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Lab Guidance

Note: 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.

Audience for this lab:

The primary audience for this lab is VMware Cloud Provider administrators or anyone interested in learning how vCloud Director works with some of the other product offerings in the VMware product catalog.

VMware Cloud Provider solutions, offered through the VMware Cloud Provider Program (formerly known as vCloud Air Network), enable rapid and cost effective delivery of hybrid cloud services that customers increasingly demand. Whether infrastructure-as-a-service, disaster recovery or desktop-as-a-service, service providers can benefit from decreased time to market, reduced capital investments and lower development costs to stay competitive in the cloud computing market.

In this lab, we will explore vCloud Director interoperability with NSX, vSAN, vRealize Operations, vRealize Log Insight, vCloud Availability, and Usage Meter.

Lab Module List:

- **Module 1 - Introduction to vCloud Director** (30 minutes) (Basic) This module will provide an overview of vCloud Director, its use cases and various objects involved.
- **Module 2 - vCloud Director Consumption** (15 minutes) (Basic) This module will illustrate multi-tenancy within vCD and step you through creating vApps and catalog deployment.
- **Module 3 - What's New in vCloud Director 9.0** (30 minutes) (Basic) This module introduces vCloud Director 9.0 and explores the Enhanced User Interface as well as walking your through the Distributed Logical Router.

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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 is 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 - Introduction to vCloud Director (30 minutes)
Introduction

This Module contains the following lessons:

- Introduction to vCloud Director
- Mapping vSphere Resources to vCloud Director
- vCloud Director Networking with NSX
Introduction to vCloud Director

VMware vCloud Director enables VMware Cloud Providers to build differentiated cloud services that are inherently hybrid-aware and ideal for enterprise-class organizations. It is available through the VMware Cloud Provider Program.

vCloud Director Login

If you have not already done so, log in to vCloud Director

1. Open Chrome by double clicking the icon on the desktop
2. Select the vCD-Admin bookmark link in the bookmark toolbar. This will bring you to the vCloud Director login screen
3. Enter user name Administrator
4. Enter password VMware1!
5. Click Login

Note: if you get a message asking to open vmware-csd.exe, click Cancel.
Complete Software-Defined Services as Virtual Data Centers

VMware vCloud Director is a software product that provides the ability to build secure, multi-tenant clouds by pooling virtual infrastructure resources into virtual datacenters and exposing them to users through Web-based portals and programmatic interfaces as a fully-automated, catalog-based service.

Terminology and Architecture Overview

vSphere Resources

vCloud Director relies on vSphere resources to provide CPU and memory to run virtual machines. In addition, vSphere datastores provide storage for virtual machine files and other files necessary for virtual machine operations. vCloud Director also utilizes vSphere distributed switches and vSphere port groups to support virtual machine networking. You can use these underlying vSphere resources to create cloud resources.

Cloud Resources

Cloud resources are an abstraction of their underlying vSphere resources. They provide the compute and memory resources for vCloud Director virtual machines and vApps. A vApp is a virtual system that contains one or more individual virtual machines, along with parameters that define operational details. Cloud resources also provide access to storage and network connectivity. Cloud resources include provider and organization virtual datacenters, external networks, organization virtual datacenter networks, and network pools. Before you can add cloud resources to vCloud Director, you must add vSphere resources.

Provider Virtual Datacenters

A provider virtual datacenter combines the compute and memory resources of a single vCenter Server resource pool with the storage resources of one or more datastores available to that resource pool. You can create multiple provider virtual datacenters for users in different geographic locations or business units, or for users with different performance requirements.

Organization Virtual Datacenters

An organization virtual datacenter provides resources to an organization and is partitioned from a provider virtual datacenter. Organization virtual datacenters provide an environment where virtual systems can be stored, deployed, and operated. They also provide storage for virtual media, such as floppy disks and CD ROMs. A single organization can have multiple organization virtual datacenters.

