

VMWARE PRESENTS

# THE GORILLA GUIDE TO...<sup>®</sup>



# Maximizing VMware vRealize Operations

David Davis, vExpert

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## INSIDE THE GUIDE:

- How to Get Started with vRealize Operations
- How to Deploy and Configure vRealize Operations
- What's New in vRealize Operations 7.5

**HELPING YOU NAVIGATE  
THE TECHNOLOGY JUNGLE!**



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**THE GORILLA GUIDE TO...**

# Maximizing VMware vRealize Operations

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Printed in the United States of America

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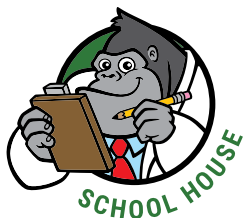
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# ENTERING THE JUNGLE

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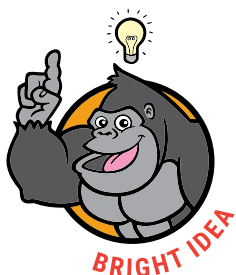
# CALLOUTS USED IN THIS BOOK



The Gorilla is the professorial sort that enjoys helping people learn. In the Schoolhouse callout, you'll gain insight into topics that may be outside the main subject but that are still important.



This is a special place where readers can learn a bit more about ancillary topics presented in the book.



When we have a great thought, we express them through a series of grunts in the Bright Idea section.



Takes readers into the deep, dark depths of a particular topic.



Discusses items of strategic interest to business leaders.

# ICONS USED IN THIS BOOK



## DEFINITION

Defines a word, phrase, or concept.



## KNOWLEDGE CHECK

Tests your knowledge of what you've read.



## PAY ATTENTION

We want to make sure you see this!



## GPS

We'll help you navigate your knowledge to the right place.



## WATCH OUT!

Make sure you read this so you don't make a critical error!

# CHAPTER 1

## Getting Started with VMware vRealize Operations

IT professionals around the world trust VMware's vRealize Operations (vROps) for vSphere management, but not everyone maximizes the power that vROps can provide. Many don't know the tips and tricks that you can use to get the most out of it.

For instance, you may not know that vROps can manage the full data center stack, from applications to infrastructure; and it can do this across physical, virtual, and cloud environments. Perhaps you aren't aware of the multitude of resources available to soup up vROps into a performance and capacity management machine for the IT operations group. And, I'd be willing to bet that you aren't aware of the latest enhancements to vROps that allow you to enable self-driving cloud operations in your data center.

In this book, you'll learn all that and much more!

### What Is vRealize Operations?

Before we start, let's take a moment to give you a brief introduction to vROps to ensure that we're all on the same page.

VMware has designed vROps to provide what it calls "intelligent operations" for your data center. If you take a moment to think about that phrase, you might consider the opposite: "unintelligent operations." None of us want to manage our data center "unintelligently," although it happens at so many companies.



## EXPERIENCED vROPS ADMINS ONLY

### Do you know this already?

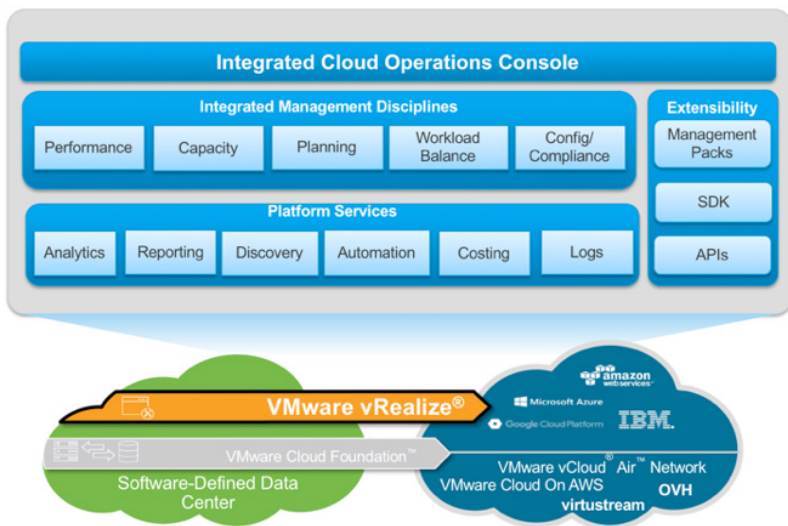
If you already have a good understanding of vROps, you can skip this introductory chapter and the installation chapter (Chapter 2) to move directly to “Configuring vRealize Operations for Maximum Effect” (Chapter 3). If you’re already an experienced vROps administrator, I recommend you jump to the final chapter of the book, “Maximizing vRealize Operations” (Chapter 4).

Many organizations are missing crucial information about their data centers. For example, they don’t understand how their applications are performing today; they don’t have a capacity plan for the future; and when trouble happens, they blindly restart software and hardware in hopes of returning the applications to the status quo.

All of these are a sign of a data center management group that doesn’t have any intelligence around their data center operations. It’s no secret that modern data centers are complex, so it makes sense that you’d need intelligent tools to manage such an environment. vROps is the tool, both now and in the future, that you should be using to manage your complex, modern data center.

With the release of vROps 7.5, VMware has updated its description of vROps by stating that it provides “Self-Driving Operations.” This is an important addition to the description of “intelligent operations” that it’s always provided. We’ll learn more about this “self-driving” data center later in the book, when we cover maximizing vROps.





**Figure 1-1**

## How Does vRealize Operations Work?

vROps deploys as a virtual appliance into a vSphere infrastructure. That virtual appliance includes both the database and the analysis engine. The integrated database stores collected data; the analysis engine presents that data to you, intelligently, and alerts you to what you need to know. The vROps virtual appliance connects to VMware vCenter to learn about the vSphere infrastructure hosts, clusters, VMs, virtual networks, and datastores.

It can also communicate with other data sources like applications, databases, servers, networks, and much more. vROps is designed to be able to pull data from just about anywhere and correlate that data with other data sources to give you a holistic view of what's happening in the data center. We'll go more into vROps architecture in a later chapter.

In the past, when virtual infrastructures were smaller, more static, and less complex, analysis using only vCenter was adequate for most companies. They didn't feel the need to push their utilization levels, as

## 5 Reasons You Need a Virtualization Performance and Capacity Management Tool



**1. Maximize VM density.** Servers now have massive CPU and memory density. This gives them the ability to run more virtual machines (VMs) than you've ever likely run before on a single server.

Even if the potential number of VMs exceeds your comfort level, it's your job as a virtualization admin to push that hardware to the limit to maximize your company's IT investment. But how do you know what that number is? Just because one company can run 100 VMs on a server doesn't mean that your servers can.

The only way to find out what that number is for your particular servers and your company's specific applications is to slowly increase that number until your intelligent tool tells you to stop (which will be before applications see slowness). Maximizing VM density isn't something that you should try to do without the right analytics tools in place.

**2. Prevent bottlenecks and downtime.** Virtual infrastructure can and will hit resource bottlenecks, and it's your job to prevent that before they degrade application performance or cause application downtime. This can be tough to do without a tool that's monitoring your resource utilization 24/7, keeping a history, and making recommendations.

**3. Correlate events and changes.** With more complex virtual infrastructure comes multiple administrators and multiple changes. It's critical to have a system that tracks those changes and correlates them with system events and/or performance issues. This way, when unexpected downtime or performance bottlenecks occur, they can quickly be tied back to events and changes that may be the root cause.

**4. Plan capacity growth.** Most workloads tend to grow over time, as the user/customer base of those applications grows. The virtualization admin needs to be able to predict that growth before the virtual infrastructure runs out of capacity.

This foresight is important, since adding new capacity to the virtual infrastructure may require physical capacity (pCPU, pRAM, or pDisk) that takes time to purchase and add to the cluster. Your virtualization management tool must monitor the workloads of your applications over time, and be able to predict when additional capacity is needed, alerting you even months ahead of time.

**5. Achieve a unified view.** Too many so-called virtualization management tools monitor the virtual infrastructure with only insight from SNMP element monitoring, or with only basic information from the vCenter API. You need a tool that offers a unified view gained from a rich and extensible wealth of data.

For example, your virtualization management tool should have the ability to communicate directly with storage arrays for storage insight; it should have application insight into Tier 1 applications; and it should be able to provide insight into the hybrid cloud when your company is ready to migrate workloads.

they were satisfied with consolidating 10 or 20 VMs on a server (that's not hard to understand, when compared to the 1:1 OS-to-server ratio they were running with physical servers).

Today, enterprises can be running hundreds of VMs on each host and pushing the VM-to-host ratio to the maximum to squeeze every penny out of their data center investment. Additionally, many companies are using desktop virtualization and more complex multi-tiered applications than in the past.

While the adoption of virtualization management tools has increased, those tools haven't always proven to be worthwhile (in some cases, they're even ignored by administrators). Some enterprises have managed their virtual infrastructure with vCenter and command-line tools for years and believe that there's no need to add another tool. And still others are using a third-party tool that wasn't designed with virtualization in mind, such as an element-monitoring tool.

In just about all these cases, the enterprise doesn't realize what they're missing until it's too late. Unfortunately, too many of those companies don't understand that their existing tools aren't up to the job until they're trying to troubleshoot an application slowdown; or, even worse, a virtual infrastructure outage.

For those who need a reminder of why vROps Management Suite is so necessary in today's data centers, or what makes vROps so valuable in today's data center if you already own it, read on.

## **Understanding vRealize Operations Editions**

Before you start using vROps, there are a few things you should know. The most important thing to know is that it's easy. Assuming you already have VMware vSphere, you can download the free 60-day trial of vROps, deploy it, and be up and running in less than 15 minutes. We'll walk you step-by-step through the deployment later in this book. If you want to try vROps without a download, you can do that in a live lab environment with the VMware Hands-On Labs (covered in the next section).

Before you kick off your deployment, let's review some of the "must-knows" of vROps, starting with how it's packaged and licensed.

vROps is offered in three editions: Standard, Advanced, and Enterprise. What's common across all editions is that they include vROps performance monitoring, analytics, predictive capacity management,

predictive Distributed Resource Scheduling (DRS), vRealize Log Insight integration, and vSAN overview/migration dashboards.

vRealize Operations is also included in bundles such as the vRealize Suite and the vCloud Suite.

Traditionally, vROps has been licensed per CPU; recently, VMware announced a new licensing option called portable licensing, which offers the flexibility to manage workloads whether they're on-premises, third-party hypervisors, physical servers, or supported public clouds using the same license. The portable license unit (PLU) licensing option is only available when you purchase vROps in the vCloud Suite or the vRealize Suite and then, only with vROps Advanced or Enterprise.

The benefit of the PLU licensing model is that there's no license switching or conversion required. The PLU allows usage of vROps to manage unlimited operating system instances (OSI) deployed on-premises on one vSphere CPU, or up to 15 OSIs deployed on the public cloud. It includes VMware Cloud on AWS (VMC), all supported public clouds, VMware Cloud Providers, and third-party hypervisors and physical servers.

## **vRealize Advanced Edition**

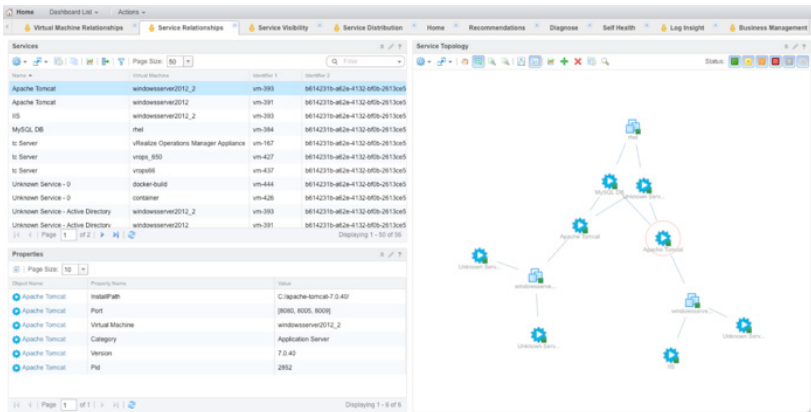
There are a number of reasons that enterprises move up to the Advanced edition of vROps, including these major benefits:

- Wavefront integration
- vROps high availability
- Customizable dashboards
- Super metrics
- Advanced APIs
- Fine-grained cost analytics for reclamation, planning, and public cloud cost comparison

- What-if scenarios for adding VMs to private and public clouds, hardware procurement/decommissioning, and adding vSAN capacity
- Business intent-based automated and schedulable workload balancing
- vSAN-aware workload placement and host-based placement
- Automated actions
- vSAN troubleshooting and capacity management
- Monitoring of OS resources
- vRealize Orchestrator management pack
- Custom compliance templates
- Automated compliance drift remediation
- Service discovery and application dependency mapping
- ServiceNow Integration
- VMware Skyline integration
- Third-party storage, network, hyper-convergence, and multi-cloud management packs

For customers wanting to do service discovery and mapping, they can leverage the vRealize Operations Service Discovery Management Pack (shown in **Figure 1-2**). vROps Service Discovery discovers all the services running in each VM and then builds a relationship or dependencies between services from different VMs, based on the network communication.

The management pack can create dynamic applications based on the network communication between the services and brings the functionality into VMware vRealize Operations Manager that was earlier provided by VMware vRealize Infrastructure Navigator.



**Figure 1-2**

## vRealize Operations Enterprise Edition Overview

What does vROps Enterprise edition offer above and beyond the Advanced edition? There are four important features:

- Out-of-the-box discovery, monitoring, and troubleshooting for packaged applications
- Multi-cloud and container monitoring management packs: Amazon Web Services (AWS), Microsoft Azure, OpenStack, Kubernetes
- Care system analytics management pack (for electronic health record [HRE] management systems)
- Third-party database, middleware, and application management packs. For example, with vROps Enterprise edition, you can use Blue Medora's SQL Server or Oracle database management packs.

The primary reason that most companies select vROps Enterprise edition is the ability to monitor applications and middleware, as well as the ability to use 75-plus different management packs including compute,

storage, networking, converged/hyperconverged, other hypervisors, container, cloud, connectors, database, big data, and applications.

## Learning vROps in VMware's Hands-On Labs

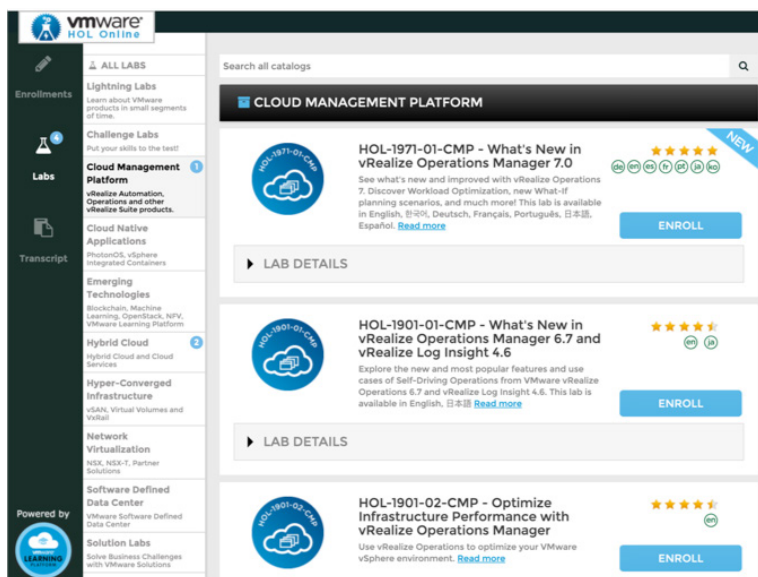
So how can you get access to the latest vROps and use it, first-hand, without ever having to install it? VMware's Hands-on Labs (HOL) provides access to the entire VMware product line. It's available to anyone at no cost; it's already installed, and includes detailed lab instructions which are easy to follow. (The author frequently uses the HOL to immediately access some of VMware's most complex products.)

### vRealize Operations in the HOL

VMware currently offers more than 90 HOL labs, with at least six of those covering specific components of the vRealize Suite. New labs are always being released; at the time of this writing, here are my favorite eight labs to learn vROps:

- **HOL-1901-01-CMP** - What's New in vRealize Operations Manager 6.7 and vRealize Log Insight 4.6
- **HOL-1901-02-CMP** - Optimize Infrastructure Performance with vRealize Operations Manager
- **HOL-1901-03-CMP** - Optimize vSphere Capacity and Cost Savings with vRealize Operations Manager
- **HOL-1901-04-CMP** - Monitor and Troubleshoot with vRealize Suite
- **HOL-1901-05-CMP** - vRealize Operations Manager and vRealize Log Insight - Advanced Topics
- **HOL-1906-02-SLN** - Automate IT - Making Private Cloud Easy





**Figure 1-3**

These labs cover the new features of vROps and vRealize Log Insight, how vROps manages a hybrid cloud, and more. If you’re new to vROps and the vRealize Suite, I recommend starting with the “Optimize Infrastructure Performance with vRealize Operations Manager” lab.

## Summary

In this chapter, you’ve learned how vROps is packaged, about different features available in each edition, and how you can get some hands-on experience with the VMware HOL.

The next chapter dives into vROps architecture, then shows you how to deploy vROps step-by-step, and connect vROps to vCenter.

## CHAPTER 2

# Deploying vRealize Operations

Before you start any new deployment (yes, even in a lab environment), I always recommend that you first take a few minutes to understand the architecture behind the solution, and the basics of how to size it. This is important so that you don't get caught off guard later and end up unable to scale the solution as your company's needs dictate.

