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Lab Overview - HOL-1906-02-SLN - Automate IT - Making Private Cloud Easy
Lab Guidance

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

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

This lab contains four modules aimed at exploring practical Software-Defined Data Center (SDDC) use cases for automating the delivery of IT services in a private cloud environment. The lab will walk through some of the main integration points between the vRealize Suite (vRS) components such as vRealize Operations, vRealize Automation, and vRealize Log Insight. It will also showcase integration between vRealize Suite and the rest of the VMware SDDC stack, including NSX and SPBM storage for app-centric networking, security and storage automated provisioning. These powerful individual components work even better together, with less time, cost, and effort.

Lab Module List:

- **Module 1 - vRealize Automation & vRealize Operations Integration (30 minutes, Intermediate)**
- **Module 2 - vRealize Log Insight & vRealize Operations Integration (30 minutes, Intermediate)**
- **Module 3 - Better together: vRA & NSX App-Centric Network and Security (45 minutes, Intermediate)**
- **Module 4 - Better together: vRA & SPBM App-Centric Storage (30 minutes, Intermediate)**

Lab Captains:

- **Module 1 - Hassan HAMADE, Cloud Architect, EMEA.**
- **Module 2 - Clement WONG, Cloud Management Specialist, Singapore.**
- **Module 3 - Hassan HAMADE, Cloud Architect, EMEA.**
- **Module 4 - Hassan HAMADE, Cloud Architect, EMEA.**

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 have a localized manual deployed with your lab, you may utilize this document to help guide you through the process:


**Location of the Main Console**

1. The area in the RED box contains the Main Console. The Lab Manual is on the tab to the Right of the Main Console.
2. A particular lab may have additional consoles found on separate tabs in the upper left. You will be directed to open another specific console if needed.
3. Your lab starts with 90 minutes on the timer. The lab can not be saved. All your work must be done during the lab session. But you can click the **EXTEND** to increase your time. If you are at a VMware event, you can extend your lab time twice, for up to 30 minutes. Each click gives you an additional 15 minutes. Outside of VMware events, you can extend your lab time up to 9 hours and 30 minutes. Each click gives you an additional hour.

**Alternate Methods of Keyboard Data Entry**

During this module, you will input text into the Main Console. Besides directly typing it in, there are two very helpful methods of entering data which make it easier to enter complex data.
Click and Drag Lab Manual Content Into Console Active Window

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

Accessing the Online International Keyboard

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

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

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

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

Click on the @ key

1. Click on the "@ key".

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

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

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

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

This cosmetic issue has no effect on your lab.

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

In this module, we will walk through the integration between vRealize Automation and vRealize Operations. We will start by showing how vRealize Operations provides deep visibility into the structure and the health of the vRealize Automation platform. We will then see how the two solutions integrate together to provide intelligent workload placement by using analytics-based initial placement policies to recommend the optimal compute cluster and datastore for a workload.
Review the vRealize Automation Dashboard in vRealize Operations

vRealize Operations is a powerful and user-friendly solution for environment management and monitoring. When integrating and extending its reach with VMware and third party management packs and plug-ins, users have the ability to intimately understand the operational efficiency of their environments and seamlessly adjust and correlate visibility of their metrics and trends.

In this module, we will review the vRealize Automation-centric dashboards in vRealize Operations Manager and investigate the metrics and data of most utility for people in charge of monitoring vRealize Automation as a whole platform.

The integration between vRealize Operations and vRealize Automation has been completed already, so this is a walk-through of what setting up the integration looks like.

**Open Chrome Browser**

1. Click on the **Google Chrome** icon on the Windows taskbar

**Adjust Browser Zoom Level**

As the Hands On Labs default resolution is relatively low, if the zoom is not already set to 80%, we will need to adjust this setting in the browser to make sure all necessary areas are visible and accessible.
1. Click the menu icon on the top right corner of the browser window.
2. Click the "-" symbol to decrease the zoom to 80%.
3. Press the "ESC" key on your keyboard.

**Navigate to vRealize Operations**

![Image of navigation to vRealize Operations]

1. In your open browser, click the vRealize Operations bookmark or navigate to https://vrops-01a.corp.local

**Log In to vRealize Operations Manager**

![Image of login page]

We will authenticate using vRealize Operations Manager local user database.

1. Make sure to select Local Users from the dropdown listbox.
2. Use admin for username and VMware1! for the password.
3. Click LOG IN.
Navigate to Administration

Management Packs are accessed through the Administration section, so we'll navigate there

1. Click Administration

Navigate to the vRealize Automation Management Pack

Here we can see all of the Solutions and Management Packs currently installed and made available to the vRealize Operations Manager instance.

1. Click Solutions
2. Expand the Name column
3. Scroll down the list until you see **VMware vRealize Automation**
4. Select the **VMware vRealize Automation** solution
5. Observe that the management pack is already configured
6. Click on the gear icon to view the configuration
View the vRealize Automation Adapter Instance Settings

The vRealize Automation Management Pack has already been configured, so we'll view the settings. Ensuring connectivity for the collection of information is vital to the accuracy of data provided by vRealize Operations Manager. This is where Collection State and Collection Status are most relevant.

Under Basic Settings:

1. Note the URL for the vRealize Automation Appliance URL of https://vra-01a.corp.local
2. Leave the Credentials-vRA-Adapter credential selected
3. Click Test Connection

Acknowledging Test Success

An informational prompt of the successful test result will appear.
1. Click **OK**

**View the vRealize Automation Adapter Advanced Settings**

vRealize Automation (version 7.4) and vRealize Operations (version 6.7) come together to provide analytics-based initial placement policies for vSphere machines. vRealize Automation will use analytics data in vRealize Operations to optimize the placement of workloads.

1. Click On the Down Arrow on **Advanced Settings**
2. Note that **vRA Enabled Intelligent Placement** is set to **ON** - this allows vRealize Operations Manager to manage the placement of VMs that are part of clusters managed by vRealize Automation. This mode is always ON and used for work-load placement (WLP)
Close the vRealize Automation Adapter Instance Settings

1. Click on **Advanced Settings** to collapse it
2. Click on **Close** (note - you may need to adjust the dialog box to see the close button)
Navigating Back to Home

Configuring the integration of vRealize Automation with vRealize Operations provides tenant-aware visibility of the infrastructure. With this extended visibility, operational management extends to vRealize Automation cloud objects such as Tenants, Business Groups, Reservations and Reservation Policies. We will access this visibility through out-of-the-box Dashboards and Views.

1. Click **Home**

Dashboards Overview

After configuring the integration between vRealize Automation and vRealize Operations Manager, additional out-of-the-box Dashboards are made available.
Maximize the viewable screen area by toggling the side bar

1. Click the side bar toggle

**Navigate to Dashboards**

1. Click on Dashboards

**Navigate to the vRealize Automation Dashboards**

We will take a look at the out-of-the-box vRealize Automation Environment Overview dashboard first.

1. Click on the **down arrow** next to **All Dashboards**
2. Click on the **arrow** next to **vRealize Automation**
3. Click on **Environment Overview**

**View the vRealize Automation Environment Overview Dashboard**

[Image of the vRealize Automation Environment Overview dashboard]

Windows have been re-sized to show a more complete view. You will need to scroll down to see some of the information shown in the screenshot.

With the vRealize Automation Environment Overview dashboard, we can view information about Tenants, Business Groups, Reservations, Blueprints and related alerts. We can also view the health, risk and efficiency of resources for a given object from the managed inventory.

As this lab has been designed and built to operate at a very lean capacity, this lesson simply outlines the out-of-the-box visibility and functionality made available by the vRealize Automation Management Pack for vRealize Operations Manager. In larger and more complex production and lab environments, much more information would typically be shown.

There is only one tenant configured in the vRealize Automation environment, vsphere.local, and the information shown in the different widgets relates to this tenant.
Observe and review the updated information now populated in the other widgets. Multiple widgets are visible in this dashboard - below are brief descriptions of some of them:

- **Environment Summary**: Use this widget to view the health of tenants, business groups, virtual machines, blueprints, reservations, deployments, cluster compute resources and the relationships between these objects. If you double-click an object in the Environment Overview widget, you can view detailed information for the object.

- **Tenant List**: Use this widget to view the tenant objects available in the environment. You can see a data grid with a list of objects in the inventory on which you can sort and search.

- **Business Group List**: Use this widget to view the business group objects available in the environment. You can see a data grid with a list of objects in the inventory on which you can sort and search.

- **Configured Users**: Use this widget to view the business group name and the user configured for the business group.

- **vRealize Automation Inventory**: Use this widget to view the objects available for each vRealize Automation solution that is deployed in the environment.

- **vRealize Automation Managed Clusters**: Use this widget to view the vCenter clusters which are managed by vRealize Automation. You can see a data grid with a list of objects in the inventory on which you can sort and search.

- **Top Alerts**: Alerts with the greatest significance on the selected objects it is configured to monitor. The top alerts include a short description of alerts configured for the widget. The alert name opens a secondary window from which you can link to the alert details. In the alert details, you can begin resolving the alerts.
Navigate to the vRealize Automation Top-N Dashboard

We will now take a look at the out-of-the-box vRealize Automation Top-N Dashboard

1. Click on the **down arrow** next to **All Dashboards**
2. Click on the **arrow** next to **vRealize Automation**
3. Click on **Top-N Dashboard**
View the vRealize Automation Top-N Dashboard

You can use the widgets in the vRealize Automation Top-N dashboard to view the top results from analysis of blueprints and business groups that you select. In the current setup, there are no numbers and figures because those HOL environments get provisioned dynamically for each student and no deployments have been performed before you, as a student, start using them.

However, as you start deploying resources from the next lesson onwards, you will see these start to be populated with data.

You can use the Top-N dashboard to perform some of the following tasks:

- To view the most popular blueprints, business groups, and tenants.
- To view the business groups that have the most critical alerts.

You can actually use the dashboard widgets in several ways.

**Tenant with most critical alerts:** Use this widget to view the top-five tenant objects that have the most critical alerts.

**Business Groups with most Critical Alerts:** Use this widget to view the top-five business group objects that have the most critical alerts.

**Tenant with most failed requests:** Use this widget to view the top-five tenant objects that have the most failed requests.
Most popular deployed Tenant: Use this widget to view the top-five most popular deployed tenant objects in the environment.

Most popular deployed Business Group: Use this widget to view the top-five most popular deployed business group objects in the environment.

Most Popular Deployed Blueprints: Use this widget to view the top-five most popular deployed blueprint objects in the environment.

