

# VMware Cloud Operations Model Simulator: Building the VCOMS configuration with VCF Lab Constructor

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# VMware Cloud Operations Model Simulator Overview

The VMware Cloud Operations Model Simulator is designed to provide a scalable, repeatable hands-on experience for VMware Cloud Foundation (VCF) partners and customers highlighting how VCF delivers a *Cloud Operating Model* for customer managed on premises environments, capable of hosting traditional and modern applications. The VCOMS package is designed to run on a current well provisioned ESXi host, where the host can easily support 2 or more “pods” to allow multiple users to participate in the VCF Experience.

The VCOMS package is comprised of three major components:

- VCF Lab Constructor (VLC) package to deploy repeatable nested Cloud Foundation labs
- A standardized nested environment to support lab development.
- Lab guides and lab support components to demonstrate the Cloud Operating Model to multiple teams within the datacenter

Note: The lab guides and lab environment were developed in an internal project known as “Project Holodeck”. You will see the project name show up in several places in the environment.

## VLC Overview

VLC is a Powershell/PowerCLI utility designed to automate the deployment of VMware Cloud Foundation in a nested environment for hands-on enablement and testing. Building VCF in a nested environment solves several problems typically seen when attempting to create a VCF sandbox.

- Hardware requirements: a typical VCF sandbox would require a minimum of four vSAN Ready Nodes and typically up to eight nodes if you wish to test with a workload domain. VLC configures a nested environment that allows one or more complete cloud foundation deployments on a single larger ESXi host.
- Network configuration: A complete VCF environment typically requires a BGP connection into the customers Network. This is often problematic to set up for a test bed. A VLC configured nested environment completely isolates the sandbox network from the customers network, while still allowing complete test functionality.
- External support services: One barrier to success in a VCF sandbox is the initial set up, with specific services needed from the customer environment. The VLC environment provides DHCP, NTP, DNS, BGP peering and L3 routing within the pod.
- Automation: VLC provides complete automation for deploying support services as well as the complete cloud foundation deployment. This allows the user to focus attention on specific test scenarios versus building from scratch each time

VCF Lab Constructor is not a VMware supported product, it is similar to a “Fling”. Please consider joining the VLC Support slack channel at <http://tiny.cc/getVLCslack> to connect with other members of the VLC community. VLC is developed and maintained by Ben Sier (@datareload) with assistance from other members of the Cloud Foundation Technical Marketing team

## Nested Environment Overview

The “VCF Holodeck Multi Pod” configuration is an opinionated nested VMware Cloud Foundation configuration used as the baseline for several Private Cloud operation and consumption lab exercises created by the Cloud Foundation Technical Marketing team. Each “Pod” on a Holodeck Multi Pod deployment runs an identical nested configuration to simplify lab development and maintenance. For configurations needing different nested instances of Cloud Foundation to communicate with each other, please see the companion guide *“Configuring VLC for use in Holodeck Multi Region”*

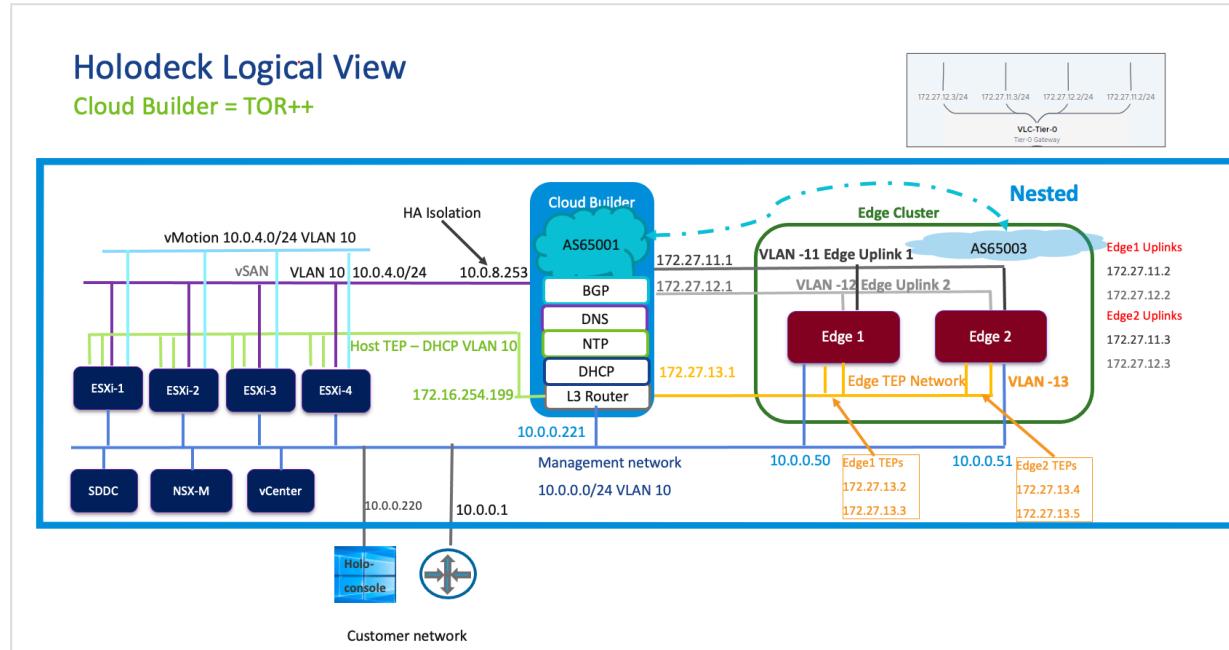
The nested lab configuration relies on several capabilities provided by the underlying vSphere hypervisor.

- Ability to create virtual ESXi hosts on top of a physical ESXi host.
- Isolated Virtual switch per pod to keep communications within a pod.
- A Portgroup configured as a Trunked VLAN (VLAN 4095)
  - Allows components on the portgroup to use VLAN tagging to isolate communications between nested VLANs.
  - Removes the need to have physical VLAN plumbed to ESXi host to support nested labs.

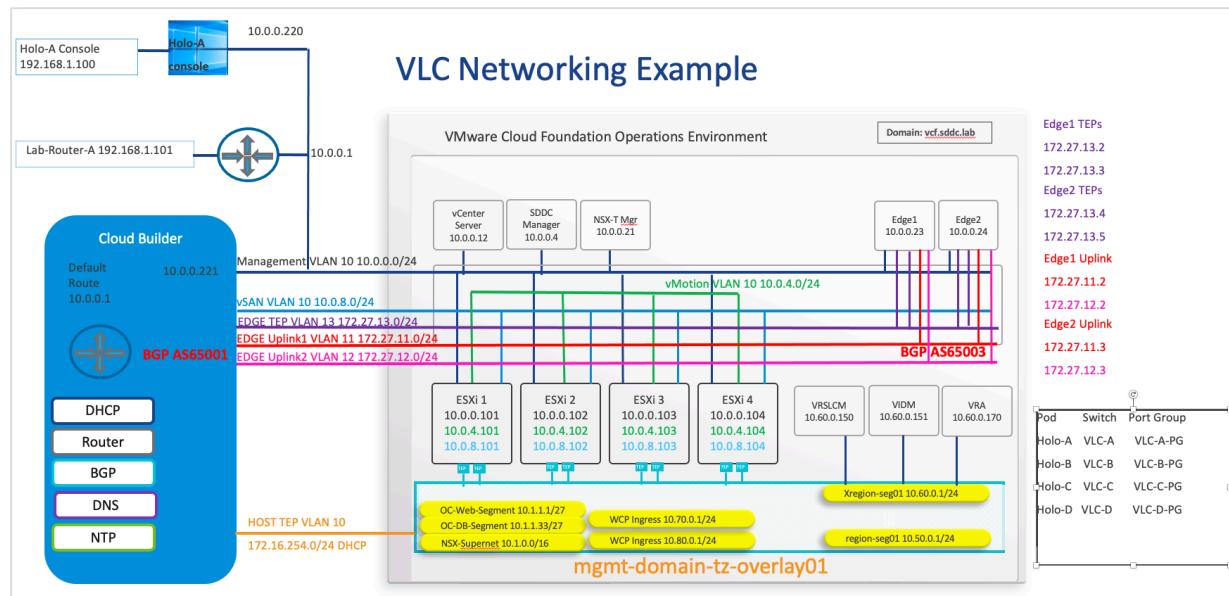
The VLC Holodeck configuration customizes the Cloud Foundation Cloud Builder VM to provide several support services within the pod to remove the requirement for specific customer side services. Cloud Builder is configured to provide the following within the pod:

- DNS (local within the pod, acts as forwarder)
- NTP (local within pod)
- DHCP (Local for Host TEP network)
- L3 TOR for vMotion, Management, Host TEP and Edge TEP networks (vLAN network IP address not plumbed on Cloud Builder)
- BGP peer from VLC Tier 0 NSX/AVN Edge (Provides connectivity into NSX overlay networks from lab console)

The figure below shows a logical view of a single Holodeck Pod. Each pod requires two IP addresses on the customer side network. All other networks are configured within the pod.



The figure below shows a standardized Holodeck configuration, along with example customer side addressing for Jump host and Lab router. Adding additional pods to an ESXi host is very simple.



- Each Pod has a unique vSphere Standard Switch and Portgroup to isolate communications from other pods.

- User access to each Pod is via a Windows Server 2019 “Jump host” virtual machine, with one network interface connected to the external (customer facing) network and one interface on the Portgroup for the pod.
- External access from each pod is configured using PFSense Community Edition. Specific labs need external access to VMware, github, Debian.com, etc

## Configuring VLC for use in Holodeck Multi Pod

### Overview

Deploying the “VCF Holodeck Multi Pod” configuration to an ESXi host is a multi-step process.

- Task 1: Configure ESXi host networking
- Task 2: Deploy nested jump host
- Task 3: Set Jumphost hostname
- Task 4: Configure jump host security settings
- Task 5: Configure jump host networking
- Task 6: Configure jump host applications
- Task 7: Deploy PFsense Lab Gateway
- Task 8: Deploy VCF using VLC
- Task 9: Create Holodeck Opencart Lab Infrastructure
- Task 10: Deploy additional hosts using VLC Expansion Pack

### Prerequisites

- Server requirements
  - Minimum server: Single ESXi host with 20 cores, 512gb memory and 2TB SSD/NVME
  - Ideal server: Single ESXi host with 40+ cores, 1.5TB memory and 6TB SSD/NVME
- Default server configuration:
  - vSphere 7.0U3
    - Stand alone, non vCenter Server managed host

- Single host cluster managed by a vCenter Server instance
- Note: Multi host clusters are not supported in this release due to requiring physical VLAN support
  - Virtual switch and portgroup configured with uplinks to customer network
- Valid login to <https://customerconnect.vmware.com>
- Licenses for 8 hosts minimum (16 hosts if planning to test Cloud Foundation Multi region with NSX Federation)
  - SDDC Manager
  - NSX Enterprise
  - vSAN Enterprise
  - vSphere Enterprise Plus
  - vCenter Server (One license)
  - vRealize Suite Advanced or Enterprise (Or access to Cloud Assembly Cloud)
- External networks required
  - ESXi host management IP
  - Windows console IP (user side accessible)
    - One jump host per Holodeck instance
    - Plan for 3-4 addresses per ESXi host for larger hosts
  - Lab Uplink (user side accessible)
    - One lab-router instance per Holodeck pod
    - Plan for 3-4 router addresses per ESXi host for larger hosts
    - Holodeck users guide documents PFsense CE 2.6 deployment for lab routers
      - User could configure Jump Host as alternate router if desired
- Software needed
  - ESXi 7.0u3 (for lab host)
  - [Cloud Foundation Cloud Builder 4.4.1 OVA](#)

- *VCF Lab Constructor Holodeck-Standard* package (includes VCF lab Constructor, Holodeck support automation scripts and lab guides)
- *Windows Server 2019 ISO* on ESXi host datastore
- *PFSense 2.6 community edition* on ESXi datastore (for external lab connectivity)
- Documentation needed
  - VCF Lab Constructor Install Guide 44-021022.pdf (or later version). Included in Holodeck package
- Holodeck internal networks in a default deployment.
  - 10.0.0.0/24 - Management
  - 10.0.0.4/24 - vMotion
  - 10.0.0.8/24 - vSAN
  - 10.1.0.0/16 – Opencart “Supernet”
  - 10.50.0.0/24 - AVN Region segment
  - 10.60.0.0/24 – AVN X-Region seg
  - 10.70.0.0/24 – Tanzu Ingress
  - 10.80.0.0/24 – Tanzu Egress
  - 172.27.11.0/24 – Edge TEP
  - 172.27.12.0/24 – Edge Uplink 1
  - 172.27.13.0/24 – Edge Uplink 2
  - 172.16.254/24 – Host TEP/DHCP

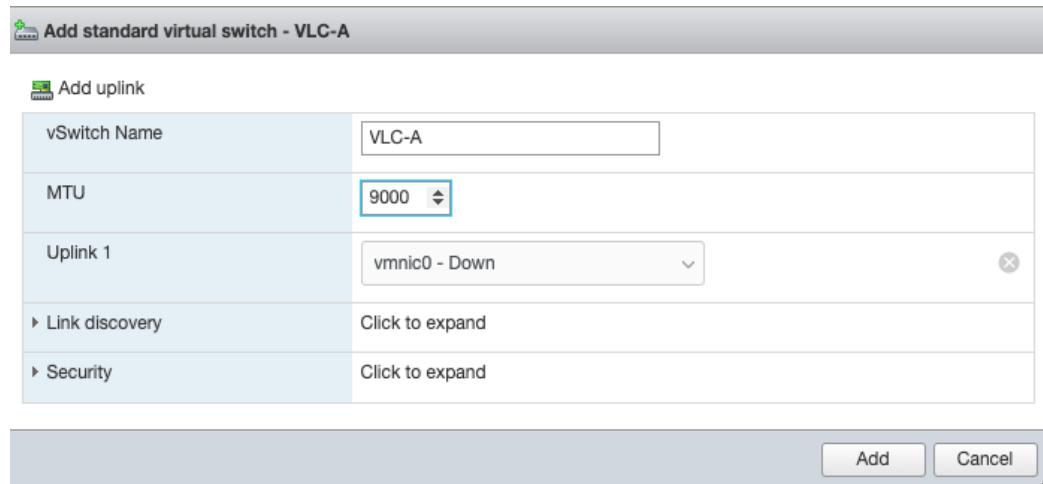
## Task 1: Configure ESXi host networking

Each Holodeck pod requires a unique vSphere standard switch and a corresponding portgroup. This task shows the process for setting up switch VLC-A and portgroup VLC-A-PG.

- This task can be repeated for additional switches VLC-B, VLC-C and VLC-D and portgroups VLC-B-PG, VLC-C-PG, VLC-D-PG
- “*Holodeck-multi-pod-switch.ps1*” is a sample powershell script included in the git repository to create 4 virtual switches and portgroups for use in Holodeck Multi Pod. Edit the file and change ESXi -Server and -Password fields to match your environment and execute in Powershell as administrator

### [Step 1] Configure VLC vSwitch for nested networking

- A. Create a standard switch called “VLC-A” with no uplinks, and MTU 9000. Click the x on the uplink line to remove uplink if necessary



- B. Click Add

### [Step 2] Configure VLC Portgroup

- A. Add a new port group
- B. Name the portgroup VLC-A-PG
- C. Set VLAN ID to 4095 (Trunk all VLAN)
- D. Set virtual switch to VLC-A
- E. Open security and set all to accept
- F. Click Add

Add port group - VLC-A-PG

Name	VLC-A-PG
VLAN ID	4095
Virtual switch	VLC-A
▼ Security	
Promiscuous mode	<input checked="" type="radio"/> Accept <input type="radio"/> Reject <input type="radio"/> Inherit from vSwitch
MAC address changes	<input checked="" type="radio"/> Accept <input type="radio"/> Reject <input type="radio"/> Inherit from vSwitch
Forged transmits	<input checked="" type="radio"/> Accept <input type="radio"/> Reject <input type="radio"/> Inherit from vSwitch

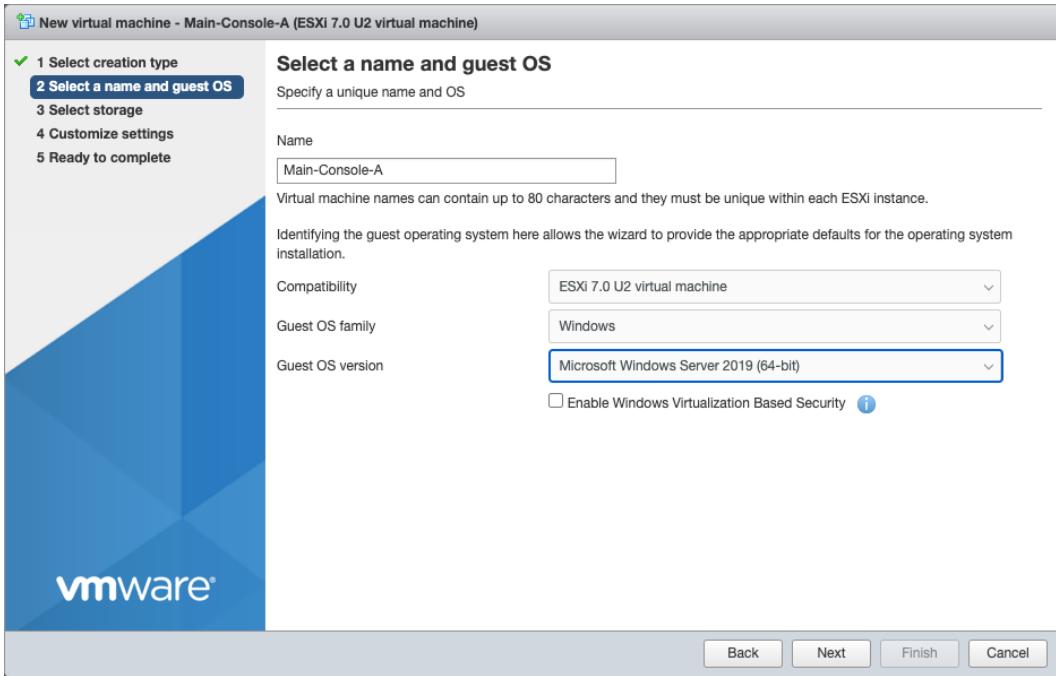
Add Cancel

## Task 2: Deploy nested Windows Server 2019 jump host

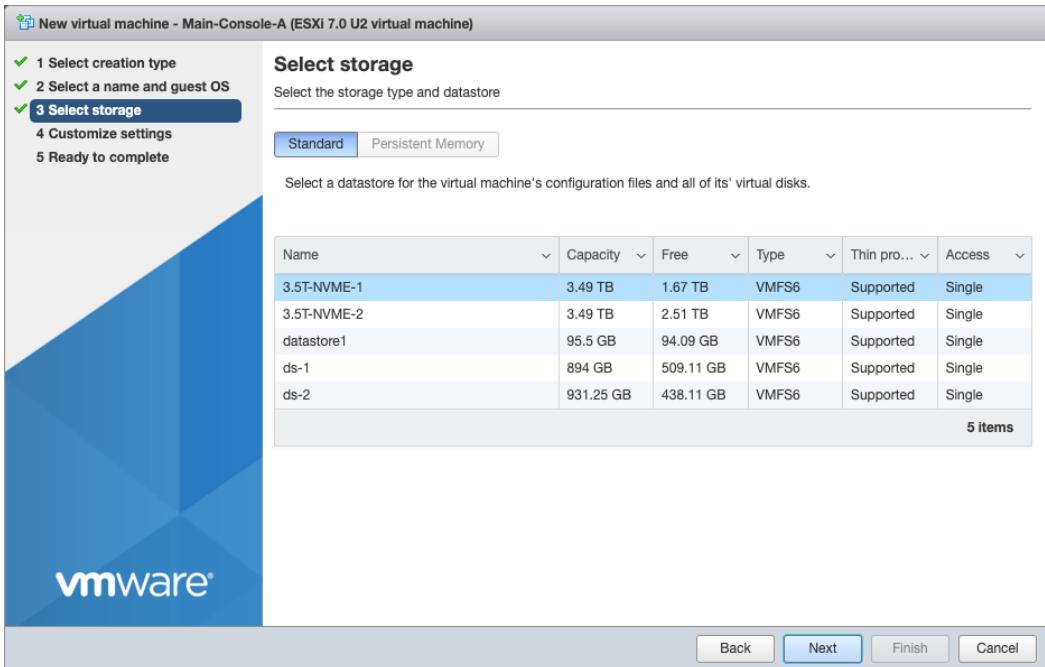
Each pod requires a unique Windows based jump host VM. The host provides access/User Interface as well as a place to run VLC Powershell scripting inside the pod. In the Holodeck Multi Pod configuration, this task must be repeated for each Holodeck instance deployed on a host. The Holodeck package has been tested with Windows Server 2019 only

### [Step 1] Deploy ISO

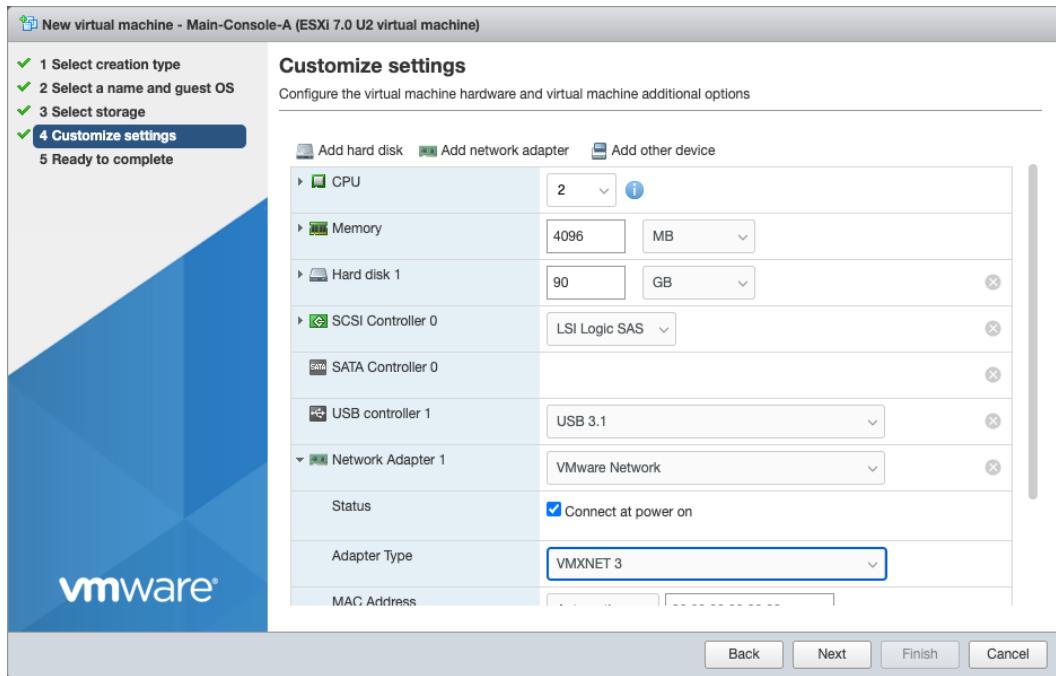
- A. Name the VM Main Console-A (In this Holodeck example we are using “Holo-Console-A”)



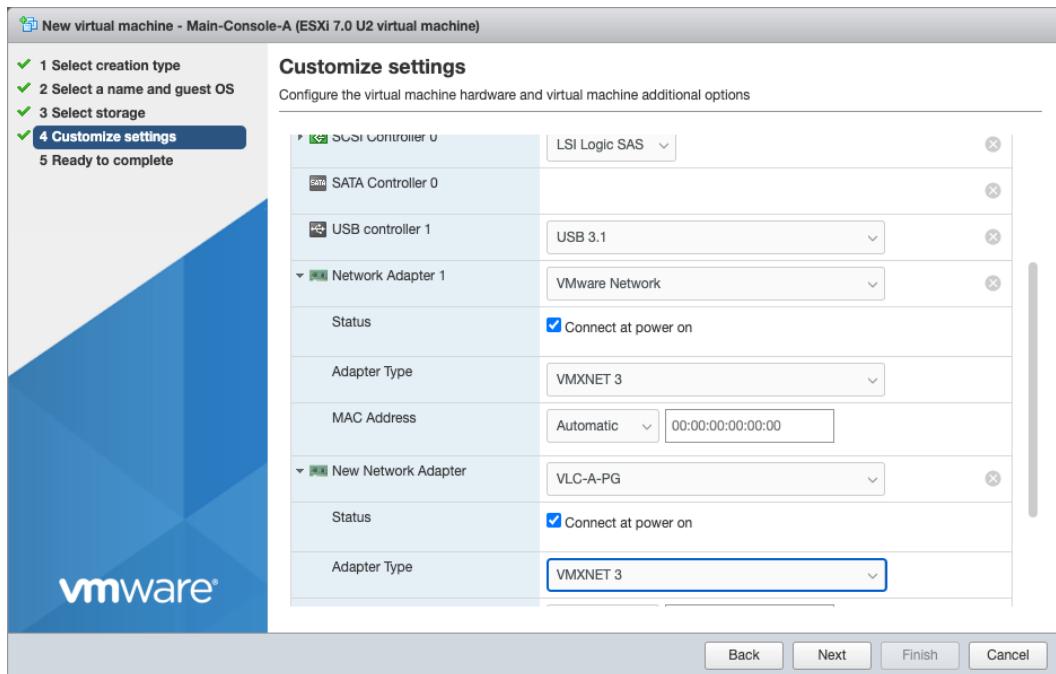
B. Select storage appropriate for your ESXi host then click next



- C. Set network adapter 1 to your external facing portgroup (VM Network in this example)  
D. Select VMXNET 3 as adapter type

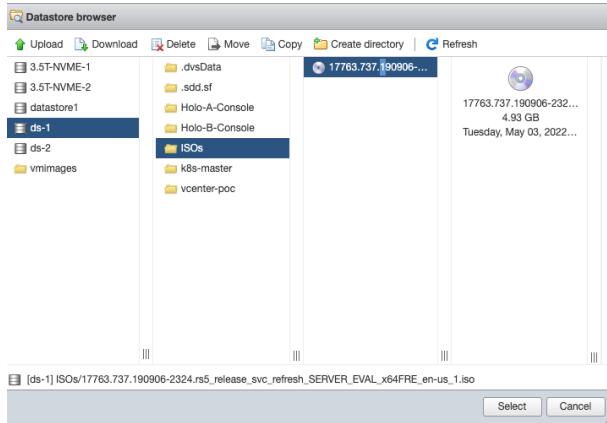


- E. Click Add network adapter
- F. Connect to VLC-A-PG Portgroup (replace VLC-A-PG with VLC-B-PG, etc as needed for additional instances)
- G. Select VMXNET 3

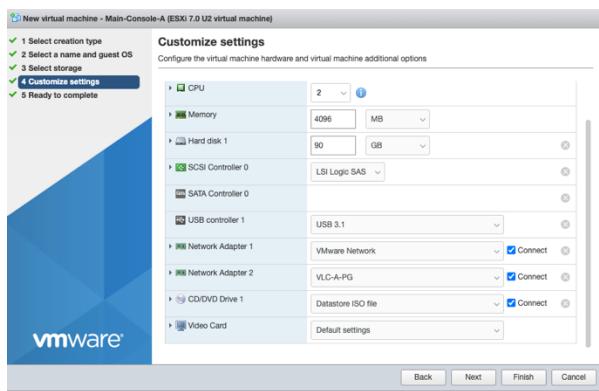


- H. Click CD/DVD Drive and set to Datastore ISO

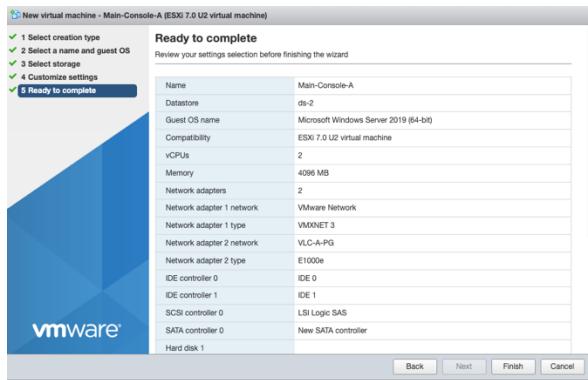
## I. Select the appropriate location for your Windows Server 2019 ISO



