VMware vSphere: Optimize and Scale 6.7

Installation and Configuration Guide

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> ⚠️ Installation of *VMware vSphere: O&S v6.7* virtual pods as described in this guide requires that your *NETLAB+ VE* system is equipped with software version **19.5.0 or later**.

Contents

1   Introduction

This document provides detailed guidance on performing the installation and configuration of the VMware vSphere: Optimize and Scale 6.7 pod on the *NETLAB+ VE* system.

1.1   Introducing the VMware vSphere: Optimize and Scale 6.7 Pod

The *VMware vSphere: Optimize and Scale 6.7* pod is a 100% virtual machine pod consisting of six virtual machines. Linked together through virtual networking, these four virtual machines provide the environment for a student or a team to perform the *VMware vSphere: Optimize and Scale 6.7* labs.
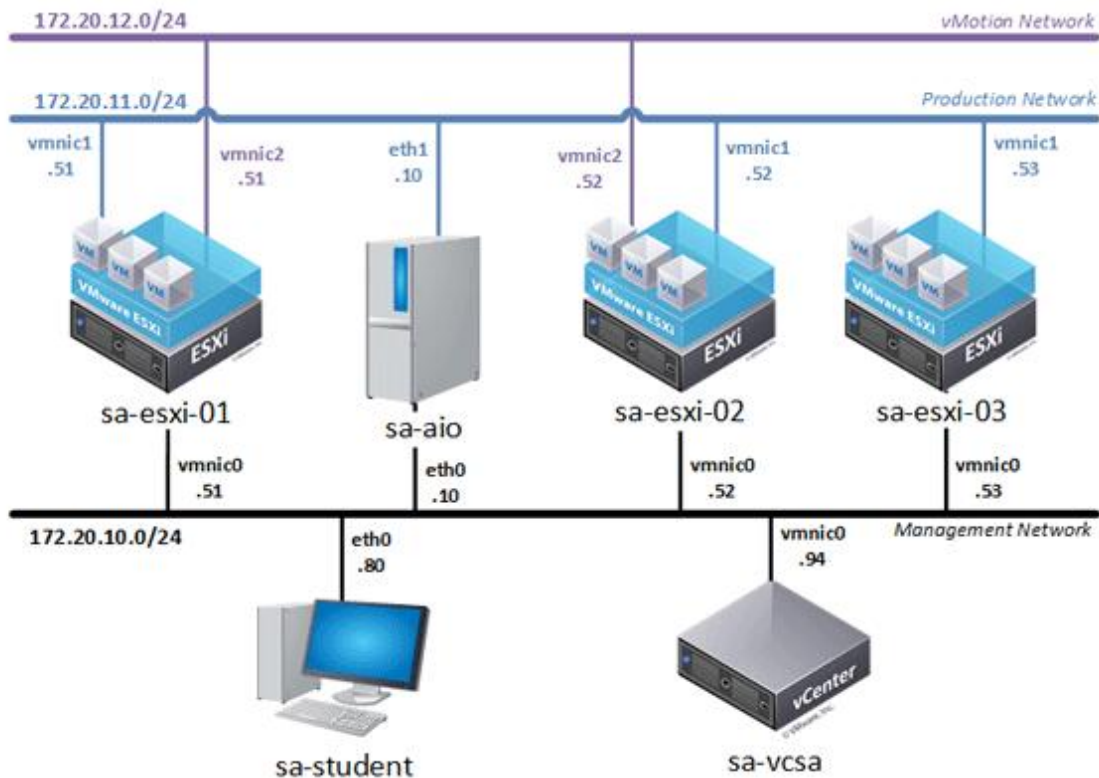
2 Planning

This guide provides specific information pertinent to delivering the *VMware vSphere: Optimize and Scale 6.7* pod. The *NETLAB+ Remote PC Guide Series* provides the prerequisite guidance for setting up your VMware infrastructure, including:

) An introduction to virtualization using *NETLAB+*
) Detailed setup instructions for standing up *VMware vCenter* and *VMware ESXi*
) Virtual machine and virtual pod management concepts using *NETLAB+*

This document assumes that you have set up virtual machine infrastructure in accordance with the *NETLAB+ Remote PC Guide Series*. The planning information below refers to specific sections in the *Remote PC Guide* when applicable.

2.1 Pod Creation Workflow

The following list is an overview of the pod setup process.

1. Obtain the master virtual machine images required for the master pod.
2. Deploy the master virtual machine images to your *VMware vCenter Appliance*.
   a. Deploy virtual machines using **Thin Provisioning** to reduce storage consumption.
   b. Make necessary adjustments to each virtual machine in the environment.
      i. Insert/Verify manual **MAC** addresses.
      ii. Change the default network to **SAFETY NET**.
      iii. Any other configuration changes mentioned in this guide.
3. Import the deployed virtual machines to the *NETLAB+* **Virtual Machine Inventory**.
4. Activate or license the required software on each virtual machine when prompted.
5. Take a snapshot of each virtual machine in the master pod labeled **GOLDEN_MASTER** after all configurations and licensing have taken effect. The *GOLDEN_MASTER* snapshot is used to clone virtual machine images for the user pods.
6. Use the *NETLAB+* **Pod Cloning** feature to create student pods from the master pod.
7. If multiple hosts are used in the *NETLAB+* environment, make a **Full Clone** of the master pod on the initial host (Host A) to the subsequent host (Host B) and so on using the *NETLAB+* **Pod Cloning** feature.

2.2   Pod Resource Requirements

The *VMware vSphere: Optimize and Scale 6.7* course will consume 43.8 GB of storage per each master pod instance.

The following table provides details of the storage requirements for each of the virtual machines in the pod.

Virtual Machine	OVF/OVA	Initial Master Pod (Thin Provisioned)
sa-aio	24.3 GB	54.5 GB
sa-esxi-01	8.8 GB	16.7 GB
sa-esxi-02	2.6 GB	5.4 GB
sa-esxi-03	527 MB	590.4 MB
sa-student	7.9 GB	12.9 GB
sa-vcsa	10.6 GB	21 GB
Total	**54.7 GB**	**111 GB**

2.3   ESXi Host Server Requirements

Before you try to deploy the *VMware vSphere ICM 6.7* pod, you'll need to check the *VMware Compatibility List* to verify that your CPU is compatible to support *vSphere 6.7* software. Reading *VMware's* official release notes, notice that *VMware* has dropped support for many legacy CPUs.

