



# VMware vSphere: ICM v5.5 Pod Installation and Configuration Guide

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Installation of VMware vSphere: ICM v5.5 virtual pods as described this guide, requires that your NETLAB+ system is equipped with software version **2014.R2.B1 or later**.

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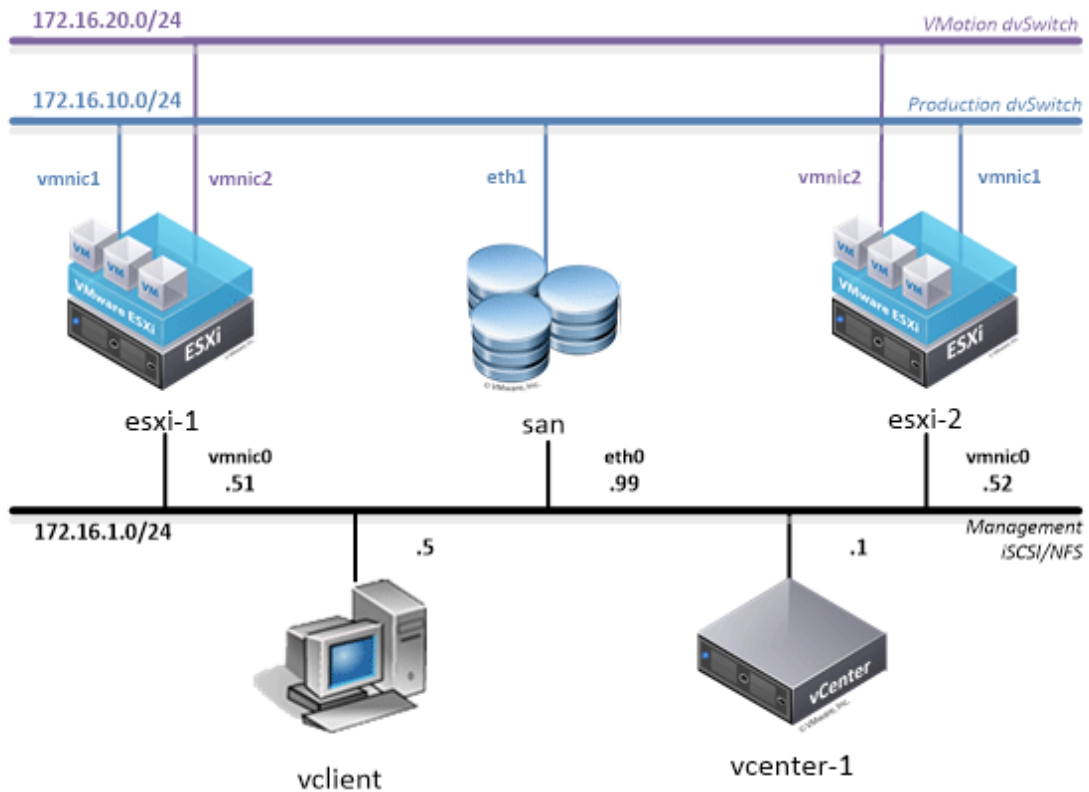
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# 1 Introduction

This document provides detailed guidance on performing the installation and configuration of the VMware vSphere ICM 5.5 pod on the NETLAB+ system.

## 1.1 Introducing the VMware vSphere Install, Configure and Manage (ICM) Pod

The vSphere ICM pod is a 100% virtual machine pod consisting of 5 virtual machines. Linked together through virtual networking, these 5 virtual machines provide the environment for a student or a team to perform the VMware vSphere ICM labs.



## 2 Planning

This guide provides specific information pertinent to delivering the vSphere ICM 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 pod.
2. Deploy the master virtual machine images to a master pod.
  - a. Deploy virtual machines using Thin Provisioning to reduce storage consumption.
  - b. Make necessary adjustments to each virtual machine in the environment.
    - i. Insert manual MAC addresses.
    - ii. Change default network to SAFETY NET.
3. Import the virtual machines deployed to the NETLAB+ Virtual Machine Inventory.
4. Activate or license the required software on each virtual machine.
5. Take a snapshot of each virtual machine in the master pod labeled GOLDEN\_MASTER. The GOLDEN\_MASTER snapshot is used to clone virtual machine images for the user pods.
6. Create copies of the virtual machines in the master pod on VMware host using the NETLAB+ Pod Cloning feature.
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), using the NETLAB+ Pod Cloning Feature.