## J. Click Select



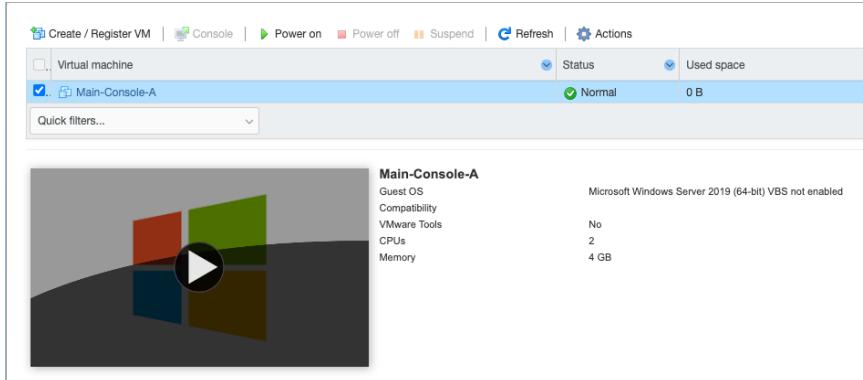
## K. Click Next



## L. Click Finish

**[Step 2] Power on the virtual machine for initial setup**

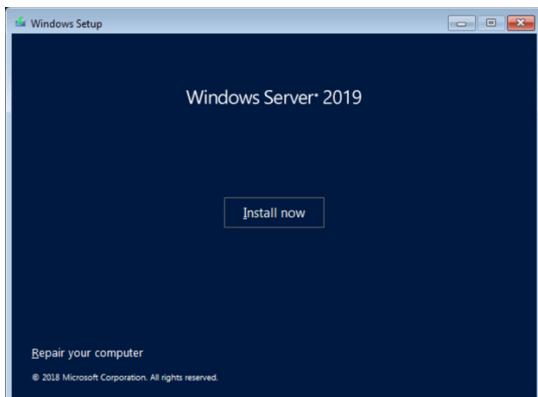
- A. From the vSphere client select the newly created VM
- B. Select Power On



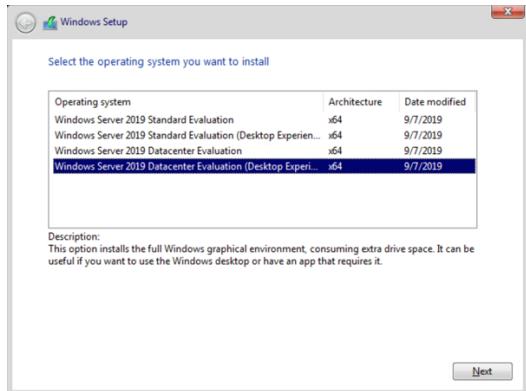
- C. ESXi should immediately launch a console
- D. Click in the Console window and press any key to boot from Virtual CD-Rom.
- E. If you miss the prompt, click Actions->Guest OS-> Send Keys-> Ctrl-Alt-Del
- F. Select boot from CD-Rom if needed



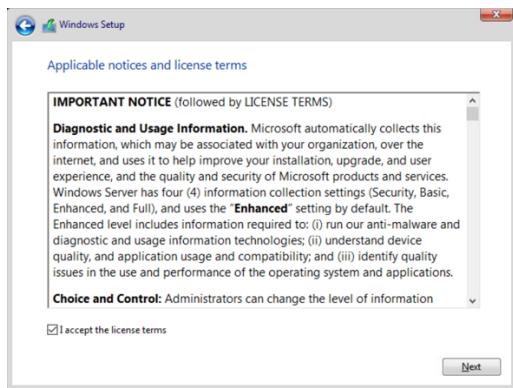
- G. Click Next -> Install Now



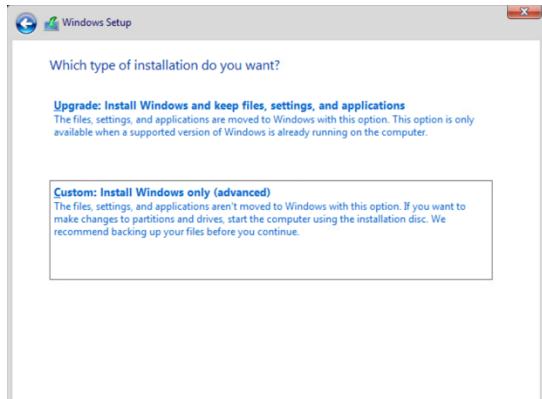
## H. Select Windows Server 2019 Datacenter Evaluation Desktop Experience



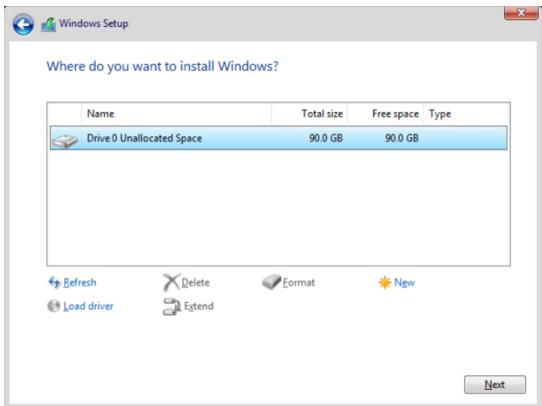
## I. Accept the license



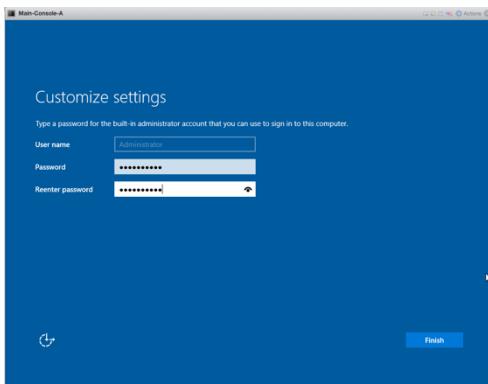
## J. Select Custom: Install Windows Only



## K. Select Drive 0



L. Set password to VMware123!



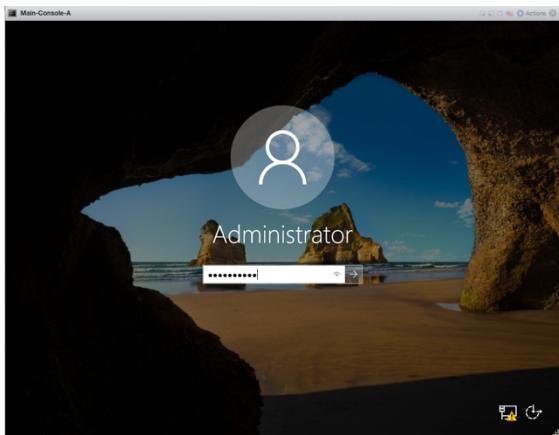
M. Click Finish

**[Step 3] Install VMware Tools**

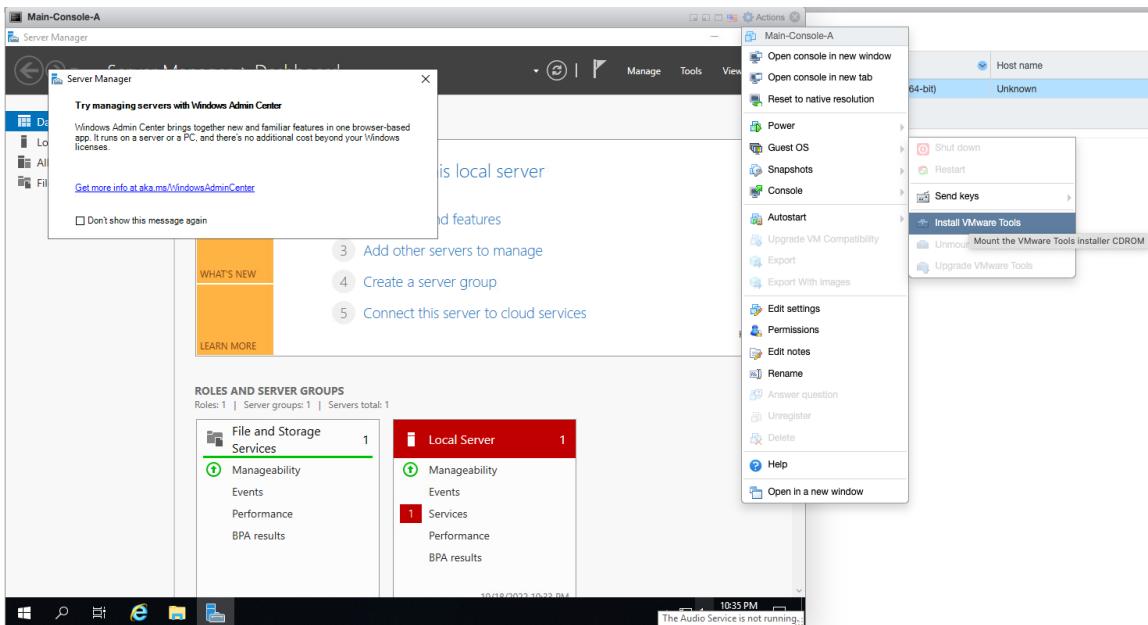
A. From the ESXi console window click Actions -> Guest OS -> Send Keys-> Ctrl-Alt-Delete



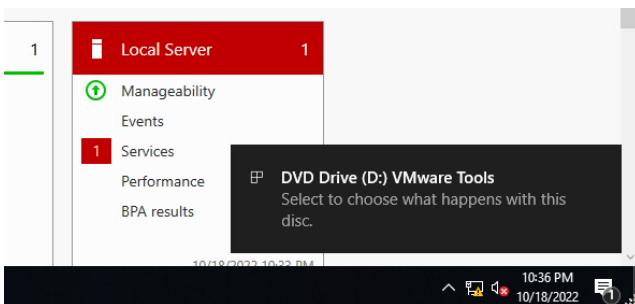
B. Login with password VMware123!



### C. Select Guest OS-> install VMware Tools



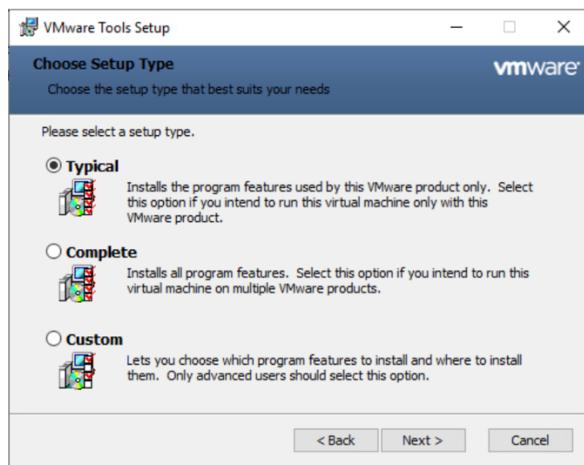
### D. Click on the DVD choice box



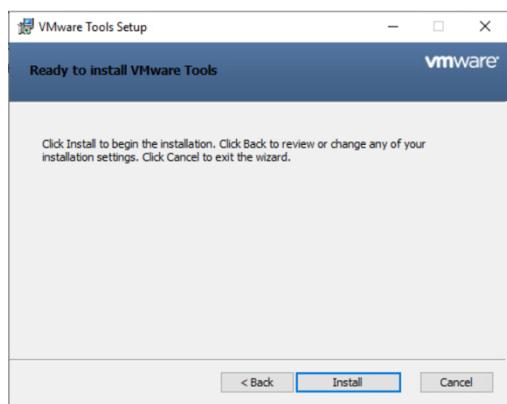
E. Select run setup64.exe



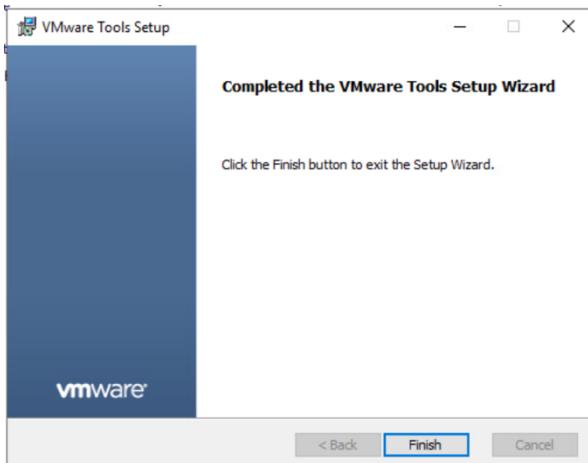
F. Select next -> Typical



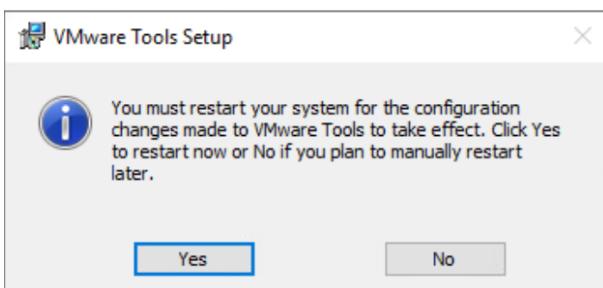
G. Click Install



H. Click Finish



I. Click Yes to restart

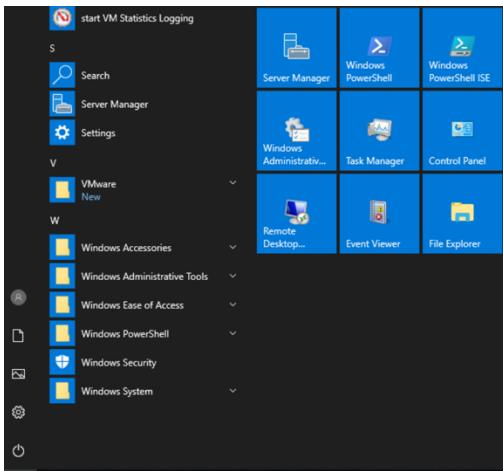


- J. Click on Guest OS -> Send keys -> Ctrl-Alt-Delete
- K. Login with password VMware123!
- L. Note mouse handling is greatly improved after reboot with VMware tools

### Task 3: Configure hostname

In this task we will change hostname on the Windows Server 2019 jump host to help keep things straight later

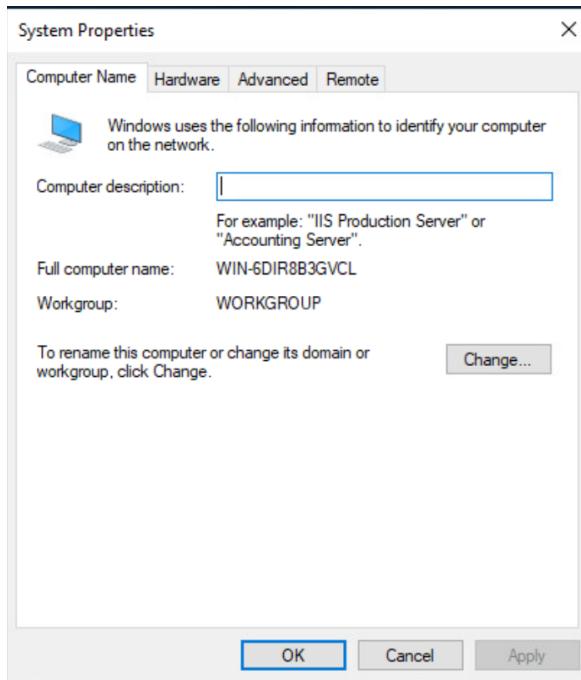
- A. Click the Windows Icon and Server Manager



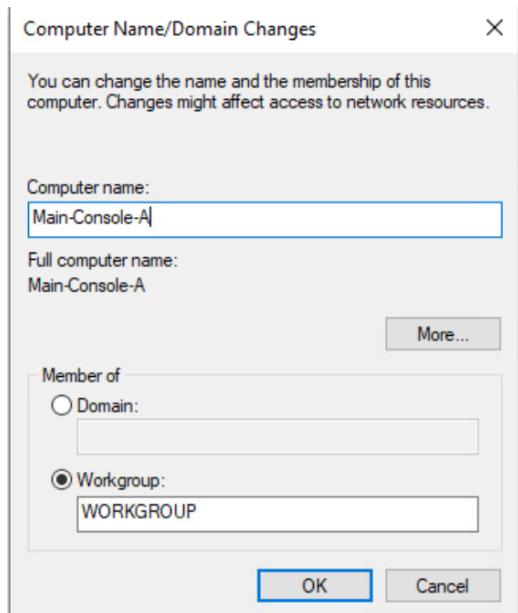
- B. Click Local Server
- C. Click on Computer name

A screenshot of the Microsoft Server Manager interface. The title bar says "Server Manager" and "Local Server". The main area shows the "PROPERTIES" tab for the server "WIN-AHBNFVFCBM". Under "Computer name", it lists "Computer name: WIN-AHBNFVFCBM" and "Workgroup: WORKGROUP". In the "Windows Defender Firewall" section, it shows "Public: On", "Remote management: Enabled", "Remote Desktop: Disabled", "NIC Teaming: Disabled", "Ethernet0: IPv4 address assigned by DHCP. IPv6 enabled", and "Ethernet1: IPv4 address assigned by DHCP. IPv6 enabled". At the bottom, it shows "Operating system version: Microsoft Windows Server 2019 Datacenter Evaluation" and "Hardware information: VMware, Inc. VMware7.1".

- D. Click Change



- E. Change the name to something descriptive in your Holodeck environment. Here we are using Main-Console-A



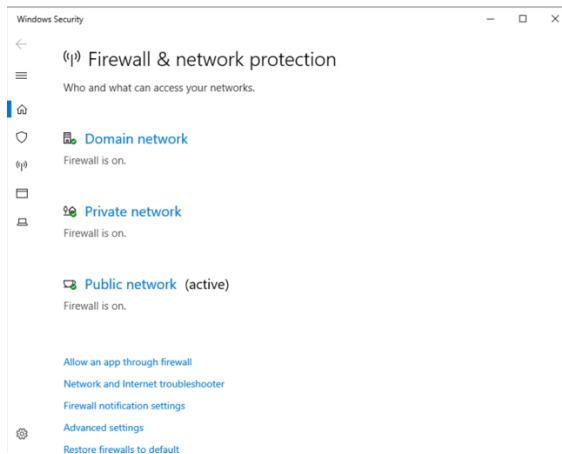
- F. Click OK.  
G. Acknowledge needing restart  
H. Click Close  
I. Click Restart Now

## Task 4: Configure security settings for Jump Host use

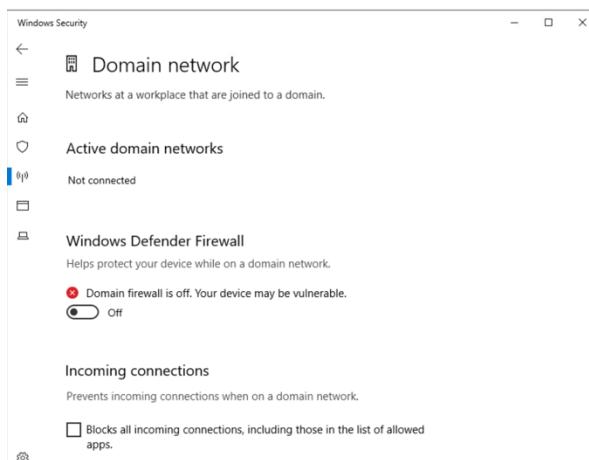
In this task we will configure security and other settings on the Windows Server 2019 jump host. Since this host is acting as a dual homed jump host, we will need to disable most built-in security features, as well as enable remote desktop

### [Step 1] Change Windows Defender Firewall

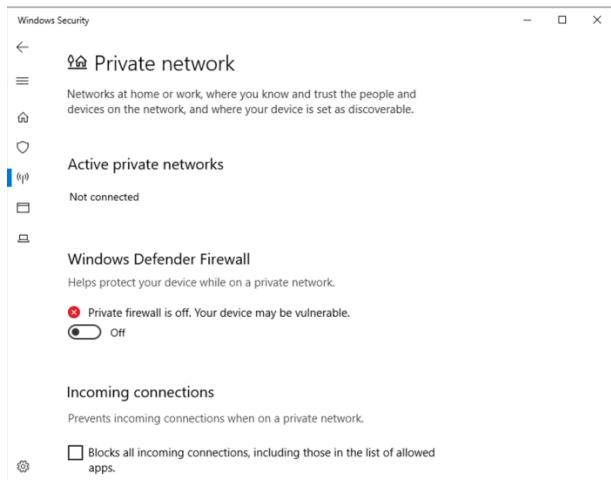
- Launch Server Manager -> Local Server
- Click on “Public: On” on the Windows Defender Firewall
- Click on Domain Network



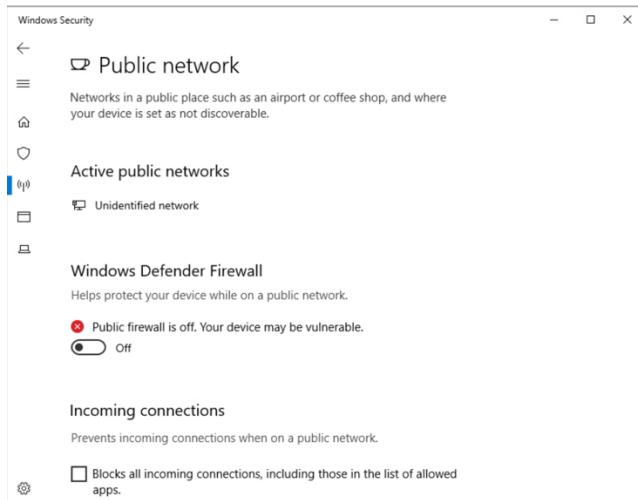
- Click the radio button to toggle Windows Defender Firewall off



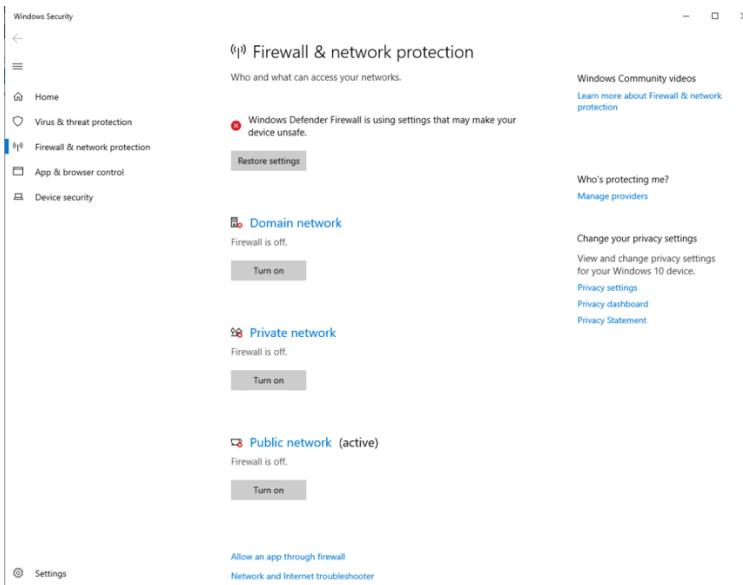
- Click back arrow at top left of box
- Click Private Network
- Click the radio button to toggle Windows Defender Firewall off



- H. Click back arrow
- I. Click Public Network
- J. Click the radio button to toggle Windows Defender Firewall off



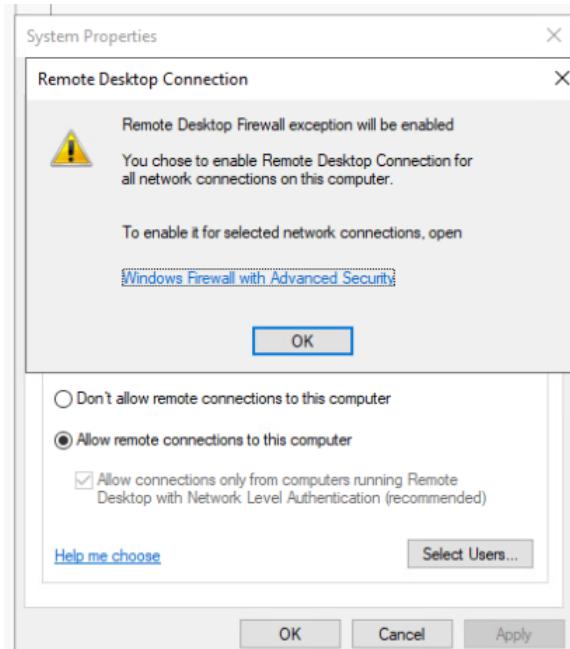
- K. Click back on screen



L. Click the X on top right

### [Step 2] Change Remote Desktop

- Launch Server Manager -> Local Server
- Click on Remote Desktop: Disabled
- Click Allow Remote Connections to this Computer, then OK

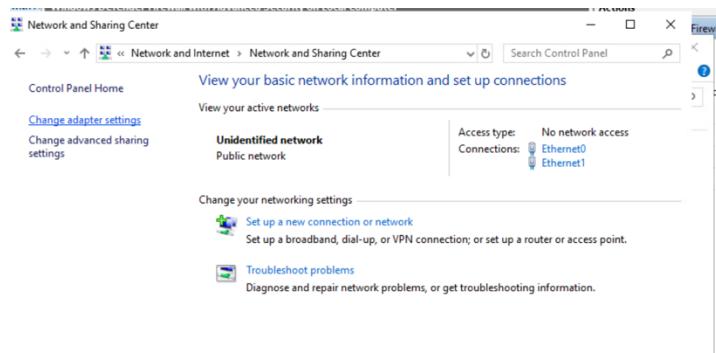


## Task 5: Configure jump host networking

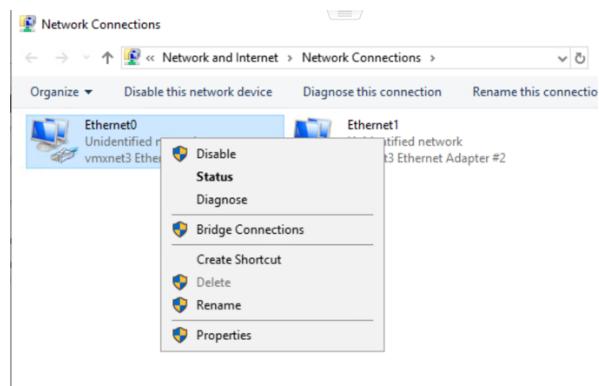
In this task we will configure networking on the Windows Server 2019 jump host

### [Step 1] Set Interface Names

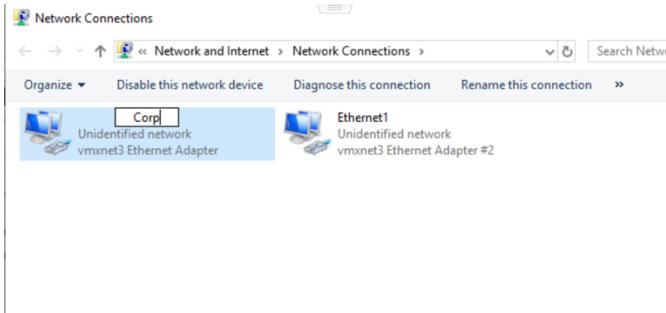
- A. Close Server Manager
- B. Open Windows control panel
- C. Select Network and Internet
- D. Select Networking and Sharing
- E. Click change Adapter settings



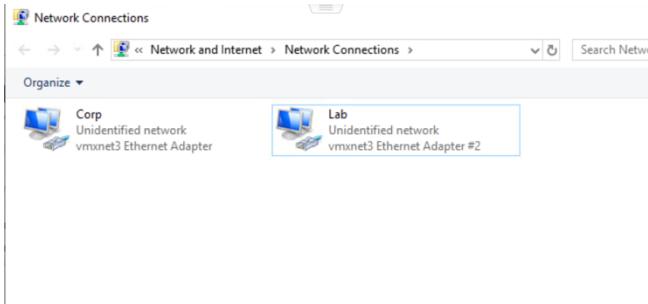
- F. Right Click Ethernet0 and click rename



