# Table of Contents

Lab Overview - HOL-1844-02-SLN - VMware Cloud Foundation - Hybrid Cloud ............2  
Lab Guidance .................................................................................................................3  
Module 1 - Hybrid Cloud Introduction (manual only) (15 minutes) .........................6  
Introduction (manual only) .............................................................................................7  
Conclusion .......................................................................................................................9  
Module 2 - Deploying VMware Cloud Foundation in a Public Cloud (15 minutes) ....11  
Introduction ...................................................................................................................12  
Interactive Simulation: Deploying VCF in a Public Cloud ...........................................13  
Conclusion .......................................................................................................................14  
Module 3 - Extending vRealize Automation to the Public Cloud (15 minutes) .........16  
Introduction ...................................................................................................................17  
Interactive Simulation: Extending vRealize Automation to the Public Cloud ..........19  
Extending vRealize Automation to the Public Cloud - iSIM notes .............................20  
Conclusion .......................................................................................................................31  
Module 4 - Expanding Public Cloud Capacity (15 minutes) .....................................33  
Introduction ...................................................................................................................34  
Hands-on Labs Interactive Simulation: Expanding Public Cloud Capacity ..........35  
Conclusion .......................................................................................................................36  
Module 5 - Apply Software Updates in the Public Cloud (15 minutes) ....................38  
Introduction ...................................................................................................................39  
Interactive Simulation: Apply Software Updates in the Public Cloud ....................40  
Conclusion .......................................................................................................................41  
Module 6 - Security & Compliance Automation on IBM Cloud with HyTrust (15 minutes) 43  
Introduction ...................................................................................................................44  
Interactive Simulation: Security & Compliance Automation on IBM Cloud with HyTrust ..................................................47  
Conclusion .......................................................................................................................48
Lab Overview - HOL-1844-02-SLN - VMware Cloud Foundation - Hybrid Cloud
Lab Guidance

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

In this interactive simulation lab, we will introduce you to the VMware Cloud Foundation offering on the IBM cloud.

Lab Module List:

- **Module 1 - Hybrid-Cloud Introduction (manual only)** (15 minutes) (Basic)
  This interactive simulation will introduce you to the Cloud Foundation hybrid cloud value proposition and show how VCF enables true hybrid cloud by implementing a common unified SDDC platform with a common architecture and operational model, and where deployment, management and ongoing operations are automated and simplified with SDDC Manager.

- **Module 2 - Deploying VMware Cloud Foundation in the Public Cloud** (15 minutes) (Basic)
  This interactive simulation will show you how to deploy VCF into the public cloud on IBM Bluemix. 12 hours later have a pool of capacity in the public cloud that is made up of the same SDDC components that they are using on-prem.

- **Module 3 - Extending vRealize Automation to the Public Cloud** (15 minutes) (Basic)
  This interactive simulation will show how customers can avoid getting locked-in by leveraging the benefits of a common SDDC platform across public and private cloud to easily migrate workloads without a need to convert virtual machine formats.

- **Module 4 - Expanding Public Cloud Capacity** (15 minutes) (Basic)
  This interactive simulation will show that the customer has run out of available capacity in the IBM Cloud and is now unable to add capacity through the SDDC manager.

- **Module 5 - Applying software updates into the Public Cloud** (15 minutes) (Basic)
  This interactive simulation will show you how you can leverage the built in automated Lifecycle Management capabilities of Cloud Foundation to quickly apply patches and updates with no interruption to the hosted workloads.

- **Module 6 - Security & Compliance Automation on IBM Cloud with HyTrust** (15 minutes) (Basic)
  This interactive simulation will show you how IBM and VMware have partnered with HyTrust to provide a robust security solution uniquely well suited for your VMware Cloud Foundation-based hybrid cloud.

*Note: To learn more about deploying Cloud Foundation in a private cloud environment see HOL Lab**HOL-1844-01-SLN** in the main catalog.*

Lab Captains:

- **Module 1-6 - Randy Carson, Sr. Cloud Specialist SE, USA**
This lab manual can be downloaded from the Hands-on Labs Document site found here:

http://docs.hol.vmware.com

**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.

**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.
Module 1 - Hybrid Cloud
Introduction (manual only) (15 minutes)
Introduction (manual only)

VMware Cloud Foundation is VMware’s new unified SDDC platform for the private and public cloud. VMware Cloud Foundation brings together VMware’s compute, storage, and network virtualization solutions into a natively integrated stack, delivering enterprise-ready cloud infrastructure with unique automation and management capabilities for simplified operations that is consistent across private and public clouds.

Cloud Foundation was purposely designed to simplify the process of deploying, operating, and maintaining a VMware based cloud. At its core are the key SDDC building blocks of compute virtualization (vSphere), storage virtualization (vSAN), and network virtualization (NSX). Along with these key SDDC components Cloud Foundation introduces the VMware SDDC Manager, an infrastructure automation tool that simplifies the deployment, configuration and ongoing maintenance of the SDDC stack, to include automated patching and upgrades.

Along with unifying the SDDC software stack, Cloud Foundation also makes it easy to leverage the advanced monitoring and management capabilities of the vRealize Suite. Each Cloud Foundation implementation includes vRealize Log Insight to provide centralized log aggregation. In addition, vRealize Operations and vRealize Automation can optionally be deployed to provide monitoring and cloud management services.
Finally, along with the vRealize Suite, Cloud Foundation also includes built in integration with VMware Horizon allowing it to fully automate the deployment and configuration of virtual desktop environments.

