what we will average on.

## Select the Virtual Machine Object Type



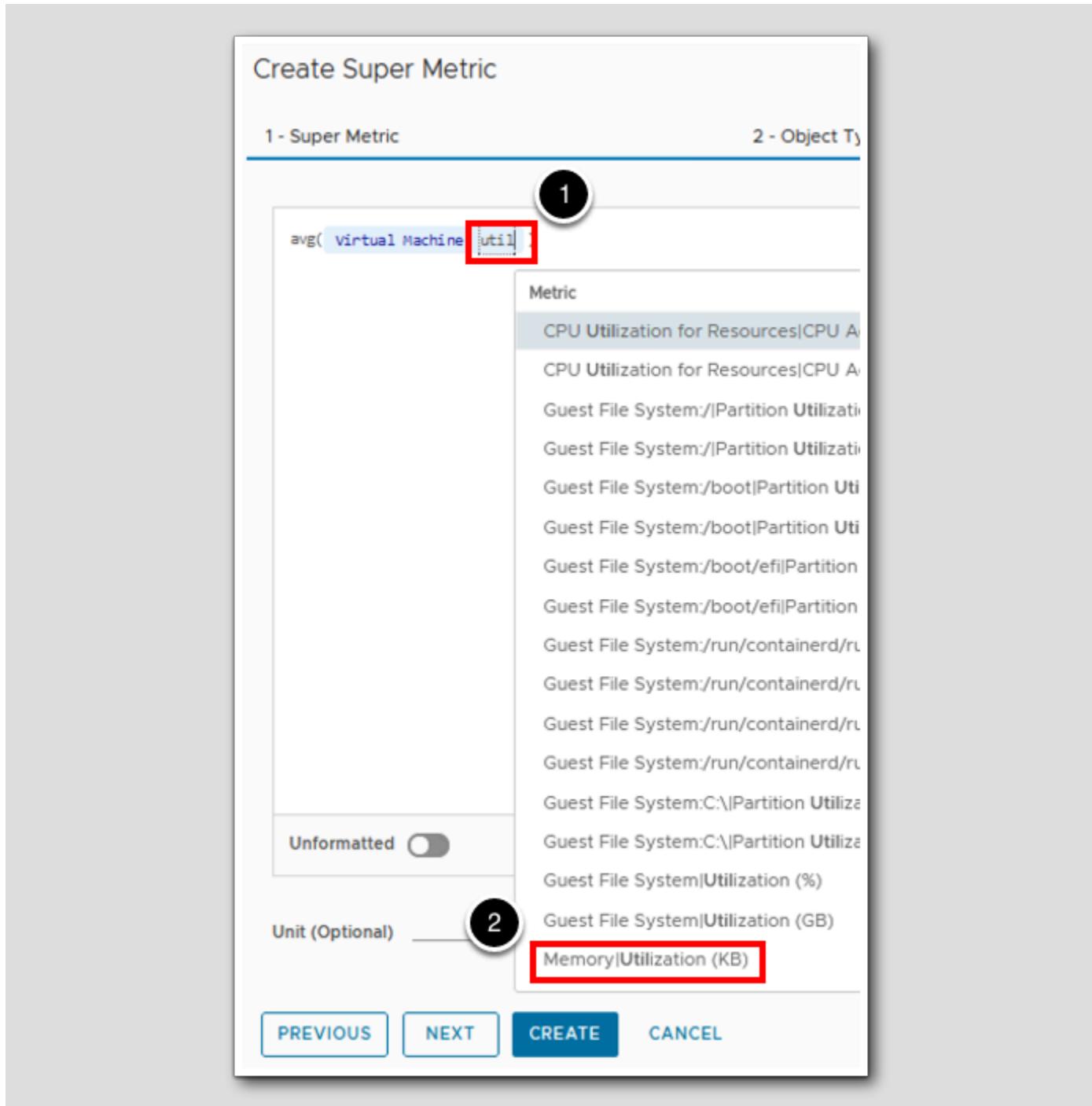
2. Select Virtual Machine as our Object Type.

## Add the Attribute



1. Since we want to average a specific metric from all of the virtual machines, click **Metric**

## Select the Metric



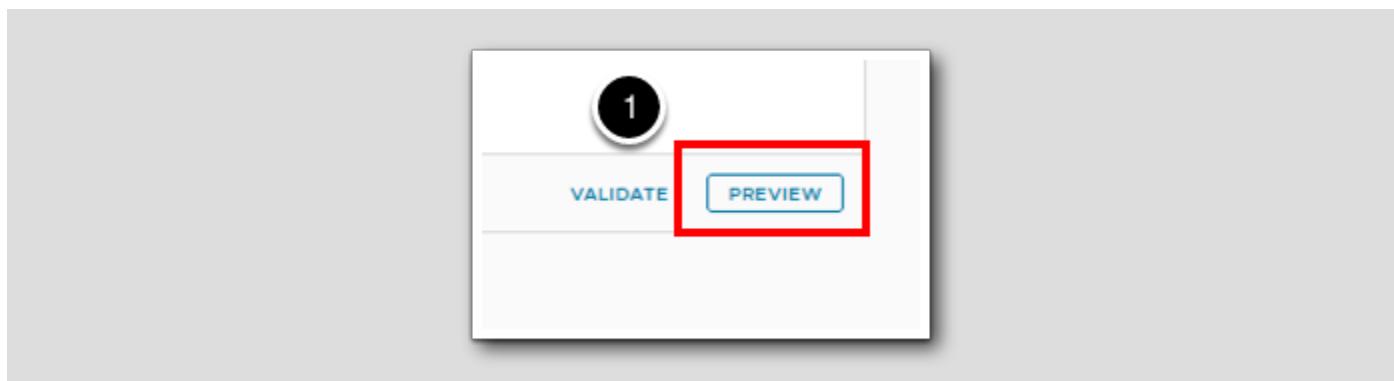
1. Start typing some text from the metric name if you know it. Type **util**
2. Click **Memory|Utilization (KB)** (note the highlighted portion of the metric.) You should remember this metric from the beginning of the lesson.

Note that the the units of memory utilization are in KB but we want our super metric value to be in GB. That's OK because we can just add the additional math to the formula to do the conversion from KB to GB.

## Preview

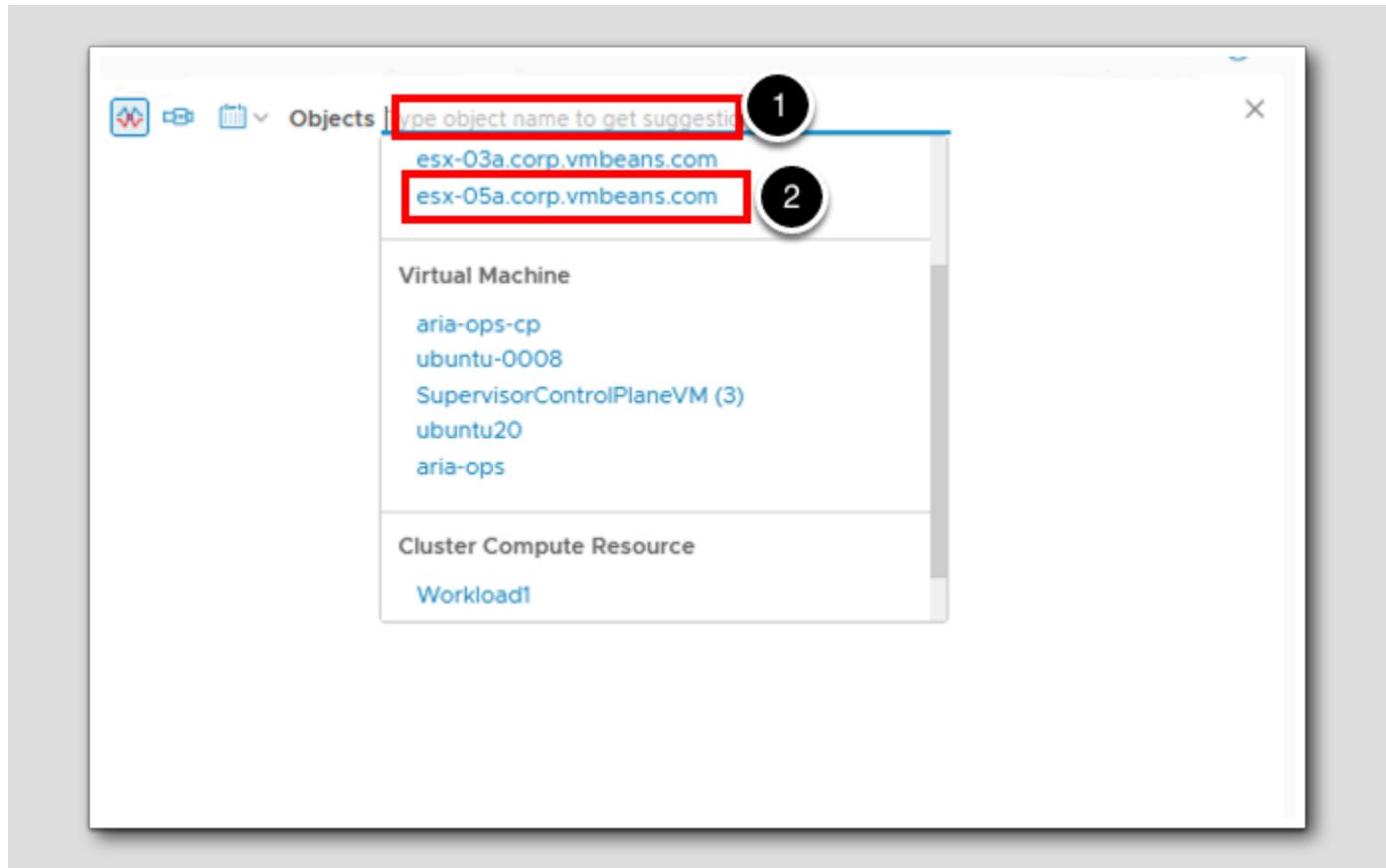
[409]

Lets take a look at our formula now that it's got something to calculate



1. Click **PREVIEW** in the lower right hand corner of the screen.

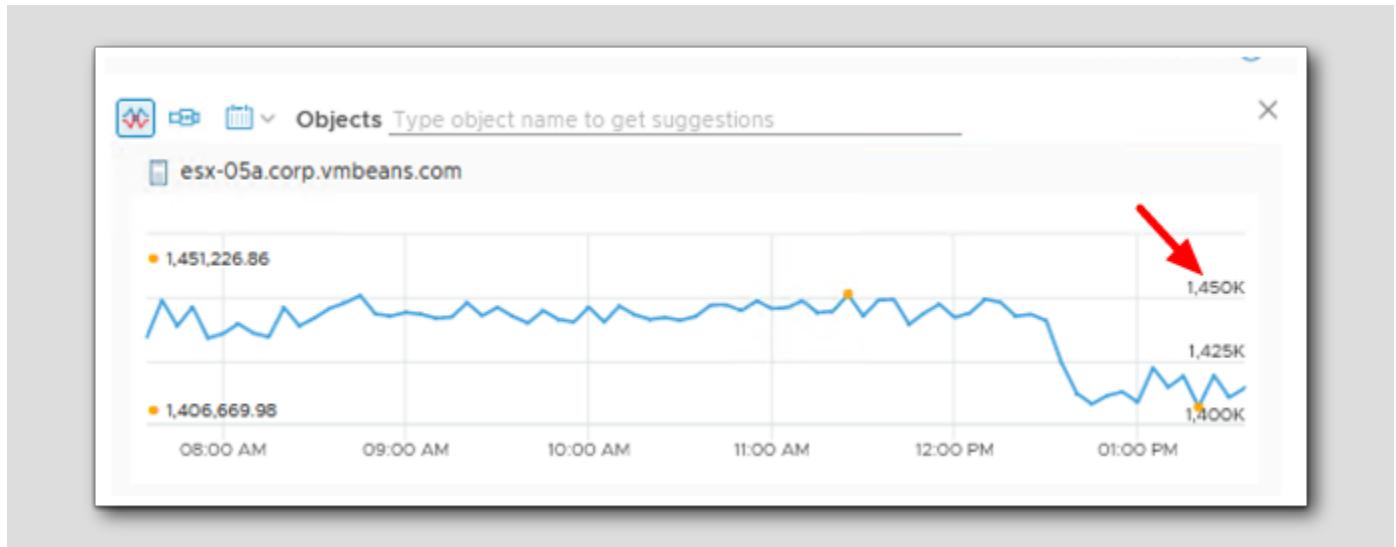
## Object List



1. Click in the Objects search bar to bring up a list of Objects.
2. Select esx-05a.corp.vmbeans.com.

Notice that the list has a combination of Hosts, Virtual Machines and Cluster Compute Resource based on the Object Types we added earlier.

## Average Memory usage on the host



Notice that the chart is displaying memory usage in KB and not GB. Lets adjust our formula to accomodate that.

## Convert from KB to GB

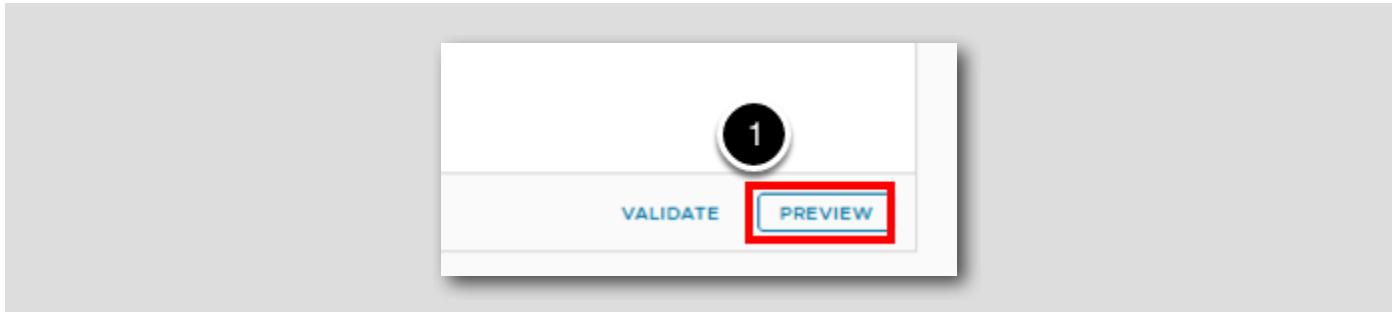


In order to convert our resulting value in kilobytes (KB) to gigabytes (GB), we need to divide the resultant average by 1024 to get to megabytes (MB) and then divide again by 1024 to get to GB.

1. At the end of the formula add /1024/1024 so the formula looks like - avg({Virtual Machine: Memory|Utilization, depth=1})/1024/1024

Do we see GB now

[413]

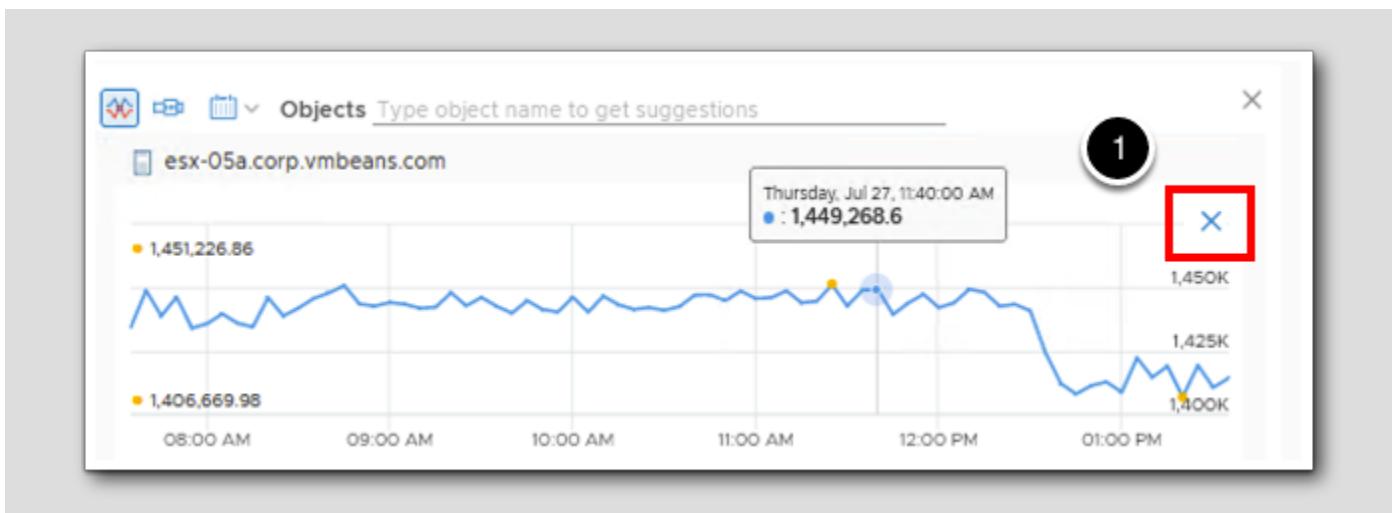


1. Click Preview again to expand the preview section.

Get rid of the old chart

[414]

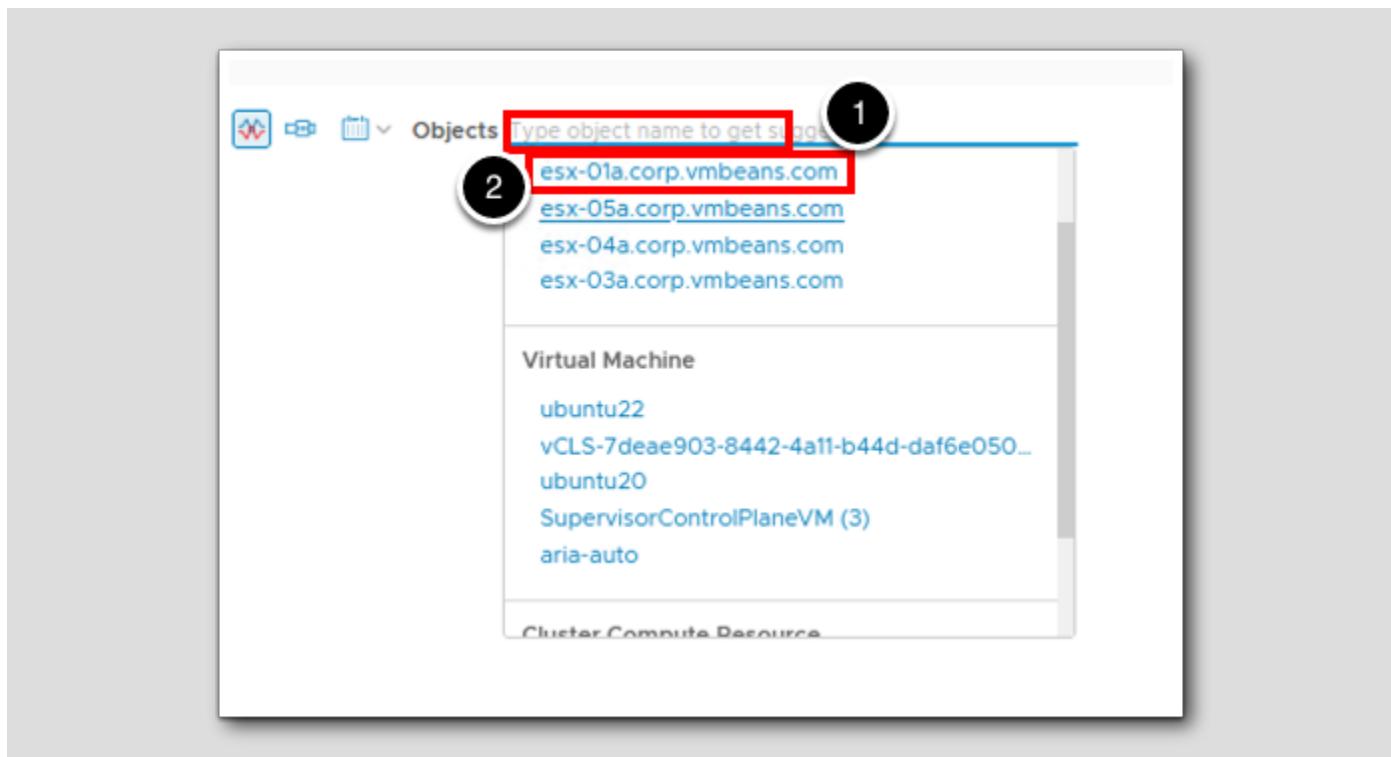
You will notice the old chart is still in preview and is showing in KB still. Lets close that chart and re-open it.



1. Hover your mouse over the chart and the blue X will appear, click on the blue X.

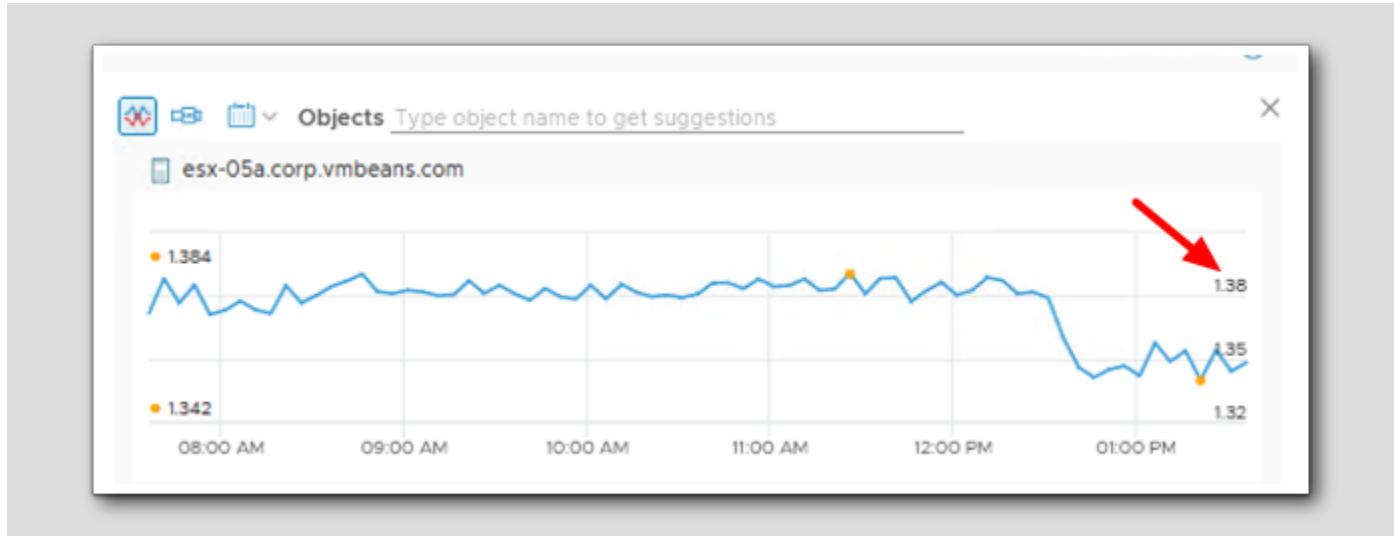
You will close out Preview if you click on the upper right X instead of the blue X. Just re-click on PREVIEW to get back in.

## Re-Add Esx-05



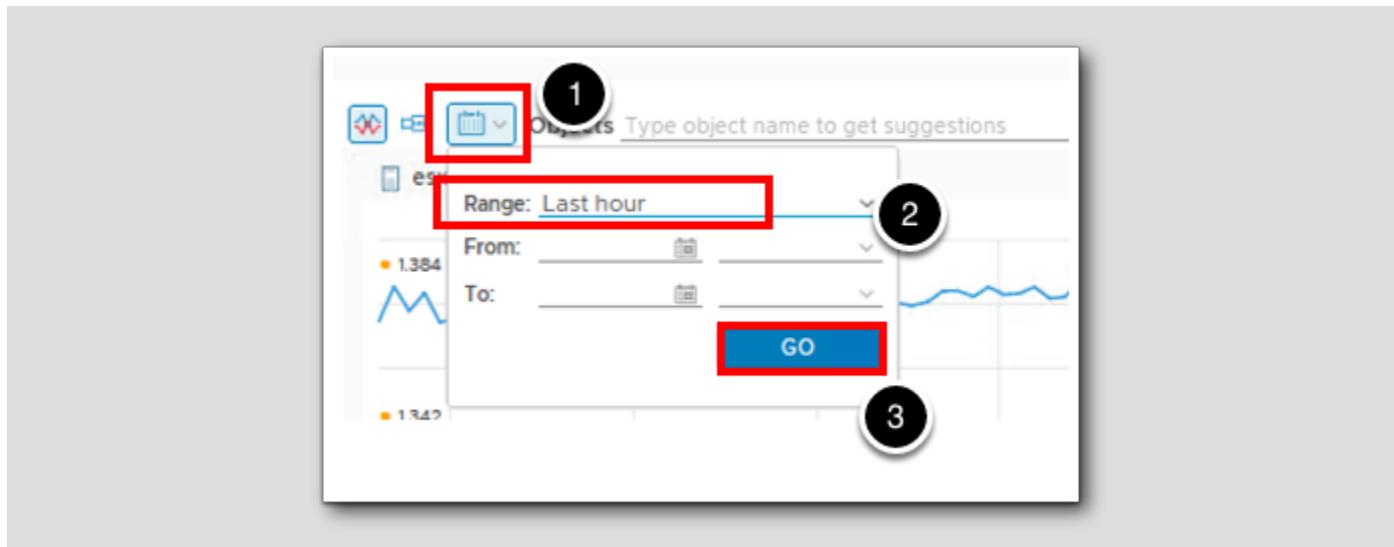
1. Click in the Objects search bar to bring up a list of Objects.
2. Select esx-05a.corp.vmbeans.com.

Shows GB now doesn't it



You should see that the chart is now displaying in GB vs KB with the extra /1024/1024 in there.

View the Host Preview

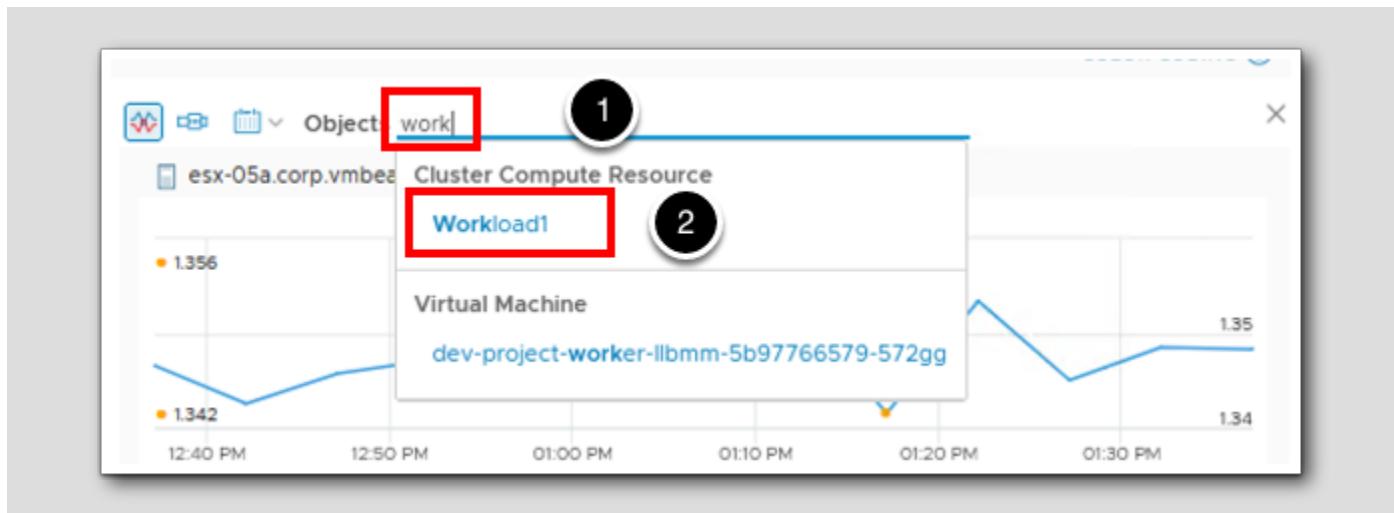


You should see a preview of your super metric on the `esx-05a.corp.vmbeans.com` host. Note that your values will likely be different and you may or may not see the graph cover the entire time period depending on how long your lab environment has been running before you started this lesson.

1. You can change the time period of the preview if desired. Click the calendar icon.
2. Click the Range drop-down and change the option from Last 6 hours to Last hour.
3. Click GO to apply the changes.