- G. Since Ethernet0 is your external facing interface, name it accordingly

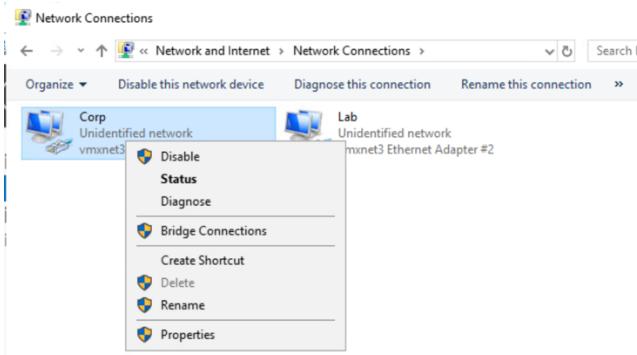


**H. Repeat the process for Ethernet #2**

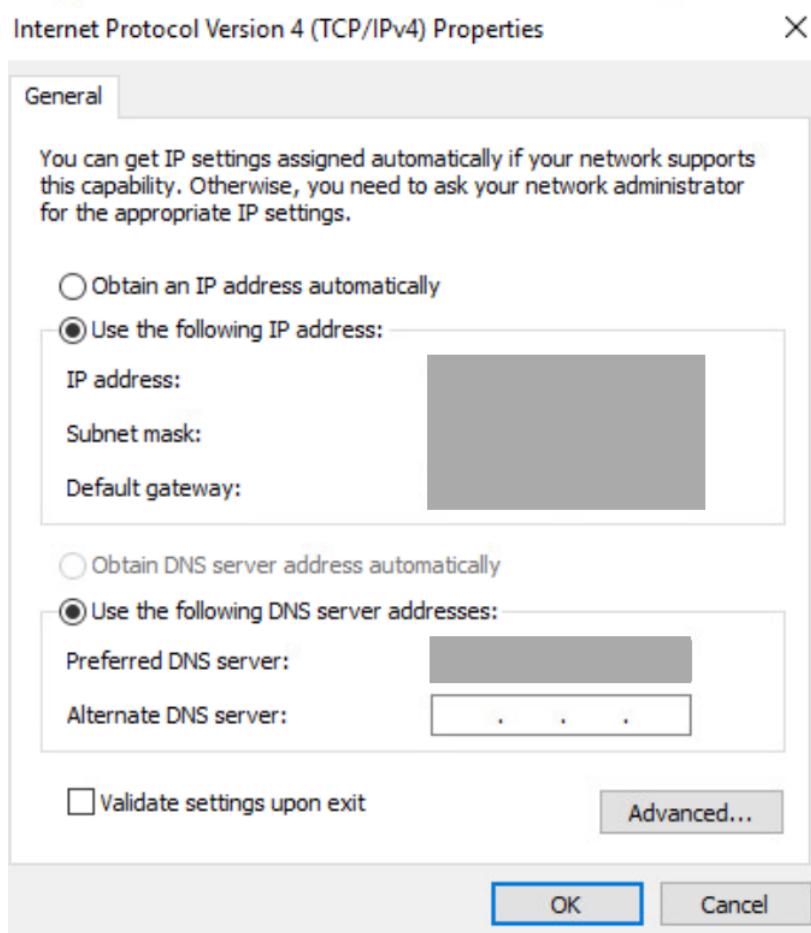


**[Step 2] Set External Interface addressing**

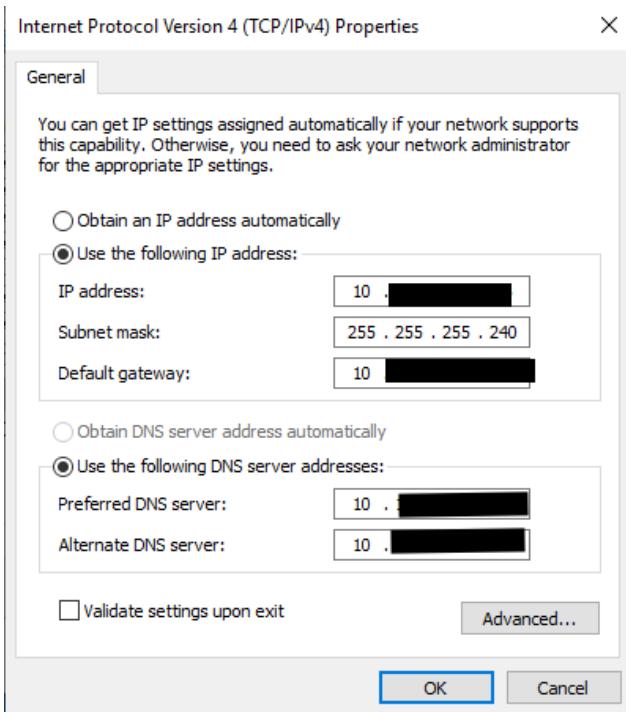
**A. From Network Connections, right click on Corp then Properties**



- B. Select Internet protocol Version 4 and Properties  
C. Set up addressing to fit your host**

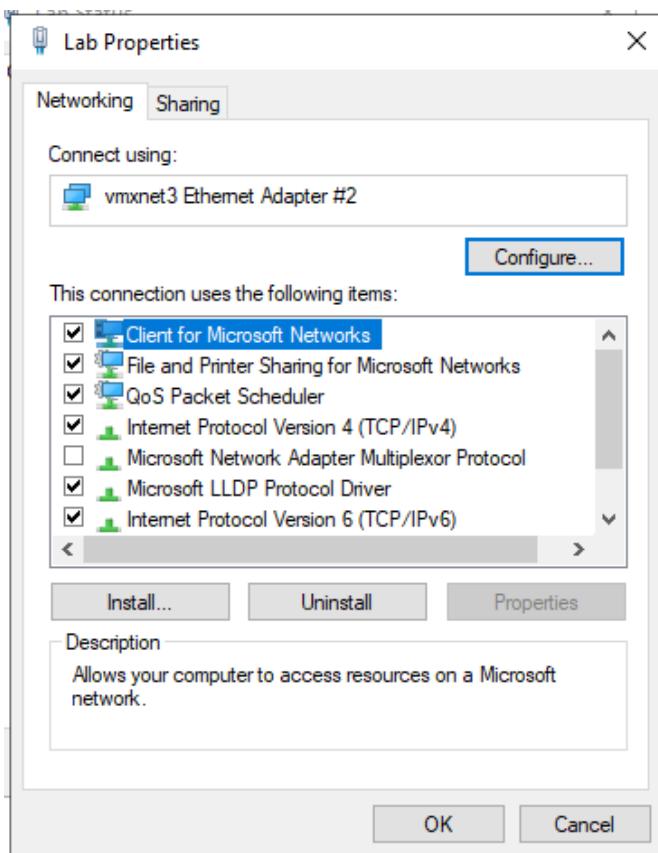


D. Click OK, then Close

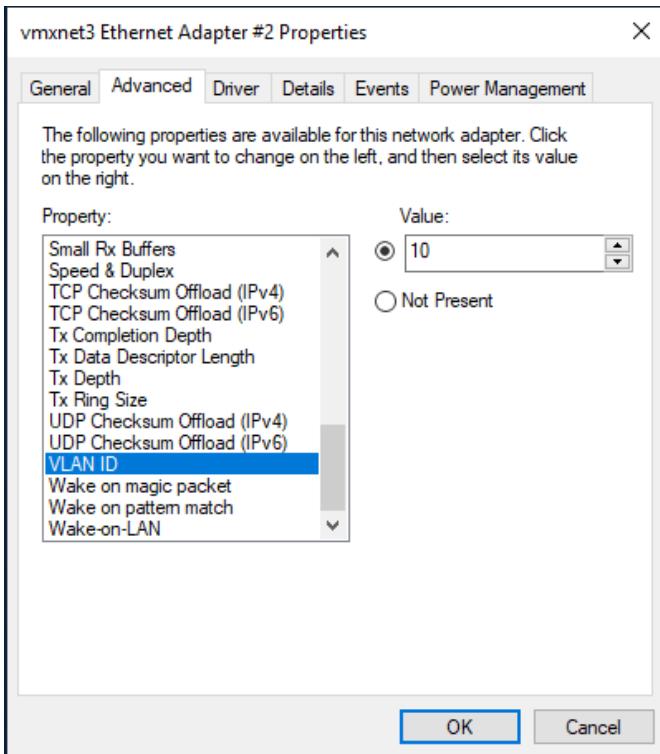


## [Step 2] Set internal networking

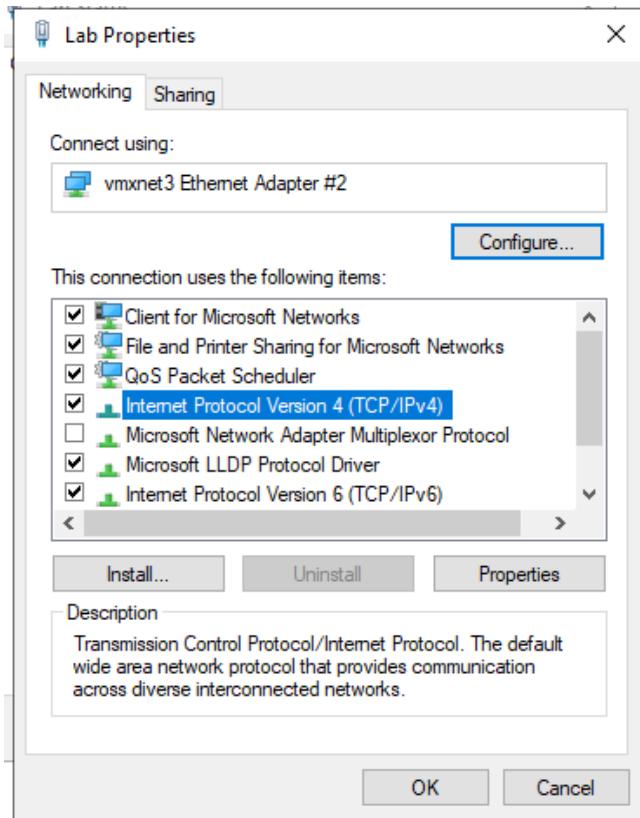
- Open Windows control panel
- Select Network and Internet
- Select the VLC facing interface and click properties
- Click Configure under the interface



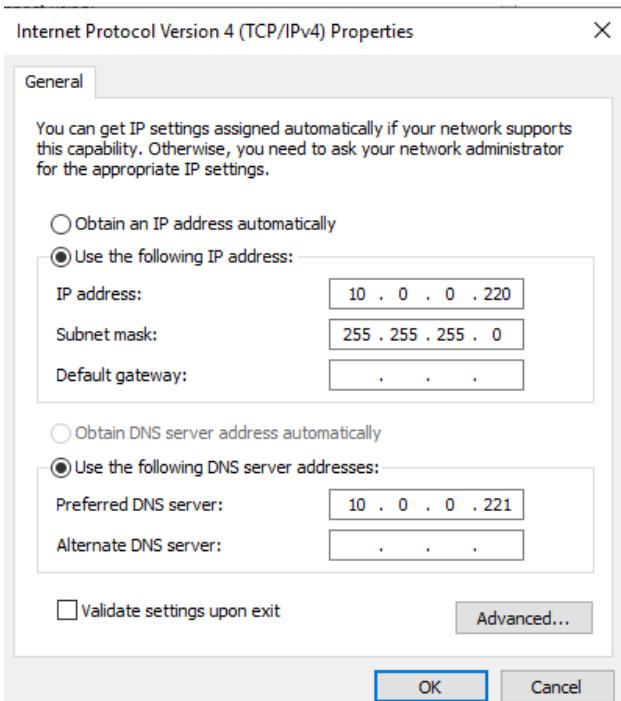
- E. Click Advanced, then scroll down to VLAN ID
- F. Set VLAN ID 10, then ok



G. Click properties, then Internet Protocol Version 4, then properties



#### H. Set IP address to 10.0.0.220, netmask 255.255.255.0, DNS 10.0.0.221



- I. Click OK, then close

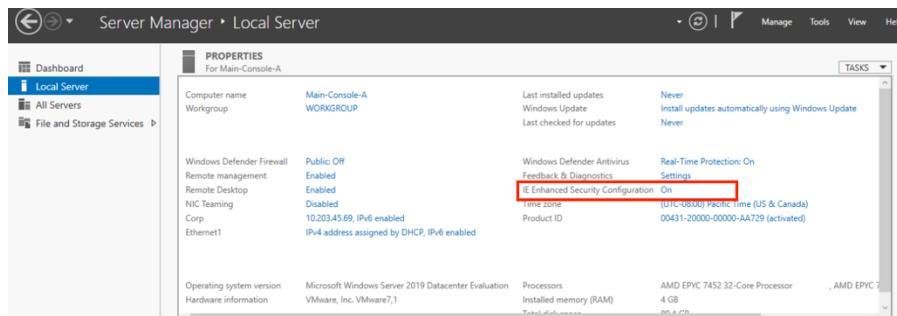
## Task 6: Configure jump host applications

In this task we will configure software/applications needed to deploy the Holodeck nested lab

- Chrome Browser
- Powershell 5.1+ (Included in Windows Server 2019)
- PowerCLI 12.1+
- OVFTool 4.4+
- .Net Framework

### [Step 1] Disable IE Enhanced Security

- A. From the Windows Start menu, launch Server Manager -> Local Server
- B. Click “On” at IE Enhanced Security Configuration



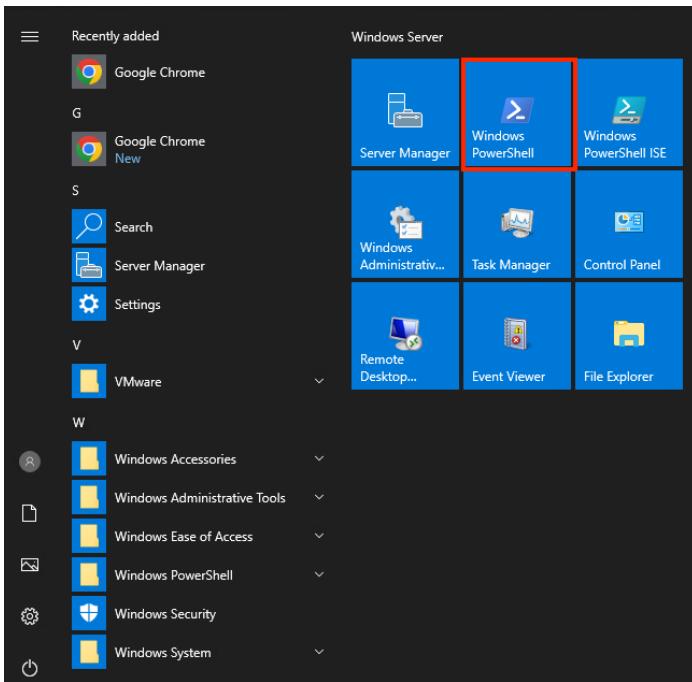
- C. Set both to Off
- D. Click OK

### [Step 2] Download and install Google Chrome Browser

### [Step 3] Install PowerCLI 12.4

Note: This step assumes you are using Windows Server 2019 that has Windows PowerShell 5.1 pre-installed

- A. Click Windows Start Menu and open a PowerShell window



- B. Run the command `install-module vmware.powercli -scope AllUsers -force -SkipPublisherCheck -AllowClobber`

A screenshot of an 'Administrator: Windows PowerShell' window. The title bar says 'Administrator: Windows PowerShell'. The window shows the command `install-module vmware.powercli -scope AllUsers -force -SkipPublisherCheck -AllowClobber` being typed into the command line. The background is dark blue.

- C. Progress screens look like the following

```

Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Installing package 'VMware.PowerCLI'
  Installing dependent package 'VMware.VimAutomation.Cis.Core'
[oooo]
Installing package 'VMware.VimAutomation.Cis.Core'

[          ]                                     [          ]

```

## D. Complete

```

Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\Administrator> install-module vmware.powercli -scope AllUsers -force -SkipPublisherCheck -AllowClobber
PS C:\Users\Administrator>
PS C:\Users\Administrator>
PS C:\Users\Administrator>
PS C:\Users\Administrator>

```

### [Step 4] Install OVFTool

- From the jump host browser, go to <https://developer.vmware.com/web/tool/4.4.0.ovf>
- Select version 4.4.3 at top of list

The screenshot shows the VMware Developer website with the URL <https://developer.vmware.com/web/tool/4.4.0.ovf>. The page displays information about the VMware OVF Tool, including its purpose (importing and exporting OVF packages), a note about version 4.5 for vSphere 8.0, and a list of related resources like the Open Virtualization Format Tool (OVF) Forum. Below this, there's a section for 'Downloads' with a table showing the available version 4.4.3. The table has columns for Name, Version, Size, and MD5, and includes a 'Download' button.

Name	Version	Size	MD5	
Open Virtualization Format Tool (ovftool)	4.4.3			<a href="#">Download</a>

- Click download, then enter your contact info, then Accept EULA
- Click Download Now for Windows 64 bit

The screenshot shows the VMware Customer Connect interface. At the top, there's a navigation bar with links for 'Products and Accounts', 'Knowledge', 'More', 'Register', and 'Login'. Below the navigation, a table provides details about the product:

<b>Product</b>	OVFTOOL 4.4.3
<b>Version</b>	4.4.3
<b>Release Date</b>	2021-10-05
<b>Build Number</b>	18663434

Below the table, a section titled 'Product Downloads' lists two files:

- VMware-ovftool-4.4.3-18663434-win-32.msi**: Windows 32 bit, 24.66 MB, File type: msi. Release Date: 2021-10-05. Build Number: 18663434. MD5SUM: d3d514c29b621cfa113509ce3d04b204. SHA1SUM: 486ed35ce32d653be5a2e5d2c5a19c18043f16a. SHA256SUM: 306c1203a3196c52fd988dd80f8aa442c1402a5b08b83471d5e740b7d80f88.
- VMware-ovftool-4.4.3-18663434-win-x64.msi**: Windows 64 bit, 26.22 MB, File type: msi. Release Date: 2021-10-05. Build Number: 18663434. MD5SUM: 7432034eb35e62151b247c6c000260. SHA1SUM: 35b9555c889e0f37118cba72bdff7193001575261. SHA256SUM: 8cf72e5c0313e0f76bcd7efdf2d88be764b821a3be62d40279fc480df7a32ddf2.

Each file entry has a 'DOWNLOAD NOW' button.

- E. This will take you to a VMware Customer Connect page where you will need a valid customer connect account login and password

The screenshot shows the VMware Customer Connect login page. The left side features a 'Welcome to Customer Connect' message and fields for 'Email address or customer number' and 'Password'. It also includes links for 'Forgot your password?' and 'SIGN IN'. The right side of the page has a large, stylized blue background image of clouds.

- F. Once you login you will access the actual download link for Windows 64 bit

**OVFTOOL 4.4.3**

Product Downloads

File	Information	Action
<a href="#">VMware-ovftool-4.4.3-18663434-win_x86.msi</a>	Windows 32 32 Bit Windows Installer File size: 24.66 MB File type: msi Release Date: 2021-10-05 Build Number: 18663434	<a href="#">DOWNLOAD NOW</a>
<a href="#">VMware-ovftool-4.4.3-18663434-win_x64.msi</a>	Windows 64 64 Bit Windows Installer File size: 26.22 MB File type: msi Release Date: 2021-10-05 Build Number: 18663434	<a href="#">DOWNLOAD NOW</a>

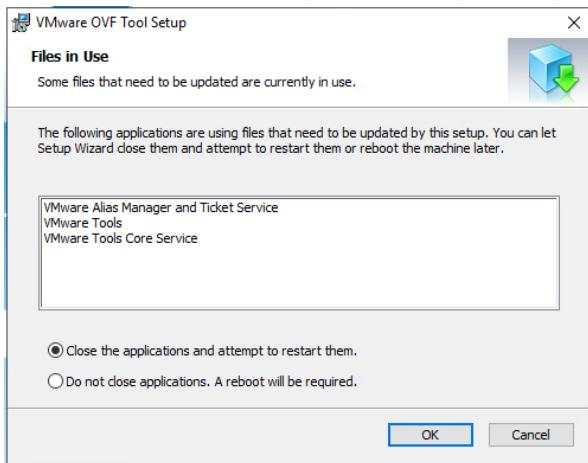
**G. Click on the downloaded file to launch setup**



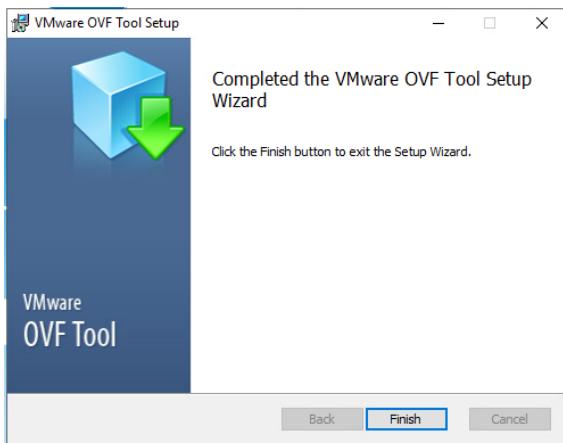
**H. Click Next -> accept license -> Next -> Next**

**I. Click Install**

**J. Allow the installer to close VMware services (VMware Tools is running on this VM)**

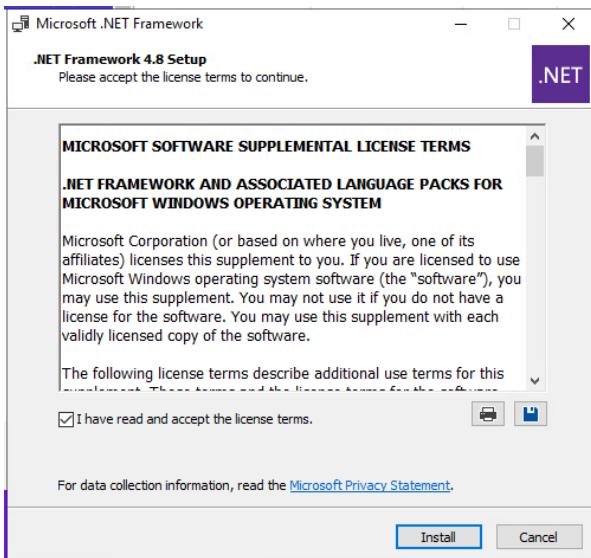


#### K. Click Finish

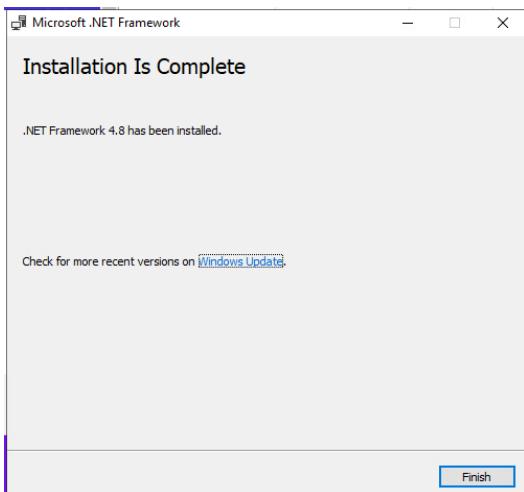


#### [Step 5] Install .NET Framework

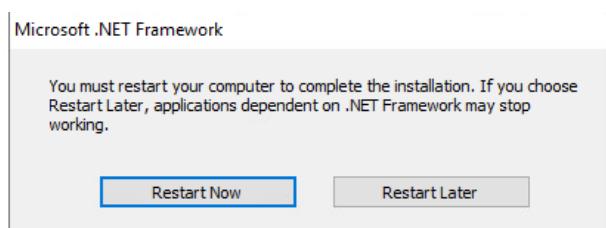
- A. From the jump host browser, navigate to <https://dotnet.microsoft.com/en-us/download/dotnet-framework/net48>
- B. Download the .NET Framework Runtime
- C. Click to execute the download
- D. Accept the license info and click Install



E. Click Finish



F. Restart the console to complete the install



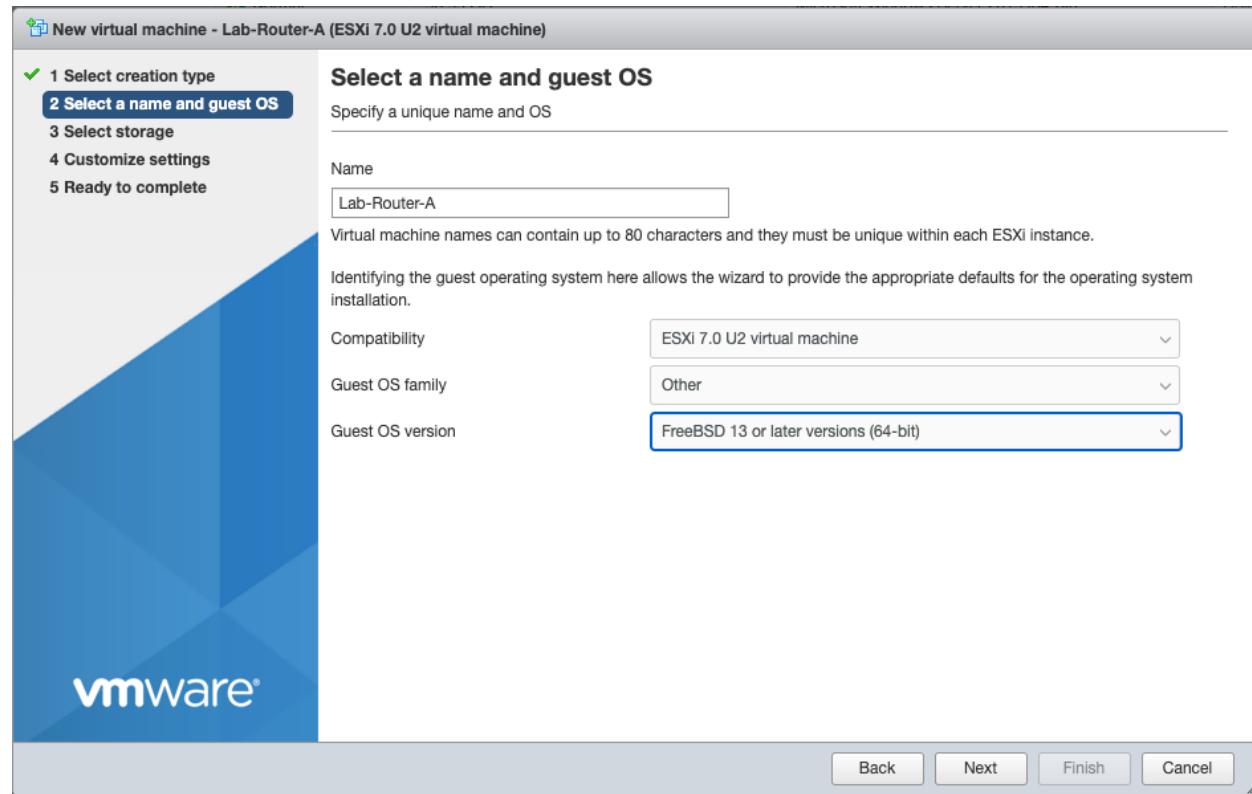
## Task 7: Deploy PFsense Lab Gateway to physical host

In this task we will deploy a PFsense router to act as a lab gateway. This step requires you have downloaded [PFsense CE 2.6](#) to your ESXi host