Cloud Foundation can be deployed both as a private cloud, running inside your existing data center on qualified servers and switches, as well as ‘as-a-service’, running on hosted infrastructure managed by public cloud providers. Thus, cloud foundation provides a common platform across both the private and public cloud, enabling a true hybrid cloud. This common platform provides several benefits:

- Allows you to standardize on the proven, industry leading virtualization capabilities of vSphere, vSAN and NSX across both private and public clouds
- Allows you to leverage the advanced capabilities of SDDC Manager to simplify the deployment and operations of your hybrid cloud, to include automated patch and upgrade
- Provides a common toolset for operating and maintaining your hybrid cloud
- Ensures a common feature set across the hybrid cloud, thus avoiding public cloud lock in
- Allows workloads to be moved across the hybrid cloud without requiring VM conversions
Conclusion

In this module you were given an overview VMware Cloud Foundation in the hybrid cloud

Congratulations on completing Module 1.

If you are looking for additional information on Cloud Foundation in the Public Cloud, try one of these:

- Click on this VMware Cloud Foundation
- Or use your smart device to scan the QRC Code.

Proceed to any module below which interests you most.

- **Module 2 - Deploying VMware Cloud Foundation in the Public Cloud** (15 minutes) (Basic) This interactive simulation will show you how to deploy VCF into the public cloud on IBM Bluemix. 12 hours later have a pool of capacity in the public cloud that is made up of the same SDDC components that they are using on-prem.
- **Module 3 - Extending vRealize Automation to the Public Cloud** (15 minutes) (Basic) This interactive simulation will show how customers can avoid getting locked-in by leveraging the benefits of a common SDDC platform across public and private cloud to easily migrate workloads without a need to convert virtual machine formats.
- **Module 4 - Expanding Public Cloud Capacity** (15 minutes) (Basic) This interactive simulation will show that the customer has run out of available capacity in the IBM Cloud and is now unable to add capacity through the SDDC manager.
- **Module 5 - Applying software updates into the Public Cloud** (15 minutes) (Basic) This interactive simulation will show you how you can leverage the built in automated Lifecycle Management capabilities of Cloud Foundation to quickly apply patches and updates with no interruption to the hosted workloads.
- **Module 6 - Security & Compliance Automation on IBM Cloud with HyTrust** (15 minutes) (Basic) This interactive simulation will show you how IBM and VMware have partnered with HyTrust to provide a robust security solution uniquely well suited for your VMware Cloud Foundation-based hybrid cloud.
How to End Lab

To end your lab click on the **END** button.
Module 2 - Deploying VMware Cloud Foundation in a Public Cloud (15 minutes)
Introduction

This module introduces you to the IBM Cloud portal and provide an overview on how to deploy VMware Cloud Foundation in the IBM Cloud.

The IBM Cloud is a public hosting platform that provides the elasticity and capacity flexibility that organizations have come to expect from a public cloud provider. VMware and IBM have teamed up to provide a Cloud Foundation service on the IBM Cloud making it easy for customers to deploy, and operate a VMware based public cloud based on VMware Cloud Foundation.

You access the Cloud Foundation service by logging into the IBM Cloud portal and selecting it from the list of available solutions. You will be prompted to select your desired hardware platform and a data center location, after which the IBM Cloud team will take care of the racking and stacking of the hardware and imaging the hardware in preparation for Cloud Foundation. Once this has been completed, the VMWare SDDC Manger will be used to deploy the unified SDDC platform and instantiate the Cloud Foundation instance. Everything is fully automated. Once deployed you simply logon to the vSphere web client and manage your public infrastructure just as you would any on-premises VMware environment.
Interactive Simulation: Deploying VCF in a Public Cloud

This interactive simulation walks you through

1. How to deploy VMware Cloud Foundation on IBM Bluemix.

The interactive simulation will allow you to experience steps which are too time-consuming or resource intensive to do live in the lab environment.

1. Click here to open the interactive simulation. It will open in a new browser window or tab.
2. When finished, click the “Return to the lab” link to continue with this lab.
Conclusion

In this module you were given an overview of how to deploy vCF in IBM Bluemix public cloud.

Congratulations on completing Module 2

If you are looking for additional information on Cloud Foundation in the Public Cloud, try one of these:

- Click on this VMware Cloud Foundation
- Or use your smart device to scan the QRC Code.

Proceed to any module below which interests you most.

- **Module 1 - Hybrid-Cloud Introduction (manual only)** (15 minutes) (Basic) This interactive simulation will introduce you to the Cloud Foundation hybrid cloud value proposition and show how VCF enables true hybrid cloud by implementing a common unified SDDC platform with a common architecture and operational model, and where deployment, management and ongoing operations are automated and simplified with SDDC Manager.
- **Module 3 - Extending vRealize Automation to the Public Cloud Capacity** (15 minutes) (Basic) This interactive simulation will show you how to dynamically grow/shrink their public cloud capacity (and hence control costs) by leveraging the automated extend/shrink capabilities of Cloud Foundation and the SDDC Manager.
- **Module 4 - Expanding Public Cloud Capacity** (15 minutes) (Basic) This interactive simulation will show you how you can easily expand your capacity in the public cloud using the SDDC manager.
- **Module 5 - Applying software updates into the Public Cloud** (15 minutes) (Basic) This interactive simulation will show you how you can leverage the built in automated Lifecycle Management capabilities of Cloud Foundation to quickly apply patches and updates with no interruption to the hosted workloads.
- **Module 6 - Security & Compliance Automation on IBM Cloud with HyTrust** (15 minutes) (Basic) This interactive simulation will show you how IBM and VMware have partnered with HyTrust to provide a robust security solution uniquely well suited for your VMware Cloud Foundation-based hybrid cloud.
**How to End Lab**

To end your lab click on the **END** button.
Module 3 - Extending vRealize Automation to the Public Cloud (15 minutes)
Introduction

Once you have deployed Cloud Foundation on the IBM Cloud you are ready to begin deploying workloads. Ideally, you will want to leverage any existing templates that you already have in your private cloud. In addition, you expect to be able to deploy workloads in the public cloud just as easy, and just as quickly as you can in your on-premises private cloud. Fortunately, this is easily done by leveraging your existing vRealize Automation deployment.