## 2.2 Pod Resource Requirements

The VMware vSphere ICM 5.5 course will consume 28.5 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	Initial Master Pod (Thin Provisioning)
Client	8.5
ESXi01	4
ESXi02	1
SAN	8.5
vCenter	6.5
<b>Total Recommended</b>	<b>28.5</b>

## 2.3 ESXi Host Server Requirements

Please refer to the NDG website for specific ESXi host requirements to support virtual machine delivery: <http://www.netdevgroup.com/content/vmita/requirements/>

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

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](http://www.netdevgroup.com/support/remote_pc.html#vm_host_server_specifications).

## 2.4 NETLAB+ Requirements

Installation of VMware vSphere ICM 5.5 pods, as described in this guide, requires that your NETLAB+ system is equipped with NETLAB+ version 2014.R2.B1 or later.

Previous versions of NETLAB+ do not support requirements for the VMware vSphere ICM 5.5 course on the physical host servers.

## 2.5 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 Obtaining Software and Licenses

### 3.1 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: <http://www.cssia.org/cssia-resources.cfm>.
2. Select **VM Image Sharing Agreement – Image Sharing Agreement**.
3. Select **VM Image Sharing Agreement** to open the request form.
4. Complete and submit your access request by following the instructions on the request form.
5. CSSIA will email a link, along with a username and password to access the download server. Access to the download server 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, and/or EMC Academic Alliance).
6. Once access to the download server has been established, the virtual machines can be deployed directly to the vCenter Server by clicking on File > Deploy OVF Template in the client window and copying the link into the location field.
7. The deployment will start after the username and password are entered.
8. Each virtual machine is deployed individually.

### 3.2 Obtaining vita Licenses

In order to obtain the VMware IT Academy (vita) licenses you must become a member. Membership information can be found at their website:

<https://labs.vmware.com/vmware-it-academy>

Additional information regarding VMAP and vita can be found here:

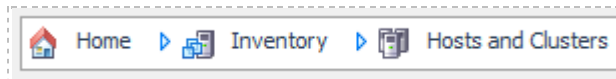
<http://www.netdevgroup.com/support/documentation/VMware%20VMAP-vITA%20Licensing%20Chart.pdf>

## 4 Master Pod Configuration

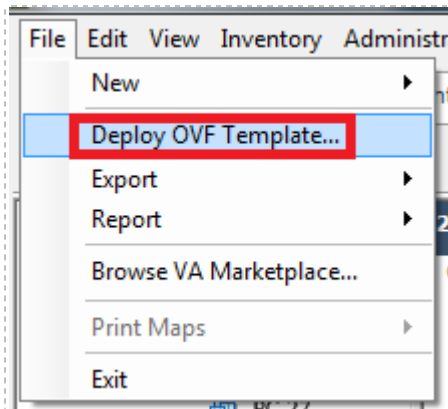
### 4.1 Deploying Virtual Machine OVF/OVA Files

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

1. Connect to the vCenter Server from a machine that house the virtual machine image files obtained from CSSIA.
2. Select **Hosts and Clusters** in the address bar.



3. Click on the first ESXi Host Server.
4. Click on **File -> Deploy OVF Template**.



5. Click on **Browse** and locate the OVF/OVA file you downloaded. Click **next** to continue.
6. On the OVF Template Details window, click **next**.
7. On the Name and Location window, 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. Click **Next**.

Virtual Machine Topology Name	Virtual Machine Deployment Name
<b>Client</b>	vSphere_ICM_55_Master_Client
<b>ESXi01</b>	vSphere_ICM_55_Master_ESXi01
<b>ESXi02</b>	vSphere_ICM_55_Master_ESXi02
<b>SAN</b>	vSphere_ICM_55_Master_SAN
<b>vCenter</b>	vSphere_ICM_55_Master_vCenter

8. On the Datastore window, select the appropriate datastore and click **Next**.



9. On the Disk Format window, select **Thin provision format** and click **Next**.
10. On the Network Mapping window, ensure SAFETY NET is selected for all Destination Networks . Click **Next**.

Network mapping is handled automatically by the NETLAB+ system during pod creation.

11. On the Ready to Complete window, confirm the information and click **Finish**.
12. vCenter will begin deploying the virtual machine. This may take some time depending on the speed of your connection, HDDs, etc.
13. When completed, click on **Close**.