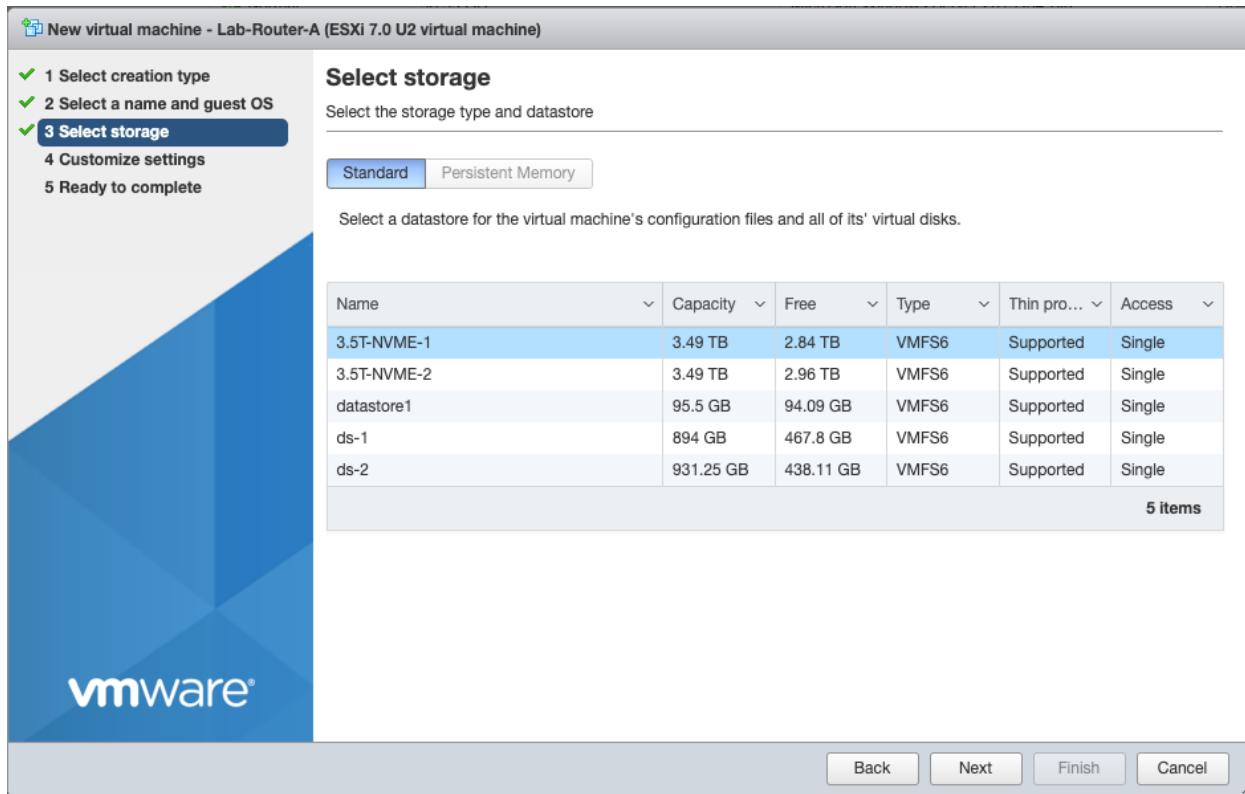
### [Step 1] Create new virtual machine

- A. From the virtual machine tab select Create/Register VM
- B. Select create new VM
- C. Name the VM Lab-Router-A (or similar)
- D. Select OS Other, and FreeBSD 13 or later 64 bit

vmx

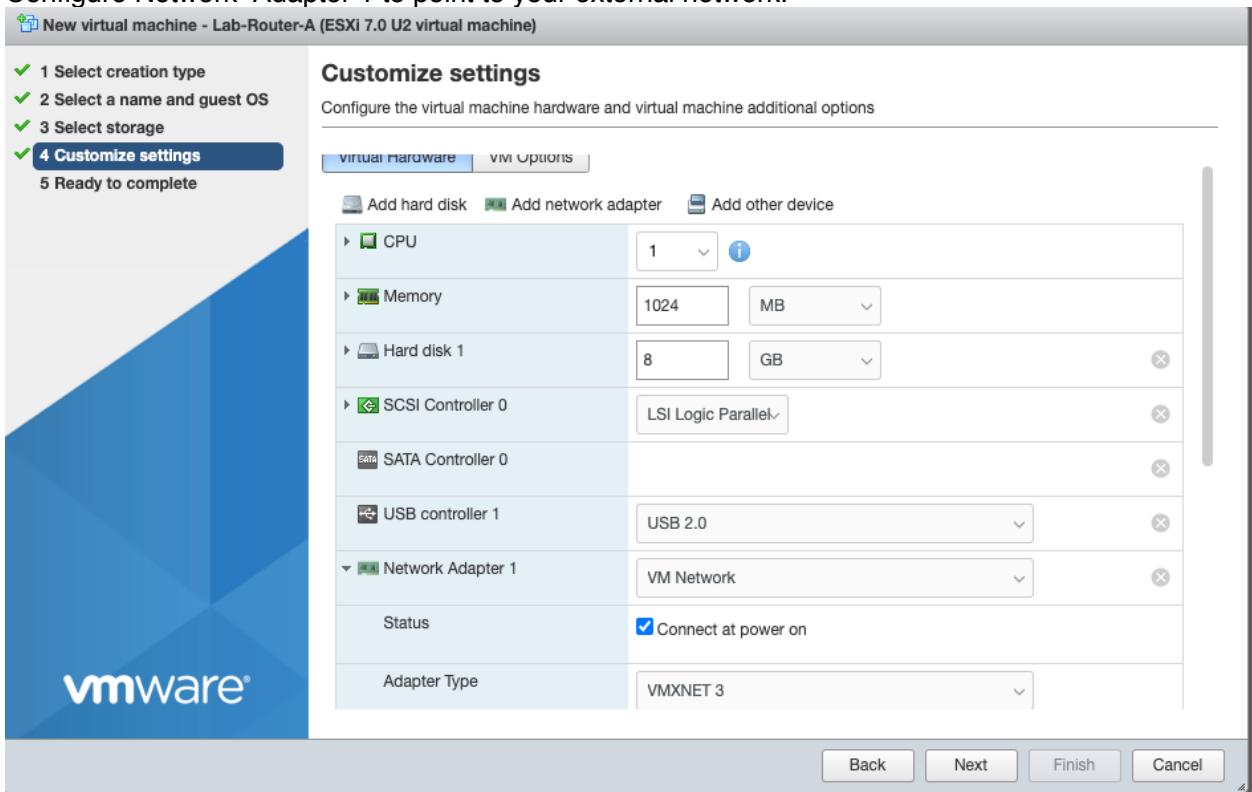


- E. Select Storage

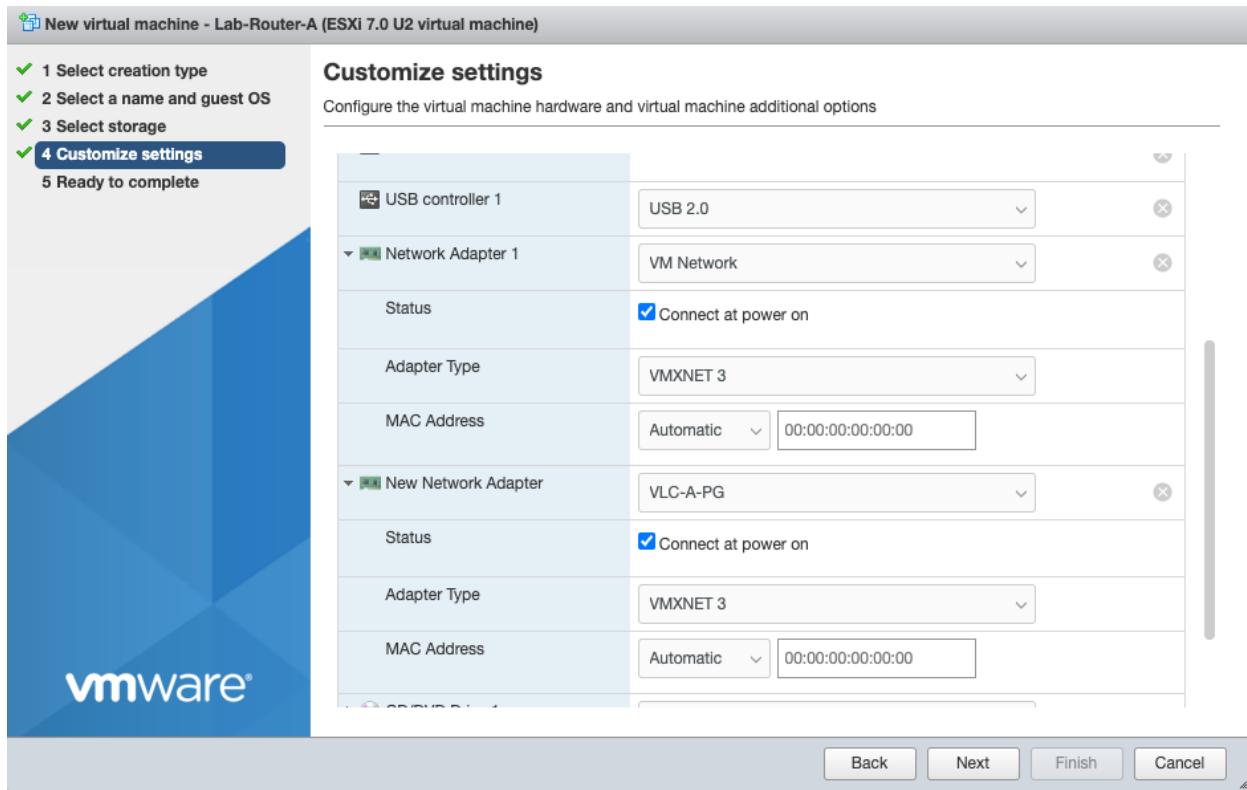


- F. Default CPU, memory and disk are adequate
- G. Set SCSI Controller to LSI Logic Parallel

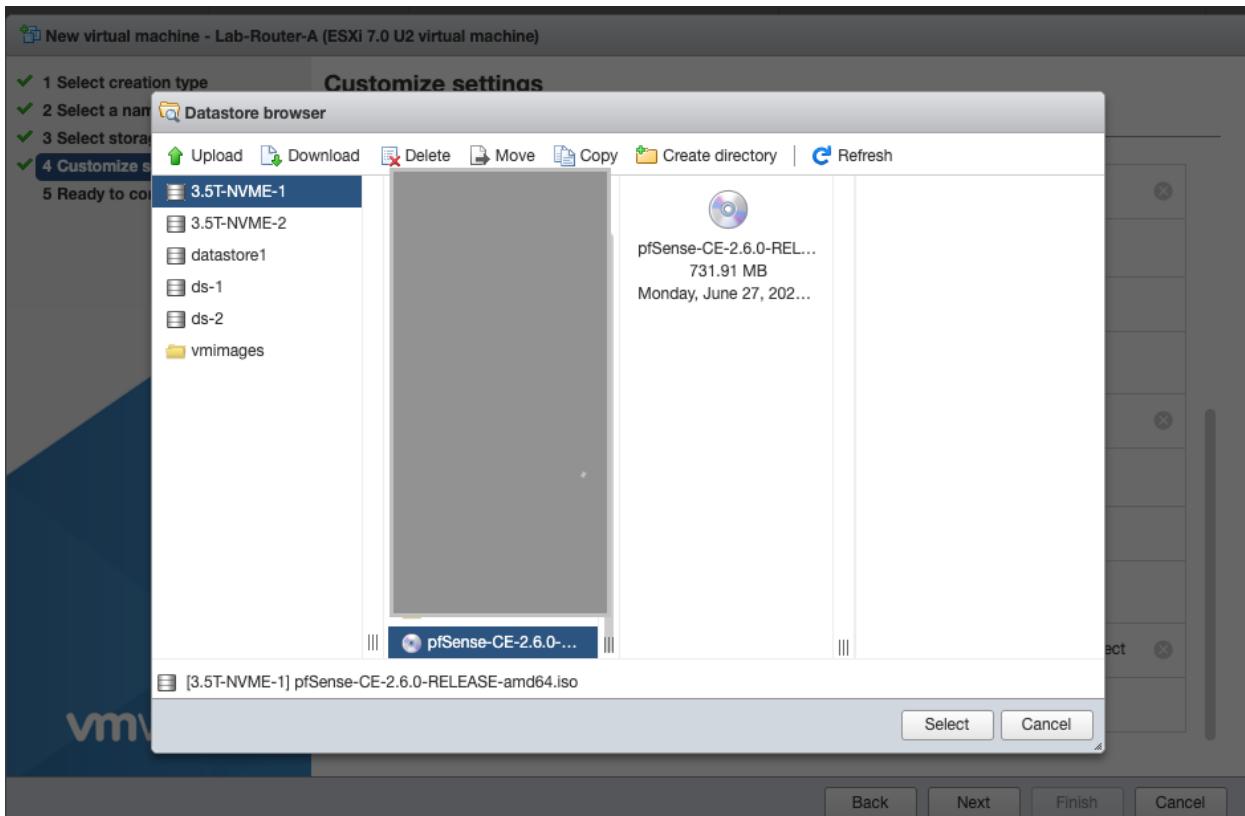
H. Configure Network Adapter 1 to point to your external network.



I. Add a second network adapter and connect to VLC-PG-A

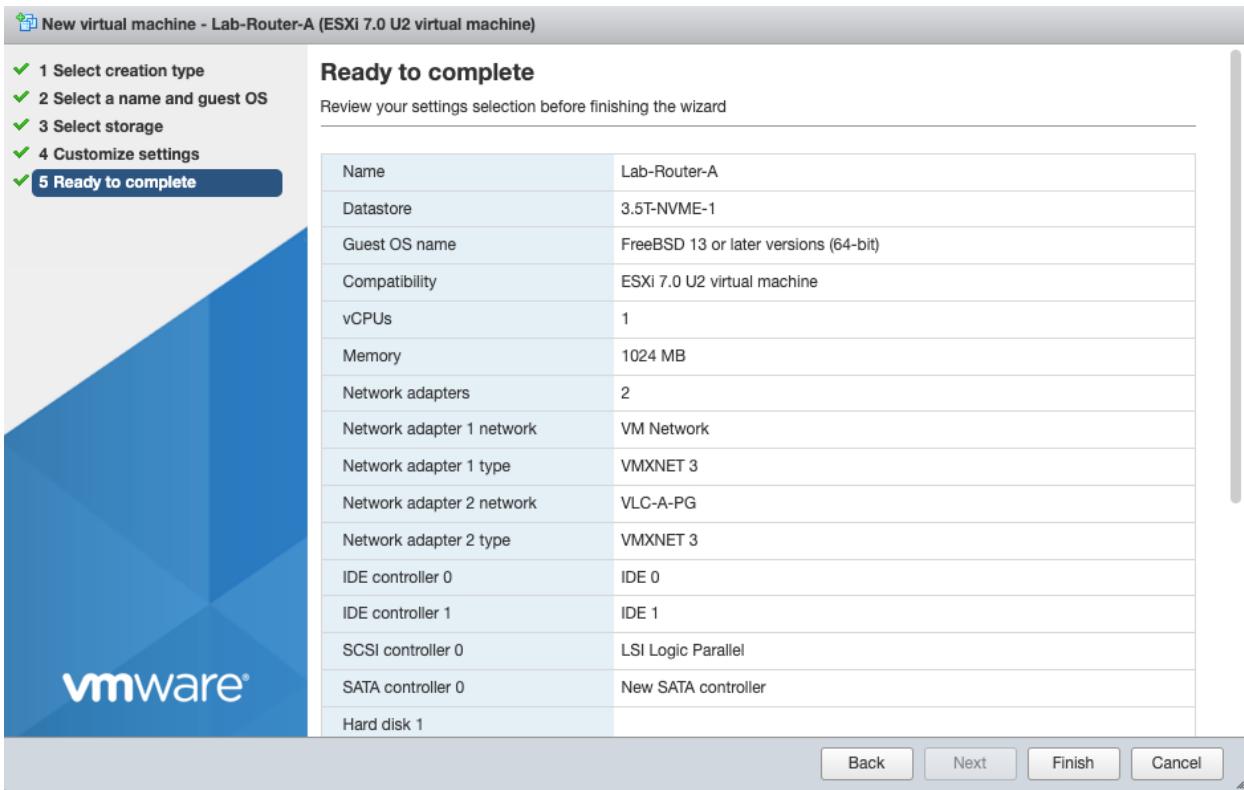


J. Set CD to Datastore ISO and select location of the PFsense iso

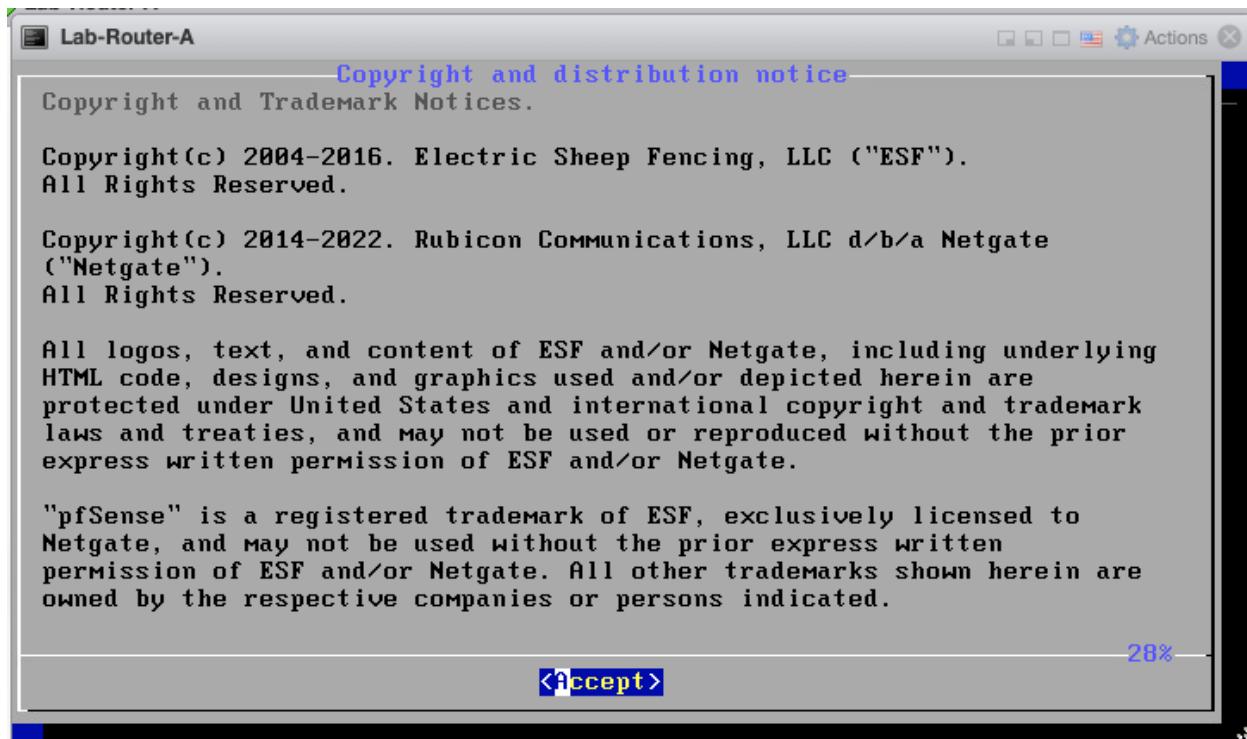


K. Click Next

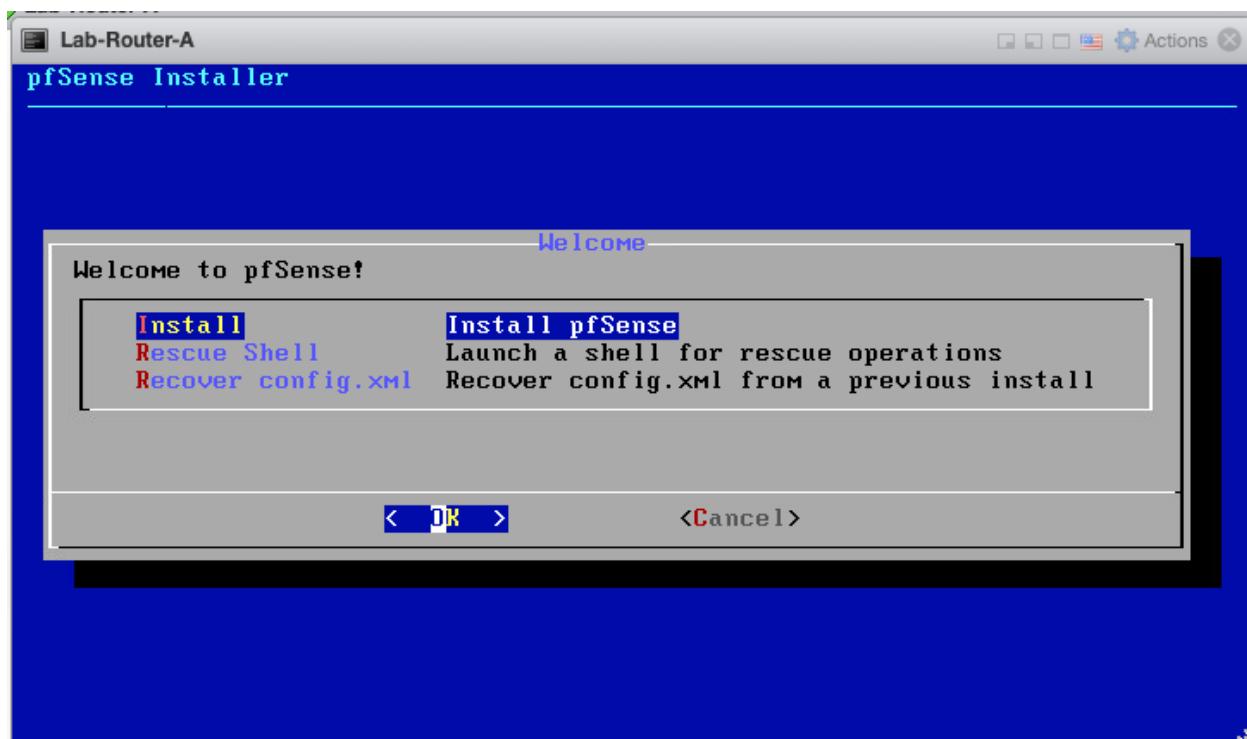
L. Your deployment should look like this



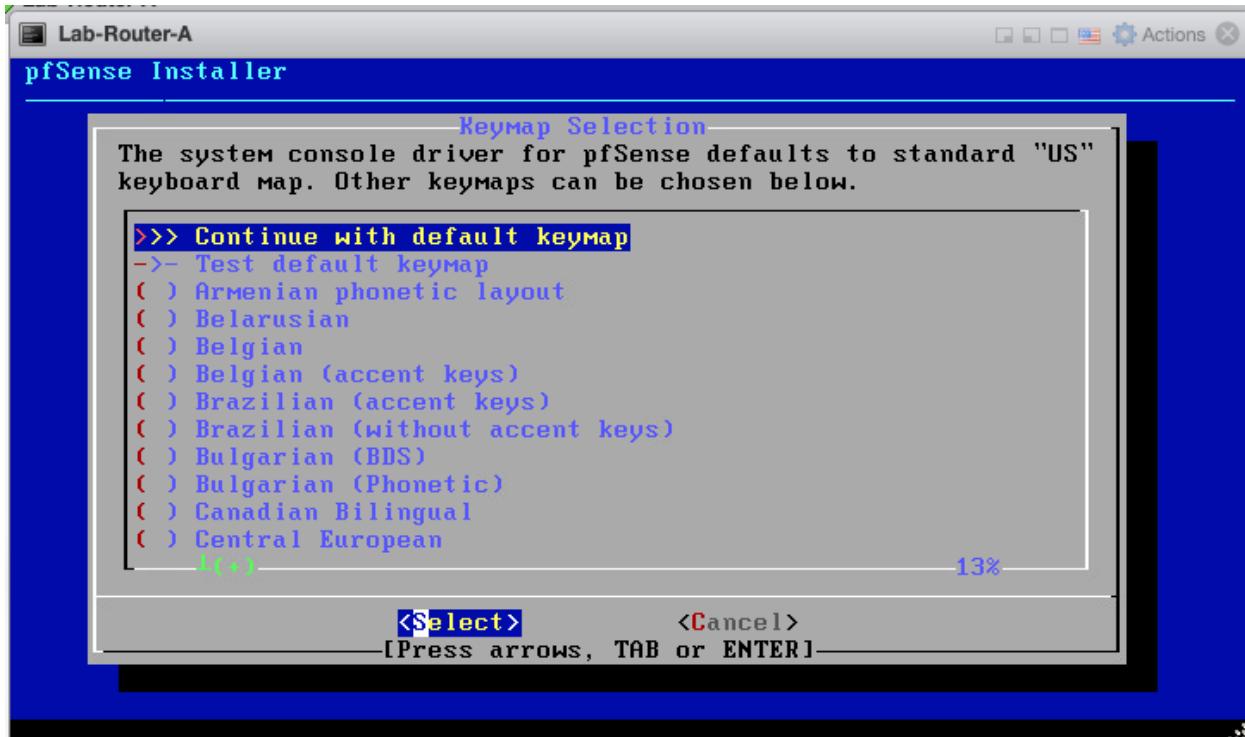
- M. Click Finish
- N. Power on the VM
- O. Open a console into the VM
- P. Accept the EULA