## vRealize Operations Architecture Overview

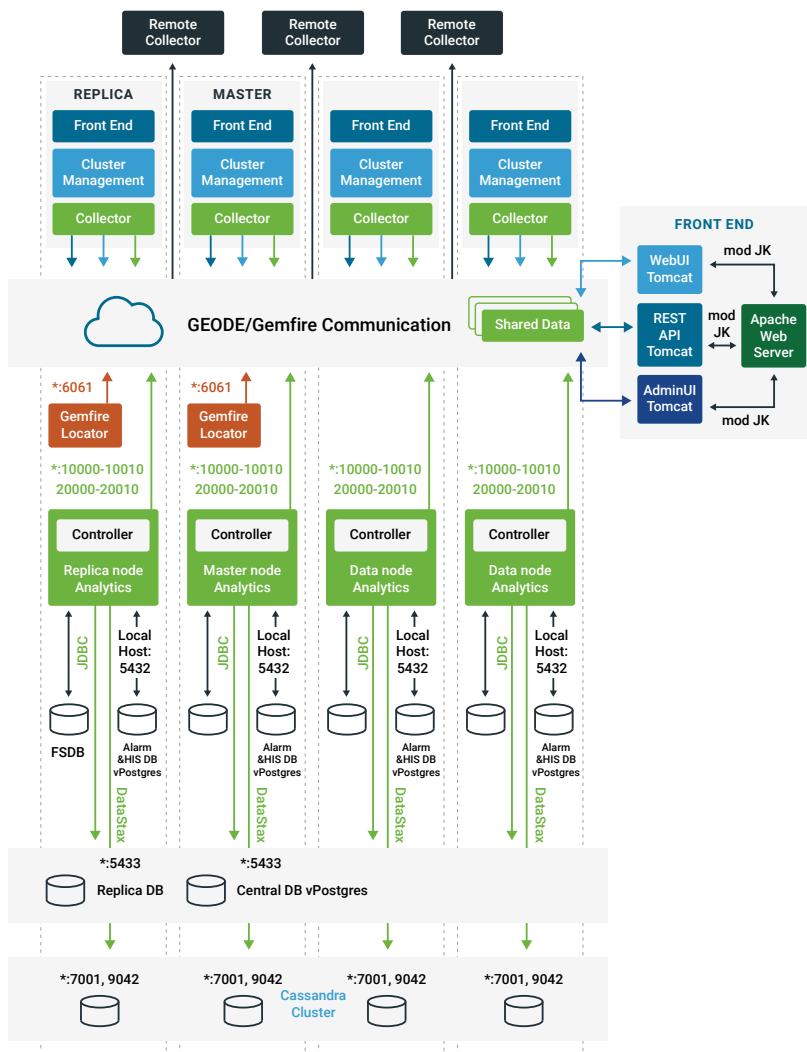
A huge benefit of the vROps deployment model is that you don't have to install a new guest OS, install a database, install an app, or even connect it to the database.

vROps is easily deployed and can run entirely within a single VM that you can size to at deployment time with a simple “t-shirt sizing” model. For enterprises that have multiple sites or require high availability, multiple vROps appliances can be deployed.

**Figure 2-1** shows what the architecture looks like inside the vROps VM.

The single vROps VM includes the user interface, RESTful API, vROps controller, analytics analysis, and data storage.

By deploying more vROps VMs, you can easily create a multi-node cluster, or even a multi-node highly available cluster.



**Figure 2-1 : vROps Architecture**

## Sizing vRealize Operations

When deploying vROps for the first time, one of the things you need to take into consideration is the size of the virtual infrastructure you'll manage. This will determine how you size your vROps deployment.

## Deploy OVF Template

- 1 Select an OVF template
- 2 Select a name and folder
- 3 Select a compute resource
- 4 Review details
- 5 License agreements
- 6 Configuration**
- 7 Select storage
- 8 Select networks
- 9 Customize template
- 10 Ready to complete

### Configuration

Select a deployment configuration

<input checked="" type="radio"/> Small	<b>Description</b> Use this configuration for environments less than 3500 VMs. This deployment will require 4 vCPUs and 16GB Memory for the vApp.
<input type="radio"/> Medium	
<input type="radio"/> Large	
<input type="radio"/> Remote Collector (Standard)	
<input type="radio"/> Remote Collector (Large)	
<input type="radio"/> Extra Small	
<input type="radio"/> Extra Large	

7 Items

CANCEL
BACK
NEXT

**Figure 2-2**

During the deployment process (which we will cover in more detail in the next chapter), you'll be asked to size the vROps VM as small, medium, large, extra small, extra large, remote collector standard, or remote collector large (**Figure 2-2**). These sizes match up with a range of VM resources that will be used in your deployment, including vCPU, vRAM, and storage resources.

**Figure 2-3** shows how the different sizes correspond to the vCPU and vRAM that will be allocated to the vROps VM.

	vRealize Operations Node					Remote Collector (RC)	
	Extra Small	Small	Medium	Large	Extra Large	Standard	Large
<b>Configuration</b>							
vCPU	2	4	8	16	24	2	4
Default Memory (GB)	8	16	32	48	128	4	16
Maximum Memory Configuration (GB)	N/A	32	64	96	N/A	8	32

**Figure 2-3**

VMware KB article 67752<sup>1</sup> details the sizing guidelines for vROps 7.5; I encourage you to review it for more sizing information.

What's great about vRealize Operations Manager 7.5 is that you can monitor the same footprint with up to a 15% vCPU reduction.

## **Installing vRealize Operations for the First Time**

Armed with the knowledge of vROps sizing and architecture, it's time to begin installation.

The vROps Manager deployment guide offers pages of installation prerequisites that you should be aware of if you're deploying it into a production environment. It's always recommended to have the latest version of the ESXi and vCenter before you deploy the latest version of vROps.

Keep in mind that, unlike a traditional Windows application, with the vROps virtual appliance-based deployment model there's no need to do things like create a new VM, buy a Windows Server OS license, install Windows, create a new table and user on your SQL Server, install the Windows-based management application, connect it to SQL, and so on.

## **Deploying the vRealize Operations Appliance**

There are a few different ways to go about downloading and deploying the vROps appliance. For those new to vROps, I recommend that you go here: <https://www.vmware.com/go/vrealize-ops-dl-en>

It will bring you to the VMware vRealize Operations evaluation center, where you can sign up for a free, 60-day fully-functioning license for vROps.

Existing VMware customers can go to the VMware download center and download the vRealize Operations OVA directly from there. If you're

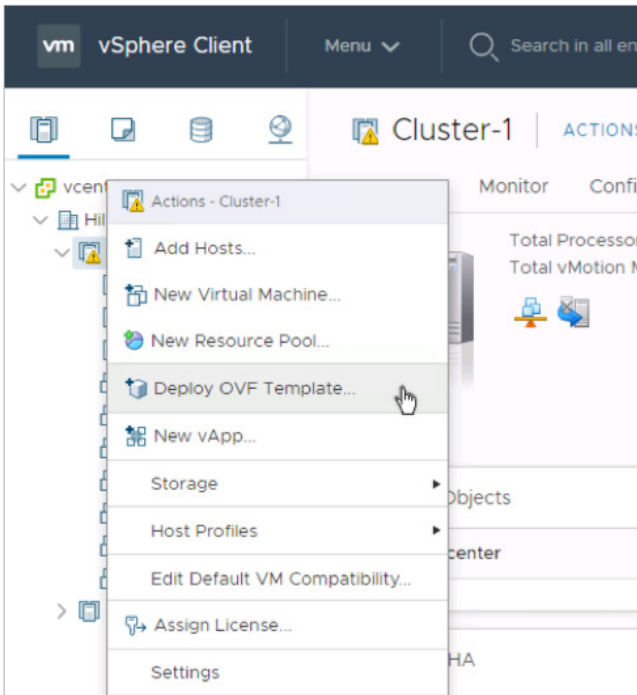
<sup>1</sup> <https://kb.vmware.com/s/article/2093783>

licensed for vROps, you'll need to enter your license key after deployment. (We'll cover where to enter your license later in this chapter.)

Once you've downloaded the vROps virtual appliance, you can go to the vSphere Client, **Hosts and Clusters**, then right-click on your **Virtual Datacenter** or **Cluster** and click **Deploy OVF Template**, as shown in **Figure 2-4**).

This will bring up the Deploy OVF Template wizard to walk you through the process. It's here that you'll specify the OVA file you downloaded from VMware.com (**Figure 2-5**).

After that, you'll be walked through the deployment wizard, starting with giving the VM a name and selecting where you'd like to deploy it (**Figure 2-6**).



**Figure 2-4**

## Deploy OVF Template

1 Select an OVF template

2 Select a name and folder

3 Select a compute resource

4 Review details

5 Select storage

6 Ready to complete

### Select an OVF template

Select an OVF template from remote URL or local file system

Enter a URL to download and install the OVF package from the Internet, or browse to a location accessible from your computer, such as a local hard drive, a network share, or a CD/DVD drive.

☐ URL

<http://remoteserver-address/filetoinstall.ovf>

☒ Local file

vRealize-Opera\_949\_OVF10.ova

**Figure 2-5**

## Deploy OVF Template

✓ 1 Select an OVF template

2 Select a name and folder

3 Select a compute resource

4 Review details

5 Select storage

6 Ready to complete

### Select a name and folder

Specify a unique name and target location

Virtual machine name:

Select a location for the virtual machine.

✓

vcenter.company.pr

>

Hilton Head, SC

**Figure 2-6**

## Deploying OVAs over Slow WiFi or a WAN is a No-No

If you ever do download an OVA file (for any virtual appliance) and try to deploy it using the vSphere Client (Windows or web), make sure you have a good connection. In the past, I've struggled trying to deploy an OVF over a WAN or slow Wi-Fi and had to troubleshoot numerous FAILED error messages. Eventually I discovered that when I connect via reliable Ethernet to the same network that the vSphere infrastructure is on, the errors simply disappear.



If you can't do that, try creating a Windows VM in the vSphere infrastructure, connecting to it via RDP, downloading the OVF file to that Windows VM (because it's on the same network as the vSphere infrastructure), and then deploying the OVF file from there.

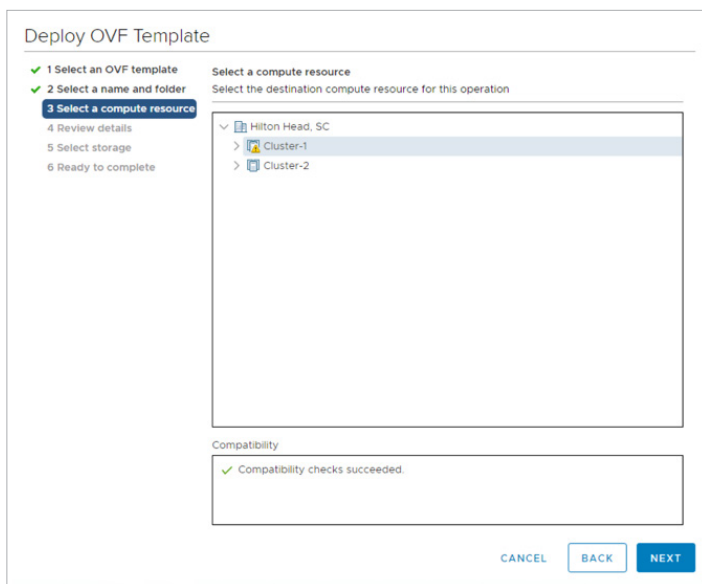


Figure 2-7



Next, select the virtual infrastructure resource where you'd like to deploy the virtual appliance (**Figure 2-7**).

Next, you'll have a chance to review the details of what you're about to deploy (**Figure 2-8**), including the version of the vROps and the required disk size.

Deploy OVF Template

✓ 1 Select an OVF template

✓ 2 Select a name and folder

✓ 3 Select a compute resource

**4 Review details**

5 License agreements

6 Configuration

7 Select storage

8 Select networks

9 Customize template

10 Ready to complete

Review details

Verify the template details.

Publisher	VMware®, Inc. (Trusted certificate)
Product	vRealize Operations Manager Appliance
Version	7.5.0.13165949
Vendor	VMware Inc.
Description	vRealize Operations Manager Appliance Version 7.5.0 running on SLES 11 SP4
Download size	2.4 GB
Size on disk	1.8 GB (thin provisioned)
	274.0 GB (thick provisioned)

CANCEL

BACK

NEXT

**Figure 2-8**

Accept the VMware end user license agreement by clicking **Accept** and then **Next**.

Now select the size of your virtual infrastructure, based on the sizing information discussed earlier in this chapter. Sizes range from extra small to extra large. As we saw, this will determine the resources that will be allocated to the VM once it's deployed.

Select the datastore where you'll install vROps, the virtual disk format, the VM storage policy (if applicable), and click **Next** (**Figure 2-9**).

### Deploy OVF Template

- ✓ 1 Select an OVF template
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Review details
- ✓ 5 License agreements
- ✓ 6 Configuration
- 7 Select storage**
- 8 Select networks
- 9 Customize template
- 10 Ready to complete

**Select storage**  
Select the storage for the configuration and disk files

☐ Encrypt this virtual machine

Select virtual disk format: Thin Provision

VM Storage Policy: Datastore Default

Name	Capacity	Provisioned	Free	Type
esx1-ds1	271.25 GB	1.41 GB	269.84 GB	VM
esx2-ds1	278.75 GB	1.53 GB	277.22 GB	VM
esx3-ds1	278.75 GB	4.12 GB	274.63 GB	VM
ISCSI-SAN-LUN-1	99.75 GB	109.34 GB	78.69 GB	VM
NFS-NAS	7.85 TB	2.4 TB	6.17 TB	NF
vsanDatastore	1.82 TB	58.44 GB	1.76 TB	Vtr

Compatibility

✓ Compatibility checks succeeded.

CANCEL BACK NEXT

**Figure 2-9**

Next, select the network to which the vROps VM will connect (**Figure 2-10**).

### Deploy OVF Template

- ✓ 1 Select an OVF template
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Review details
- ✓ 5 License agreements
- ✓ 6 Configuration
- ✓ 7 Select storage
- 8 Select networks**
- 9 Customize template
- 10 Ready to complete

**Select networks**  
Select a destination network for each source network.

Source Network	Destination Network
Network 1	VM Network

1 items

**IP Allocation Settings**

IP allocation: Static - Manual

IP protocol: IPv4

CANCEL BACK NEXT

**Figure 2-10**

Next, you have the chance to customize the template that will be used to create the VM (**Figure 2-11**). This includes the time zone and any static IP network settings you want to use. If you'll be using this in a production or lab environment, using a static IP address is recommended.

Deploy OVF Template

- ✓ 1 Select an OVF template
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Review details
- ✓ 5 License agreements
- ✓ 6 Configuration
- ✓ 7 Select storage
- ✓ 8 Select networks
- ✓ 9 Customize template**
- 10 Ready to complete

**Customize template**  
Customize the deployment properties of this software solution.

✓ **User Settings** Please add the 2 settings  
amount of disk space required before powering up the node.

**Timezone setting**  
Select the proper timezone setting for this VM or leave default Etc/UTC.  
US/Eastern

**IPv6**  
Use IPv6. If IPv6 is not available configuration will not succeed.  
☐

✓ **Networking Properties** 6 settings

**Default Gateway**  
The default gateway address for this VM. Leave blank if DHCP is desired.  
192.168.1.1

**Domain Name**  
The domain name of this VM. Leave blank if DHCP is desired.

CANCEL BACK NEXT

**Figure 2-11**

Finally, review everything and, if correct, click **Finish** (**Figure 2-12**).

After a few minutes, you should see the new vROps VM deployed on the new host or cluster specified. After you power on the VM and a minute or so has passed, you can go to the vROps console. It will look very similar to **Figure 2-13**.

As you can see, it directs you to the URL for the vROps appliance.

### Deploy OVF Template

- ✓ 1 Select an OVF template
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Review details
- ✓ 5 License agreements
- ✓ 6 Configuration
- ✓ 7 Select storage
- ✓ 8 Select networks
- ✓ 9 Customize template
- 10 Ready to complete**

**Ready to complete**  
Click Finish to start creation.

Provisioning type	Deploy from template
Name	vRealize-Ops-7.5
Template name	vRealize-Operations-Manager-Appliance-7.5.0.13165949_OVF10
Download size	2.4 GB
Size on disk	1.8 GB
Folder	Hilton Head, SC
Resource	Cluster-1
Storage mapping	1
All disks	Datastore: NFS-NAS, Format: Thin provision
Network mapping	1
Network 1	VM Network
IP allocation settings	
IP protocol	IPv4
IP allocation	Static - Manual

CANCEL BACK FINISH

Figure 2-13

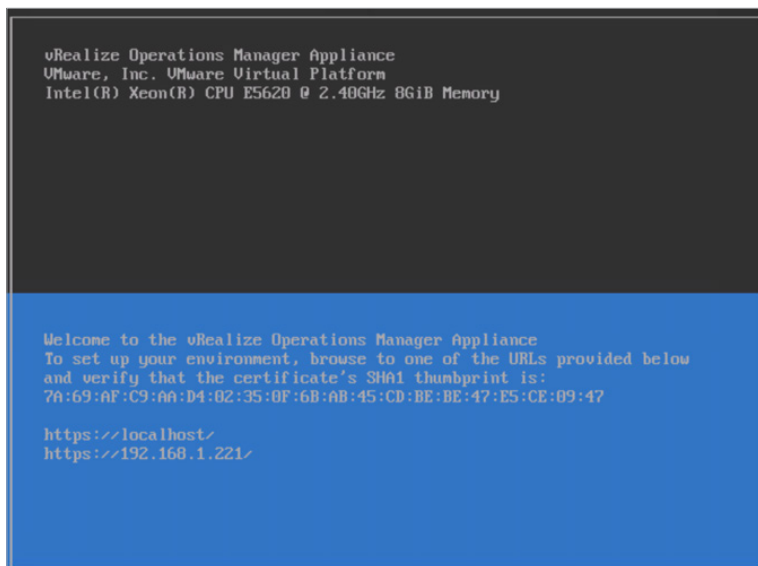
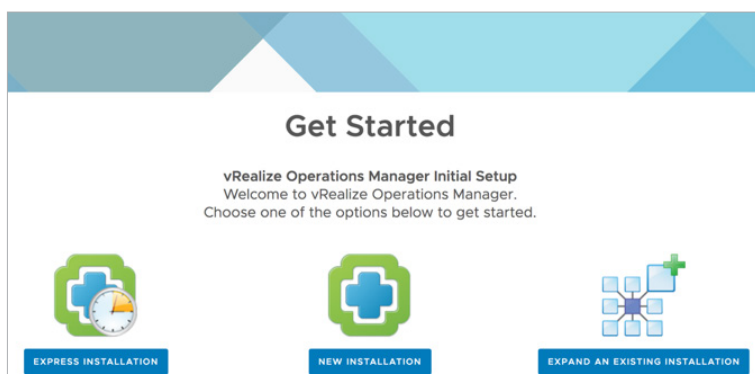


Figure 2-12

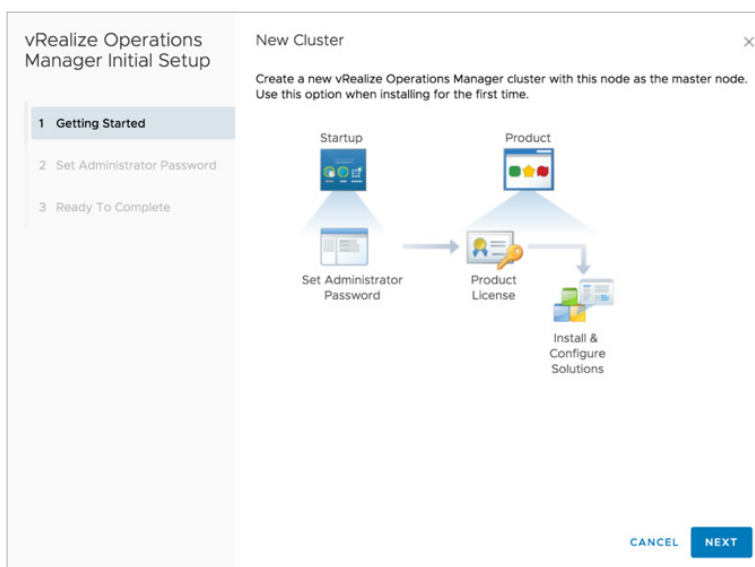
# Performing Initial Configuration

Pointing your web browser to the correct URL will bring you to a screen that looks like **Figure 2-14**.