Most Popular Deployed Business Group (7 day trend): Use this widget to view graphical trends that contain metrics for the virtual machine count that has been deployed the most for the business group object over a seven-day period.

Most Popular Deployed Blueprints (7 day trend): Use this widget to view graphical trends that contain metrics for the virtual machine count that has been deployed the most for the blueprint object over a seven-day period.

Navigate to the vRealize Automation Application Overview

We will now take a look at the out-of-the-box vRealize Automation Application Overview Dashboard

1. Click on the down arrow next to All Dashboards
2. Click on the arrow next to vRealize Automation
3. Click on Application Overview
View the vRealize Automation Top-N Dashboard

You can use the widgets in the Application Overview dashboard to view the blueprint objects and the blueprint deployment details.

You can use the Application Overview dashboard to view the hierarchy, the properties of the blueprint and deployments, and the metric information.

Below is a detailed description of the widgets in this dashboard:

**Blueprint List:** Use this widget to view the blueprint objects in the environment.

**Blueprint Overview:** Use this widget to view the relationship between the blueprint objects and the deployment, virtual machines, cluster compute resources, and the datastore objects. To find the deployment, virtual machine, and other related details, click the blueprint object.

**Blueprint Property List:** Use this widget to view the properties of the blueprint object such as the total cost, average deployment time, and the average cost of the blueprint object.

**Deployment List:** Use this widget to view the blueprint objects deployed in the environment.

**Deployment Property List:** Use this widget to view the properties for the deployment object such as the cost until date and the approval time for each deployment.

**Blueprint Deployment Info:** Use this widget to select a metric. You can view the details in the Metric Chart widget.
**Metric Chart:** Use this widget to view the relevant data based on the metric you select in the Blueprint Deployment Info widget.

**Note:** If you have started with this module (module 1) in this lab (there are four modules overall) you will most likely see little data on this dashboard. The Deployment List widget, for instance, will not show any deployment since nothing has been requested by students so far. It will start populating as you make progress in the lab so feel free to come back and check this dashboard to see how data populates when working later in module 1 or when you perform modules 2, 3 and 4.

**Navigate to the vRealize Automation Resource Consumption Overview Dashboard**

We will now take a look at the out-of-the-box vRealize Automation Resource Consumption Overview Dashboard

1. Click on the **down arrow** next to **All Dashboards**
2. Click on the **arrow** next to **vRealize Automation**
3. Click on **Resource Consumption Overview**
View the vRealize Automation Resource Consumption Overview Dashboard

Windows have been re-sized to show a more complete view. You will need to scroll down to see some of the information shown in the screenshot.

You can use the widgets in the Resource Consumption Overview dashboard to view the resources consumed by vRealize Automation on a vCenter Server.

Below is a detailed description of the widgets in this dashboard:

**Tenant List:** Use this widget to view the tenant objects available in the environment. You can see a data grid with a list of tenants objects in the inventory on which you can sort and search.

**Business Group List:** Use this widget to view the business group objects available in the environment. You can see a data grid with a list of objects in the inventory on which you can sort and search.

**Reservation List:** Use this widget to view the reservation objects available in the environment. You can see a data grid with a list of objects in the inventory on which you can sort and search.

**Tenant Capacity:** Use this widget to analyze the capacity of the tenant object.

**Business Group Capacity:** Use this widget to view the memory, storage, and quota capacity that is allocated, reserved, and free for each business group object.
**Reservation Capacity:** Use this widget to view the memory, storage, and quota capacity that is allocated, reserved, and free for each reservation object.

**Tenant Memory Trend:** Use this widget to view and analyze a seven-day trend for the memory allocated, reserved, and free for a tenant object.

**Tenant Storage Trend:** Use this widget to view and analyze a seven-day trend for the storage allocated, reserved, and free for a tenant object.

**Log Out of vRealize Operations Manager**

1. Click the down arrow next to the user icon
2. Click **Log Out**
Review the vRealize Automation Dashboard in vRealize Operations

vRealize Operations is a powerful and user-friendly solution for environment management and monitoring. When integrating and extending its reach with VMware and third party management packs and plug-ins, users have the ability to intimately understand the operational efficiency of their environments and seamlessly adjust and correlate visibility of their metrics and trends.

In this module, we will review the vRealize Automation-centric dashboards in vRealize Operations and investigate the metrics and data of most utility for people in charge of monitoring vRealize Automation as a whole platform.

The integration between vRealize Operations and vRealize Automation has been completed already, so this is a walk-through of what setting up the integration looks like.

Navigate to vRealize Operations

1. In your open browser, click the **vRealize Operations Manager** bookmark or navigate to https://vrops-01a.corp.local
Log In to vRealize Operations Manager

We will log in to vRealize Operations

1. Make sure to select Local Users from the dropdown listbox.
2. Enter admin for username and VMware1! for the password.
3. Click LOG IN.
Navigate to Administration

Management Packs are accessed through the Administration section, so we'll navigate there

1. Click **Administration**

Navigate to the vRealize Automation Management Pack

Here we can see all of the Solutions and Management Packs currently installed and made available to the vRealize Operations Manager instance.

1. Click **Solutions**
2. Expand the **Name** column
3. Scroll down the list until you see **VMware vRealize Automation**
4. Select the **VMware vRealize Automation** solution
5. Observe that the management pack is already configured
**IMPORTANT NOTE:** We have observed, in some cases, the vRealize Automation Adapter adapter in a failed state. This is due to the dynamic nature of the Hands-on-Labs environment. If your adapter shows a failed state as in the next picture, please apply the following procedure to fix the problem before you move forward to the next section:

**PROCEDURE to fix vRealize Automation Adapter in a failed state:**

1. Select **VMware vRealize Automation** under **Name**
2. Highlight **vRealize Automation Adapter** under **Adapter Type**
3. Click the **Stop Collecting** button
4. Click the **Start Collecting** button
5. Wait for a couple of seconds (10s) and click **refresh**
After a few seconds, you should see "Adapter Status", "Collection State" and Collection Status" fields all turn green again. You can now move to the next step in this lesson.

**View vRealize Automation Configuration**

1. Highlight **VMware vRealize Automation** under **Name**
2. Click on the **gear icon** to view the configuration

**View the vRealize Automation Adapter Instance Settings**

- **Display Name**: `vra-01a.corp.local`
- **vRealize Automation Appliance URL**: `https://vra-01a.corp.local`
- **Credential**: `Credentials-vRA-Adapter`

The vRealize Automation Management Pack has already been configured, so we'll view the settings. Ensuring connectivity for the collection of information is vital to the accuracy of data provided by vRealize Operations Manager. This is where **Collection State** and **Collection Status** are most relevant.
Under Basic Settings:

1. Note the URL for the vRealize Automation Appliance URL of https://vra-01a.corp.local
2. Leave the Credentials-vRA-Adapter credential selected
3. Click Test Connection

**Acknowledge Test Success**

An informational prompt of the successful test result will appear.

1. Click OK

**View the vRealize Automation Adapter Advanced Settings**

vRealize Automation (version 7.4) and vRealize Operations (version 6.7) come together to provide analytics-based initial placement policies for vSphere machines.
Automation will use analytics data in vRealize Operations to optimize the placement of workloads.

1. Click On the **Arrow** on **Advanced Settings**
2. Note that **vRA Enabled Intelligent Placement** is set to **ON** - this allows vRealize Operations Manager to manage the placement of VMs that are part of clusters managed by vRealize Automation. This mode is always ON and used for work-load placement (WLP)

**Close the vRealize Automation Adapter Instance Settings**

1. Click on **Advanced Settings** to collapse it
2. Click on **Close** (note - you may need to adjust the dialog box to see the close button)
Configuring the integration of vRealize Automation with vRealize Operations provides
tenant-aware visibility of the infrastructure. With this extended visibility, operational
management extends to vRealize Automation cloud objects such as Tenants, Business
Groups, Reservations and Reservation Policies. We will access this visibility through
out-of-the-box Dashboards and Views.

1. Click **Home**

**Dashboards Overview**

After configuring the integration between vRealize Automation and vRealize Operations
Manager, additional out-of-the-box Dashboards are made available.
Maximize the viewable screen area by toggling the side bar

1. Click the **side bar toggle**

**Navigate to Dashboards**

![Dashboard navigation image]

1. Click on **Dashboards**

**Navigate to the vRealize Automation Dashboards**

![Dashboard navigation image]
The latest release of the vRealize Automation Management Pack features two new additional dashboards: the Application overview and Resource Consumption dashboards. We will take a look at the out-of-the-box vRealize Automation Environment Overview dashboard first.

1. Click on the **down arrow** next to **All Dashboards**
2. Click on the **arrow** next to **vRealize Automation**
3. Click on **Environment Overview**

### View the vRealize Automation Environment Overview Dashboard

Windows have been re-sized to show a more complete view. You will need to scroll down to see some of the information shown in the screenshot.

With the vRealize Automation Environment Overview dashboard, we can view information about Tenants, Business Groups, Reservations, Blueprints and related alerts. We can also view the health, risk and efficiency of resources for a given object from the managed inventory.

As this lab has been designed and built to operate at a very lean capacity, this lesson simply outlines the out-of-the-box visibility and functionality made available by the vRealize Automation Management Pack for vRealize Operations Manager. In larger and more complex production and lab environments, much more information would typically be shown.

There is only one tenant configured in the vRealize Automation environment, vsphere.local, and the information shown in the different widgets relates to this tenant.
Observe and review the updated information now populated in the other widgets. Multiple widgets are visible in this dashboard - below are brief descriptions of some of them:

- **Environment Summary**: Use this widget to view the health of tenants, business groups, virtual machines, blueprints, reservations, deployments, cluster compute resources and the relationships between these objects. If you double-click an object in the Environment Overview widget, you can view detailed information for the object.
- **Tenant List**: Use this widget to view the tenant objects available in the environment. You can see a data grid with a list of objects in the inventory on which you can sort and search.
- **Business Group List**: Use this widget to view the business group objects available in the environment. You can see a data grid with a list of objects in the inventory on which you can sort and search. You can see a data grid with a list of objects in the inventory on which you can sort and search.
- **Configured Users**: Use this widget to view the business group name and the user configured for the business group.
- **vRealize Automation Inventory**: Use this widget to view the objects available for each Realize Automation solution that is deployed in the environment.
- **vRealize Automation Managed Clusters**: Use this widget to view the vCenter clusters which are managed by vRealize Automation. You can see a data grid with a list of objects in the inventory on which you can sort and search.
- **Top Alerts**: Alerts with the greatest significance on the selected objects it is configured to monitor. The top alerts include a short description of alerts configured for the widget. The alert name opens a secondary window from which you can link to the alert details. In the alert details, you can begin resolving the alerts.
Navigate to the vRealize Automation Top-N Dashboard

We will now take a look at the out-of-the-box vRealize Automation Top-N Dashboard

1. Click on the **down arrow** next to **All Dashboards**
2. Click on the **arrow** next to **vRealize Automation**
3. Click on **vRealize Automation Top-N Dashboard**
**View the vRealize Automation Top-N Dashboard**

You can use the widgets in the vRealize Automation Top-N dashboard to view the top results from analysis of blueprints and business groups that you select. In the current setup, there are no numbers and figures because the Hands-On Lab environments get provisioned dynamically for each student and no deployments have been performed before you, as a student, start using them.