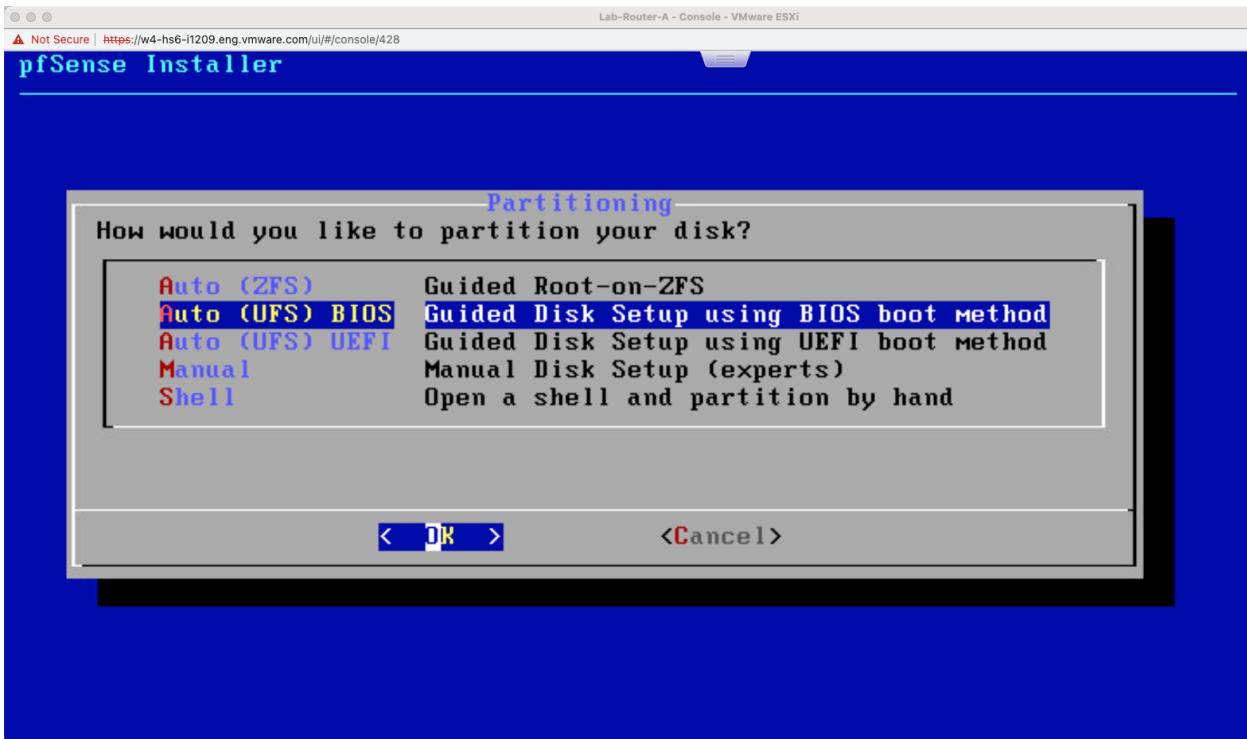
Q. Select install



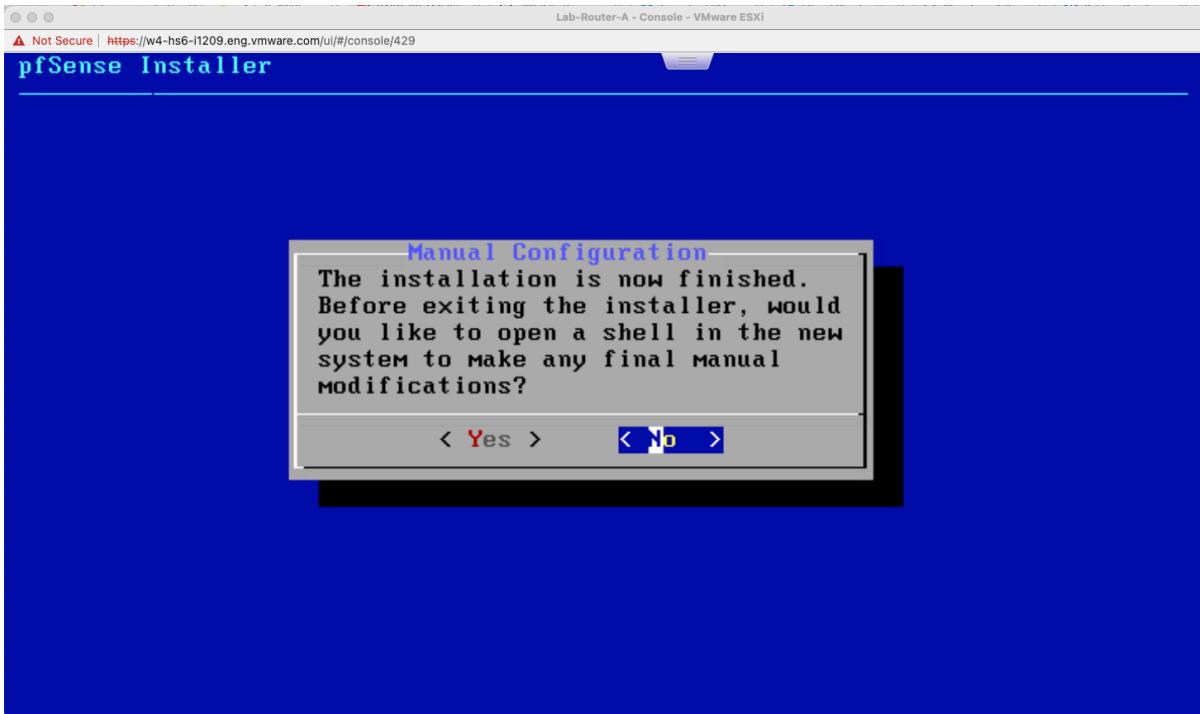
R. Select continue with default keymap



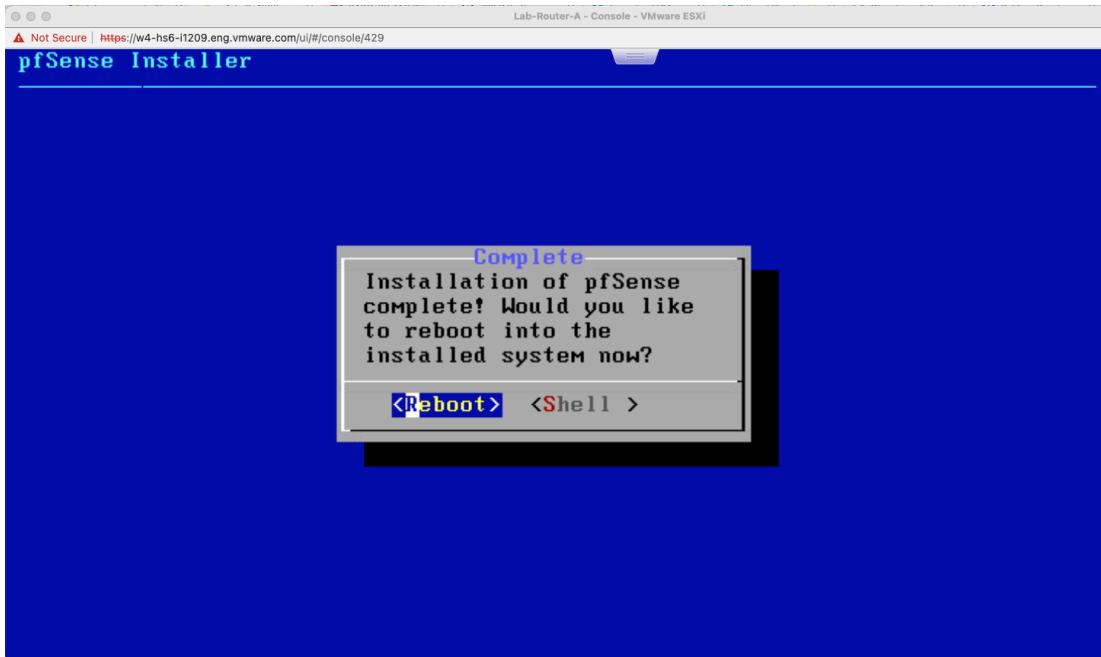
S. Select Auto (UFS) BIOS



- T. Select Proceed with install
- U. Select no when asked if you would like to open a shell



## V. Select reboot



### [Step 2] Configure PFsense

This step will configure PFsense for your environment.

- After initial boot, your PFsense config should look like the following

Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429 Lab-Router-A - Console - VMware ESXi

```
XSAVE Features=0xf<XSAVEOPT,XSAVEVEC,XINUSE,XSAVES>
AMD Extended Feature Extensions ID EBX=0x1201<CLZERO>
TSC: P-state invariant
Hypervisor: Origin = "VMwareVMware"
Done.
.... done.
Initializing..... done.
Starting device Manager (devd)...done.
Loading configuration.....done.
Updating configuration...done.

Default interfaces not found -- Running interface assignment option.
vmx0: link state changed to UP
vmx1: link state changed to UP

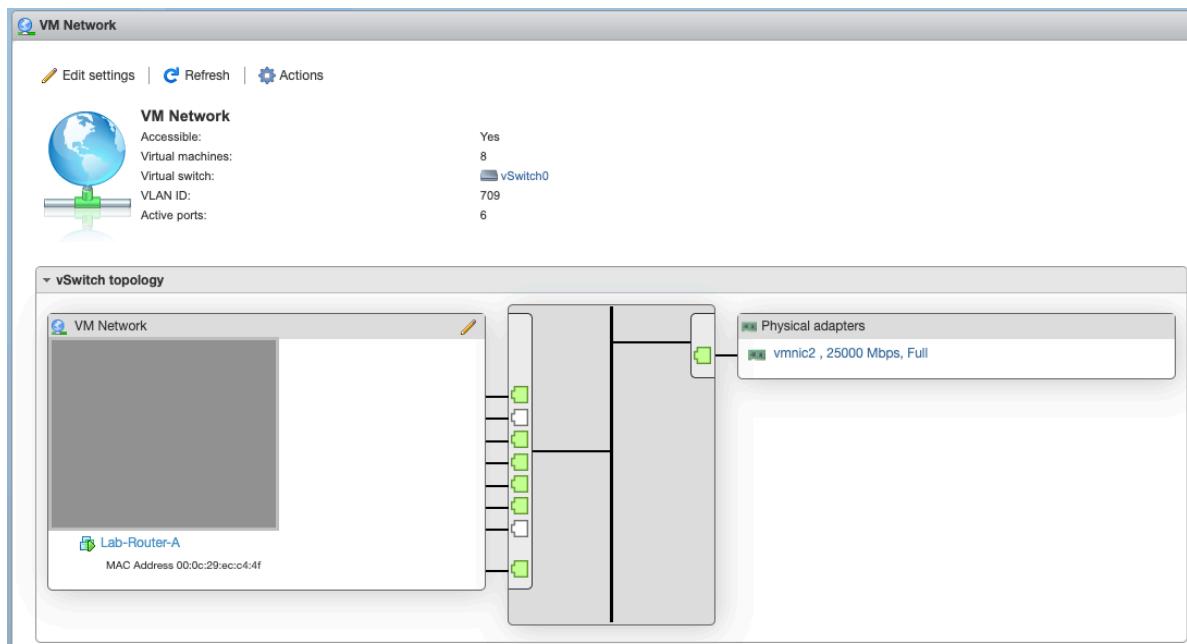
Valid interfaces are:

vmx0      00:0c:29:ec:c4:4f (down) VMware VMXNET3 Ethernet Adapter
vmx1      00:0c:29:ec:c4:59 (down) VMware VMXNET3 Ethernet Adapter

Do VLANs need to be set up first?
If VLANs will not be used, or only for optional interfaces, it is typical to
say no here and use the webConfigurator to configure VLANs later, if required.

Should VLANs be set up now [y|n]? █
```

- B. From your vSphere client, determine which interface (using mac address) connects to your external network. This will be your “WAN” interface later. In this example we can see that the vmx0 interface with MAC ending in c4:4f is connected to our external network



- C. For the VLC Holodeck configuration, we need the inside (LAN) interface to connect on VLAN 10. We will configure vmx0 for VLAN use. Select y on the PFsense console to configure VLANs

```

Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429
Lab-Router-A - Console - VMware ESXi

XSAVE Features=0xf<XSAVEOPT, XSAVEC, XINUSE, XSAVES>
AMD Extended Feature Extensions ID EBX=0x1201<CLZERO>
TSC: P-state invariant
Hypervisor: Origin = "VMwareVMware"
Done.
.... done.
Initializing..... done.
Starting device manager (devd)...done.
Loading configuration.....done.
Updating configuration...done.

Default interfaces not found -- Running interface assignment option.
vmx0: link state changed to UP
vmx1: link state changed to UP

Valid interfaces are:

vmx0    00:0c:29:ec:c4:4f (down) VMware VMXNET3 Ethernet Adapter
vmx1    00:0c:29:ec:c4:59 (down) VMware VMXNET3 Ethernet Adapter ←

Do VLANs need to be set up first?
If VLANs will not be used, or only for optional interfaces, it is typical to
say no here and use the webConfigurator to configure VLANs later, if required.

Should VLANs be set up now [y:n]? n ←

```

- D. Enter the parent interface for the new VLAN. In this example our LAN interface will be on vmx1, so we will enter vmx1 and enter

```

Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429
Lab-Router-A - Console - VMware ESXi

Updating configuration...done.

Default interfaces not found -- Running interface assignment option.
vmx0: link state changed to UP
vmx1: link state changed to UP

Valid interfaces are:

vmx0    00:0c:29:ec:c4:4f (down) VMware VMXNET3 Ethernet Adapter
vmx1    00:0c:29:ec:c4:59 (down) VMware VMXNET3 Ethernet Adapter

Do VLANs need to be set up first?
If VLANs will not be used, or only for optional interfaces, it is typical to
say no here and use the webConfigurator to configure VLANs later, if required.

Should VLANs be set up now [y:n]? y ←

VLAN Capable interfaces:

vmx0    00:0c:29:ec:c4:4f    (up)
vmx1    00:0c:29:ec:c4:59    (up)

Enter the parent interface name for the new VLAN (or nothing if finished): vmx1 ←

```

- E. Enter VLAN tag 10
- F. Hit enter when asked for parent interface for next VLAN (signaling we do not need another VLAN)

```
VMX1  00:0c:29:ec:c4:59 (down) VMware VMNET3 Ethernet Adapter
Do VLANs need to be set up first?
If VLANs will not be used, or only for optional interfaces, it is typical to
say no here and use the webConfigurator to configure VLANs later, if required.

Should VLANs be set up now [y\?n]? y

VLAN Capable interfaces:
VMX0  00:0c:29:ec:c4:4f  (up)
VMX1  00:0c:29:ec:c4:59  (up)

Enter the parent interface name for the new VLAN (or nothing if finished): VMX1
Enter the VLAN tag (1-4094): 10

VLAN Capable interfaces:
VMX0  00:0c:29:ec:c4:4f  (up)
VMX1  00:0c:29:ec:c4:59  (up)

Enter the parent interface name for the new VLAN (or nothing if finished):
```

- G. Enter the interface that is connected to your external network for WAN interface. In this example, the WAN interface was determined to be on vmx0

```

Lab-Router-A - Console - VMware ESXi
Not Secure | https://w4-hs6-l1209.eng.vmware.com/ui/#/console/429

VMX0      00:0c:29:ec:c4:4f  (up)
VMX1      00:0c:29:ec:c4:59  (up)

Enter the parent interface name for the new VLAN (or nothing if finished): VMX1
Enter the VLAN tag (1-4094): 10

VLAN Capable interfaces:
VMX0      00:0c:29:ec:c4:4f  (up)
VMX1      00:0c:29:ec:c4:59  (up)

Enter the parent interface name for the new VLAN (or nothing if finished):

VLAN interfaces:
VMX1.10      VLAN tag 10, parent interface VMX1

If the names of the interfaces are not known, auto-detection can
be used instead. To use auto-detection, please disconnect all
interfaces before pressing 'a' to begin the process.

Enter the WAN interface name or 'a' for auto-detection
(vmx0 vmx1 vmx1.10 or a): VMX0

```

H. Enter the interface for the LAN interface. In this example we need to select the vmx1.10 interface to enable VLAN10

```

Lab-Router-A - Console - VMware ESXi
Not Secure | https://w4-hs6-l1209.eng.vmware.com/ui/#/console/429

Enter the VLAN tag (1-4094): 10

VLAN Capable interfaces:
VMX0      00:0c:29:ec:c4:4f  (up)
VMX1      00:0c:29:ec:c4:59  (up)

Enter the parent interface name for the new VLAN (or nothing if finished):

VLAN interfaces:
VMX1.10      VLAN tag 10, parent interface VMX1

If the names of the interfaces are not known, auto-detection can
be used instead. To use auto-detection, please disconnect all
interfaces before pressing 'a' to begin the process.

Enter the WAN interface name or 'a' for auto-detection
(vmx0 vmx1 vmx1.10 or a): VMX0

Enter the LAN interface name or 'a' for auto-detection
NOTE: this enables full Firewalling/NAT mode.
(vmx1 vmx1.10 a or nothing if finished): VMX1.10

```

I. We do not need an optional interface, so hit enter

```

Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429
Lab-Router-A - Console - VMware ESXi

VLAN Capable interfaces:
vmx0      00:0c:29:ec:c4:4f  (up)
vmx1      00:0c:29:ec:c4:59  (up)

Enter the parent interface name for the new VLAN (or nothing if finished):

VLAN interfaces:
vmx1.10      VLAN tag 10, parent interface vmx1

If the names of the interfaces are not known, auto-detection can
be used instead. To use auto-detection, please disconnect all
interfaces before pressing 'a' to begin the process.

Enter the WAN interface name or 'a' for auto-detection
(vmxt0 vmx1 vmx1.10 or a): vmx0

Enter the LAN interface name or 'a' for auto-detection
NOTE: this enables full Firewalling/NAT mode.
(vmxt1 vmx1.10 a or nothing if finished): vmx1.10

Enter the Optional 1 interface name or 'a' for auto-detection
(vmxt1 a or nothing if finished): █

```

J. Your output should look like this

```

Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429
Lab-Router-A - Console - VMware ESXi

VLAN interfaces:
vmx1.10      VLAN tag 10, parent interface vmx1

If the names of the interfaces are not known, auto-detection can
be used instead. To use auto-detection, please disconnect all
interfaces before pressing 'a' to begin the process.

Enter the WAN interface name or 'a' for auto-detection
(vmxt0 vmx1 vmx1.10 or a): vmx0

Enter the LAN interface name or 'a' for auto-detection
NOTE: this enables full Firewalling/NAT mode.
(vmxt1 vmx1.10 a or nothing if finished): vmx1.10

Enter the Optional 1 interface name or 'a' for auto-detection
(vmxt1 a or nothing if finished): █

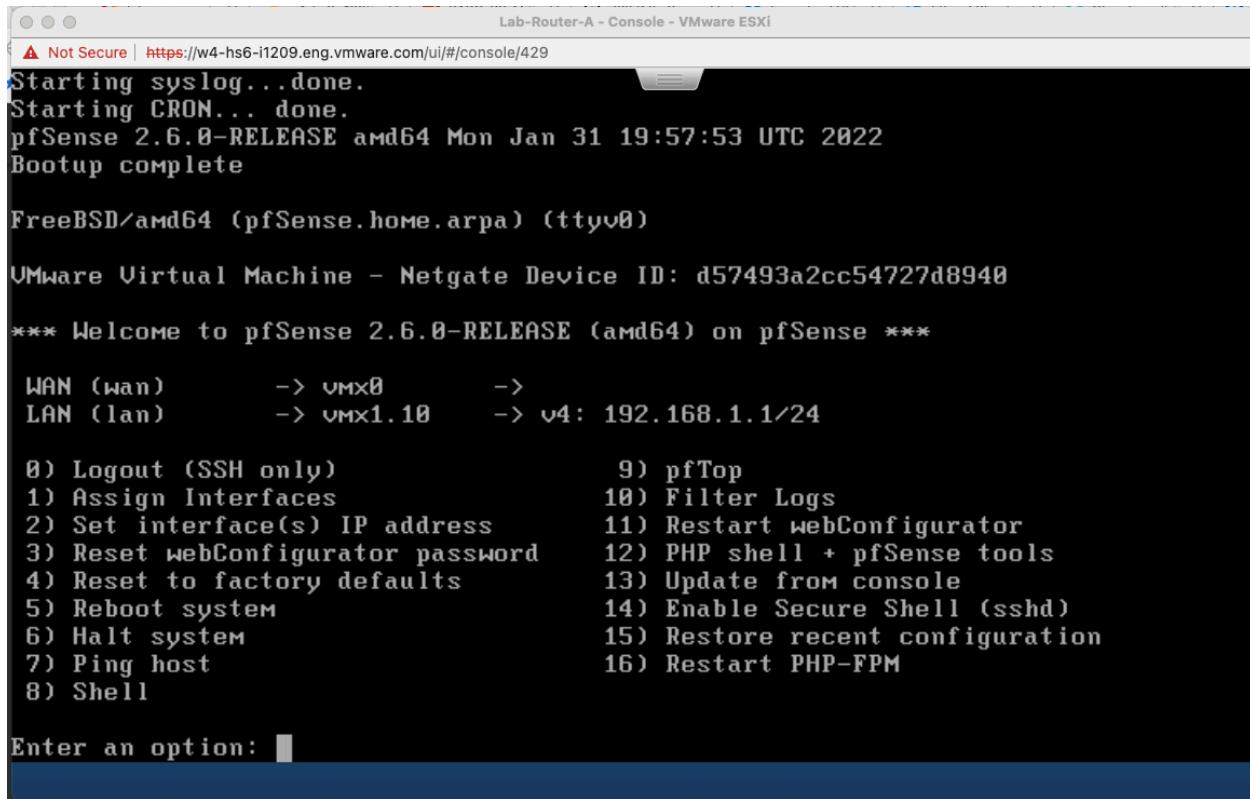
The interfaces will be assigned as follows:
WAN  -> vmx0
LAN  -> vmx1.10

Do you want to proceed [y/n]? █

```

K. Enter y to proceed. PFsense will reconfigure and reboot

L. After reboot, select 2 to set IP addressing



The screenshot shows a terminal window titled "Lab-Router-A - Console - VMware ESXi". The URL in the address bar is "https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429". The window displays the following text:

```
⚠️ Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429
Starting syslog...done.
Starting CRON... done.
pfSense 2.6.0-RELEASE amd64 Mon Jan 31 19:57:53 UTC 2022
Bootup complete

FreeBSD/amd64 (pfSense.home.arpa) (ttyv0)

VMware Virtual Machine - Netgate Device ID: d57493a2cc54727d8940

*** Welcome to pfSense 2.6.0-RELEASE (amd64) on pfSense ***

WAN (wan)      -> VMX0      ->
LAN (lan)      -> VMX1.10    -> v4: 192.168.1.1/24

0) Logout (SSH only)          9) pfTop
1) Assign Interfaces          10) Filter Logs
2) Set interface(s) IP address 11) Restart webConfigurator
3) Reset webConfigurator password 12) PHP shell + pfSense tools
4) Reset to factory defaults   13) Update from console
5) Reboot system               14) Enable Secure Shell (sshd)
6) Halt system                 15) Restore recent configuration
7) Ping host                   16) Restart PHP-FPM
8) Shell

Enter an option: █
```

- M. Select 1 for WAN interface . Configure as per your environment. In this example, we will use a fixed /28 IPv4 address (no DHCP) and no IPv6

```
Lab-Router-A - Console - VMware ESXi
⚠️ Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429
Enter an option: 2
Available interfaces:
1 - WAN (vmx0 - dhcp, dhcp6)
2 - LAN (vmx1.10 - static)

Enter the number of the interface you wish to configure: 1
Configure IPv4 address WAN interface via DHCP? (y/n) n
Enter the new WAN IPv4 address. Press <ENTER> for none:
> 10.0.0.1

Subnet masks are entered as bit counts (as in CIDR notation) in pfSense.
e.g. 255.255.255.0 = 24
     255.255.0.0 = 16
     255.0.0.0 = 8

Enter the new WAN IPv4 subnet bit count (1 to 32):
> 28

For a WAN, enter the new WAN IPv4 upstream gateway address.
For a LAN, press <ENTER> for none:
> 10.0.0.1
```

N. Select yes for HTTP for web configurator

y

```
Lab-Router-A - Console - VMware ESXi
⚠ Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui#/console/429
Configure IPv4 address WAN interface via DHCP? (y/n) n
Enter the new WAN IPv4 address. Press <ENTER> for none:
> 10. [REDACTED]
Subnet Masks are entered as bit counts (as in CIDR notation) in pfSense.
e.g. 255.255.255.0 = 24
      255.255.0.0   = 16
      255.0.0.0     = 8
Enter the new WAN IPv4 subnet bit count (1 to 32):
> 28
For a WAN, enter the new WAN IPv4 upstream gateway address.
For a LAN, press <ENTER> for none:
> 10. [REDACTED]
Configure IPv6 address WAN interface via DHCP6? (y/n) n
Enter the new WAN IPv6 address. Press <ENTER> for none:
>
Disabling IPv4 DHCPD...
Disabling IPv6 DHCPD...
Do you want to revert to HTTP as the webConfigurator protocol? (y/n) [REDACTED]
```

O. Press enter to continue

```
Lab-Router-A - Console - VMware ESXi
⚠ Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429
Enter the new WAN IPv4 subnet bit count (16 to 32):
> 28

For a WAN, enter the new WAN IPv4 upstream gateway address.
For a LAN, press <ENTER> for none:
> 10. [REDACTED]

Configure IPv6 address WAN interface via DHCP6? (y/n) n

Enter the new WAN IPv6 address. Press <ENTER> for none:
>

Disabling IPv4 DHCPD...
Disabling IPv6 DHCPD...

Do you want to revert to HTTP as the webConfigurator protocol? (y/n) y

Please wait while the changes are saved to WAN...
Reloading filter...
Reloading routing configuration...
DHCPD...
Restarting webConfigurator...

The IPv4 WAN address has been set to 10. [REDACTED]

Press <ENTER> to continue. [REDACTED]
```

P. Select option 2 to set IP for LAN interface, then 2 to select LAN

2

```
Lab-Router-A - Console - VMware ESXi
⚠ Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui#/console/429
VMware Virtual Machine - Netgate Device 157493a2cc54727d8940

*** Welcome to pfSense 2.6.0-RELEASE (amd64) on pfSense ***

WAN (wan)      -> vmx0      -> v4: 10.157.49.3/24
LAN (lan)      -> vmx1.10    -> v4: 192.168.1.1/24

0) Logout (SSH only)          9) pfTop
1) Assign Interfaces          10) Filter Logs
2) Set interface(s) IP address 11) Restart webConfigurator
3) Reset webConfigurator password 12) PHP shell + pfSense tools
4) Reset to factory defaults   13) Update from console
5) Reboot system               14) Enable Secure Shell (sshd)
6) Halt system                 15) Restore recent configuration
7) Ping host                   16) Restart PHP-FPM
8) Shell

Enter an option: 2

Available interfaces:

1 - WAN (vmx0 - static)
2 - LAN (vmx1.10 - static)

Enter the number of the interface you wish to configure: 2
```

- Q. Set LAN interface to 10.0.0.1/24. You do not need an upstream gateway, IPv6 info or DHCP server

```
Lab-Router-A - Console - VMware ESXi
⚠ Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429

1 - WAN (vmx0 - static)
2 - LAN (vmx1.10 - static)

Enter the number of the interface you wish to configure: 2

Enter the new LAN IPv4 address. Press <ENTER> for none:
> 10.0.0.1

Subnet Masks are entered as bit counts (as in CIDR notation) in pfSense.
e.g. 255.255.255.0 = 24
     255.255.0.0      = 16
     255.0.0.0        = 8

Enter the new LAN IPv4 subnet bit count (1 to 32):
> 24

For a WAN, enter the new LAN IPv4 upstream gateway address.
For a LAN, press <ENTER> for none:
>

Enter the new LAN IPv6 address. Press <ENTER> for none:
>

Do you want to enable the DHCP server on LAN? (y/n) n
```

R. Your end result should look like this

```
Lab-Router-A - Console - VMware ESXi
⚠ Not Secure | https://w4-hs6-i1209.eng.vmware.com/ui/#/console/429

Enter the new LAN IPv4 subnet bit count (1 to 32):
> 24

For a WAN, enter the new LAN IPv4 upstream gateway address.
For a LAN, press <ENTER> for none:
>

Enter the new LAN IPv6 address. Press <ENTER> for none:
>

Do you want to enable the DHCP server on LAN? (y/n) n
Disabling IPv4 DHCPD...
Disabling IPv6 DHCPD...

Please wait while the changes are saved to LAN...
Reloading filter...
Reloading routing configuration...
DHCPD...

The IPv4 LAN address has been set to 10.0.0.1/24
You can now access the webConfigurator by opening the following URL in your web
browser:
http://10.0.0.1/

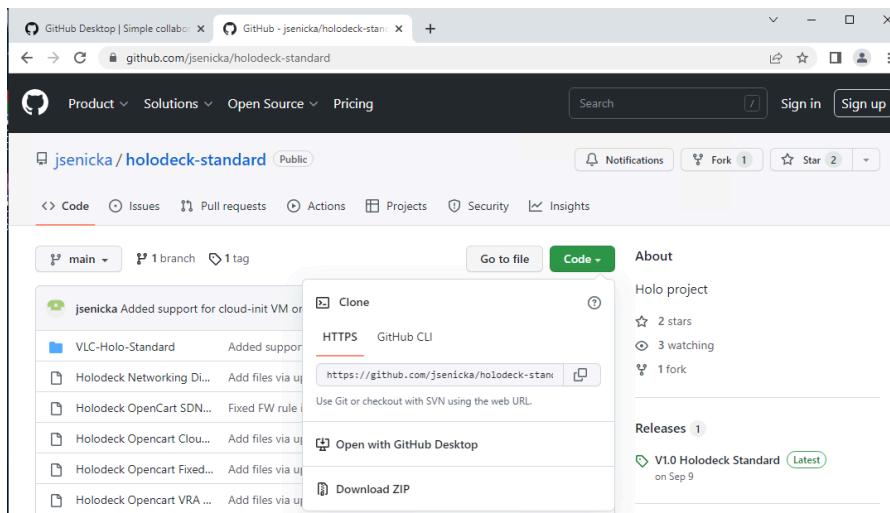
Press <ENTER> to continue.
```

## Task 8: Deploy VCF using VLC

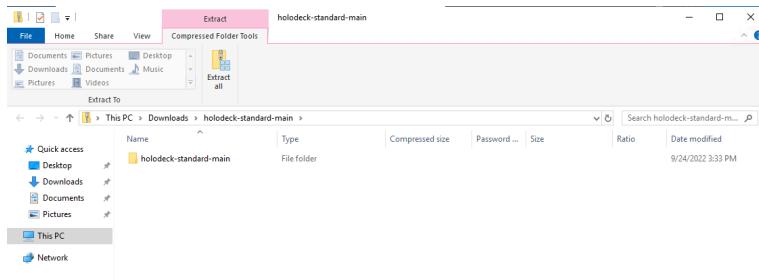
In this task we deploy a nested VCF instance using VCF Lab Constructor.