Once Cloud Foundation is deployed you will need to add it to your existing vRealize Automation instance as an endpoint.
Once the endpoint is added you simply make your existing VM templates available in the public cloud. One way to do this is to replicate the content library so that it will synchronize templates between the vCenter Server instances running in the private cloud with the vCenter Server Instances running in the public cloud.

With the templates copied, the public cloud vCenter instances added as an endpoint, you are ready to begin creating blueprints and deploying workloads in the public cloud.
Interactive Simulation: Extending vRealize Automation to the Public Cloud

This interactive simulation walks you through

1. The steps to synchronize the content library
2. The creation of blue prints to begin deploying workloads in IBM Cloud

The interactive simulation will allow you to experience steps which are too time-consuming or resource intensive to do live in the lab environment.

1. Click here to open the interactive simulation. It will open in a new browser window or tab.
2. When finished, click the “Return to the lab” link to continue with this lab.
Extending vRealize Automation to the Public Cloud - iSIM notes

Configure the vSphere Content Library for the Hybrid Cloud

Today, the organization currently uses the vSphere content library in their on-premises private cloud to manage the distribution of approved templates, ISOs, and customization specifications. The organization in-turn creates blueprints in vRealize Automation's design canvas that consume these templates and customization specifications.

Now that the organization is on the path to the hybrid cloud with their new VMware Cloud Foundation instance running on the IBM Cloud, they need these approved templates, ISOs and customization specifications to also be synchronized to the public cloud.

In this portion of the interactive simulation, we will show how to extend the organization's content library to their VMware Cloud Foundation instance running on the IBM Cloud and synchronize the organizations approved content. We'll also show how to build blue prints in vRealize Automation and begin deploying workloads in the public cloud.

This part of the lab is presented as a Hands-on Labs Interactive Simulation. This will allow you to experience steps which are too time-consuming or resource intensive to do live in the lab environment. In this simulation, you can use the software interface as if you are interacting with a live environment.

The orange boxes show where to click, and the left and right arrow keys can also be used to move through the simulation in either direction.

Reviewing the Private Cloud Content Library

Begin by logging into the private cloud and reviewing the content library.

1. Click the + icon on the browser to open a new tab.
2. Click the Address Bar in the browser.
3. Enter https://rack-1-vc-1.pao01.demo.vmware.com/vsphere-client into the address bar.
4. Click the Arrow Icon on the browser.
5. Enter administrator@vsphere.local in the User Name field.
6. Click the Password field and the password will auto populate.
7. Click Login.
8. In the vSphere Web Client click on **Content Libraries**.

   We see that two content libraries have been created in the private cloud.

9. **Management-PAO-01** for the use in the Management Domain

10. **TMM-PAO-01** used to organize and distribute content used by workloads and automation.

11. Click on the **TMM-PAO-01** Content Library.

   Here we see that the content library is hosted on the a vSAN datastore and consumes 76.22 GB of storage.

12. Click on **Related Objects** to review the items in the library.

   Here we see that 4 templates are contained within the library.

   - os-lnx-centos-7-x64  CentOS Linux 7
   - os-lnx-ubuntu-16-x64  Ubuntu Linux 16.04 LTS
   - os-win-server-2012-r2-x64  Windows Server 2012 R2
   - os-win-server-2016-x64  Windows Server 2016

1. Click on **Other Types** to see additional content items that have been imported into the content library.

   Here we see that both customization specs (cs- objects) and ISOs (iso- objects) have also been added into the content library.

2. Click on **Manage**.

   Here we see that the content library has been configured to be published to any subscriber with the Subscription URL.

3. Click **Copy Link** to copy the Subscription URL to the clipboard.

   Now that we have the **Subscription URL** for the content library in the private cloud, we will create and subscribe a content library in the public cloud.

4. Click the browser tab labeled **vSphere Web Client** to connect to our vCenter Server instance running on the IBM Cloud.

5. In the vSphere Web Client click on **Content Libraries**.

   We see that presently, there are no content libraries configured in the public cloud.

6. Click the **New Content Library Icon**.

7. In the **Name** field, enter **BMX-SJC-01**.

8. In the **Notes** field, enter **Content library in IBM Bluemix synced from on-premises** and click **Next**.

9. Select the radio button next to **Subscribed Content Library**.

10. Click in the **Subscription URL** field and the URL will auto-populate (this is the subscription URL for the content library being shared from our on-premises vCenter Server Instance that we looked at earlier).
Note that the option to **Download all library content immediately** is checked by default. If we didn't want to download the entire library, we could choose the option to only download content when needed.

11. Click **Next**.
12. Click **Yes** to trust the SSL Thumbprint of the subscription host.
13. Click the radio button for **vsanDatastore** as the storage location for the library contents.

Note that in this example we are using the vSAN data store as an example. There is no requirement to save the content library on vSAN. You could just as easily choose an NFS or iSCSI datastore, assuming of course you have IP based storage available in your environment.

1. Click **Next**.
2. Review the new content library settings and click **Finish** to complete the subscription.
3. Click **Recent Tasks** at the bottom of the vSphere Web Client to view the progress of the content library synchronization.

The content library has been created on our public cloud vCenter Server instance and it's content synchronized with our private cloud vCenter Server instance.

4. Click **Recent Tasks** again to close the tasks.
5. Click on the new **BMX-SJC-01** content library.

Here we see that the content library is hosted on the a vSAN datastore and consumes 77.37 GB of storage.