As you can see, the three options are to perform an express installation, a new installation, or expand an existing installation.



**Figure 2-14**



**Figure 2-15**

In our case, we will choose the express installation to get vROps up and running as quickly as possible; if you'd like to see every additional installation option, choose the new installation. If you already have an existing installation, you'd choose to expand that existing installation to add greater scalability or high availability to your pre-existing cluster.

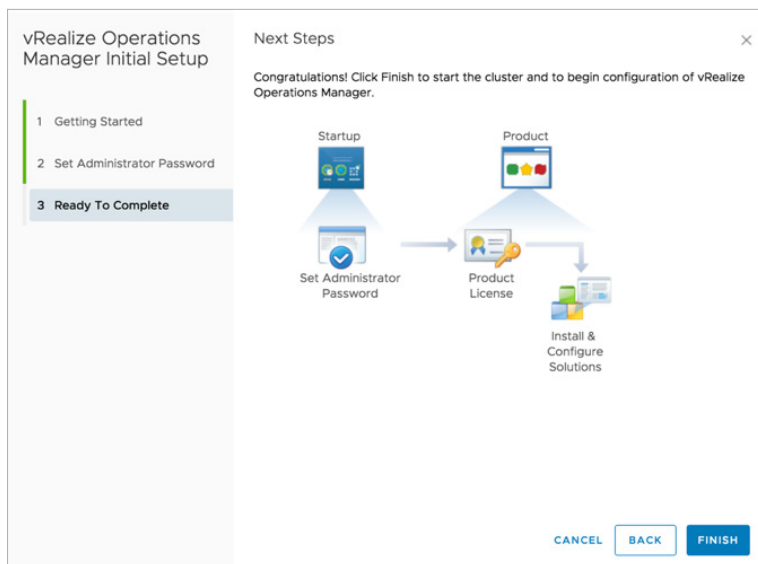
Choosing the express installation begins the three steps of the vROps Manager initial setup wizard, which is initiated by clicking **Next** (Figure 2-15).

The first step is to enter the new password for the admin account. Keep in mind that you need to use a complex password that meets the requirements, as shown in Figure 2-16.

After clicking **Next**, you're ready to complete the vROps installation (Figure 2-17).

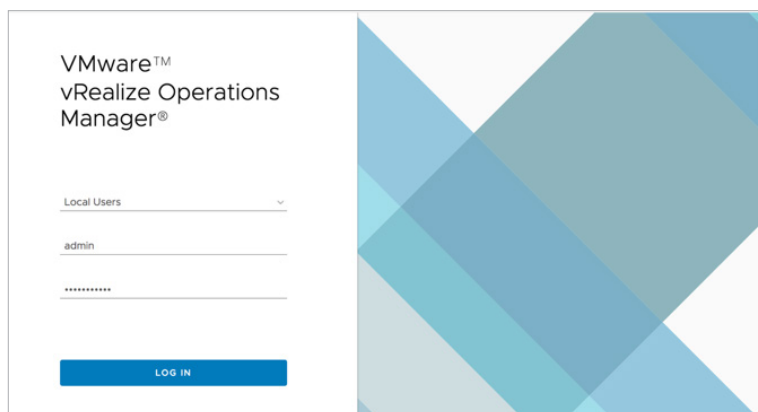
The screenshot shows the 'vRealize Operations Manager Initial Setup' wizard. On the left, a sidebar lists three steps: '1 Getting Started', '2 Set Administrator Password' (which is highlighted with a blue bar), and '3 Ready To Complete'. The main area is titled 'Set the Administrator account password' and contains the following text: 'Set the Administrator account password for this deployment of vRealize Operations Manager.' Below this, there are three input fields: 'User name:' with the value 'admin', 'New password:' with a masked password '\*\*\*\*\*', and 'Re-enter password:' with a masked password '\*\*\*\*\*'. Below the input fields, a section titled 'Passwords must meet the following requirements:' lists three bullet points: '- Be at least eight characters long', '- Be different from your user name', and '- Contain lowercase, uppercase, numeric, and non-alphanumeric characters'. At the bottom right, there are three buttons: 'CANCEL', 'BACK', and 'NEXT'.

**Figure 2-16**



**Figure 2-17**

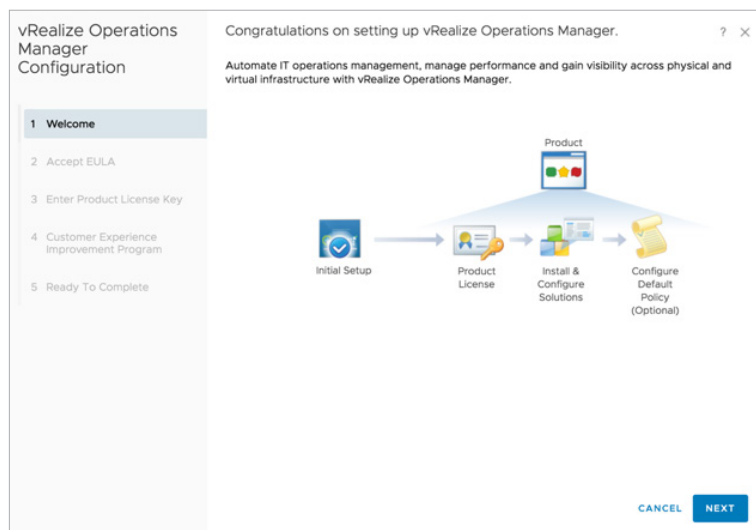
The additional options provide the ability to choose a custom security certificate, configure a name for the customer master node, and enter an NTP server address for timekeeping.



**Figure 2-18**

Once configured, the vROps web UI displays a login screen, at which point you can log in with the admin username and password you configured (**Figure 2-18**).

vRealize Operations Manager deployment is now complete, leading to the final five-step configuration wizard, shown in **Figure 2-19**.



**Figure 2-19**

After clicking **Next** and accepting the license agreement, you're prompted to enter your product license key, shown in **Figure 2-20**.

You can choose either the product evaluation default; or if you're a licensed vROps Manager user, you'd enter your product key here.

For this tutorial, the product evaluation default was selected. One more checkbox about being part of the VMware customer experience improvement program, then click **Next**, then **Finish** (**Figure 2-21**) to complete the installation wizard.



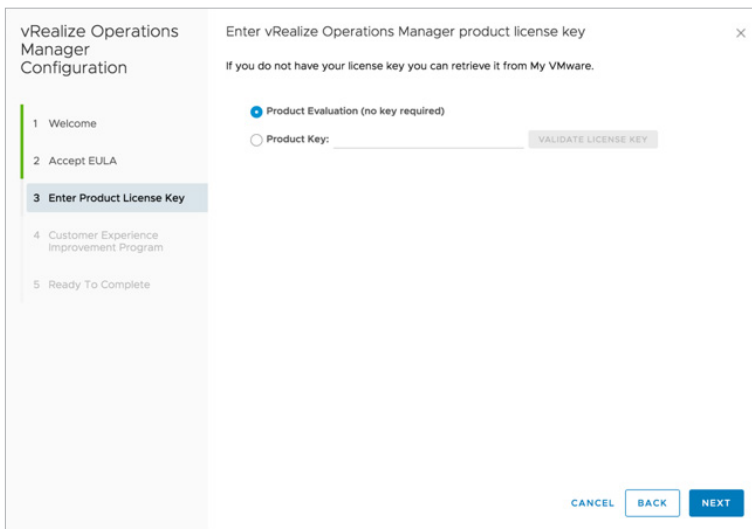


Figure 2-20

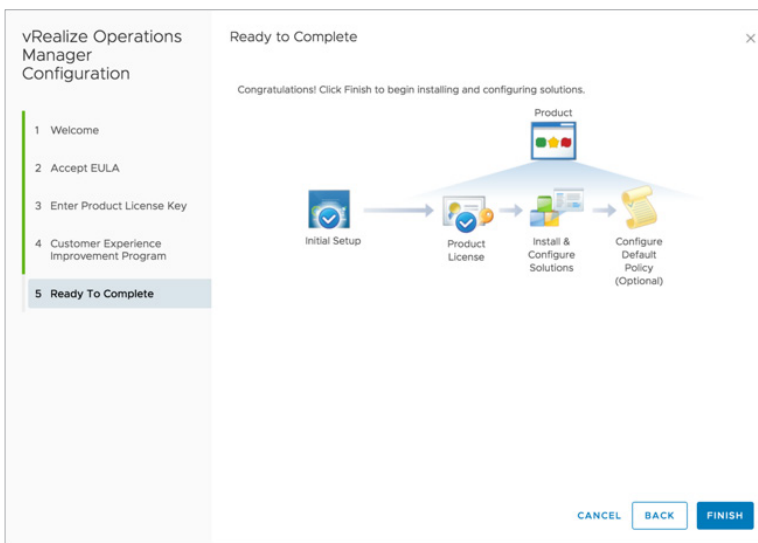
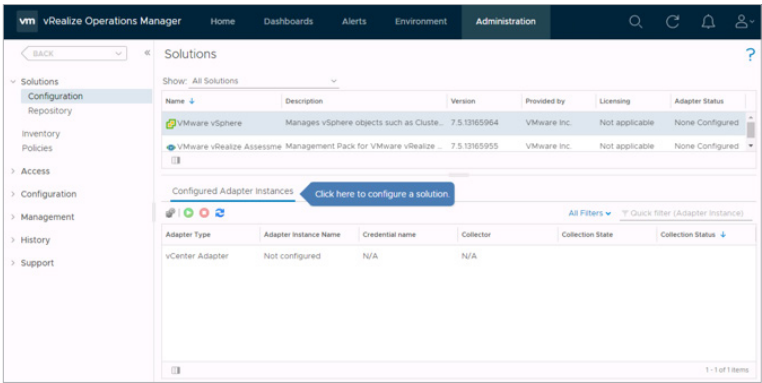


Figure 2-21

# Configuring the VMware vSphere Solution

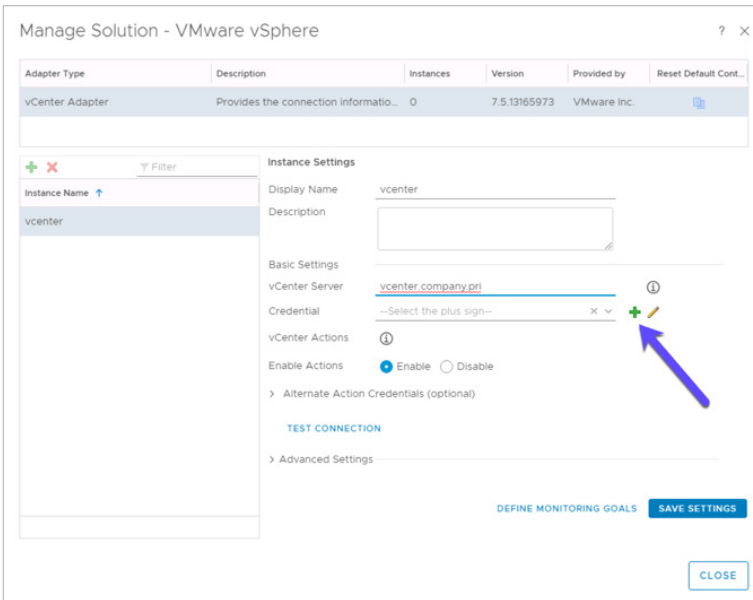
When first logging in to vROps, you're prompted to configure a solution. As **Figure 2-22** shows, you should choose **VMware vSphere** and then the **vCenter Adapter instance**. You're connecting vROps to the vCenter server that's managing your vSphere infrastructure, enabling vROps to begin gathering performance data related to your hosts, clusters, storage, and VMs.



**Figure 2-22**

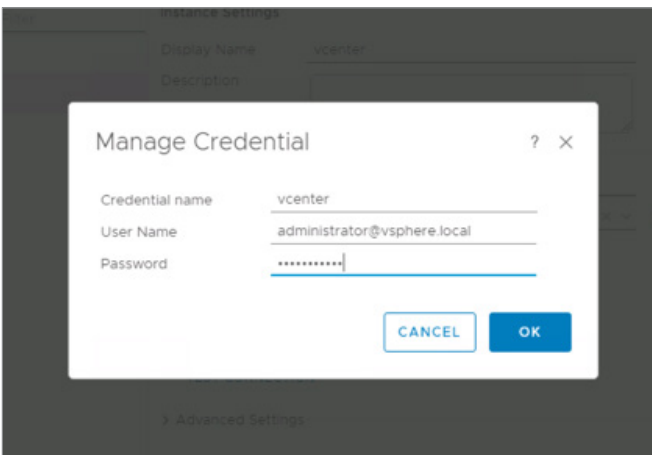
To configure the vSphere solution, select the **vCenter Adapter** instance and click on the **gear icon** inside the **Administration** tab and under **Solutions**.

This brings you to the manage solution configuration. The first thing to do is add a new set of credentials by clicking the **Plus** sign on the right side of the credentials field (**Figure 2-23**).

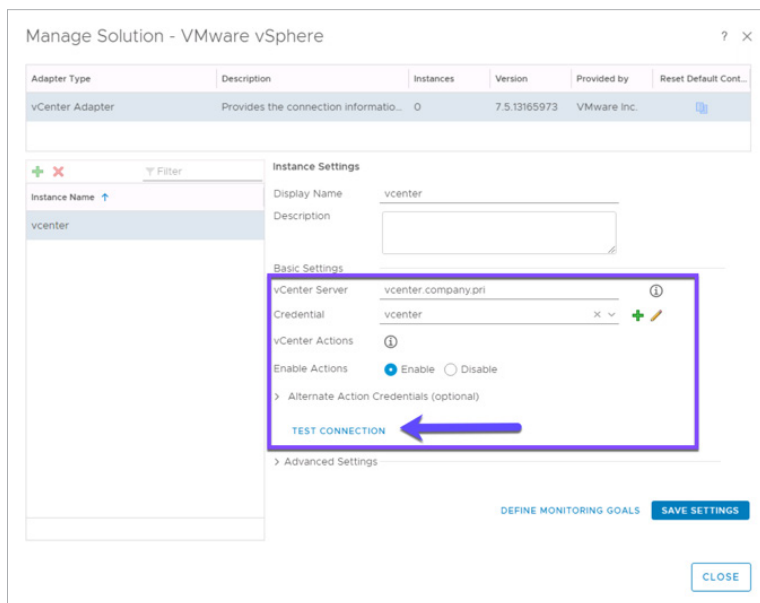


**Figure 2-23**

It's here that you can add your administrative vCenter username and password, shown in **Figure 2-24**.



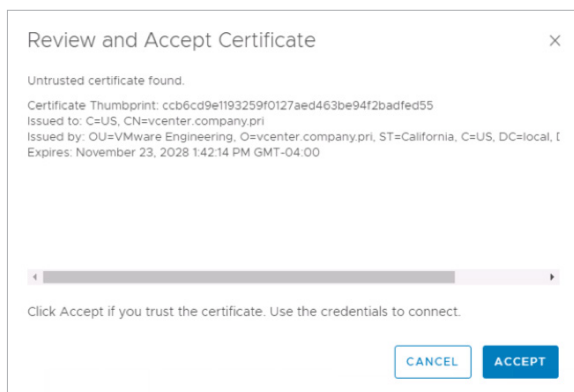
**Figure 2-24**



**Figure 2-25**

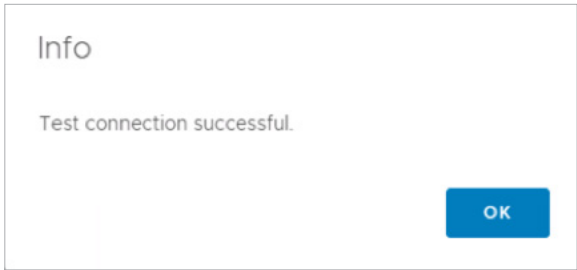
With your credentials added, you next add a display name for your vCenter server and your vCenter server's domain name or IP address; then click the button **Test Connection** (Figure 2-25).