## 4.2 Modify and Activate Virtual Machines

The following tasks must be performed prior to taking snapshots or assigning the virtual machines to pods.

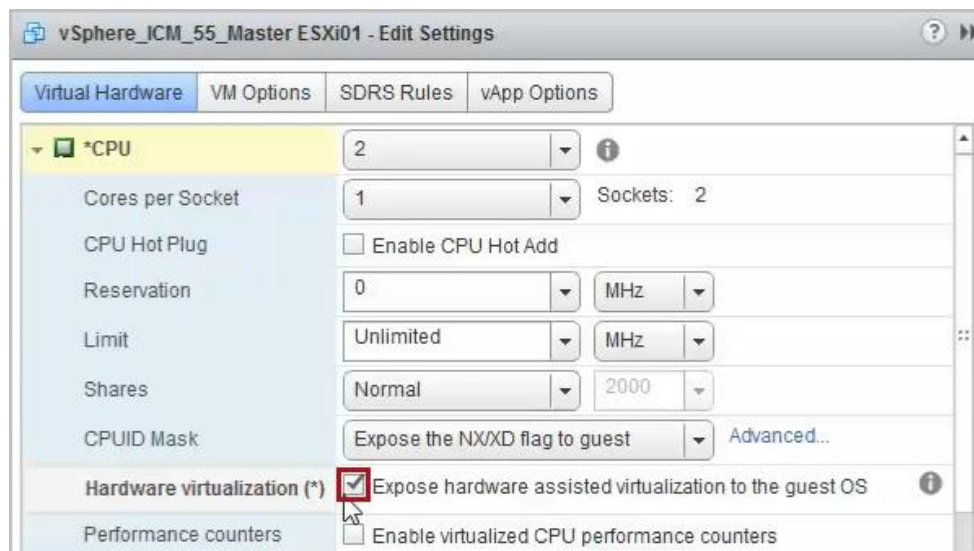
### 4.2.1 Modify Virtual Machines

Once the virtual machines are imported onto the host, change the CPU hardware virtualization and the Network Interface Cards (NIC's) MAC address via the VMware vSphere Web Client interface. The following steps will guide you through the process.

1. In the vSphere Web Client interface, right-click on the imported virtual machine and select **Edit Settings**.
2. If the virtual machine that you are editing is one of the nested hypervisors (**ESXi01** or **ESXi02**) you will need to expose hardware assisted virtualization to the guest OS. This can be accomplished by clicking the \*CPU menu tree to expose the **Hardware virtualization** section and then checking the **Expose hardware assisted virtualization to the guest OS** checkbox.

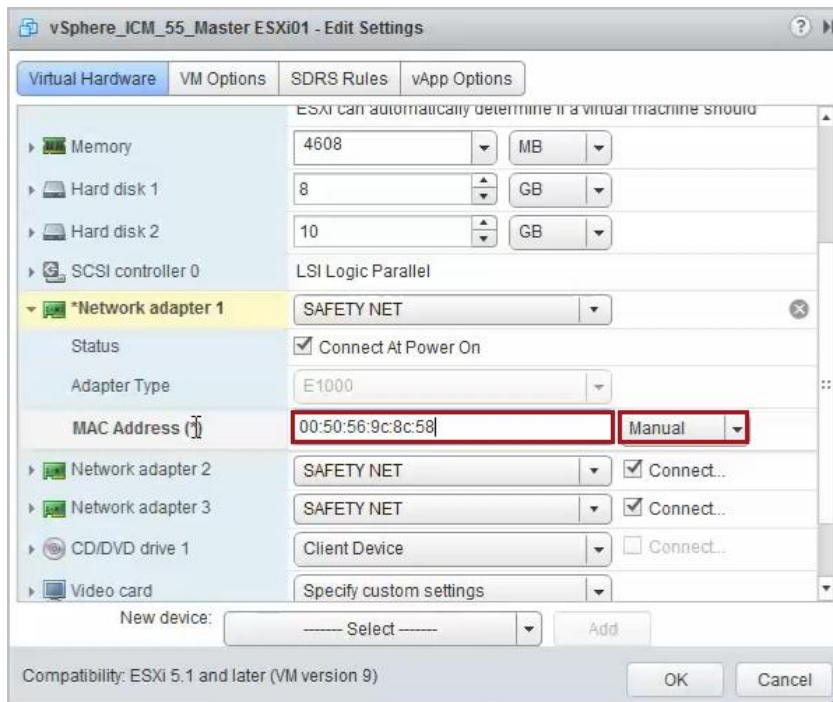
If the checkbox is grayed-out, it is likely that you do not have hardware virtualization enabled in the BIOS for your system or you may not be using a system with hardware virtualization capabilities.