6. Click on **Related Objects** to review the items in the library synced from the private cloud.

Here we see that 4 templates are contained within the library.

- os-lnx-centos-7-x64  CentOS Linux 7
- os-lnx-ubuntu-16-x64  Ubuntu Linux 16.04 LTS
- os-win-server-2012-r2-x64  Windows Server 2012 R2
- os-win-server-2016-x64  Windows Server 2016

This completes the steps for creating and synchronizing the Content Library in the public cloud. Next, we will show how to export the templates in the content library so they can be consumed by vRealize Automation.

1. With the **os-lnx-centos-7-x64** template already highlighted, click the **Actions**.
2. Select **New VM from This Template**.
3. Click the **SDDC-Datacenter** datacenter object.
4. Click the **Templates** folder object as the destination for the template.
5. Click **Next**.
6. Click the **SDDC-Cluster** cluster object as the destination resource.
7. Click **Next**.
8. Review the template details and click **Next**.
9. Click the dropdown for the **VM Storage Policy** and select **Virtual SAN Default Storage Policy** (note the default vSAN storage policy was created for us by SDDC Manager when we deployed Cloud Foundation on the IBM Cloud).
10. Click the radio button for **vsanDatastore** as the storage location for the template.
11. Click **Next**.
12. Click the dropdown for the **Destination Network**.
13. Click **Browse** to select a destination network for the template.
14. Select the network labeled **vxw-dvs-9-virtualwire-7-sid-5-5005-Templates** to select the NSX Logical Switch.
15. Click **OK**.
16. Click **Next**.
17. Review the template configuration data and click **Finish** to complete the creation.
18. Click **Recent Tasks** at the bottom of the vSphere Web Client to view the status of the template.

Here we see that the OVF template stored in the content library has been deployed to a VM. We will now use this newly deployed VM to create a template. As part of the template creation process let's first export the Linux customization file that we will use for this template to our local desktop.

19. Click **Recent Tasks** again to close the tasks.
20. Click the **Other Types** in the Related Objects section.

Here we see the list of available customization specs that were synchronized.

1. Click **cs-os-lnx-centos.xml** and then click **Actions**.
2. Click **Export Item**.
3. Click **Browse**.
4. Click **Select Folder** to save the customization specification to the Desktop.
5. Click **OK** to export the item.

With the VM we will use for the template created and the customization spec saved to our desktop we're now ready to convert the VM into a template.

1. Click the **Home Icon** in the vSphere Web Client.
2. Click **VMs and Templates**.

Here we see that the **os-lnx-centos-7-x64** virtual machine is located in the folder we previously specified.

3. Click on the **os-lnx-centos-7-x64** template.
4. Click on **Actions** **Template Convert to Template**.
5. Click **Yes** to convert the **os-lnx-centos-7-x64** virtual machine to a template.

Note that the virtual machine has changed to a template as indicated by the new icon. Next we will import the customization spec so it can be used with this template.
6. Click the **Home Icon** in the vSphere Web Client.
7. Click **Policies and Profiles**.
8. Click the **Import Customization Specification** icon.
9. Select the `cs-os-lnx-centos.xml` folder on the desktop.
10. Select the `cs-os-lnx-centos XML` Document and click **Open**.

The customization specification has now been added to the public cloud.

Note that we've gone ahead and added the rest of the templates and customization specification for you as you'll see them later in this interactive simulation.

![Image of vSphere Web Client with templates](image)

We're done with our vSphere setup.

1. Click the **Home Icon** in the vSphere Web Client.
2. Click the **Hosts and Clusters**.

We see the contents of our vSphere cluster running on the IBM cloud. Note that currently, there are no VMs running in the Compute-ResourcePool. Next, we'll switch over to vRealize Automation and go over the steps to build a blue print in vRealize Automation, using the template we just created, and how to deploy workload VMs onto our public cloud.
Preparing vRealize Automation to Extend to the VMware Cloud Foundation on IBM Cloud.

In this portion of the lab, we will show how to extend the organization's implementation of vRealize Automation to include the VMware Cloud Foundation endpoint running on the IBM Cloud. We'll then show how to create and deploy our first blueprint into the public cloud.

1. Click the + icon on the browser to open a new tab.
2. Click the Address Bar in the browser.
4. Click the Arrow Icon on the browser.
5. Click Next to set the domain as demo.vmware.com.
6. Click the Username field and enter ryan.
7. Click the Password field and enter VMware123!.
8. Click Sign-In.
9. Click Catalog to view the self-service catalog for the organization.

We are logged into vRealize Automation as the Cloud Architect where we see the list of blueprints that are available. However, these blueprints are only available to be deployed to their private cloud. To deploy these blueprints to the new public cloud instance of Cloud Foundation instance running on the IBM cloud we need to configure the public cloud as a new endpoint and setup a reservation. Details on how to perform these steps are outside the scope of this lab. However, they are summarized below:

**Install vRA Proxy Agent to the Public cloud:** To extend the on-premises instance of vRealize Automation so it can deploy workloads to our public cloud we first installed a vRealize Automation proxy agent. This agent is used by vRealize Automation to communicate with the vCenter Server instance running in the public cloud to perform work and report status.

**Setup a service account with the correct privileges:** We also configured a service account (vra.service@demo.vmware.com) with the required permissions needed to access to both the vCenter Server and NSX Manager instances. Consult the vRealize Automation documentation for more information.

**Add the Public Cloud as a vRealize Endpoint and configure fabric and resource groups:** Finally we login to vRealize Automation and add our public cloud vCenter Server and NSX Manager instances as an endpoints. When we add the endpoints we also setup fabric groups, configure resources, and configure reservations.