If the test is successful, you'll be prompted to accept the default certificate (Figure 2-26).



**Figure 2-26**

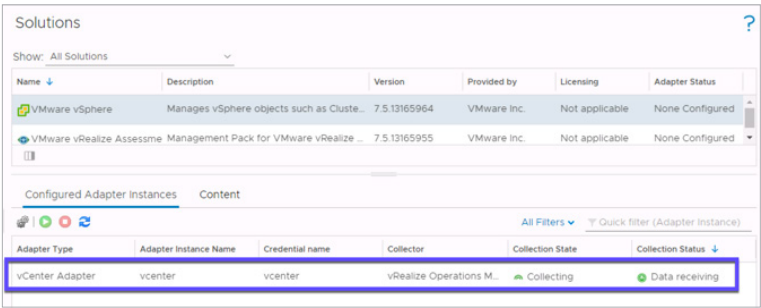
After clicking **Accept**, you should see a message like the one in **Figure 2-27** that says the test was successful.



**Figure 2-27**

After you click **OK**, make sure that you click **Save Settings** before clicking **Close** to continue.

With the solution configured, you should now see that vROps is collecting data from vCenter, as shown in **Figure 2-28**.



**Figure 2-28**

It will take some time for vROps to gather all the data that it needs to learn about your virtual infrastructure to start making recommendations for optimization; but just in the first few minutes, you'll start learning where your bottlenecks are and which of your VMs, hosts, and datastores are currently under the heaviest workloads (and who those workloads are caused by).

# Accessing vRealize Operations

Every vROps administrator should know how to access critical vROps interfaces and how to log in to those interfaces.

Here's what you need to know:

## The vROps Web User Interface

- Access it by pointing your web browser to the URL (IP address or domain name) of the vROps VM. This IP address was either statically configured when you deployed vROps or obtained by DHCP. If you don't know the IP address of your vROps VM, simply go to the console of the VM inside the vSphere Web Client.
- The username for the web interface defaults to **admin**; the password was configured when you deployed vROps.

## The vROps Administrative Interface

- This is accessed by pointing your web browser to the same IP address or domain name used to access vROps; but add “/admin” after it, like this: <http://192.168.1.221/admin>
- The username for the web interface defaults to admin; the password was configured when you deployed vROps.

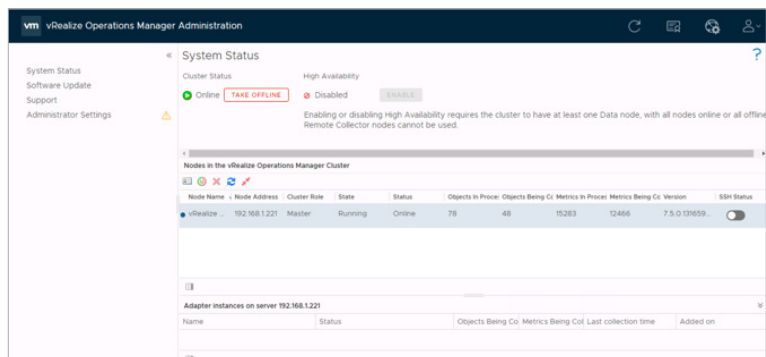
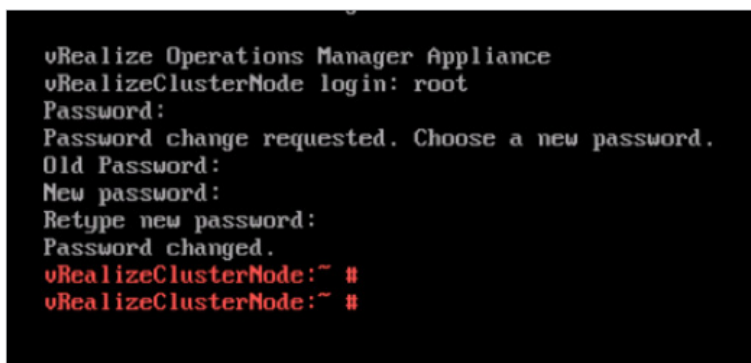


Figure 2-29

## The vROps Console and SSH Access

- The vROps console (**Figure 2-29**) is typically used for troubleshooting and network reconfiguration. The console is accessed through the VM's console in the vSphere Web Client. SSH access may have been enabled when you deployed vROps; if not, it's possible to enable it by using the console access through the vSphere Web Client.
- You can log in to the console using the same admin account shown in **Figure 2-30**, but it's much more useful to log in as the root account. By default in vROps, there's no password set on the root; so the first time you log in you'll be prompted to change the password. To do so you must enter the current password. Since the default password is blank, you can press enter to move on.
- The most commonly used administrative tools inside the vROps command-line console are in `"/opt/vmware/share/vami."`
- For example, `vami_config_net`, shown in **Figure 2-31**, is used to reconfigure networking on the vROps virtual appliance; this is very useful if you used DHCP IP addressing when you deployed the virtual appliance, but later want to change to a static IP address or reconfigure the DNS servers being used.



```
vRealize Operations Manager Appliance
vRealizeClusterNode login: root
Password:
Password change requested. Choose a new password.
Old Password:
New password:
Retype new password:
Password changed.
vRealizeClusterNode:~ #
vRealizeClusterNode:~ #
```

Figure 2-30

```
vRealizeClusterNode:/opt/vmware/share/vani #  
vRealizeClusterNode:/opt/vmware/share/vani # ./vani_config_net  
  
Main Menu  
0) Show Current Configuration (scroll with Shift-PgUp/PgDown)  
1) Exit this program  
2) Default Gateway  
3) Hostname  
4) DNS  
5) Proxy Server  
6) IP Address Allocation for eth0  
Enter a menu number [0]:
```

Figure 2-31

## Summary

In this chapter, you’ve learned about the vROps architecture, how to deploy vROps, and how to connect it to vCenter. You should now be up and running.

In the next chapter, you’ll get detailed information on how vROps is configured in the real world regarding single sign-on, alert configuration, custom policies, and more.



## CHAPTER 3

# Configuring vRealize Operations for Maximum Effect

With vROps deployed and the initial configuration performed, you're ready to enable intelligent operations for your virtual infrastructure. In this chapter, you'll learn about some of the most common configurations you may want to perform beyond the initial configuration. You'll also learn how to configure SSO authentication, custom policies, custom alerts, predictive DRS, automated workload balancing, capacity management, and more.

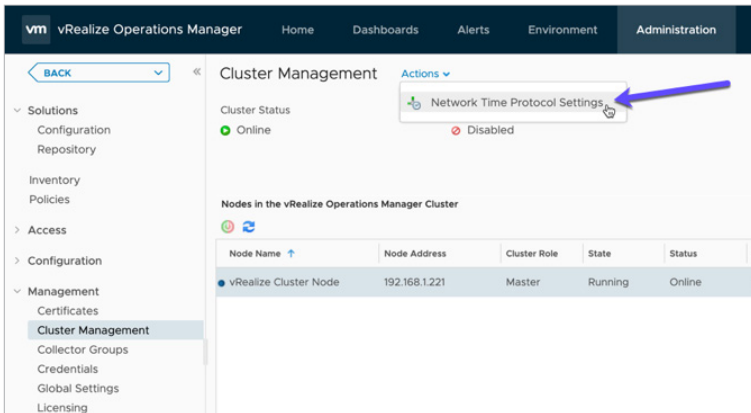
## Configuring SSO in vROps

Some administrators always log in to vSphere using root or admin. Those are the same admins who always log in to vROps using the SuperUser “admin” account. This is a shame, because it's so easy to configure single sign-on (SSO) with vROps.

The benefit of SSO is that any login you can use to log in to the vSphere Web Client will also allow you to log in to vROps. And once you log in to the vSphere Web Client, you can use vROps without any authentication whatsoever. This is a huge convenience.

## Prerequisites for Configuring SSO

To configure SSO in vROps, let's first talk about the prerequisites. These steps assume that you already have vSphere, vCenter, and vROps Manager installed and configured.



**Figure 3-1**

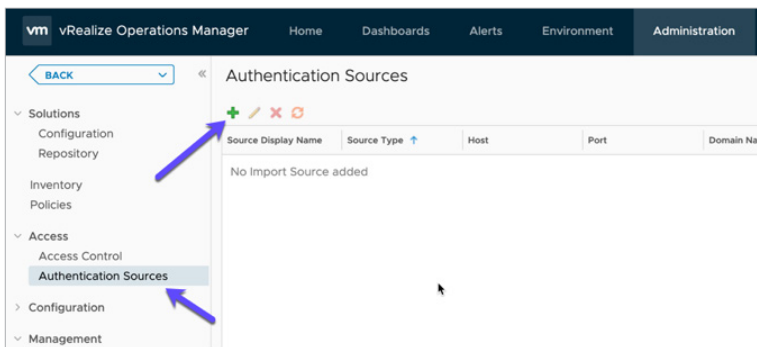
Finally, make sure that the time on your vOps server is synced with the time on your vCenter server. Network Time Protocol (NTP) is the best way to do this, and configuring NTP in vOps is easy. Just go into **Administration, Cluster Management**, and, on the **Actions** menu, click on Network Time Protocol Settings, as shown in **Figure 3-1**.

If you already have an NTP server (likely configured during deployment of vOps), you can move on from here. If you don't have an NTP server, enter the name of your NTP server and click **Add** to add your NTP server.

Next, make sure you have DNS configured for your vCenter server and vOps server. If you don't have DNS properly configured, you'll get the error "failed to retrieve single sign on SSL certificates, the host or port is not reachable."

Finally, note carefully the version, update, and patch levels of your vCenter server and your vOps server. I recommend the latest version of both.

Once you've met the prerequisites, you can move on to configuring SSO. To configure SSO in vOps, go to the **Administration** tab, and



**Figure 3-2**

under **Access**, click on **Authentication Sources**. Then, click **Add** to add a new authentication source, as shown in **Figure 3-2**.

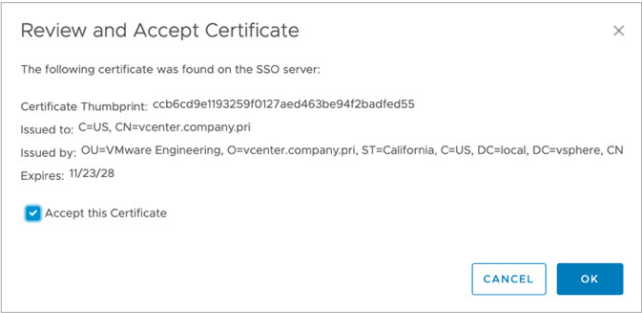
Note that under “source type” you can configure authentication to SSO SAML (likely pointing to vCenter), Windows Active Directory (AD), or Open LDAP.

**Figure 3-3**

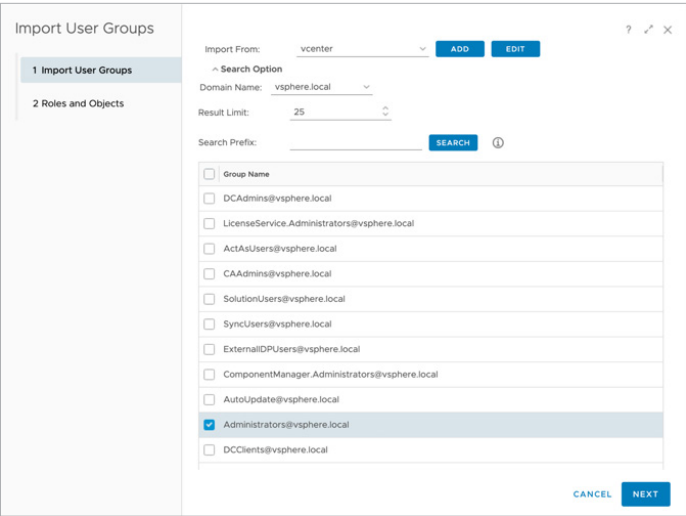
I'd recommend configuring your vCenter server to use AD authentication, then configuring vROps to point to vCenter for SSO SAML authentication. This is preferable to configuring vROps to go to AD for authentication.

Enter a name for the authentication source (whatever you want), keeping the default of SSO SAML for the source type. Then enter the vCenter IP address or host name, username, and password. See **Figure 3-3**.

Next, accept the certificate from vCenter and click **OK**, as shown in **Figure 3-4**.



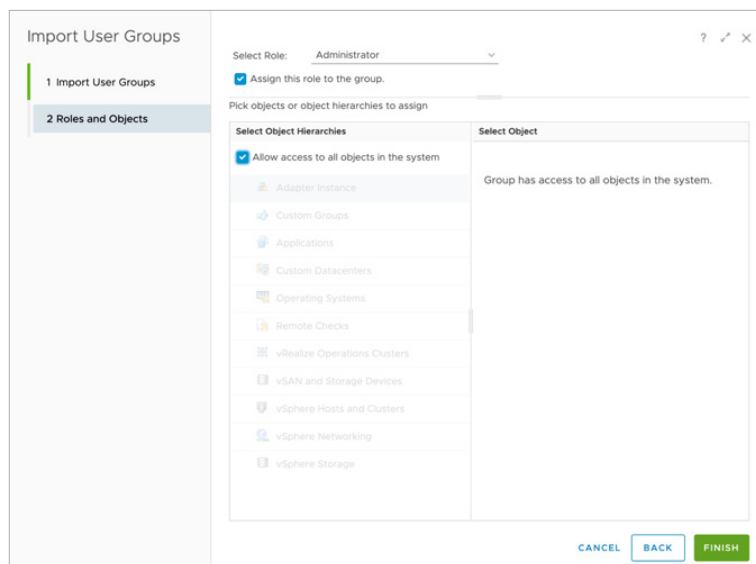
**Figure 3-4**



**Figure 3-5**

Then, as **Figure 3-5** shows, specify which groups you want to import.

Assign vROps roles to the user groups that you're importing (**Figure 3-6**).



**Figure 3-6**

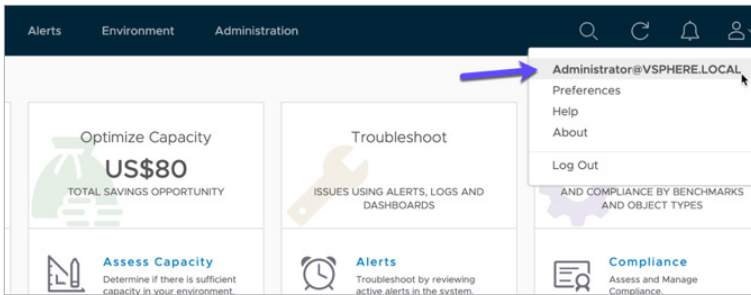
In this case, we added the vCenter administrators@vsphere.local account and made it an administrator for vROps.

In production environments, you might want to create an AD group in which you add your vROps administrators, then authorize that group to administer or simply use vROps.

At this point, your configuration should be complete. To test it, log out of vROps and the vSphere Web Client.

Log back into the vSphere Web Client and open the web page for vROps; you should be automatically logged in with no authentication.

As you can see in **Figure 3-7**, vROps is allowing the AD admin account to log in.



**Figure 3-7**

Remember: the goal of this SSO configuration is that you never have to log in to vROps again (during normal usage), as long as you're already logged into the vSphere Web Client. Mission accomplished!

## Understanding vROps Groups

vROps includes groups already created for you. Some of those groups are system-defined (the adapter groups) and cannot be changed. Other groups are user-defined and can be modified or added to.

Examples of system-defined adapter groups include Operating Systems World, Universe, vSAN World, and vSphere World. These groups contain objects such as the vCenter server, ESX hosts, data centers, and so on.

Examples of the pre-defined user groups include Department, Environment, Function, Location, Security Zone, and Service Level Object. You should use the vROps grouping to organize the objects in your virtual infrastructure in the way that makes the most sense to you. If possible, use the pre-defined user groups.

However, if those groups don't suit you, vROps group types also allow you to create your own custom object groups, specifically tailored for your environment. Figure 3-8 shows the creation of the Dev-Test group, for example.

**New group**

Name: Dev-Test

Group Type: Environment Policy: --Select-- ☒ Keep group membership up to date

**Define membership criteria**

Select the Object Type that matches all of the following criteria: Cluster Compute Resource

Object name	is	HA / DRS Cluster 1

Add another criteria set

Objects to always include

Objects to always exclude

PREVIEW CANCEL OK

**Figure 3-8**

By choosing a dynamic group membership (“Keep group membership up to date,” from **Figure 3-8**, for instance), you’re able to define a vSphere inventory object like a folder, cluster, resource pool, or even a virtual data center. All the objects under that object will always be associated with the group you’ve created, whether or not they’re added or removed. This is great for dynamically changing environments, as most are today.

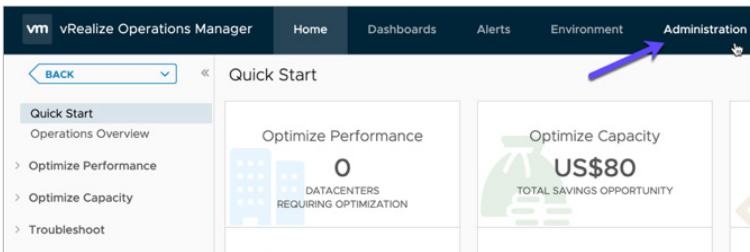
Once the group’s created, the logical inventory view allows you to use that group for all common vROps functions, such as showing the performance and capacity for all associated resources.

For more information on policies, group types, and groups, check out the **vROps Configuration Guide** (<https://docs.vmware.com/en/vRealize-Operations-Manager/7.5/vrealize-operations-manager-75-config-guide.pdf>) in the vROps documentation for more detailed information.