Please refer to the *NDG* website for specific *ESXi* host requirements to support virtual machine delivery: https://www.netdevgroup.com/products/requirements/

The deployment of the *VMware vSphere: Optimize and Scale 6.7* requires a *VMware vSphere Version* of **6.0** for the infrastructure at a minimum due to the *Hardware Version* of select *VMware vSphere VMs (version 11)* in the pod.

Please Note

The number of **active** pods that can be used simultaneously depends on the *NETLAB+* product license and the number of *VMware ESXi* host servers meeting the hardware requirements specifications.

For current *ESXi* server requirements and active pod count, refer to the following URL:
http://www.netdevgroup.com/support/remote_pc.html#vm_host_server_specifications.

2.4   NETLAB+ Requirements

Installation of *VMware vSphere: Optimize and Scale 6.7* pods, as described in this guide, requires that you are running *NETLAB+ VE* version **19.5.0 or later**.

Previous versions of *NETLAB+* do not support requirements for the *VMware vSphere: Optimize and Scale 6.7* course on the physical host servers.

Please refer to the *NETLAB+ Remote PC Guide Series*.

2.5   NETLAB+ Virtual Machine Infrastructure Setup

The *NETLAB+ Virtual Machine Infrastructure* setup is described in the following sections of the *NETLAB+ Remote PC Guide Series*:

- *Registering a Virtual Datacenter in NETLAB+*
- *Adding ESXi hosts in NETLAB+*
- *Proactive Resource Awareness*

> It is important to configure *Proactive Resource Awareness* to maximize the number of active pods per physical *ESXi* host.

2.6   Software Requirements

For the purpose of software licensing, each virtual machine is treated as an individual machine, PC, or server. Please refer to the specific vendor license agreements (and educational discount programs, if applicable) to determine licensing requirements for your virtual machines' software, operating system, and applications.

The minimum virtual infrastructure software required for standing up this pod is in the following table.

Virtual Infrastructure Requirements	
Software	**Version**
vSphere ESXi	6.0
vCenter Server	6.0

2.7   Networking Requirements

To accommodate the movement of large *VMs*, *OVF/OVAs*, and *ISO* disk images from one host to another, gigabit Ethernet or better connectivity is recommended to interconnect your *NETLAB+*, *vCenter Server* system and *ESXi* host systems.

The two standard networking models recommended to interconnect your servers are described in detail in the *Networking Models* section of the *Remote PC Guide Series, Volume 1 - Introduction and Planning.*

3　　Software and Licenses

3.1　　Obtaining Software Licenses

Licensing considerations will vary depending on your school's participation in the VMware IT Academy Program (VITA) program and/or the VMware Academic Subscription (VMAS) . Guidance on navigating licensing is available on the VMware Product Licensing VMAS vs. VITA chart.

> Please Note
>
> Based on the deployment of the pod, administrators may choose to update the licenses on their already deployed master pods or they may choose to download updated OVAs from CSSIA.org which will already include updated licensed virtual machines for the next licensing renewal cycle.

1. Follow the link provided to you by *VMware* when you registered in the *VMware Academic Subscription*. This will take you to the academic software store.
2. Sign in with your registered login.
3. Click on **Faculty/Staff** at the top, followed by **VMware** and then **Software** to see the available downloads. You must be an authorized *Faculty/Staff* user. For more information, contact the *VMware Academy* contact at your school.
4. Click on **VMware vSphere 6.7**, **VMware vSphere 6.5 Enterprise**, or **VMware vSphere 6 Enterprise Plus** - these licenses will work with *VMware vSphere v6.7*. This is the first of three software items you will obtain from your school's webstore.
5. Click on **Add to Cart.**
6. Click on **Continue Shopping**.
7. Click on **VMware vCenter Server 6 Standard**.
8. Click on **Add to Cart.**
9. Click on **Continue Shopping**.
10. Click on **VMware vSAN**.
11. Click on **Add to Cart.**
12. Click on **Check Out** to continue.
13. Read and accept the **EULA**.
14. On the confirmation page, click on **Proceed With Order.**
15. On the receipt page, record the serial numbers found under **Items**.

3.2   Downloading OVF Files

The virtual machines are made available as *Open Virtualization Format* (*OVF*) or *Open Virtualization Archive* (*OVA*) files. These files are available for download from *CSSIA*.

To request access to the preconfigured virtual machine templates from *CSSIA*:

1. Go to *the CSSIA Resources* page: https://www.cssia.org/cssiaresources/
2. Select **CSSIA VM Image Sharing Agreement**.
3. Complete and submit your access request by following the instructions on the request form.
4. *CSSIA* will provide, via email, password-protected download links. Access to the download links is provided only to customers who are current with their NETLAB+ support contract and are participants in the appropriate partner programs (*i.e., Cisco Networking Academy, VMware IT Academy, Red Hat Academy, and/or Palo Alto Networks*).
5. Once all virtual machines have been downloaded, they can be deployed following the steps in the appropriate pod installation guide. Each virtual machine is deployed individually.

4   Master Pod Configuration

4.1   Deploying Virtual Machine OVF/OVA Files

Deploy on your host server the pod virtual machine *OVF/OVA* files you have downloaded.

1. Navigate to your **vSphere Client** using your management workstation, ensure that your downloaded *OVA/OVF* files are accessible on this machine, and then connect to your **vCenter Server**.
2. From the *vSphere Client* interface, navigate to **Hosts and Clusters**.
3. Right-click on the target **ESXi Host Server** and select **Deploy OVF Template**.
4. In the *Deploy OVF Template* window, on the *Select source* step, select the **Local File** radio button and click **Browse**.
5. Locate and select one of the VMs for the pod, click **Open**.