However, as you start deploying resources from the next lesson onwards, you will see these start to be populated with data.

You can use the Top-N dashboard to perform some of the following tasks:

- To view the most popular blueprints, business groups, and tenants.
- To view the business groups that have the most critical alerts.

You can actually use the dashboard widgets in several ways.

**Tenant with most critical alerts**: Use this widget to view the top-five tenant objects that have the most critical alerts.

**Business Groups with most Critical Alerts**: Use this widget to view the top-five business group objects that have the most critical alerts.

**Tenant with most failed requests**: Use this widget to view the top-five tenant objects that have the most failed requests.
**Most popular deployed Tenant:** Use this widget to view the top-five most popular deployed tenant objects in the environment.

**Most popular deployed Business Group:** Use this widget to view the top-five most popular deployed business group objects in the environment.

**Most Popular Deployed Blueprints:** Use this widget to view the top-five most popular deployed blueprint objects in the environment.

**Most Popular Deployed Business Group (7 day trend):** Use this widget to view graphical trends that contain metrics for the virtual machine count that has been deployed the most for the business group object over a seven-day period.

**Most Popular Deployed Blueprints (7 day trend):** Use this widget to view graphical trends that contain metrics for the virtual machine count that has been deployed the most for the blueprint object over a seven-day period.

**Navigate to the vRealize Automation Application Overview Dashboard**

![Dashboard Image]

We will now take a look at the out-of-the-box vRealize Automation Application Overview Dashboard

1. Click on the **down arrow** next to **All Dashboards**
2. Click on the **arrow** next to **vRealize Automation**
3. Click on **vRealize Automation Application Overview Dashboard**
View the vRealize Automation Top-N Dashboard

You can use the widgets in the Application Overview dashboard to view the blueprint objects and the blueprint deployment details.

You can use the Application Overview dashboard to view the hierarchy, the properties of the blueprint and deployments, and the metric information.

Below is a detailed description of the widgets in this dashboard:

**Blueprint List:** Use this widget to view the blueprint objects in the environment.

**Blueprint Overview:** Use this widget to view the relationship between the blueprint objects and the deployment, virtual machines, cluster compute resources, and the datastore objects. To find the deployment, virtual machine, and other related details, click the blueprint object.

**Blueprint Property List:** Use this widget to view the properties of the blueprint object such as the total cost, average deployment time, and the average cost of the blueprint object.

**Deployment List:** Use this widget to view the blueprint objects deployed in the environment.

**Deployment Property List:** Use this widget to view the properties for the deployment object such as the cost until date and the approval time for each deployment.

**Blueprint Deployment Info:** Use this widget to select a metric. You can view the details in the Metric Chart widget.
Metric Chart: Use this widget to view the relevant data based on the metric you select in the Blueprint Deployment Info widget.

Note: If you have started with this module (Module 1) in this lab you will most likely see little data on this dashboard. The Deployment List widget, for instance, will not show any deployment since nothing has been requested so far. It will start populating as you make progress in the lab so feel free to come back and check this dashboard to see how data populates when working later in module 1 or when you perform modules 2, 3 and 4.

Navigate to the vRealize Automation Resource Consumption Overview Dashboard

We will now take a look at the out-of-the-box vRealize Automation Resource Consumption Overview Dashboard

1. Click on the **down arrow** next to All Dashboards
2. Click on the **arrow** next to vRealize Automation
3. Click on vRealize Automation Resource Consumption Overview Dashboard
View the vRealize Automation Resource Consumption Overview Dashboard

Windows have been re-sized to show a more complete view. You will need to scroll down to see some of the information shown in the screenshot.

You can use the widgets in the Resource Consumption Overview dashboard to view the resources consumed by vRealize Automation on a vCenter Server.

Below is a detailed description of the widgets in this dashboard:

**Tenant List:** Use this widget to view the tenant objects available in the environment. You can see a data grid with a list of tenants objects in the inventory on which you can sort and search.

**Business Group List:** Use this widget to view the business group objects available in the environment. You can see a data grid with a list of objects in the inventory on which you can sort and search.

**Reservation List:** Use this widget to view the reservation objects available in the environment. You can see a data grid with a list of objects in the inventory on which you can sort and search.

**Tenant Capacity:** Use this widget to analyze the capacity of the tenant object.

**Business Group Capacity:** Use this widget to view the memory, storage, and quota capacity that is allocated, reserved, and free for each business group object.
Reservation Capacity: Use this widget to view the memory, storage, and quota capacity that is allocated, reserved, and free for each reservation object.

Tenant Memory Trend: Use this widget to view and analyze a seven-day trend for the memory allocated, reserved, and free for a tenant object.

Tenant Storage Trend: Use this widget to view and analyze a seven-day trend for the storage allocated, reserved, and free for a tenant object.

Log Out of vRealize Operations Manager

1. Click the down arrow next to the user icon
2. Click Log Out
Review the Intelligent Workload Placement Configuration and Policies in vRealize Automation and vRealize Operations

Policy-Based Optimization of Virtual Machine Placement

vRealize Automation and vRealize Operations come together to provide analytics-based initial placement policies for vSphere machines. vRealize Automation uses analytics data in vRealize Operations to optimize the placement of workloads according to performance goals. These capabilities enable organizations to:

- Maximize your infrastructure investment by optimizing placement
- Combine vRealize Automation governance with performance based insight to optimize placement
- Place virtual machines according to performance goals, using multiple algorithms including balance for maintaining maximum headroom in case of spikes and consolidate to leave space for large workloads

The integration between vRealize Automation and vRealize Operations helps to optimize the placement of workloads and ensure each workload meets its SLA and performance requirements. You will be able to define monitoring and placement policies in vRealize Operations Manager per type of workload that vRealize Automation 7.3 can use to ensure the best possible placement for a workload.

When you use workload placement to provision blueprints, the provisioning workflow uses the reservations in vRealize Automation, and the placement optimization from vRealize Operations Manager.

- vRealize Automation provides the governance rules to allow placement destinations
- vRealize Operations Manager provides placement optimization recommendations for compute cluster and datastore according to analytics data
- vRealize Automation continues the provisioning process according to the placement recommendations from vRealize Operations Manager
- Requires vRealize Operations Manager 6.6 or higher

If vRealize Operations Manager cannot provide a recommendation, or the recommendation cannot be used, then vRealize Automation falls back to its default placement logic.

In this section of the module, we will review the theory behind this placement engine as well as the configuration that enables it.
Flowchart for Configuring Intelligent Workload Placement
Does an endpoint exist for the vRealize Operations Manager instance?

Yes

Does an endpoint exist for the vCenter Server in the vRealize Automation instance used for workload placement?

Yes

Add reservations to the vCenter Server endpoint. Infrastructure > Reservations > Reservations

No

Create a vSphere endpoint. Infrastructure > Endpoints > Endpoints

Create a vRealize Operations Manager endpoint. Infrastructure > Endpoints > Endpoints

No

Is Workload Placement enabled?

Yes

Enable Placement. Infrastructure > Reservations > Placement Policy > Use vRealize Operations Manager for placement recommendations

No

Is vRealize Operations Manager monitoring the vCenter Server instance?

Yes

Go to vRealize Operations Manager, and configure workload placement to use the vCenter Server instance. See Configuring vRealize Operations Manager for Workload Placement in vRealize Automation.

No

vRealize Automation uses the vRealize Operations Manager workload placement analytics to deploy new blueprints.
To use workload placement analytics to place machines when you deploy new blueprints, you must prepare the vRealize Automation instance.

Before the placement policy can suggest placement destinations for blueprints, you must perform several steps as shown in the flowchart and outlined in Configuring Workload Placement.

In this lesson, we will walk through the configuration between vRealize Automation and vRealize Operations to provide intelligent workload placement.

**Navigate to vRealize Automation**

1. Open a Google Chrome browser (not shown) and click the vRealize Automation bookmark on your browser's toolbar

**Log In to vRealize Automation**

1. cloudadmin
2. ********
3. Sign In
To create a vRealize Operations Manager endpoint, we will log in as the IaaS administrator.

1. Type `cloudadmin` into the username field
2. Type `VMware1!` into the password field
3. Click **Sign In**

**Navigate to Endpoints Configuration**

1. Click the **Infrastructure** tab
2. Click **Endpoints**

To use the placement policy to place machines when you deploy new blueprints, we'll take a look at how to configure vRealize Automation to use the analytics that vRealize Operations Manager provides. We will also look at how to configure vRealize Operations Manager to apply a policy to consolidate and balance workloads to our cluster compute resources.

1. Click the **Infrastructure** tab
2. Click **Endpoints**
Navigate to Endpoints Configuration Continued

1. Click **Endpoints**

View vRealize Operations Manager Endpoint

In our vRealize Automation instance, we have already added an endpoint for the vRealize Operations Manager instance to enable placement recommendations based on analytics data, so we'll take a look at that endpoint

1. Click the configured **vRealize_Operations** endpoint
View the vRealize Operations Manager Endpoint Configuration & Test Connection

The endpoint has already been configured for us, so we'll note the fields that have been set, and we'll test the connection to our vRealize Operations endpoint

1. Click **Test Connection**
Accept the Security Alert

1. Click **OK**

Note: You will see a "The test connection was successful" message.
Cancel the Editing of the vRealize Operations Manager Endpoint

Since we haven't made any changes to the endpoint, we'll cancel out of the edit

1. Click **Cancel**
Navigate to the Main Infrastructure Tab

![Screenshot of vRealize Automation interface]

1. Click on `<Infrastructure>` from the menu on the left

Navigate to Reservations

![Screenshot of vRealize Automation interface]

1. Click on `Reservations` >
Navigate to Placement Policy

We can use the placement policy to have vRealize Automation determine where to place machines when we deploy new blueprints. The placement policy uses the analytics of vRealize Operations Manager to identify workloads on our clusters so that it can suggest placement destinations.