### Select the Workload 1 Cluster For Preview

[418]



Since we wanted our super metric to show the average vm memory utilization for hosts and clusters, let's test our metric on the Workload 1 vSphere cluster. There are four VMs running in that cluster so we should see the average memory utilization across the four VMs, right?

1. Delete the esx-03a entry, and type the first few letters of your cluster: **workl**
2. Select the **Workload 1** cluster

## View the Cluster Preview

The screenshot shows the 'Create Super Metric' wizard interface. The top navigation bar includes tabs for '1 - Super Metric', '2 - Object Types', '3 - Formula', and '4 - Policies'. A question mark icon is in the top right corner.

**1 - Super Metric:** Shows the formula `avg({ Virtual Machine: Memory|utilization } depth=1) 1824/1824`. A red box highlights the 'depth=1' parameter. A circled '2' is above this section.

**2 - Object Types:** Shows a list of objects: `esx-05a.corp.vmbeans.com`. Below it is a chart titled 'Workload1' showing memory utilization over time (12:50 PM to 01:40 PM). A red box highlights the chart area. A circled '1' is to its left.

**3 - Formula:** Shows a color coding legend and a preview chart for 'esx-05a.corp.vmbeans.com' with values 1.356 and 1.342. A circled '2' is above this section.

**4 - Policies:** Not visible in the screenshot.

Below the tabs are buttons for 'Unit (Optional)', 'PREVIOUS', 'NEXT', 'CREATE', and 'CANCEL'.

1. Now our preview shows zero. What's going on? That cluster has four VMs running and certainly the average memory utilization is not 0 GB per vm.
2. It's time to discuss the **depth** parameter.

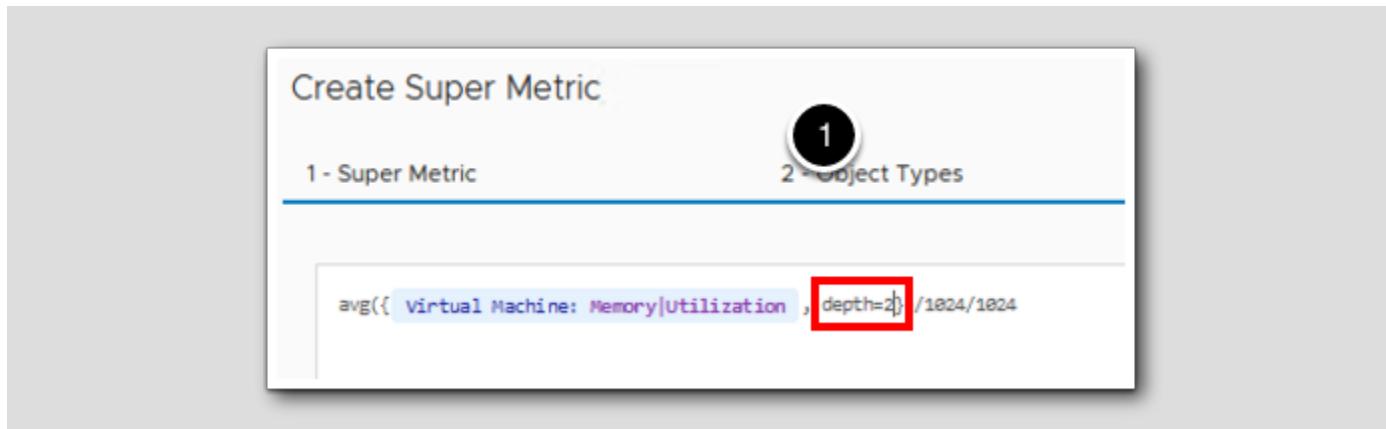
The depth parameter in a super metric formula is used to tell Aria Operations how far down (or up) the object hierarchy to look for the objects and their metrics when performing the calculation. As mentioned earlier, within Aria Operations there are multiple hierarchies (or traversal specs). Each adapter type will usually have at least one hierarchy. For example, the vCenter adapter creates vSphere Hosts and Clusters, vSphere Networking and vSphere Storage hierarchies.

If we look at the vSphere Hosts and Clusters hierarchy, it goes (from top to bottom): vSphere World --> vCenter Server(s) --> vSphere Datacenter(s) --> vSphere Cluster(s) --> vSphere Host(s) --> Virtual Machines --> Datastores. So in our case we want to calculate our super metric based on one (host --> vm) or two (cluster --> host --> vm) levels down the hierarchy. If you look at our super metric formula, you see that **depth=1** was added automatically which is why the preview worked on the esx-05a host (the vms were one level below the host) but not for the Workload 1 cluster (the vms were two levels below the cluster).

Something else you might notice about the **depth** parameter is that a positive value (1 in this case) will look down the hierarchy. If we wanted to look up the hierarchy, we would need to use a negative value for the depth parameter. That might seem opposite from what you would expect but you just need to remember that rule: positive depth = look down, negative depth = look up.

## Fix the Super Metric Formula

[420]



So let's update our formula to get it to look two levels down the hierarchy.

1. Delete the '1' and replace it with a 2 for the depth parameter.

Now the formula is calculating the average VM memory utilization for our cluster. But does that mean it won't work for hosts any longer? Since it is looking down two levels down in the hierarchy for vms will it look past the vms when applied to a host? The good news is that it will still work for hosts. In fact, a depth of 2 means it will look down one level and two levels. A depth of 5 would look down one, two, three, four and five levels for vms (or whatever object type is in the formula).

[Back to Preview](#)

[421]



1. Click the PREVIEW tab again.

Workload1 shows correctly

The screenshot shows the 'Create Super Metric' wizard at step 3 - Formula. The formula entered is `avg({ Virtual Machine: Memory|Utilization , depth=2})/1024/1024`. The chart preview on the right displays two data series: 'esx-05a.corp.vmbeans.com' and 'Workload1'. A red arrow points from the formula input field towards the chart preview. The chart shows memory utilization over time, with values ranging from 1.33 to 1.36. Step 1 is highlighted with a red box around the 'NEXT' button.

Notice this time the chart preview updated without deleting and re-adding

1. Click NEXT.

## Assign The Super Metric To One or More Policies

Create Super Metric

1 - Super Metric	2 - Object Types	3 - Formula	4 - Policies
Select which policies you would like to enable this super metric in. You may also customize thresholds per policy. After one collection cycle, the super metric begins collecting and processing data, and it appears on each instance of the specified object type on the All Metrics tab.			
Policy	Virtual Machine	Host System	Cluster Compute Resource
vSphere Solution's Default Policy (May 12, 2023 10:...)	<input type="checkbox"/>	<b>1</b> <input checked="" type="checkbox"/>	<b>2</b> <input checked="" type="checkbox"/>
<a href="#">PREVIOUS</a> <a href="#">NEXT</a> <b>CREATE</b> <a href="#">CANCEL</a>			

The final (optional) step is to enable the super metric for the object types in one or more policies. If you don't enable the metric calculation in a policy here, you will have to go edit the policy(ies) where you want to enable the calculation later in the policy editor.

In our lab we only have one policy that is being used. In a production environment you might have several or more policies active in Aria Operations. If you have multiple active policies you will see all of them listed on this screen and you can select which policies you want to activate the super metric calculation in for each object type.

1. Check the box to enable the metric on hosts in the policy.
2. Check the box to enable the metric on clusters in the policy.
3. Click CREATE to save your super metric.

## Lesson end

Congratulations! You have created your first super metric and applied it to two object types in the active policy in your lab environment. There are a few more lessons ahead where we will explore creating other super metrics to learn about some additional super metric features. If you want to skip ahead and see the results of your work, use the Table of Contents at the top of the lab manual to jump past the other super metric creation lessons.

## Using 'This' and Negative Depth Parameters in Super Metric Formulas

Let's create another super metric. For this example, the assignment is to use a super metric to calculate the percentage of a datastore's capacity that is being used to store virtual machine snapshots.

1

sum( Virtual Machine **snap**)

**2**

Metric

- Disk Space|Snapshot|Virtual Machine used (GB)
- Disk Space|Snapshot Space (GB)**
- Summary|Reclaimable Snapshot Space (GB)

Metric Type

- Disk Space|Snapshot|Access Time (ms)
- Disk Space|Snapshot|Virtual Machine used (GB)
- Disk Space|Snapshot Space (GB)
- Summary|Reclaimable Snapshot Space (GB)

Property Type

- Disk Space|Snapshot|Creator
- Disk Space|Snapshot|Description
- Disk Space|Snapshot|Managed Object Reference
- Disk Space|Snapshot|Name
- Disk Space|Snapshot|Number of Days Old
- Disk Space|Snapshot|Age (Days)

Unit (Optional)

Unformatted

**CREATE**

- Type snap
- Click Disk Space|Snapshot Space (GB) under the Metric section

Note that the metric we want to use shows up both in the Metric Type category and the Metric category. Metric Type is a general attribute and should be used any time there might be more than one instance of the metric on an object (for example a CPU core's

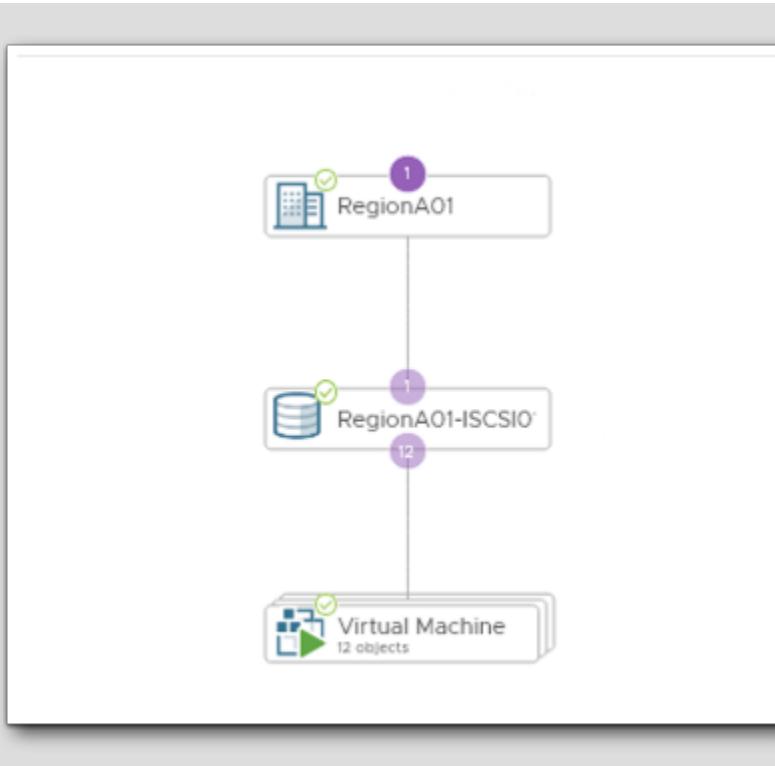
usage where there are multiple cores in the host. Or the space used by individual snapshots when there are multiple snapshots on the virtual machine). In this case, the Disk Space|Snapshot Space is just a single metric that represents the total snapshot space used by the VM across all snapshots (if there are more than one).

The screenshot shows the 'Create Super Metric' dialog box. The left pane is titled '1 - Super Metric' and contains a search bar with the query 'sum( Virtual Machine :snap )'. The right pane is titled '2 - Object Types' and displays a dropdown menu under 'Metric'. The menu items are:

- Disk Space|Snapshot|Virtual Machine used (GB)
- Disk Space|Snapshot Space (GB)** (highlighted with a red box)
- Summary|Reclaimable Snapshot Space (GB)

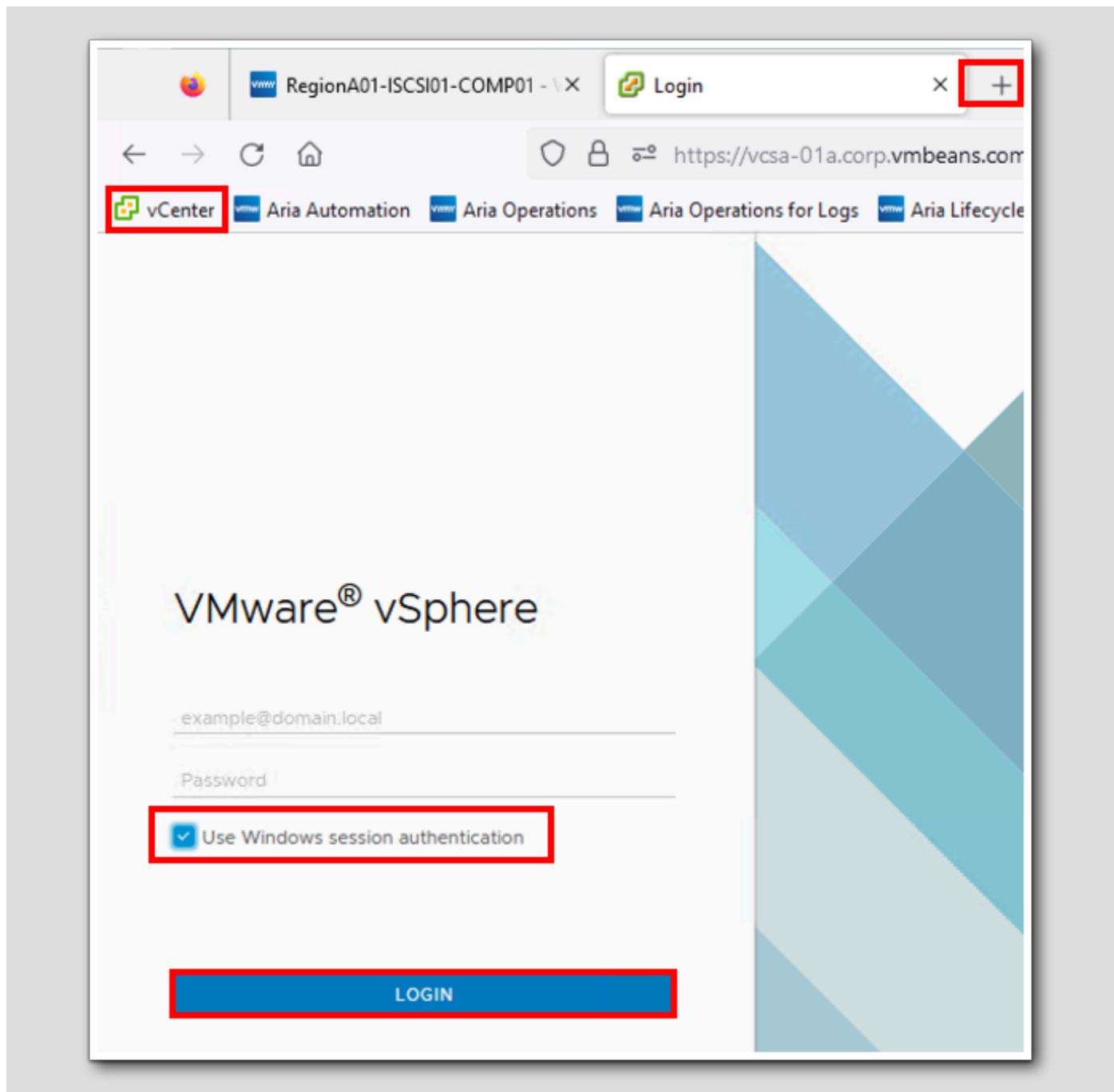
Below the metric dropdown are sections for 'Metric Type' and 'Property Type', each listing several options. At the bottom of the dialog are buttons for 'PREVIOUS', 'NEXT', 'CREATE', and 'CANCEL'.

## The Hierarchical Relationship



If you recall from a previous lesson, we learned that a datastore is a child of hosts and of virtual machines in the vSphere Hosts and Clusters hierarchy. In this case, we will be using the VM <--> datastore relationship. Note in the graphic (and in our lab environment) that the RegionA01-ISCSI0 datastore supports Twelve virtual machines. So if we create a super metric on the datastore object type and have it look one level up the hierarchy to create the sum of the metric representing snapshot space on virtual machines, we will have completed the assignment for this lesson.

## Preparing the Lab Environment

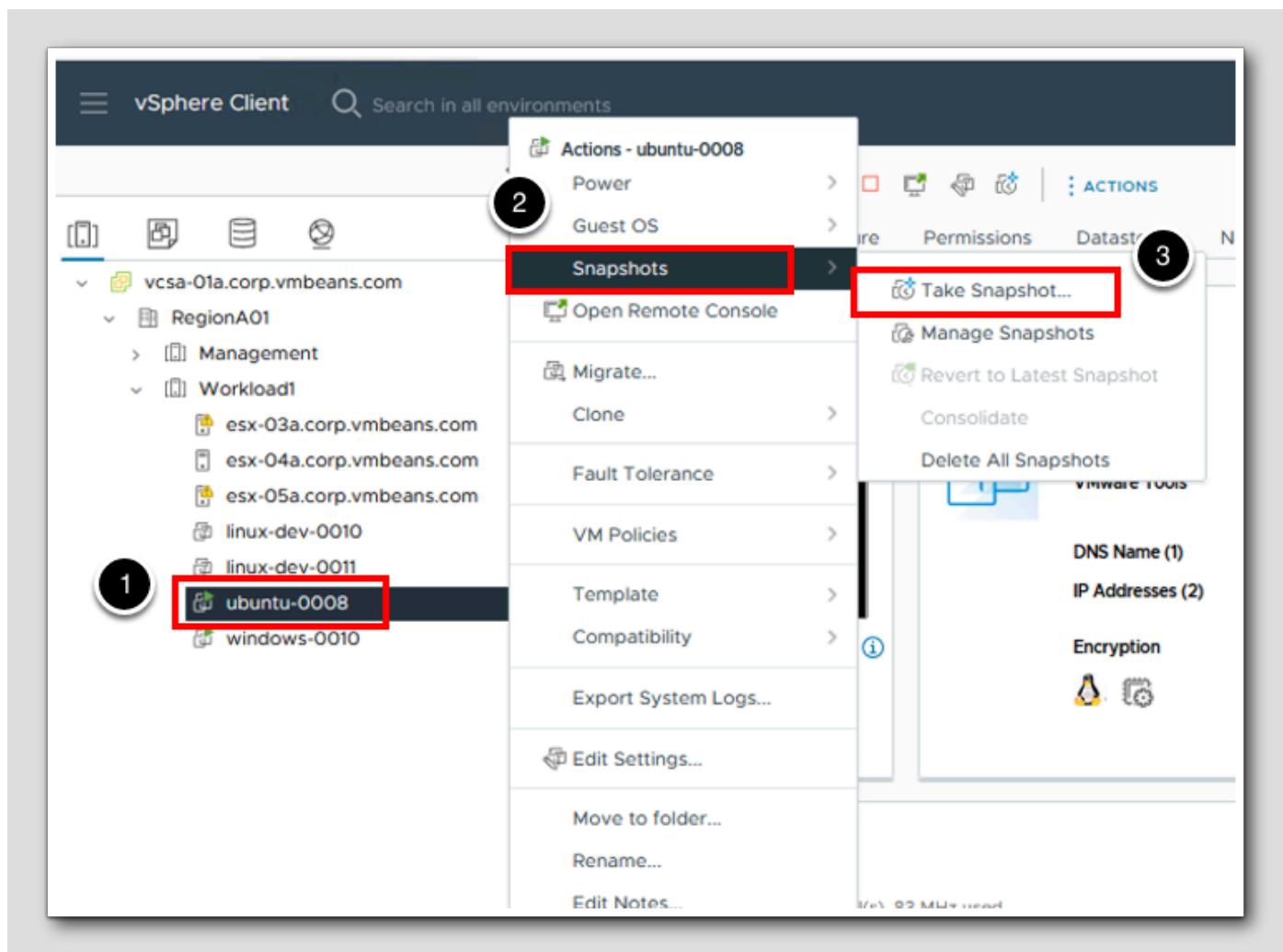


Before we begin this exercise, we must prepare the lab environment. None of the VMs in this lab currently have snapshots, so we will take one quickly.

1. Click the + sign in the Firefox title bar to open a new browser tab
2. Click the vCenter bookmark to navigate to the vSphere Client login
3. Click the checkbox next to Use Windows session authentication
4. Click LOGIN

### Take a Snapshot of the ubuntu-0008 Virtual Machine

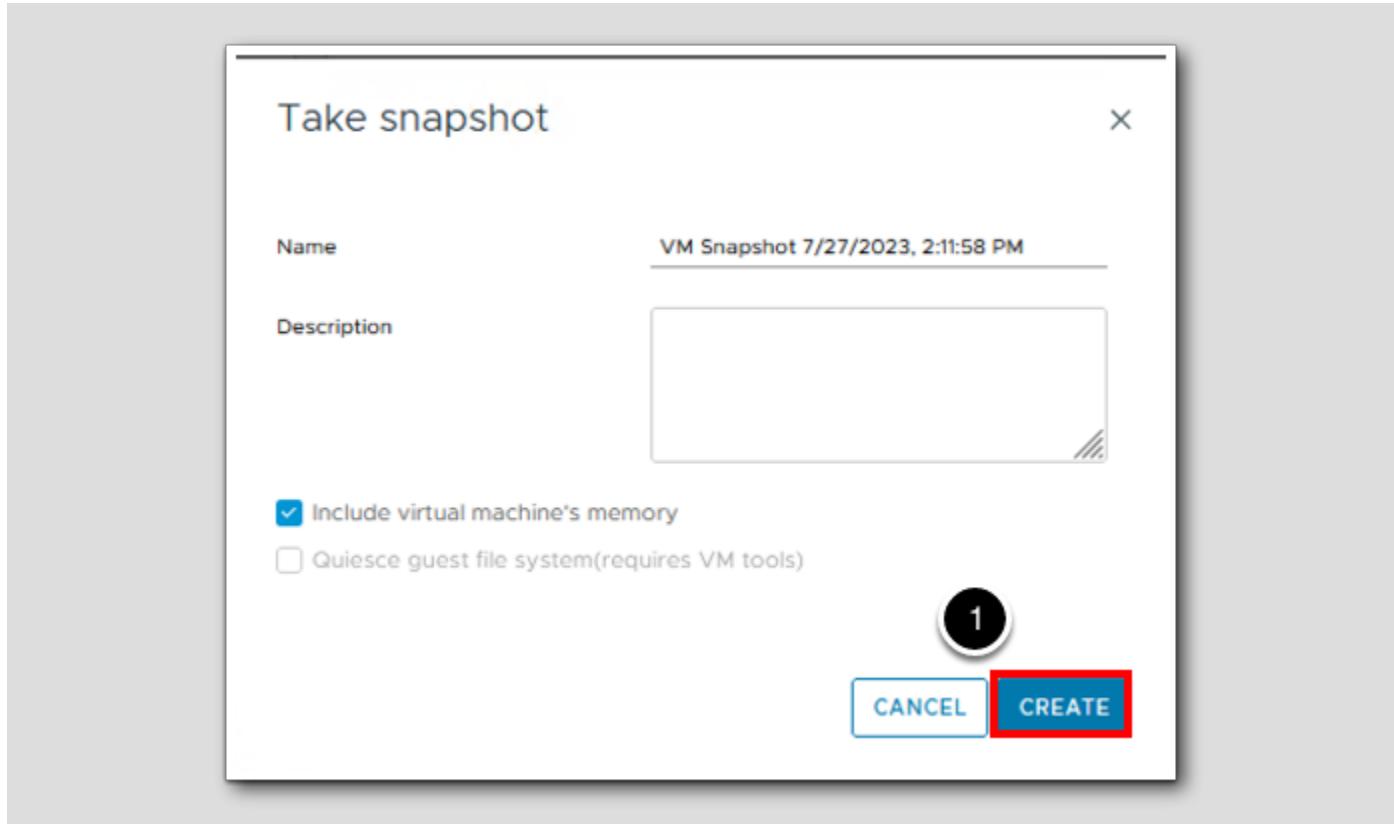
[428]



1. Right click on the ubuntu-0008 VM in the vSphere inventory to open the Actions - ubuntu-0008 menu.
2. Mouse over **Snapshots** to open the sub-menu
3. Click on **Take Snapshot...**

### Take a Snapshot of the ubuntu-0008 Virtual Machine

[429]



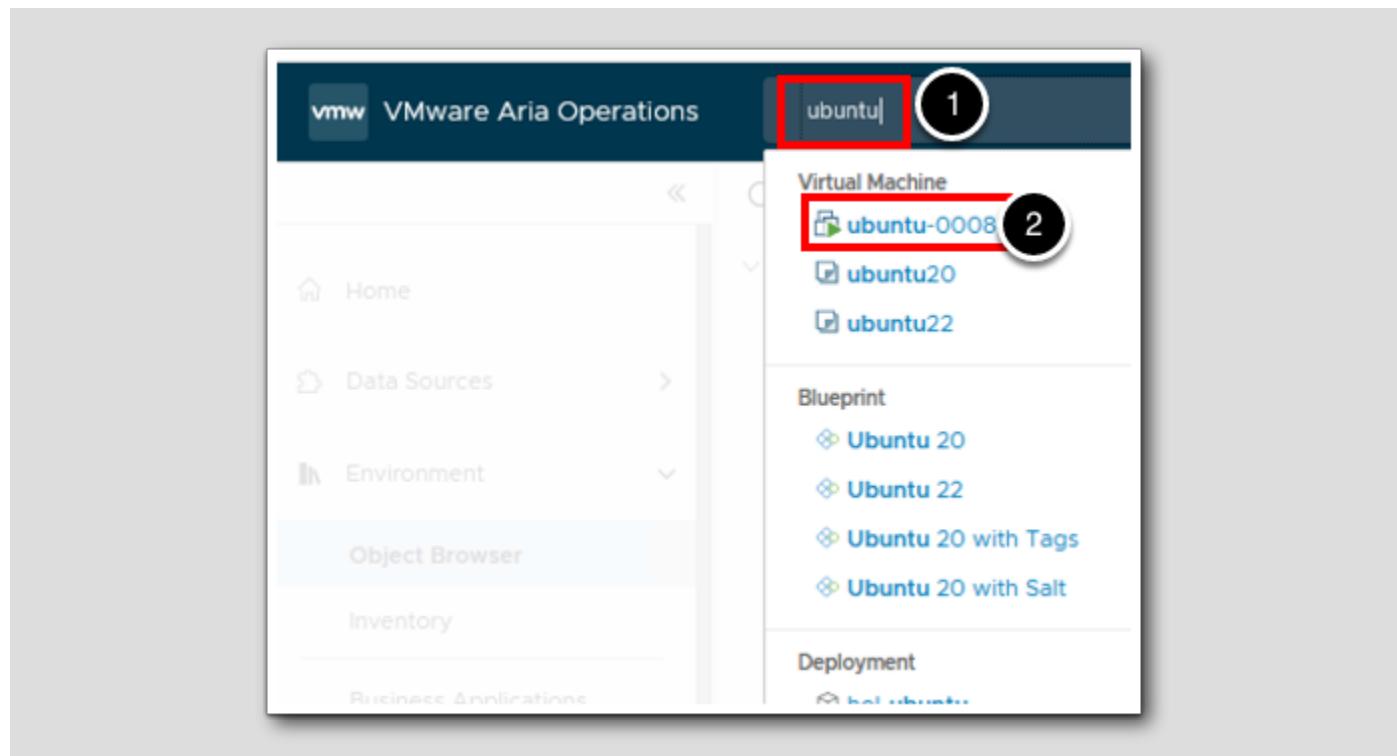
The default snapshot name and settings will suffice for this exercise.