Please see [http://www.netdevgroup.com/support/remote\\_pc.html](http://www.netdevgroup.com/support/remote_pc.html) for hardware recommendations.



- For all of the virtual machines manually assign the MAC addresses for each NIC. The table below identifies the MAC addresses per NIC.

Virtual Machine	NIC	MAC
<b>Client</b>	1	00:50:56:9c:07:eb
	2	00:50:56:9c:62:66
	3	00:50:56:9c:7b:f8
<b>ESXi01</b>	1	00:50:56:9c:8c:58
	2	00:50:56:9c:58:67
	3	00:50:56:9c:45:9d
<b>ESXi02</b>	1	00:50:56:9c:eb:81
	2	00:50:56:9c:c0:27
	3	00:50:56:9c:39:52
<b>SAN</b>	1	00:50:56:b3:9f:5d
	2	00:50:56:9c:c0:27
<b>vCenter</b>	1	00:50:56:9c:39:52



- Repeat steps 1 – 3 for each of the virtual machines in the pod.

## 4.2.2 Activate Licenses

This pod is designed to use the VMware IT Academy (vITA) infrastructure license keys for the both vSphere ESXi hosts (ESXi01 and ESXi02) and for the vCenter virtual machines.

The vITA Infrastructure license keys are to be used for licensing the master pods using the root account only. The students are not to have access to the root accounts nor to the infrastructure licenses.

Since the vITA infrastructure license keys are not to be made available to students, the administrator will need to configure the master pod with the infrastructure license keys using the root credentials in the vCenter Web Client.

The following table provides a list of the credentials for the systems in the pod:

Machine	User name	Password
Client	sysadmin	vmware123
ESXi01	root	vmware123
ESXi02	root	vmware123
vCenter	admin	vmware
SAN	openfiler	password

Please follow these steps to setup licenses on the master pod:

1. Power on all virtual machines on your ESXi host.
2. Log into the Client machine with username `sysadmin` and password `vmware123`.
3. Open the Google Chrome web browser and access the VMware vSphere Web Client using the URL `https://172.16.1.1:9443` and the root credentials.

[Contact NDG support](#) for the VMware vCenter Server Appliance (VCSA) root credentials. The root credentials are required for changing or applying licenses for the master virtual machines in the master pod and are **not** to be shared with students.

You may need to wait 10 to 15 minutes for the VCSA to completely boot and be ready for use.

4. Once you are logged into the VMware vSphere Web Client, click on the **Home** icon then click on **Administration** in the Navigator area.



5. Under Administration in the Navigator area, click on **Licenses** and then click on the **License Keys** tab in the Content area.
6. Click the **plus** sign to open the Add License Keys window.

7. Enter the vITA infrastructure license keys in the text area box provided and then click **Finish**.
8. To assign the vCenter key, click on the **vCenter Server Systems** tab, then click on the **Assign License Key...** button.
9. In the Assign License Key popup window, select the radio button associated with the key you just entered then click the **OK** button.
10. To assign the Host key, click on the **Hosts** tab, select the **host** to assign the key to, then click on the **Assign License Key...** button.
11. In the Assign License Key popup window, select the radio button associated with the key you just entered then click the **OK** button.
12. Repeat steps 10-11 for all hosts in the inventory.
13. Once the vCenter and hosts are licensed, gracefully power down the virtual machines and take snapshots.

Gracefully shutdown the virtual machines for snapshot in the following order:

- Client
- vCenter (Wait for vCenter to be completely powered down before continuing)
- ESXi01
- ESXi02
- SAN

**Failure to follow the power down sequence prior to snapshots can cause problems with the vCenter/host environment.**

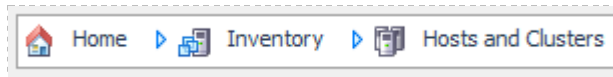
14. For instructions on taking snapshots of the virtual machine, see Section 4.3 Create Snapshots for the Master Virtual Machines.
15. Once the snapshots are taken, you may continue to the next section.