Organizations
vCloud Director supports multi-tenancy through the use of organizations. An organization is a unit of administration for a collection of users, groups, and computing resources. Users authenticate at the organization level, supplying credentials established by an organization administrator when the user was created or imported. System administrators create and provision organizations, while organization administrators manage organization users, groups, and catalogs.

Exploring vCloud Director

When you first log in to vCloud Director, you start in the Home portion of the System tab. Note the Guided Tasks section with a number of links to help give shortcuts to common tasks. There is also a Guided Tasks section below that has links to take you directly to whatever section of vCloud Director you may want to go. In order to show how to navigate the user interface, we won't use those shortcuts right now.

1. Click on the Manage & Monitor button

View Organizations
Within Organizations, there are 2 tenants listed, Tenant 1 (T1) and Tenant 2 (T2). There is also a Public Org tenant. The Public Org tenant contains templates that both tenants can access.

**Open the T1 Tenant**

1. Double Click on the Org name T1 to open a new tab within the Admin interface
2. In the T1 Org click on the Open hyperlink within T1-vApp1
View vApp Architecture

Note the workloads **T1-tclinux-01a** and **T1-tclinux-02a** that are running for **T1** (Tenant 1). Also, take note of the internal network **T1-vApp1-net** that these workloads are connected to. **T1-vApp1-net** is also routed out to the external **T1-OrgNet-Rtd** network.

You can go back to the **System** tab and open up **T2** (Tenant 2), then **Open** the **T2-vApp1**. Note the single workload in Tenant 2 as well as different network segments as compared to what we viewed in Tenant 1.
Mapping vSphere Resources to vCloud Director

A new tenant has just signed up with your service. They have requested that they want to put their workloads in a Pay-As-You-Go resource. We will need to create a new Provider VDC and Org VDC for this Pay-As-You-Go service. Let us walk through the steps to get the resources in place and then setup the new Tenant 3 with their new service.

Create a New Environment for Tenant 3

1. Click on the System tab to return to the Admin Manage & Monitor page.
Setup a Bronze Provider VDC

1. Ensure you are on the **Manage & Monitor** view
2. Choose **Provider VDCs**
3. Click on the green **Plus** button to create a new Provider VDC
Name the New Provider VDC

Because we already have Gold and Silver PVDCs, we will name this one Bronze (we already have a Bronze Resource Pool to map it to in the next step).

1. Type **Bronze-PVDC** into the Name field
2. Verify there is a **checkmark** in the **Enabled** box
3. Click **Next**
Select Resource Pool

It is generally considered best practice to map Provider VDCs to Clusters in vSphere, but you can map them to Resource Pools as well. Due to the limited resources within this lab environment, we are mapping PVDCs to Resource Pools.

1. Select the vCenter instance named **vcsa-01a**
2. Select the Resource Pool named **Bronze**
3. Click on the **Next**
Add a Storage Policy

1. Select one of the storage policies - pick one other than *(Any)
2. Click on the **Add** button
3. Click on **Next**
Configure VXLAN Network Pool

You can create specific VXLAN Network Pools for PVDCs ahead of time, or you can just let vCloud Director create the VXLAN Network Pool for you. For this lab, we're going to let vCloud Director create a VXLAN Network Pool for us.

Click **Next**.
Select Virtual Hardware Version

You can define the highest virtual hardware version you want to be supported by the PVDC. This is useful if you have different or older versions of ESXi running on the hosts providing resources to the PVDC. For this lab, we will leave it at Hardware Version 13.

Click Next.
Review Ready to Complete

Review the Ready to Complete page and click **Finish**.

**Verify Bronze-PVDC Creation**
Verify the Bronze-PVDC has been created and the status has a green checkmark. Let us continue the setup and create a new Org for Tenant 3.