1. Click **CREATE** to create the snapshot
2. Click the **Aria Operations Manager** browser tab (not shown) to return to Aria Operations

### Which Metric Will We Be Using?

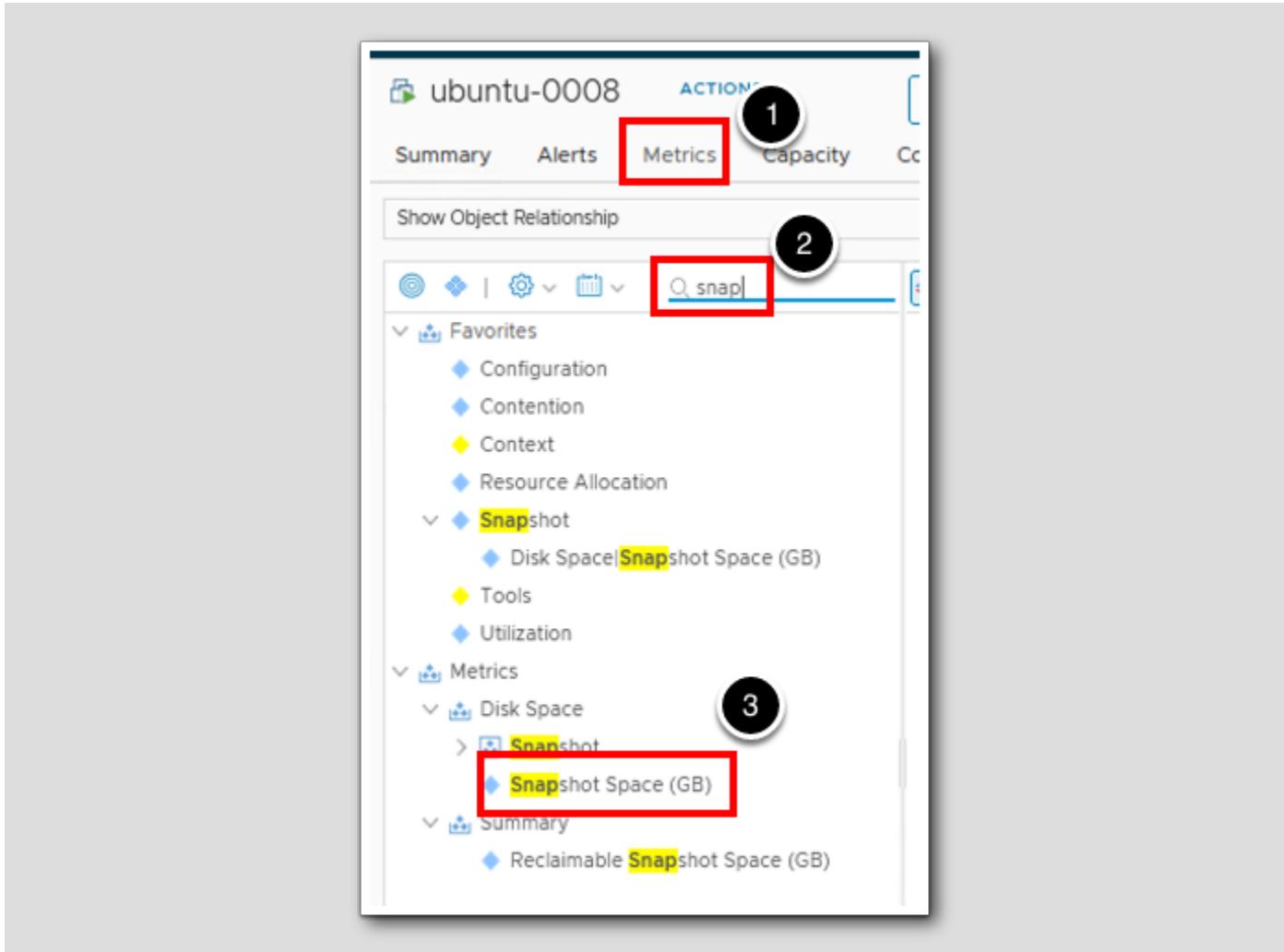
[430]

Before we get started with the super metric, let's understand which virtual machine metric we will be using for this lesson. Since we want to average a vm metric (disk snapshot space), let's go find a vm to see what metrics are available. We will again take a look at the ubuntu-0008 virtual machine.



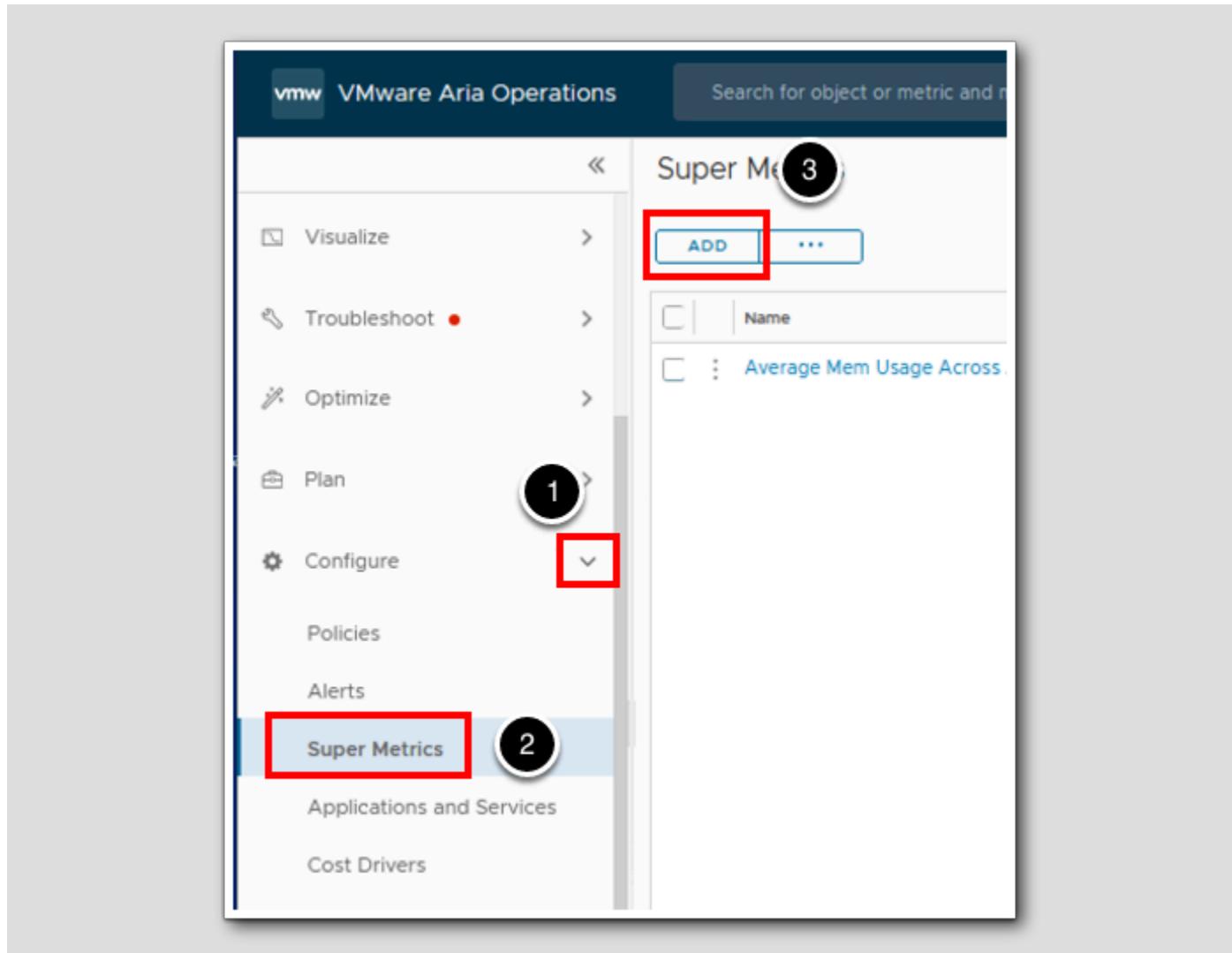
1. In the search box, type ubuntu
2. Click the **ubuntu-0008** link under the Virtual Machine object type

## Expand the All Metrics Tree



1. On the ubuntu-0008 object page, click the Metrics tab.
2. In the filter field, type snap and press the Enter key to filter the metric results.
3. Metrics --> Disk Space --> Snapshot Space (GB) is the metric that represents the total space on the disk consumed by snapshots on this virtual machine.

## Create the Super Metric



1. Expand Configure.
2. Click on Super Metrics.
3. Click ADD.

## Create Super Metric

Create Super Metric

1 - Super Metric      2 - Object Types

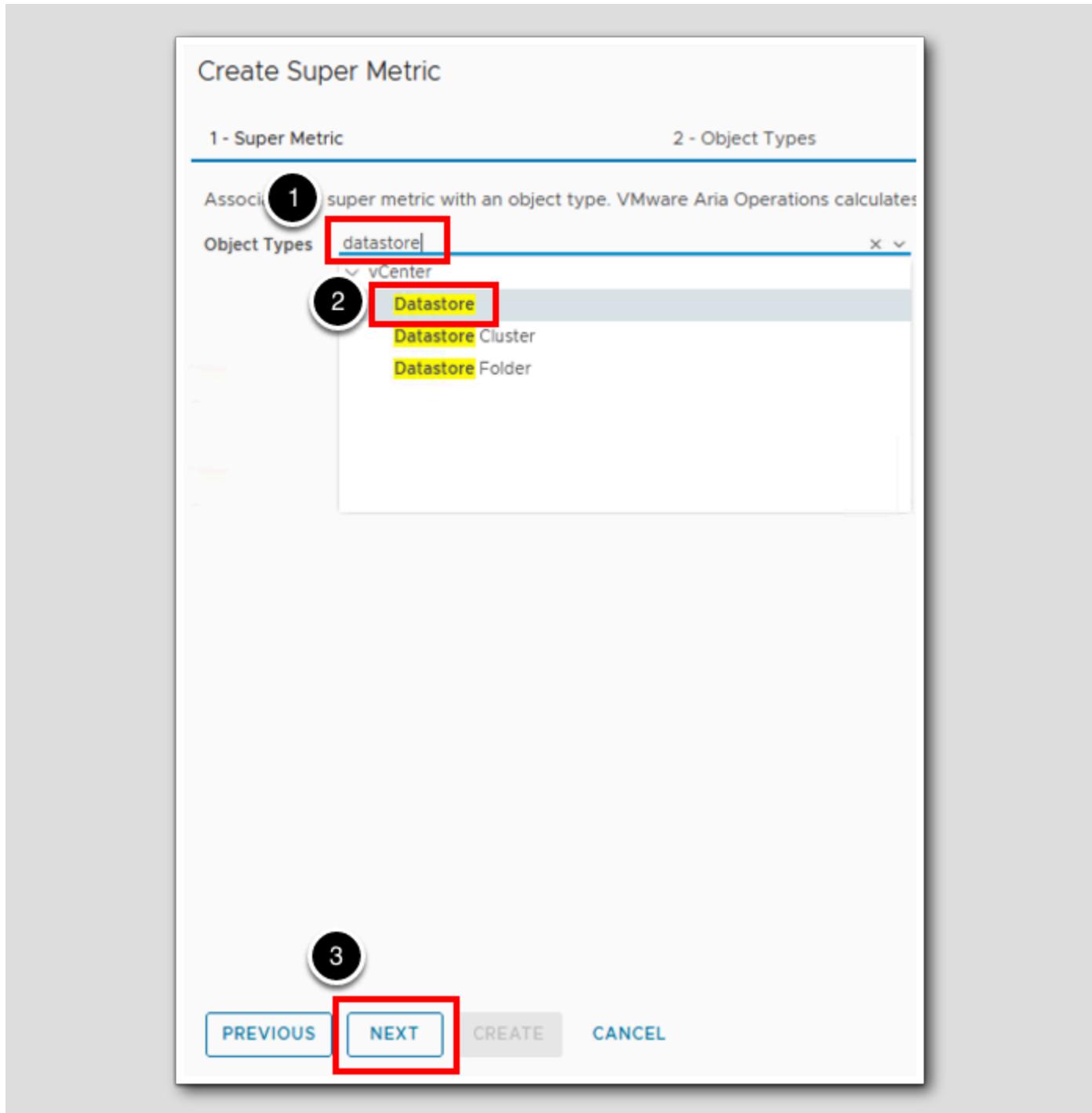
Name: Percentage of Datastore Capacity Used by Snapshots (%)

Description (Optional): On a datastore object, find the percentage of the total datastore capacity that is used by all VM snapshots on the datastore.

PREVIOUS      **NEXT**      CREATE      CANCEL

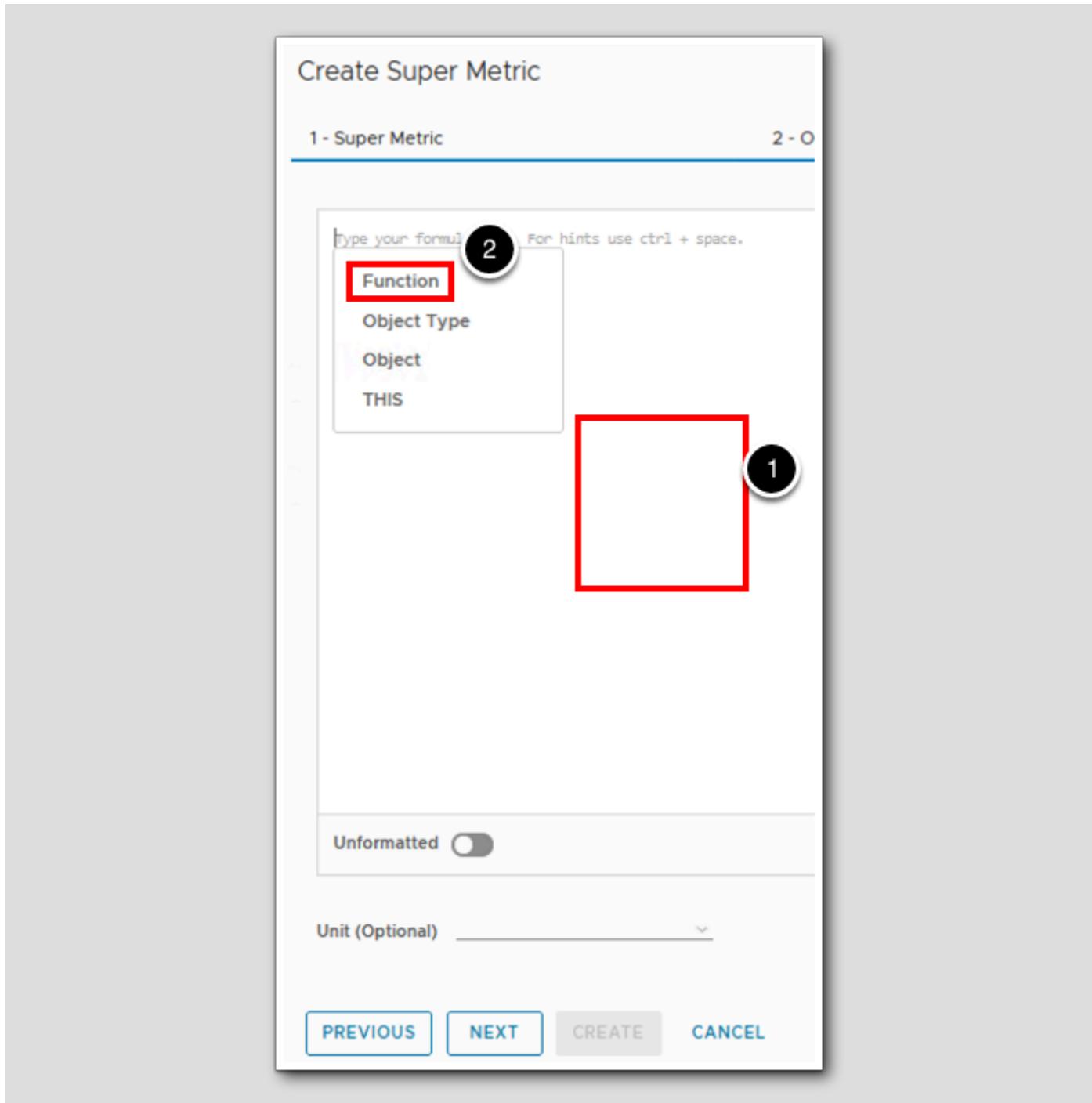
1. Type the super metric Name: Percentage of Datastore Capacity Used by Snapshots (%)
2. Type a description for the metric (optional).
3. Click the **NEXT** button (not shown) to advance the wizard.

## Select the Object Types



1. In the **Object Types** line type **datastore**.
2. Click **Datastore** under vCenter Adapter to select the object type.
3. Click **NEXT**.

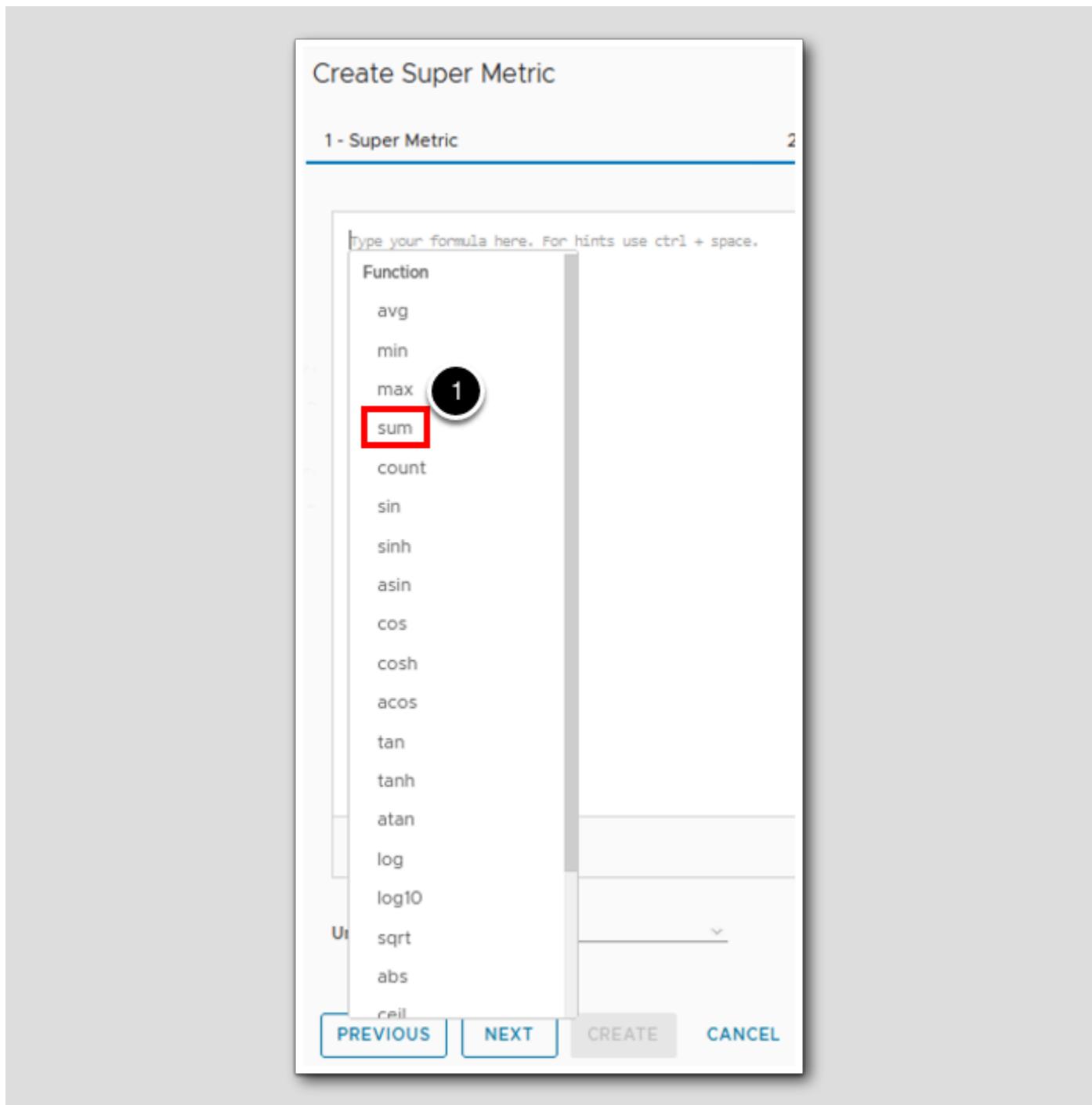
## Start the Formula



The formula will be: The sum of the snapshot space from all VMs on the datastore divided by the total capacity of the datastore.

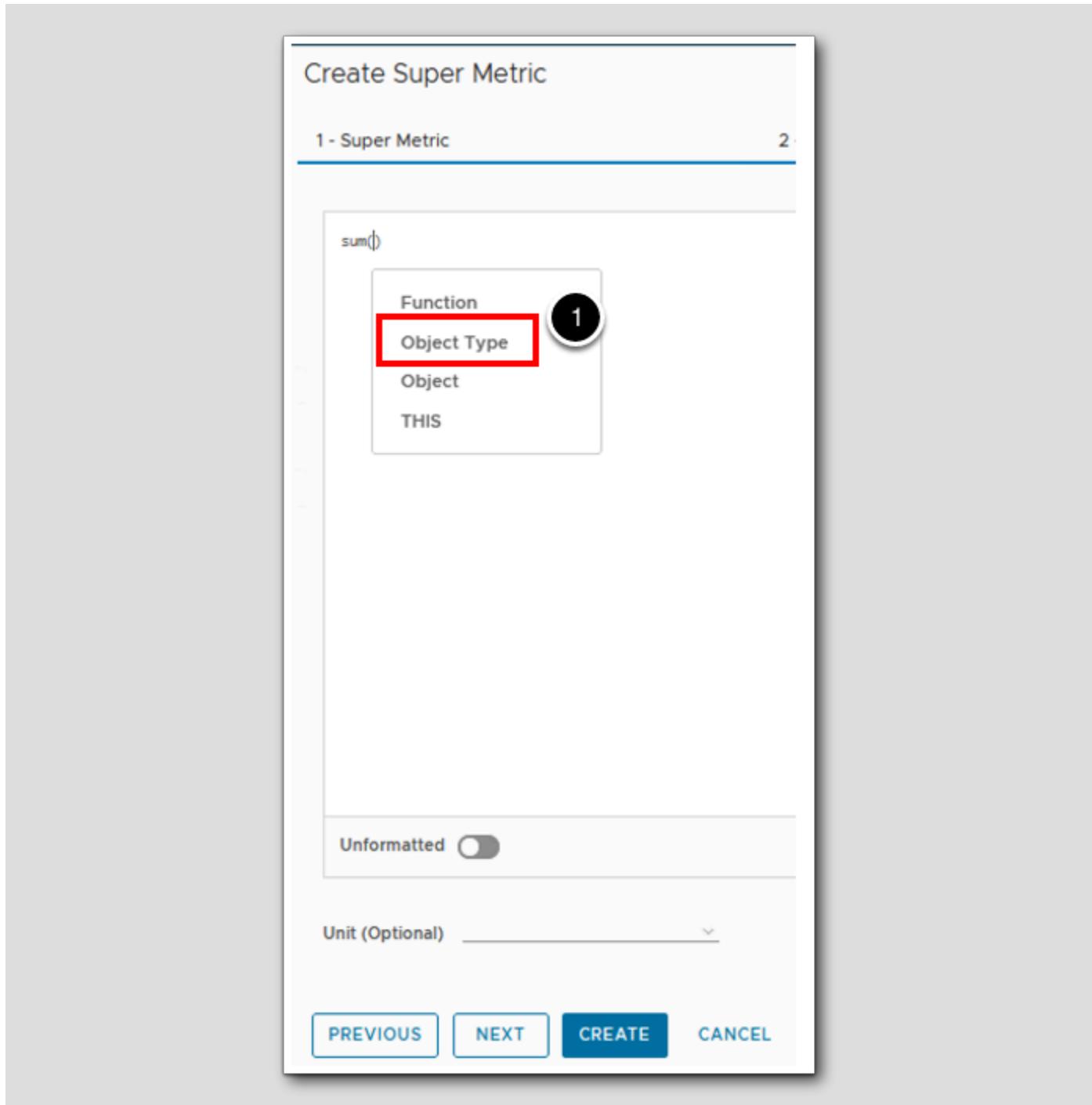
1. Click anywhere in the **empty formula box**.
2. Select **Function**.

## Add Sum



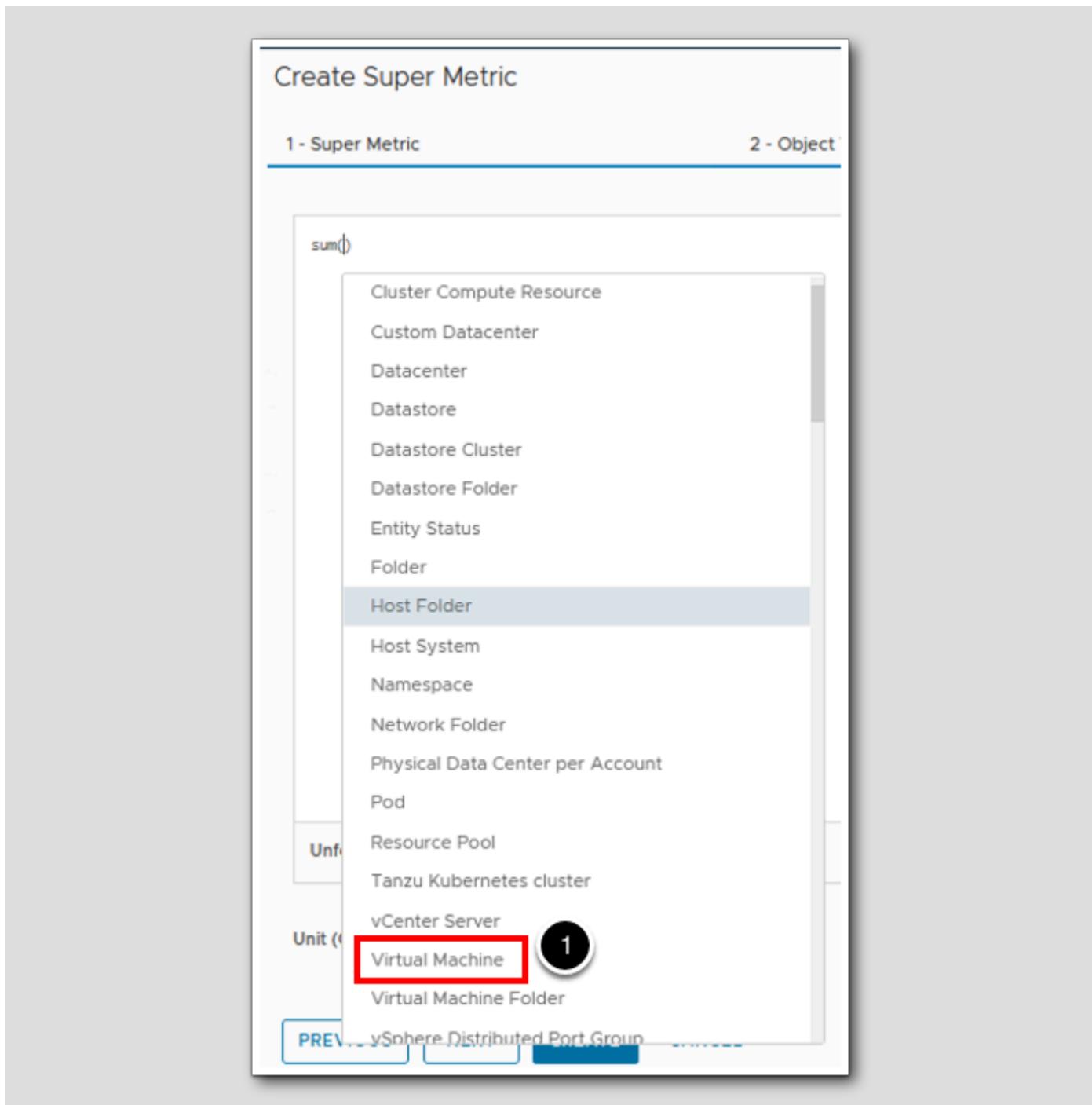
1. Select sum.

## Add the Virtual Machine Object Type



Select Object Type.

## Select Virtual Machine



1. Select Virtual Machine.

## Add the Metric

1. Select Metric.

Let's select the metric. Remember from earlier in this lesson that we will be using the Disk Space|Snapshot Space (GB) metric

## Continue Creating the Formula

We have the numerator of our formula (the sum of the snapshot space from all VMs on the datastore). Let's add the division operator and get ready to add the denominator.

### Create Super Metric

1 - Super Metric      2 - Object Types

```
sum({ Virtual Machine: Disk Space|Snapshot Space , dept[n=1]) / |
```

Function
Object Type
Object
THIS

Unformatted

Unit (Optional)

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

1. Move your cursor to the end of the formula and type a **space** followed by a **/** and then another **space** (note that the spaces are optional but they make the formula easier to read).
2. Select **THIS**.