### 4.3 Create Snapshots for the Master Virtual Machines

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

Verify that all VMs are powered off before taking snapshots.

1. Open the vClient on your management workstation. Connect to your vCenter Server on your management machine.
2. Select **Hosts and Clusters** in the address bar.



3. Right-click on each virtual machine and select **Snapshot > Take Snapshot**.
4. Enter **GOLDEN\_MASTER** as the Snapshot Name.
5. Enter a description. It is a good idea to include the date in the description for later reference.
6. Click **OK**.
7. Repeat Steps 3-6 for the remaining virtual machines in the pod.
8. When all tasks are complete, continue to the next section.

### 4.4 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.

## 4.5 NETLAB+ Virtual Machine Inventory Setup

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

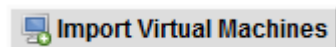
1. Login into your NETLAB+ system using the administrator account.
2. Select the **Virtual Machine Infrastructure** link.



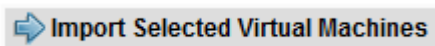
3. Click the **Virtual Machine Inventory** link.



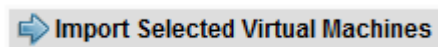
4. Click the **Import Virtual Machines** button.



5. Select the check box next to the virtual machines you had just deployed and click **Import Selected Virtual Machines**.



6. When the Configure Virtual Machines 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**
  - c. Add any comments for each virtual machine in the box to the right.
  - d. Verify your settings and click **Import Selected Virtual Machines**.



- e. Click **OK** when the virtual machines have finished loading.
- f. Verify that your virtual machines show up in the inventory.

For additional information, please refer to the *NETLAB+ Remote PC Guide Volume 3*:  
[http://www.netdevgroup.com/support/documentation/NETLAB Remote PC Guide Vo  
l 3 Configuring.pdf](http://www.netdevgroup.com/support/documentation/NETLAB_Remote_PC_Guide_Vol_3_Configuring.pdf).

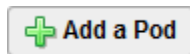
## 4.6 Create the Master VMware vSphere ICM 5.5 Pod

This section will assist you in adding the VMware vSphere ICM 5.5 Pod to your NETLAB+ system.

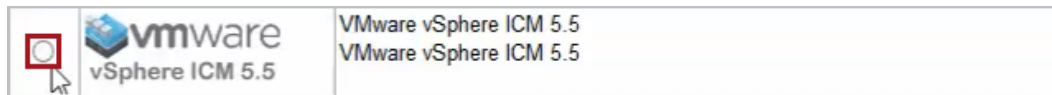
1. Login into NETLAB+ with the administrator account.
2. Select the **Equipment Pods** link.



3. Create a new pod by scrolling to the bottom and clicking the **Add a Pod** button.



4. On the New Pod Wizard, page click **Next**.
5. Then select the VMware vSphere ICM 5.5 pod radio button and click **Next**.



6. Select a Pod ID and click **Next**.

It is best practice to use a block of sequential ID numbers for the number of pods you are going to install. The Pod ID number determines the order in which the pods will appear in the scheduler.

7. Type in **vSphere\_ICM\_55\_Master** for the Pod Name and click **Next**.
8. To finalize the wizard click **OK**.

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

[http://www.netdevgroup.com/support/documentation/NETLAB\\_Administrator\\_Guide.pdf](http://www.netdevgroup.com/support/documentation/NETLAB_Administrator_Guide.pdf).



## 4.7 Update the Master Pod

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

1. Update the master pod on your NETLAB+ system.
  - a. Login into NETLAB+ with the administrator account.
  - b. Select the **Equipment Pods** link.



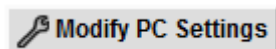
2. Select VMware vSphere ICM 5.5 master pod.

	<b>1000</b>	<b>vmware</b> vSphere ICM 5.5	vSphere_ICM_55_Master	OFFLINE	IDLE
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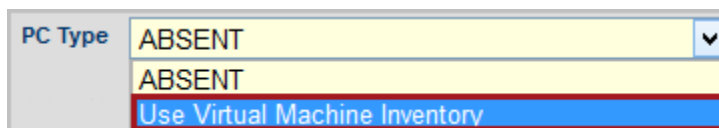
3. Click on the Magnifying Glass icon next to the first VM. Please note that your PC IDs will not match the graphic below.