**Setup a New Tenant3 Organization**

1. Select **Organizations**
2. Click on the **New Organization...** button (Green Plus sign)
1. In the Organization name field, type in **T3**
2. Type **Tenant3** in the Organization full name field
3. Click **Next**
LDAP Options

Verify **Do not use LDAP** is selected and **Click Next**
Add Local User

1. Click on the Add... button
2. Type in t3admin in the User name field
3. Type in VMware1! into the Password fields
4. Ensure that there is a checkmark in the Enable box
5. Choose Organization Administrator from the dropdown menu
6. Click on OK
Verify Account Creation

Verify the t3admin account has been created and click **Next**
In a traditional deployment of vCloud Director, you may want to allow tenants to publish, share, or subscribe to catalogs. For this tenant, we will leave these unchecked.

Click **Next**
Email Preferences

Normally, you would probably want to configure email settings and notifications for your tenants. For this lab, however, we will not.

Click **Next**
Normally, when you create Organizations, you would configure lease times and quota limits based on your requirements. For this lab, we will leave the defaults.

Click **Next**
Review Ready to Complete

Review the Ready to Complete screen and click **Finish**

Verify T3 Creation

Verify that Tenant3 (T3) is now listed in **Organizations**
Setup Organization VDC for Tenant3 and Pay-As-You-Go Allocation Model

1. Click on **Organization VDCs**
2. Click on **New Organization VDC...** (Green Plus button)
Select Organization

1. Select **T3** from the Organization list
2. Click **Next**
Select Provider VDC

1. Select **Bronze-PVDC** from the list
2. Click **Next**
Select Allocation Model

Read the descriptions of the different Allocation Models to understand what options are available for Organization VDCs.

1. Select **Pay-As-You-Go** as the Allocation Model.
2. Click **Next**.
Configure Pay-As-You-Go Model

Normally, based on your own requirements, you would configure quotas and limits when you create Organization VDCs. For this lab, however, we will leave the default settings.

Keep the defaults and click **Next**
Storage Allocation

1. Select the storage policy (it should be the same one you selected when creating the PVDC)
2. Click on the Add button
3. Place a checkmark in the Enable thin provisioning box
4. Click Next
1. Choose **Bronze-PVDC-VXLAN-NP** from the Network pool dropdown
2. Click **Next**
Configure Edge Gateway

1. Place a **check in the box** to create a **new edge gateway**
2. Type in **T3-ESG** for the name
3. Read through the different options you have when creating an Edge Gateway through vCloud Director. Leave the default settings.
4. Click **Next**
Configure External Networks

1. Select **External Network**
2. Click on the **Add** button
3. Click **Next**
1. Select **External_Network**
2. Select **192.168.100.1**
3. Place a **checkmark** in the **Use default gateway for DNS Relay** box
4. Click **Next**
Create Organization VDC Network

1. Place a checkmark in the Create a network for this virtual datacenter... box
2. Type in T3-OrgNet-Ext for the Network name
3. Enter 192.168.200.1 for the Gateway address
4. Enter a subnet mask of 255.255.255.0
5. Click Next
Enter Name for Organization VDC

1. Type in **T3-OVDC** into the **Name** field
2. Click **Next**
Review and Finish

Verify the information in the Ready to Complete screen. Click **Finish**

Verify T3-OVDC Creation

We have just successfully created a new Bronze resource for Tenant3 with a Pay-As-You-Go allocation model (note: it may take a few minutes to create the new OVDC). The t3admin can now review the VMware vCloud Director User's Guide, which will provide information about managing organizations, catalogs, vApps, and virtual machines. In the next lesson, we will explore vCloud Director Networking with NSX.
vCloud Director Networking with NSX

This module provides an overview of the networking and security aspects of VMware vCloud Director, and explains the types of networks and network pools with NSX that are available in vCloud Director.

Providing Infrastructure-as-a-Service (IaaS) involves more than providing just compute and storage resources. It involves providing agile networking capabilities and services that are easy to consume. NSX Manager virtualizes networks and security to create efficient, agile, extensible logical constructs that scale requirements and meet the performance of virtualized data centers. vCloud Director supports different types of networks:

- vApp network
- External network
- Organization VDC network

These networks enable end users to self-provision separate L2 network segments, define custom L3 Internet protocol (IP) policies, and configure networking services such as dynamic host configuration protocol (DHCP), NAT, and firewalls.