Specifying 'This Object';

Create Super Metric

1 - Super Metric      2 - Object Types

A screenshot of a software interface titled "Create Super Metric". It has two tabs: "1 - Super Metric" and "2 - Object Types". The "1 - Super Metric" tab is active, showing a text input field containing a query: "sum({ Virtual Machine: Disk Space|Snapshot Space , depth=1}) / Datastore: [redacted]". To the right of the input field is a context menu with five options: "Metric" (highlighted with a red border and a red arrow pointing to it), "Property", "Metric Type", and "Property Type". A small circular badge with the number "1" is positioned next to the "Metric" option. Below the input field is a "Unformatted" toggle switch. Further down are fields for "Unit (Optional)" and "Unit (Optional) [dropdown arrow]". At the bottom are four buttons: "PREVIOUS", "NEXT", "CREATE" (highlighted with a blue border), and "CANCEL".

What happens when depth=0?

Let's take the example we are working on from the perspective of the datastore. The metric will be applied to datastore objects and we want to know for each datastore, what is the sum of the disk snapshot space from all of the VMs attached to that datastore (VMs are the parents) and then divide the sum by a metric on the datastore itself (the total capacity of the datastore). So if we are going to create a metric that will be attached to datastore objects and one of the calculation inputs is a metric from the datastore object itself, can we just say object type = datastore and depth = 0 in the super metric formula? Actually, there is special syntax for this type of situation ... instead of saying depth=0, it entails prefacing the metric or metric attribute with 'This Resource' and there is a special way of building that into the metric definition - the **THIS** button in the editor.

Clicking the THIS button has added a green Datastore: object in the formula.

1. Click on **Metric**.

## Select the Total Capacity Metric

Create Super Metric

1 - Super Metric      2 - Object Types      3 - Formula

1

sum({ Virtual Machine: Disk Space|Snapshot Space , depth=1}) / Datastores: total

2

Metric

Capacity|Total Capacity (GB)

Capacity|Total Provisioned Consu

Capacity Analytics Generated|Dis

Cost|Monthly Total Cost (US\$/Mo

Datastore|Total Latency (ms)

Datastore|Total Throughput (KBp

Devices:Aggregate of all Instance

Devices:Aggregate of all Instance

Devices:Aggregate of all Instance

Disk Space|Total Capacity (GB)

Disk Space|Total Provisioned Disk

Summary|Total Number of Cluste

Summary|Total Number of Hosts

Summary|Total Number of VMs

VMware Aria Operations Generat

VMware Aria Operations Generat

Unformatted

Unit (Optional)

PREVIOUS    NEXT    CREATE    CANCEL

1. Type total to filter the list.
2. Click Capacity|Total Capacity (GB) from the Metric section to select the metric.

## Finish the Formula

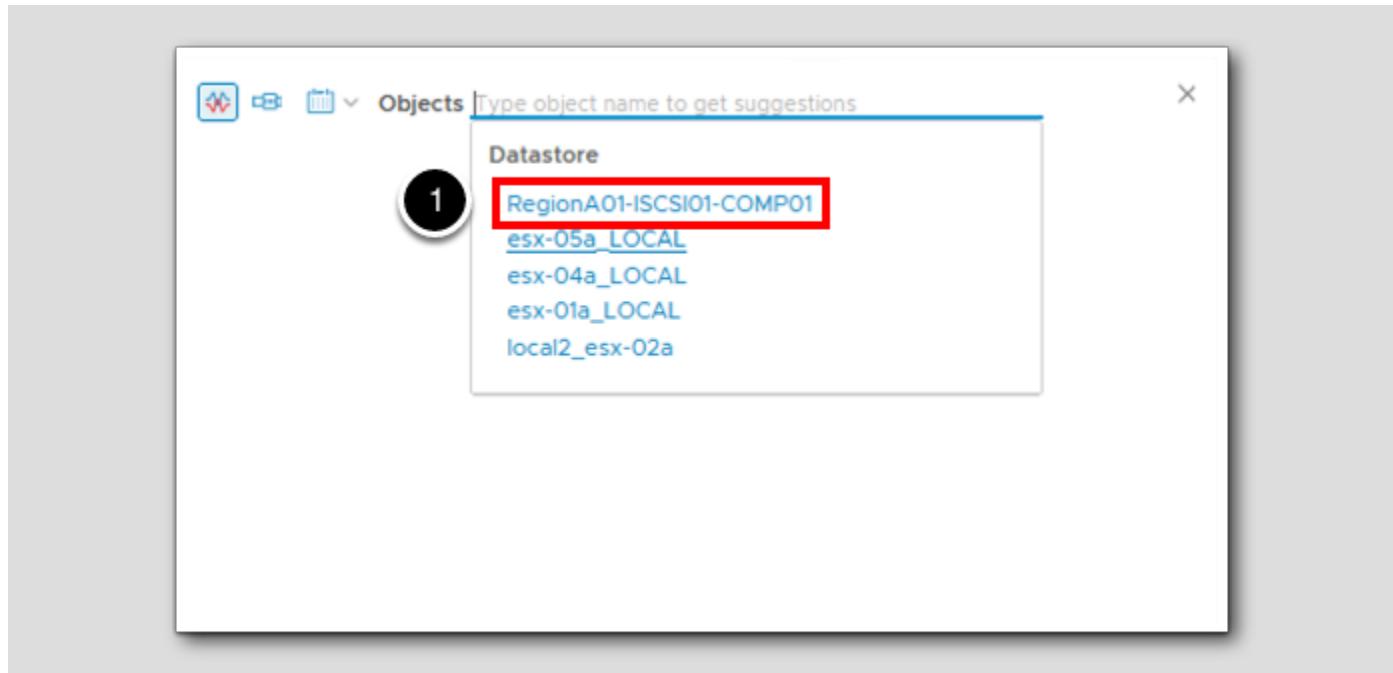
The result at this point will be a ratio of the sum of the snapshot space metric for all of the VMs on a datastore divided by the total capacity of that datastore. To convert it to a percentage, we just need to multiply by 100.

The screenshot shows the vRealize Operations formula editor interface. At the top, there are four tabs: 1 - Super Metric, 2 - Object Types, 3 - Formula, and 4 - Policies. The 3 - Formula tab is selected. Below the tabs is a color coding legend. The main area contains a formula: `sum({ Virtual Machine: Disk Space|Snapshot Space , depth=1}) / { THIS: Capacity|Total Capacity } * 100`. The part `* 100` is highlighted with a red box and has a circled '1' below it. At the bottom right of the formula entry area are two buttons: **VALIDATE** and **PREVIEW**, with **PREVIEW** also highlighted with a red box and a circled '2' below it. On the left side, there is an **Unformatted** toggle switch.

1. With your cursor at the end of the formula, type space then \* then space then 100
2. Click **PREVIEW** to open that section.

## Preview the Super Metric

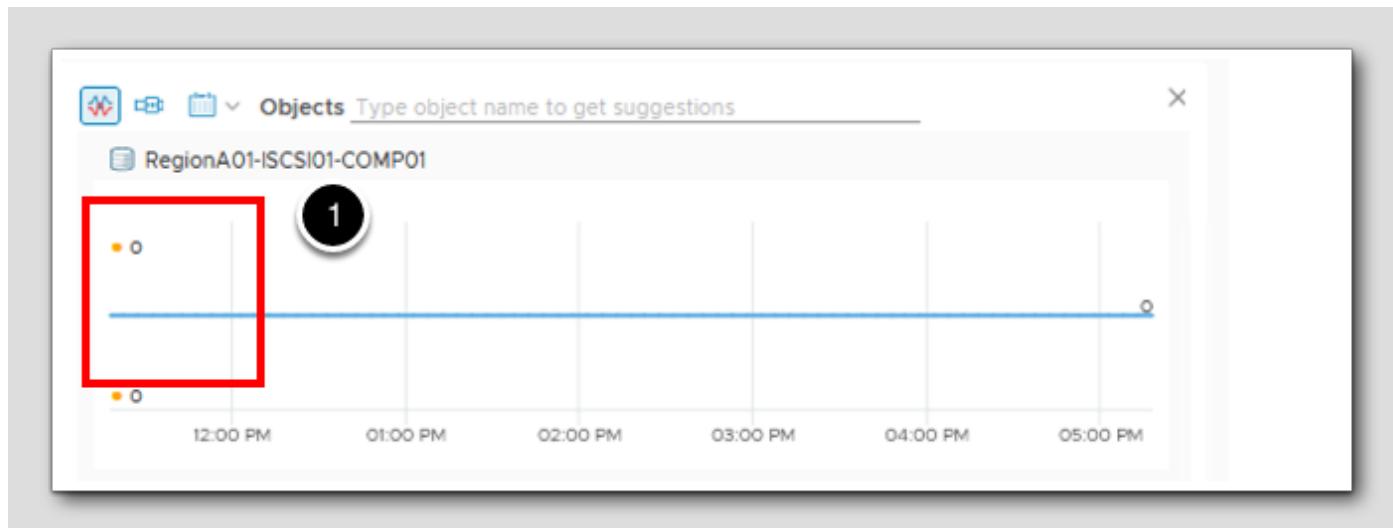
[444]



1. Click the RegionA01-ISCSI01-COMP-01 datastore object as the preview source.

## View the Preview

[445]



1. The preview shows zero percent of the datastore is used by snapshot storage. In this lab environment that is not the case. So why doesn't our formula work?

Do you remember the relationship hierarchy between datastores and VMs? Do you remember how the depth parameter works in a super metric formula?

In this case, virtual machines are parents of datastores. Our depth parameter on the datastore object is 1. Remember that a depth of 1 means one level down the hierarchy. But here we need to look up the hierarchy one level - from the datastore to the VM. So instead of depth=1, we need to have depth=-1.

Remember? Positive depth means look down the hierarchy. Negative depth means look up the hierarchy.

## Fix the Formula

[446]

Create Super Metric

1 - Super Metric      2 - Object Types      3 - Formula

```
sum({ Virtual Machine: Disk Space|Snapshot Space : depth=1 } / { THIS: Capacity|Total Capacity } * 100
```

Let's fix the depth parameter and try the preview again.

1. Place your cursor just to the left of the 1 in the depth parameter and type a minus sign (-) to make the depth=-1

## Back into Preview

[447]

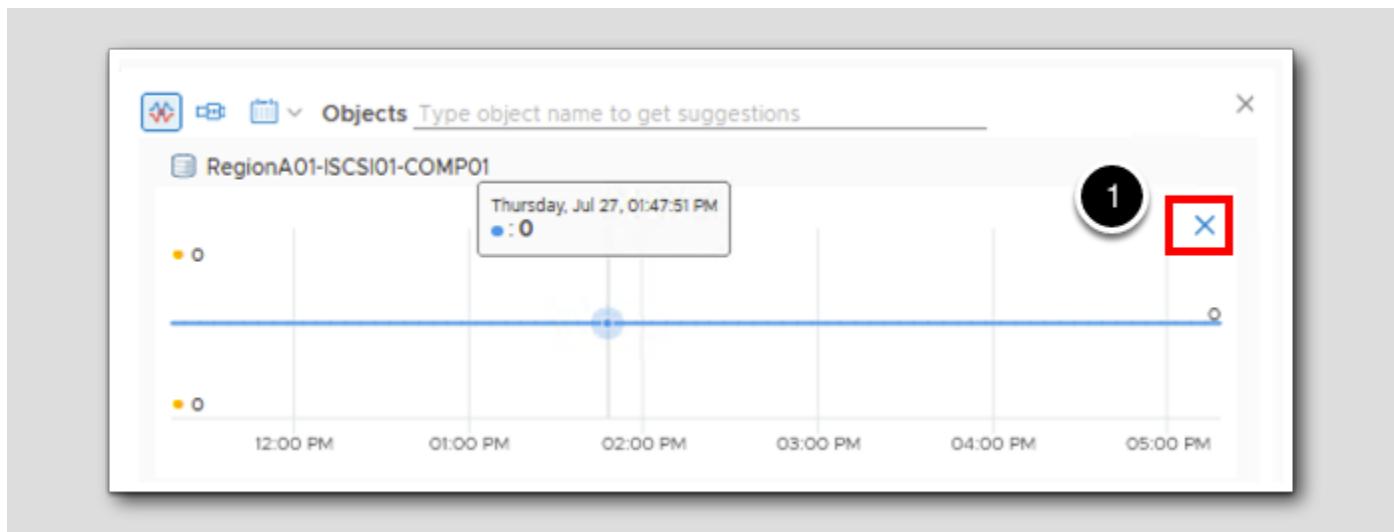
Type	Value	Status
Total Capacity	100.00%	OK
Used Capacity	0.00%	OK
Available Capacity	100.00%	OK

**VALIDATE**      **PREVIEW**

1. Click on PREVIEW again.

Close the old chart

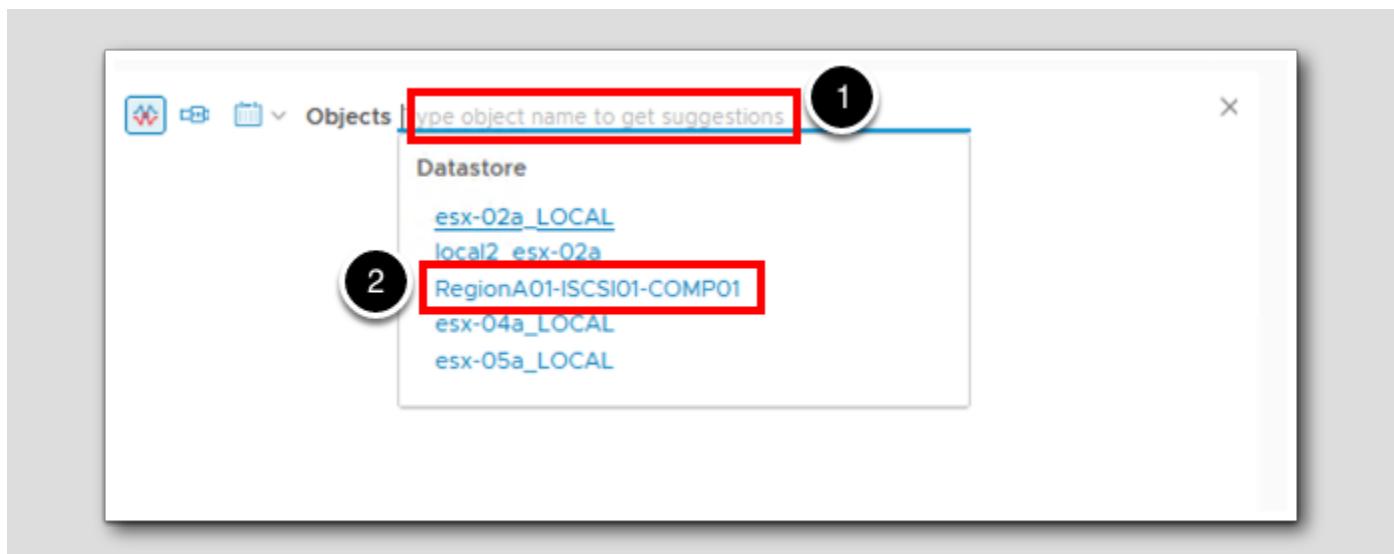
[448]



1. Hover your mouse over the RegionA01-ISCSI01-COMP01 chart until the Blue X appears, click the blue X.

Re-select RegionA01

[449]

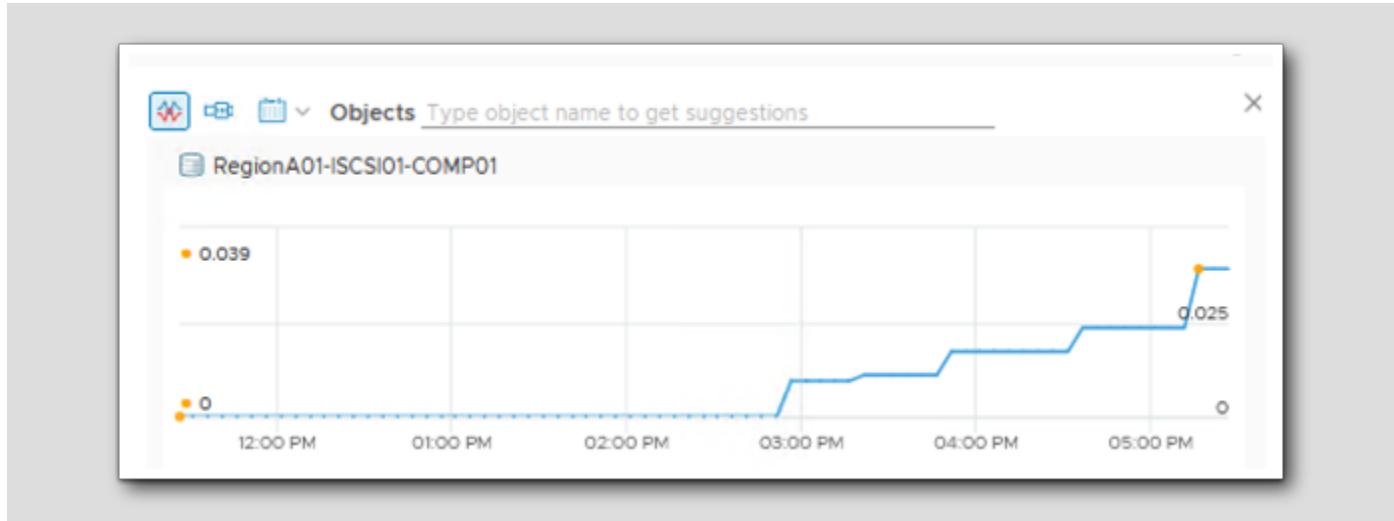


1. Click in the **Objects** line.
2. Click on **RegionA01-ISCSI01-COMP01**.

If you do not see **RegionA01-ISCSI01-COMP01**, close out of the preview window and re-open the preview window.

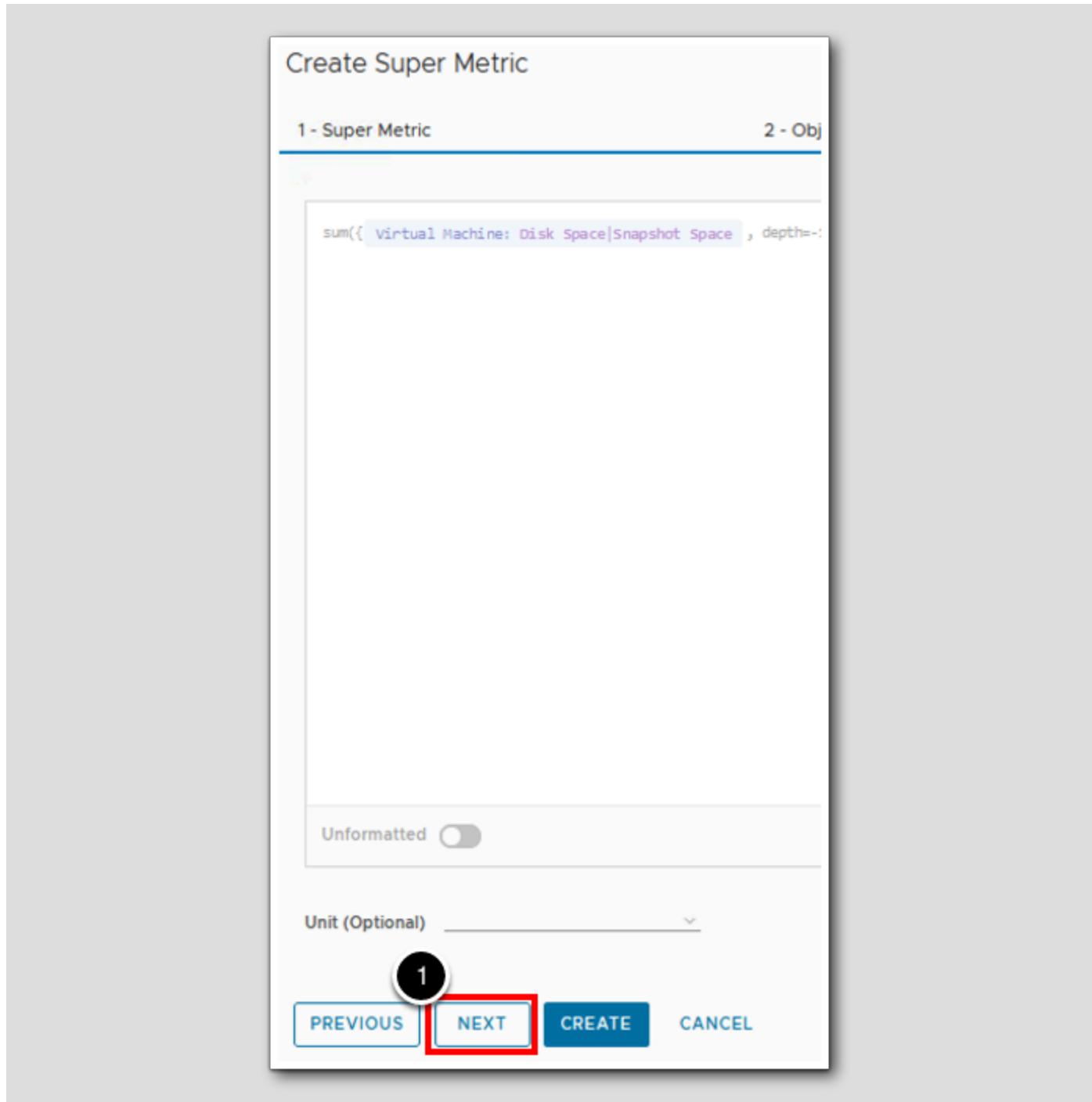
We should see the Super Metric working

[450]



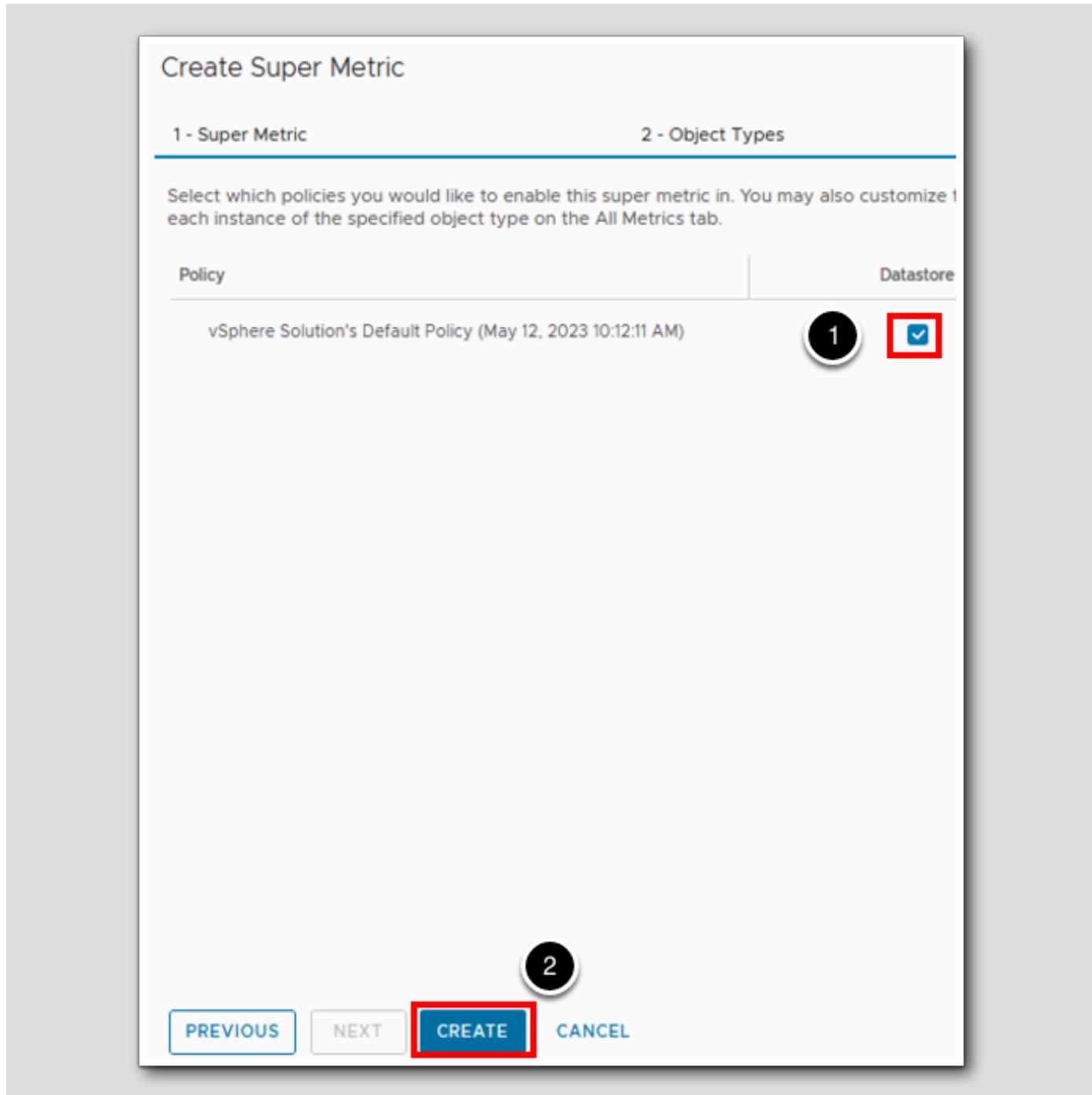
Note the chart's graph starts to grow when you added that snapshot

## On to Policies



1. Click **NEXT**.

Select the Policy and Finish



Just like in the last lesson, we need to enable the super metric in one or more policies if we want it to actually be calculated and then we can finish the process.

1. Check the **box** to enable the metric on Datastore object types in the HOL Policy policy.
2. Click the **CREATE** button to complete the wizard.

## Lesson End

[453]

In this lesson we learned how to use the THIS function in a storage Super Metric.

## Handling Sets of Data Points in a Super Metric Formula

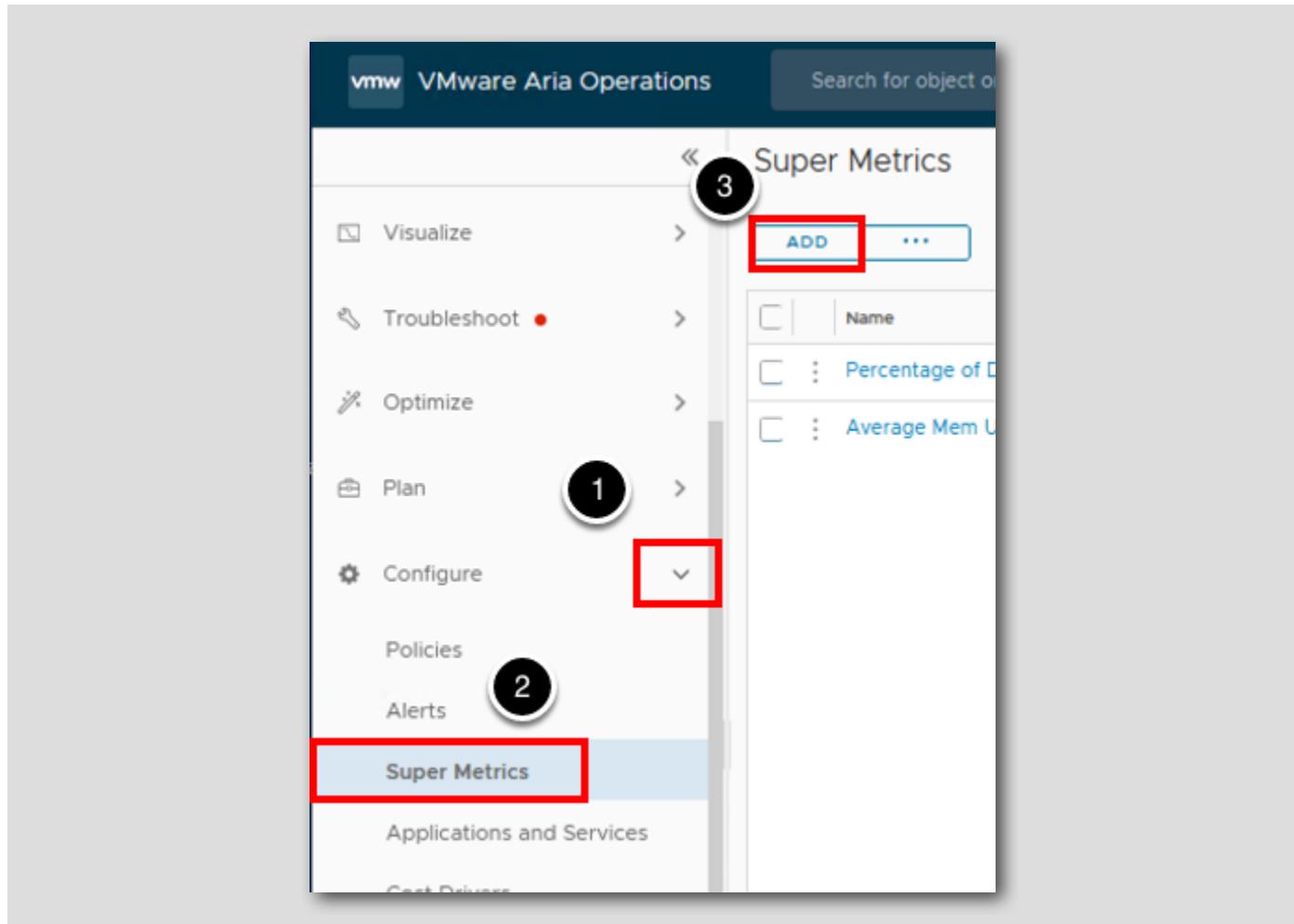
[454]

This topic confounds many people when they first start creating super metric formulas so it's worth spending some time to understand when you might run into this issue and how you can work around it. If you remember back in the lesson where we created our first super metric, there was a discussion about super metric functions and it was stated that the list of available functions includes looping functions (avg, combine, count, max, min and sum) that work on more than one input value and can return either a single value or a set of values depending on the formula syntax. The topic of this lesson centers on that notion of "either a single value or a set of values" depending on the syntax.