# Understanding Policies in vROps

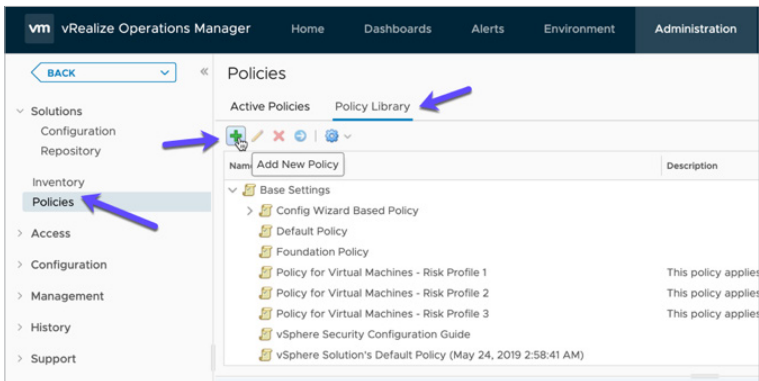
Customizing the vROps configuration to your liking and the needs of your virtual infrastructure doesn't take long, and it's a task every admin needs to perform. If you don't do it at the start, at some point, you will likely need to do it in the future so you might as well do it at the beginning.

If you click on **Administration** at the top of the vROps web interface, you'll be taken to the administrative interface where just about all vROps customizations are made (**Figure 3-9**).



**Figure 3-9**

In the administrative interface, click on **Policies** on the left to configure and customize vROps policies (**Figure 3-10**).



**Figure 3-10**



## What Is a vROps Policy?

A policy is a set of rules that you define for vRealize Operations Manager to use to analyze and display information about the objects in your environment. You can create, modify, and administer policies to determine how vRealize Operations Manager displays data in dashboards, views, and reports.



## Understanding Policies in vROps

Yes, vROps continually learns about your environment and doesn't solely work off of thresholds, but there are some things that you inherently know about your virtual infrastructure that vROps can't know.

For example, you may have a high-priority production cluster (with many more resources intentionally allocated) and a low priority dev/test cluster (with many fewer resources intentionally allocated). You don't want vROps alerting you that you need to add more resources to dev/test if you intentionally under-provisioned the dev/test cluster for the workload.

Perhaps it's more critical to be alerted to a low memory situation on a production cluster than it is for a test/dev cluster. Or you might want to exclude the vROps VMs from monitoring and alerting on themselves.

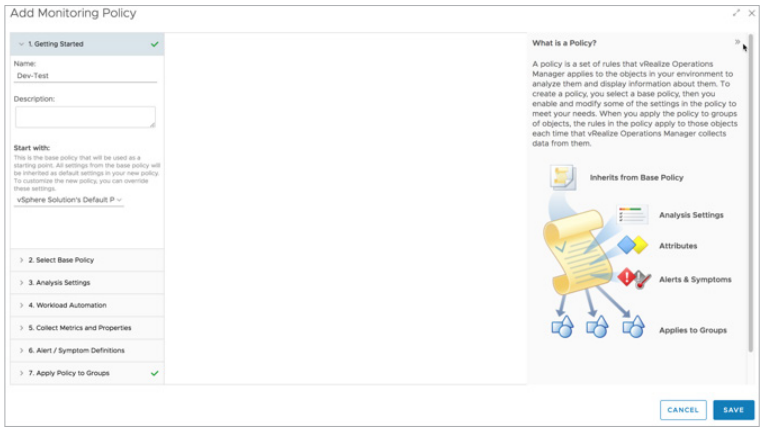
You can see the importance of customization. And since policies are applied to groups, there are times when you'll want to wait on the creation of new policies and first create a new group type and associated groups. But if you already have a group type to which you want to apply your policy, you can go ahead and create the new policy.

**NOTE:** Be careful if you choose to modify the default policy, as you’re modifying how vROps does its job, and the information that you see across vROps in dashboards, reports, and views will forever be changed.

Ideally, you want to create a new policy for something such as, let’s say, your dev/test cluster.

To do this (assuming you already had a group in mind), click on the **Policy Library** tab, then the **Plus** sign to Create a New Policy (shown in **Figure 3-10**). From there, you would give the policy a name and description.

It’s common to create a new policy by starting with an existing policy. The policy that you start with is called the “base policy,” as the new policy you create inherits its settings from that policy. See **Figure 3-11**.



**Figure 3-11**

From there, as shown in **Figure 3-12**, you’ll associate a policy with a group.

In this case, I associated that policy with the new “Dev-Test” group that I created (**Figure 3-12**). This is called the “Monitoring Policy.”

Add Monitoring Policy

> 1. Getting Started

> 2. Select Base Policy

> 3. Analysis Settings

> 4. Workload Automation

> 5. Collect Metrics and Properties

> 6. Alert / Symptom Definitions

< 7. Apply Policy to Groups

Name ↑

Dev Test

Non vSAN Datastores

vSAN Datastores

Apply To Group

☒

☐

☐

Getting Started - Apply Policy to Groups

CANCEL

SAVE

Figure 3-12

At this point, if you used a policy template you have the option of just clicking **Finish** to complete the policy creation. Or if you want to view or modify all the potential options for the policy configuration and alerts, you can do so.

Policies

Active Policies

Policy Library

+

✗

⚙

🔍

🔄

Name	Description	Last Modified
> Config Wizard Based Policy		6 days ago
Default Policy		6 days ago
Foundation Policy		6 days ago
Policy for Virtual Machines - Risk Profile 1	This policy applies vSphere Se...	6 days ago
Policy for Virtual Machines - Risk Profile 2	This policy applies vSphere Se...	6 days ago
Policy for Virtual Machines - Risk Profile 3	This policy applies vSphere Se...	6 days ago
vSphere Security Configuration Guide		6 days ago
✓ vSphere Solution's Default Policy (May 24, 2019 2:58:41 AM)		6 days ago
Dev Test		a second ago

Details

Related Objects

Dev Test

Inherit From: vSphere Solution's Default Policy (May 24, 2019 2:58:41 AM)

Priority: 1

Modified By: Administrator@VSPHERE.LOCAL

Associated with 1 groups (2 objects)

Locally Defined Settings

Complete Settings including Inherited

Metrics & Properties

Local: None

Alert Definitions

Local: None

Figure 3-13

When you're done, your new policy will show up in the policy library, as shown in **Figure 3-13**.

## Automated Remediation in vROps

There are many data center monitoring tools out there that tell you that you have a problem. Remember the robot from the old sci-fi show “Lost In Space”? It was always throwing up its arms and screeching “Warning! Warning! Danger!”



At one time, that may have been helpful (if stressful), but our expectations and needs have evolved. Today's tools are able to predict problems before they happen and tell you how to fix them before they impact your applications. Prediction and suggested remediation are the new minimum expectation. However, there are very few tools out there that will not only predict and suggest remediation, but automate the process.

Consider a cloud analogy. Cloud management requires a tool that knows what can go wrong in your cloud infrastructure and automatically solve it for you—before it impacts applications; and, yes, even without notifying you about it in the middle of the night. The ideal would be for your cloud monitoring and management tool to email you a report in the morning that says, “I fixed these problems for you while you were sleeping, and the applications were never impacted.”

This is exactly the type of functionality that vROps Intelligent Operations can provide.

vROps offers many different actions that can be automated without any scripting, and without vRealize Automation. Examples include powering on a VM, powering off a VM, resizing most VM resources, and more. With these actions, vROps is able to prevent downtime or application performance issues before they happen.

# vRealize Operations Automated Remediation

There are a few different ways to automatically remediate trouble with vROps:

- **Automated Workload Optimization.** The ability of vROps to move running VMs from one cluster to another, proactively preventing performance bottlenecks before they happen.
- **vROps Automated Actions.** vROps can perform 20 different actions on objects managed by the vCenter adapter. You can manually perform these actions or configure alerts to trigger remediation with one of them.
- **vRealize Orchestrator Integrated Actions.** The same actions that can be automated with vROps can also be automated with vRealize Orchestrator, allowing you to perform more complex automations.
- **Webhooks.** By leveraging vRealize Orchestrator integration, you can trigger an alert based on an email, SNMP trap, or REST API notification; that alert can then perform an automated action.

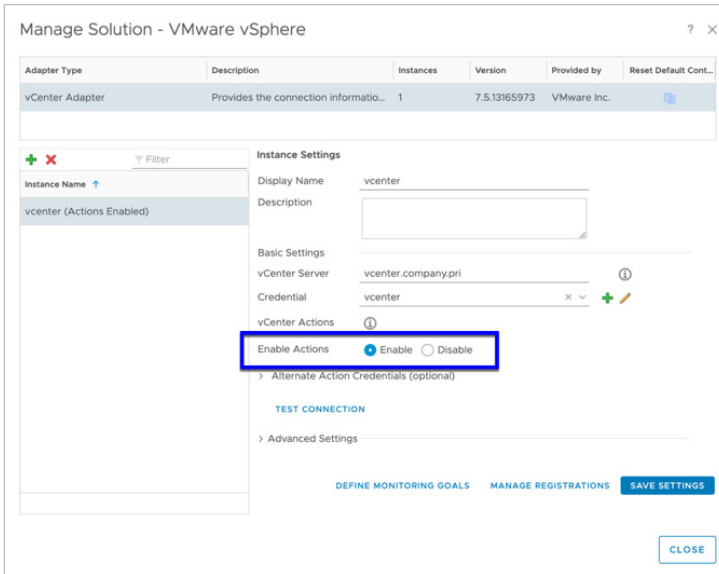


Figure 3-15

The first thing you need to know is that for these vROps actions to work, the vCenter adapter must have **Enable Actions** set to **Enable**, as shown in **Figure 3-15**.

In the past, you would configure the vCenter Python Adapter separately, but starting with vROps 6.6 that's no longer necessary.

You can view the multitude of different actions that you can either perform manually or automate by going to **Alerts, Alert Settings, and Actions**, as you see in **Figure 3-16**.

Action Name	Action Type	Adapter Type	Resource Adapter Type	Associated Object Types	Recommendations
Delete Idle VM	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	0
Delete Powered Off VM	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	0
Delete Unused Snapshots f...	Update	vCenter Python Actions Ad...	vCenter Adapter	Datastore, Host System, CL...	1
Delete Unused Snapshots f...	Update	vCenter Python Actions Ad...	vCenter Adapter	Datastore, Host System, CL...	0
Delete Unused Snapshots f...	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	1
Delete Unused Snapshots f...	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	0
Move VM	Update	vCenter Adapter	vCenter Adapter	Virtual Machine	1
Optimize Container	Update	vCenter Adapter	vCenter Adapter	Custom Datacenter, Datac...	1
Power Off VM	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	1
Power On VM	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	0
Set CPU Count and Memor...	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	0
Set CPU Count and Memor...	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	0
Set CPU Count for VM	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	3
Set CPU Count for VM Pow...	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	0
Set CPU Resources for VM	Update	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	2
Exit PDR Administration	1 description	vCenter Python Actions Ad...	vCenter Adapter	Virtual Machine, Host System...	3

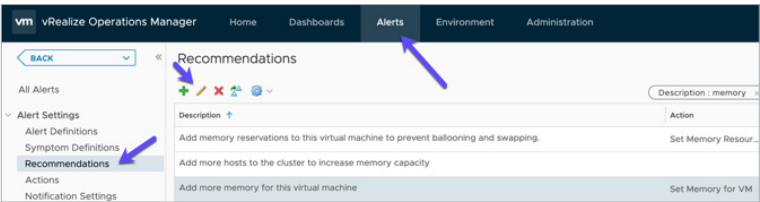
Figure 3-16

Summary	Alerts	All Metrics
Recommended Actions		
Me Datastore (1)		
1 Objects		
Delete Powered Off VM		
Delete Unused Snapshots for VM		
Move VM		
Power On VM		
Set CPU Count and Memory for VM		
Set CPU Count for VM		
Set CPU Resources for VM		
Set Memory Resources for VM		
Set Memory for VM		
Open Virtual Machine in vSphere Web Client...		

Figure 3-17

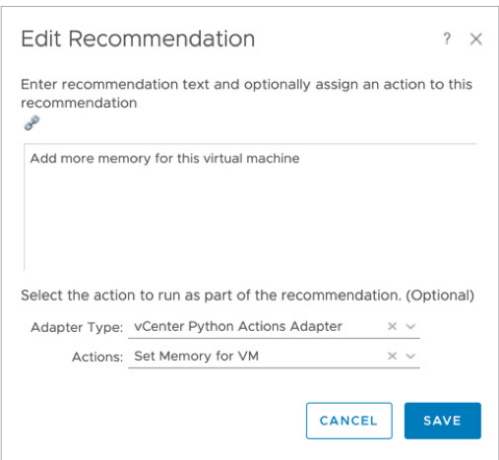
If you take a look at a specific vSphere object and click on the **Actions** dropdown for that object, you can see the actions that apply to that object and can be performed manually. For example, **Figure 3-17** shows a VM and the manual actions that can be performed.

To automate these types of actions, you need to modify a recommendation to perform an action (remediate) instead of just recommend remediation steps. To do this, go to the **Alerts** menu, then into **Alert Settings, Recommendations**, and find a recommendation you want to automate. **Figure 3-18**, for example, shows a pre-defined recommendation to add more memory to a VM.



**Figure 3-18**

In this case, there's a pre-defined action as well to add more memory to the VM to automatically remediate the memory contention issue and resolve application slowness. See **Figure 3-19**.



**Figure 3-19**

Automated remediation takes alert recommendations (which already exist in your vROps installation) and allows you to turn on an action to take that supersedes the recommendation. (Note: for the automated remediation to be successful, you must have set **Automate** to **Local**, for the alert.)

When automated actions kick in, they're displayed under **Administration, History, Recent Tasks**.

While drinking your coffee in the morning, you can look in **Recent Tasks** to find out everything that vROps resolved for you while you were sleeping.

## Configuring Alerts

According to the vROps documentation, vROps Alerts are events that occur on the monitored objects when data analysis indicates deviations from normal metric values, or when a problem occurs with one of the vRealize Operations components. In other words, alerts are things you need know about.

vROps Alerts come in three flavors:

- Critical
- Immediate
- Warning

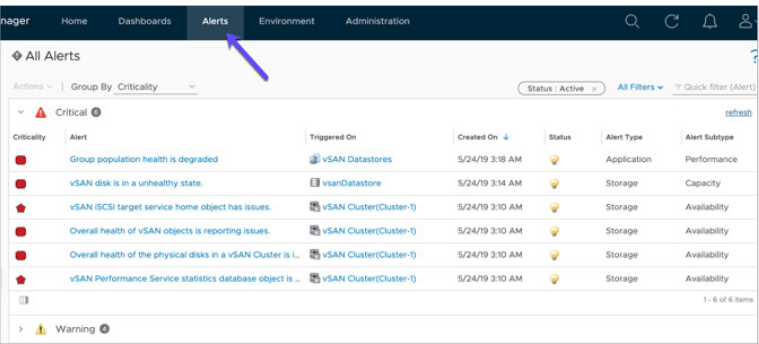


Figure 3-20



Critical alerts should be acted upon immediately; immediate alerts (somewhat counter-intuitively) should be acted on “as soon as possible”; and warning alerts should be checked “when you get time.”

Alerts are visible in a few different areas in vROps. The most obvious is the main **Alerts** menu, as shown in **Figure 3-20**. Another place to see alerts is from the **Operations Overview**, as you can see in **Figure 3-21**.

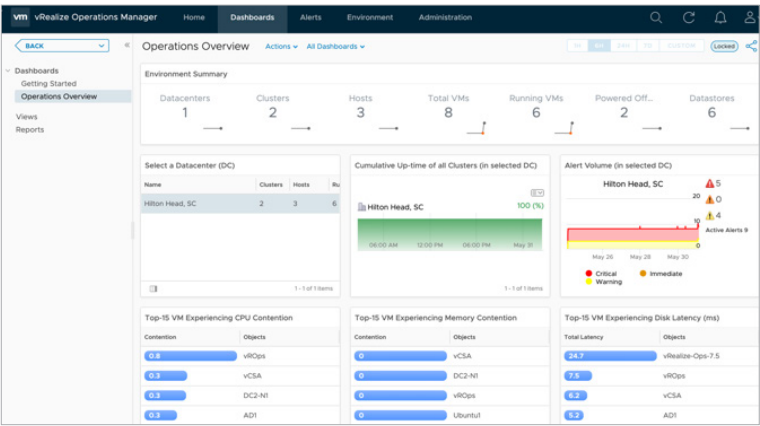


Figure 3-21

vROps comes with many different alerts preconfigured. Under the **Alerts** menu, then under **Alert Settings**, you’ll find **Alert Definitions**.

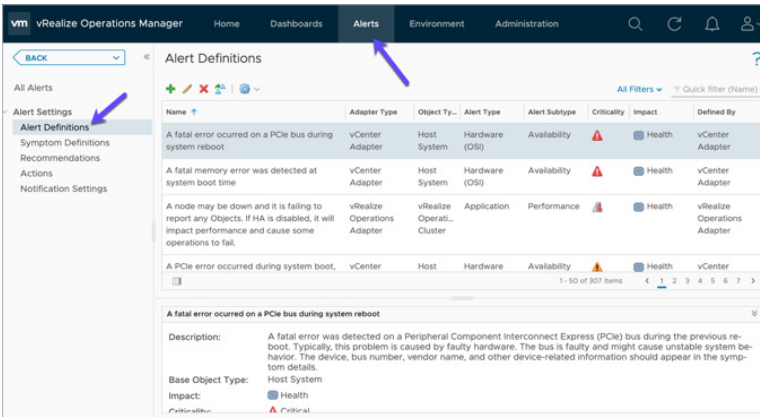


Figure 3-22

There, you can see all the predefined alerts; customize those alerts; and create your own custom alerts.

## Reacting to Alerts

It's important to know the different actions that you can take when you receive an alert. vROps is typically very helpful in resolving alerts by explaining the problem, offering metrics to support its analysis, and providing recommended actions to remediate the issue (**Figure 3-23**).