Let us explore what this looks like in vCloud Director.

Manage the Edge

First, we will take a look at what this looked like in previous versions of vCD and compare it to the new interface.

1. In the vCD Admin interface, select **Manage & Monitor**
2. Click on the **Organization VDCs**
3. Double click on **T2-OVDC**

**Edge Gateways**

1. Select the **Edge Gateways** tab
2. Select the **T2-ESG** within the Edge Gateways tab
3. Click the **Actions** button and a menu will open
4. Note the **Convert to Advanced Gateway** option, but DO NOT select it
5. Click on **Edge Gateway Services**...
1. Note the tabs that are available at the top. These are the options that have traditionally been available for management through the vCD interface.
2. Click **Cancel** to close the pop-up window
Select T1-OVDC Organization VDC

1. Next, let us take a look at the new interface by going back to the **System** tab.
2. Double click on **T1-OVDC**.
1. Select the **Edge Gateways** tab
2. Select the **T1-ESG** within the Edge Gateways tab
3. Click the **Actions** button and a menu will open
   - Note the Convert to Advanced Gateway option is no longer there. This Edge Gateway has already been upgraded.
4. Click on **Edge Gateway Services...**
A new tab opens up within the browser. As you can see, we are in the process of migrating to an HTML5 interface.

1. Note the new configuration options that are available at the top that can now be managed through the vCD interface. Feel free to click on some of the new features, like SSL VPN-Plus, Certificates, Grouping Objects, Statistics, and Edge Settings. Even the Routing option has changed. In the past, only static routes were available. Now we can configure dynamic routing protocols like OSPF and BGP. This particular Edge is configured for BGP. Take a look at the configuration.

2. Close the browser tab when you are finished.

Next, we will take a look at the Distributed Firewall.
Manage Firewall

1. Go back to the T1 Administration tab
2. Click on Virtual Datacenters
3. Select T1-OVDC
4. Click on the Actions button
5. Select Manage Firewall...

Distributed Firewall Rules

A new tab will open up in the browser with the new HTML5 interface

1. We can now manage (add/change/remove) Distributed Firewall rules and settings through vCD
2. Close the browser tab when you're finished
Conclusion

In this Module, we stepped through a basic Introduction to vCloud Director. We then walked through setting up a New Organization with a Pay-As-You-Go Allocation Model. We then looked at managing vCloud Director Networking with NSX.

You've finished Module 1

Congratulations on completing Module 1.

For more information on vCloud Director, click the following link:

- [https://cloudsolutions.vmware.com/products/vcloud-director](https://cloudsolutions.vmware.com/products/vcloud-director)

Proceed to any module below which interests you most.

- [Module 2 - vCloud Director Consumption](#) (15 minutes) (Basic)
- [Module 3 - What’s New in vCloud Director 9.0](#) (30 minutes) (Basic)

How to End Lab

To end your lab click on the **END** button.
Module 2 - vCloud Director Consumption (15 minutes)
Introduction

This Module contains the following lessons:

- Multi-tenancy in vCloud Director
- Create a vApp Within a Tenant
- Deploy a vApp from a Catalog to a Tenant
Multi-tenancy in vCloud Director

vCloud Director categorizes users into organizations that can represent any policy group, such as a business unit, division, or company. Each will have isolated virtual resources, independent role based authentication and specific policy controls. These features enable secure and robust multi-tenancy and safe sharing of infrastructure resources. vCloud Director supports multi-tenancy through the use of organizations. We will continue and illustrate Multi-tenancy in vCloud Director.

vCloud Director Login

If you have not already done so, log in to vCloud Director

1. Open Chrome by double clicking the icon on the desktop
2. Select the vCD-Admin bookmark link in the bookmark toolbar. This will bring you to the vCloud Director login screen
3. Enter user name Administrator
4. Enter password VMware1!
5. Click Login
Navigate to Organizations

1. Click on Manage & Monitor
2. Click Organizations

We can see we have two tenants listed, T1 and T2. Next, we will log into these environments to help us illustrate multi-tenancy.