> Please Note
>
> Only one VM can be selected using this wizard. The process will have to be repeated for the remaining VMs.

6. Verify that the VM information populates next to the *Browse* button and click **Next**.
7. On the *Review details* step, make sure to fill the checkbox for **Accept extra configuration options** (*if present*) and click **Next**.
8. On the *Select name and folder* step, change the name of the virtual machine to something that is easy to manage. You can use the names provided in the list below as names for the virtual machines if you do not have a set naming convention. Select the appropriate **datacenter** and click **Next**.

Virtual Machine Topology Name	Virtual Machine Deployment Name
sa-aio	VMware_OnSv67_Master.saAIO
sa-esxi-01	VMware_OnSv67_Master.saESXi01
sa-esxi-02	VMware_OnSv67_Master.saESXi02
sa-esxi-03	VMware_OnSv67_Master.saESXi03
sa-student	VMware_OnSv67_Master.saStudent
sa-vcsa	VMware_OnSv67_Master.saVCSA

9. On the *Select storage* step, choose the appropriate storage device and make sure that **Thin Provision** is selected. Click **Next**.
10. In the *Select networks* section, select **SAFETY NET** as the destination and click **Next.**

> **STOP**
>
> If *SAFETY NET* is not available, refer to the *Create a Safe Staging Network* section in the *Remote PC Guide Series – Volume 2*.
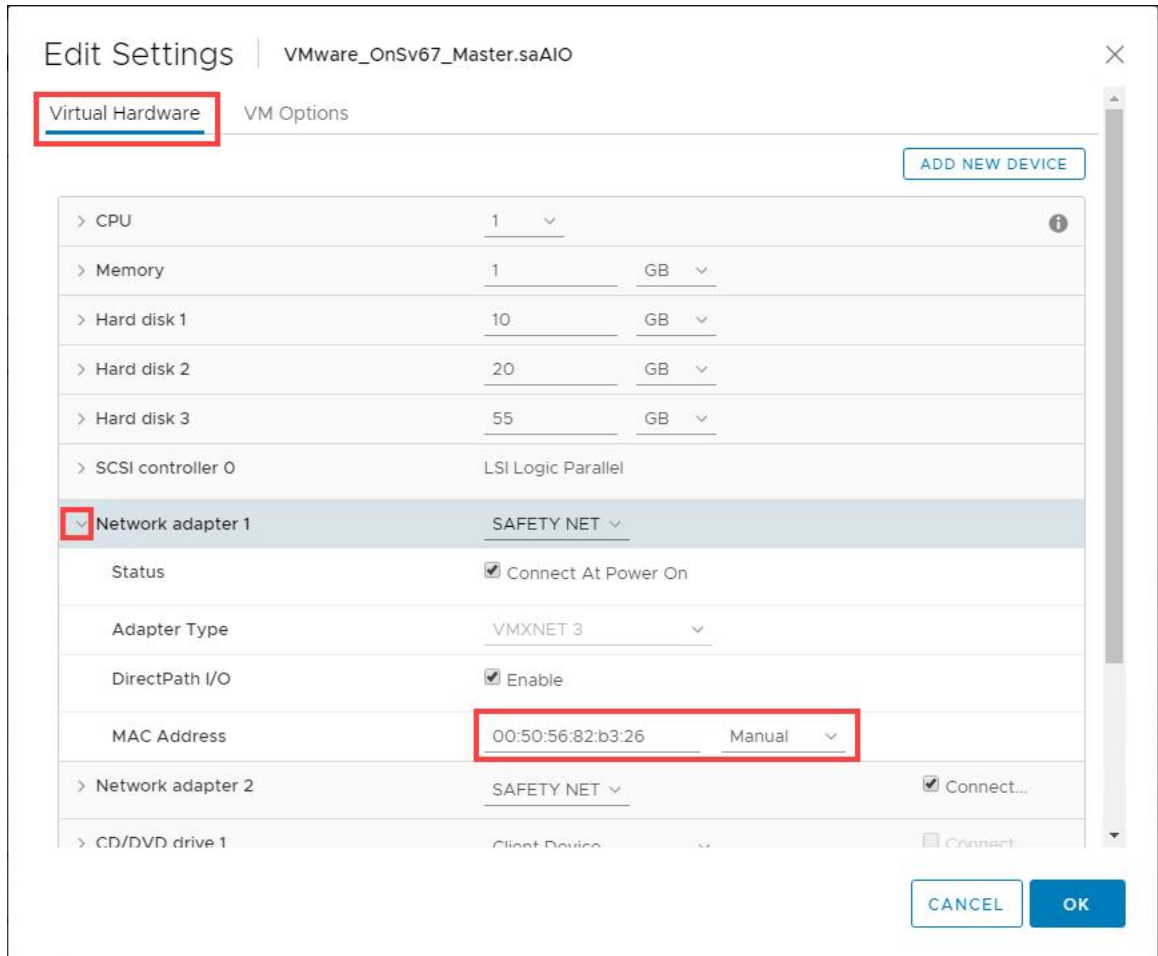
11. In the *Ready to complete* section, make sure **Power on after deployment** is **unchecked** and confirm the settings. Click **Finish**.
12. *vCenter* will begin deploying the virtual machine. This may take some time depending on the speed of your connection, HDDs, etc. Repeat the previous steps for each remaining virtual machine in the master pod.

4.1.1   Modify Virtual Machines

Once the virtual machines are imported onto the host, verify the configurations. The following steps will guide you through the process.

1. In the *vSphere Client* interface, right-click on the imported virtual machine and select **Edit Settings**.
2. For all the virtual machines, manually assign the *MAC* addresses for each *NIC*. The table below identifies the *MAC* addresses per *NIC*.