<insert screen shot showing public cloud endpoints>
Creating a vRealize Automation Blueprint to Consume to New Public Cloud Resources in IBM Cloud.

In this portion of the interactive simulation, we pick up after the deployment of the vRA Proxy Agent and the configuration of the public cloud Endpoint.

With our public cloud endpoints added to our on-premises vRealize Automation instance we are now able to deploy workloads to the public cloud. To do this we first create blueprints. In these blueprints we will use the templates and customization specification files from the content library, which we synchronized earlier.

1. Click on the **Design Tab**.
2. In the **Blueprints** section, click **New**.
3. Click the **Name** field and enter **3 Tier App Base on Bluemix**.
4. Click the **Description** field and enter **3 Tier App Base Formation**.
5. Click **OK**.

First, we will add three networks. One for each tier: Web, App and Database

1. In the **Categories** of the design canvas, click **Network and Security** then click **Existing Network**.
2. Click the **Ellipse Box** and select the **Development Web 172.21.1.0/24** network profile.
3. Click **OK**.
4. Click the **Down Arrow** in the middle of the design canvas.
5. In the **Categories** of the design canvas, click **Existing Network** again.
6. Click the **Ellipse Box** and select the **Development App 172.21.2.0/24** network profile.
7. Click **OK**.
8. In the **Categories** of the design canvas, click **Existing Network** once more.
9. Click the **Ellipse Box** and select the **Development Database 172.21.3.0/24** network profile.
10. Click **OK**.

Next, we select the virtual machine templates we will use. Again, we do this for each tier: Web, App and Database. Note that we will use the template and customization specification file that we setup earlier.

First we setup the template and custom spec for the web tier:

1. Click the **Down Arrow** in the middle of the design canvas.
2. In the **Categories** of the design canvas, click **Machine Types** then click the **down arrow** in the scroll bar..
3. Click **vSphere (vCenter) Machine**.
4. Click the **ID** field and enter **Web-Tier**.
5. Click the **Description** field and enter **Web-Tier**.
6. Click the **Reservation Policy** dropdown and select **Development**.
7. Click the **Machine Prefix** dropdown and select **dev-web-**.
8. Click the arrows in under **Maximum** until the value is **4**.
9. Click the **Build Information** tab.
10. Click the **Action** dropdown and select **Clone**.
11. Click the **Ellipse Box** in the **Clone From** and select the **os-lnx-cento-7-x64**.
12. Click **OK**.
13. Click **Customization Spec** and enter **os-lnx-centos**.
14. Click **Machine Resources**.
15. Click the arrows in under **Maximum** for **CPUs** until the value is **4**.
16. Click the textbox in under **Maximum** for **Memory** and enter **16384**.
17. Click the textbox in under **Maximum** for **Disk** and enter **100**.
18. Click **Network** followed by **New**.
19. Click the **Network** dropdown and select **DevelopmentWeb172211024**.
20. Click **OK**.

Notice how as we build the blueprint, the designer UI graphically depicts the blueprint. In this case we the Web-Tier virtual machine we just defined that is connected to the DevelopmentWeb network we specified.

Next, we repeat this these steps to setup the template and custom spec for the app tier:

1. Click the **Down Arrow** in the middle of the design canvas.
2. Click **vSphere (vCenter) Machine**.
3. Click the **ID** field and enter **App-Tier**.
4. Click the **Description** field and enter **App-Tier**.
5. Click the **Reservation Policy** dropdown and select **Development**.
6. Click the **Machine Prefix** dropdown and select **dev-app-**.
7. Click the arrows in under **Maximum** until the value is **4**.
8. Click the **Build Information** tab.
9. Click the **Action** dropdown and select **Clone**.
10. Click the **Ellipse Box** in the **Clone From** and select the **os-lnx-cento-7-x64**.
11. Click **OK**.
12. Click **Customization Spec** and enter **os-lnx-centos**.
13. Click **Machine Resources**.
14. Click the arrows in under **Maximum** for **CPUs** until the value is **4**.
15. Click the textbox in under **Maximum** for **Memory** and enter **16384**.
16. Click the textbox in under **Maximum** for **Disk** and enter **100**.
17. Click **Network** followed by **New**.
18. Click the **Network** dropdown and select **DevelopmentApp172212024**.
19. Click **OK**.

Finally, we repeat these steps a third time to setup the template and custom spec for the DB tier:

1. Click the **Down Arrow** in the middle of the design canvas.
2. Click **vSphere (vCenter) Machine**.
3. Click the **ID** field and enter **DB-Tier**.
4. Click the **Description** field and enter **DB-Tier**.
5. Click the **Reservation Policy** dropdown and select **Development**.
6. Click the **Machine Prefix** dropdown and select `dev-db-`.
7. Click the arrows in under **Maximum** until the value is **2**.
8. Click the **Build Information** tab.
9. Click the **Action** dropdown and select **Clone**.
10. Click the **Ellipse Box** in the **Clone From** and select the `os-lnx-cento-7-x64`.
11. Click **OK**.
12. Click **Customization Spec** and enter `os-lnx-centos`.
13. Click **Machine Resources**.
14. Click the arrows in under **Maximum** for **CPUs** until the value is **4**.
15. Click the textbox in under **Maximum** for **Memory** and enter **16384**.
16. Click the textbox in under **Maximum** for **Disk** and enter **100**.
17. Click **Network** followed by **New**.
18. Click the **Network** dropdown and select **DevelopmentDatabase172213024**.
19. Click **OK**.
20. Click the **Down Arrow** in the middle of the design canvas.
21. Click **Finish**.

Here we can see that our new base blueprint for a 3-tier app has been created in our Cloud Management Portal. The blueprint is consuming the template and customization specifications synced from private cloud to the public cloud.