### [Step 1] Download VLC Holodeck

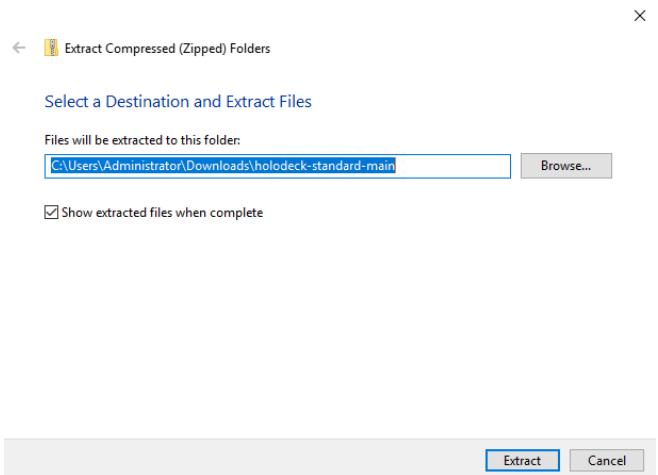
- From the jump host browser, navigate to <https://github.com/jsenicka/holodeck-standard.git>
- Click Code, then Download ZIP



- Click to open the ZIP archive
- Extract to downloads (default)

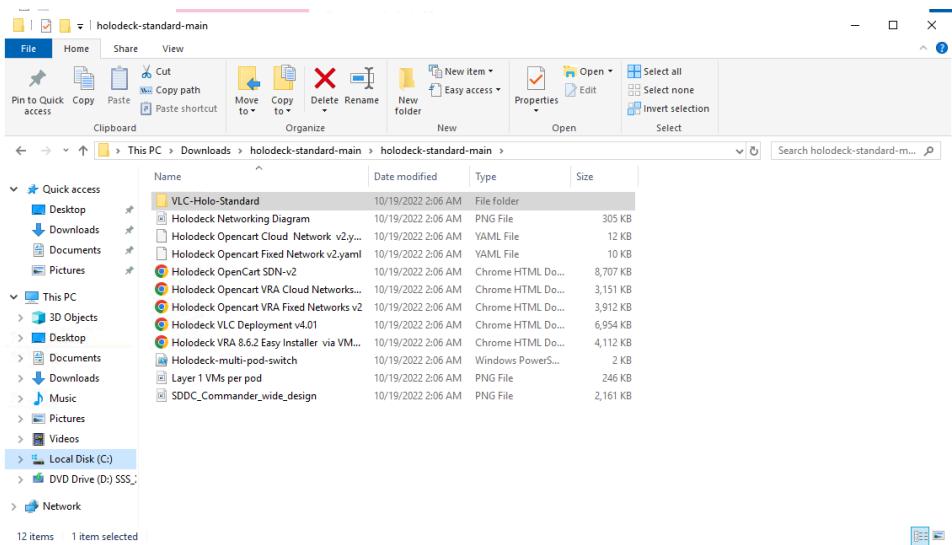


- Click Extract All -> Extract



F. Click into the holodeck-standard-main

G. Drag the VLC-Holo-Standard directory to c:\VLC-Holo-Standard



## [Step 2] Add licensing info to EMS json

- Open c:\VLC-Holo-Standard\ NOLIC-44-TMM-vcf-ems-public.json with your editor
- Within this file you will find and replace <INSERT LIC> with a valid license in 4 locations.
  - esxiLicense
  - nsxtLicense
  - vSAN licenseFile
  - vCenter licenseFile

```

C:\VLC-Holo-Standard\NOLIC-44-TMM-vcf-ems-public.json - Notepad++ [Administrator]
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
NOLIC-44-TMM-vcf-ems-public.json

13     "username": "root",
14     "password": "VMware123!",
15   },
16   "localUserPassword": "VMware123!VMware123!",
17   "vcenterId": "vcenter-1"
18 },
19 "sddcId": "mgmt-domain",
20 "esxLicense": "<INSERT LIC>",
21 "taskName": "workflowconfig/workflowspec-ems.json",
22 "ceipEnabled": false,
23 "fipsEnabled": false,
24 "ntpServers": ["10.0.0.221"],
25 "dnsSpec": {
26   "subdomain": "vcf.sddc.lab",
27   "domain": "vcf.sddc.lab",
28   "nameserver": "10.0.0.221"
29 },
30 "networkSpecs": [
31   {
32     "networkType": "MANAGEMENT",
33     "subnet": "10.0.0.0/24",
34     "gateway": "10.0.0.221",
35     "vlanId": "10",
36     "mtu": "1500",
37     "portGroupKey": "sddc-vds01-mgmt",
38     "standbyUplinks": [],
39     "activeUplinks": [
40       "uplink1",
41       "uplink2"
42     ]
43   }
44 ]

```

C. Save the edited file as c:\VLC-Holo-Standard\ NOLIC-44-TMM-vcf-ems-public.json

### [Step 3] Download Cloud Foundation 4.4.1 Cloud Builder

- A. Access [VMware Customer Connect](#) to download Cloud Foundation 4.4.1 Cloud Builder.  
Note: You will need a valid login to VMware Customer Connect to download cloud builder

The screenshot shows the VMware Customer Connect interface. At the top, there's a dark header bar with the VMware logo, navigation links for 'Products and Accounts', 'Knowledge', and 'More', and user options for 'Register' and 'Login'. Below the header, the URL 'Home / VMware Cloud Foundation 4.4.1' is visible. The main content area has a title 'Download Product' and a summary table with the following details:

Select Version	4.4.1
Documentation	<a href="#">Release Notes</a>
Release Date	2022-05-12
Type	Product Binaries

On the right side, there's a sidebar titled 'Product Resources' with links to 'View My Download History', 'Product Information', and 'Documentation'. Below the summary table is a navigation bar with tabs: 'Product Downloads' (which is selected), 'Drivers & Tools', 'Open Source', 'Custom ISOs', and 'OEM Addons'. A help icon (?) is also present.

Under the 'Product Downloads' tab, there's a table for 'VMware Cloud Builder' with two columns: 'File' and 'Information'. The 'File' column contains the file details: 'File size: 19.82 GB' and 'File type: ova'. The 'Information' column contains a 'Read More' link and a prominent blue 'DOWNLOAD NOW' button.

- B. Place the Cloud Builder OVA in C:\Cloud Builder (or similar directory)

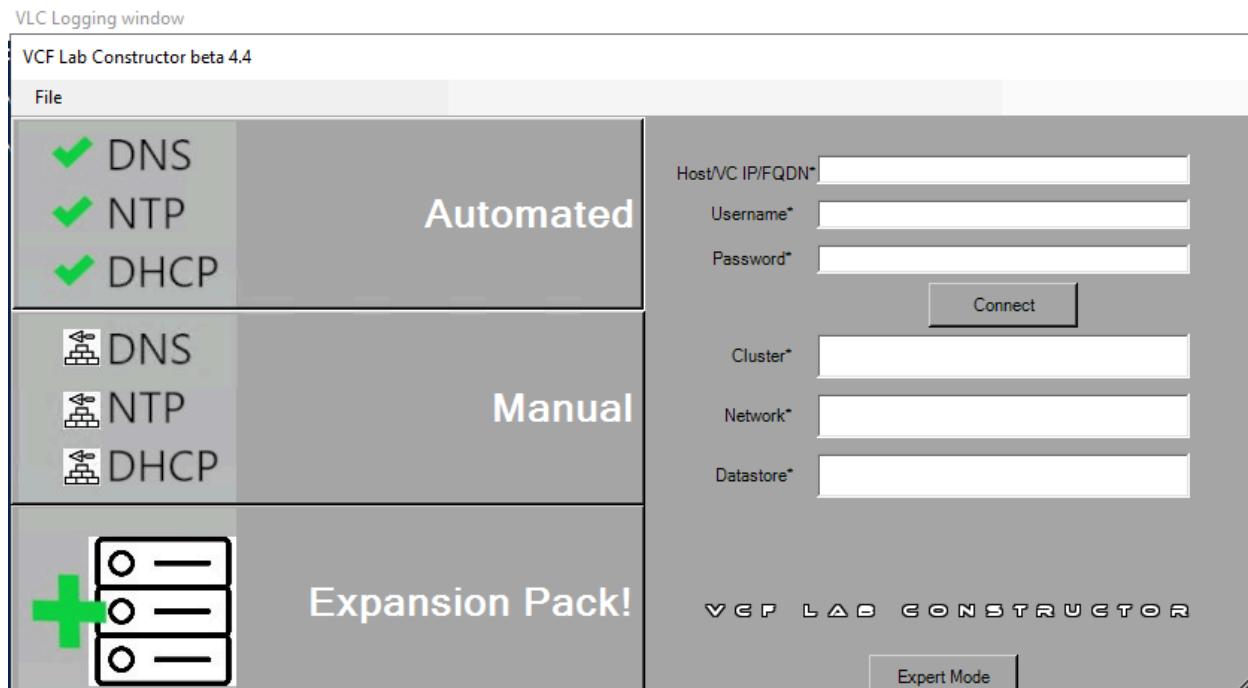
#### [Step 4] Run VLC

- A. Select c:\VLC-Holo-Standard in Windows file manager
- B. While logged in to your jump host as administrator, right click on VLCGuiHH.ps1 and click Run with Powershell (in this example I am using a pre-release version called VLCGuiHH-3.ps1)

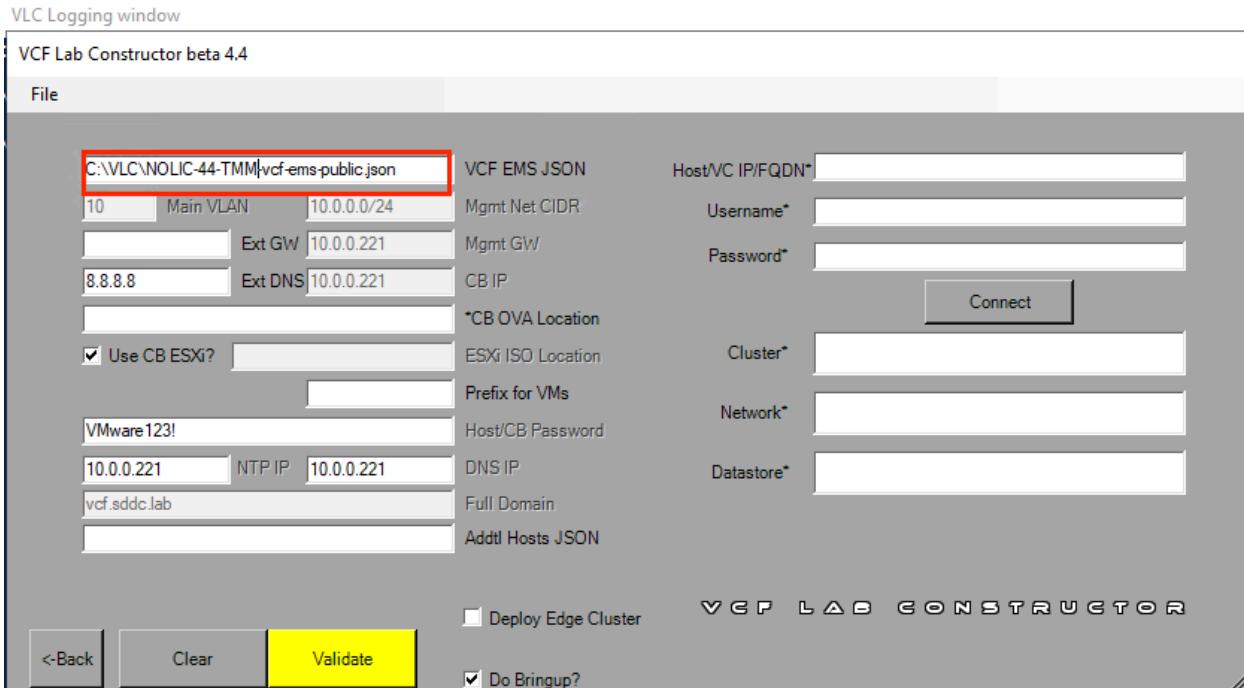
Name	Date modified	Type	Size
automated_api_jsons	5/6/2022 3:43 AM	File folder	
bin	5/6/2022 3:43 AM	File folder	
cb_esx_iso	8/9/2022 12:30 AM	File folder	
conf	5/23/2022 10:04 PM	File folder	
etc	5/6/2022 3:43 AM	File folder	
Logs	8/9/2022 12:49 AM	File folder	
Templates	8/9/2022 12:31 AM	File folder	
add_3_big_hosts	5/26/2022 12:53 PM	JSON File	1 KB
add_3_hosts	2/7/2022 4:05 PM	JSON File	1 KB
add_3_hosts_bulk_commission VSAN	12/25/2020 8:39 AM	JSON File	1 KB
add_4_big_hosts	5/24/2022 4:46 PM	JSON File	1 KB
add_4_big_hosts_ESXi5-8	6/11/2022 2:01 PM	JSON File	1 KB
add_4_hosts_bulk_commission VSAN	5/24/2022 6:45 PM	JSON File	1 KB
LIC-44-TMM-vcf-ems-public	5/6/2022 6:39 AM	JSON File	6 KB
NOLIC-44-TMM-vcf-ems-public	2/7/2022 3:55 PM	JSON File	6 KB
NSXT Edge nodes AMD Ryzen Fix	2/11/2022 5:44 AM	Chrome HTML Do...	1,544 KB
VCF Lab Constructor Install Guide 44-021...	2/11/2022 6:05 AM	Chrome HTML Do...	1,947 KB
<b>VLCGuiHH-2</b>	8/9/2022 12:29 AM	Windows PowerS...	220 KB

**Open****Run with PowerShell**

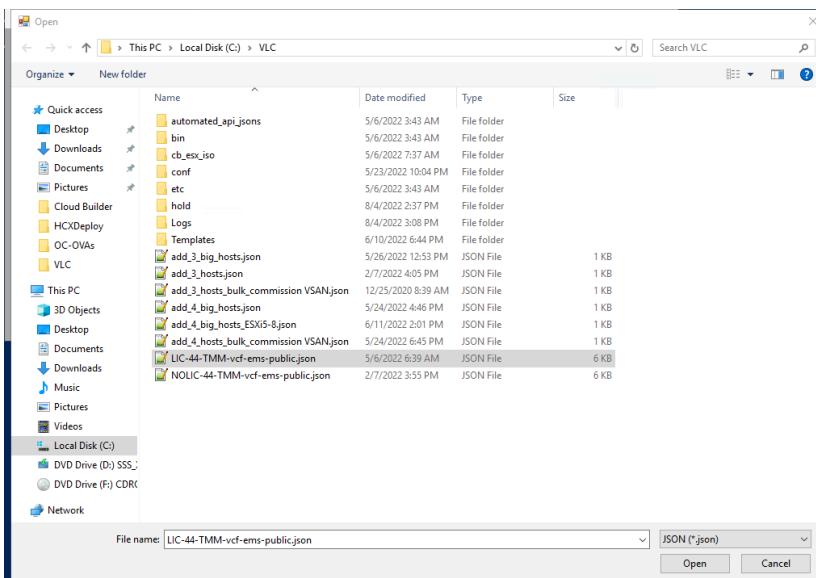
### C. Click Automated on the VLC UI



**D. Click on VCF EMS JSON field**

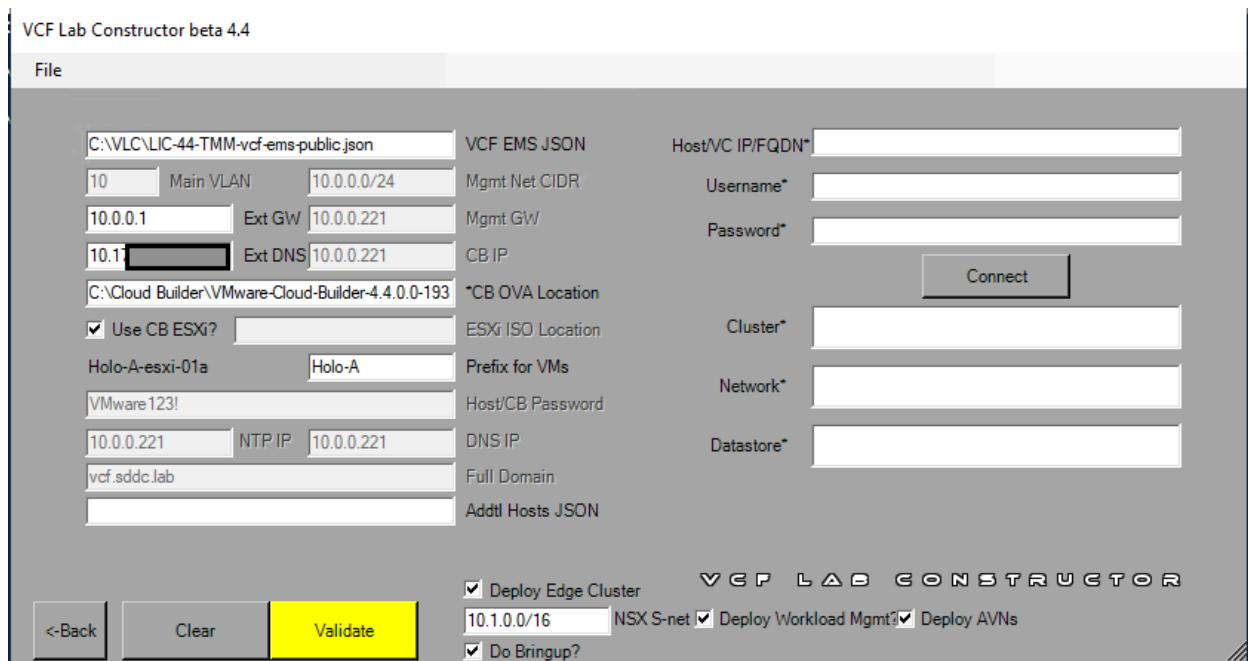


**E. Select the modified EMS json with your license keys, then Open**

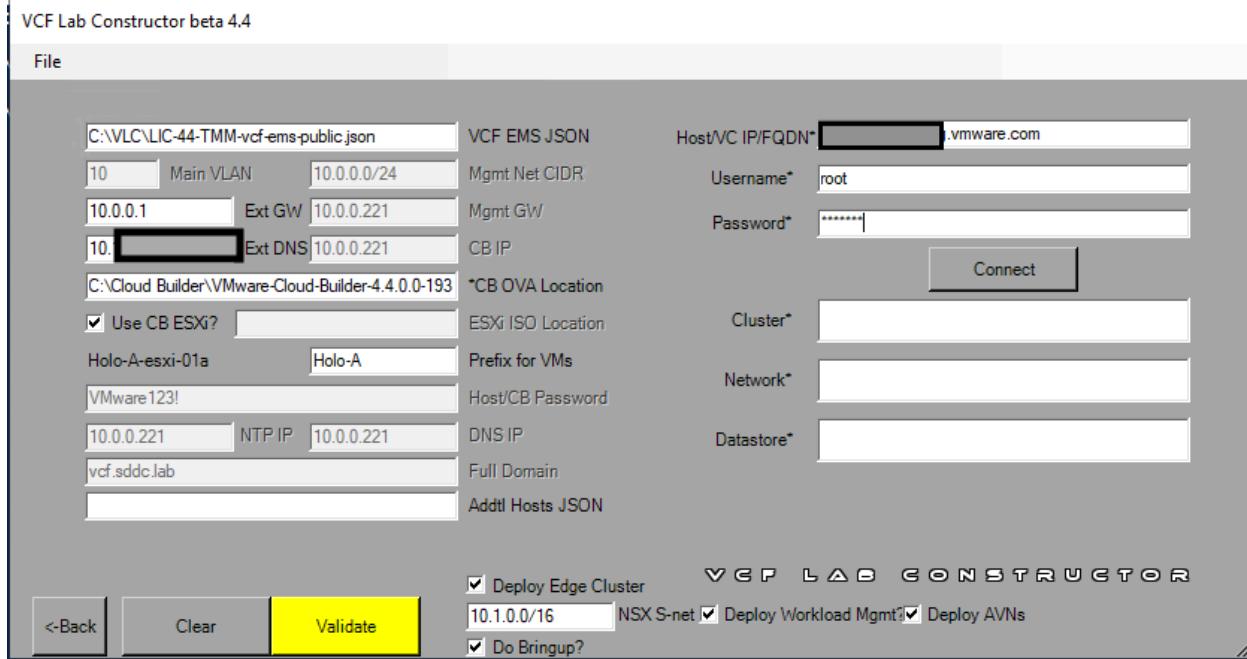


- F. Enter the address of the lab gateway created in previous steps (10.0.0.1) in the Ext GW field**
- G. If your lab requires use of DNS other than 8.8.8.8, enter in Ext DNS**
- H. Leave Mgmt Net CIDR, Mgmt GW and CB IP default**
- I. Leave “Use CB ESXi” checked**

- J. If you plan to deploy more than one lab on this physical host, add a unique name in the Prefix for VMs field. In this example we use Holo-A
- K. Leave Host/CB Password, NTP IP and DNS IP at default
- L. Leave Full Domain at default
- M. Check Deploy Edge Cluster
- N. Leave NSX S-net default at 10.1.0.0/16 (This is used for the Holodeck labs later)
- O. Select Deploy Workload Mgmt (Enables Tanzu/Container workloads later)
- P. Select Deploy AVN (used for vRealize and other infrastructure later)

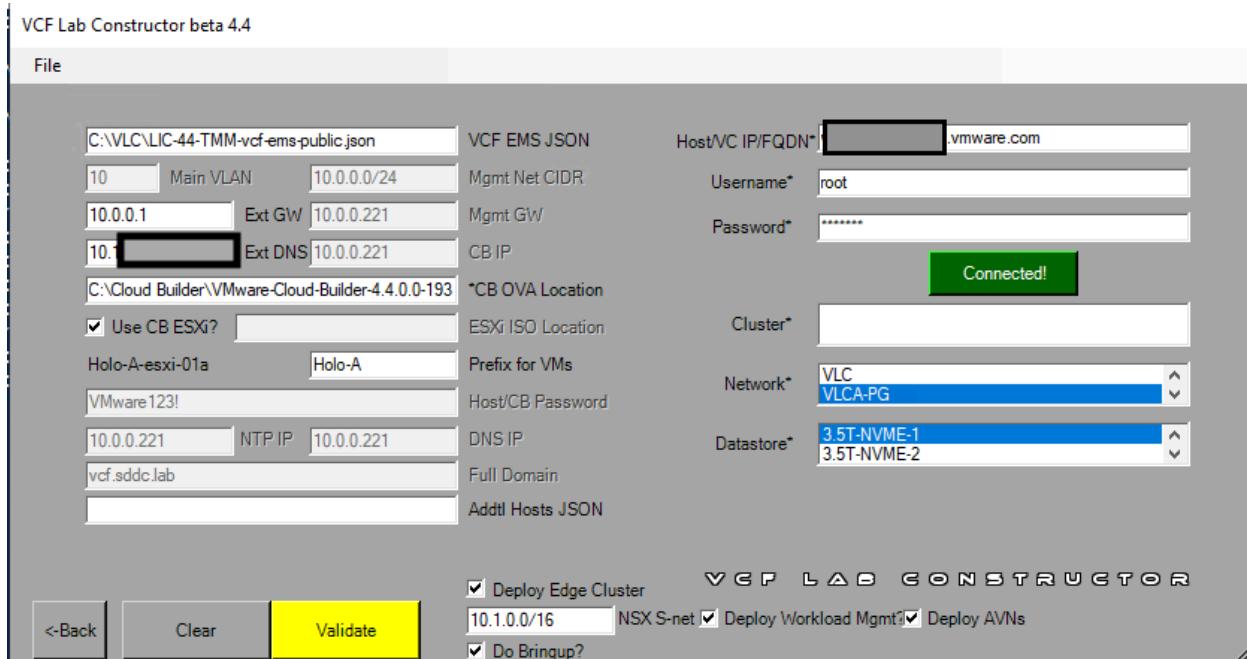


- Q. Enter hostname, username and password for your ESXi host



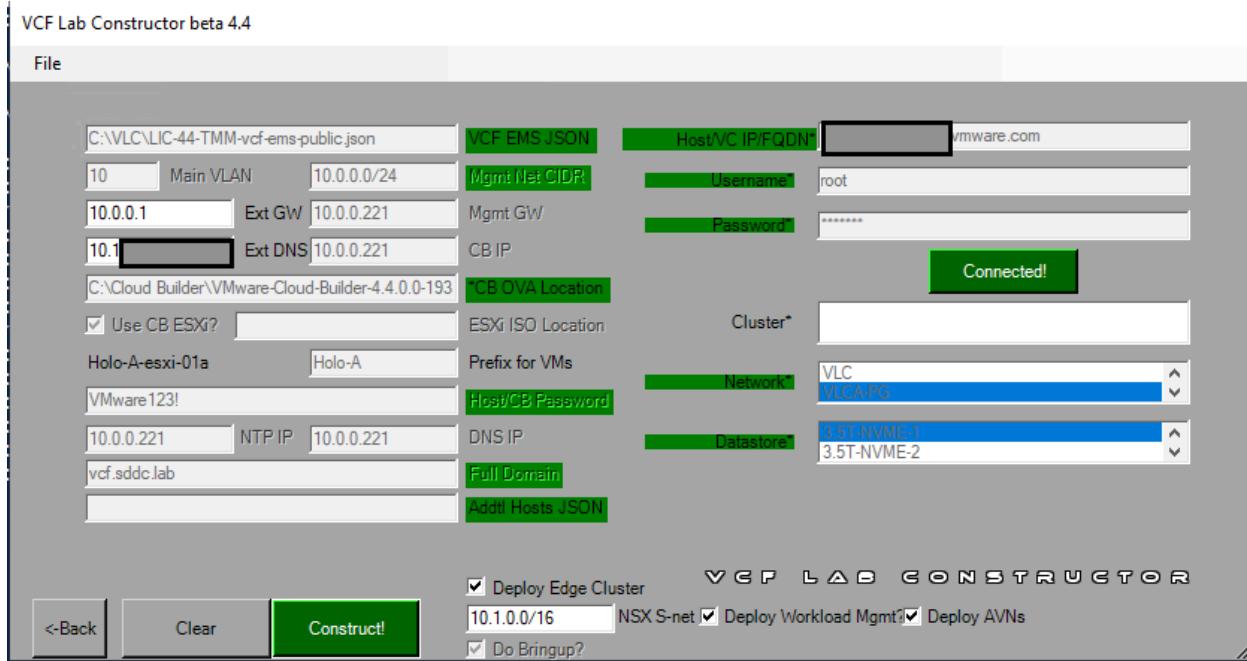
R. Click Connect

S. Select the portgroup and datastore you will use for this deployment. In this example we VLC-A-PG we created earlier



T. Click Validate

U. Your results should look like



V. Click Construct

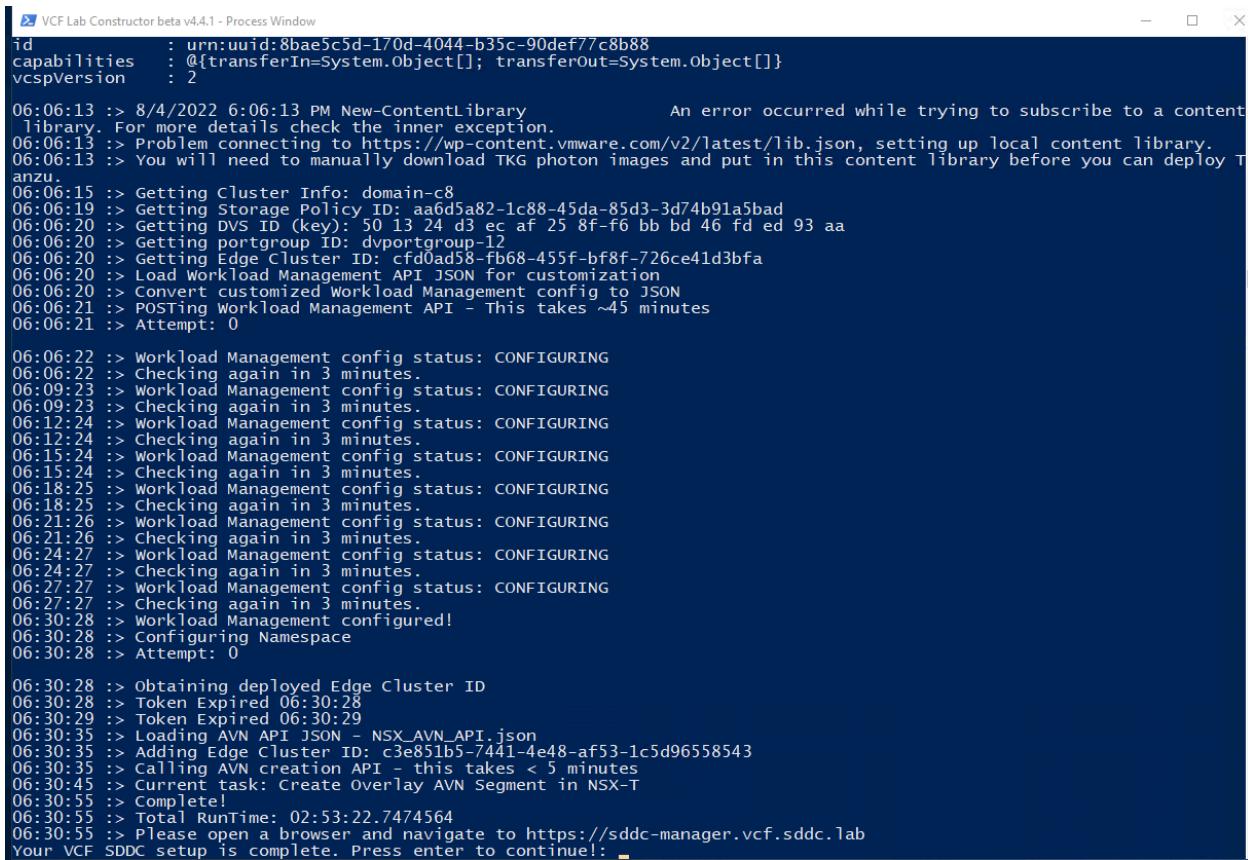
W. VLC will deploy your configuration. The process takes about 3 hours

```

VCF Lab Constructor beta v4.4.1 - Process Window
03:33:05 :> Validating Free Space on Datastore 800GB or more for deployment, 300GB or more for Expansion.
03:33:06 :> Current free space on datastore 3.5T-NVME-1 is 2172GB. Validation Passed.
form is valid: True
03:33:06 :> Validation complete, all checks passed!
03:37:33 :> -----Inputs-----4.4.1--
03:37:33 :> password ca$hc0w
03:37:33 :> dnsServer 10.0.0.221
03:37:33 :> Typeguestdisk Thin
03:37:33 :> userRoot root
03:37:33 :> cBISOLoc c:\Cloud Builder\VMware-Cloud-Builder-4.4.0.0-19312029_ovf10.ova
03:37:33 :> useCBIso True
03:37:33 :> nestedVMPrefix Holo-A-
03:37:33 :> vcfDomainName vcf.sddc.lab
03:37:33 :> nsxSuperNet 10.1.0.0/16
03:37:33 :> deployWldMgmt True
03:37:33 :> masterPassword VMware123!
03:37:33 :> cbName CB-01a
03:37:33 :> deployAVNs True
03:37:33 :> cluster
03:37:33 :> esxhost [REDACTED] vmware.com
03:37:33 :> internalSvcs True
03:37:33 :> ds 3.5T-NVME-1
03:37:33 :> mgmtNetSubnet 10.0.0.0/24
03:37:33 :> mgmtNetVlan 10
03:37:33 :> addHostsJson
03:37:33 :> labDNS 10.[REDACTED]
03:37:33 :> vcfEMSFile C:\VLC\LIC-44-TMM-vcf-ems-public.json
03:37:33 :> buildDps
03:37:33 :> mgmtNetCidr 24
03:37:33 :> mgmtNetGateway 10.0.0.221
03:37:33 :> labGateway 10.0.0.1
03:37:33 :> deployEdgeCluster True
03:37:33 :> vsphereISOLOC
03:37:33 :> ntpServer 10.0.0.221
03:37:33 :> guestOS vmkernel65guest
03:37:33 :> cbIPAddress 10.0.0.221
03:37:33 :> netName VLCA-PG
03:37:33 :> bringupAfterBuild True
03:37:33 :> -----END-Inputs-----
0
1
2
3
03:37:33 :> Importing CloudBuilder OVF
21
Opening OVA source: c:\Cloud Builder\VMware-Cloud-Builder-4.4.0.0-19312029_ovf10.ova
The manifest does not validate
Opening VI target: vi://root@w4-hs6-i1209.eng.vmware.com:443/
Deploying to VI: vi://root@w4-hs6-i1209.eng.vmware.com:443/
disk progress: 55%