Virtual Machine	NIC	MAC
sa-aio	1	00:50:56:82:b3:26
	2	00:50:56:82:ab:1d
sa-esxi-01	1	00:50:56:82:f4:08
	2	00:50:56:8a:46:26
	3	00:50:56:8a:5d:23
sa-esxi-02	1	00:50:56:8a:d1:b0
	2	00:50:56:8a:96:c6
	3	00:50:56:8a:44:c4
sa-esxi-03	1	00:50:56:ae:58:7b
	2	00:50:56:a1:63:f3
sa-student	1	00:50:56:82:1b:5f
sa-vcsa	1	00:50:56:82:00:ab

3. Repeat the previous steps for each of the remaining virtual machines in the master pod.

4. Verify that *hardware virtualization* is exposed to the **sa-esxi-01**, **sa-esxi-02**, **and sa-esxi-03** virtual machines by using the **Edit Settings** tool.
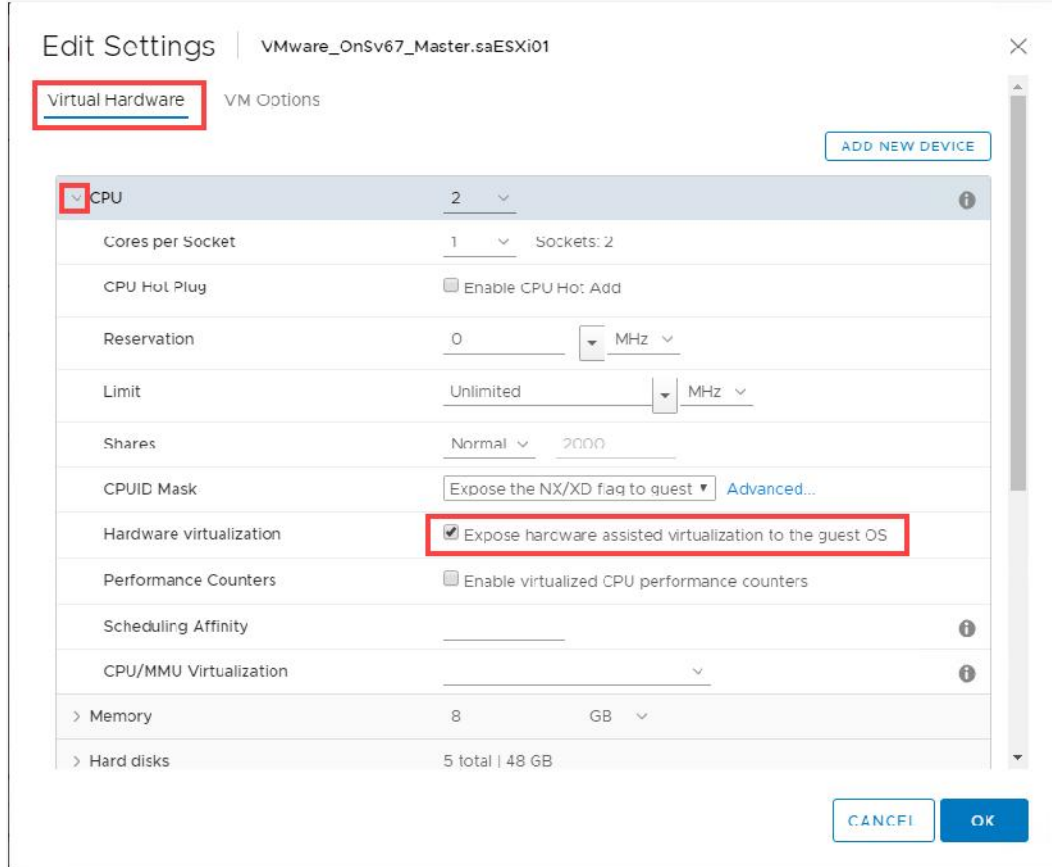
4.2   NETLAB+ Virtual Machine Inventory Setup

This section will guide you in adding your templates to the *Virtual Machine Inventory* of your *NETLAB+ VE* system.

1. Log in to your *NETLAB+ VE* system using the administrator account.
2. Select the **Virtual Machine Infrastructure** icon.

3. Click the **Virtual Machine Inventory** icon.

Virtual Machine Inventory

Import, clone, and manage the inventory of virtual machines to be used with NETLAB+.

4. Click the **Import Virtual Machines** button located at the bottom of the list.

⬇ Import Virtual Machines

5. Select the appropriate datacenter from the list where your master VMs reside.
6. Select the checkbox next to the virtual machines you had just deployed and click **Import Selected Virtual Machines**.

⬇ Import Selected Virtual Machines

7. When the *Configure VMs* window loads, you can set your virtual machine parameters.

    a. Check the drop-down box for the correct operating system for each imported virtual machine.
    b. Change *Role* to **Master** for each VM.
    c. Add any comments for each virtual machine in the last column.

> It is advised to leave the *Version* and *Build* numbers for reference when requesting *NDG* support.

    d. Verify your settings and click **Import (X) Virtual Machines** (notice the number in parenthesis is dynamic, depending on the amount of VMs selected).

⬇ Import (6) Virtual Machines

    e. Verify all *Import Statuses* report back with **OK** and then click on the **Dismiss** button.
    f. Verify that your virtual machines show up in the inventory.

For additional information, please refer to the *NETLAB+ VE Administrator Guide*.

4.3   Building the Master VMware vSphere: Optimize and Scale 6.7 Pod

This section will assist you in adding the *VMware vSphere: Optimize and Scale 6.7* pod to your *NETLAB+* system.

4.3.1   Enabling VMware vSphere Optimize and Scale 6.7 in Course Manager

Please refer to the *Course Manager* section *of the [NETLAB+ VE Administrator Guide](#)* on how to enable content. Please install the **VMware vSphere Optimize and Scale 6.7** course.