Login as Different Tenants

From the open Chrome browser:
1. Click the **Customize and Control** button to the right of the address bar
2. Select **New incognito window**

## Log into vCD - Tenant1

1. Click the **vCD - Tenant1** folder in the bookmarks bar and select **vCD - T1 Flex**
2. Type in the user name of **t1admin**
3. Type in a password of **VMware1!**
4. Click **Login**
Note: if you get a message saying vCloud Director requires Adobe Flash Player, click the link (1) and click Allow (2). If you get a message asking to open vmware-csd.exe, click Cancel.
Open T1-vApp

1. Click on **Open** hyperlink to view the vApp Diagram of T1-vApp1
Tenant 1 Workloads

Take note of the workloads that are running in Tenant1. There are two virtual machines connected to the T1-vApp1-net, which is the internal network for this vApp. The T1-vApp1-net network is then connected to an external network named T1-OrgNet-Rtd.

Let us compare this to Tenant2 to further illustrate multi-tenancy in vCloud Director.
Log out of Tenant 1.

Log into vCD - Tenant2

We will now login as Tenant2 admin
1. Click the **vCD - Tenant2** folder in the bookmarks bar and select **vCD - T2 Flex**
2. Type in the user name of **t2admin**
3. Type in a password of **VMware1!**
4. Click **Login**

*Note: if you get a message asking to open vmware-csd.exe, click **Cancel**.*

---

**Open T2-vApp**

1. Click on **Open** hyperlink to view the vApp Diagram of T2-vApp1
Tenant2 Workload

Take note of the single workload that is running in Tenant2. The single virtual machine is connected to the T2-vApp1-Net, which is the internal network for this vApp. The T2-vApp1-Net network is then connected to an external network named T2-OrgNet-Ext. The internal vApp as well as the external networks are isolated from the networks we viewed in Tenant1.

Let us take a look at how vCloud Director works with NSX to automatically deploy Edge appliances.
Open New Window

1. Click the **Customize and Control** button to the right of the address bar
2. Select **New window**

*Note: Make sure you select "New window". DO NOT open a new Incognito window (you might get weird flash errors in the next section).*

Open Region A vCenter Bookmark

1. Click on **vSphere Client** in the bookmark bar
2. Select the **RegionA vCenter** bookmark

*Note: if you get a message asking to open vmware-cip-launcher.exe, click **Cancel**.*
Administrator Login

Log in to the vSphere Web Client as:

User name: administrator@vsphere.local
Password: VMware1!

Navigate to Network & Security

1. Hover over or click the Home dropdown
2. Select Networking & Security
NSX Edges

1. Select NSX Edges
2. vCloud Director automatically deployed these appliances into NSX. T1-ESG and T1-vApp1-net were deployed for Tenant1. T2-ESG and T2-vApp1-Net were deployed for Tenant2.
3. When you're done, close the browser window.

Next, Let us create a vApp in the next lesson.
Creating a vApp

In this lesson, we will build a new vApp in vCloud Director. The purpose of this activity is to show you how to deploy virtual machines.

Log into Tenant1

1. Open a browser window, click the vCD - Tenant1 folder in the bookmarks bar and select vCD - T1 Flex
2. Type in the user name of t1admin
3. Type in a password of VMware1!
4. Click Login
Note: if you get a message saying vCloud Director requires Adobe Flash Player, click the link (1) and click Allow (2). If you get a message asking to open vmware-csd.exe, click Cancel.
Build New vApp

Click the **Build New vApp** option
1. Type in **T1-Build-New-vApp** in the **Name** field
2. Click **Next**
Add Virtual Machines

1. Choose the **Public Catalogs** from the dropdown. We have 3 base virtual machine builds to choose from.
2. Choose the **Windows-base** virtual machine
3. Click on the **Add** button
4. Click **Next**
Select Storage Policies