POD 1000 - PCs AND SERVERS (click the GO buttons to reconfigure)						
GO	NAME	PC ID	STATUS	TYPE / VM	OPERATING SYSTEM	
	Client	4100	ONLINE	ABSENT		
	vCenter	4101	ONLINE	ABSENT		
	ESX01	4102	ONLINE	ABSENT		
	ESX02	4103	ONLINE	ABSENT		
	SAN	4104	ONLINE	ABSENT		

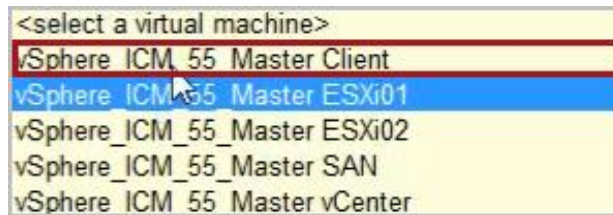
4. Click on Modify PC Settings.



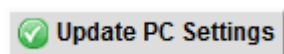
5. Change the PC Type drop down box to **Use Virtual Machine Inventory**.



6. In the Base Virtual Machine drop-box, select the corresponding virtual machines from the inventory.



7. Update **Base Snapshot** to your *GOLDEN\_MASTER* snapshot.
8. Review the information on the screen and click **Update PC Settings**.



9. Click on **Show Pod**.
10. Repeat steps 3-9 for the remaining virtual machines.

Make sure the pod status is **Offline** prior to continuing. The cloning process requires the pod be offline. Since this is our master pod, which is used for cloning other pods, we will keep it offline to create the instructor and student pods from.

## 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.

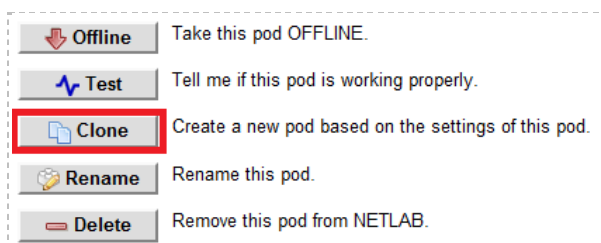
### 5.2 Creating User Pods on the First Host

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. Login into NETLAB+ with the administrator account.
2. Select the **Equipment Pods** link.



3. Click on your master pod.
4. Click the **Clone** button to create a new pod based on the settings of this pod.



5. Select the New Pod ID. 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.
6. Click **Next**.
7. Enter a New Pod Name. For example, **vSphere\_ICM\_55\_Pod\_01**. Click **Next**.
8. When the action has finished processing, a settings screen will be present.

PC Name	Source Virtual Machine	Source Snapshot	Clone Name	Clone Type	Clone Role	Runtime Host or Group	Clone Datastore	Storage Allocation
Client	vSphere_ICM_55_Master Client	GOLDEN_MASTER	vSphere_ICM_55_Pod01 Clen	Linked	Normal	Host 192.168.0.12	NFS	On Demand
vCenter	vSphere_ICM_55_Master vCenter	GOLDEN_MASTER	vSphere_ICM_55_Pod01 vCen	Linked	Normal	Host 192.168.0.12	NFS	On Demand
ESX01	vSphere_ICM_55_Master ESX01	GOLDEN_MASTER	vSphere_ICM_55_Pod01 ESX01	Linked	Normal	Host 192.168.0.12	NFS	On Demand
ESX02	vSphere_ICM_55_Master ESX02	GOLDEN_MASTER	vSphere_ICM_55_Pod01 ESX02	Linked	Normal	Host 192.168.0.12	NFS	On Demand
SAN	vSphere_ICM_55_Master SAN	GOLDEN_MASTER	vSphere_ICM_55_Pod01 SAN	Linked	Normal	Host 192.168.0.12	NFS	On Demand

9. The three key columns for this master pod clone are Source Snapshot, Clone Type and Clone Role. The following settings should be applied to all 3 virtual machines:
  - a. Source Snapshot should be set to the **GOLDEN\_MASTER** snapshot you created previously.
  - b. Under Clone Type, verify that **Linked** is selected.
  - c. Under Clone Role, verify that **Normal** role is selected.
10. When you are done changing settings, Click **Clone Pod**. This should complete within a minute as we are creating linked virtual machines.
11. When the pod clone process is finished, click **OK**.
12. Since this is a normal pod, the virtual machines will revert to snapshot upon boot up or shutdown of each pod. You will need to make a **GOLDEN\_MASTER** snapshot of every virtual machine in each pod created. Please see Section 4.3 Create Snapshots for the Master Virtual Machines for additional information regarding snapshot creation.
13. If you want to dedicate this pod to a particular class, team, or student, use the Pod Assignment feature. For details, see the [NETLAB+ Pod Assignment Guide](#).
14. Click the **Online** Button in the Pod Management page to activate the pod.