4.3.2   Create the Master Pod

1. Log into **NETLAB+ VE** with the *administrator* account.
2. Select the **Pods** icon.
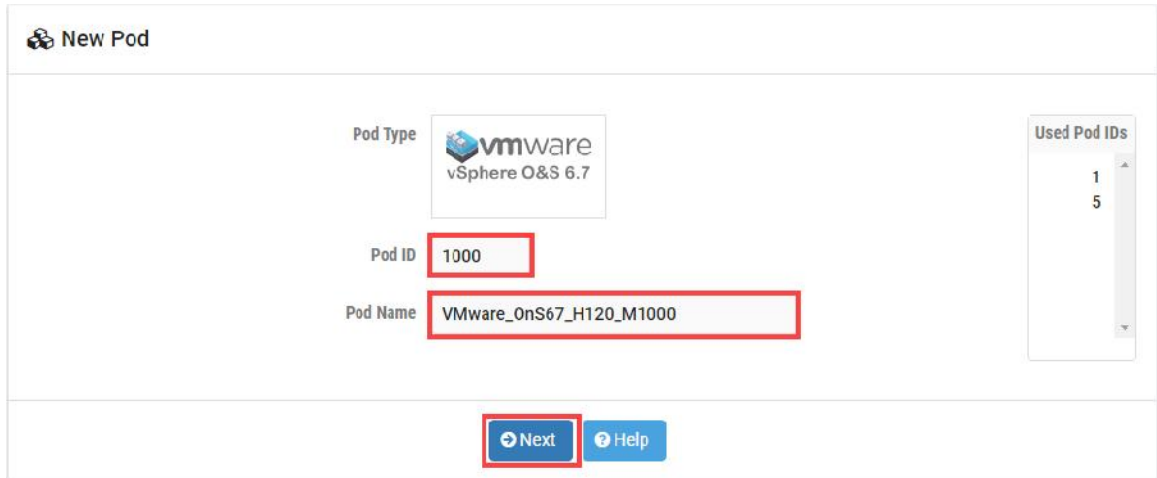
3. Create a new pod by scrolling to the bottom and clicking the **Create New Pod** button.

4. Then, click on the **VMware vSphere Optimize and Scale 6.7** pod entry from the list of installed pod types.

VMware vSphere Optimize and Scale 6.7
The VMware vSphere Optimize and Scale 6.7 training provides candidates the advanced skills to configure and optimize a scalable vSphere 6.7 infrastructure.
2019
https://www.netdevgroup.com/support/tech_support.html

5. On the *New Pod* window, input a value into the **Pod ID** and **Pod Name** fields. Click **Next**.

> The ***Pod ID*** determines the order in which the pods will appear in the scheduler. It is best practice to use a block of sequential ID numbers for the *Pod Id* that allows for the number of pods you are going to install.
>
> The ***Pod Name*** identifies the pod and is unique per pod. Here we used the name of the lab set or course in a shortened form along with a host identifier (H120), the type and number of the pod (M1000).

6. To finalize the wizard, click **OK**.

For additional information, please refer to the [NETLAB+ VE Administrator Guide](#).

4.3.3 Attach Virtual Machines to the Master Pod

Update the master pod to associate the virtual machines with the newly created pod.

1. Select the **VMware vSphere: Optimize and Scale 6.7** master pod from the pod list.

2. Click on the **Action** dropdown next to the virtual machine you are about to assign and select **Attach VM**.

	PC Name	VM	Operating System	VM Role	Runtime Host	Action
🖥️	sa-student	ABSENT				▾
📚	sa-vcsa	ABSENT				
📚	sa-esxi-01	ABSENT				
📚	sa-esxi-02	ABSENT				
📚	sa-esxi-03	ABSENT				▾
📚	sa-aio	ABSENT				▾

Remote PC 6

Dropdown menu shown:
- 👁 View
- ⚙ Settings
- ⊕ Attach VM
- ⊖ Remove VM From...
- 📷 Snapshots

3. Select the corresponding virtual machine from the inventory list.

Virtual Machine Name ▲	Operating System ⬍	Role ⬍
🖥️ VMware_OnSv67_Master.saAIO	Linux	Master
🖥️ VMware_OnSv67_Master.saESXi01	VMware ESX(i)	Master
🖥️ VMware_OnSv67_Master.saESXi02	VMware ESX(i)	Master
🖥️ VMware_OnSv67_Master.saESXi03	VMware ESX(i)	Master
🖥️ VMware_OnSv67_Master.saStudent	Linux	Master
🖥️ VMware_OnSv67_Master.saVCSA	Linux	Master

4. Click **OK** to confirm the VM attachment and repeat the previous steps for the remaining virtual machines.

4.3.4 Create Snapshots for the Master Virtual Machines

In order to proceed with pod cloning, snapshots must be created on each of the pod's virtual machines.

⚠️ Verify that all VMs are still powered off before taking snapshots.

1. Make sure to view the **VMware vSphere: Optimize and Scale 6.7** master pod you just assigned machines to. In the pod view, click on the drop-down menu option underneath the *Action* column for a specific VM and select **Snapshots**.
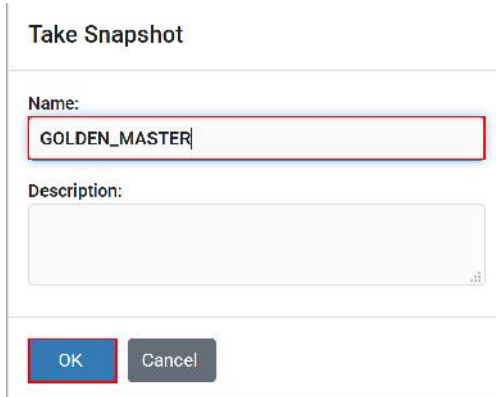
	PC Name	VM	Operating System	VM Role	Runtime Host	Action
🐧	sa-student	VMware_OnSv67_Master.saStudent	Linux	MASTER		▼
🐧	sa-vcsa	VMware_OnSv67_Master.saVCSA	Linux	MASTER		👁 View
▤	sa-esxi-01	VMware_OnSv67_Master.saESXi01	VMware ESX(i)	MASTER		⚙ Settings
▤	sa-esxi-02	VMware_OnSv67_Master.saESXi02	VMware ESX(i)	MASTER		➕ Attach VM ➖ Remove VM From...
▤	sa-esxi-03	VMware_OnSv67_Master.saESXi03	VMware ESX(i)	MASTER		📷 Snapshots
🐧	sa-aio	VMware_OnSv67_Master.saAIO	Linux	MASTER		▼

2. In the *Snapshot Manager* window, click on the **Take** button. This will take a snapshot of the current state of the virtual machine.