We will keep the default Storage Policy. Click **Next**
Configure Virtual Machines

1. Choose T1-OrgNet-Rtd from the Network dropdown
2. Choose Static - IP Pool from the IP Assignment dropdown
3. Click Next
Configure Networking

1. Place a **checkmark** in the box to **Fence vApp**. This will allow identical VMs in different vApps to be powered on without MAC and IP conflicts.
2. Click **Next**
Review and Finish

Review the Ready to Complete page and click **Finish**
Verify New vApp

The newly created vApp will eventually have a status of Stopped. Feel free to click on the Open hyperlink for this new vApp to view the vApp Diagram and other settings.

Let us take a look at deploying a vApp from a catalog in the next lesson.
Deploy vApp from Catalog

Let us now learn how to build a new vApp in vCloud Director from an existing catalog.

Add vApp from Catalog

1. In the same Tenant1 administration page, Click the Home button
2. Click Add vApp from Catalog
1. Choose Public Catalogs from the dropdown
2. Select the linux-base golden image
3. Click Next
1. Type **T1-Catalog-vApp** for the Name
2. Click **Next**
Select Storage Policy

1. Choose the **vSAN HOL Policy** from the Storage Policy dropdown
2. Click **Next**
1. Connect NIC 0 by choosing the **T1-OrgNet-Rtd** network from the Networks dropdown
2. Click **Next**
Customize Hardware

Click **Next**
Review and Finish

1. Place a checkmark in the **Power on vApp after this wizard is finished**
2. Click **Finish**

Verify New vApp
After a few minutes, the newly created vApp that we deployed from the catalog will have a status of **Running**. Feel free to click on the **Open** hyperlink to view the vApp Diagram and other settings.
Conclusion

In this Module, you learned how vCloud Director builds out a Multi-tenant service. We created a new vApp as well as deployed a vApp from a Catalog.

You've finished Module 2

Congratulations on completing Module 2.

For more information on vCloud Director, click the following link:

- [https://cloudsolutions.vmware.com/products/vcloud-director](https://cloudsolutions.vmware.com/products/vcloud-director)

Proceed to any module below which interests you most.

- Module 1 - Introduction to vCloud Director (30 minutes) (Basic)
- Module 3 - What's New in vCloud Director 9.0 (30 minutes) (Basic)

How to End Lab

To end your lab click on the **END** button.
Module 3 - What’s New in vCloud Director 9.0 (30 minutes)
Module Introduction

This Module contains the following lessons:

- What's New in vCD v9.0
- Enhanced User Interface
- Distributed Logical Router
What's New in vCD v9.0

The release of vCloud Director v9.0 introduced some new features to the platform. Let's go through them.

**Tenant HTML5 UI**

The new HTML5 Tenant UI allows for simplified tenant workflows and makes it easier for tenants to manage their environment. Because it is based on HTML5, it's easy to add functionality to the interface, like the new Management option using the optional vCD metrics database or by incorporating vRealize Operations data by use of the new vCloud Director Tenant App for vRealize Operations. The new UI can also easily be customized to allow more personalization on a per tenant basis.

We will look further into the new UI later in this module.
Multi-Tenant NSX

NSX isn't a multi-tenant product, but when combined with vCloud Director, each tenant can take advantage of NSX features within their own virtual data centers. Earlier versions of vCloud Director allowed for Edge and Distributed Firewall management. vCloud Director v9.0 now allows tenants to manage Security Groups with their Distributed Firewall. vCD 9 also allows tenants to take advantage of Distributed Logical Routers (shown later in this module). Finally, vCD 9 allows Edges to be deployed in a dedicated Edge Cluster.

You can explore more with NSX and vCloud Director in HOL-1883-02 - VMware Cloud Provider Program Tools and Offerings.

Multi-Site
vCloud Director has always supported multiple vCenters, but there hasn't been a way to connect multiple vCloud Director sites. Now, with vCloud Director v9.0, we can connect multiple instances of vCloud Director.