With the blueprint created, the next step is to publish it.

1. On the **Blueprints** select the **3 Tier App Base on Bluemix** blueprint.
2. Click **Publish**.

The blueprint has been published. Now, let’s entitle it to our development business group under a new service labeled **IBM Bluemix**.

1. Click the **Administration** tab.
2. Click **Catalog Management**.
3. Click **Catalog Items**.
4. Select the **3 Tier App Base on Bluemix** item.
5. Click **Browse** to select **black and white icon**. (this is the icon that will represent this blueprint in the catalog)
6. Click **Open**.
7. Click the **Down Arrow** on the scroll bar.
8. Click the **Service** dropdown and select **IBM Bluemix**.
9. Click **OK**.

The new blueprint is entitled to our development team and is ready to be deployed. Let’s test by deploying an instance of this 3-tier app in our public cloud powered by VMware Cloud Foundation on IBM Cloud.

1. Click **Catalog**.

Note, we now see a new section in our **Service Catalog** for IBM Bluemix.
1. Click **IBM Bluemix**.
2. Click the **3 Tier App Base on Bluemix** blueprint to Request a deployment in the public cloud.
3. Click on **Web-Tier**.
4. Click the arrows next to **Instances** until the value is 4.
5. Click the arrows next to **CPUs** until the value is 3.
6. Click the textbox next to **Memory** and enter 4096.
7. Click on **App-Tier**.
8. Click the arrows next to **Instances** until the value is 4.
9. Click the arrows next to **CPUs** until the value is 4.
10. Click the textbox next to **Memory** and enter 16384.
11. Click on **DB-Tier**.
12. Click the arrows next to **Instances** until the value is 2.
13. Click the arrows next to **CPUs** until the value is 4.
14. Click the textbox next to **Memory** and enter 16382.
15. Click the **3 Tier App Base on Bluemix**.
16. Click Description and enter **3 Tier App Base Formation Test on Bluemix**.
17. Click **Submit**.
18. Click **OK**.

Our request has been submitted. vRealize Automation will now communicate with the VMware Cloud Foundation instance running on the IBM Cloud to provision the requested blueprint.

We can logon to our vCenter Server instance and monitor the progress and watch as the VMs are deployed in our public cloud.

1. Click the **vSphere Web Client** tab in the browser.
2. Click **Recent Tasks** at the bottom of the vSphere Web Client to view the status of the request.

Here we see that the vRealize Automation has cloned, powered on, and customized the os-lnx-centos-7-x64 templates. Let’s check the state of the request.

1. Click **Recent Tasks** again to close the tasks.
2. Here we see that the following virtual machines have been deployed:

   • dev-web-0001
   • dev-web-0002
   • dev-web-0003
   • dev-web-0004
   • dev-app-0001
   • dev-app-0002
   • dev-app-0003
   • dev-app-0004
   • dev-db-0001
   • dev-db-0002
Let’s review each of the new virtual machines and check their state.

1. Click on **dev-web-001**.

Here we see that the Web-Tier has **3 CPUs** and **4GB of memory** as requested. It’s also been deployed on an NSX Logical Switch for Development Web and has been provisioned an IP Address of **172.21.1.12** from vRealize Automation.

   1. Click on **dev-web-002**, **dev-web-003** and **dev-web-004** and review this information for each. Notice that they all have the same configuration, which is to be expected.
   2. Click on **dev-app-001**.

Here we see that the App-Tier has **4 CPUs** and **16GB of memory** as requested. It’s also been deployed on an NSX Logical Switch for Development App and has been provisioned an IP Address of **172.21.2.12** from vRealize Automation.

   1. Click on **dev-app-002**, **dev-app-003** and **dev-app-004** to verify that they have the same configuration.
   2. Click on **dev-db-001**.

Here we see that the DB-Tier has **4 CPUs** and **16GB of memory** as requested. It’s also been deployed on an NSX Logical Switch for Development Database and has been provisioned an IP Address of **172.21.3.11** from vRealize Automation.

   1. Click on **dev-app-002** to see if it has the same configuration.
   2. Click the **Home Icon** in the vSphere Web Client.
   3. Click **Home**

This concludes our interactive simulation on extending vRealize Automation to the public cloud using VMware Cloud Foundation on the IBM Cloud. In this lab we have covered a lot. We showed:

1. How to leverage the vSphere Content Library to synchronize virtual machine templates and customization files across the hybrid cloud.

2. How extend our existing, on-premises instance of vRealize Automation so it can be used with VMware Cloud Foundation instance running on the IBM Cloud.

3. How to create blueprints in vRealize Automation for use with VMware Cloud Foundation instance running on the IBM Cloud.

4. How to deploy blueprints into VMware Cloud Foundation instance running on the IBM Cloud.
Conclusion

In this module you walked through how to setup a content catalog and setup vRealize for the hybrid cloud.

Congratulations on completing Module 3

If you are looking for additional information on Cloud Foundation in the Public Cloud, try one of these:

- Click on this VMware Cloud Foundation
- Or use your smart device to scan the QRC Code.

Proceed to any module below which interests you most.