1. Click on **Placement Policy**

Note that there is already a vSphere endpoint with the name vCenter created. A vSphere endpoint must be created to allow vRealize Automation to communicate with the vSphere environment and discover compute resources, collect data, and provision machines.
Enable vRealize Operations Placement Recommendations

When a blueprint is deployed, workload placement uses collected data to recommend where to deploy the blueprint based on available resources. vRealize Automation and vRealize Operations Manager work together to provide placement recommendations for workloads in the deployment of new blueprints. While vRealize Automation manages organizational policies, such as business groups, reservations, and quotas, it integrates with the capacity analytics of vRealize Operations Manager to place machines. Note that workload placement is only available for vSphere endpoints.

1. Turn on the checkbox to enable "Use vRealize Operations Manager for placement recommendations"
2. Click Apply
3. Click Yes to the "Are you sure?" confirmation (not shown)

Note: You will see a "Placement settings were successfully applied" message.
Log Out of vRealize Automation

1. Click **Logout**

Navigate to vRealize Operations

To provide workload placement analytics to vRealize Automation to place machines when we deploy new blueprints, we must also prepare the vRealize Operations Manager instance. To this point, we have configured vRealize Automation to use workload placement analytics. Earlier in this module, we also verified that the vRealize Automation Solution is installed and configured in the vRealize Operations Manager instance that is being used for workload placement. For vRealize Operations Manager to provide analytics to vRealize Automation, we will now look at configuring a policy and applying the policy to our cluster compute resources.

1. Click the **vRealize Operations** bookmark on your browser toolbar
Log In to vRealize Operations Manager

VMware™
 vRealize Operations Manager®

1. Click on Administration

2. Enter admin

3. Enter password

4. Click LOG IN

Navigate to Administration

1. Click on Administration

1. Click on Administration
Navigate to Policies

1. Click on **Policies** - we see that the **HOL Policy** is the active policy

Navigate to the Policy Library

1. Click on **Policy Library**
Edit the Active Policy

1. Click on the **HOL Policy** which is our active policy
2. Click on the **Pencil** icon to edit
Configure Workload Automation for the Active Policy

Policies in vRealize Operations Manager are configured to establish the settings for consolidation, balance, fill, CPU, memory, and disk space.
1. Click on **Workload Automation**

**Update Workload Automation Policy Settings**

- 1. Click on Workload Automation to override the parent policy settings.
- 2. Adjust the slider for Consolidate Workloads to the middle of Balance and Consolidate.
- 3. Click on the lock next to Cluster Headroom to override the parent policy settings.
- 4. Adjust the slider for Balance Workloads to 25%.
- 5. Click on the lock next to Tag Based VM Placement to override the parent policy settings.
- 6. Leave the slider as is.

**Workload Optimization**
Select **Balance** when workload performance is your first goal. This approach proactively moves workloads so that the resource utilization is balanced, leading to maximum headroom for all resources. Select **Relieve stress** when you want to be reactive by moving workloads to minimize the workload contention. Select **Consolidate** to proactively minimize the number of clusters used by workloads. You might be able to re-
purpose resources that are freed up. This approach is good for cost optimization, while making sure that performance goals are met. This approach might reduce licensing and power costs.

**Cluster Headroom**
Headroom establishes a required capacity buffer, for example, 20 percent. It provides you with an extra level of control and ensures that you have extra space for growth inside the cluster when required. Defining a large headroom setting limits the systems opportunities for optimization.

**Tag based VM placement**
You can use vCenter Server tagging to tag VMs and clusters with specific tags. These tags define, for a given cluster, the set of VMs that is placed in that cluster and remains within the cluster. When the system runs an optimization action, it uses VM-to-cluster tag matching to ensure that VMs are moved to, or stay with, the appropriate cluster.

**Exit Changes to the Active Policy**

We configured vRealize Operations Manager so that vRealize Automation uses the workload placement analytics to suggest placement destinations of machines when users deploy blueprints. Once vRealize Automation and vRealize Operations Manager have collected data from the endpoints and objects in the environment, when we deploy
new blueprints, vRealize Automation will display the workload placement recommendations, destination candidates, and selected placement for confirmation.

This lesson was to show how to change the Workload Automation settings for the Default Policy, but we won't save them for this lab.

1. Click **Cancel**

**Log Out of vRealize Operations Manager**

![Log Out of vRealize Operations Manager](image)

1. Click the **down arrow** next to the user icon
2. Click **Log Out**
Conclusion

Congratulations on completing Module 1!

As we have seen, integration is key to a holistic yet simple-to-access view of the environment and to the depth and granularity that a broad range of users require.

In this module we took some time to see that integration can be powerful and does not necessarily need to be complex or lengthy. We identified where and how vRealize Automation works with vRealize Operations Manager as the primary metrics provider of vSphere metrics, while reciprocal integration offers additional quick and easy access to vital operational environment information without the need to access additional user interfaces or portals.

We also learned about the powerful integration between vRealize Automation and vRealize Operations Manager to provide intelligent workload placement for vSphere machines.

In the next Module, we will take a closer look into integration between vRealize Log Insight with vRealize Operations. You may to proceed to the next lesson, or you can select any module below which interests you most.

You've finished Module 1

Congratulations on completing Module 1.

If you are looking for additional information on the integration between vRealize Automation and vRealize Operations or Intelligent Workload Placement in vRealize automation powered by vRealize Operations, try one of these respective links below:

- Click on this link or this link
- Or go to https://tinyurl.com/yblyqamo or https://tinyurl.com/y9y2kvb9
- Or use your smart device to scan the QRC Code.

Proceed to any module below which interests you most.
• **Module 2 - vRealize Log Insight & vRealize Operations Integration** (30 minutes) (Intermediate)
• **Module 3 - Better together: vRealize Automation & NSX App-Centric Network and Security** (45 minutes) (Intermediate)
• **Module 4 - Better together: vRealize Automation & SPBM App-Centric Storage** (30 minutes) (Intermediate)

**How to End Lab**

To end your lab click on the **END** button.
Module 2 - vRealize Log Insight & vRealize Operations Integration (30 minutes)
Introduction

Making everyone's lives easier by providing enhanced troubleshooting capabilities. We will discover in this module, the integration between vRealize Operations and vRealize Log Insight to enable quick correlation of logs and metrics in context for any monitored object(s) right from the vRealize Operations interface.
vRealize Log Insight and vRealize Operations Integration

The integration of vRealize Log Insight with vRealize Operations delivers on the complete "Intelligent Operations" use case. With these integrated solutions, we can troubleshoot smarter with 360-degree troubleshooting using metrics and logs side-by-side and in context. Integration of vRealize Operations and vRealize Log Insight brings structured data (such as metrics and key performance indicators) and unstructured data (such as log files) together, for faster root-cause analysis. The integration saves time and improves return on investment by using a central log management solution to analyze data across the IT environment, including virtual, physical and cloud environments.

The integration with Log Insight provides full integration in-context within vRealize Operations for faster troubleshooting with capabilities to:

- Direct launch into the Log insight Dashboard
- Direct launch into the Log Insight Interactive Analytics mode
- Object auto-initiated log management
- vRealize Operations alerts auto-initiated log management

We will take a look at the integration between these two solutions to provide 360-degree troubleshooting.

Open Chrome Browser

1. Click on the Google Chrome icon on the Windows taskbar
Adjust Browser Zoom Level

As the Hands On Labs default resolution is relatively low, if the zoom is not already set to 80%, we will need to adjust this setting in the browser to make sure all necessary areas are visible and accessible.

1. Click the menu icon on the top right corner of the browser window.
2. Click the "-" symbol to decrease the zoom to 80%.
3. Press the "ESC" key on your keyboard.

Navigate to vRealize Operations Manager

1. Click on the vRealize Operations bookmark on the browser toolbar
Log In to vRealize Operations Manager

We will log into vRealize Operations as an administrator. Administrator privileges are required to set up the integration between vRealize Operations Manager and vRealize Log Insight, but this integration has already been set up for this lab, so we will look at what the integration provides.

1. Select **Local Users** from the dropdown listbox
2. Type in **admin** for username
3. Type in **VMware1!** for password
4. Click **LOG IN**
Access Log Insight Directly from vRealize Operations Manager

With the integration between vRealize Operations Manager and vRealize Log Insight, you can access Log Insight directly from within the vRealize Operations Manager interface eliminating the need to open up a second user interface or log into a different solution.

1. From the Home screen, expand your navigation menu on Troubleshoot
2. Click on Using Logs
Log In to vRealize Log Insight

We can log in to vRealize Log Insight via providing credentials

1. Type in **admin** as username
2. Type in **VMware1!** as password
3. Click **LOGIN**
To be able to see more of the Log Insight interface, collapse the navigation pane

1. Click on the **double-arrow** in the navigation pane
There are two views within vRealize Log Insight - the Dashboards view and Interactive Analytics view, and we will take a look at both of these views.

For a more in-depth lab covering vRealize Operations and vRealize Log Insight, take lab HOL-1901-03-CMP - vRealize Suite Standard: Application-aware software-defined data center (SDDC) and multi-cloud management
Dashboards Overview

We will start by taking a look at the Dashboards section of Log Insight

1. If the Dashboards view is not selected, click on Dashboards
2. If it is not already selected, click on the General > Overview dashboard

Scroll around the General Overview dashboard to view the information that is provided.

Dashboards provide the ability to quickly visualize log data and determine potential issues within an environment. vRealize Log Insight provides two different types of widgets inside a dashboard: charts and queries. Charts are a visual representation of data and the most commonly used widget. Queries are saved pieces of information that provide both a visual and textual representation of data on the Interactive Analytics page, but they are listed only by a defined name on the dashboards page. Query widgets are typically used when a chart widget does not provide enough useful information.
Interactive Analytics Overview

Now we will look at Interactive Analytics which allows administrators and engineers to perform searches, using plain language or REGEX strings, to find log message details for determining problem areas and performing root cause analysis.

1. Click Interactive Analytics

Interactive Analytics Screen

The following describes the different sections of the Interactive Analytics Screen:

1. This area shows the graphical representation of the current query. Because we have not yet specified a query or filter, all events are being displayed.
2. The Filter field is used to search for data within the logs, e.g., host name, error message or error number.