Multisite capabilities allow an organization user to log in to the vCloud Director UI hosted at any of the sites where they have an Organization and Organization VDC. Upon login, the UI displays a sites icon that allows them to switch to other sites in which they have resources so that they can manage them from the same session.

**Storage Support**

- Support for creating data stores that are backed by vSAN
- Support for creating data stores with VASA 2.0 virtual volumes

Traditionally, vCloud Director has supported any vSphere storage that could be presented through a Storage Policy. Now, vCD 9 has support for VASA providers (including vSAN).
Core

In the past, vCloud Director maintained its own list of supported operating systems. vCD 9 now utilizes vCenter/vSphere for OS compatibility, which makes OS compatibility simpler and faster to support.

vCloud Director 9 also added support for PostgreSQL. vCD 9 still supports MS SQL and Oracle databases, as well.

vCloud Director Extender

vCloud Director Extender was released shortly after the release of vCloud Director 9 to help migrate VMs from on-premises vSphere deployments to vCloud Director environments. It can connect the two environments with or without NSX. This helps make it easier for end users to migrate their workloads to the cloud.
Enhanced User Interface

One of the biggest new features in vCloud Director v9.0 is the new HTML5 Tenant UI. Let's take a look at it.

Log into vCD - Tenant1

1. If you haven't already done so, launch Chrome from the shortcut on the desktop or in the taskbar.
2. Click the vCD - Tenant1 folder in the bookmarks bar and select vCD - T1 HTML5
3. Type in the user name of t1admin
4. Type in a password of **VMware1!**
5. Click **Login**

**Note:** if you get a message saying *vCloud Director requires Adobe Flash Player*, click the **link (1)** and click **Allow (2)**. If you get a message asking to open *vmware-csd.exe*, click **Cancel**.

**New User Interface**

Note how the new HTML5 Tenant UI differs from the older Flex UI. You can switch between Compute, Network, and Administration using the left-hand navigation bar (1).
By default, you start in the Compute section. Notice how you can now view individual Virtual Machines as well as vApps (2). If you click the dropdown menu for "Look in", you’ll see that you can switch between All VMs, Standalone VMs (default), and VMs in vApps (3). Toggle through the different options.

Note that we don't have any Standalone VMs yet. Click the CREATE VM button (4) to create a new standalone VM.

**Create a VM**

1. Name the VM
2. Pick the **T1-OVDC** virtual datacenter
3. Scroll down and pick the **tclinux-base** template
4. Click **OK**
Notice that the VM creation process is much more simplified than in the old Flex UI. Wait a few minutes while your new VM is being created (the status will change from Busy to Powered On when finished).

**Interact with the VM**

Once the VM is created, you can work with it in the new UI.
1. Click on the POWER and MORE dropdown links to see the familiar options for managing a virtual machine.
2. Click on the squares icon to launch the console to the VM in a new window. Close the window when you're done.
3. Click the Details link to see more details on the virtual machine.

**Virtual Machine Details**

In the Virtual Machine Details window, you'll see the basic information of the VM in the main window. You can make changes to the VM in the Hardware, Guest OS Customization, and Advanced sections.

If you have configured the optional metrics database for vCloud Director, you will see a new Monitoring Chart option. Click on the **Monitoring Chart** section.
Monitoring Chart

The Monitoring Chart pulls data from the metrics database. You can click the Metric dropdown menu to look at the different metrics available.

Note: Since you just created this VM, you probably won’t have much in your charts. Over time, the charts will show more data (based on the resource utilization of the VM). After a few minutes, you should be able to see something in the cpu.usage.average and mem.usage.average charts.

Another option to look at metrics is by using vRealize Operations, which now has a Tenant App that allows publishing metrics from vRealize Operations in the vCD UI using a plugin. That scenario is shown in the companion lab to this one, HOL-1883-02-HBD - VMware Cloud Provider Program - Tools and Offerings.
Networking

1. Click on Network in the left-hand navigation bar to view the network settings.
2. Org VDC Networks is where you can view existing and create new Org VDC Networks.
3. Edge Gateways is where you can configure Edge Services Gateways.
4. Security is where you can configure the Distributed Firewall.