```

- X. When complete, VLC will advise the user to click enter then access SDDC Manager via web browser



```

id          : urn:uuid:8bae5c5d-170d-4044-b35c-90def77c8b88
capabilities : @{transferIn=System.Object[]; transferOut=System.Object[]}
vcspVersion : 2

06:06:13 => 8/4/2022 6:06:13 PM New-ContentLibrary           An error occurred while trying to subscribe to a content library. For more details check the inner exception.
06:06:13 => Problem connecting to https://wp-content.vmware.com/v2/latest/lib.json, setting up local content library.
06:06:13 => You will need to manually download TKG photon images and put in this content library before you can deploy Tanzu.
06:06:15 => Getting Cluster Info: domain-c8
06:06:19 => Getting Storage Policy ID: aa6d5a82-1c88-45da-85d3-3d74b91a5bad
06:06:20 => Getting DVS ID (key): 50 13 24 d3 ec af 25 8f-f6 bb bd 46 fd ed 93 aa
06:06:20 => Getting portgroup ID: dvportgroup-12
06:06:20 => Getting Edge Cluster ID: cfd0ad58-fb68-455f-bf8f-726ce41d3bfa
06:06:20 => Load Workload Management API JSON for customization
06:06:20 => Convert customized Workload Management config to JSON
06:06:21 => POSTing Workload Management API - This takes ~45 minutes
06:06:21 => Attempt: 0

06:06:22 => Workload Management config status: CONFIGURING
06:06:22 => Checking again in 3 minutes.
06:09:23 => Workload Management config status: CONFIGURING
06:09:23 => Checking again in 3 minutes.
06:12:24 => Workload Management config status: CONFIGURING
06:12:24 => Checking again in 3 minutes.
06:15:24 => Workload Management config status: CONFIGURING
06:15:24 => Checking again in 3 minutes.
06:18:25 => Workload Management config status: CONFIGURING
06:18:25 => Checking again in 3 minutes.
06:21:26 => Workload Management config status: CONFIGURING
06:21:26 => Checking again in 3 minutes.
06:24:27 => Workload Management config status: CONFIGURING
06:24:27 => Checking again in 3 minutes.
06:27:27 => Workload Management config status: CONFIGURING
06:27:27 => Checking again in 3 minutes.
06:30:28 => Workload Management configured!
06:30:28 => Configuring Namespace
06:30:28 => Attempt: 0

06:30:28 => Obtaining deployed Edge Cluster ID
06:30:28 => Token Expired 06:30:28
06:30:29 => Token Expired 06:30:29
06:30:35 => Loading AVN API JSON - NSX_AVN_API.json
06:30:35 => Adding Edge Cluster ID: c3e851b5-7441-4e48-af53-1c5d96558543
06:30:35 => Calling AVN creation API - this takes < 5 minutes
06:30:45 => Current task: Create Overlay AVN Segment in NSX-T
06:30:55 => Complete!
06:30:55 => Total Runtime: 02:53:22.7474564
06:30:55 => Please open a browser and navigate to https://sddc-manager.vcf.sddc.lab
Your VCF SDDC setup is complete. Press enter to continue!:

```

### [Step 3] Test VLC Deployment

- Open a Chrome browser and click on the SDDC Manager bookmark
- Ignore security warnings (click advanced and proceed to sddc-manager.vcf.sddc.lab)
- Ignore security warnings (click advanced and proceed to vcenter-mgmt.vcf.sddc.lab as SDDC Manager use vCenter SSO for authentication)
- Login as [administrator@vsphere.local](mailto:administrator@vsphere.local) password VMware123!
- Uncheck the VMware CEIP box
- Your result should look like

The screenshot shows the VMware Cloud Foundation SDDC Manager Dashboard. The left sidebar includes sections for Dashboard, Solutions, Inventory (Workload Domains, Hosts), Lifecycle Management, Administration (Network Settings, Storage Settings, Licensing, Users, Repository Settings, Composable Infrastructure, vRealize Suite, Security), and Tasks. The main content area displays the following information:

- 1 Solutions**: Workload Management (1)
- 1 Workload Domains**: Management Domain (1), VI Domain (0)
- Host Type and Usage**: Host Types (Hybrid Host 0, All Flash Host 4), Usage (4 Total)
- CPU, Memory, Storage Usage**:
  - CPU**: 112.61 GHZ Total, 15.72 GHZ Used, 96.88 GHZ Free
  - Memory**: 384 GB Total, 165.92 GB Used, 218.08 GB Free
- Recent tasks**:
  - 8/4/22, 6:30 PM: Deploying overlay AVNs for default cluster of management domain (Succeeded)
  - 8/4/22, 5:27 PM: Adding edge cluster EC-01 (Succeeded)

## Task 9: Create Holodeck Opencart Lab Infrastructure

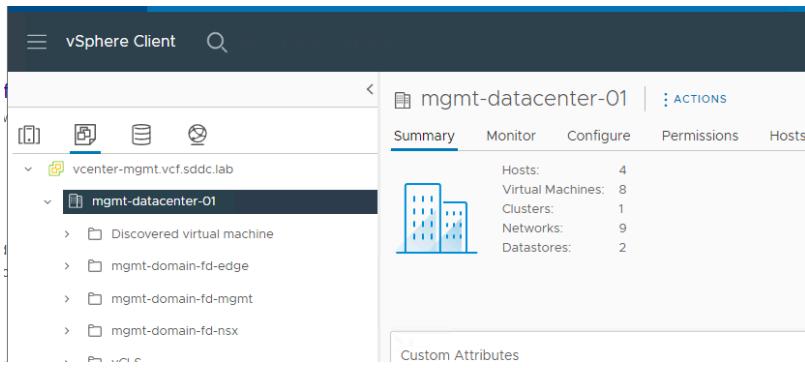
In this task we will configure a set of virtual machines and virtual machine templates that are utilized in the Holodeck SDN and VRA lab modules. This step assumes you have downloaded the complete VLC Holodeck package from <https://github.com/jsenicka/holodeck-standard.git> unzipped to c:\VLC-Holo-Standard on your jump host.

### [Step 1] Download Ubuntu 18.04 Cloud Image

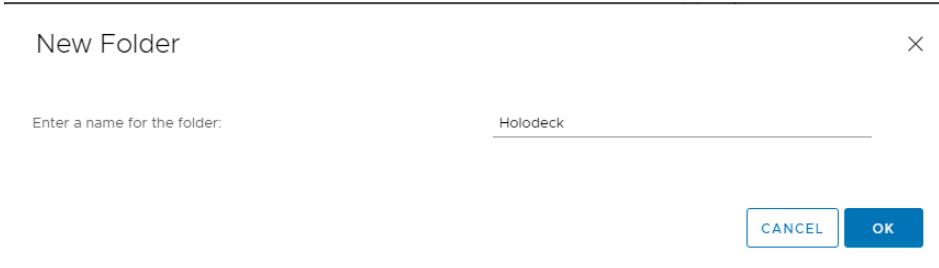
- Open a browser and download the [Ubuntu 18.04 LTS Daily Build](#)
- Copy this file to c:\VLC-Holodeck-Standard\Holo-Build\bionic.ova

### [Step 2] Create VM and Template folder

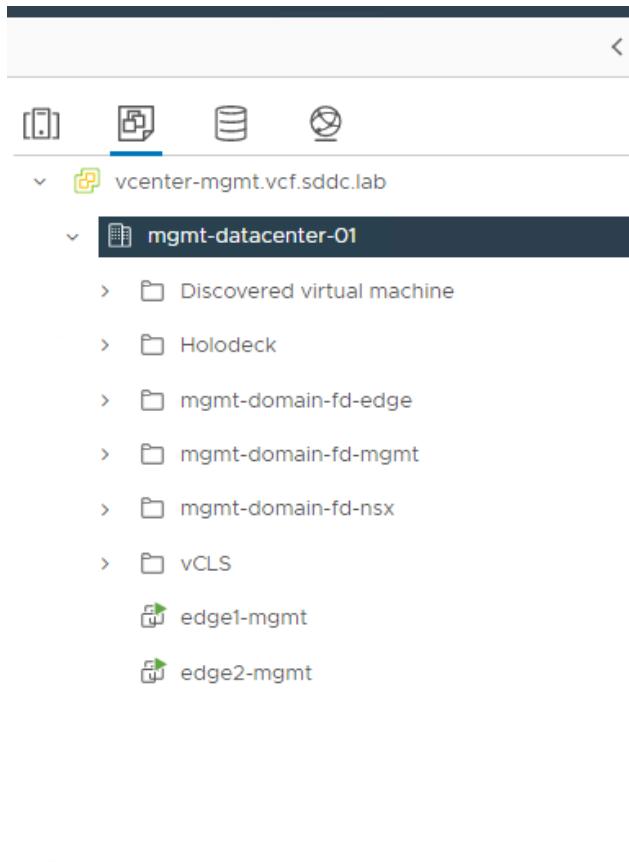
- Click on the Holodeck-> Management vCenter Server tab in the browser
- Click on Advanced to avoid certificate warning if needed
- Login user: **administrator@vsphere.local** password: **VMware123!**
- From the top left menu, open Inventory, then the Hosts and Templates view
- Open vcenter-mgmt and mgmt-datacenter-01. Click on mgmt-datacenter-01



- F. Right click on mgmt-datacenter-01
- G. Select New Folder, then New VM and Template Folder
- H. Name the folder Holodeck, then ok

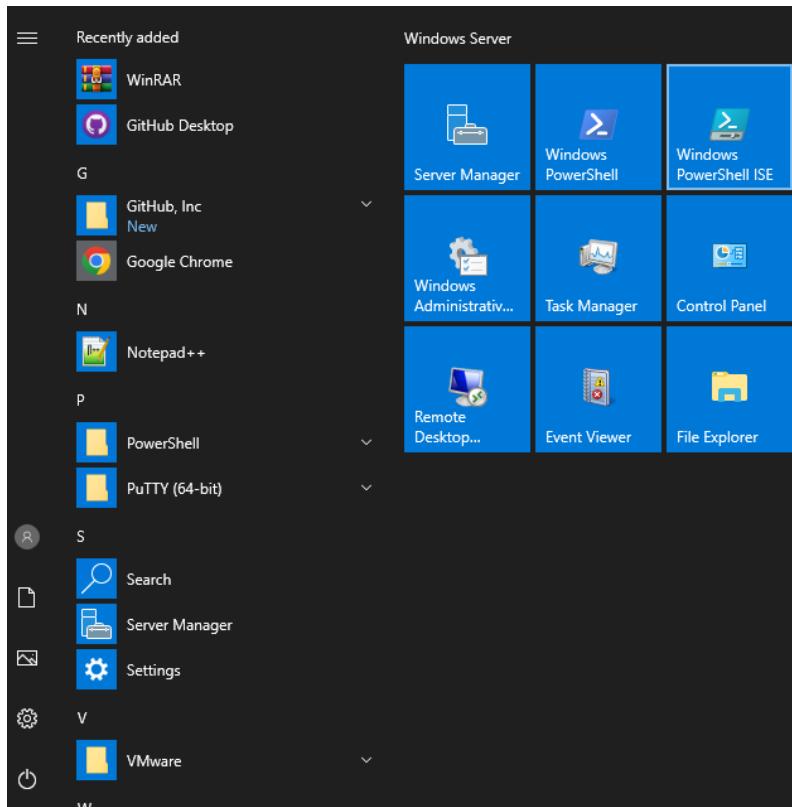


- I. Your result should look like this



#### [Step 4] Run Holo-Build scripts

- A. Open Windows File Manager and navigate to c:\VLC-Holo-Standard\Holo-Build
- B. Verify you have copied the Ubuntu 18.04 *Bionic Beaver LTS* latest daily build to c:\VLC-Holodeck-Standard\Holo-Build\bionic.ova
- C. Click on the Windows icon and launch Powershell ISE



- D. In the command window, type cd c:\VLC-Holo-Standard\Holo-Build
- E. Type dir

```
PS C:\Users\Administrator> cd C:\VLC-Holo-Standard\Holo-Build
PS C:\VLC-Holo-Standard\Holo-Build> dir

Directory: C:\VLC-Holo-Standard\Holo-Build

Mode                LastWriteTime         Length Name
----                <-----              ----- 
-a---     8/14/2022  11:27 AM           372756480 bionic.ova
-a---     8/14/2022  5:35 PM            539 holo-generate-template.json
-a---     8/15/2022  8:20 AM            2671 holo-generate-v1.json
-a---     8/14/2022  5:35 PM            7335 Holo-Template.yaml
-a---     8/15/2022  8:20 AM           3289 Install-CloudInitVM.ps1
-a---     8/15/2022  9:47 PM            2476 main.ps1
-a---     8/14/2022  5:35 PM            7952 OC-Apache.yaml
-a---     8/15/2022  9:31 AM           1367 OC-Generate-Prep-Store.ps1
-a---     8/14/2022  5:35 PM            502 OC-Generate-Prep.ps1
-a---     8/14/2022  5:35 PM            660 OC-MySQL.yaml
-a---     8/14/2022  5:35 PM           1077 Readme.txt
-a---     8/14/2022  6:38 PM            2265 Wait-Job.ps1

PS C:\VLC-Holo-Standard\Holo-Build> |
```

- F. Type \OC-Generate-Prep.ps1

```

PS C:\Users\Administrator> cd C:\VLC-Holo-Standard\Holo-Build
PS C:\VLC-Holo-Standard\Holo-Build> dir

Directory: C:\VLC-Holo-Standard\Holo-Build

Mode                LastWriteTime         Length Name
----                <-----              ----- 
-a---    8/14/2022  11:27 AM           372756480 bionic.ova
-a---    8/14/2022  5:35 PM            539 holo-generate-template.json
-a---    8/15/2022  8:20 AM            2671 holo-generate-v1.json
-a---    8/14/2022  5:35 PM            7335 Holo-Template.yaml
-a---    8/15/2022  8:20 AM            3289 Install-CloudInitVM.ps1
-a---    8/15/2022  9:47 PM            2476 main.ps1
-a---    8/14/2022  5:35 PM            7952 OC-Apache.yaml
-a---    8/15/2022  9:31 AM            1367 OC-Generate-Prep-Store.ps1
-a---    8/14/2022  5:35 PM            502 OC-Generate-Prep.ps1
-a---    8/14/2022  5:35 PM            6605 OC-MYSQL.yaml
-a---    8/14/2022  5:35 PM            1077 Readme.txt
-a---    8/14/2022  6:38 PM            2265 Wait-Job.ps1

PS C:\VLC-Holo-Standard\Holo-Build> .\OC-Generate-Prep.ps1

```

G. Your output should look like this

```

PS C:\VLC-Holo-Standard\Holo-Build> .\OC-Generate-Prep.ps1
WARNING: Please consider joining the VMware Customer Experience Improvement Program, so you can help us make VMware better.
Set-PowerCLIConfiguration -Scope User -ParticipateInCEIP $true

VMware's Customer Experience Improvement Program ("CEIP") provides VMware with information that enables VMware to improve its products and services. This information does not personally identify any individual.

For more details: type "help about_ceip" to see the related help article.

To disable this warning and set your preference use the following command and restart PowerShell:
Set-PowerCLIConfiguration -Scope User -ParticipateInCEIP $true or $false.

Name          Port   User
----          ----
vccenter-mgmt.vcf.sddc.lab     443   VSphere.LOCAL\Administrator

Host      : OC-MYSQL
User     : ocuser
Password : VMware123!
File     :

Host      : OC-Apache-A
User     : ocuser
Password : VMware123!
File     :

Host      : OC-Apache-B
User     : ocuser
Password : VMware123!
File     :

Host      : OC-Apache-C
User     : ocuser
Password : VMware123!
File     :

Host      : Holo-Template
User     : ocuser
Password : VMware123!
File     :

PS C:\VLC-Holo-Standard\Holo-Build>

```

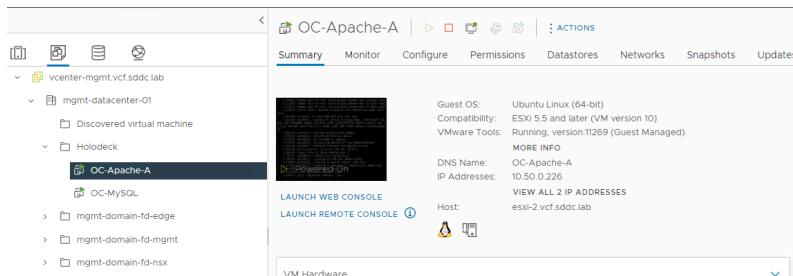
H. Type \main.ps1 and click enter

```
PS C:\VLC-Holo-Standard\Holo-Build> .\main.ps1
```

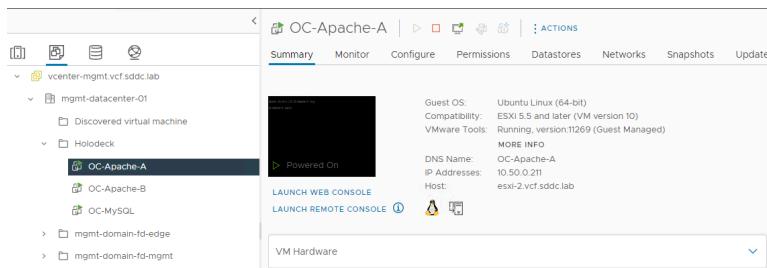
- I. The script will begin deploying OC-MySQL, followed by OC-Apache-A, OC-Apache-B, OC-Apache-C and Holo-Template

```
PS C:\VLC-Holo-Standard\Holo-Build> .\main.ps1
Deploying Set 1
Instance OC-MySQL
```

- J. The script takes approximately 20 minutes to complete  
 K. Monitor the script progress by locating the VM's being deployed in the Holodeck folder.  
 L. Each VM goes through 2 phases during cloud init.  
 • The first phase has a DHCP address assigned on the 172.16.254.0/24 network. To simplify configuration, we are making use of an existing DHCP network configured by VLC for the ESXi Host TEP network.



- As the cloud-init progresses, each VM will switch to a fixed address in the 10.0.0.0/24 Management subnet, with IP's between 10.0.0.60 and 10.0.0.79



## M. Monitor progress in the Powershell ISE window

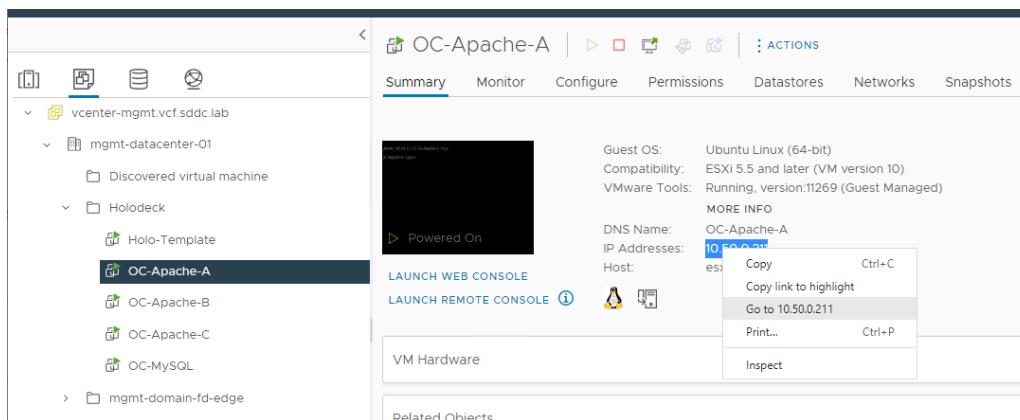
```
PS C:\VLC-Holo-Standard\Holo-Build> .\main.ps1
Deploying Set 1
Instance OC-MySQL Completed
Instance OC-Apache-A Completed
Instance OC-Apache-B
```

```
PS C:\VLC-Holo-Standard\Holo-Build> .\main.ps1
Deploying Set 1
  Instance OC-MySQL    Completed
  Instance OC-Apache-A  Completed
  Instance OC-Apache-B  Completed
  Instance OC-Apache-C  Completed
  Instance Holo-Template Completed
Set 1 completed

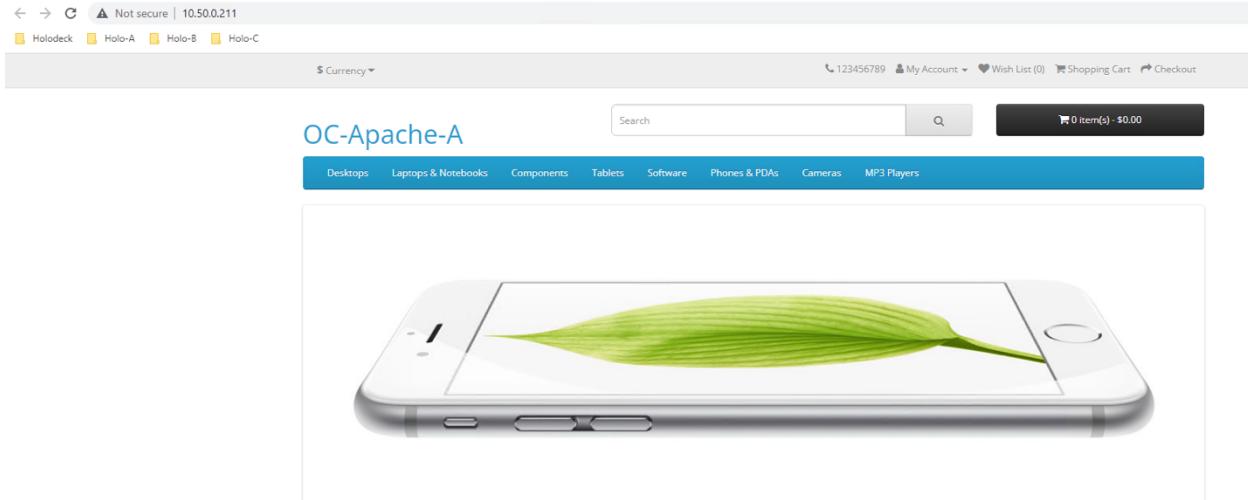
PS C:\VLC-Holo-Standard\Holo-Build>
```

### [Step 5] Test Holo Infrastructure

- From the vSphere client VM and template view, Click on OC-Apache-A
- Notice the IP address 10.50.0.211
- Double click on the IP address, right click and select go to 10.50.0.211



- Your result should be



### [Step 6a] Convert and shutdown Holo Infrastructure VM's

This final step preps each VM for later use in Holodeck SDN and VRA labs

- From the vSphere client VM and template view, Click on OC-Apache-A
- Click Launch web console
- Login as **ocuser**, password **VMware123!**
- Change directory to /etc/holodeck
- List directory contents
- Run the script .\sdn-lab-prepare.sh

```
ocuser@OC-Apache-A:~$ cd /etc/holodeck
ocuser@OC-Apache-A:/etc/holodeck$ ls
90-sdn-lab.yaml  sdn-lab-prepare.sh
ocuser@OC-Apache-A:/etc/holodeck$ ./sdn-lab-prepare.sh
```