3. vRealize Log Insight auto-correlates all log data. In this field, we can specify a specific time range we would like to search for log entries. By default, the time range field is set to the last 5 minutes of data. Be advised that large date ranges will take a longer time to return the complete set of data, but that data will stream in as the query result is returned. In this lab, we have only just connected to the vCenter and therefore we have a limited time range where data is available.

4. Events are the log entries which match the query and will be displayed here. The key words (Fields) contained in each of the log messages will be called out in blue below the log message. By default vRealize Log Insight understands all the Syslog-defined fields. As as part of vRealize Log Insight Content Packs, which can be downloaded from VMware's Solution Exchange, fields are added which are specific to their domain. In our case, all of the vSphere and Syslog Fields are available.

For more in-depth lab covering vRealize Operations and vRealize Log Insight, take lab HOL-1901-03-CMP - vRealize Suite Standard: Application-aware software-defined data center (SDDC) and multi-cloud management

**Launch vRealize Log Insight In Context of a Selected Object**

Not only can we view the Log Insight user interface directly from within vRealize Operations Manager, but we can launch the Interactive Analytics screen in context for a selected object.

1. Click on the main **Search** icon on the top menu bar
Launch vRealize Log Insight In Context of a Selected Object

In the Search bar, we will type the beginning of the string we want to search for

1. Type **esx** to get a list of all of the datastores and host systems in the environment
2. Click on **esx-03a.corp.local**
View the Logs for the Selected Host

The vRealize Operations Manager Summary screen for the esx-03a.corp.local host is displayed. From here, we can click on Logs to see Log Insight in the context of this selected host.

1. Click **Logs**
View the Interactive Analytics Screen for the Selected Host

Because we viewed the logs in the context of the esx-03a.corp.local host, a filter has been set, and we will only see log information for that host.

1. If Events is not already selected, click on Events
2. Note that all events are in relation to esx-03a.corp.local (you will have to scroll down to see the events)

View Logs in the Context of a vRealize Operations Manager Alert

---
We can also view logs in the context of a vRealize Operations Manager Alert. Since there is an alert on this host, we'll take a look at it.

1. Click on Alerts for the esx-03a.corp.local host

Select the Maintenance Mode Alert

![Image of vRealize Operations Manager interface]

There is an alert on this host because it has been in maintenance mode for at least 1 hour. Having this host in maintenance mode for a long period of time could cause issues in the environment, so we want to find out who put the host into maintenance mode and why - previously, we would have to do this using the command-line interface.

1. Click on the dropdown listbox next to Group By and select None
2. Click on the Host is in maintenance mode for at least 1 hours alert

View the Logs Associated with the Alert

![Image of vRealize Operations Manager interface]

We can take a look at the logs in the context of the alert

1. Click on View Logs under Need more information?
View the Interactive Analytics Screen for the Object with the Alert

Here we see all of the events on our esx-03a.corp.local host that were raised during that alert and they are grouped by Event Types.
Find Maintenance Mode Events

We will filter the event types to show us those events with the phrase "maintenance mode" in them

1. Type **maintenance mode** into the search box
2. Note that a **custom time range** has been set to pull events from the time of this alert
3. Click the **magnifying glass** icon to search
We'll look through the event types until we find the event type that provides us with the user that placed this host into maintenance mode.

1. **Scroll down** the list of Event Types
2. Stop scrolling when you find the event that includes the phrase "has entered maintenance mode"
3. **Expand** the details to show more events of this type
4. We can quickly see that the user that put this host into maintenance mode was the **VSPHERE.LOCAL\Administrator** user
Log Out of vRealize Operations

1. Click on the **down arrow** next to the user icon
2. Click **Log Out**

Close the Browser

1. Click on the **X** to close the browser
Conclusion

Congratulations on completing Module 2!

As we have seen, the integration between vRealize Operations Manager and vRealize Log Insight delivers on the complete "Intelligent Operations" use case and provides 360-degree troubleshooting so you can look at metrics and logs side-by-side and in context.

If you are looking for additional information on vRealize Operations Manager and vRealize Log Insight, try one of these:

- Click on this link
- Or use your smart device to scan the QRC Code.

In the next Module, we will take a closer look into integration between vRealize Automation and NSX for vSphere. You may proceed to the next lesson, or you can select any module below which interests you most.

- **Module 1 - vRealize Automation and vRealize Operations Integration** (30 minutes) (Basic)
- **Module 3 - Better together: vRealize Automation and NSX App-Centric Network and Security** (45 minutes) (Basic)
- **Module 4 - Better together: vRealize Automation and SPBM App-Centric Storage** (30 minutes) (Basic)

How to End Lab

To end your lab click on the END button.
Module 3 - Better together: vRealize Automation and NSX App-Centric Network and Security (45 mns)
Introduction

In this module, we will at how vRealize Automation can provision, update and decommission network and security services in lockstep with your virtualized applications to deliver application-centric network and security services. Network and security services can be deployed as part of the automated delivery of an application, such that they are consistent with its connectivity, security, and performance requirements. Automation creates a standardized, repeatable process that helps accelerate delivery, reducing the time needed to perform the task. Automation also improves the consistency and reliability of the configuration, by eliminating of manual errors. Finally automation reduces operational costs by eliminating many manual tasks, and improves development productivity by delivering application environments to engineers faster. vRealize Automation, used in conjunction with NSX, automates an application’s network connectivity, security, performance, and availability.

In this module, users will deploy a series of vRealize Automation Blueprints that feature network and security objects and configurations. Users will also get a chance to modify security rules on existing deployments. In vRealize Automation, we will showcase the deployment of blueprints with on-demand NSX networks, which are either routed end-to-end through the VMware SDDC infrastructure, or one-to-many NAT networks that will be modified to allow incoming traffic. We will also build a blueprint that deploys an on-demand NSX software load balancer.
Deploy a vRealize Automation Blueprint with an On-Demand NSX Routed Network

1. Click on the Google Chrome icon on the Windows taskbar

Adjust Browser Zoom Level

As the Hands On Labs default resolution is relatively low, if the zoom is not already set to 80%, we will need to adjust this setting in the browser to make sure all necessary areas are visible and accessible.

1. Click the menu icon on the top right corner of the browser window.
2. Click the "-" symbol to decrease the zoom to 80%.
3. Press the "ESC" key on your keyboard.
Navigate to vRealize Automation from the bookmark toolbar (not shown). Log in with the following credentials:

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

We are going to log in to vRealize Automation as an end user of IT services and we will request a Blueprint from the service catalog.
Request the Blueprint

1. Click on **Catalog**
2. **Locate** the **CentOS-Routed** Blueprint
3. Click **Request**

Many blueprints are published as one can tell, some of which will be requested in the next lessons of this module.
Submit the Request

This blueprint is intrinsically very simple from a middleware and application provisioning perspective as it simply deploys a single CentOS VM, but the objective is to show the power of automatic network creation and end-to-end routing of dynamically provisioned subnets.

1. Click **Submit**. Then click **OK** (not shown)

Navigate to Requests

1. Click **Requests** to track the progress of the request.

Indeed, once users have requested a blueprint from the catalog, they can track the status of their request under the **Requests** tab.
View Request Details

1. Highlight the top most request named **CentOS-Routed** - this is the request that corresponds to the blueprint we requested in the previous step.
2. Click **View Details**

Navigate to Execution Information for the Request

This screen is a summary of your request - had you entered a Description or Reason for your request, it would have shown here. In our case, we kept things simple and left these fields blank.

1. Click **Execution Information** to see the provisioning process step by step.

View the Execution Information for the Request
The Execution information screen shows the blueprint components being deployed. 
Note this blueprint will deploy:

1. An On-Demand NSX **Routed Logical Switch**.
2. It will connect this logical switch to an **NSX Edge device** which is a distributed logical router.
3. A **Virtual Machine**.

**Log Out of vRealize Automation**

While this blueprint deploys (the deployment time will take approximately 6 minutes), let's go and have a look at the how the blueprint was designed. For that, we need log out as a development user and log back in as a cloud administrator.

1. Click **Logout**

**Navigate Back to the Login Page**

1. Click **Go back to login page**
Log In to vRealize Automation as the Cloud Administrator

Log in with the following credentials:

1. username: cloudadmin
2. password: VMware1!
3. Click Sign in
Navigate to the Blueprints Design Area

1. Click the **Design** tab
2. Highlight the **CentOS - Routed** blueprint
3. Click **Edit**

Blueprints in vRealize Automation are authored under the **Design** tab. The responsibility of managing Blueprints can be assigned in a very granular way based on your operational requirements and structure. You could, for instance, decide to establish a relatively broad "Cloud Admin" role in the organization with rights in both platform management and service/applications creation - this is the scenario we have implemented throughout this lab. Or, you could decide to break down responsibilities and create two different sets of roles - platform admins on one side and service/application authors on the other.

Let's review the Blueprint now.
Review the CentOS-Routed Blueprint

1. Click on the **RoutedNSXNetwork** network object under the vSphere Virtual Machine.

This displays more detailed information about the configuration of the network to which the vSphere virtual machine is going to be connected upon deployment of the blueprint.
Review the network configuration of the CentOS-Routed Blueprint

Review the configuration of this network. Note that you may need to scroll around the Design Canvas to see the routed network.

This NSX object was dragged from the Network & Security objects on the left hand side of the screen when designing the blueprint. This is an object of type "On-Demand Routed Network" which means that when such a blueprint is requested by a user from the catalog, vRealize Automation will command NSX to automatically create and deploy a new NSX logical network network and attach this network to an existing NSX router so that the IP subnet associated to this network gets automatically routed and propagated across the enterprise network.

The immediate benefit is this VM will be reachable across the enterprise network upon deployment.

Feel free to explore the other tabs such as **DNS/WINS** and **IP Ranges**.
Close the Blueprint Design Canvas

When you are done reviewing the blueprint design:

1. Click **Cancel**
2. Respond **yes** to the "**Cancel and discard your changes ?**" question

Log Out of vRealize Automation

Time for us to go and review the blueprint deployment.

1. Click **Logout**
Navigate Back to the Login Page

1. Click **Go back to login page**

Log In to vRealize Automation as the Development User

Log back into vRealize Automation with the following credentials:
1. Username: devuser
2. Password: VMware1!
3. Click Sign in

You are logging back in as the end user that had initially requested the CentOS - Routed blueprint.

**Navigate to the Requests**

![Requests tab]

1. Click the Requests tab
2. Highlight the latest Request (Note: the request number will be different than the one shown in the previous picture).
3. Click View Details

**View the Execution Information**

![Execution Information]

1. Click the link to view the Execution Information
Refresh the Request Execution Information Screen

Some provisioning steps, if not all, will have turned green, which means they have been successfully passed.