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.

**Time Saver:** If you clone the 1st user pod instead of the master pod, the defaults will all be set correctly, and you will not have to change the Clone Type or Clone Role each time. NETLAB+ will still assume you want to link to the master VMs as masters are ranked higher than normal or persistent VMs in the default pod cloning selections.

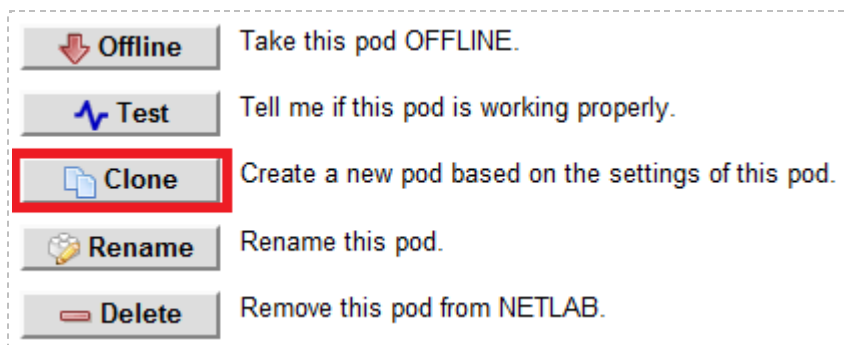
### 5.3 Copying Your Master Pod to the Second Host

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

1. Login into NETLAB+ with the administrator account.
2. Select the **Equipment Pods** link.



3. Click on the master pod that was created on the 1st VMware host server.
4. Click the **Clone** button to create a new pod based on the settings of this pod.



5. Select the New Pod ID.

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.

6. Click **Next**.
7. Enter a New Pod Name. For example, **CourseName\_Master\_Pod\_2** then Click **Next**.
8. When the action has finished processing, a settings screen will be present.

PC Name	Source Virtual Machine	Source Snapshot	Clone Name	Clone Type	Clone Role	Runtime Host or Group	Clone Datastore	Storage Allocation
Client	vSphere_ICM_55_Master Client	GOLDEN_MASTER	vSphere_ICM_55_Pod01 Client	Linked	Normal	2nd Host	NFS	On Demand
vCenter	vSphere_ICM_55_Master vCenter	GOLDEN_MASTER	vSphere_ICM_55_Pod01 vCent	Linked	Normal	2nd Host	NFS	On Demand
ESX01	vSphere_ICM_55_Master ESX01	GOLDEN_MASTER	vSphere_ICM_55_Pod01 ESX01	Linked	Normal	2nd Host	NFS	On Demand
ESX02	vSphere_ICM_55_Master ESX02	GOLDEN_MASTER	vSphere_ICM_55_Pod01 ESX02	Linked	Normal	2nd Host	NFS	On Demand
SAN	vSphere_ICM_55_Master SAN	GOLDEN_MASTER	vSphere_ICM_55_Pod01 SAN	Linked	Normal	2nd Host	NFS	On Demand

9. The four key columns for this master pod clone are Source Snapshot, Clone Type and Clone Role, and Runtime Host.
  - a. Source Snapshot should be set to the **GOLDEN\_MASTER** snapshot you created previously.
  - b. Under Clone Type, click the dropdown menu and verify that **Full** is selected.
  - c. Under Clone Role, click the dropdown menu and select **Master**.
  - d. Under Runtime Host, select the 2nd host system (which should be different than the system you are cloning from).
10. 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.

The NETLAB+ software does not automatically create the snapshots on the virtual machines. It is necessary to create the snapshots manually as you did in a previous section.

11. When the cloning process is complete, you should create a GOLDEN\_SNAPSHOT on each virtual machine in the second master pod.

#### 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 (section 5.2), substituting the second master pod (created in the previous section) as the cloning source.

## 6 Assigning Pods to Students, Teams , or Classes

Please refer to the [NETLAB+ Pod Assignment Guide](#) for details on using the Pod Assignment feature.