Snapshot Manager

- 🖥 [   ]
  - 🔘 You Are Here!

Name:

Description:

[🖥 Take] [🖥 Delete All]   [🔘 Go To] [🗒 Edit] [🖥 Delete]

[⊙ Dismiss]
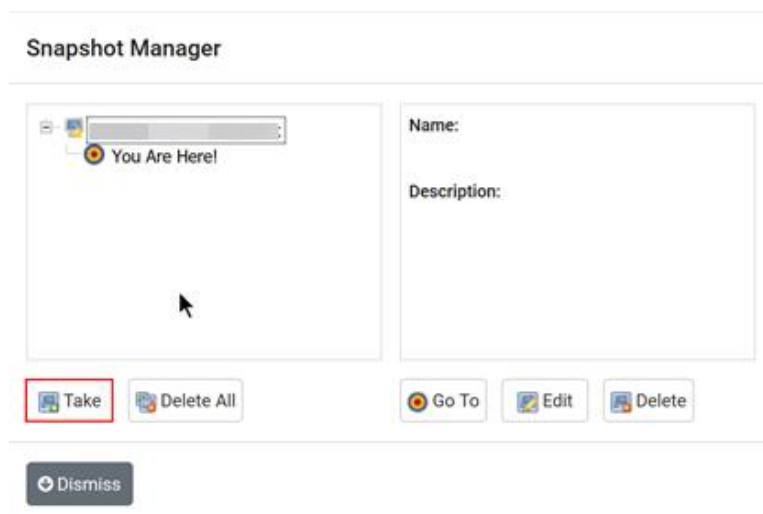
⚠️ Any changes made after this will require a new snapshot or those changes will not reflect in the reset state of the pod or its clones.

3. In the *Take Snapshot* window, type `GOLDEN_MASTER` into the *Name* text field, or you may choose another naming convention as long as it is consistent for easy management. Click **OK**.
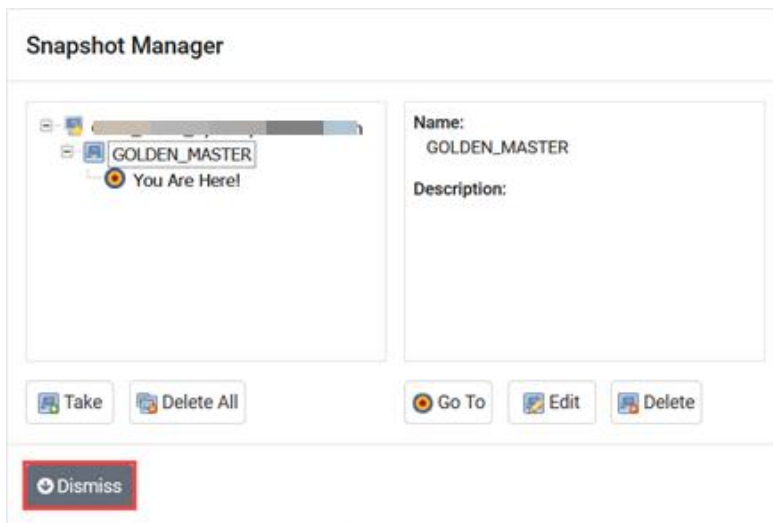
> ⚠ It is recommended to use *GOLDEN_MASTER* as the snapshot name when working with normalized pod types.

4. In the *Snapshot Manager* window, notice the snapshot is created. Click the **Dismiss** button.

> ⚠ At this point it is good to verify that you have only one snapshot on the virtual machine. Multiple snapshots increase the likelihood of having problems, especially if the snapshots are named the same. Also, the more snapshots a virtual machine has, the slower the performance and the more drive space is used.

5. Repeat the previous steps for the remaining virtual machines.

4.3.5   Set the Revert to Snapshot

1. Make sure to view the **VMware vSphere: Optimize and Scale 6.7** master pod you just created snapshots for. In the pod view, click on the drop-down menu option underneath the *Action* column and select **Settings**.

	PC Name	VM	Operating System	VM Role	Runtime Host	Action
	sa-student	VMware_OnSv67_Master.saStudent	Linux	MASTER	172.30.10.80	▼
	sa-vcsa	VMware_OnSv67_Master.saVCSA	Linux	MASTER		👁 View
	sa-esxi-01	VMware_OnSv67_Master.saESXi01	VMware ESX(i)	MASTER		⚙ Settings
	sa-esxi-02	VMware_OnSv67_Master.saESXi02	VMware ESX(i)	MASTER		⊕ Attach VM
						⊖ Remove VM From...
	sa-esxi-03	VMware_OnSv67_Master.saESXi03	VMware ESX(i)	MASTER	172.30.10.80	📷 Snapshots
	sa-aio	VMware_OnSv67_Master.saAIO	Linux	MASTER	172.30.10.80	▼

2. In the virtual machine's *Settings* window, click on the *Revert to Snapshot* drop-down and select **GOLDEN_MASTER** and then click the **Submit** button.

> This sets the snapshot on the virtual machine that will get reverted to each time the pod is scheduled.

🐧 sa-student Settings

Field	Value
PC Name	sa-student
PC Type	Virtual Machine
Datacenter	
Virtual Machine	VMware_OnSv67_Master.saStudent
Role	Master
Revert to Snapshot	GOLDEN_MASTER
Shutdown Preference	Graceful Shutdown
Guest Operating System	Linux

Options
- ✔ enable remote display auto-configuration
- ✔ enable network auto-configuration
- ✔ enable advanced setting auto-configuration
- ✔ enable minimum requirements verification

✔ Submit   ✖ Cancel   ❓ Help

3. Click **OK** to confirm.
4. Return to the pod view page and repeat the previous steps for the remaining virtual machines.