If you think back to the discussion about hierarchies in Aria Operations, you will recall for example that in the vSphere Hosts and Clusters hierarchy, virtual machines are children of hosts and that a virtual machine's parent is a host. We understand that a host can have one or more VMs as children but that a VM can only have a single host as its parent. But if we think about the relationship between hosts and datastores, we realize that a host can have one or more datastores as descendants and a datastore can have one or more hosts as ascendants. We know this because we understand vSphere enough to realize that. However, Aria Operations really has no way to know whether relationships between particular objects or object types are one-to-one or one-to-many. This is the thing that can cause confusion when creating a super metric formula until you understand the concept and how to work with it.

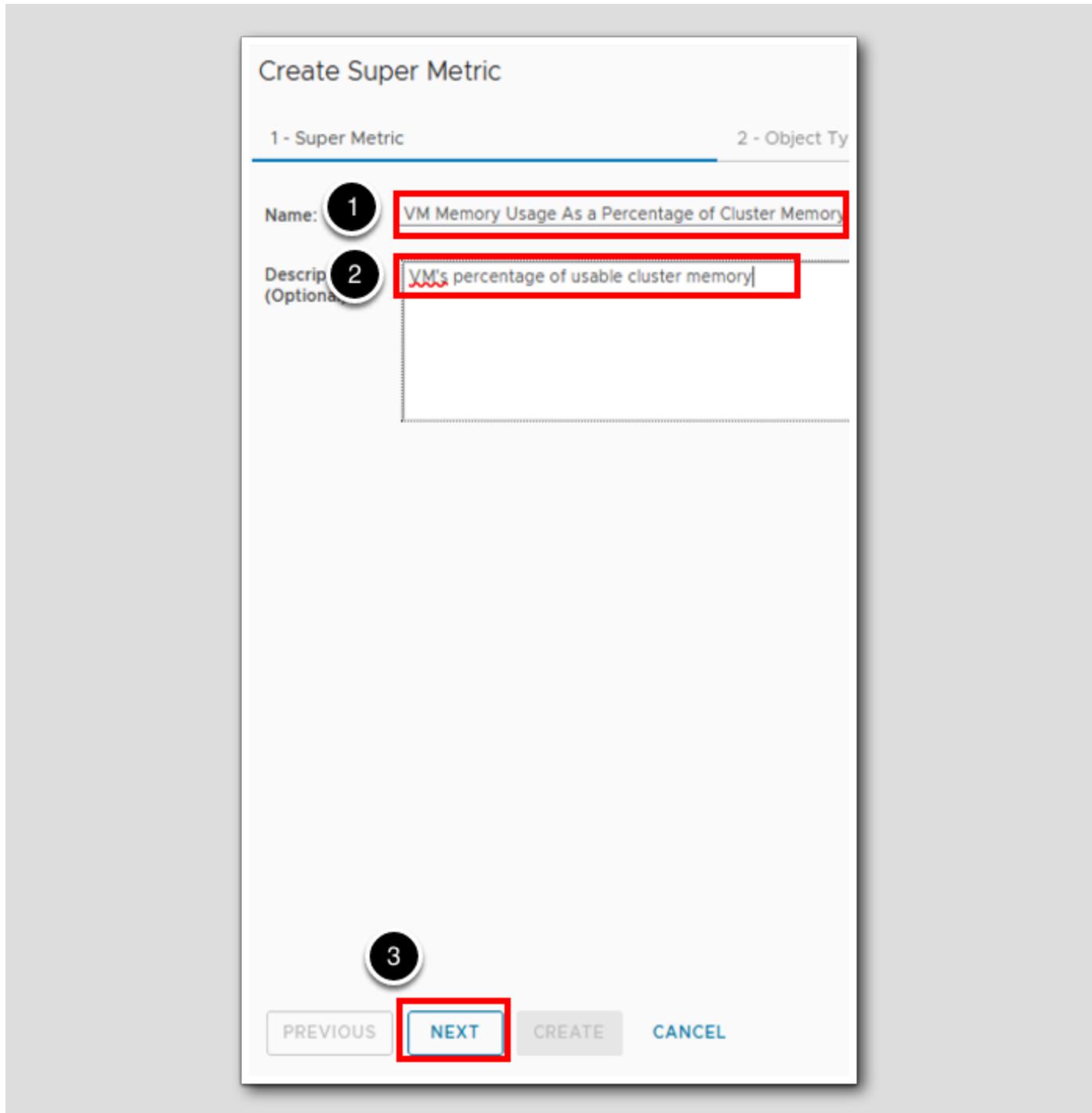
In this lesson we will explore this concept by creating a super metric that can be applied to virtual machine. It will calculate the percentage of a vSphere cluster's usable memory that the VM is using. For example, if a cluster has 200 GB of usable memory and a VM in that cluster was demanding 4 GB of memory, our value should be  $4/200*100$  (to make the ratio into a percentage). The assignment will require us to use some concepts that we covered in the previous lessons and will address the issue discussed above.

Launch the Super Metric Wizard



1. Expand Configure.
2. Click on Super Metrics.
3. Click ADD.

Name the Super Metric



1. In the Name field, type VM Memory Usage As a Percentage of Cluster Memory (%).
2. In the Description field, type VM's percentage of usable cluster memory.
3. Click **NEXT**.

## Assign to an Object Type

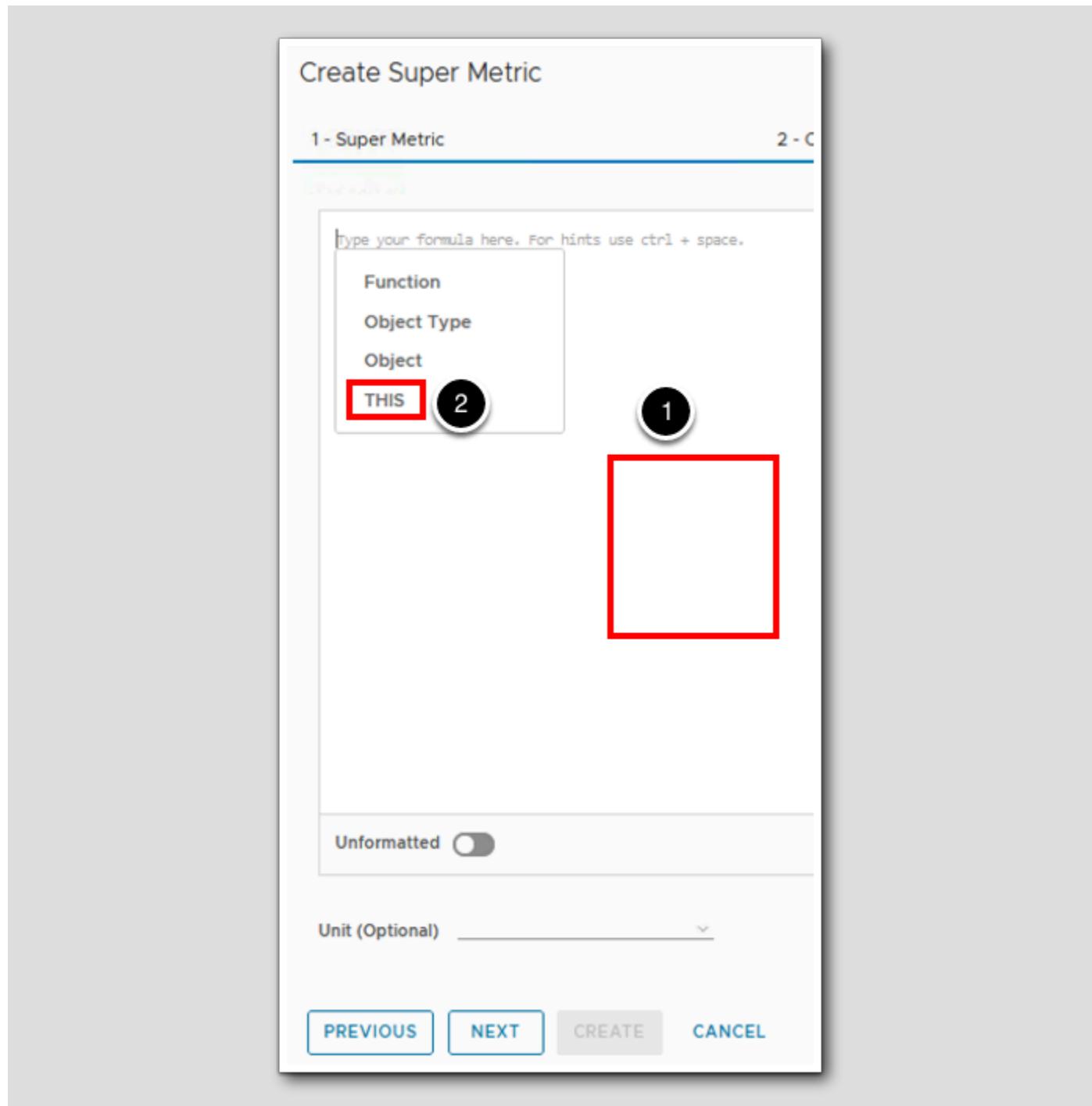


1. In the **Object Types** search field, type **virtual machine**.
2. Single click on **Virtual Machine**.
3. Click **NEXT**.

## Formula

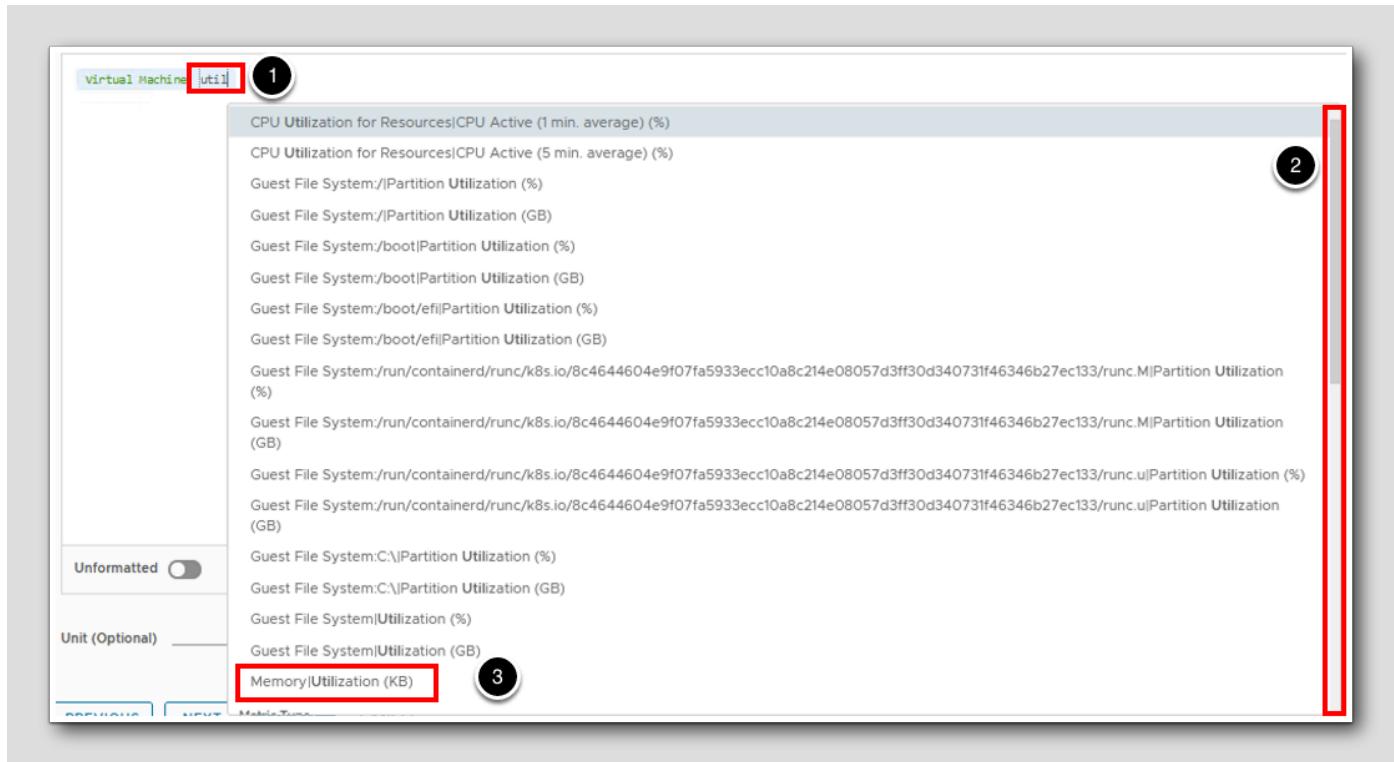
[458]

Since the super metric will be applied to virtual machines and the first metric (the numerator) in the formula is the vm's memory demand we will again use the **THIS** button here.



1. Click anywhere in the empty Formula box.
2. Click the THIS button.

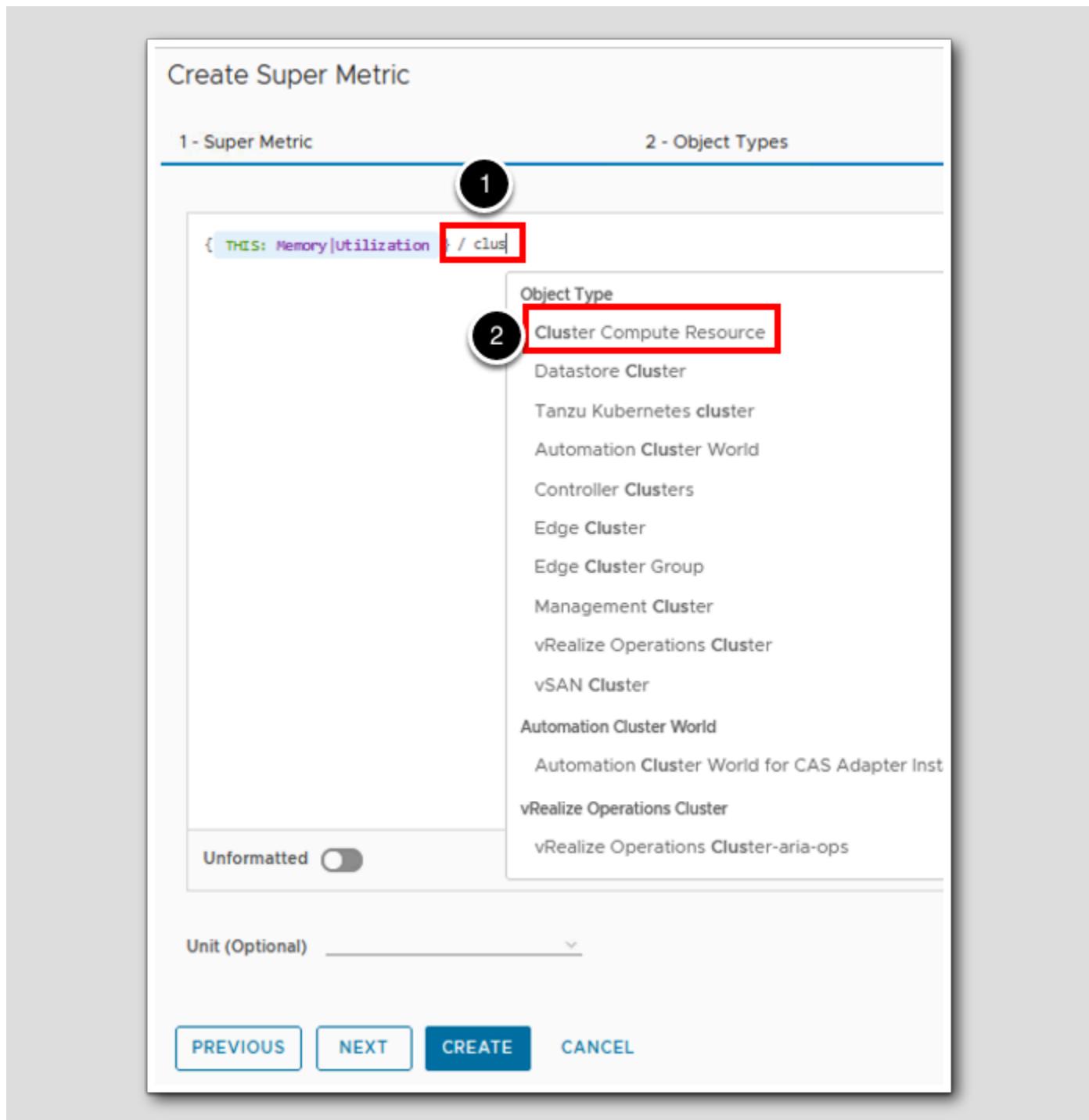
## Add the Metric



Since we want the VM's memory utilization metric,

1. Type util after the green Virtual Machine.
2. Use the scroll bar to scroll to the bottom of the list. Ensure that you are in the list of Metrics and not Metric Types
3. Click Memory|Utilization (KB) to add it to the formula.

## Choose the vSphere Cluster Object Type



1. At the end of the formula line, type a space then / then another space then clus (the spaces are not necessary but make the formula easier to read).
2. Click Cluster Compute Resource to select the object type.

## Select the Metric

[461]

**Create Super Metric**

1 - Super Metric      2 - Object Types      3 - Formula

1

{ THIS: Memory|Utilization } / Cluster Compute Resource **usable**

2

Metric

- CPU|Demand|Usable Capacity after HA and Buffer (MHz)
- CPU|Number of usable CPUs (Cores)
- CPU|Usable Capacity (MHz)
- Disk Space|Demand|Usable Capacity after HA and Buffer (GB)
- Memory|Demand|Usable Capacity after HA and Buffer (KB)
- Memory|Usable Capacity (KB)
- Memory|Usable Memory (KB)**
- Memory|Usage / Usable (%)

Metric Type

- CPU|Allocation|Usable Capacity after HA and Buffer (vCPUs)
- CPU|Demand|Usable Capacity after HA and Buffer (MHz)
- CPU|Number of usable CPUs (Cores)
- CPU|Usable Capacity (MHz)
- Disk Space|Allocation|Usable Capacity after HA and Buffer (GB)
- Disk Space|Demand|Usable Capacity after HA and Buffer (GB)
- Memory|Allocation|Usable Capacity after HA and Buffer (KB)
- Memory|Demand|Usable Capacity after HA and Buffer (KB)
- Memory|Usable Capacity (KB)

Unformatted

Unit (Optional)

PREVIOUS    NEXT    CREATE    CANCEL

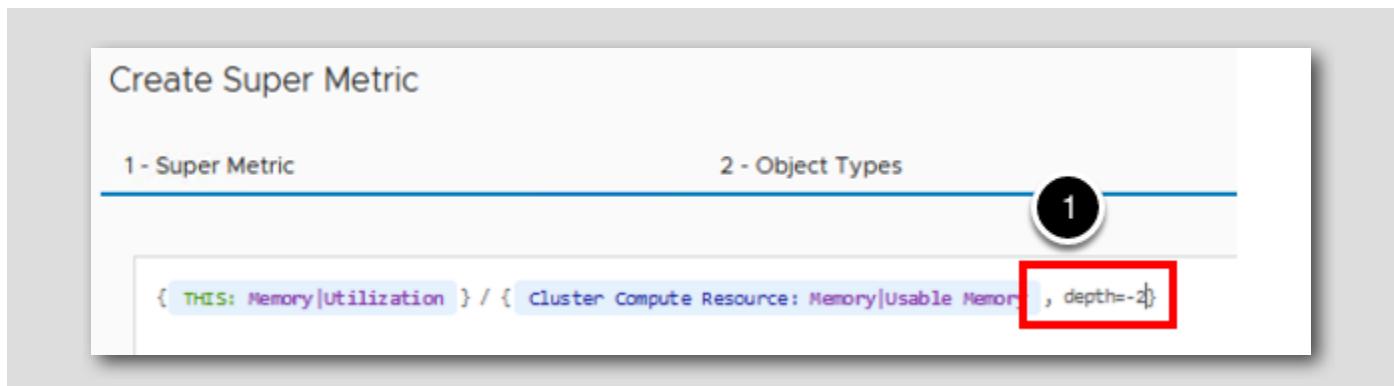
Be sure to select the correct metric here. There are a lot of similarly named that are returned by the filter.

1. On the formula line, type **usable** after Cluster Compute Resource.
2. Click **Memory|Usable Memory (KB)** in the **Metric** section to add it to the formula.

## Adjust the Formula Depth

[462]

Remembering what we learned earlier about the depth parameter and knowing that vSphere clusters are two levels above VMs in the hierarchy, we need to adjust the value. Remember for the depth parameter, a positive number means look down the hierarchy while a negative number means look up.

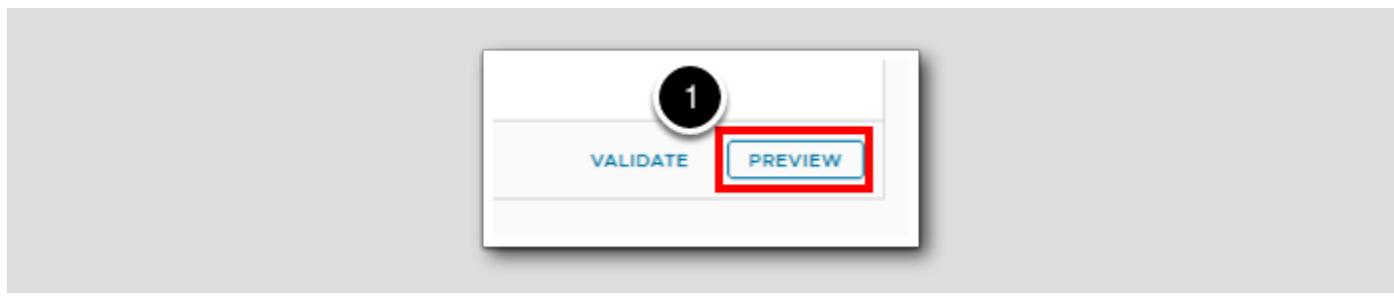


1. On the formula line, change the "1" and in its place, type -2

## Preview the Super Metric

[463]

OK. We're done, right? Let's preview the super metric by selecting a virtual machine in our inventory.



1. Click **Preview**

Uh Oh!

Create Super Metric

1 - Super Metric

```
{ THIS: Memory|Utilization } / { Cluster Compute Re:
```

Unformatted

(i) Cannot convert aggregated result to number.

Unit (Optional)

PREVIOUS NEXT CREATE CANCEL

A screenshot of a 'Create Super Metric' dialog box. The title bar says 'Create Super Metric' and the sub-header says '1 - Super Metric'. Below that is a code editor containing the expression '{ THIS: Memory|Utilization } / { Cluster Compute Re:'. Underneath the code editor is a toggle switch labeled 'Unformatted' which is turned on. Below the switch is a red error message box containing the text '(i) Cannot convert aggregated result to number.' At the bottom of the dialog are four buttons: 'PREVIOUS', 'NEXT', 'CREATE' (which is highlighted in blue), and 'CANCEL'.

Uh oh. We got an error - Cannot convert aggregated result to number. This is the issue that was discussed at the beginning of the lesson. Remember that while we know there can only be one cluster as an ascendant (2 levels up) from the VM, Aria Operations doesn't have any way of knowing that. As far as Aria Operations knows, there could be a set of cluster objects that are two levels above the VM.

So how do we handle this? We need to modify the formula using a looping function. If you recall from the beginning of the lesson, it was reiterated that looping functions (avg, combine, count, max, min and sum) work on more than one input value and can return either a single value or set of values depending on the formula syntax. What does that mean in this context? It means we can use many of those looping functions to convert the results of the cluster portion of the formula to a single value. Essentially we can tell Aria Operations to take the avg or min or max or sum of the values from all clusters above the VM and return a single number representing the calculation. What is the average or minimum or maximum or sum of a single number? It's that number.

In this case, we will use the max function (to find the maximum value from a set of one).

## Revise the Formula

Create Super Metric

1 - Super Metric      2 - Object Types

1      2

```
{ THIS: Memory|Utilization } , max({ Cluster Compute Resource: Memory|Usable Memory , depth=2 })
```

Unformatted

Unit (Optional)

PREVIOUS    NEXT    CREATE    CANCEL

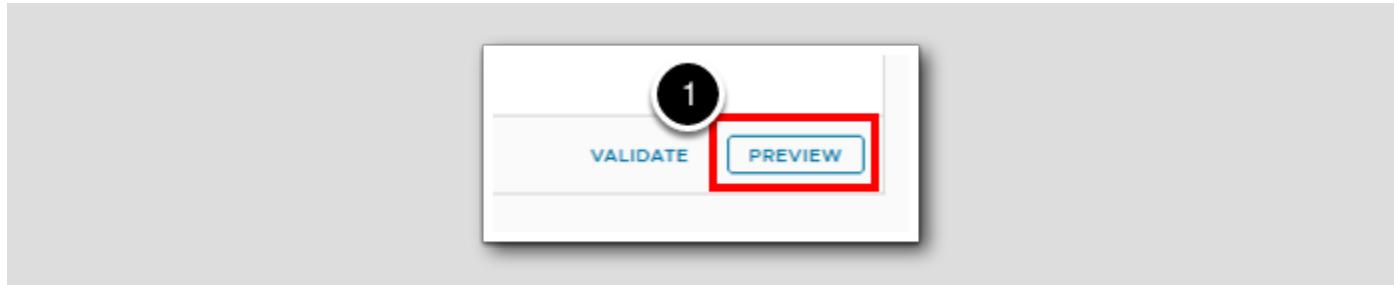
The screenshot shows a 'Create Super Metric' dialog box. At the top, there are two tabs: '1 - Super Metric' and '2 - Object Types'. Below the tabs, the formula is displayed as a code snippet: '{ THIS: Memory|Utilization } , max({ Cluster Compute Resource: Memory|Usable Memory , depth=2 })'. Two red boxes are overlaid on the screen, one around the 'THIS' object and another around the 'Cluster Compute Resource' object. At the bottom of the dialog, there are buttons for 'PREVIOUS', 'NEXT', 'CREATE', and 'CANCEL'.