1. Click on the refresh button, approximately every 30 seconds, until all steps become green.

The last step, vSphere_vCenter_Machine, is the longest one. The end-to-end provisioning time for this blueprint is approximately 6 minutes.

View the Execution Information for the Deployment

One completed, you will see all provisioning steps with a **Successful** Status, which means that the request has been properly fulfilled.
Note: your dev-XX virtual machine may have different number than 002 as in the previous picture and this isn't an issue at all. Numbers assigned to virtual machines are based on the order in which this labs modules and lessons were taken.

Navigate to Items

Once a Blueprint was successfully deployed, it becomes an item and is manageable by the end user under the Items tab.

1. Click on the Items tab
2. Click on the arrow to expand the CentOS - Routed-XXXX deployment.
3. Take note the IP address of the dev-XX VM that got deployed as part of this blueprint. In our case, it is 172.16.160.18 (your IP address can be be different).

Verify the End-to-End Connectivity

Our Windows desktop plays the role of a resource connected to an enterprise Intranet trying to access a resource dynamically created by vRealize Automation in the private cloud environment of that same enterprise.

1. Open a command prompt by clicking on the command icon in the desktop toolbar.
Ping the Created Virtual Machine

Ping the IP address noted in the previous step (remember - your IP address will likely be different than the one below):

1. Type `ping 172.16.160.18`

Ping is successful!

Close The Command Prompt

1. Close the Command Prompt before moving forward.
What we have showcased here is an enterprise routed Architecture: not only can vRealize Automation command NSX to dynamically create a network, but it can also ask for that network to be automatically advertised across the whole intranet infrastructure.

Here is how this was achieved:

- Upon order from vRealize Automation, NSX has created a brand new Logical switch (a L2 broadcast domain with an IP subnet)
- NSX has connected this logical switch to an existing NSX DLR (distributed logical router)
- This DLR was already peering OSPF with an upstream NSX Edge router (software router). The new subnet has been automatically redistributed in the OSPF process and advertised to the NSX Edge router.
- The NSX Edge router, in turn, was already peering with an intranet router outside of the cloud environment so the new subnet was advertised to it and later router across the whole intranet network.

In the next lesson, we will deploy a Blueprint with dynamically created NAT networks.

**Log out of vRA**

1. Exit vRA and go back to the login page by clicking on **logout**.
Deploy a vRealize Automation Blueprint with an On-Demand NSX NAT network

Open a Chrome Browser and navigate to vRealize Automation from the bookmark toolbar (not shown). Log in with the following credentials:

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

We are going to log in to vRA as an end user of IT services and we will request a Blueprint from the service catalog.
Request the Blueprint

1. Click on **Catalog**
2. Spot the Blueprint called **CentOS - NATed**
3. Click **Request**
Submit the Request

Note that this blueprint is made of two CentOS VMs that will be deployed connected to a NATed network in the private cloud environment. The use case here is a enterprise NAT private cloud architecture. Moreover, the NAT network those VMs will be deployed into a one-to-Many NAT network. One-to-many NAT is preferred to one-to-one NAT when internal routable RFC1918 IP subnets are a scarce resource inside an enterprise IP network.

1. Click Submit and then click OK on the next screen (not shown)

Navigate to Requests

1. Click the Requests tab to track the progress of the request.

Indeed, once users have requested a blueprint from the catalog, they can track the status of their request under the Requests tab.
View Request Details

1. Highlight the top most request CentOS-NATed - this is the request that corresponds to the blueprint just requested in the previous step.
2. Click View Details

View the Execution Information

This screen is a summary of your request - had you entered some Description or Reasons for your request, it would have showed here. In our case, we kept things simple and left these fields blank.

1. Click Execution Information to see the provisioning process step by step.
View the Execution Information for the Deployment

The Execution information screen shows the blueprint constituents being deployed. This blueprint will deploy:

1. An NSX Routed logical switch named **OnetoManyNAT**
2. An **NSX Edge** gateway to which this logical switch will be connected. This Edge gateway will implement the NAT rules.
3. Two **vSphere Virtual Machines** connected to the logical switch.

Log Out of vRealize Automation

While this blueprint deploys (the deployment time will take approximately 6 minutes), let's go and have a look at the how the blueprint was designed. For that, we need log out as a user first and log back in as a cloud administrator.

1. Click **Logout**
Navigate to the Login Page

1. Click Go back to login page

Log In to vRealize Automation as the Cloud Administrator
Log in with the following credentials:

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

### Navigate to the Blueprints Design Area

1. Click the **Design** tab
2. Highlight the **CentOS - NATed** blueprint
3. Click **Edit**

Blueprints in vRealize Automation are authored under the **Design** tab. The responsibility of managing Blueprints can be assigned in a very granular way based on your operational requirements and structure. You could, for instance, decide to establish a relatively broad "Cloud Admin" role in the organization with rights in both platform management and service/applications creation - this is the scenario we have implemented throughout this lab. Or, you could decide to break down responsibilities and create two different sets of roles - platform admins on one side and service/application authors on the other.

Let's review the Blueprint now.
Review the CentOS - NATed Blueprint

Notice the two vSphere machines next to each other connected to the same network.

1. Click on the **One-to-Many-NAT** network object under the two vSphere Virtual Machines.

This will display more detailed information about the configuration of the network to which the vSphere virtual machines are going to be connected upon deployment of the blueprint.
Review the Network Configuration of the CentOS - NATed Blueprint

Review the configuration of this network. Note that you may need to scroll around the Design Canvas to see the NAT network.

This NSX object was dragged from the Network & Security objects on the left hand side of the screen when designing the blueprint. Note the NAT type is One-to-Many to save on routable IP addresses available to use in the enterprise. The object is of type "On-Demand NAT Network" which means that when such a blueprint is requested by a user from the catalog, vRA will command NSX to automatically create and deploy a new NSX logical network network, attach it to an NSX NAT gateway also created on demand and implement a NAT rule on the later so that the VM that is connected to the NAT network can be reached from anywhere on the enterprise corporate network.

Feel free to explore the other tabs such as DNS/WINS and IP Ranges.
Close the Blueprint Design Canvas

When you are done reviewing the blueprint design:

1. Click **Cancel**
2. Respond **yes** to the "**Cancel and discard your changes ?"** question

Log Out of vRealize Automation

Time for us to go and review the blueprint deployment.

1. Click **Logout**
Navigate to the Login Page

1. Click **Go back to login page**

Log In to vRealize Automation as the Development User

Log back into vRealize Automation with the following credentials:
1. Username: **devuser**
2. Password: **VMware1!**
3. Click **Sign in**

You are logging back in as the end user that had initially requested the **CentOS - NATed** blueprint.

**Navigate to Requests**

1. Click the **Requests** tab
2. Highlight the latest Request named **CentOS-NATed** (Note: the request number will be different than the one shown in the previous picture).
3. Click **View Details**

**View the Execution Information**

1. Click **Execution Information** on the far right side of the screen.
### Refresh the Request Execution Information Screen

Some provisioning steps, if not all, will have turned green, which means they have been successfully passed.

1. Click on the refresh button, approximately every 30 seconds, until all steps become green.

The last two steps, Server1 and Server2, are the longest ones. The end-to-end provisioning time for this blueprint is approximately 6 minutes.

### View the Execution Information for the Deployment

One completed, you will see all provisioning steps with a **Successful** Status, which means that the request has been properly fulfilled.
Navigate to Items

Once a Blueprint was successfully deployed, it becomes an item and is manageable by the end user under the Items tab.

1. Click on the Items tab.
2. Click on the arrow to expand the CentOS - NATed-XXXX deployment.
3. Take note the IP addresses of the two dev-XX VMs that got deployed as part of this blueprint. In our case, those are 172.16.152.102 and 172.16.152.101 (your IP addresses can be different).

Test Inbound/Outbound Access To/From the Provisioned VMs

Our Windows desktop here plays the role of a machine connected to an enterprise Intranet trying to access a resource dynamically created by vRealize Automation in the private cloud environment of that same enterprise.

1. Open a command prompt by clicking on the command icon in the desktop toolbar.
Ping the IP Addresses for the VMs

1. Ping the IP addresses noted in the previous step (remember - your IP addresses will likely be different than the addresses below):

   ping 172.160.101
   ping 172.160.102

   Behavior is as expected: given this one-to-Many NAT, incoming ping doesn't go through!

Now let's test outgoing ping.
Close the Command Prompt Window

1. Close the Command Prompt

Navigate to vCenter

1. Open a second Chrome tab and click on the HTML5 Client bookmark.
Login to vCenter

1. Select **Use Windows session authentication**
2. Click **Login**
Navigate to the Deployed VMs

1. Expand the RegionAO1 datacenter and the RegionAO1-COMP01 and RegionAO1-COM02 clusters
2. Locate one of the two VMs deployed by vRealize Automation behind that NAT network. In our case here, we've decided to pick dev-004 but remember, your VM number will be different.
3. Click on dev-004
4. Click Launch Web Console

The web console page popup will be blocked - this expected behaviour.
Allow pop-ups in Chrome

1. Click on the blocked popup icon on the top right of the Chrome browser page.
2. Select **Always allow pop-ups from https://vcsa-01a.corp.local**
3. Click **Done**

1. Click **Launch Web Console** one more time.
Log In to the VM

1. Click **Enforce US Keyboard Layout**.
2. Click in the black screen of the remote console and log into **dev-004** using the following credentials:
   - Username: **root**
   - Password: **VMware1!**

Issue an Outgoing Ping

Let's check whether we can issue an outgoing ping from this machine to the outside.

1. At the command prompt, type the following command (192.168.110.10 is the IP address of our windows desktop simulating a machine connected to the enterprise intranet).
Success! Ping goes through.

In conclusion:

- Outgoing traffic from the VMs connected to the OneToMany NAT network to the outside world is permitted.
- Incoming traffic from the outside world towards those VMs is blocked.

Close the VM Console

To leave the virtual machine shell prompt, you need to first issue a the following keys combination on the keyboard: **CTRL + ALT**

1. Once this combination issues, point your mouse to close the web console window.
Adding NAT Rules to Allow Inbound Access to the VMs

Now what if the VMs or application owner wants to access his VMs from the outside without using the web console? Let's suppose the application owner wants to be able to SSH into each of those VMs.

vRA network and security day 2 actions allow the user to perform these kinds of configurations in a self-service fashion. Let's explore how this can be achieved.