4.3.6   Bring the Master Pod online

1. In the pod view, click the drop arrow under *State* and select **Online**.
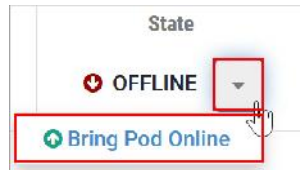
4.4   Make changes to the Master Pod

Some pods have software that needs to be altered on the host machine before it can be used properly. This normally happens when software requires licenses to function.

If there are changes that need to be made to the master pod prior to link cloning, either student pods or full cloning other master pods on other hosts, you will need to follow this set of instructions to ready your master pod.

For the VMware vSphere: Optimize and Scale 6.7 master pod, you will need to have the *sa-esxi-01*, *sa-esxi-02*, and *sa-vcsa* machines licensed. This process consists of:

〕 Scheduling the master pod
〕 Licensing the *sa-esxi-01, sa-esxi-02,* and *sa-vcsa* machines
〕 Shutting down the *sa-esxi-01, sa-esxi-02,* and *sa-vcsa* machines
〕 Resetting the network interface cards to *SAFETY NET*
〕 Taking a new *GOLDEN_MASTER* snapshot for the *sa-esxi-01, sa-esxi-02,* and *sa-vcsa* machines
〕 Ending the reservation

> **Please Note**   The virtual machine *OVA/OVF* files obtained from *CSSIA* for this pod should already be licensed. If you wish to license the virtual machines using your own license keys, you may choose to do so and follow the instructions below.

4.4.1   Virtual Machine Credentials

For your reference, the following table provides a list of the credentials for the systems in the pod:

Machine	User name	Password
sa-aio	sysadmin	vmware123
sa-esxi-01	root	Train1ng$
sa-esxi-02	root	Train1ng$
sa-esxi-03	root	Train1ng$
sa-student	sysadmin	vmware123
sa-vcsa	administrator@vclass.local	s3cretP@$$

4.4.2   Create Class and Schedule the Master Pod

Create a class as identified in the *Add Classes* section of the [NETLAB+ VE Instructor Guide](#) then schedule the *Master Pod* to license the *sa-esxi-01, sa-esxi-02,* and *sa-vcsa* virtual machines.

> ⚠️ When scheduling the *Master Pod*, it is important to schedule the pod for enough time to complete the following steps. Failure to complete the steps prior to taking the final snapshot could mean redeploying necessary virtual machines.

4.4.3   Licensing the sa-esxi-01, sa-esxi-02, and sa-vcsa

1. Launch the **sa-student** virtual machine to access the graphical login screen.
2. Log in as `sysadmin` using the password `vmware123`.
3. Launch the **Mozilla Firefox** web browser by either clicking on the icon shortcut found on the bottom toolbar or by navigating to **Start Menu > Internet > Firefox Web Browser**.
4. Notice the homepage is automatically configured to load the URL address of the *VMware vCenter Server Appliance* (*sa-vcsa* virtual machine). Click on the **Launch vSphere Client (HTML5)** button to launch the HTML5-based *vSphere* client.

> ⚠️ If you cannot successfully load the *VMware Getting Started* webpage, then please **wait an additional 3-4 minutes** and refresh the page to continue. During this time, the *vCSA* is still booting up and requires extra time to initialize.

5. In the *User name* text field, type `administrator@vclass.local` and in the *Password* text field, type `s3cretP@$$`. Click on **Login**.

> **Please Note** You may ignore the "*browser-OS combination*" warning message presented on the *VMware vCenter Single Sign-On* page and continue moving forward with the lab.

6. Once you are logged into the *VMware vSphere Client*, click on the **Menu** icon, then click on **Administration**.
7. Under *Administration* in the navigator pane, click on **Licenses**.
8. Click **Add New Licenses** to open the *New Licenses* window.
9. Enter all the provided *vITA* infrastructure license keys in the text area box provided and then click **Next**.
10. On the *Edit license names* step, name the licenses accordingly and click **Next**.
11. On the *Ready to complete* step, review the information and click **Finish**.
12. To assign the *VMware vCenter Server* key, click on the **Assets** tab, followed by ensuring that the **vCenter Server Systems** button is selected.
13. Check the checkbox for **172.20.10.94** and select **Assign License**.
14. In the *Assign License* window, select the appropriate license and click **OK**.
15. To assign the *VMware ESXi* key, click on the **Hosts** button.
16. Check the checkboxes for the **sa-esxi-01 and sa-esxi-02** entries and select **Assign License**.
17. In the *Assign License* window, select the appropriate license and click **OK**.

4.4.4   Shut Down the sa-esxi-01, sa-esxi-02, and sa-vcsa Machines

1. Once the Hosts and vCenter are licensed, gracefully power down the virtual machines in the following order:
   a. sa-vcsa (wait for the virtual machine to be completely powered down before continuing to the others)
   b. sa-esxi-01
   c. sa-esxi-02

4.4.5   Reset the NIC to SAFETY NET

1. Outside the *NETLAB+* web interface, navigate to your **vSphere Client** using your management workstation, and then connect to your **vCenter Server**.
2. From the *vSphere Client* dashboard, select **Hosts and Clusters**.
3. Select your host under the **NETLAB** datacenter.
4. Locate the **sa-esxi-01** virtual machine. Right-click on the virtual machine and select **Edit settings**.
5. Change *Network adapter 1-3* to **SAFETY NET**.
6. Click **OK** to confirm settings.
7. Repeat these instructions for the **sa-esxi-2** and **sa-vcsa** virtual machines; making sure that all adapters are set to **SAFETY NET**.

4.4.6   Create Snapshot on the Changed Master Virtual Machines

1. Right-click on the **sa-esxi-01** virtual machine and select **Snapshots-> Manage Snapshots...**
2. Click **Delete** to delete the current snapshot. Remember the name of this snapshot, as the new snapshot will need to have the exact same name.
3. Click **Yes** on the *Confirm Delete* window.
4. Click **Close** on the *Manage Snapshots* window.
5. Right-click on the **sa-esxi-01** virtual machine and select **Snapshots-> Take Snapshot...**
6. In the *Take Snapshot* window, type `GOLDEN_MASTER` or whatever prior snapshot name the virtual machine had. Click **OK** to take the snapshot.
7. Repeat these instructions for the **sa-esxi-02** and **sa-vcsa** machines.