- **Module 1 - Hybrid-Cloud Introduction (manual only)** (15 minutes) (Basic) This interactive simulation will introduce you to the Cloud Foundation hybrid cloud value proposition and show how VCF enables true hybrid cloud by implementing a common unified SDDC platform with a common architecture and operational model, and where deployment, management and ongoing operations are automated and simplified with SDDC Manager
- **Module 2 - Deploying VMware Cloud Foundation in the Public Cloud** (15 minutes) (Basic) This interactive simulation will show you how to deploy VCF into the public cloud on IBM Bluemix. 12 hours later have a pool of capacity in the public cloud that is made up of the same SDDC components that they are using on-prem.
- **Module 4 - Expanding Public Cloud Capacity** (15 minutes) (Basic) This interactive simulation will show you how you can easily expand your capacity in the public cloud using the SDDC manager
- **Module 5 - Applying software updates into the Public Cloud** (15 minutes) (Basic) This interactive simulation will show you how you can leverage the built in automated Lifecycle Management capabilities of Cloud Foundation to quickly apply patches and updates with no interruption to the hosted workloads.
- **Module 6 - Security & Compliance Automation on IBM Cloud with HyTrust** (15 minutes) (Basic) This interactive simulation will show you how IBM and VMware have partnered with HyTrust to provide a robust security solution uniquely well suited for your VMware Cloud Foundation-based hybrid cloud.
How to End Lab

To end your lab click on the **END** button.
Module 4 - Expanding Public Cloud Capacity (15 minutes)
Introduction

As we have seen, getting started with Cloud Foundation on IBM Blue mix is easy. But what happens when you need more capacity. Here again we are able to leverage the capabilities of the IBM Cloud together with the automation capabilities of the SDDC Manager to quickly, and seamlessly expand our cloud capacity.

Adding an additional server to an existing Cloud Foundation involves adding the new server to the cluster and then updating the cluster, vSAN, VDS and NSX settings to account for the additional host.

The process begins by logging into the IBM Portal and requesting additional capacity. IBM Cloud will install and cable the new server and then call out to SDDC Manager to perform the required configurations within vSphere, vSAN and NSX to incorporate the new capacity. Its quick and seamless.
Hands-on Labs Interactive Simulation: Expanding Public Cloud Capacity

This interactive simulation walks you through

1. How to request additional capacity for your Cloud Foundation instance running in the IBM Cloud

The interactive simulation will allow you to experience steps which are too time-consuming or resource intensive to do live in the lab environment.

1. Click here to open the interactive simulation. It will open in a new browser window or tab.
2. When finished, click the “Return to the lab” link to continue with this lab.
Conclusion

In this module you expanded the vCF by adding a host through the SDDC Manager

Congratulations on completing Module 4.

If you are looking for additional information on Cloud Foundation in the Public Cloud, try one of these:

- Click on this VMware Cloud Foundation
- Or use your smart device to scan the QRC Code.

Proceed to any module below which interests you most.

- **Module 1 - Hybrid-Cloud Introduction (manual only)** (15 minutes) (Basic) This interactive simulation will introduce you to the Cloud Foundation hybrid cloud value proposition and show how VCF enables true hybrid cloud by implementing a common unified SDDC platform with a common architecture and operational model, and where deployment, management and ongoing operations are automated and simplified with SDDC Manager.

- **Module 2 - Deploying VMware Cloud Foundation in the Public Cloud** (15 minutes) (Basic) This interactive simulation will show you how to deploy VCF into the public cloud on IBM Bluemix. 12 hours later have a pool of capacity in the public cloud that is made up of the same SDDC components that they are using on-prem.

- **Module 3 - Extending vRealize Automation to the Public Cloud Capacity** (15 minutes) (Basic) This interactive simulation will show you how to dynamically grow/shrink their public cloud capacity (and hence control costs) by leveraging the automated extend/shrink capabilities of Cloud Foundation and the SDDC Manager.

- **Module 5 - Applying software updates into the Public Cloud** (15 minutes) (Basic) This interactive simulation will show you how you can leverage the built in automated Lifecycle Management capabilities of Cloud Foundation to quickly apply patches and updates with no interruption to the hosted workloads.

- **Module 6 - Security & Compliance Automation on IBM Cloud with HyTrust** (15 minutes) (Basic) This interactive simulation will show you how IBM
and VMware have partnered with HyTrust to provide a robust security solution uniquely well suited for your VMware Cloud Foundation-based hybrid cloud.

How to End Lab

To end your lab click on the **END** button.
Module 5 - Apply Software Updates in the Public Cloud (15 minutes)
Introduction

Once you deploy your Cloud Foundation infrastructure there will inevitably be software updates that need to be applied. Historically, keeping up-to-date on software updates has proven very difficult for IT teams. However, with Cloud Foundation the process for applying software updates, both in the private cloud and public cloud is vastly simplified.

In this module, we show how easy it is to update the entire SDDC software stack by leveraging the automation provided by the SDDC Manager in the IBM Cloud.
Interactive Simulation: Apply Software Updates in the Public Cloud

This interactive simulation walks you through

1. How to apply a software update to your VCF instance running on the IBM Cloud

The interactive simulation will allow you to experience steps which are too time-consuming or resource intensive to do live in the lab environment.

1. Click here to open the interactive simulation. It will open in a new browser window or tab.
2. When finished, click the “Return to the lab” link to continue with this lab.
Conclusion

In this module you were given an overview of how to apply a software updates to your VMware Cloud Foundation instance running on the IBM Cloud.

Congratulations on completing Module 5.

If you are looking for additional information on Cloud Foundation in the Public Cloud, try one of these:

- Click on this VMware Cloud Foundation
- Or use your smart device to scan the QRC Code.

Proceed to any module below which interests you most.

- **Module 1 - Hybrid-Cloud Introduction (manual only)** (15 minutes) (Basic) This interactive simulation will introduce you to the Cloud Foundation hybrid cloud value proposition and show how VCF enables true hybrid cloud by implementing a common unified SDDC platform with a common architecture and operational model, and where deployment, management and ongoing operations are automated and simplified with SDDC Manager.

- **Module 2 - Deploying VMware Cloud Foundation in the Public Cloud** (15 minutes) (Basic) This interactive simulation will show you how to deploy VCF into the public cloud on IBM Bluemix. 12 hours later have a pool of capacity in the public cloud that is made up of the same SDDC components that they are using on-prem.