1. Place your cursor just before "{Cluster..." in the formula and type **max(** (don't click max in the list of suggestions or it will add both parenthesis there)
2. Press the **End** key on your keyboard to move to the end of the line and type a closing parentheses )

For reference, there is the completed formula so far: `{This Resource: Memory|Utilization} / max({Cluster Compute Resource: Memory|Usable Memory, depth=-2})`

Click Preview again

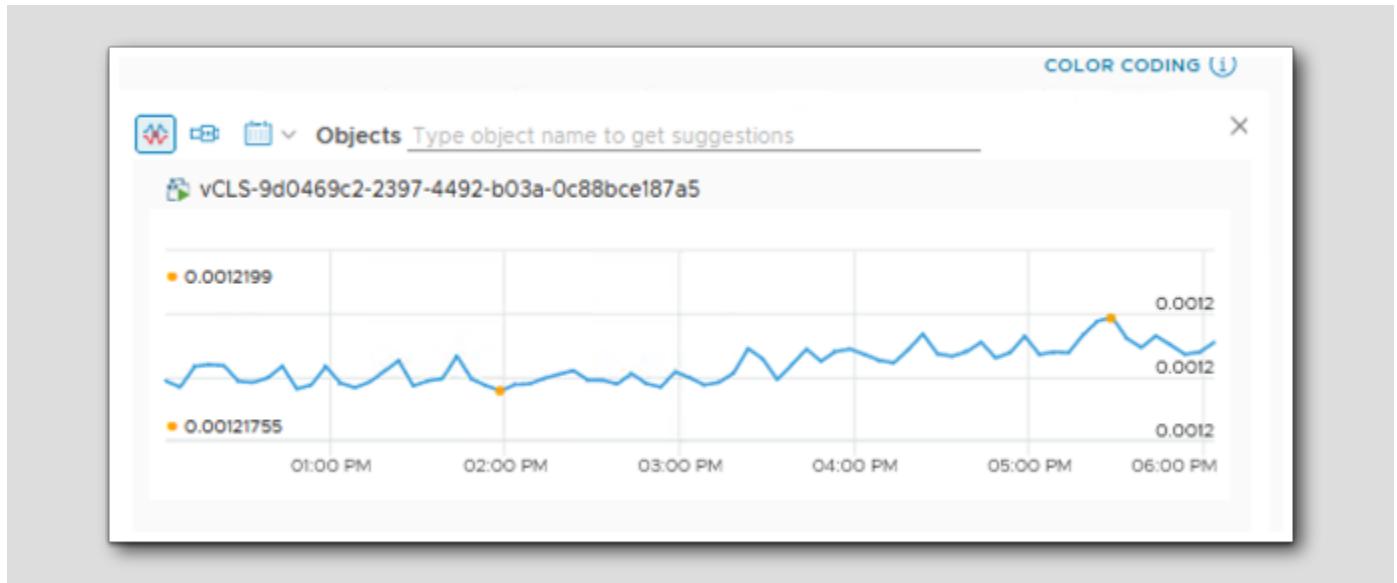
[466]



1. Click **PREVIEW**.

Hey it worked this time!

[467]

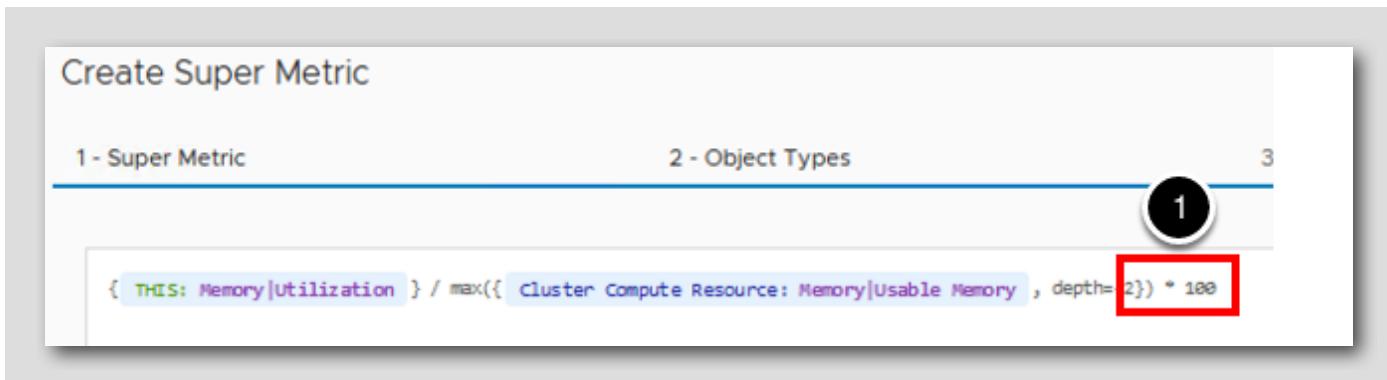


You should not get an error this time and get a populated chart.

## Convert the Ratio to a Percentage

[468]

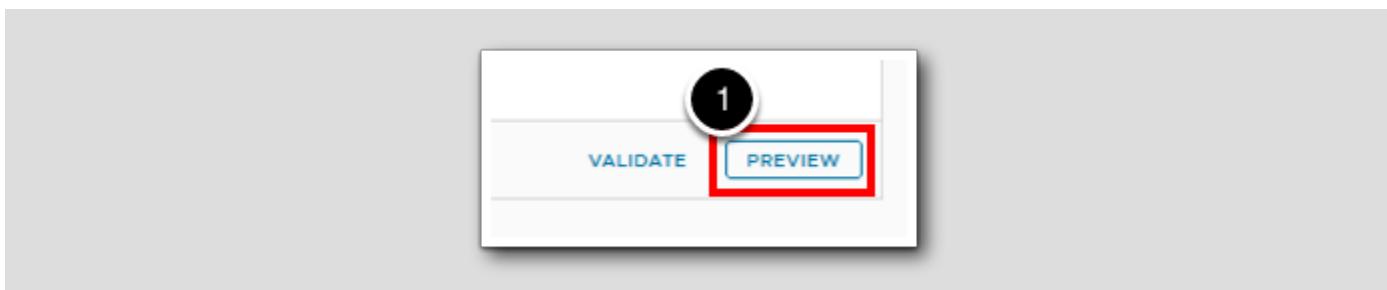
The formula is returning the ratio of vm memory utilization to cluster memory capacity. But the assignment was to calculate the value as a percentage.



1. At the end of the formula type space then \* then space then 100

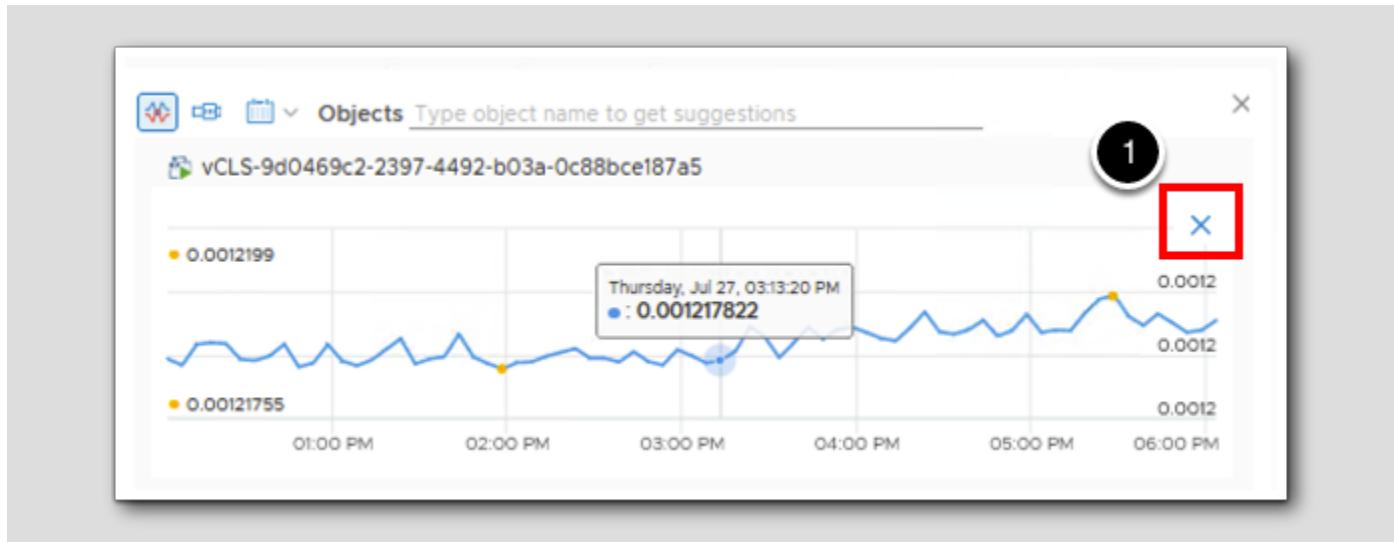
## Preview one more time

[469]



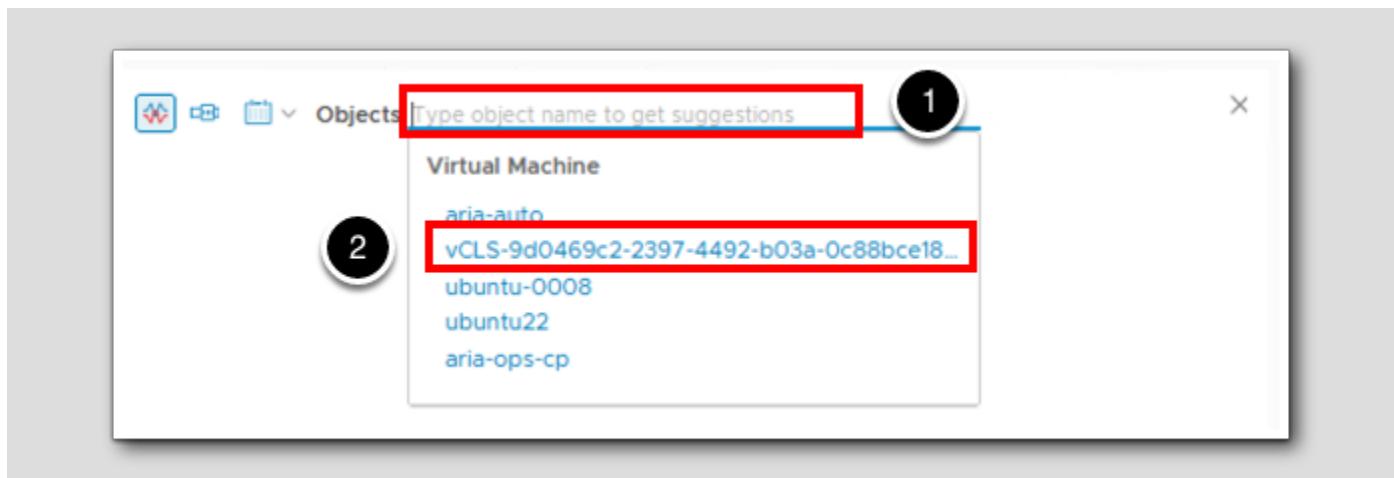
1. Click PREVIEW.

Remove and re-add the chart



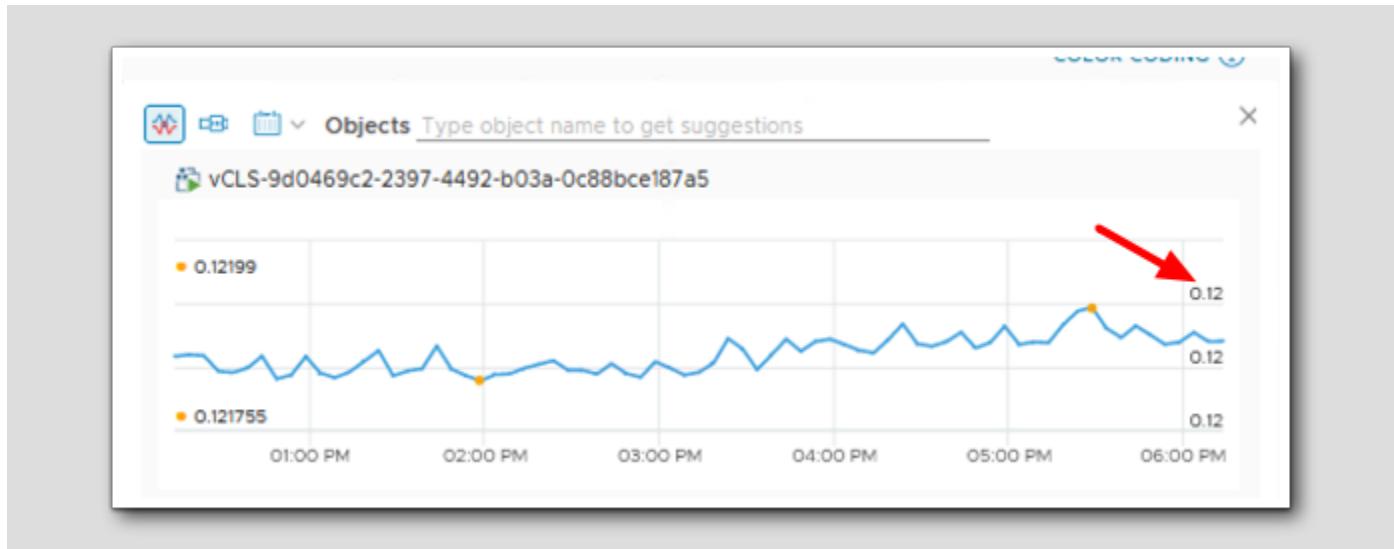
1. Hover your mouse over the chart until the Blue X appears, click the blue X.

Add the object back in



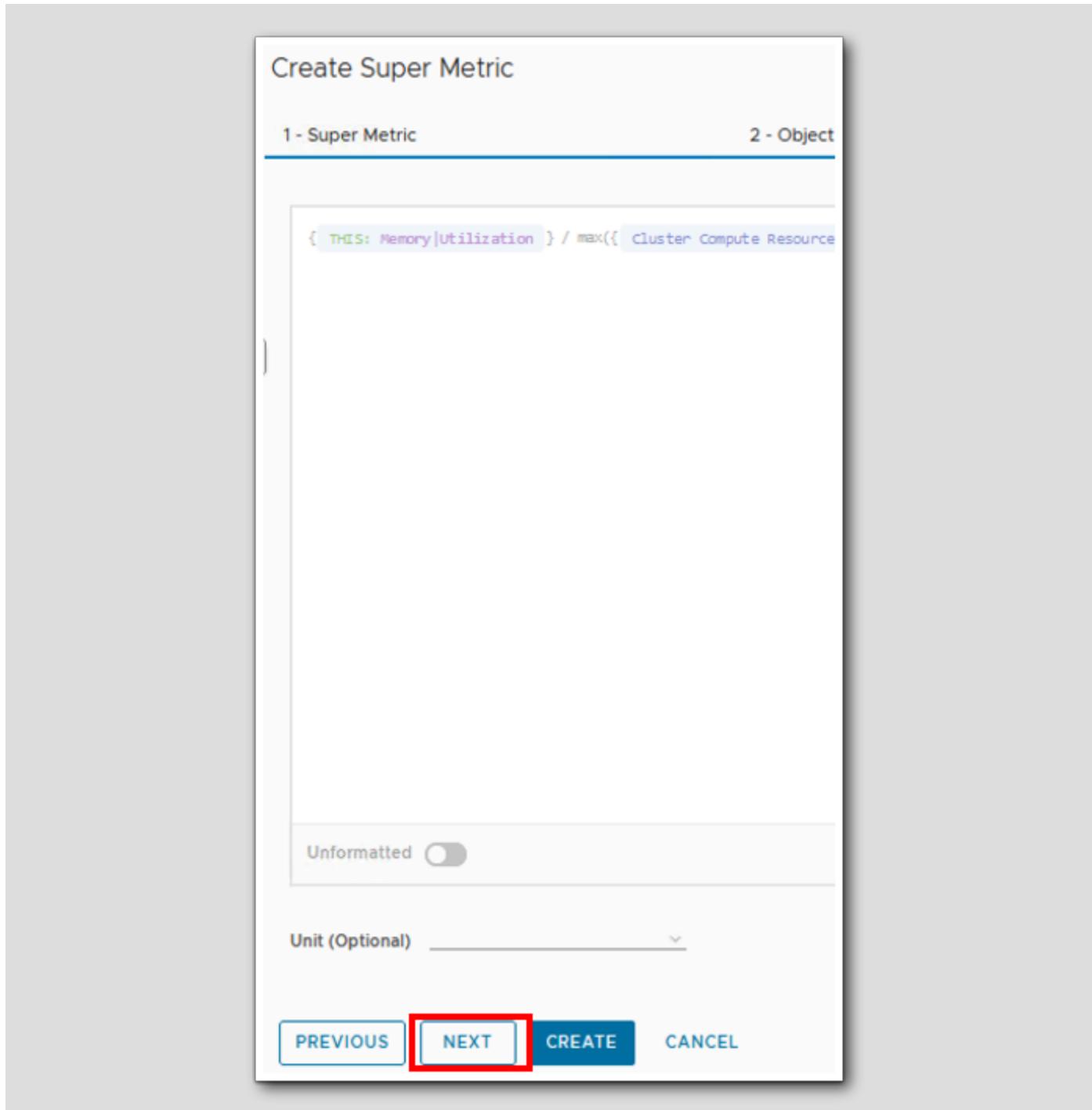
1. Click in the Objects line.
2. Select the vCLS-... virtual machine.

The Chart now shows %



Notice the Y axis values have changed to the desired scale.

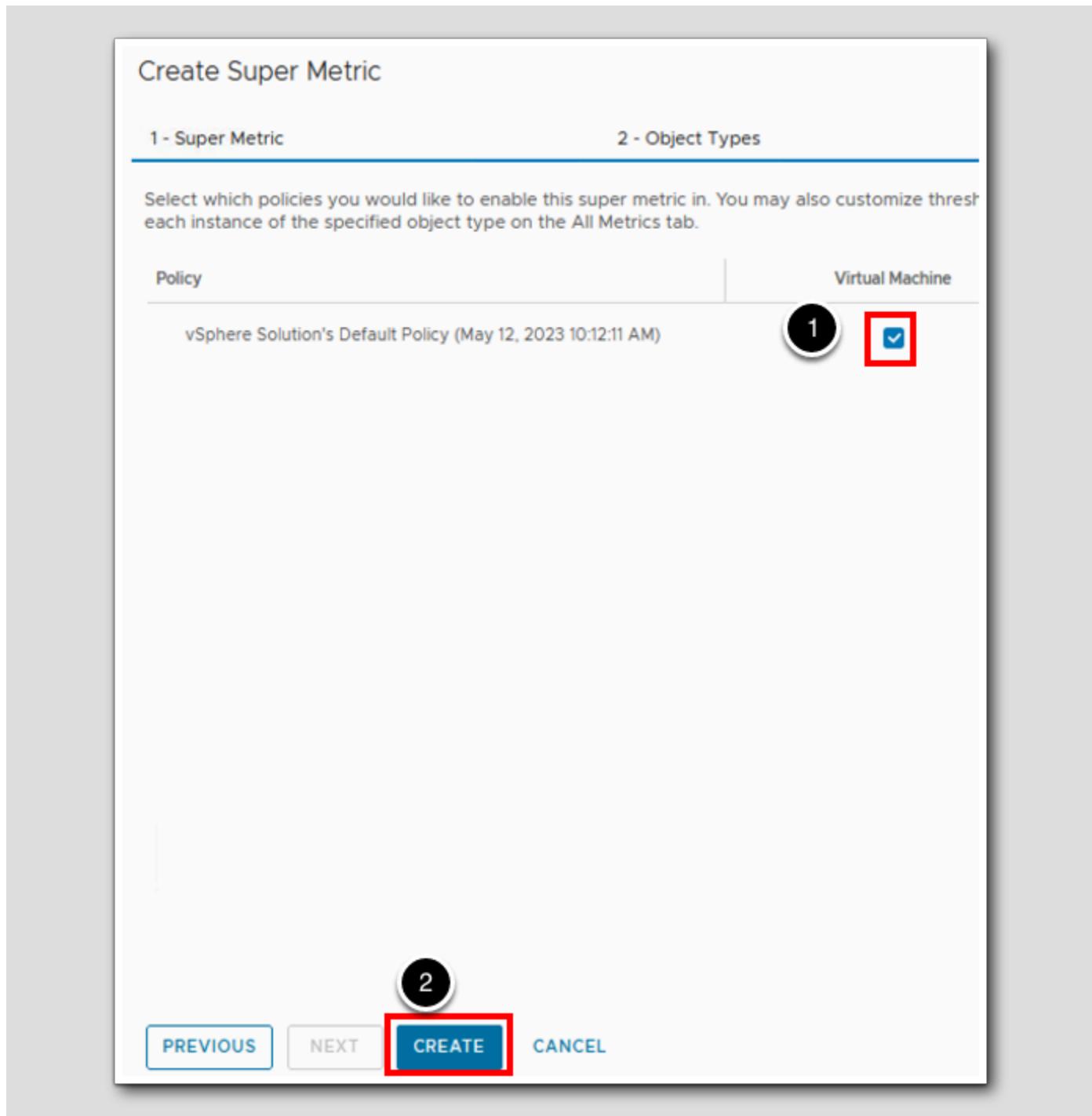
## On to the Policy



1. Click NEXT.

## Select the Policy and Finish

Just like in the previous lessons, we need to enable the super metric in one or more policies if we want it to actually be calculated and then we can finish the process.



1. Check the box to enable the metric on Virtual Machine object types in the vSphere Solution's policy
2. Click the CREATE.

## Lesson End

In this lesson we learned how to handle sets of data points in a Super Metric formula and how to navigate the error Cannot convert aggregated result to number using the MAX function.

## Using String Operators and the "Where" Clause in a Super Metric Formula

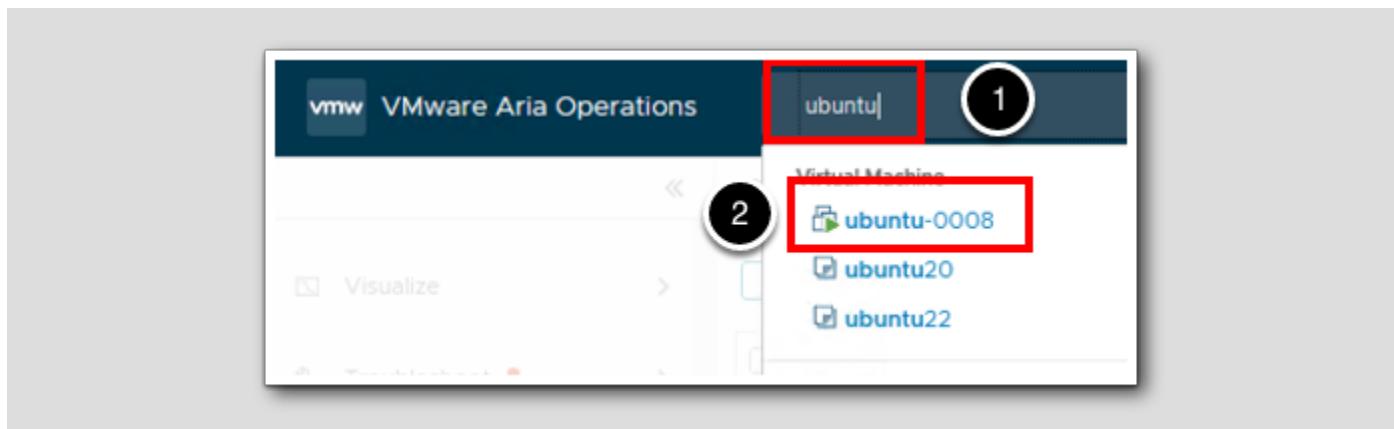
Super metrics can also include some logic in the formula. In this lesson we will look at using the "where" clause and a string operator to evaluate a VM property (the guest OS).

The task this time is to determine the total number of VMs in our datacenter that are running some variant of the ubuntu operating system.

The following string operators are available for use in a super metric formula. Note that string operators are valid only when used in a "where" clause to evaluate whether or not the specified text does or does not exist in the string.

### Examine the Guest OS Full Name Property

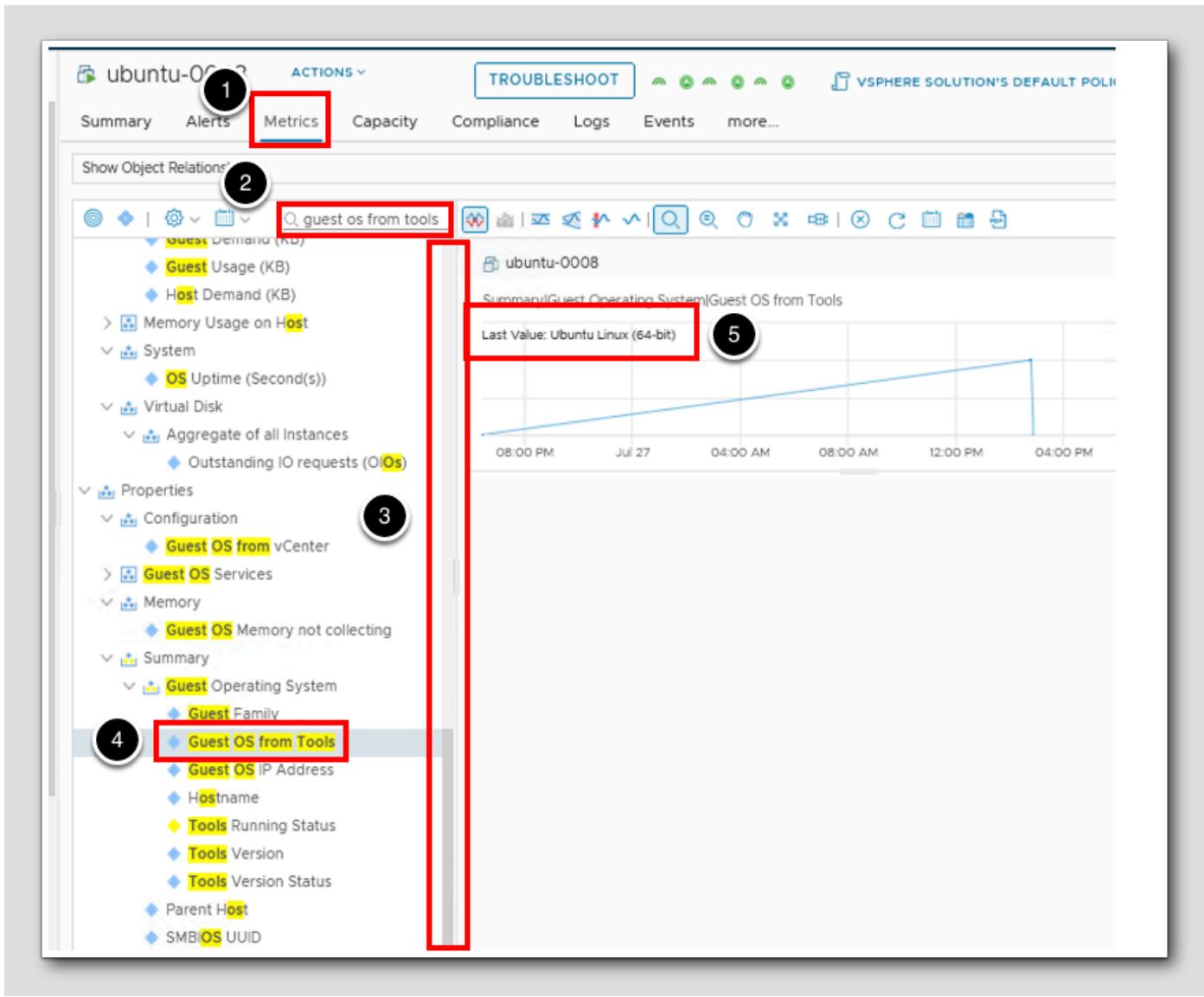
Let's first take a look at the VM property we are going to use in this super metric formula.