- Repeat step 6 A-F for OC-MySQL, OC-Apache-B and OC-Apache-C

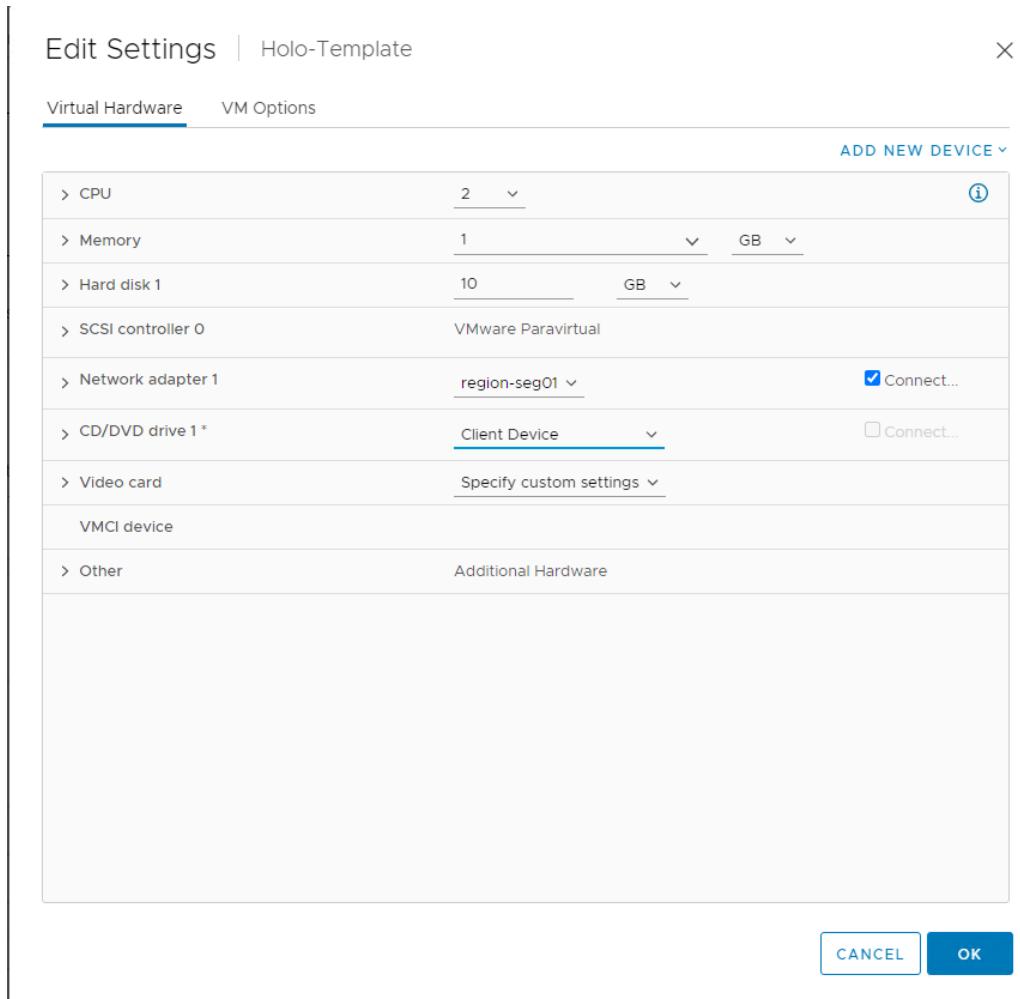
### [Step 6b] Convert and shutdown Holo-Template

- From the vSphere client VM and template view, Click on Holo-Template
- Click Launch web console
- Login as **ocuser**, password **VMware123!**
- Change directory to /etc/holodeck
- List directory contents
- Run the script .\ubuntu-prepare.sh
- The host will update packages, and then shutdown

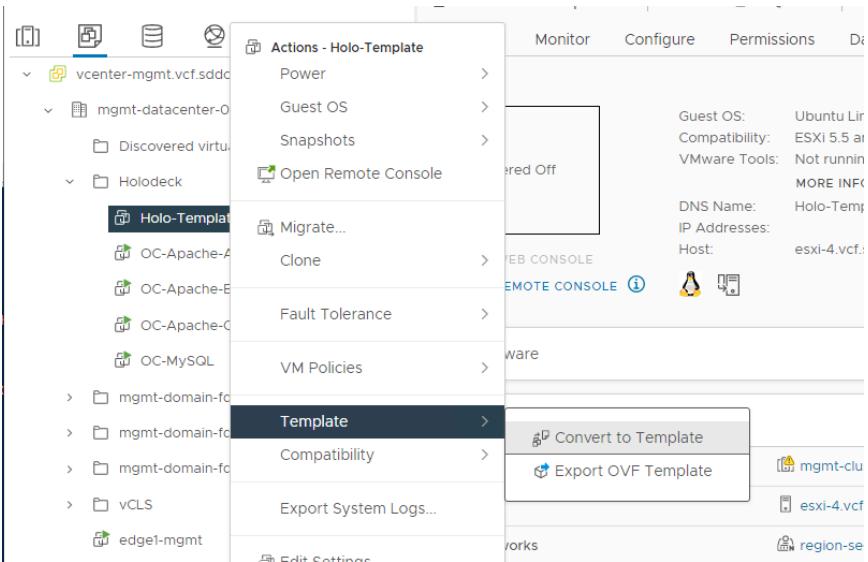
```
ocuser@Holo-Template:~$ cd /etc/holodeck
ocuser@Holo-Template:/etc/holodeck$ ls
ubuntu-prepare.sh
ocuser@Holo-Template:/etc/holodeck$ ls -al
total 12
drwxr-xr-x  2 root root 4096 Aug 15 20:52 .
drwxr-xr-x  96 root root 4096 Aug 15 20:53 ..
-rwxr--r--  1 root root 2567 Aug 15 20:52 ubuntu-prepare.sh
ocuser@Holo-Template:/etc/holodeck$ sudo ./ubuntu-prepare.sh
```

H. On the vSphere client, right click on Holo-Template, -> Edit Settings

I. Change CD/DVD to Client Device then click OK



J. On the vSphere client, right click on Holo-Template, -> Template -> Convert to Template



K. Click yes to confirm



## Task 10: Deploy additional hosts using VLC Expansion Pack

In this task we deploy additional nested ESXi hosts using the VCF Lab Constructor Expansion pack mode. The Holodeck-Standard package includes json files to add 3 or 4 hosts, with different host sizing and host numbering per file. The json files with “\_big\_” in filename generate ESXi hosts large enough for typical application lab work. The json files without “\_big\_” create smaller hosts suitable for use in VCF scaling lab exercises. The files also provide a choice between hosts numbered 10 and up (esxi-10, esxi-11, etc) and hosts numbered 5-8.

## [Step 1] Validate add-hosts json

- Open c:\VLC-Holo-Standard\ add\_4\_hosts\_ESXi5-8.json with your editor
- This file will generate hosts 5-8 with minimum CPU, Memory and Disk needed for VCF Scale operations labs (Screen shot cropped to just show ESXi-5)

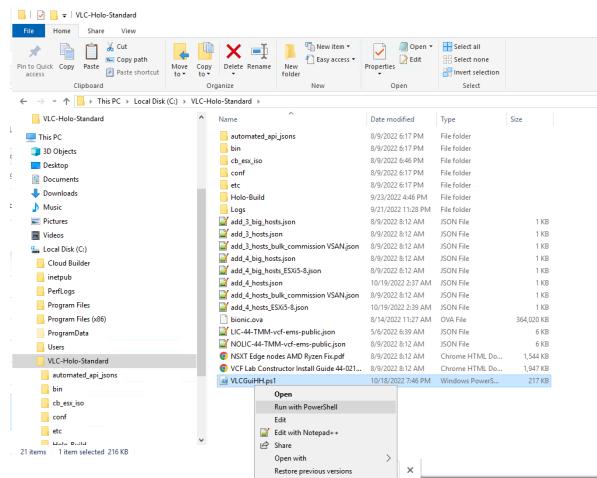
```

1  {
2   "genVM": [
3     {
4       "name": "esxi-5",
5       "cpus": 4,
6       "mem": 24,
7       "disks": "16,30,300",
8       "mgmtip": "10.0.0.105",
9       "subnetmask": "255.255.255.0",
10      "ipgw": "10.0.0.221"
11    }
12  ]

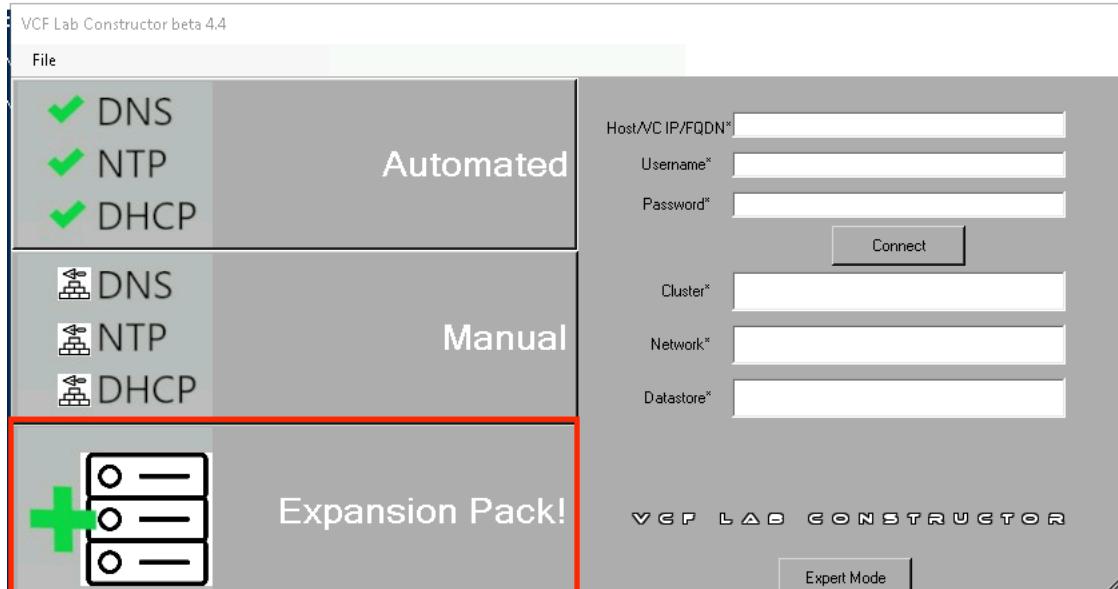
```

## [Step 2] Add nested hosts with VCF Lab Constructor

- Right click c:\VLC-Holo-Standard\ VLGGuiHH.ps1 and run with PowerShell

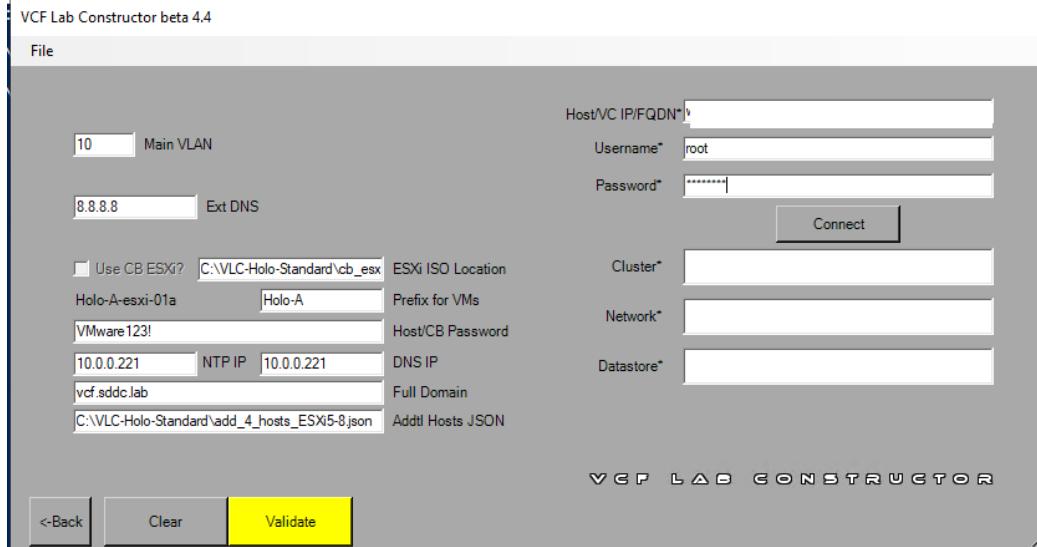


- Select Expansion Pack

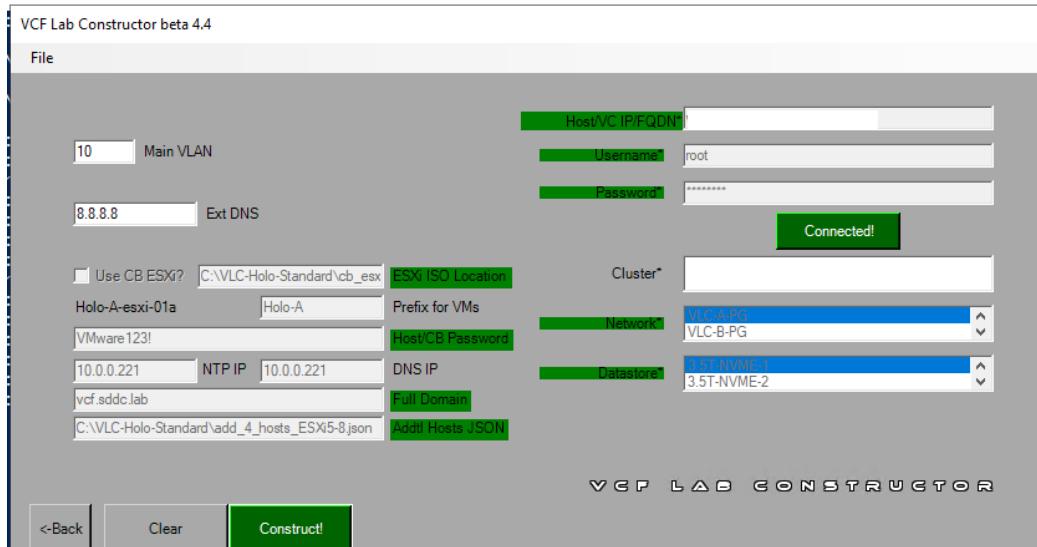


C. Fill in appropriate info for this deployment

- Main VLAN 10
- Enter ESXi ISO location on local host or network share. (Usually where you initially ran VLC from)
- Enter VM prefix needed
- Enter VMware123! For Cloud Builder password
- Add in Cloud Builder IP for NTP and DNS (10.0.0.221 in default builds)
- Add vcf.sddc.lab for domain
- Add json file location for hosts being added. This will be on local VLC directory or network share
- Add hostname of ESXi host or vCenter Server instance where you are adding additional nested ESXi hosts
- Add host username and password



- D. Click Connect
- E. Select appropriate cluster, network and datastore (this example is using a stand alone ESXi host versus a single node cluster)
- F. Click Validate



- G. Click Construct
- H. Monitor progress in the Powershell process window

```
VCF Lab Constructor beta v4.1 - Process Window
11:57:00 > useBios False
11:57:00 > dnsServer 10.0.0.221
11:57:00 > cbName CBLab
11:57:00 > labpassword H010123!
11:57:00 > labgateway 10
11:57:00 > mgmtNetVlan 10
11:57:00 > cbIpAddress
11:57:00 > mgmtNetCidr False
11:57:00 > cluster
11:57:00 > hostProfile
11:57:00 > mgmtNetGateway
11:57:00 > addHostsJson C:\VLC-Holo-Standard\add_4_hosts_ESXi5-8.json
11:57:00 > exshost vmware.com
11:57:00 > masterPassword VMware123!
11:57:00 > netname VLC-A-PG
11:57:00 > ds 3.5T-NVME-1
11:57:00 > deployWlDmgmt False
11:57:00 > vsphereISOloc C:\VLC-Holo-Standard\cb_esx_iso\VMvisor-Installer-7.0U3c-19193900.x86_64.iso
11:57:00 > deployAVNs False
11:57:00 > deployEsxCluster False
11:57:00 > vcfdomainName vcf.sddc.lab
11:57:00 > ntpserver 10.0.0.221
11:57:00 > mgmtNetSubnet 10.1.0.0/16
11:57:00 > nasxsuperNet 10.1.0.0/16
11:57:00 -----END-Inputs-----
11:57:02 > Extracting 'C:\VLC-Holo-Standard\cb_esx_iso\VMvisor-Installer-7.0U3c-19193900.x86_64.iso' to 'C:\VLC-Holo-Standard\Temp-202210111020\iso' ...
11:57:05 > Copy complete
11:57:05 > Starting creation of 4 found in JSON and template.
11:57:06 > Creating host esxi-1
11:57:06 > Creating host esxi-6
11:57:11 > Creating host esxi-7
11:57:18 > Creating host esxi-8
[KCF Lab Constructor Host Creation Start Time: 11:57]
MAC address is 01-00-0c-29-bb-ae-8e
11:58 esxi-8 status:
MAC address is 01-00-0c-29-e4-48-72
11:58 esxi-7 status:
MAC address is 01-00-0c-29-82-c5-d8
11:58 esxi-8 status:
Waiting to STOP!
```

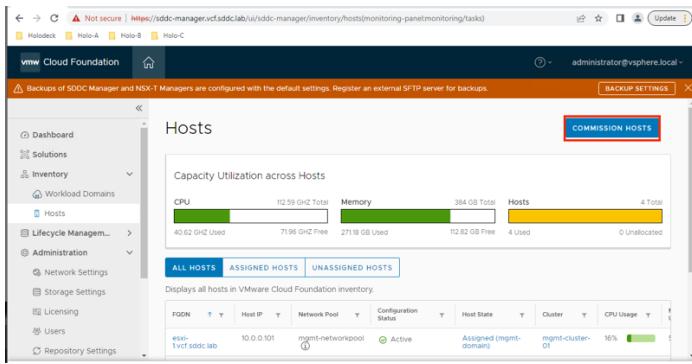
## I. Completion status

```
11:58:31 > Starting up esxi-5
11:58:31 > Starting up esxi-6
11:58:32 > Starting up esxi-7
11:58:32 > Starting up esxi-8
[KCF Lab Constructor Host Startup Start Time: 11:58]
11:58 esxi-8 status:
11:58 esxi-7 status:
11:58 esxi-6 status:
Waiting for host to install and reboot. .....
11:58 esxi-5 status:
11:58 esxi-4 status:
Waiting for host to install and reboot.
12:06:14 > Nested Hosts Online Time: 00:09:14.1674242
12:06:14 > Waiting 1 min for nested hosts to settle
12:07:14 > Total Time for Imaging: 00:10:14.1776023
12:07:14 > Total OnTime: 00:10:14.1868399
Your host(s) are ready.:
```

## [Step 3] Commission hosts into VCF

- Log in to SDDC Manager [administrator@vsphere.local](mailto:administrator@vsphere.local) password VMware123!
- Select Inventory-> Hosts

## C. Select Commission hosts



- D. Select All in the checklist and proceed (the VLC deployed environment meets all of the commissioning criteria)

**Checklist**

Commissioning a host adds it to the VMware Cloud Foundation inventory. The host you want to commission must meet the checklist criterion below.

Select All

Host for vSAN workload domain should be vSAN compliant and certified per the VMware Hardware Compatibility Guide. BIOS, HBA, SSD, HDD, etc. must match the VMware Hardware Compatibility Guide.

Host has a standard switch with two NIC ports with a minimum 10 Gbps speed.

Host has the drivers and firmware versions specified in the VMware Compatibility Guide.

Host has ESXi installed on it. The host must be preinstalled with supported versions (7.0.3-19193900).

Host is configured with DNS server for forward and reverse lookup and FQDN.

Hostname should be same as the FQDN.

Management IP is configured to first NIC port.

Ensure that the host has a standard switch and the default uplinks with 10Gb speed are configured starting with traditional numbering (e.g., vmnic0) and increasing sequentially.

Host hardware health status is healthy without any errors.

All disk partitions on HDD / SSD are deleted.

Ensure required network pool is created and available before host commissioning.

Ensure hosts to be used for vSAN workload domain are associated with vSAN enabled network pool.

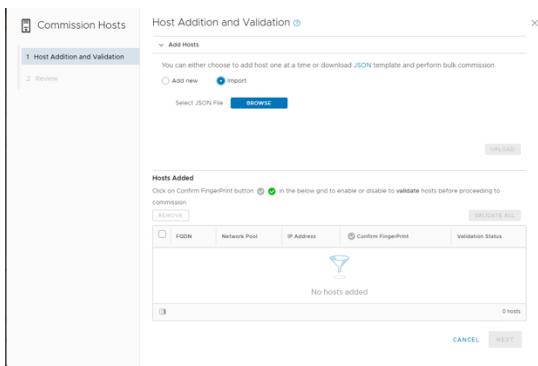
Ensure hosts to be used for NFS workload domain are associated with NFS enabled network pool.

Ensure hosts to be used for VMFS or FC workload domain are associated with NFS or VMOTION only enabled network pool.

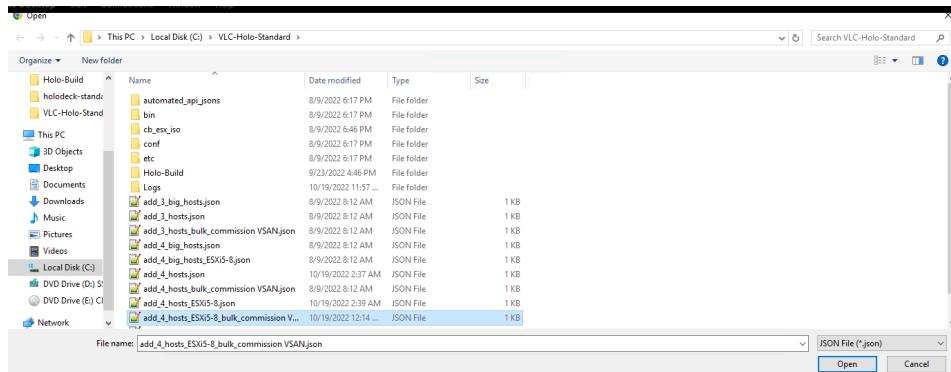
Ensure hosts to be used for vVol FC workload domain are associated with NFS or VMOTION only.

**CANCEL PROCEED**

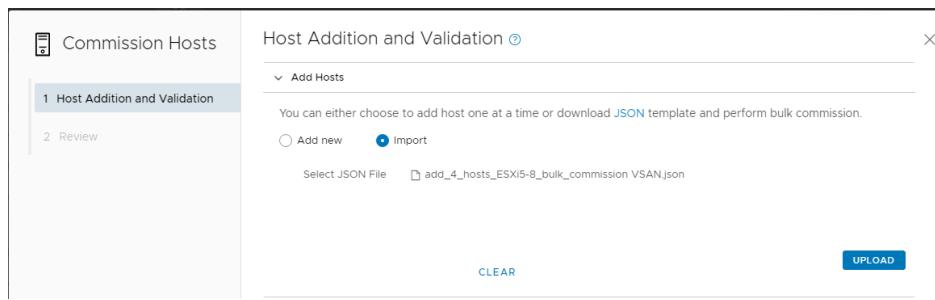
- E. Select Import then click Browse



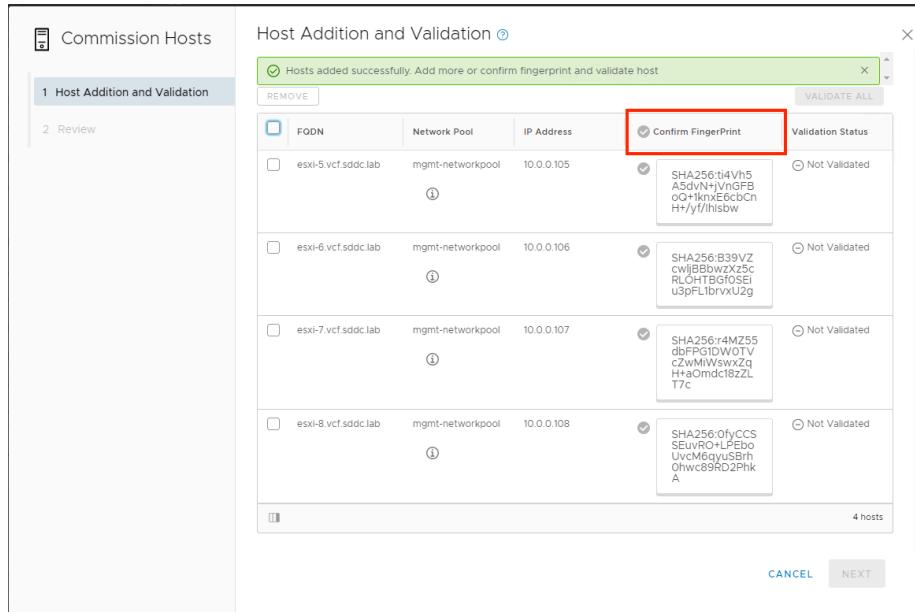
- F. Select the bulk\_commission json corresponding to the hosts you generated. In our case, this is c:\VLC-Holo-Standard\add\_4\_hosts\_ESXi5-8\_bulk\_commission VSAN.json then click Open



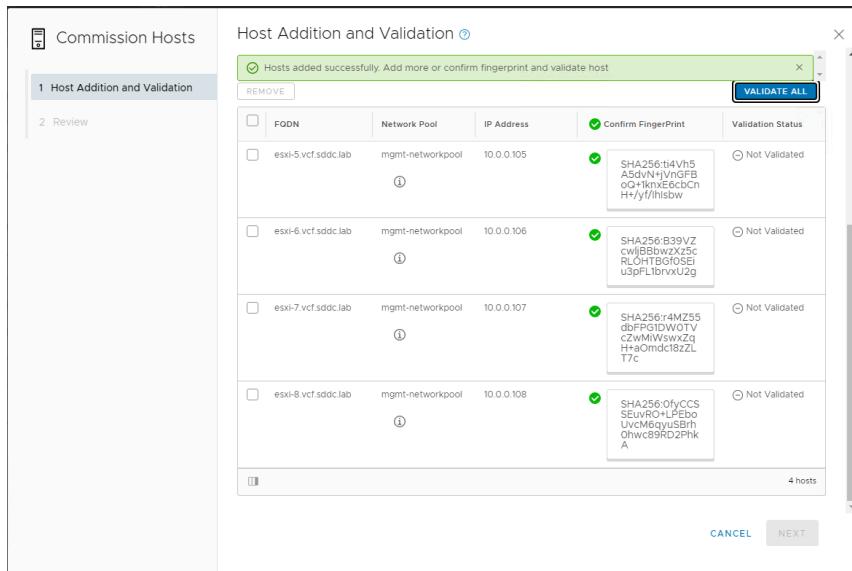
## G. Click Upload



## H. Click the Confirm Fingerprint header to accept all thumbprints

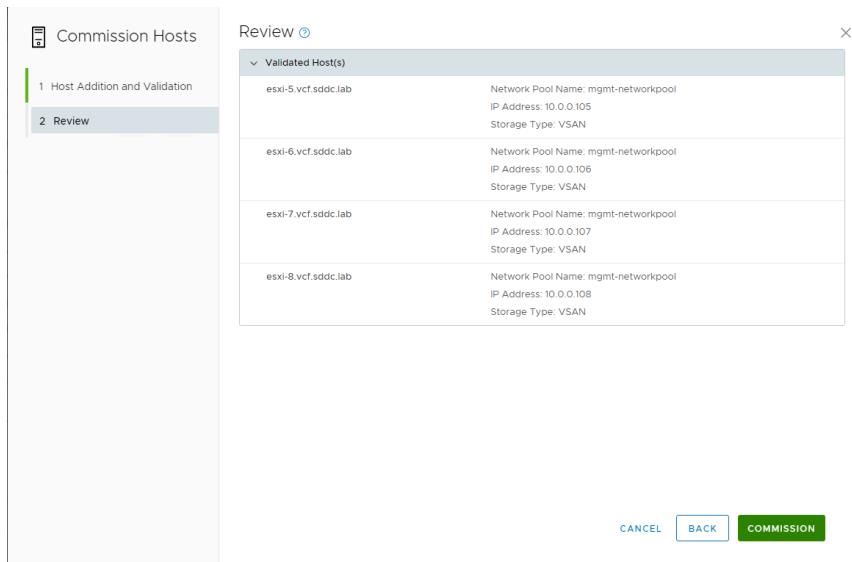


## I. Click Validate all



J. Click Next

K. Click Commission



L. Monitor progress in Tasks pane

The screenshot shows the VMware Cloud Foundation interface for managing hosts. On the left, a navigation sidebar includes options like Dashboard, Solutions, Inventory, Workload Domains, Hosts, Lifecycle Management, Administration, Network Settings, Storage Settings, Licensing, Users, and Repository Settings. The main content area is titled 'Hosts' and displays 'Capacity Utilization across Hosts' with three progress bars: CPU (112.59 GHz Total, 40.62 GHz Used), Memory (384 GB Total, 271.18 GB Used), and Hosts (4 Total, 4 Used). Below this are tabs for ALL HOSTS, ASSIGNED HOSTS, and UNASSIGNED HOSTS. A table lists a single host entry: esxi-1.vcf.sddc.lab, IP 10.0.0.101, Network Pool mgmt-networkpool, Configuration Status Active, Host State Assigned (mgmt-domain), Cluster mgmt-cluster-01, and CPU Usage 16%. At the bottom, a 'Tasks' section shows a single task: 'Commissioning host(s) esxi-5...'. The task details show it's running and last occurred on 10/19/22, 1:20 PM.

Task	Description	Status	Last Occurrence
Commissioning host(s) esxi-5...	Commissioning host(s) esxi-5.vcf.sddc.lab,esxi-6.vcf.sddc.lab,esxi-7.vcf.sddc.lab,esxi-8.vcf.sddc.lab to VMware Cloud ...	Running	10/19/22, 1:20 PM



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