- **Module 3 - Extending vRealize Automation to the Public Cloud** (15 minutes) (Basic) This interactive simulation will show how customers can avoid getting locked-in by leveraging the benefits of a common SDDC platform across public and private cloud to easily migrate workloads without a need to convert virtual machine formats.

- **Module 4 - Expanding Public Cloud Capacity** (15 minutes) (Basic) This interactive simulation will show that the customer has run out of available capacity in the IBM Cloud and is now unable to add capacity through the SDDC manager.

- **Module 6 - Security & Compliance Automation on IBM Cloud with HyTrust** (15 minutes) (Basic) This interactive simulation will show you how IBM
and VMware have partnered with HyTrust to provide a robust security solution uniquely well suited for your VMware Cloud Foundation-based hybrid cloud.

**How to End Lab**

To end your lab click on the **END** button.
Module 6 - Security & Compliance Automation on IBM Cloud with HyTrust (15 minutes)
Introduction

Working together, VMware and IBM make it easy to get started with the hybrid cloud. With the VMware Cloud Foundation solution on IBM Cloud, customers can easily deploy the same standardized software-defined data center solution that they run in their on-premises data center on top of their leased Bluemix infrastructure to enable a seamless hybrid cloud experience.

As with any cloud environment security is always paramount and together IBM and VMware have partnered with HyTrust to provide a robust security solution uniquely well suited for your VMware Cloud Foundation-based hybrid cloud.

The collaboration between IBM Bluemix, Intel and HyTrust has created a solution that enables leading concepts — such as geo-fencing and trusted compute tools — and powerful new use cases.

IBM Cloud Secure Virtualization leverages technology from HyTrust and Intel, to address security and compliance issues for sensitive VMware workloads, breaking down barriers to cloud adoption and allowing organizations to more confidently leverage the efficiency, agility and scalability of the cloud.

In this module, we will look at two of the HyTrust security services available as part of your VMware Cloud Foundation solution on IBM Cloud:
• **HyTrust BoundaryControl** allows you to meet data sovereignty, data security and hardware specification requirements. Working closely with Intel, HyTrust has developed BoundaryControl for VMs using Intel TXT hardware technology. BoundaryControl allows you to tightly define where your VMs are allowed to run, and where they are not allowed to run.

![BoundaryControl Diagram](image)

• **HyTrust DataControl** provides Host security attestation. Workloads can move often, sometimes to hosts that may not be trusted. HyTrust DataControl integrates with HyTrust CloudControl to leverage Intels TXT (Trusted Execution Technology) to provide proof of a hosts security state. With this capability, administrators can set policy and determine what to do if a workload is moved onto a host that does not have the appropriate level of security desired.

![DataControl Diagram](image)

There are two demos included in this module:

• The first demo shows how to use HyTrust BoundaryControl to limit where virtual machines can run in your Cloud Foundation-based hybrid cloud. By leveraging the portable encryption controls of HyTrust, vSphere is able to check with the HyTrust policy engine to determine when and where decryption of virtual machines is permitted, thus enabling IT admins to restrict where virtual machines can run in the hybrid cloud.

• The second demo shows how to use HyTrust DataControl to enforce Host security attestation. By definition, workloads in the hybrid cloud are mobile and can move often, and sometimes to hosts that may not be trusted. HyTrust DataControl integrates with HyTrust CloudControl to leverage Intels TXT (Trusted Execution Technology) to provide proof of a hosts security state. With this capability, administrators can set policy and determine what to do if a workload is moved...
onto a host that does not have the appropriate level of security desired, such as automatically unmounting a mapped drive.

Working together, VMware, IBM, and HyTrust enable you to increase your hybrid-cloud security posture while simultaneously embracing compliance automation. Run your sensitive VMware workloads and leverage the clouds key benefits without worrying about security and compliance.
Interactive Simulation: Security & Compliance Automation on IBM Cloud with HyTrust

This interactive simulation walks you through

1. How to use HyTrust BoundaryControl to limit where virtual machines can run in your Cloud Foundation-based hybrid cloud. By leveraging the portable encryption controls of HyTrust, vSphere is able to check with the HyTrust policy engine to determine when and where decryption of virtual machines is permitted, thus enabling IT admins to restrict where virtual machines can run in the hybrid cloud.

2. How to use HyTrust DataControl to enforce Host security attestation. By definition, workloads in the hybrid cloud are mobile and can move often, and sometimes to hosts that may not be trusted. HyTrust DataControl integrates with HyTrust CloudControl to leverage Intel’s TXT (Trusted Execution Technology) to provide proof of a host’s security state. With this capability, administrators can set policy and determine what to do if a workload is moved onto a host that does not have the appropriate level of security desired, such as automatically unmounting a mapped drive.

The interactive simulation will allow you to experience steps which are too time-consuming or resource intensive to do live in the lab environment.

1. Click here to open the interactive simulation. It will open in a new browser window or tab.
2. When finished, click the “Return to the lab” link to continue with this lab.
Conclusion

In this module you saw how Cloud Foundation together with HyTrust Workload Security Solutions enables IT to secure workloads in the cloud and reduce risks associated with hybrid cloud mobility by automating compliance and enforcing security-based policies across private and public clouds.

Congratulations on completing Module 6.

If you are looking for additional information on Cloud Foundation in the Public Cloud, try one of these:

- Click on this [VMware Cloud Foundation](#)
- Or use your smart device to scan the QRC Code.

Proceed to any module below which interests you most.

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automated Lifecycle Management capabilities of Cloud Foundation to quickly apply patches and updates with no interruption to the hosted workloads.

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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