1. In the search box, type **ubuntu**.
2. Click to select the **ubuntu-0008** Virtual Machine.

### Select the OS Name Property

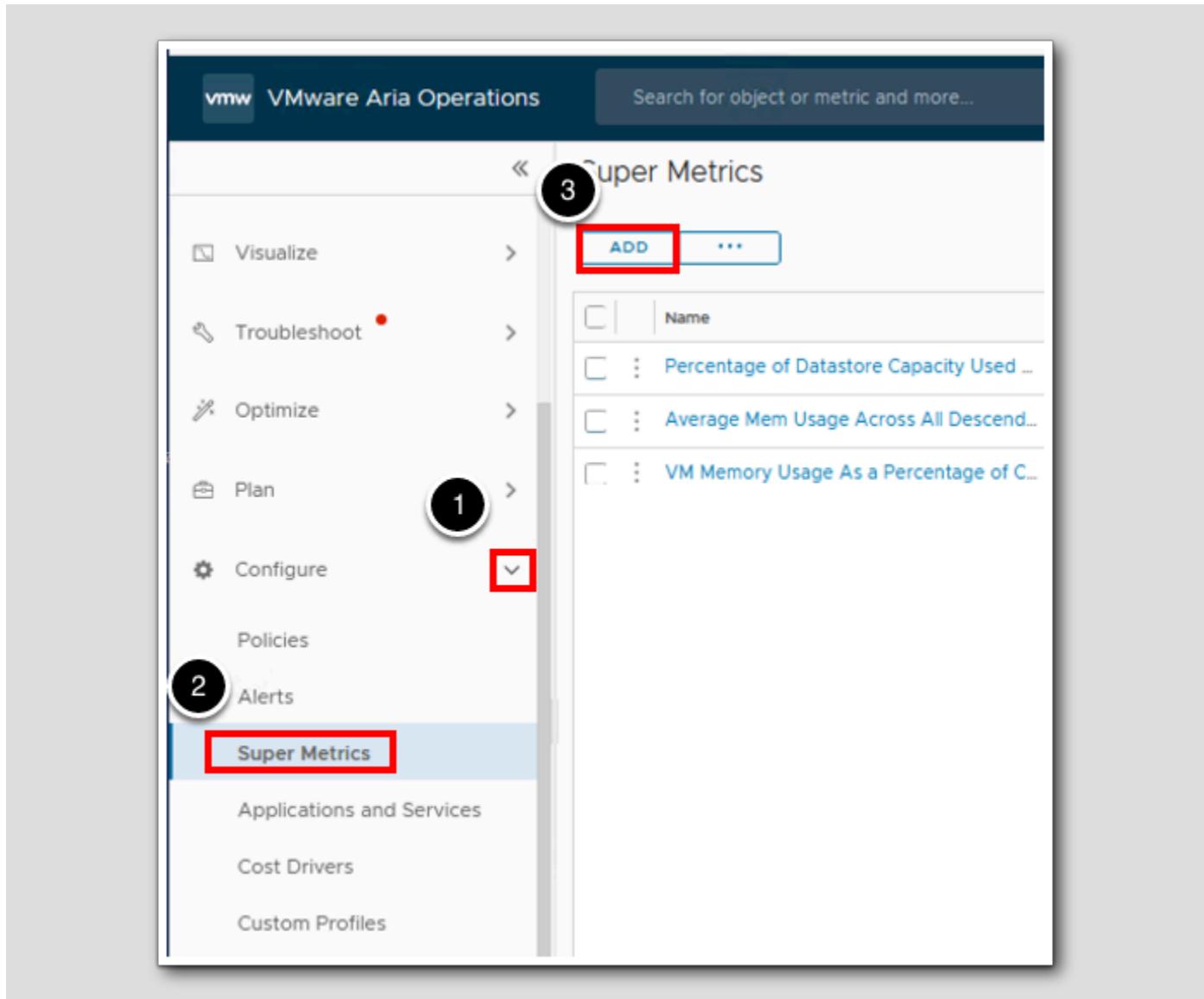
The guest operating system name is contained in the Guest OS Full Name property for a vm that is running VMtools.



1. Click the **Metrics** tab.
2. In the filter box, type **guest os from tools** and press the **Enter** key.
3. Scroll down to the **Property** section
4. Double-click the property **Guest OS from Tools**.
5. Note the OS name of this VM.

We will create a super metric that counts all of the VMs with the text "ubuntu" in that property field and then we can apply the super metric to our datacenter object type.

## Create the Super Metric



1. Expand the Configuration section.
2. Click Super Metrics.
3. Click ADD to create a new super metric.

## Name the Super Metric

### Create Super Metric

1 - Super Metric      2 - Object Types

Name: **Count of Ubuntu VMs**

Description (Optional): Counts the number of VMs that are running Ubuntu as an operating system in the attached datacenter, cluster or host.

es

3

PREVIOUS    **NEXT**    CREATE    CANCEL

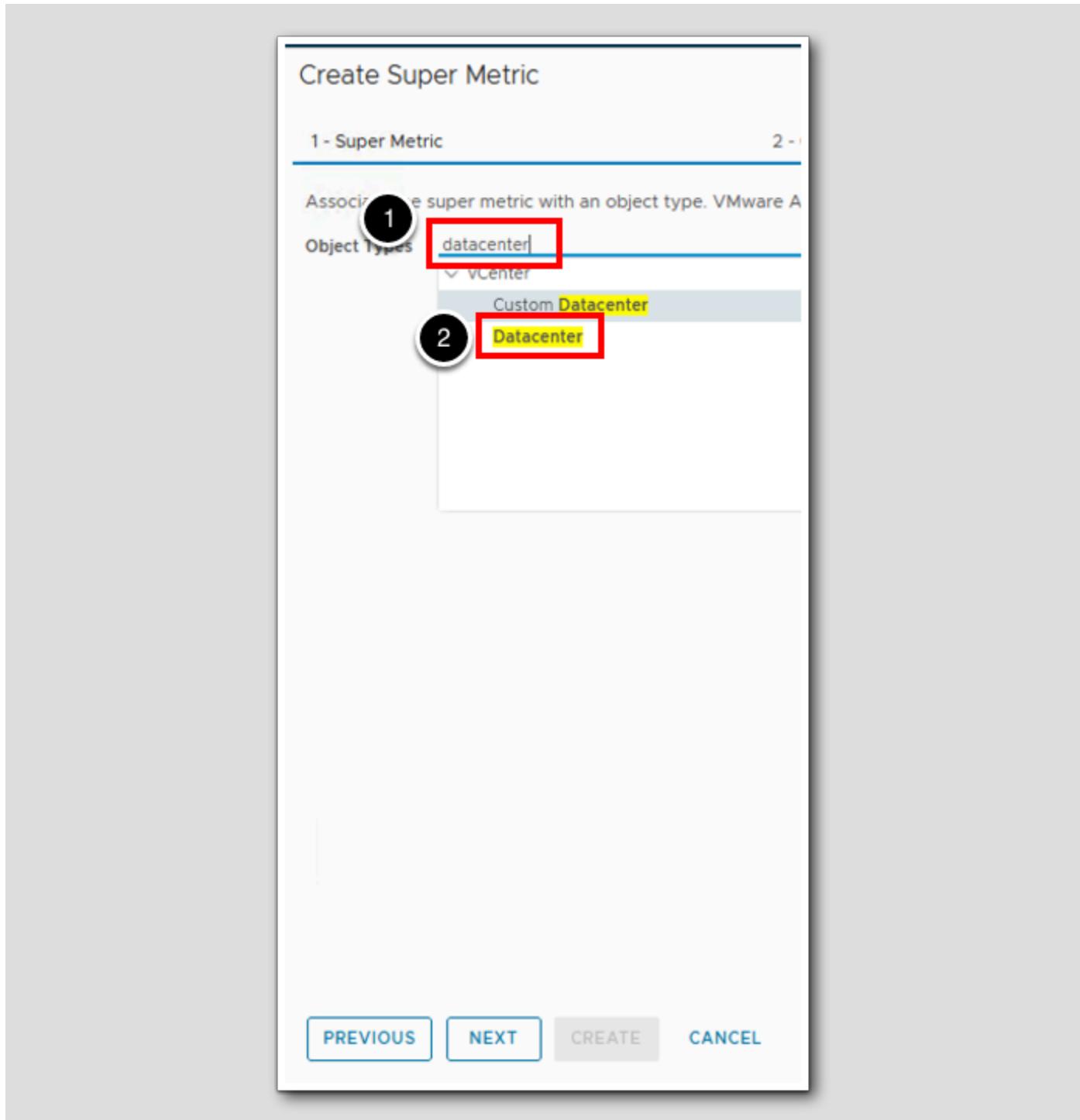
The screenshot shows the 'Create Super Metric' wizard. Step 1 is titled '1 - Super Metric'. It has two main input fields: 'Name' and 'Description (Optional)'. The 'Name' field contains 'Count of Ubuntu VMs' and the 'Description' field contains a placeholder text about counting Ubuntu VMs in attached datacenters, clusters, or hosts. Both fields are highlighted with red boxes. Step 2, '2 - Object Types', is partially visible on the right. At the bottom, there are navigation buttons: 'PREVIOUS', 'NEXT' (which is highlighted with a red box), 'CREATE', and 'CANCEL'. There is also a small 'es' label on the left side of the form area.

1. Type the name: Count of Ubuntu VMs.

2. Type a description.

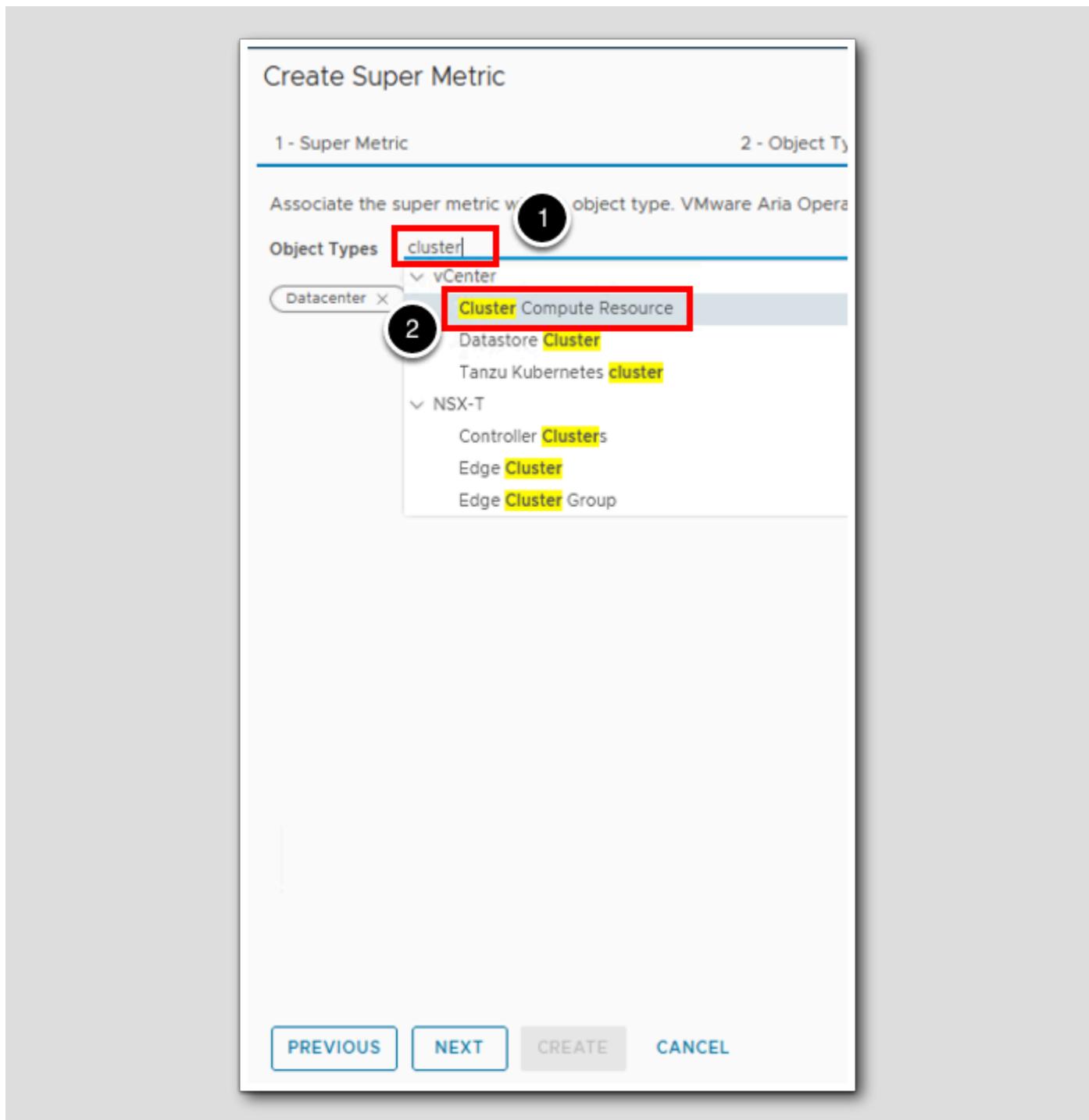
3. Click **NEXT**.

## Object Types



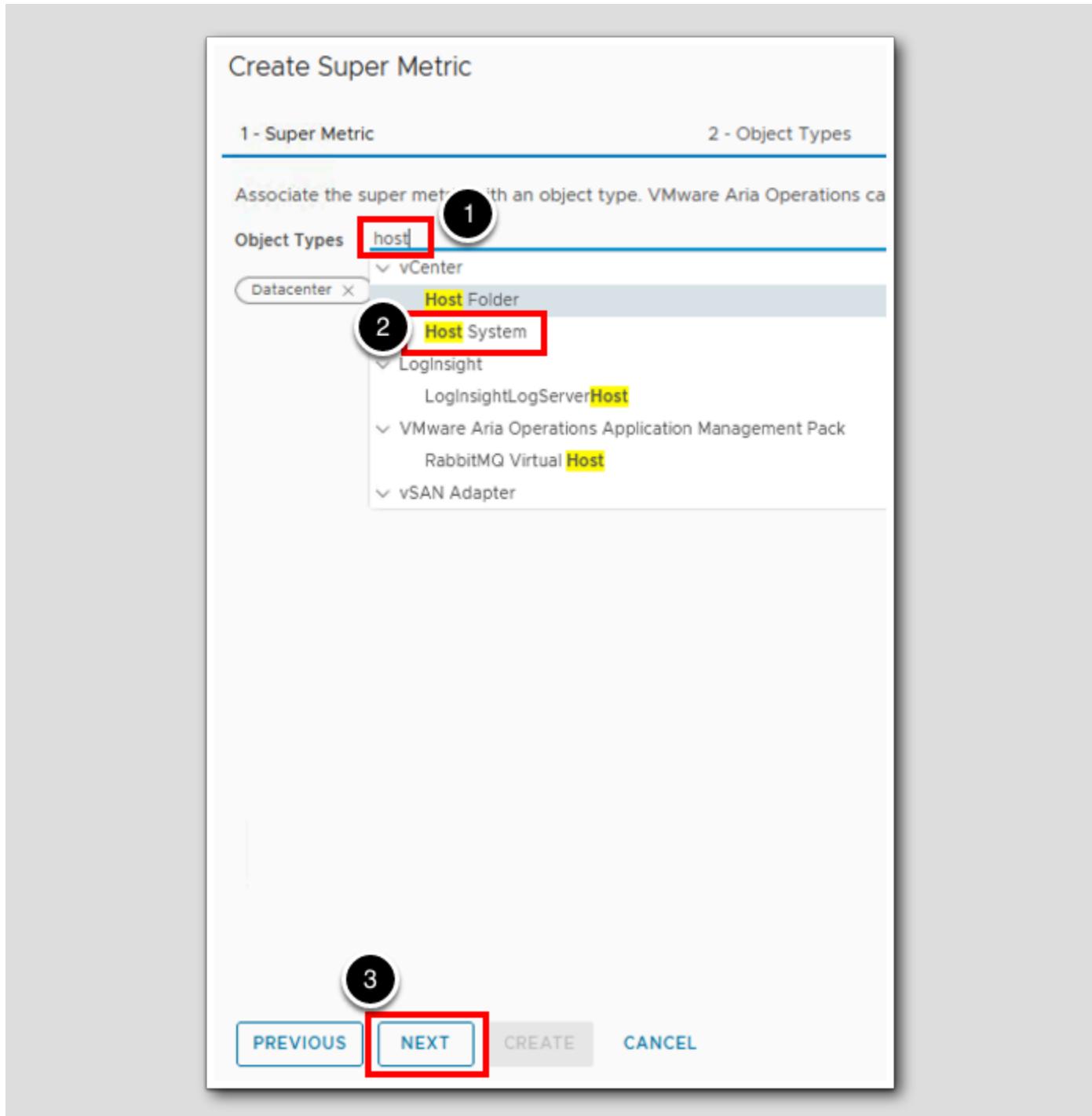
1. In the **Object Types** field type **datacenter**.
2. Single click on **Datacenter**.

## Add Cluster as a type



1. In the **Object Types** field type **cluster**.
2. Single click on **Cluster Compute Resource**.

Now add Host System

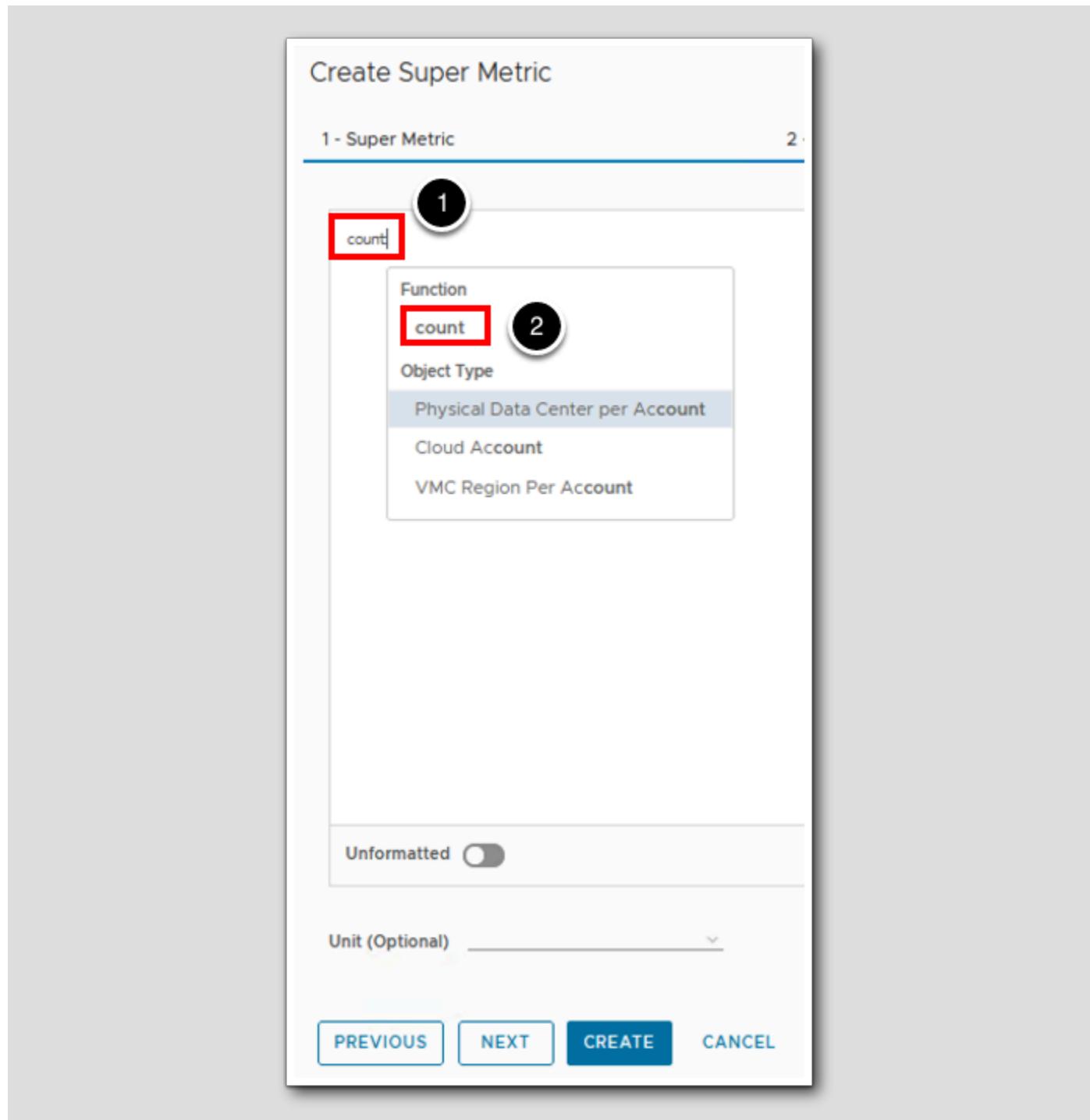


1. In the **Object Types** field type host.
2. Single click on Host System.
3. Click **NEXT**.

## Start the Formula

[484]

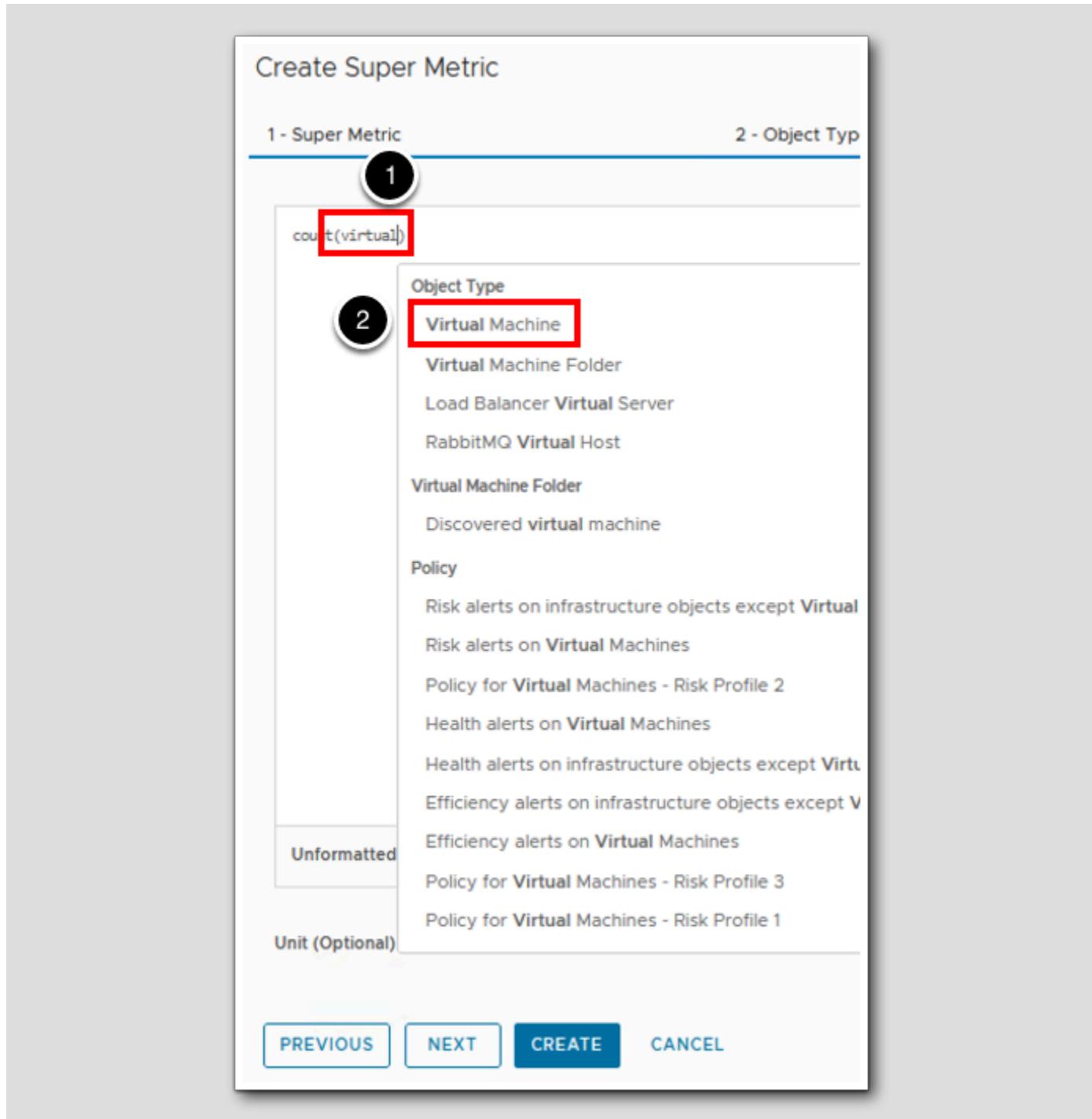
Remember that we want to count the number of VMs running the CentOS operating system so we will use the **count** looping function.



1. Type count to see a list of matching options.

2. Click the count function.

## Select the Virtual Machine Object Type



At the cursor position (between the parenthesis):

1. Type **virtual**.
2. From the match list, click the **Virtual Machine** object type to select it.

## Select the Guest OS From Tools Property

Create Super Metric

1 - Super Metric      2 - Object Types

1      2

count( virtual Machine guest os from )

Property

Configuration|Guest OS from vCenter

Summary|Guest Operating System|Guest OS from Tools

Metric Type

- Cost|Allocation|Daily CPU Cost (US\$)
- Cost|Allocation|Daily Memory Cost (US\$)
- Cost|Allocation|Daily Disk Space Cost (US\$)
- Cost|Allocation|Monthly Projected Total Cost (US\$/Month)
- Cost|Allocation|MTD Total Cost (US\$)
- Cost|Daily Tags and Custom Properties Cost|Monthly Projected Total Cost (US\$/Month)
- Cost|Daily Additional Cost (US\$)
- Cost|Demand Based Daily CPU Cost (US\$)
- Cost|Demand Based Daily Memory Cost (US\$)
- Cost|Demand Based Daily Storage Cost (US\$)
- Cost|Effective Daily Cost (US\$)
- Cost|Effective Daily CPU Cost (US\$)
- Cost|Effective Daily Memory Cost (US\$)
- Cost|Effective Daily Storage Cost (US\$)
- Cost|Monthly Effective Projected Total Cost (US\$/Month)
- Cost|Effective MTD Cost (US\$)

Unformatted

Unit (Optional) \_\_\_\_\_

PREVIOUS    NEXT    CREATE    CANCEL

The screenshot shows the 'Create Super Metric' interface. On the left, there's a code editor-like area with a metric definition: 'count( virtual Machine guest os from )'. A red box highlights the 'guest os from' part. On the right, the 'Object Types' tab is active, showing a list of properties. A second red box highlights the 'Summary|Guest Operating System|Guest OS from Tools' item in this list. Below this, the 'Metric Type' section lists various cost-related metrics. At the bottom, there are buttons for 'PREVIOUS', 'NEXT', 'CREATE', and 'CANCEL', with a cursor hovering over the 'NEXT' button.

At the cursor position:

1. Type `guest os` from.
2. From the match list, click the `Summary|Guest Operating System|Guest OS` from Tools property.

## Adjust the Depth Parameter

[487]

Remember that we are going to want to apply this metric at the vSphere Datacenter object level. Going back to our discussion earlier about depth, we will need to set the depth to Datacenter --> Cluster --> Host --> VM or three levels down. Traversing down the hierarchy means a positive depth parameter so:

## Create Super Metric

1 - Super Metric      2 - Object Types

1

```
count({ Virtual Machine: Summary|Guest Operating System|Guest OS from Tools , depth=3})|
```

Unformatted

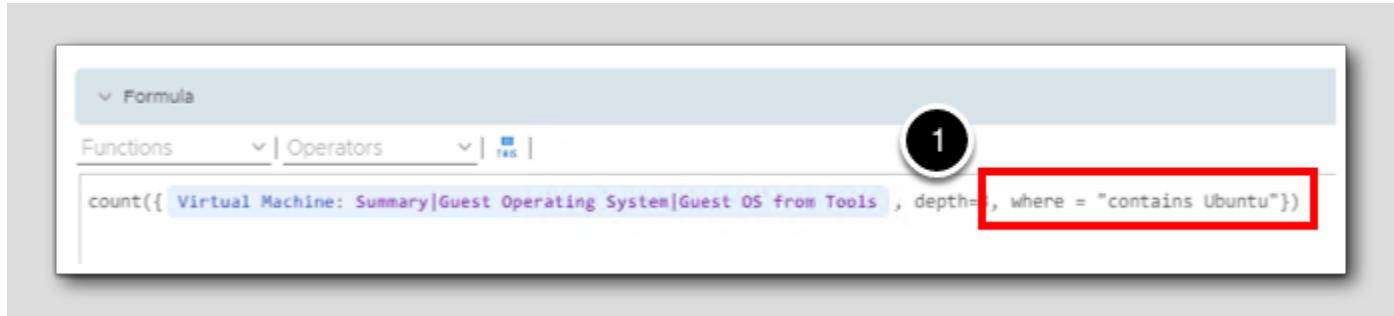
Unit (Optional)

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

The screenshot shows a 'Create Super Metric' dialog box. The '1 - Super Metric' tab is active. In the main area, there is a text input field containing the expression: 'count({ Virtual Machine: Summary|Guest Operating System|Guest OS from Tools , depth=3})|'. A red box highlights the 'depth=3' part of the expression. Below the input field, there is an 'Unformatted' checkbox which is checked. At the bottom, there are buttons for 'PREVIOUS', 'NEXT', 'CREATE', and 'CANCEL'.

1. Delete the 1 for depth and then type 3 in its place.

## Add the Where Clause



At the cursor position (just to the right of the 3 you typed), type the following. Note the leading comma, the quotation marks and the exact case. The syntax may not seem intuitive but that is the way it needs to be written. It might be easiest to just highlight the text below and drag it to the HOL console.