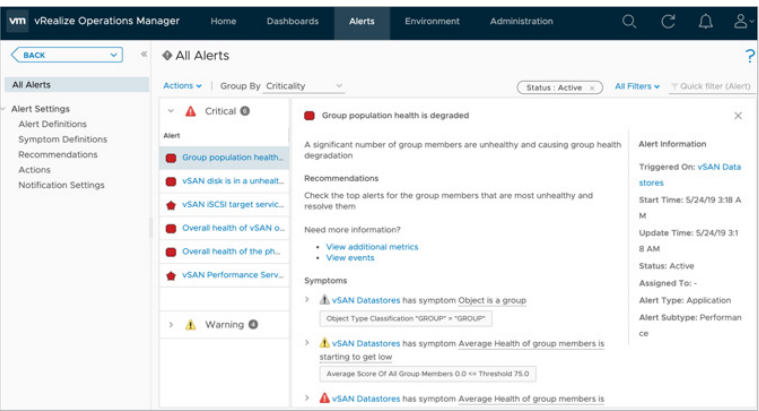


Figure 3-23

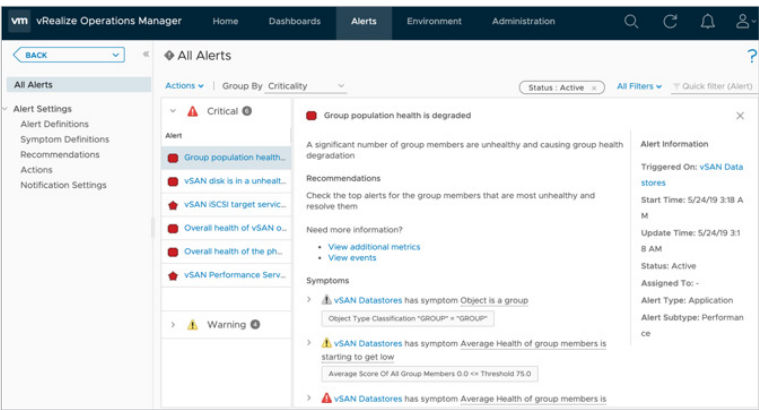


Figure 3-24

If you select an alert in the **Alerts** menu, you can take ownership, cancel the alert, suspend the alert, go to the alert definition, or release ownership (**Figure 3-24**).

## Predictive DRS

Back in vROps 6.4, VMware introduced predictive distributed resource scheduler (pDRS). What does pDRS do that DRS doesn't?

If you're a typical vSphere admin, it's likely that you already use DRS in your vSphere infrastructure, and it's equally likely that you love it (I know I do). You may think that DRS is already perfect (and I agree, it's pretty cool); but what if DRS had the information it needed to actually predict the needs of your applications? With that, your applications can achieve the fastest performance possible and your vSphere infrastructure can have the fastest workload balancing ever. Would that interest you?

vSphere and DRS have been working together since vROps 6.2, when Intelligent Workload Placement with DRS was announced. With Intelligent Workload Placement, vROps helped to rebalance VM workloads across clusters.

With Intelligent Workload Placement installed, you may think that DRS doesn't need any help balancing workloads within a cluster; after all, DRS already does its job very well. But let's look at the different approaches DRS has available to it.

Traditionally, DRS has worked by *reactively* balancing workloads when applications (running on VMs) aren't getting the resources they need. DRS analyzes the resources allocated (CPU and memory) and looks to see if those resources are continuously available; if they aren't, it moves that VM to a host that has those resources available.

While this works well in most cases, there is the potential for contention and, thus, negative application performance impact (albeit very short). DRS is included with vSphere Enterprise Plus and vSphere Platinum.

The next step from *reactive* is to *balance*, which is the Intelligent Workload Placement approach discussed earlier. With the balance method, vSphere DRS and vROps begin working together.

This is an improvement over the reactive method, because vROps is working at a higher level than DRS to analyze performance across multiple clusters. While this is by itself better than DRS, the downside is that it comes with high overhead and doesn't do anything to prevent application performance issues and contention before it happens.

## Enabling Predictive Distributed Resource Scheduler (pDRS)

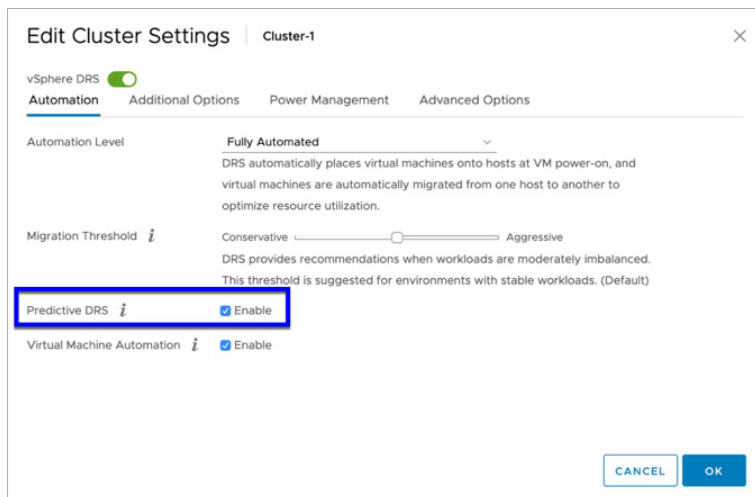
Thus, neither reactive nor balanced can promise elimination of application performance issues. While they typically fix application performance issues very quickly, there's no guarantee that they will; in addition, there's no proactive diagnosis and prevention of problems before they happen.

Predictive DRS does exactly this, helping the admin get out ahead of their infrastructure (**Figure 3-25**). With minimal overhead, pDRS predicts what resources each VM will need that day using the past resource consumption of each VM as a guide to future needs.

It combines that predictive ability with the knowledge of what VMs are on each host and the resources that each host is able to contribute. vROps makes these predictions using its dynamic thresholds. The great thing about these dynamic thresholds is that they're tailored to each individual VM and application.



**Figure 3-25**



**Figure 3-26**

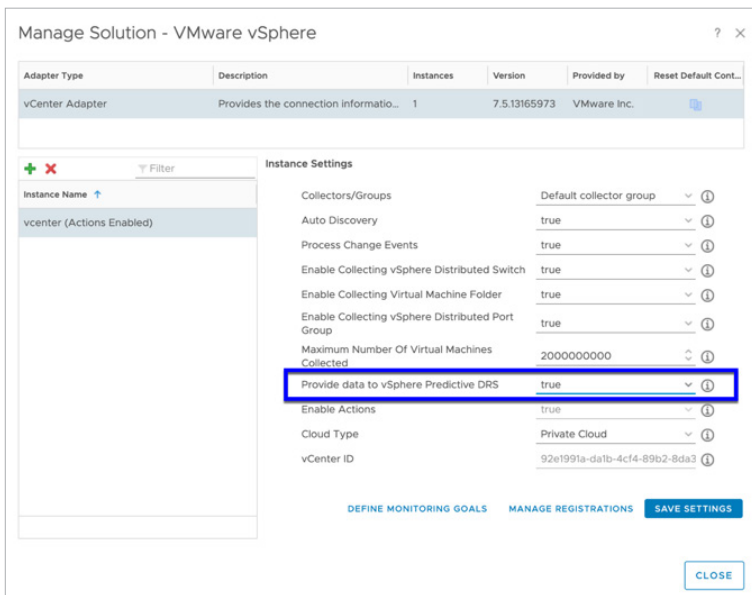
To enable pDRS, log into your vSphere Web Client (*not* vROps), go to your **Cluster Configuration** tab, click **Edit**, enable **vSphere DRS** and check the box to **Enable Predictive DRS** (see **Figure 3-26**).

Next, navigate to the **Administration** menu in vROps, then to **Solutions**. Edit your vSphere Solution, then under the advanced settings, enable the vCenter adapter to **Provide data to vSphere Predictive DRS**, as shown in **Figure 3-27**.

Each hour, predictive DRS will combine its knowledge of the environment combined with the historical resource utilization of each VM, then take action to ensure that the VMs receive the resources they need before they're needed. The end result is that your critical applications never get the chance to suffer performance degradation.

## Automated Workload Optimization

Announced with vROps 6.7 was a new automated capacity management feature called automated workload optimization (AWO). You might be thinking, "Wait! Doesn't DRS automate the balancing of workloads in vSphere?" The answer is that yes, DRS automates the balancing of



**Figure 3-27**

workloads (although, technically, it doesn't balance at all; it ensures that workloads get the resources that they need).

Unlike DRS, which works within vSphere clusters, automated workload optimization automates the optimization of workloads *between* vSphere clusters. Thus, to leverage AWO, the first requirement is having multiple vSphere clusters.

I like to say that DRS works *intra*-cluster, and AWO works *inter*-cluster.

## How Does Automated Workload Optimization Work?

You'll find **Workload Optimization** on the vROps Home screen, under the **Optimize Performance** section. See **Figure 3-28**.

New in vROps 7.5, you now have the option to edit both **Operational Intent** and **Business Intent**. In the past, Operational Intent was simply called "Placement Settings." By editing the **Operational Intent** you can

specify if you want your workloads balanced across clusters or consolidated in as few clusters as possible. It's here that you can also configure the cluster headroom.

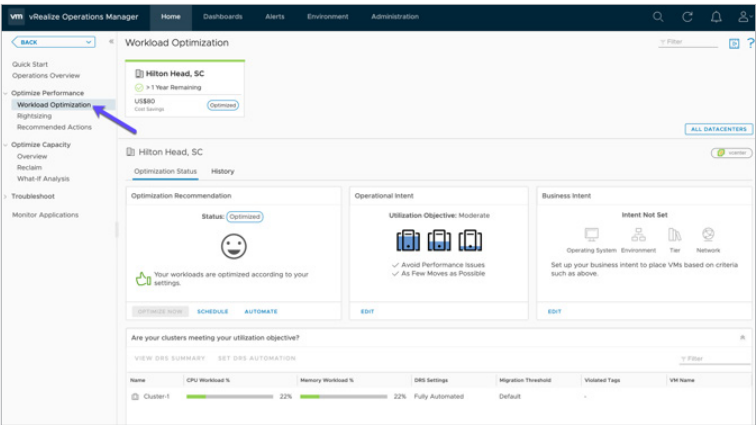


Figure 3-28

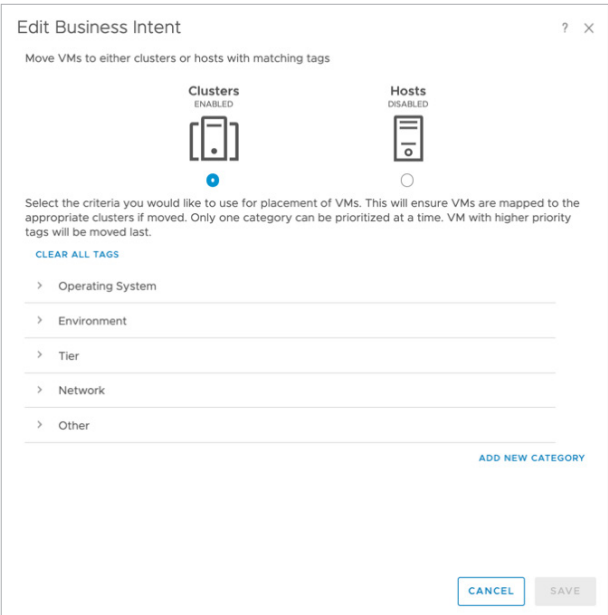


Figure 3-29

The new **Business Intent**, shown in **Figure 3-29**, allows you to create simple or complex rules defining how you would like VMs mapped to hosts or clusters: based on OS, environment, tier, network, or custom tags.

Once you have multiple clusters managed by vROps, you can choose to **Rebalance Clusters** manually (**Figure 3-30**), configure rebalancing on a **Schedule**, or make workload balancing **Automatic**.



Figure 3-30

The ultimate goal is to go from clusters that aren't optimized to clusters that are continuously and automatically optimized, as you see in **Figure 3-31**

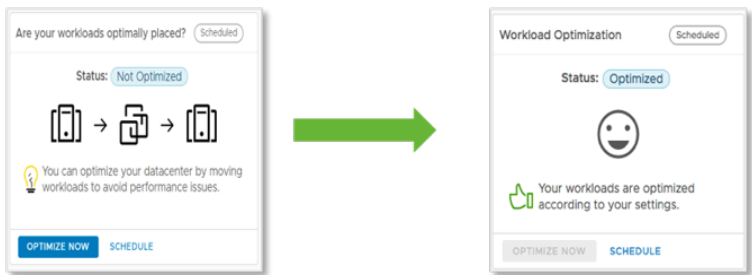
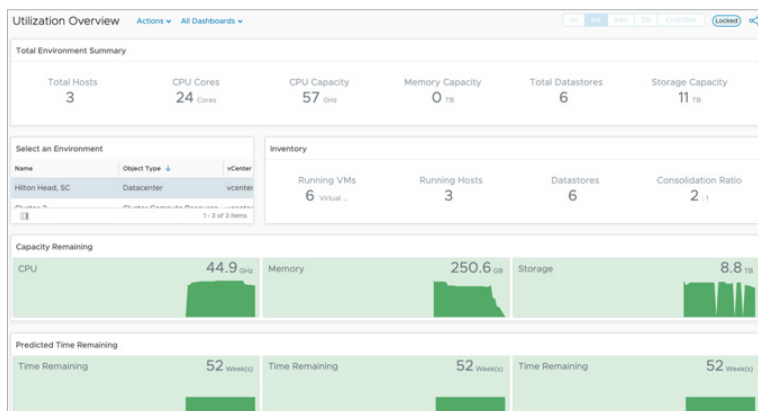


Figure 3-31





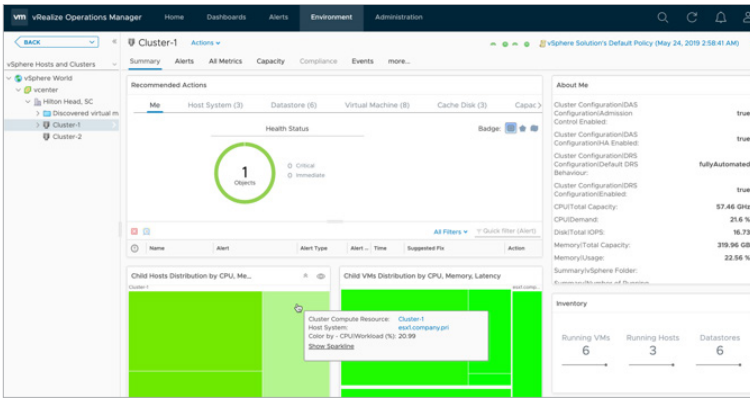
**Figure 3-32**

## Maximizing Capacity Analysis with vROps

While many admins begin analyzing capacity using the **Assesses Capacity** option on the Quick Start dashboard, it's the the **Utilization Overview** dashboard in vROps (**Figure 3-32**) that offers a host of valuable metrics:

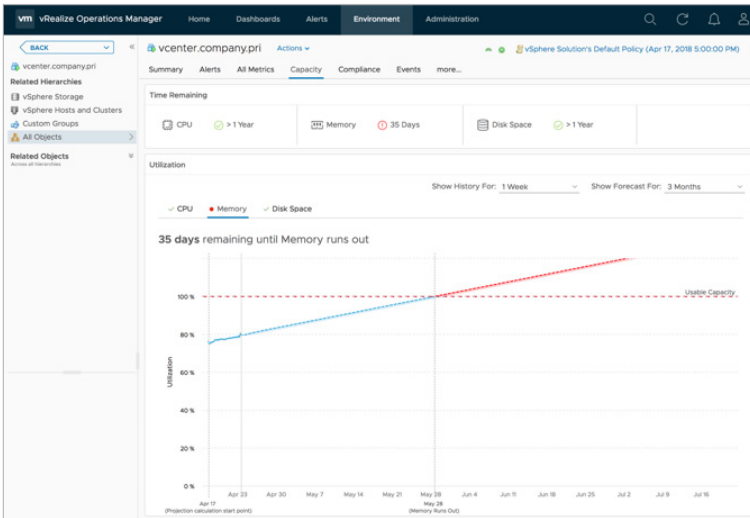
- Total environment capacity
- Used capacity
- CPU capacity trends
- Memory capacity trends
- Disk capacity trends
- Predict how much time remains before your most critical resources are depleted

By drilling down into a specific cluster, you'll move down into the environment level; from there you can drill even deeper. For example, check out the workload analysis of the cluster in **Figure 3-33**.



**Figure 3-33**

This drilldown can be done for a specific host, VM, or datastore. For example, **Figure 3-34** shows the capacity remaining for a specific VM. In this case you should be concerned, since just 35 days remain until memory runs out in your vCenter Server VM.



**Figure 3-34**

vROps can show the capacity and time remaining for any object it manages, including clusters, hosts, datastores, and VMs. It will proactively alert you should the capacity and time remaining fall below predetermined levels.

# Maximize Troubleshooting with vROps

While vROps does its best to predict and prevent problems before they happen, it's likely that at some point you'll need to use vROps to troubleshoot your vSphere infrastructure.

To that end, vROps constantly applies performance analysis to identify bottlenecks. As you can see in **Figure 3-35**, vROps offers troubleshooting dashboards for clusters, datastores, hosts, VMs, and vSAN, in addition to the ability to troubleshoot via log data.