4.4.7   End Reservation

You may now end the reservation of the master pod.

5   Pod Cloning

This section will help you create multiple student pods. The following sections describe the *NETLAB+* pod cloning feature used to create student pods on one or two host systems.

5.1   Linked Clones and Full Clones

NETLAB+ can create *linked clones* or *full clones*.

A **linked clone** (or linked virtual machine) is a virtual machine that shares virtual disks with the parent (or master) virtual machine in an ongoing manner. This conserves disk space and allows multiple virtual machines to use the same software installation. Linked clones can be created very quickly because most of the disk is shared with the parent VM.

A **full clone** is an independent copy of a virtual machine that shares nothing with the parent virtual machine after the cloning operation. Ongoing operation of a full clone is entirely separate from the parent virtual machine.

5.2   Creating User Pods

The following section describes how to create user pods on the same *VMware Host* system that holds your master pod's virtual machines. In this scenario, we will create linked virtual machines using the *NETLAB+* pod cloning utility.

1. Log in to **NETLAB+ VE** with the *administrator* account.
2. Select the **Pods** icon.

3. Click on your master pod.
4. Make sure the pod is offline by selecting **Take Pod Offline**.
5. Click the **Clone Pod** button to create a new pod-based on the settings and snapshots of this pod.

6. Input a new ID value into the **New Pod ID** field. It is advised to keep the pods in numerical order. If the pod IDs are not in numerical order, they will not show up in the scheduler in numerical order. Click **Next**.

7. Enter a name for the cloned pod into the **New Pod Name** field. For example, **VMware_OnS67_H120_S1001**. Click **Next**.

> The *Pod Name* identifies the pod and is unique per pod. Here we used the name of the lab set or course in a shortened form along with a host identifier (H120), the type and number of the pod (S1001).

8. When the action has finished processing, you are presented with a settings screen. Notice each VM has its own tab. Go through each tab and verify the following:

   Source Virtual Machine:
   a. *From Snapshot* should be set to the **GOLDEN_MASTER** snapshot you created previously.

   Target Virtual Machine:
   a. For *Type*, verify that **Linked** is selected.
   b. For *Role*, verify that the **Normal** role is selected.
   c. For *Take Snapshot*, verify that **GOLDEN_MASTER** is inputted.

9. When you are done changing settings, click **Clone Pod**. This should complete within a minute as we are creating linked virtual machines.

10. When the pod clone process is finished, click **OK**.
11. If you want to dedicate this pod to a particular class, team, or student, use the *Pod ACLs* feature. For details, see the *NETLAB+ VE Instructor Guide*.

12. Click the **Online** Button on the *Pod Management* page to make the pod available.

Activity	ACL State	State
IDLE	🔓 DISABLED	⏻ OFFLINE ▾
		⬆ Bring Pod Online
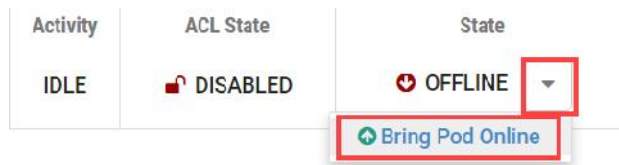
The user pod can now be reserved. When the reservation becomes active, *NETLAB+* will automatically configure virtual machines and virtual networking for your new pod.

> The *GOLDEN_MASTER* snapshot is the starting point for all pods. We recommend that you reserve the 1st pod and conduct some labs to make sure the snapshot images work correctly. If there are defects, make corrections to the images to the master pod and retake the *GOLDEN_MASTER* snapshot before creating additional pods.

5.3 Copying Your Master Pod to the Second Host

For this task, we will use the pod cloning utility to copy our master pod to the second host.

1. Log in to *NETLAB+* with the administrator account.
2. Select the **Pods** icon.

Pods

3. Click on the master pod.
4. Make sure the pod is offline by selecting **Take Pod Offline**.
5. Click the **Clone** button to create a new pod-based on the settings of this pod.
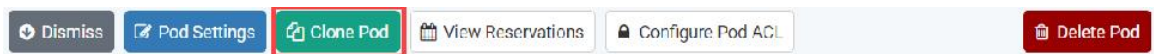
⏻ Dismiss	📝 Pod Settings	🗐 Clone Pod	📅 View Reservations	🔒 Configure Pod ACL	🗑 Delete Pod

6. Input a new ID value into the **New Pod ID** field. It is advised to keep the pods in numerical order. If the pod IDs are not in numerical order, they will not show up in the scheduler in numerical order. Click **Next**.

7. Enter a name for the cloned pod into the **New Pod Name** field. For example, **VMware_OnS67_H130_M1000**. Click **Next**.

> The *Pod Name* identifies the pod and is unique per pod. Here we used the name of the lab set or course in a shortened form along with a host identifier (H130), the type and number of the pod (M1000).

8. When the action has finished processing, you are presented with a settings screen. Notice each VM has its own tab. Go through each tab and verify the following:

   Source Virtual Machine:
   a. *From Snapshot* should be set to the **GOLDEN_MASTER** snapshot you created previously.

   Target Virtual Machine:
   a. For *Type*, verify that **Full** is selected.
   b. For *Role*, verify that the **Master** role is selected.
   c. For *Take Snapshot*, verify that **GOLDEN_MASTER** is inputted.
   d. For *Runtime Host*, select the second host system (which should be different than the system you are cloning from).

9. When you are done changing settings, click **Clone Pod**. This may take up to 30 minutes as full copies are being made. You may navigate away from the cloning progress screen, and then later return to the pod to check progress.

10. When the pod clone process is finished, click **OK**.

5.4　　Creating User Pods on the Second Host

To create user pods on the second host, repeat the steps to create user pods on the first host (see *Creating User Pods)*, substituting the second master pod (created in the previous section) as the cloning source.

5.5　　Assigning Pods to Students, Teams, or Classes

Please refer to the *NETLAB+ VE Instructor Guide* for details on using the *Pod ACLs* feature.