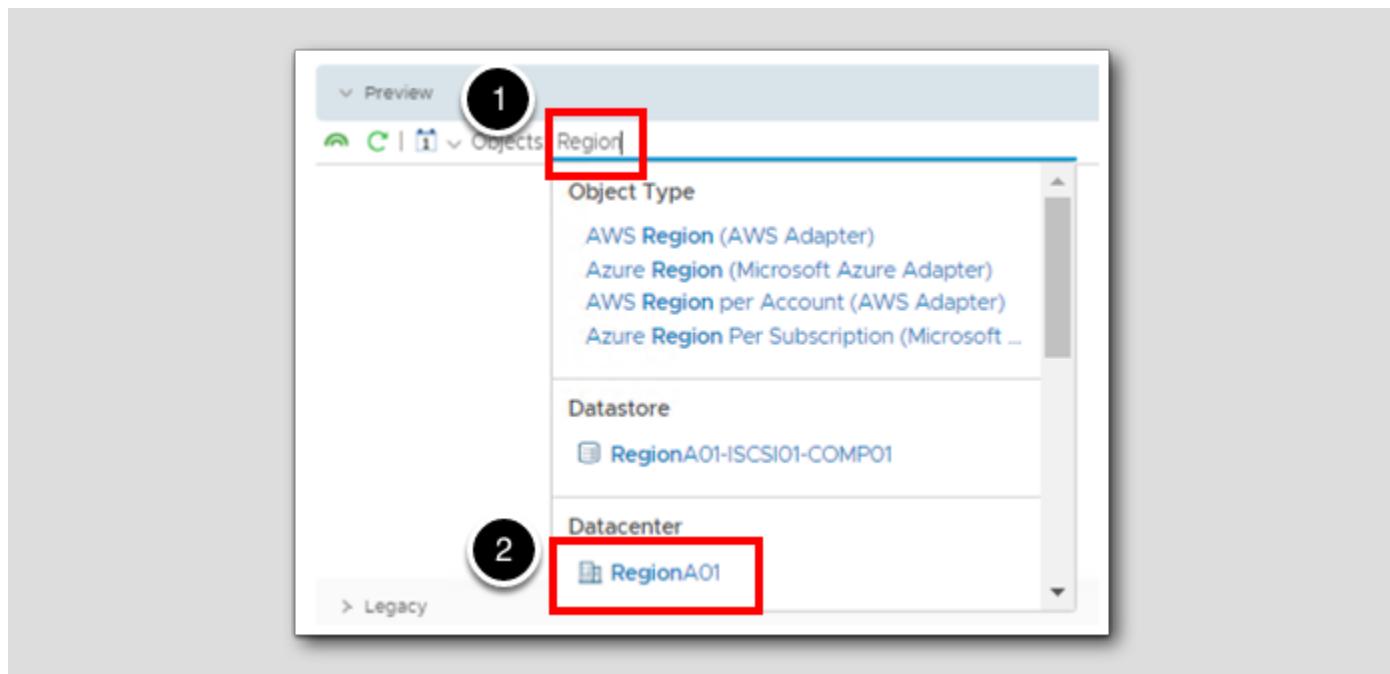
1. After depth=3 type , where = "contains Ubuntu"

## Let's Preview it



1. Click PREVIEW.

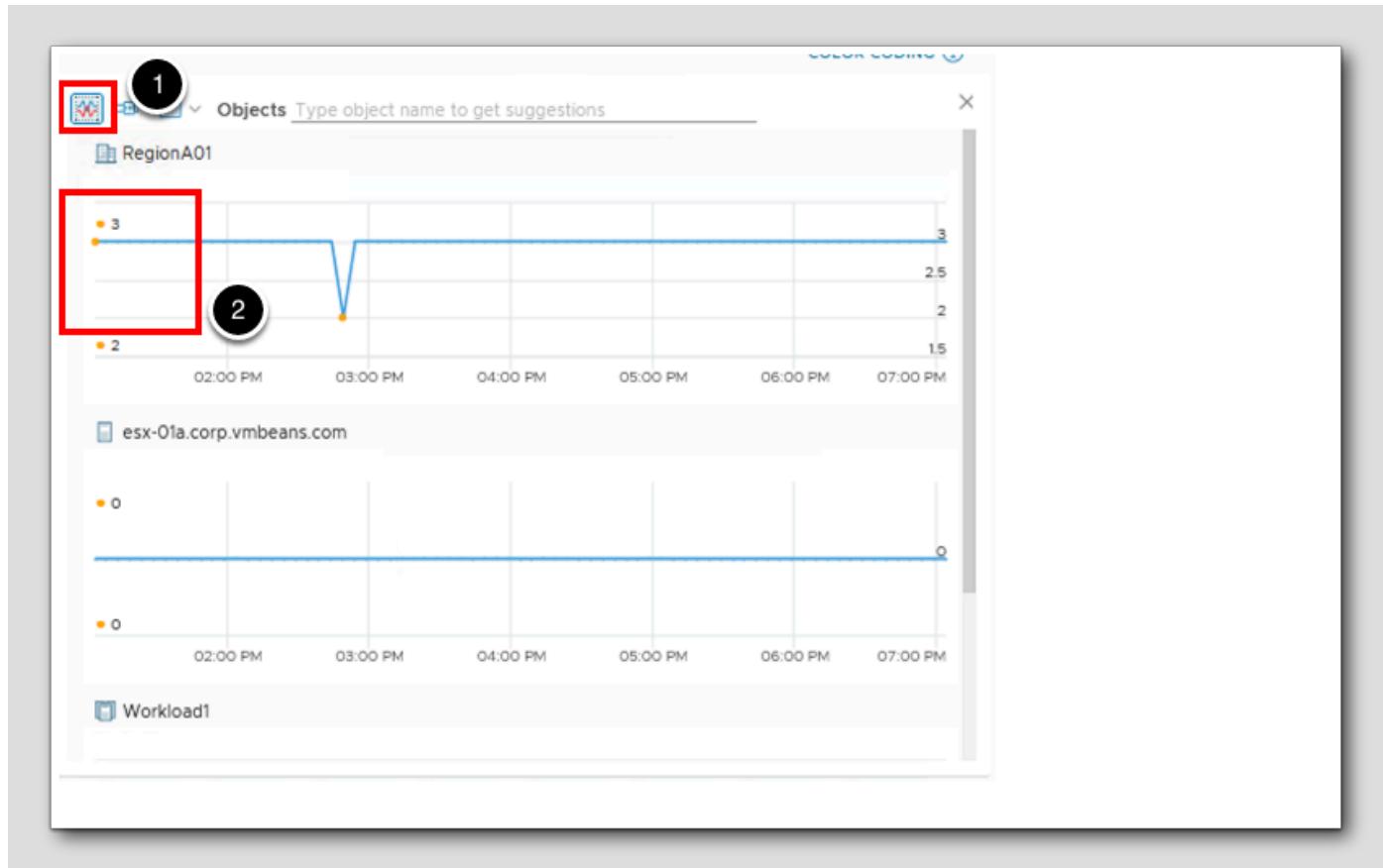
## Select the Regional Datacenter Preview Source



Let's see how this super metric works for our vSphere datacenter.

1. In the Preview Objects filter, type Region.
2. Click to select the RegionA01 datacenter object.

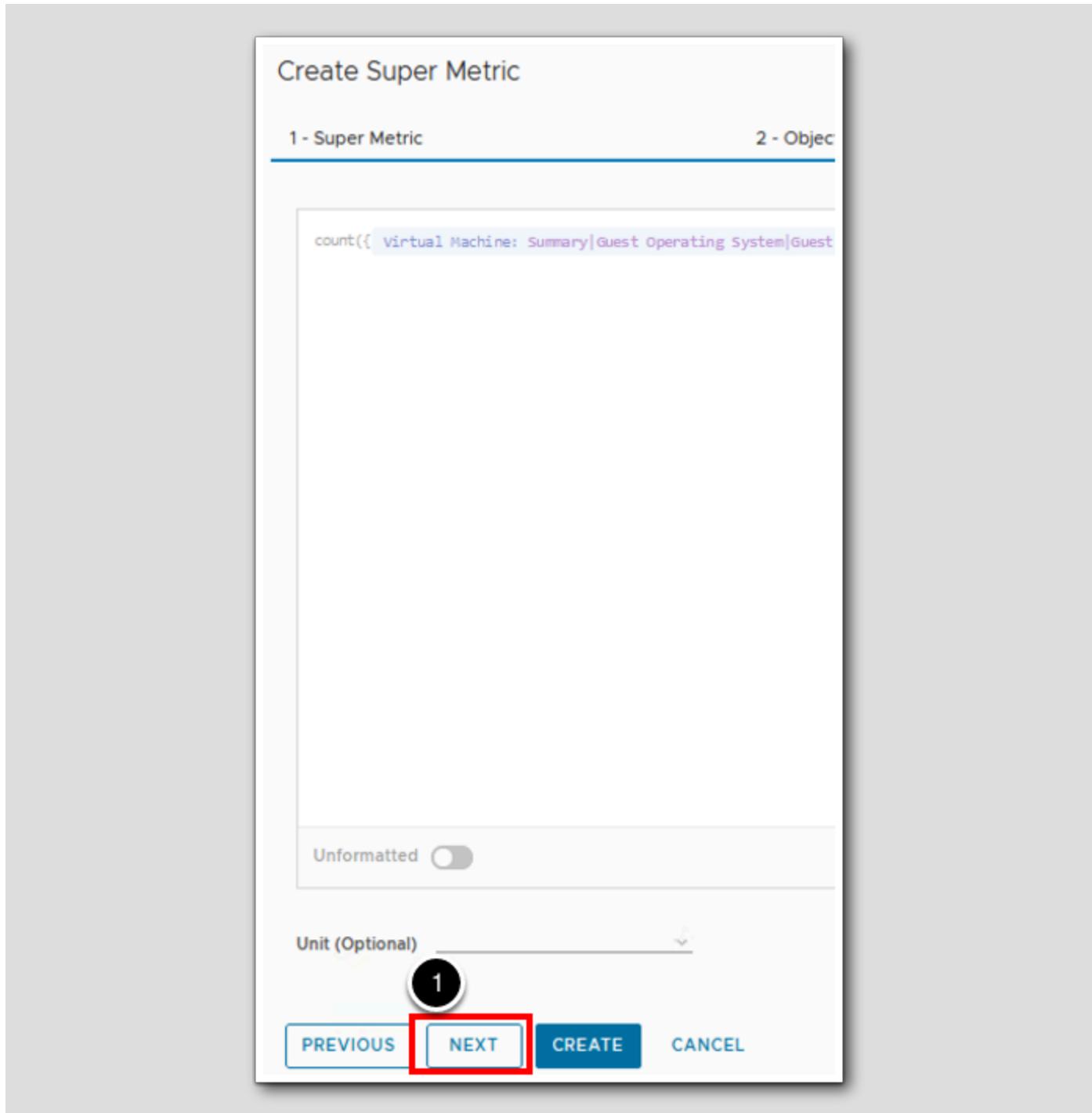
## View The Super Metric Preview



1. If the Split Charts button is not active, click on the Split Charts button.
2. Notice that RegionA01 shows 3 Ubuntu VMs.

Note that you can also assign the super metric to Host System and Cluster Compute Resource object types with good results since this formula will look down 1, 2 and 3 levels to find Virtual Machine object types and check the operating system property for Ubuntu.

## On to Policy



1. Click NEXT.

## Assign Policies for Object Types

Create Super Metric

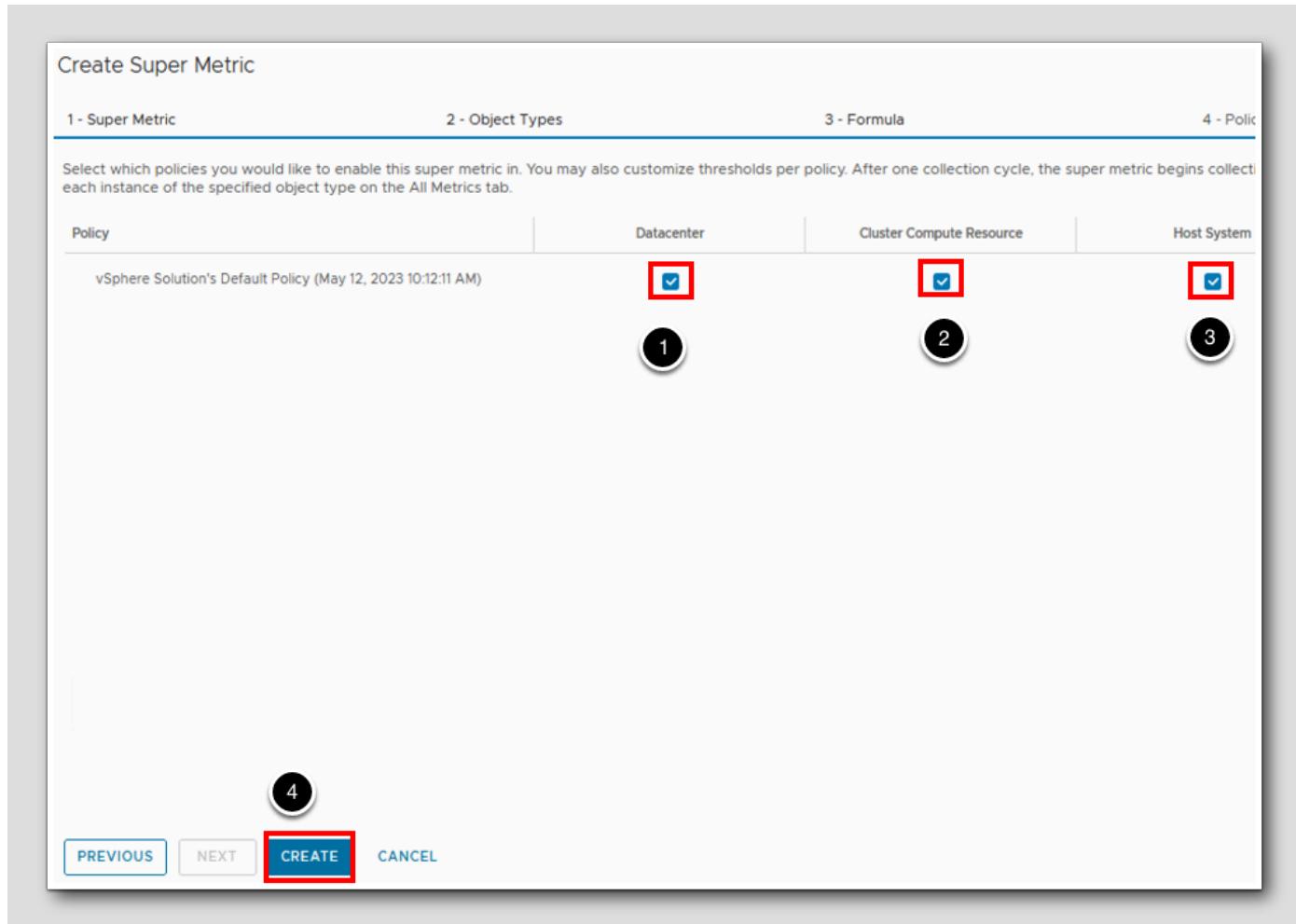
1 - Super Metric      2 - Object Types      3 - Formula      4 - Policies

Select which policies you would like to enable this super metric in. You may also customize thresholds per policy. After one collection cycle, the super metric begins collecting each instance of the specified object type on the All Metrics tab.

Policy	Datacenter	Cluster Compute Resource	Host System
vSphere Solution's Default Policy (May 12, 2023 10:12:11 AM)	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 3

4

PREVIOUS    NEXT    **CREATE**    CANCEL



1. Check the Policy box for Datacenter.
2. Check the Policy box for Cluster Compute Resource.
3. Check the Policy box for Host System.
4. Click CREATE.

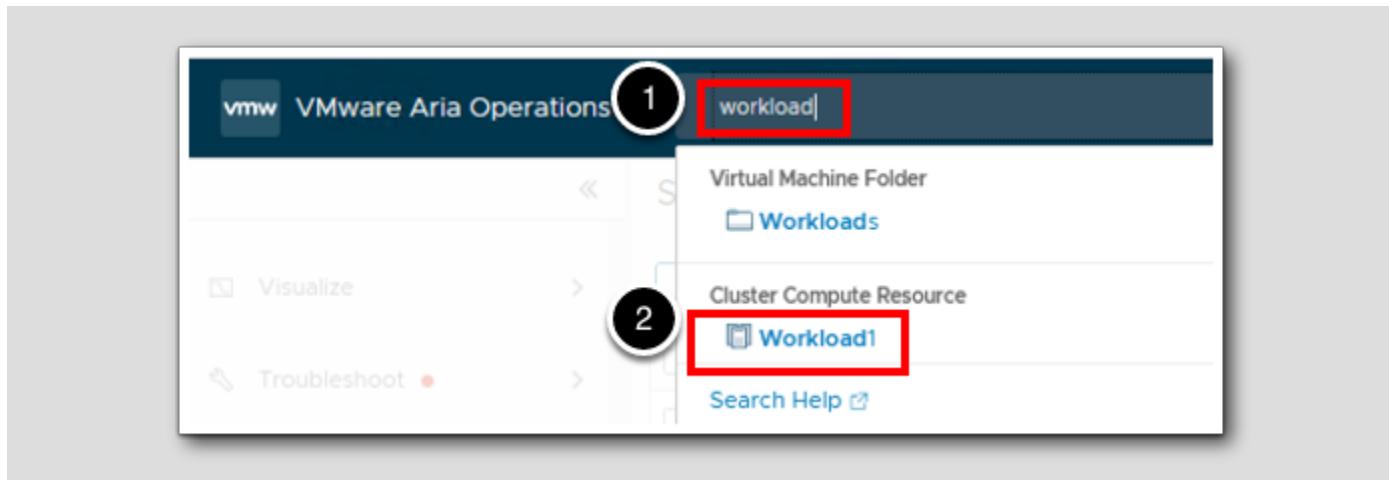
## Lesson End

In this lesson we created a Super Metric that used a Where clause to count Ubuntu systems across different Object Types.

## Verifying Super Metric Calculation

We just created several super metrics. Let's check to make sure they are being calculated on the appropriate objects in our environment.

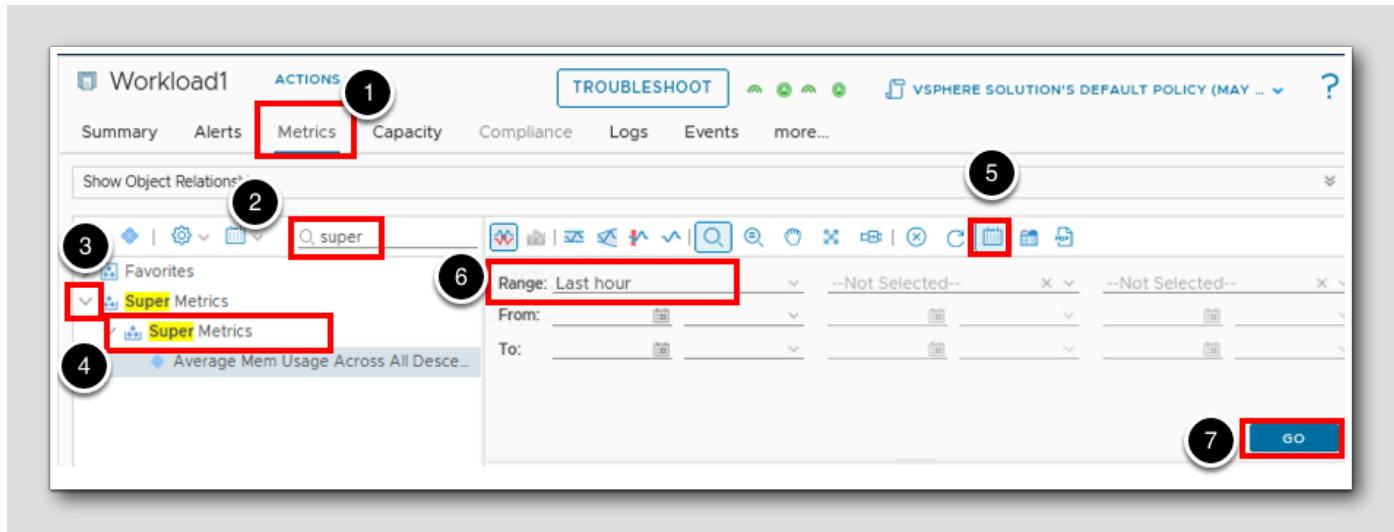
### Search for a Cluster



Let's first take a look at the Workload 1 vSphere cluster's metrics.

1. In the search box, type **workload**.
2. Click to select the **Workload 1** vSphere cluster.

## View the Workload 1 Super Metric

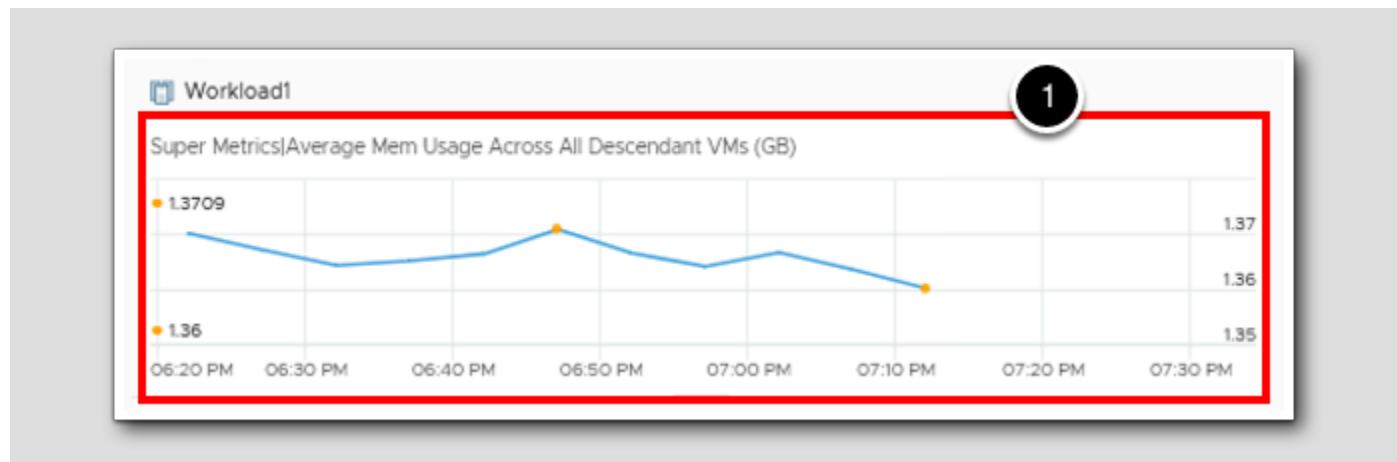


To see the calculated value of the cluster super metric:

1. Click the **Metrics** tab.
2. In the search box, enter **Super** and hit Enter.
3. Note that there is a metric category **Super Metrics**. This will only exist when there are one or more super metrics calculated for the object. Click to expand it.
4. Double-click **Average Mem Usage Across All Descendant VMs (GB)**.
5. Since the metric is new, let's change the time scale. Click the **calendar** icon.
6. Click **Last Hour** to change the time scale.
7. Click **GO**.

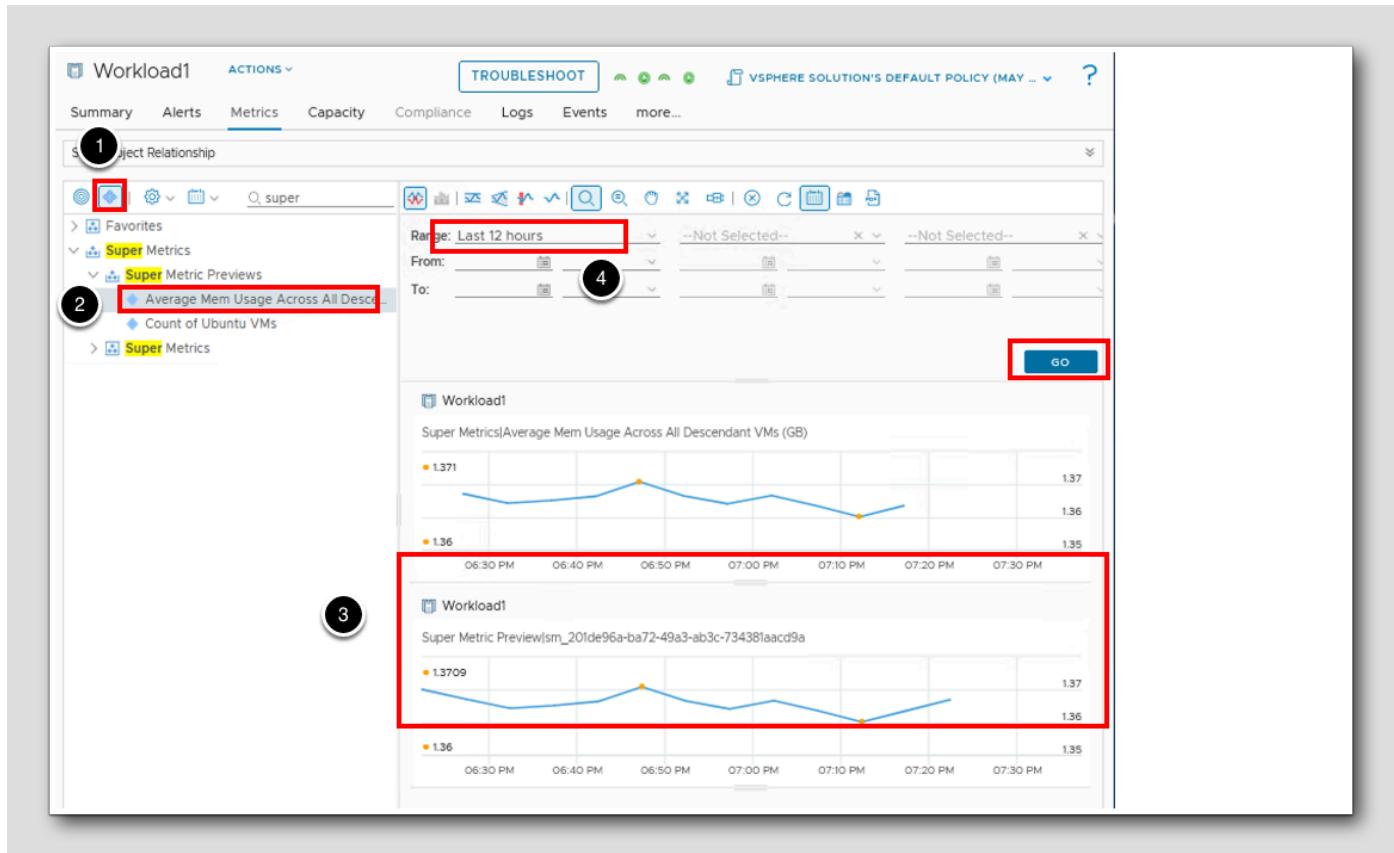
## Super Metric Graph

It is important to understand that super metric values will only be stored in the database from the time you create the metric and enable it in the appropriate policy.



1. Note that in this case the super metric has been calculated and stored in the database for several minutes. In your lab environment, the value and number of metric points will vary.

## Visualize Historical Super Metric Values



We also have the ability to visualize what a super metric value would have been for time frames prior to when the metric was created.

1. Click the Show previewable supermetrics button. Note that there is now a **Super Metric Previews** category now, and it should be expanded. If it is not, then click to expand it.
2. Double-click the super metric name.
3. You can see that a historical view of the super metric is available.
4. It may help to look further back, so use the calendar icon to select a different time range. In this case, I've set my range to the **Last 12 hours**.
5. Click **GO**.

Note that the historical super metric calculation will be limited to the time range available for the metric(s) that are used in the super metric formula. In this lab environment, you may see large gaps in the data because of when the environment was created and the fact that the lab pod sits dormant (powered off) until shortly before you logged in and took this lab. Also note that while we have set a non-standard data collection interval of one minute in this lab pod (see frequency of data points in the top graph), the historical preview uses the standard 5-minute interval for calculations.

If you are interested, you can select VM, host, datacenter and datastore objects in this environment and confirm that the super metrics we created and enabled for each of those object types is also being calculated.

## Lesson End

[500]

In this lesson we checked our Super Metric creations from the Metrics tab.

## Conclusion

[501]

In this module, we created multiple Super Metrics to highlight the power of creating Super Metrics in Aria Operations.

## You've finished the module

[502]

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

## Conclusion

### Learning Path Next Steps!

[504]

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