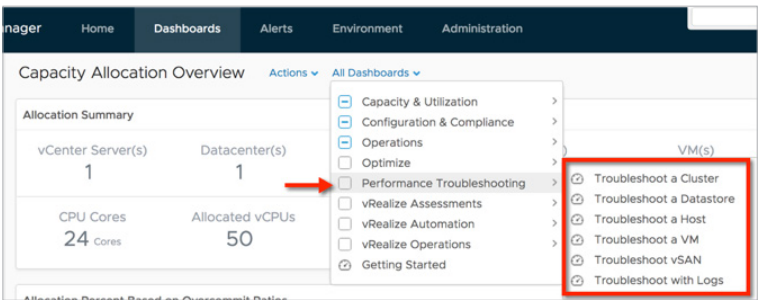


Figure 3-35

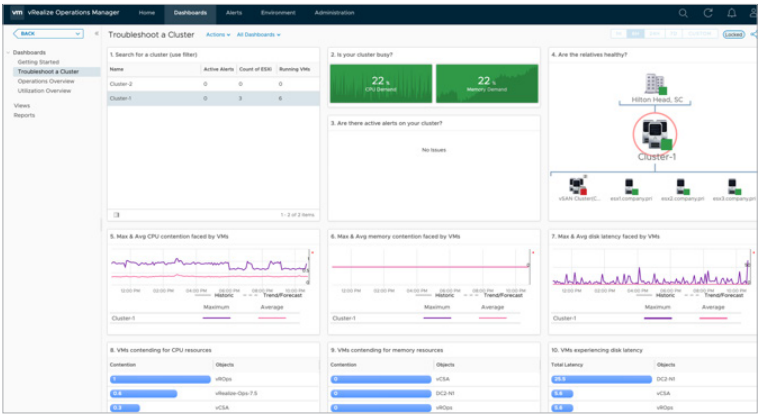


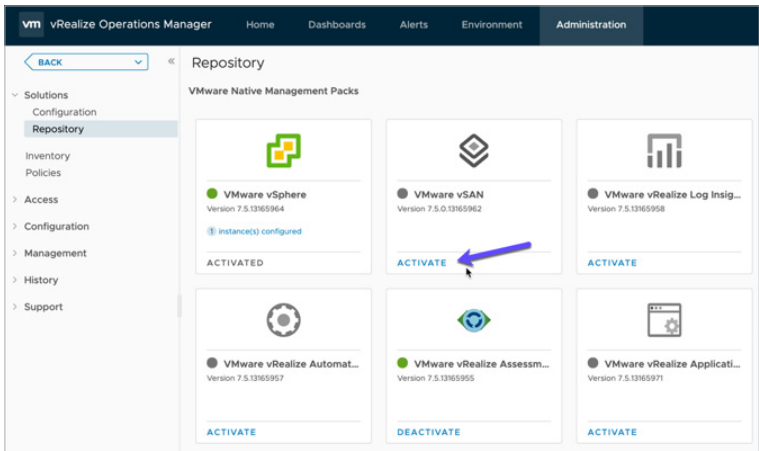
Figure 3-36

**Figure 3-36** shows how easy it is to use the **Troubleshoot a Cluster** dashboard. It enables you to quickly identify the type of contention faced by each VM in the cluster.

Besides the troubleshooting dashboards, the real power of vROps shines through when you realize how often the vROps Smart Alerts are able to point you to the root cause of an issue and provide recommendations for remediation so that you can quickly resolve any trouble that might occur.

## vSAN Management

In the past, vROps was capable of analyzing vSAN, but only when you installed the vROps Management Pack for vSAN. vSAN management has been included since vROps 6.6, but it must be activated and connected to vCenter. Note that vROps Standard edition includes the vSAN Overview and Migration Dashboards, whereas vROps Advanced and Enterprise include additional vSAN-related features such as vSAN What-If Scenarios, vSAN-Aware Workload Balancing, and vSAN Performance, Capacity, and Troubleshooting.



**Figure 3-37**

To activate and connect the vSAN management pack, go to the **Administration** menu, then to **Repository**; select **Activate VMware vSAN Management Pack** (Figure 3-37).

From there, confirm that you do indeed want to activate the vSAN management pack by clicking Yes; after a few minutes of installation, the vSAN management pack will be ready to configure.

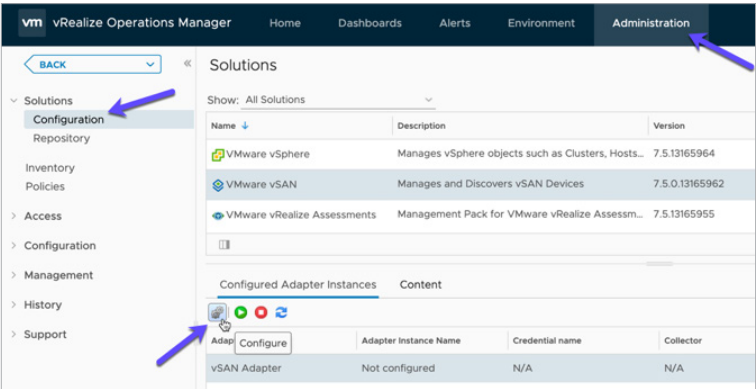


Figure 3-38

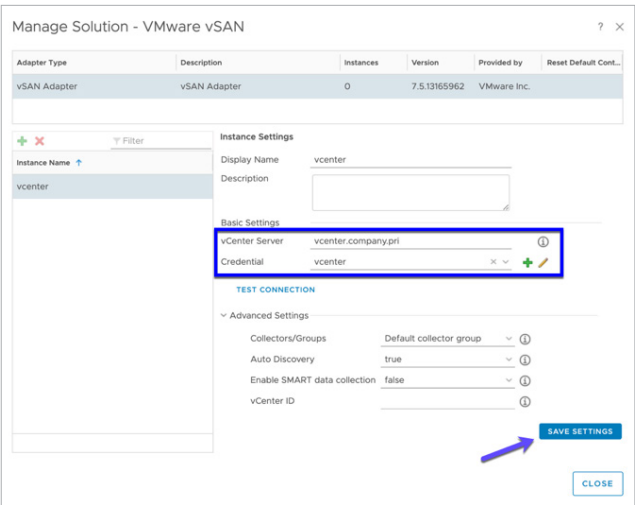


Figure 3-39

Next, click on the **Solutions, Configuration**, then on the **VMware vSAN** solution, select the **vSAN Adapter** and click the **Gear** icon, as shown in **Figure 3-38**.

Next, you'll add your **vCenter Server Hostname** and **Credentials** to connect to your vCenter server, as shown in **Figure 3-39**.

After you get a successful test of the connection and credentials (by clicking **Test Connection**), make sure that you click **Save Settings**.

At this point, vROps will begin gathering statistics from your vCenter server related to vSAN; then you'll quickly start seeing some very insightful statistics and recommendations from vROps.

## **vSAN Dashboards in vRealize Operations**

vROps offers a number of dashboards, including:

- vSAN Capacity Overview
- Migrate to vSAN
- vSAN Operations Overview
- Troubleshoot vSAN

**Figure 3-40** displays the **vSAN Operations Overview Dashboard**.

These dashboards are invaluable. They allow you to plan capacity across multiple vSAN clusters, optimize vSAN clusters, prevent vSAN trouble before it happens; and, if needed, troubleshoot vSAN (**Figure 3-41**).

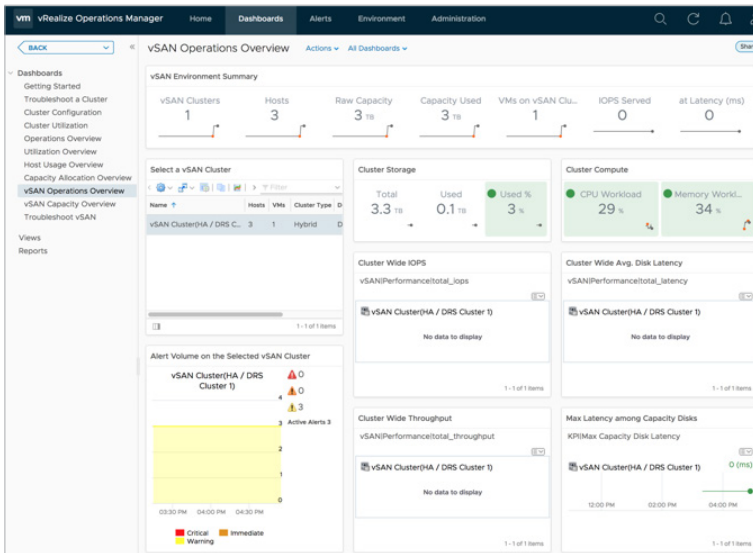


Figure 3-40

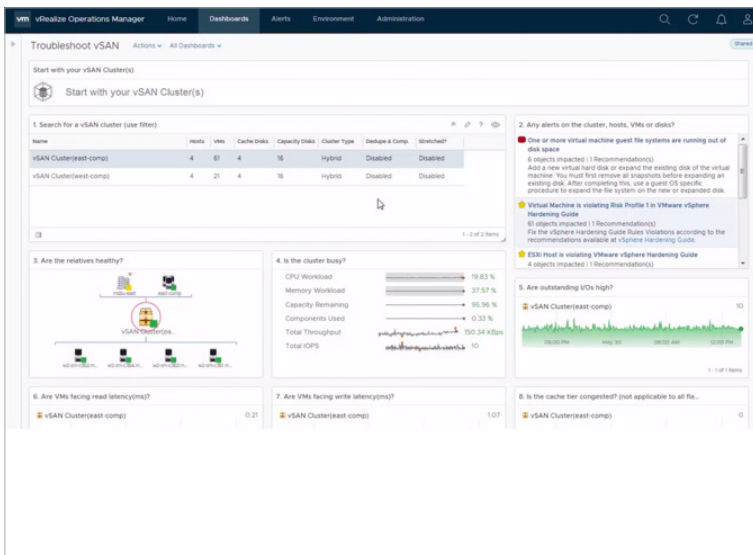


Figure 3-41

## Summary

In this chapter, you've learned how to configure the most common vROps features and how to maximize your vSphere infrastructure using vROps features like predictive DRS, vSAN management, and powerful capacity dashboards.

With the latest version of vROps, even more powerful features have been released. In the next chapter we'll dive into the latest vROps features that will allow you to enable a self-driving vSphere infrastructure.

Drive on!



## CHAPTER 4

# Maximizing vRealize Operations

To get the maximum power of vROps, make sure you read this chapter completely. With vROps 6.7, VMware brought “Self-Driving Operations for the Data Center,” and with subsequent releases of vROps—7.0 and now 7.5—VMware has taken this to a whole new level. What does this mean for you?

VMware says that the self-driving data center brings “Continuous performance optimization based on operational and business intent, efficient capacity management, proactive planning, and intelligent remediation.”

The goal for the self-driving data center is to provide a unified management platform so that the IT organization can optimize, plan, and scale the software-defined data center and multiple cloud deployments, from the applications to the infrastructure.

Before we jump into the latest enhancements with vROps 7.5, let’s first do a quick review of the major new enhancements in vROps 6.7, as there are some important features included that you need to be aware of.

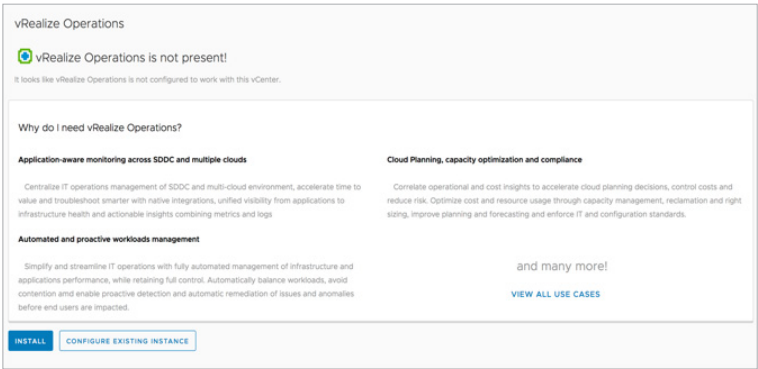
## Review of vRealize Operations 6.7 Features

Important vROps 6.7 enhancements included:

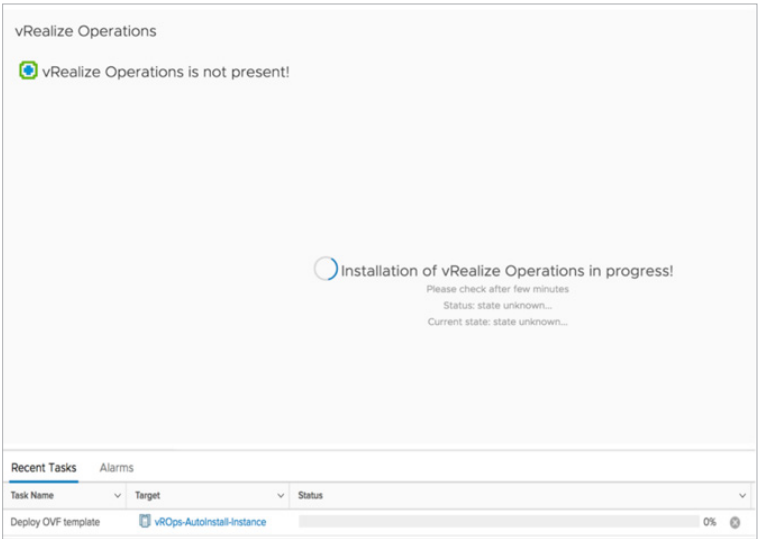
**High speed installation**—while we used the traditional method of downloading the vROps OVA file and then deploying the appliance to

your cluster, this new feature allows you to have vCenter download vROps for you and deploy it directly, saving you significant time.

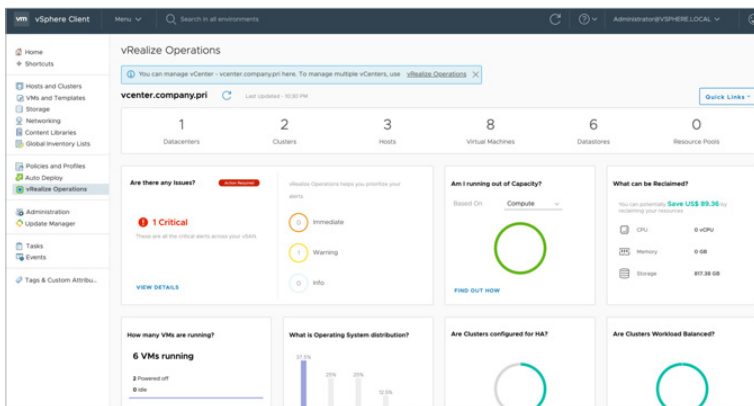
In fact, if you’re running vCenter 6.7 or greater and don’t have vROps installed, vCenter will prompt you to install it (as you see in **Figure 4-1**).



**Figure 4-1**



**Figure 4-2**



**Figure 4-3**

**vRealize Operations plugin for vCenter**—vROps is automatically integrated in the vSphere Client such that the vROps plug-in overview dashboard is available from the vSphere Client Home screen.

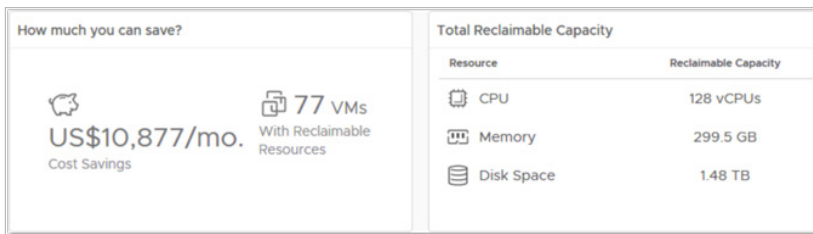
The vRealize Operations within vCenter plugin provides you with six new dashboards directly inside your vCenter UI (**Figure 4-4**).

The end result is that you get all the goodness of vROps in your vSphere client, helping you be more productive than ever.

**Cost savings assessment with automated optimization**—view total cost of ownership and get detailed insights on potential cost savings from reclamation, and analyze optimum densities for the future.



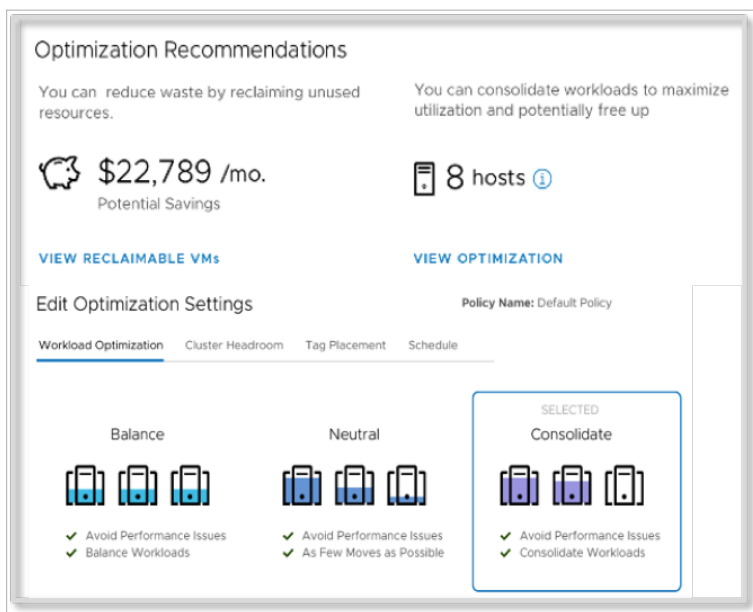
**Figure 4-4**



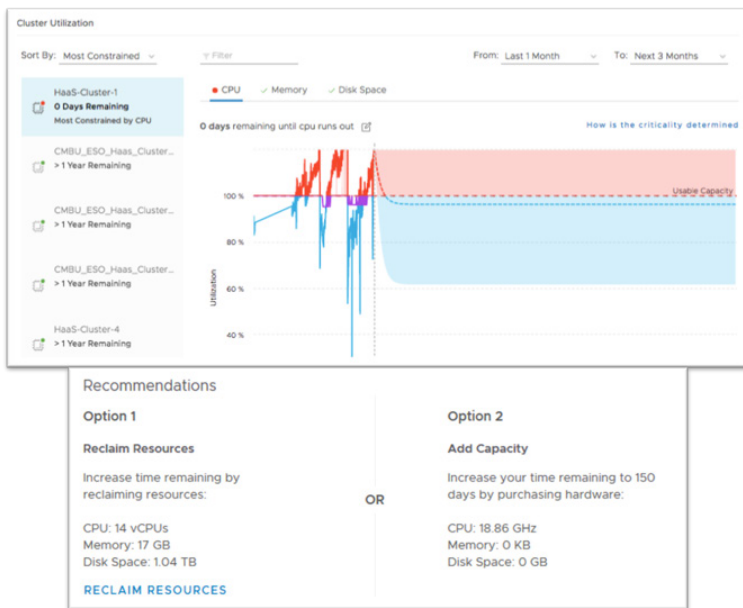
**Figure 4-5**

**Figure 4-5** shows an example of the kind of savings opportunities presented. As you can see, cost data is directly correlated with capacity analytics to ensure that you intelligently reclaim capacity when it's not needed.