Navigate back to vRealize Automation

1. Go back to the open vRealize Automation tab
2. If you have been logged out of vRealize Automation, log back in as devuser by clicking on Go back to login page.

If you have not been logged out and you are still in vRealize Automation as devuser, skip the next login step and proceed to the Navigate to Items task.
Log In to vRealize Automation as the Development User

Log back into vRealize Automation with the following credentials:

1. Username: **devuser**
2. Password: **VMware1!**
3. Click **Sign in**
Navigate to Items

1. Click on **Items**
2. Expand the deployment called **CentOS - NATed-XXXX**
3. Highlight the **OnetoManyNAT-XXX** object
4. Click the down arrow next to **Actions**
5. Click **Change NAT Rules**

Add NAT Rules

You see the following screen that indicated that no destination NAT rules for this NAT network have been configured so far.

1. Click the **green plus sign** next to **New**
Create Two NAT Rules

Create two new NAT rules that look like the previous picture:

1. One NAT rule to allow incoming \textbf{SSH} towards \textbf{dev-003} on port \textbf{22}. The SSH request will be forwarded by the NAT process to TCP port 22 on dev-003.
2. Another NAT rule to allow incoming \textbf{SSH} towards \textbf{dev-004} on port \textbf{2124}. The SSH request will be forwarded by the NAT process to TCP port 22 on dev-004.
3. Click \textbf{Submit}, and then lick \textbf{OK} on the next screen (not shown)

Additionally, please note the IP address that NSX uses to source NAT the VMs connected to this network: 172.16.100.50. We will use this IP later when testing the incoming SSH to those VMs.

Navigate to Requests

1. Click on the \textbf{Requests} tab.
2. Locate the request at the top most of the request list - this is the NAT rule add request.
3. Wait for this request to show \textbf{successful} - this should not take more than 45 seconds to complete.
Once the request shows successful, proceed to the next step in this lesson.

**Verify SSH Access to the VMs Behind NAT**

1. Click on the **Items** tab.
2. Expand the **CentOS - NATed-XXX** deployment.
3. Locate the **IP addresses** of the two VMs on the right hand-side of the deployment page.

**Open a Putty Window**

1. Click on the **putty** icon in the windows toolbar to open a putty window
Open a new putty session with the following parameters:

1. Hostname (or IP address): **172.16.100.50**
2. Port: **22**
3. Click **Open**
1. Click **Yes** to the security warning
Log In as root

1. Log into the remote server using root as a username
2. Note the prompt: we are SSH'ed into dev-003

Let's try now to open another SSH session to dev-004.
Open Another SSH Session

1. Click on the computers icon on the top left part of the existing putty session
2. Click **New Session**
Open a New Putty Session

Open a new putty session with the following parameters:

1. Hostname (or IP address): **172.16.100.50**
2. Port: **2124**
3. Click **Open**
1. Click **Yes** to the security warning
**Log In as root**

1. Log into the remote server using **root** as a username
2. Note the prompt: we are SSH'ed into dev-020

What we have showcased here in lesson 2 of this module is an enterprise networking architecture where NSX logical networks can be dynamically requested and created by vRealize Automation to support a one-to-many NAT topology with routable private IP addresses that are a scarce resource.

We have also demonstrated how vRealize Automation offers flexible day 2 network and security actions to modify the configuration of already deployed resources.

In the next lesson, we will deploy a Blueprint with a dynamically created load-balancer for traffic distribution on a web server farm.

**Log out of vRA**
1. Exit vRA and go back to the login page by clicking on **logout**.
Deploy a vRealize Automation Blueprint with an On-Demand NSX Load-Balancer

Open a Chrome Browser and navigate to vRealize Automation from the bookmark toolbar (not shown). Log in with the following credentials:

1. username: devuser
2. password: VMware1!
3. Click Sign in
Request the Blueprint

1. Click on Catalog
2. Locate the Blueprint called CentOS - Apache - LoadBalanced
3. Click Request

Submit the Blueprint Request

1. Click on Web-Server
2. Increase the number of instances from 1 to 2.
3. Click **Submit** then click **OK** on the next screen (not shown)

This blueprint deploys a CentOS VM with Apache pre-installed in the base CentOS image and a very simple dynamic web page used for HTTP load-balancing illustration purposes only.

**Navigate to Requests**

1. Click the **Requests** tab to track the progress of the request.

**View the Details of the Request**

1. Highlight the top most request named **CentOS - Apache - LoadBalanced** - this is the request that corresponds to the blueprint just requested in the previous step.
2. Click **View Details**

**View the Execution Information**

1. Click **Execution Information** to see the provisioning process step by step
The Execution information screen is pretty self-explanatory and shows the blueprint constituents being deployed. This blueprint will deploy:

1. An **NSX Edge** Router.
2. A **On-Demand Load-Balancer** service on this NSX Edge.
3. Two **web-server VMs**.
4. It will connect those two VMs to an **existing network**.

### Log Out of vRealize Automation

While this blueprint deploys (the deployment time will take approximately 6 minutes), let's go and have a look at how the blueprint was designed. For that, we need log out as a user first and log back in as a cloud administrator.

1. Click **Logout**
Navigate to the Log In Page

1. Click Go back to login page

Log In to vRealize Automation as the Cloud Administrator
Log in with the following credentials:

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

Navigate to the Blueprint Design Area

1. Click the **Design** tab
2. Highlight the **CentOS - Apache - LoadBalanced** blueprint
3. Click **Edit**
Edit the Blueprint

Observe the overall design of this blueprint:

- The Load-Balancer is an **on-demand NSX load-balancer** deployed in a one-arm fashion
- Both the load-balancer and the web-servers are connected to the same existing network, **DefaultExternalNetwork**.
- The VIP exposed also belongs to the same existing network.
1. Click on the On-Demand_LoadBalancer_1 object in the middle of the design canvas to review the configuration in more detail
2. Note that the Load-Balancer listen and distributes traffic on port HTTP 80
Close the Blueprint Design Canvas

When you are done reviewing the blueprint design:

1. Click **Cancel**
2. Respond **yes** to the "**Cancel and discard your changes?**" question

Log Out of vRealize Automation

Time for us to go and review the blueprint deployment.

1. Click **Logout**
Navigate to the Login Page

1. Click **Go back to login page**

Log In to vRealize Automation as the Development User

Log back into vRealize Automation with the following credentials:
1. Username: **devuser**
2. Password: **VMware1!**
3. Click **Sign in**

**Navigate to Requests**

1. Click the **Requests** tab
2. Highlight the latest Request named **CentOS - Apache - LoadBalanced** (Note: the request number will be different than the one shown in the previous picture).
3. Click **View Details**

**View the Execution Information**

1. Click **Execution Information**

**View the Deployment Execution Information**
You should see that all provisioning steps have ended with a **green Successful Status** which means that the request has been properly fulfilled.

Note: your dev-XX virtual machines may have different number than 021 and 022 as in the previous picture and this isn't an issue at all. Numbers assigned to virtual machines are based on the order in which this labs modules and lessons were taken.

**Navigate to Items**

1. Click on the **Items** tab
2. Expand the **CentOS - Apache -LoadBalanced** deployment
3. Notice the three IP addresses on the right hand-side of the screen. **192.168.110.200** is the VIP address hosted on the Load-Balancer. **Make note of it**: we will use in the next lesson. 192.168.110.202 and 192.168.110.203 are the **IP addresses** of the real servers in the web-server pool.

Note: in your lab, the IP addresses can be different.

**Verify the Load-Balancing Operations**

1. Open a new Chrome tab and enter the VIP address, **192.168.110.200** as the URL
2. Notice the web server has responded and the server actually serving the request is **192.168.110.202**
Verify the Load-Balancing Operations Continued

Welcome to VMware Apache Server! My IP Address is: 192.168.110.202

1. Highlight the whole IP address in the URL space and hit Enter to force the Chrome browser to refresh its cache and send a new request to the VIP.

Verify the Load-Balancing Operations Continued

Welcome to VMware Apache Server! My IP Address is: 192.168.110.203

1. Notice the web server has responded BUT the server actually serving the request is 192.168.110.203

This proves that the NSX Load-Balancer is effectively load-balancing across the two web servers deployed as part of the vRealize Automation blueprint, which concludes this lesson.

Log out of vRA

1. Exit vRA and go back to the login page by clicking on logout.
Conclusion

Congratulations on completing Module 3!

In this module, we have covered how to deploy a fully automated network stack with our application stack. In IT today, it's not just how fast you can deploy a virtual machine, but also how fast you can provide the network, security and availability services.

You've finished Module 3

Congratulations on completing Module 3.

If you are looking for additional information on the integration between vRealize Automation and NSX, try one of the links below:

- Click on this link
- Or go to https://tinyurl.com/y7r9d6xl
- Or use your smart device to scan the QRC Code.

If you have not done them yet, please proceed to any module below which interests you most.

- **Module 1 - vRealize Automation & vRealize Operations Integration** (30 minutes) (Intermediate)
- **Module 2 - vRealize Log Insight & vRealize Operations Integration** (30 minutes) (Intermediate)
- **Module 4 - Better together: vRealize Automation & SPBM App-Centric Storage** (30 minutes) (Intermediate)

How to End Lab
To end your lab click on the **END** button.
Module 4 - Better together: vRealize Automation and SPBM App-Centric Storage (30 minutes)
Introduction

VREALIZE AUTOMATION AND STORAGE POLICY BASED MANAGEMENT FRAMEWORK INTEGRATION

Software Defined Storage technologies are one of the key pillars of the Software Defined Data Center (SDDC). Storage policies are essential to ensure agility, responsiveness and efficiency to enterprise storage offerings while maintaining data integrity and redundancy. This module features the integration of the vSphere Storage Policy-Based Management framework into vRealize Automation service catalog for end users in order to present on demand storage capabilities for current software defined storage technologies such as Virtual SAN, Virtual Volumes, and future storage solutions.

In this module, we will show you how to build and deploy a vRealize Automation blueprint that offers the possibility of selecting, upon request by end users, a different storage class for every disk in the VM.
Review the Storage Configuration in vSphere

1. Click on the Google Chrome icon on the Windows taskbar

Adjust Browser Zoom Level

As the Hands On Labs default resolution is relatively low, if the zoom is not already set to 80%, we will need to adjust this setting in the browser to make sure all necessary areas are visible and accessible.

1. Click the menu icon on the top right corner of the browser window.
2. Click the "-" symbol to decrease the zoom to 80%.
3. Press the "ESC" key on your keyboard.