Click through the different sections and look at the configuration options. Close any new windows that open when finished. Next, we'll look at Administration.

Administration

1. Click on Administration in the left-hand navigation bar.

This is where you would configure the new Multisite feature in vCloud Director v9.0. Assuming the federation between sites has already been done on the Administration side, you would first Export from one vCloud Director instance, then you would Create on another instance and import the exported data from the original instance. This would effectively pair Org-A at Site A with Org-B at Site B, for example. We only have one vCD instance in this lab, so we won't do Multisite.
Distributed Logical Router

This section shows how to manage Distributed Logical Router in vCloud Director.

The DLR is optimized for forwarding in the logical space between VMs, on VXLAN-backed or VLAN-backed portgroups.

The DLR has the following properties:

- High performance, low overhead first-hop routing
- Scales linearly with the number of hosts
- Supports 8-way ECMP on uplink
- Up to 1,000 DLR instances per host
- Up to 999 logical interfaces (LIFs) on each DLR (8 x uplink + 991 internal) + 1 x management
- Up to 10,000 LIFs per host distributed across all DLR instances (not enforced by NSX Manager)

Keep in mind the following caveats:

- Cannot connect more than one DLR to any given VLAN or VXLAN.
- Cannot run more than one routing protocol on each DLR.
- If OSPF is used, cannot run it on more than one DLR uplink.
- To route between VXLAN and VLAN, the transport zone must span single DVS.

The DLR’s design at a high level is analogous to a modular router chassis, in the following ways:

- ESXi hosts are like line cards:
  - They have ports with connected end stations (VMs).
  - This is where the forwarding decisions are made.

- The DLR Control VM is like a Route Processor Engine:
  - It runs dynamic routing protocols to exchange routing information with the rest of the network.
  - It computes forwarding tables for “line cards” based on the configuration of interfaces, static routes, and dynamic routing information.
  - It programs these forwarding tables into the “line cards” (via the Controller Cluster, to enable scale and resiliency).

- The physical network connecting ESXi hosts together is like a backplane:
  - It carries VLAN-encapsulated or VXLAN-encapsulated data between the “line cards.”

Distributed Routing in vCloud Director is enabled on the Edge Services Gateway in the Org VDC. This allows DLR services for all networks connected to the Edge Services Gateway.
vCloud Director Login

If you have not already done so, log in to vCloud Director

1. Open Chrome by double clicking the icon on the desktop
2. Select the **vCD-Admin** bookmark link in the bookmark toolbar. This will bring you to the vCloud Director login screen
3. Enter user name **Administrator**
4. Enter password **VMware1!**
5. Click **Login**

*Note: if you get a message asking to open vmware-csd.exe, click **Cancel**.*
Open the T1-OVDC

1. Click on **Manage & Monitor**
2. Click on **Organization VDCs**
3. Click the link for **T1-OVDC** (or double-click anywhere on that line)
Enable Distributed Routing

1. Click on the **Edge Gateways** tab
2. Right-click on the **T1-ESG**
3. Select **Enable Distributed Routing**

Click **Yes** on the popup window.

1. Wait for the Status to go green again.
2. Then notice the green checkmark in the Distributed Routing column.
Conclusion

In this Module, we covered some of the new features in vCloud Director 9.0. We showed the new user interface. Then we showed how to configure NSX Distributed Logical Routers in the vCloud Director interface.

You've finished Module 3

Congratulations on completing Module 3.

For more information on vCloud Director, click the following link:

- [https://cloudsolutions.vmware.com/products/vcloud-director](https://cloudsolutions.vmware.com/products/vcloud-director)

Proceed to any module below which interests you most.

- Module 1 - Introduction to vCloud Director (30 minutes) (Basic)
- Module 2 - vCloud Director Consumption (15 minutes) (Basic)

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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