After getting an idea of which data centers to prioritize and potential cost savings (**Figure 4-6**), you can easily automate optimization actions. This includes reclamation, right-sizing and automating workload balancing to reduce license costs, as well as densification to



**Figure 4-6**



**Figure 4-7**

consolidate workloads into minimal clusters while assuring that you meet goals for performance, target utilization, and defined intent.

The new capacity analytics engine is able to view historical trends and predict the most constrained resources such as CPU, memory, and disk space. It can also give recommendations to either reclaim unused capacity or even add capacity (**Figure 4-7**).

**What-if scenarios for private and public cloud workload distribution**—as shown in **Figure 4-8**, you can determine if VMware Cloud on AWS or AWS EC2 would be a lower-cost option for running your workloads.

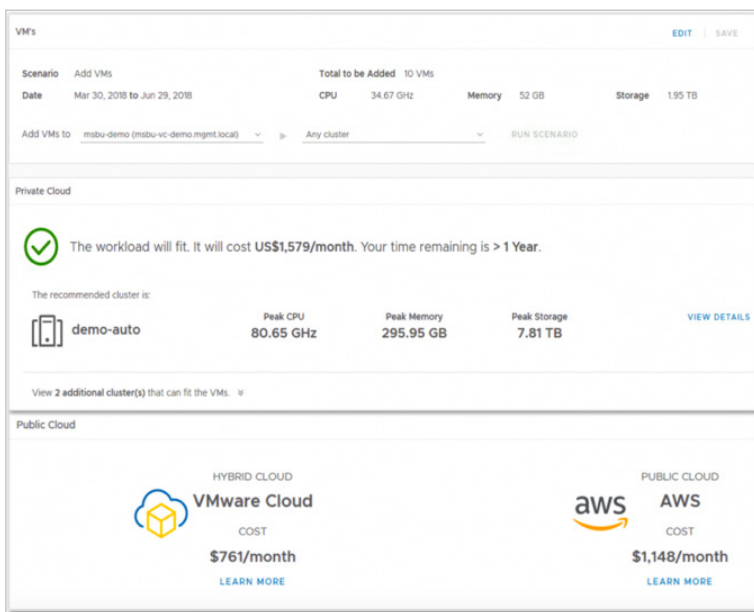


Figure 4-8

## New vRealize Operations 7.0 and 7.5 Features

With vROps 7.0 and 7.5, the focus has been on driving real business value from the self-driving features of vRealize Operations. Here are some of the top new features:

**Enhanced user interface**—With an updated UI that makes vROps easier to use, you’ll be more productive. The new UI includes a use case and persona-based “Quick Start Dashboard” to help you quickly perform operational tasks. It also includes updated workflows for enterprise-wide troubleshooting with metrics and logs. **Figure 4-9** shows the new interface.

**Fully automated workload balancing based on business and operational intent**—With the new **Automate** button, vRealize Operations will automatically search for optimization opportunities across

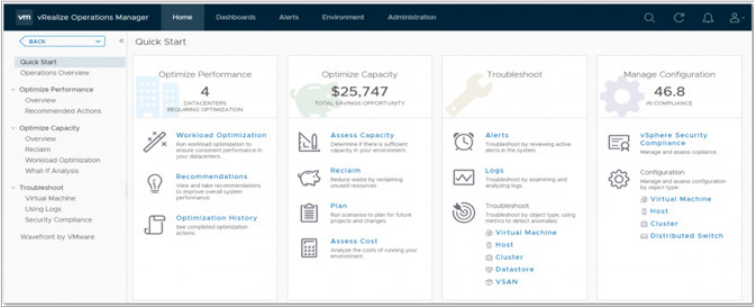


Figure 4-9

multiple clusters and execute accordingly (shown in **Figure 4-10** and **Figure 4-11**).

**Automated host-based placement, driven by business intent**—This provides the ability to automate DRS based on business intent. This can be used for license separation, compliance, tiering, and more (**Figure 4-12**).

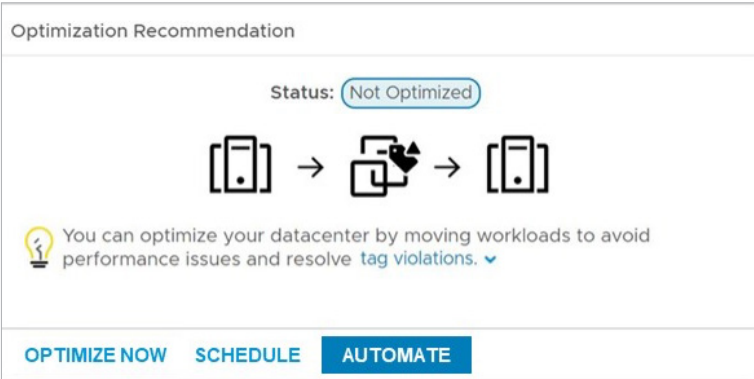
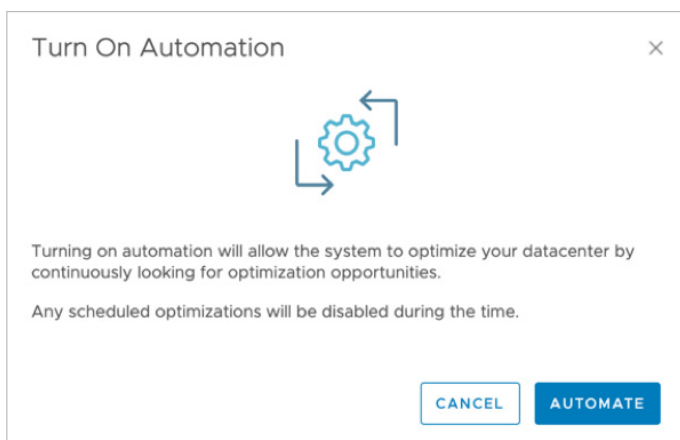
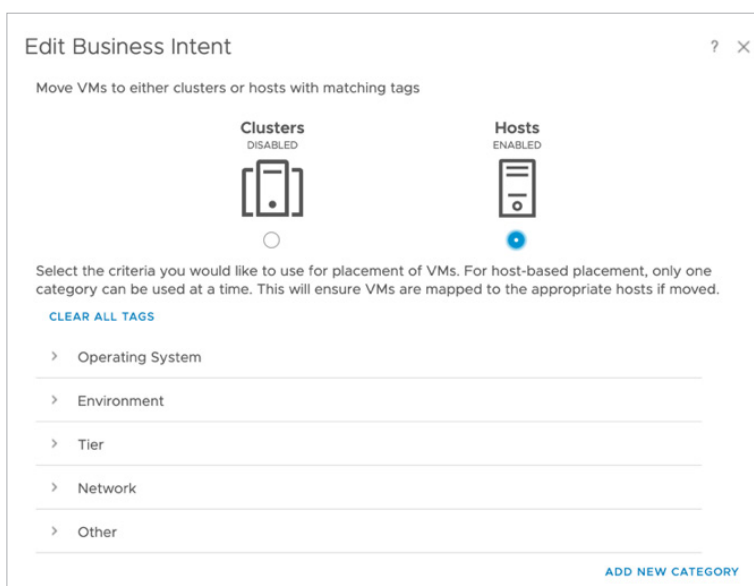


Figure 4-10



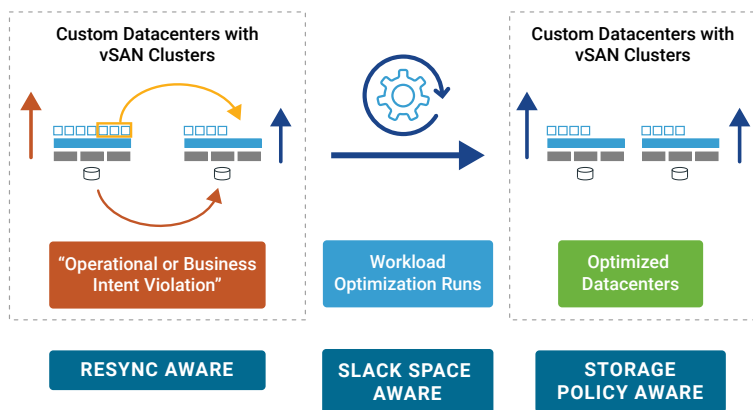
**Figure 4-11**



**Figure 4-12**



## vSAN Aware Workload Optimization



**Figure 4-13**

**vSAN-aware workload optimization**—This provides placement optimization for vSAN workloads using storage intent definition and storage aware workload placement that is Resync, slack-space, and storage policy-based management (SPBM) aware (**Figure 4-13**).

**Allocation and demand-based capacity management**—This gives you the ability to calculate capacity remaining based on multiple capacity models—either demand or allocation. It also allows you to determine the number of VMs remaining based on custom profiles (**Figure 4-14**).

### Allocation and Demand based Capacity Management

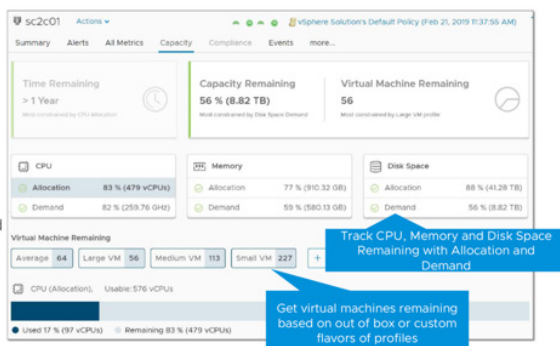
#### Capacity Remaining

#### Capacity Remaining based on Capacity Model

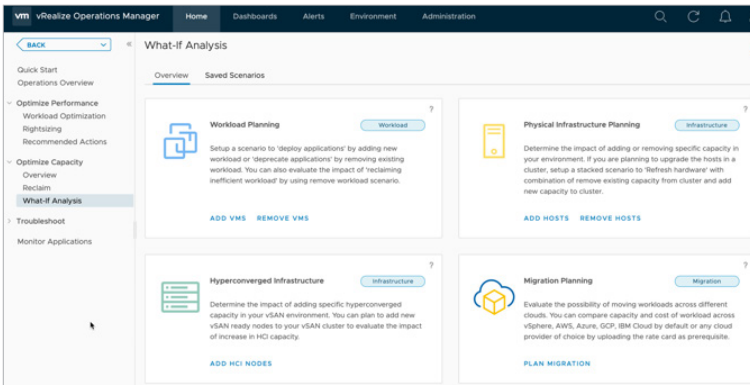
- Demand (e.g. based on GHz CPU consumed)
- Allocation (e.g. based on configured overcommit ratio)

#### Virtual Machine Remaining using Custom Profiles

- Define custom profiles and track virtual machine remaining to easily plan new projects.



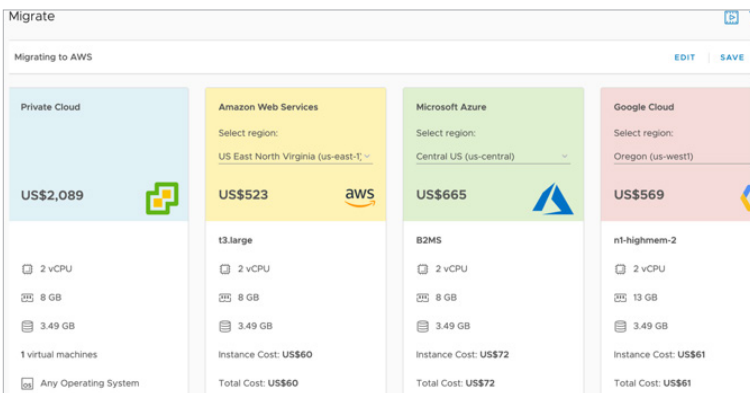
**Figure 4-14**



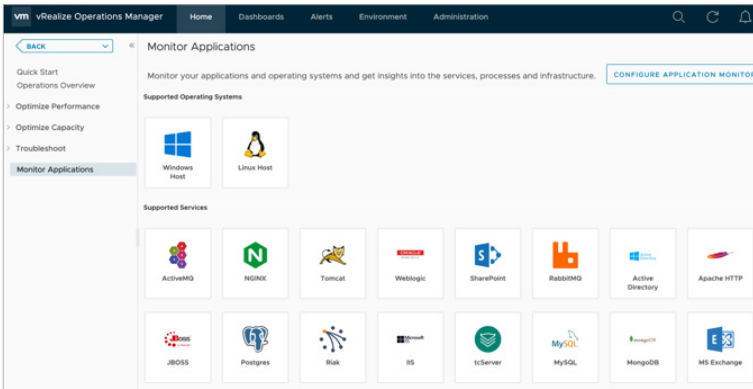
**Figure 4-15**

**What-if analysis with multi-cloud migration, hyperconvergence, and physical infrastructure planning**—This multi-cloud comparison includes VMware Cloud on AWS, Azure, Google Cloud Platform (GCP), and IBM Cloud by default. You can add any cloud provider for comparison by uploading the rate card in an easy-to-use Excel format (**Figure 4-15**).

It only takes a few clicks to select all the VMs in your vSphere infrastructure and see what it would cost to run those same workloads in the public cloud (**Figure 4-16**).



**Figure 4-16**



**Figure 4-17**

**Native application monitoring is now included**—With vROps 7.5, application agents from Wavefront (called Telegraf agents) are included for easy application monitoring (**Figure 4-17**).

To manage agents, you simply deploy the Application Remote Collector (ARC), a virtual appliance that can support up to 6,500 VMs in the “Large” deployment configuration (more information on sizing is available at VMware KB 67752).

After deployment, simply register the ARC with vROps and select the vCenter servers hosting VMs with applications you’d like to monitor. At that point, you’re ready to start deploying Telegraf. Once the Telegraf agent is deployed, a service discovery runs to find any of the supported applications on the VM (**Figure 4-18**).

Objects <span>Manage Agents</span> <span>Geographical</span>						
<span>Collection State</span> <span>VM Name</span> <span>Operating System</span> <span>Services Discovered</span> <span>Agent status</span> <span>Last operation status</span> <span>VM State</span>						
db-c-902	CentOS 7 (64-bit)	Remote Check <span>mysql</span>	Agent Running	Install Success	Powered On	
db-w-907	Microsoft Windows Server 2016 (64-bit)	Remote Check <span>mssql</span>	Agent Running	Install Success	Powered On	
web-c-901	CentOS 7 (64-bit)	Remote Check <span>apache</span>	Agent Running	Install Success	Powered On	
web-w-906	Microsoft Windows Server 2016 (64-bit)	Remote Check <span>mssql</span>	Agent Running	Install Success	Powered On	

**Figure 4-18**

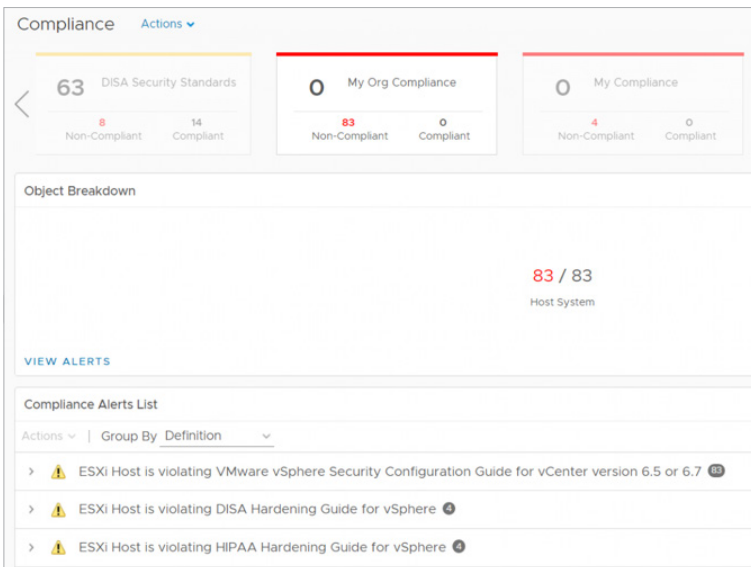


**Figure 4-19**

Then select the applications you wish to monitor, provide some configuration details, and you're ready to go.

Updates also include application-specific dashboards, agent lifecycle management, and “application to infrastructure line of sight” (as shown in **Figure 4-19**)

**Integrated compliance**—Compliance management for vSphere is included in vROps 7.5. In addition to common compliance templates like PCI, HIPAA, DISA, ISO, CIS, and FISMA, you'll be able to create your own custom compliance standards and activate automated configuration management and drift remediation with out-of-the-box workflows and VMware vRealize Orchestrator integration.



### Figure 4-20

As you might expect, these compliance workflows are completely integrated with the rest of vRealize's Self-Driving Operations mandates, meaning configuration changes will be interpreted in light of other performance or capacity requirements (**Figure 4-20**).

If your vSphere infrastructure is out of compliance, you can have vROps fix it for you with a few clicks.

vROps 7.5 includes a huge feature payload and a smorgasbord of usability improvements—too many to list here, in fact.

One of the coolest published stats about vROps 7.x is that, according to Forrester's Total Economic Impact (TEI) Study, actual customers who used 7.0 realized a 3-year ROI of more than 300%, and passed the break-even point on their investment in less than 3 months. Those are head-turning numbers.

## What's Next?

In this book you've learned the power of vROps: how it works, how it's packaged, how it's installed, and how it's configured.

More importantly, you've learned how to maximize the power of vROps to make the most of your vSphere infrastructure. When paired together, the latest version of vSphere and vRealize Operations 7.5 are a data center solution that provides powerful features like predictive DRS, workload optimization, cost savings, and, ultimately, the self-driving data center.

## Get Started with vRealize Operations Today!

If you already have vROps but aren't running the latest version, check out the vROps Upgrade Center:

<https://www.vmware.com/products/vrealize-operations/upgrade-center.html>

If you don't have vROps in place already, you can sign up for a free 60-day evaluation:

<https://my.vmware.com/en/web/vmware/evalcenter?p=vrops-eval>