Navigate to the vSphere HTML5 Client

1. Click on the HTML5 Client bookmark in the RegionA folder.
Log In to vCenter

1. Turn on the "Use Windows session authentication" checkbox
2. Click Login

Check the Available Datastores

1. Once logged in vCenter client, click on the storage icon
2. Expand the RegionA01 datacenter object under vcsa-01a.corp.local to observe the datastores available in our vSphere setup
3. Note that there are two datastores available for us to deploy VM disks into: vsanDatastore is a single-node vSAN datastore setup that runs on esx-01a and RegionA01-ISCIO1-COMP01 is a shared ISCSI datastore that is accessible by all esx hosts in the infrastructure.

In our scenario, we will consider that these datastores offer two different classes of service in terms of performance, data features supported, resilience, etc... We will use
the vsanDatastore when a higher-end storage platform is needed for a particular component of an application.

So RegionA01-ISCSI01-COMP01 is the datastore where VM disks get deployed by default by vRealize Automation. If a user wants a higher-end storage service, he will have to explicitly request when submitting a deployment in the vRealize Automation self-service catalog.

Note: Local-esx04a is a datastore that is local to esx04a and made out of the disks present in the host. It will not be used in this part of the lab.

**View the Storage Policies in vCenter**

![Image of vCenter interface showing Policies and Profiles]

Let's look at the storage policies configured in vCenter and how those relate to the two datastore we've seen just before, vsanDatastore and RegionA01-ISCSI01-COMP01.
Storage policies are what we will be exposed to end users in the vRealize Automation form. Indeed, application architects and developers care more about the capabilities of a given storage class rather than raw storage capacity itself when architecting or deploying their applications.

To view the storage policies

1. Click on **Menu**
2. Click on **Policies and Profiles**

**View the VM Storage Policies**

**View the vSAN Default Storage Policy**
Deploy a Blueprint with Different Storage Classes for Different Disks

In this lesson, we are going to log in vRealize Automation as a development user and request a Blueprint that has been prepared in such a way that enables the user to select of a specific storage class for every disk in a self-service fashion.

1. Open a new browser tab (not shown) and click on the vRealize Automation bookmark
Log In to vRealize Automation as the Development User

Login with the following credentials:

1. Username: devuser
2. Password: VMware1!
3. Click Sign in
Navigate to the vRealize Automation Catalog

1. Click on the Catalog tab.

Request the CentOS-SPBM Blueprint

1. Locate the Blueprint called CentOS - SPBM and click Request.

DON'T CLICK SUBMIT yet on the following screen!

Request the CentOS-SPBM Blueprint Continued
Review the short description of the blueprint on the left hand-side of the screen.

1. When done, click on CentOS
2. Click on the Storage tab

Notice that this virtual machine has been modeled with two disks simply labeled Disk0 and Disk1.

Request the CentOS-SPBM Blueprint Continued

1. Click on the General tab and notice the three drop-downs that are exposed to the user:

The user gets to choose a specific storage class for each of the following objects:

- **VM Home Storage Policy**: this term is used to describe all the virtual machine configuration files, such as the .vmx, .log, swap files, etc... More on this notion of VM home can be found at: [https://cormachogan.com/2014/03/12/vsan-part-18-vm-home-namespace-and-vm-storage-policies/](https://cormachogan.com/2014/03/12/vsan-part-18-vm-home-namespace-and-vm-storage-policies/)

- **Virtual Machine Disk0 Disk Storage Policy**: this object represents the first vmdk of the machine.

- **Virtual Machine Disk1 Disk Storage Policy**: this object represents the second vmdk of the machine.

**Note**: it will take between 10 and 15 seconds for the drop-downs to populate with values. This time lag is not representative of a real production implementation, where this time can be dramatically improved. Please remember Hands-on-labs are a showcase of VMware technologies and focus on features rather performance.
Select the Disk Storage Policy

1. Once the drop-downs have been populated, leave the first two with the default values and select **vSAN Default Storage Policy** as a storage policy for **Virtual Machine Disk 1**.

2. Once you have reviewed your configuration and the information below, click **Submit**. Click **OK** when prompted (not shown).

Your form should look like the previous picture, that is:

- **VM Home Storage Policy: Datastore default**
- **Virtual Machine Disk0 Disk Storage Policy: Use VM Home Storage Policy**
- **Virtual Machine Disk1 Disk Storage Policy: vSAN Default Storage Policy**

With such a configuration, we are instructing the system to:

- deploy the VM configuration files on the default storage policy, which means the files will be deployed on the iSCSI datastore
- deploy the first disk of that VM on the same storage policy as VM home, which means it will be deployed on the iSCSI datastore
- deploy the second vmdk of that VM on the vSAN default storage policy, which means it will be deployed on the VSAN datastore
It will take approximately 6 minutes for this blueprint to fully deploy. In the meantime, please move onto the next lesson in this module where you'll get to learn more about the different configurations that enable vRealize Automation to interact with the underlying storage platform in the vSphere architecture.
Review the Design of the Blueprint that Features Different Storage Classes

In this lesson, we will walk you through the high-level configuration steps required to enable this capacity for an end-user to select different storage classes for different disks in a VM blueprint.

This lesson is not meant to be a detailed step by step guide but rather a high-level overview of the major steps.

Log in to vRealize Automation as the Cloud Administrator

After submitting the Blueprint creation request, you will be back at the vRealize Automation catalog screen. Log out of vRealize Automation.

1. Click Logout and then click Go back to login page (not shown)
Log In to vRealize Automation as the Cloud Administrator

Login now as the cloud administrator:

1. Username: **cloudadmin**
2. Password: **VMware1!**
3. Click **Sign in**
Review the Reservation Configuration in vRealize Automation

1. Click on **Infrastructure**
2. Click on **Reservations**

Edit the Development Reservation

1. Click on **Reservations** in the left-hand menu
2. Highlight the **Development Reservation row**. This is the reservation we are using for our storage classes Blueprint.
3. Click **Edit**
1. On the **Edit Reservation** screen, click on the **Resources** tab.

Note that this reservation has access to both the vSAN and ISCSI vSphere datastores. Since ISCSI has a lower priority, by default, vRealize Automation will try to deploy resources in that datastore.

The next configuration steps are meant to add an additional logic to enable the user to override the default system configuration and to explicitly select the storage class they want.
Exit the Editing of the Reservation

1. Once you've finished reviewing the reservation configuration, click **Cancel**.
Review the Blueprint Design

1. Click the **Design** tab
2. Click **Blueprints**
3. Highlight the **CentOS - SPBM** blueprint row (note that the blueprint may be further down the list)
4. Click **Edit**
Review the CentOS - SPBM Blueprint

For the drop-down and storage class selection to work, the Blueprint has to be configured with custom properties. vRealize Automation will use those to collect decision-making information from the end user about where and how the developer wants storage to be configured for the virtual machine.

Let's review how custom properties have been applied to disk0 for instance:

1. Click on the **vSphere CentOS machine** in the center of the blueprint canvas
2. Click on the **Storage** tab
3. Highlight **Disk0**
4. Click on the **pencil icon** under **Custom Properties**
1. **VirtualMachine.Disk0.DiskStoragePolicy** is a property that has been created in the system by a platform architect or a cloud admin and which can be leveraged by blueprint authors to expose a drop-down option to gather input from end users needed to execute a specific automation upon Blueprint deployment. A similar custom property has also been used for Disk1 as well as the vSphere VM itself.

2. Click **Cancel**

vRealize Automation custom properties and similar concepts are covered in details in the series of vRealize Automation-focused hands-on-labs.
Exit the Blueprint Design Canvas

1. Click **Cancel**
2. Click **Yes** for "Cancel and discard your changes?"

Log Out of vRealize Automation

Let's now go back to our Blueprint deployment, review the end result and check where every disk has been deployed in the vSphere infrastructure.

1. Click **Logout**
Verify the Storage Provisioning

Log back in to vRealize Automation as the development user with the following credentials:

1. username: **devuser**
2. password: **VMware1!**
3. Click **Sign in**
Verify the deployment in vRealize Automation

1. Click on the **Items** tab
2. Expand the deployment called **CentOS - SPBM**
3. Highlight the **dev-XXX** virtual machine in this deployment. The value of XXX doesn't matter here as you should one and only one CentOS - SPBM blueprint deployed under Items.
4. Click **View Details**

View the Details of the Deployed VM

1. Click on the **storage** tab to review the storage configuration of this VM.
2. Notice how **disk0** was deployed into the default datastore **regionA01-ISCOI01-COMP01** while **disk1** was deployed into the **vsanDatastore**.

This proves that the end user was able to decide on which storage infrastructure every disk of the VM should be deployed.

Feel free to click **View** under Custom Properties to further understand how the end user request was interpreted and processed by the system. Note that it may be necessary to scroll to the right to see the Custom Properties information.
Verify the Deployment in vSphere

1. Open a second browser tab and click on the HTML5 Client bookmark to log into vCenter

View the VM Storage Policies

1. Expand the RegionA01 datacenter and then the RegionA01-COMP01 cluster
2. Locate the VM named dev-0XX (not dev-000)
3. Right-click on that VM and select VM Policies
4. Click **Edit VM Storage Policies**

**View the VM Storage Policies**

This screen gives another confirmation, at a virtual infrastructure level, of which vSphere storage policies were applied to the VM files and disks upon creation and, as a consequence, into which datastores those files and vmdks were eventually deployed.
Conclusion

Congratulations on completing Module 4!

In this module, we have showcased the integration of a storage policy consumption model into vRealize Automation.

This integration enabled VM-granular control based on the vSphere SPBM (storage policy based management framework). The configuration performed exposed vSphere VM Storage policies to vRealize Automation service catalog, allowing the ability to dynamically assign individual VM storage policies to virtual disks based on their storage requirement characteristics (performance, availability, security, etc).

You've finished Module 4

Congratulations on completing Module 4.

If you are looking for additional information on the integration between vRealize Automation and vSphere's SPBM (Storage Policy-Based Management), try the links below:

• Click on this link
• Or go to https://tinyurl.com/yajgpoh4
• Or use your smart device to scan the QRC Code.

If you have not done them yet, please proceed to any module below which interests you most.

• Module 1 - vRealize Automation & vRealize Operations Integration (30 minutes) (Intermediate)
• Module 2 - vRealize Log Insight & vRealize Operations Integration (30 minutes) (Intermediate)
• Module 3 - Better together: vRealize Automation & NSX App-Centric Network and Security (45 minutes) (Intermediate)
How to End Lab

To end your lab click on the END button.
Conclusion

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

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