Red Hat OpenStack Administration Pod

Installation and Configuration Guide

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Installation of *Red Hat OpenStack Administration* virtual pods as described in this guide requires that your *NETLAB+ VE* system is equipped with software version **17.2.7 or later**.

Contents

1   Introduction

This document provides detailed guidance on performing the installation and configuration of the Red Hat OpenStack Administration pod on the *NETLAB+ VE* system.

1.1   Introducing the Red Hat OpenStack Administration Pod

The *Red Hat OpenStack Administration* pod is a 100% virtual machine pod consisting of 4 virtual machines. Linked together through virtual networking, these 4 virtual machines provide the environment for a student or a team to perform the *Red Hat OpenStack Administration I (CL110)* labs.
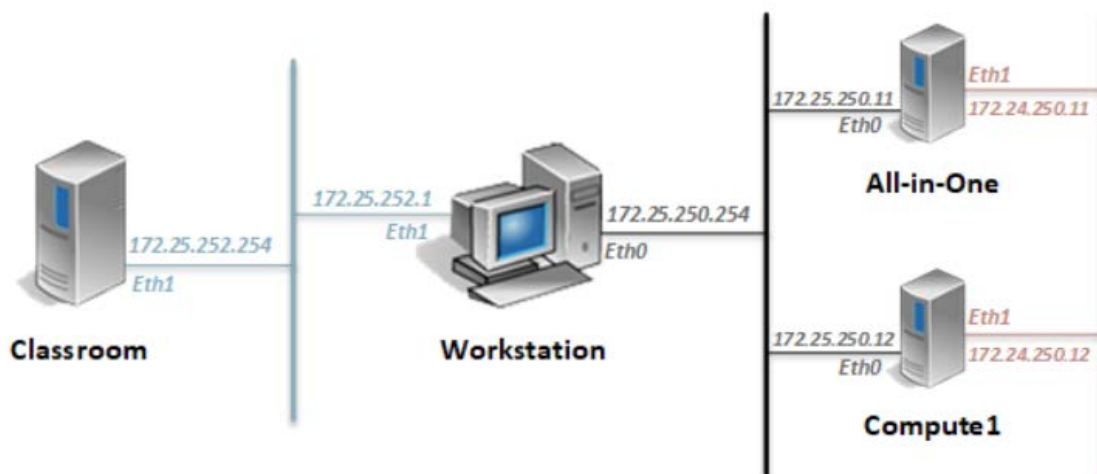
2   Planning

This guide provides specific information pertinent to delivering the *Red Hat OpenStack Administration* 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**.
      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 Red Hat OpenStack Administration course will consume *29.2 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 Provisioning)
All-in-One	4.57	8
Classroom	12.1	13.2
Compute1	0.496	1.2
Workstation	4.05	6.8
Total	**21.22 GB**	**29.2 GB**

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 deployment of the *Red Hat* VMs from the *Red Hat OpenStack Administration* pod

requires a *VMware Version* of **5.1** at minimum due to the *Hardware Version* of the *Red Hat VMs (version 9)*.

> **Please Note**
>
> 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.

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 *Red Hat OpenStack Administration* pods, as described in this guide, requires that your *NETLAB+* system is equipped with *NETLAB+ VE* version **17.2.7 or later**.

Previous versions of *NETLAB+* do not support requirements for the *Red Hat OpenStack Administration* course on the physical host servers.

Please refer to the [NETLAB+ Remote PC Guide Series](#).

2.5   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	5.1
vCenter Server	5.1

2.6   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, Red Hat Academy, Palo Alto 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.

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 Web Client** using your management workstation, ensure that your downloaded *OVA/OVF* files are accessible on this machine and then connect to your **vCenter Server**.
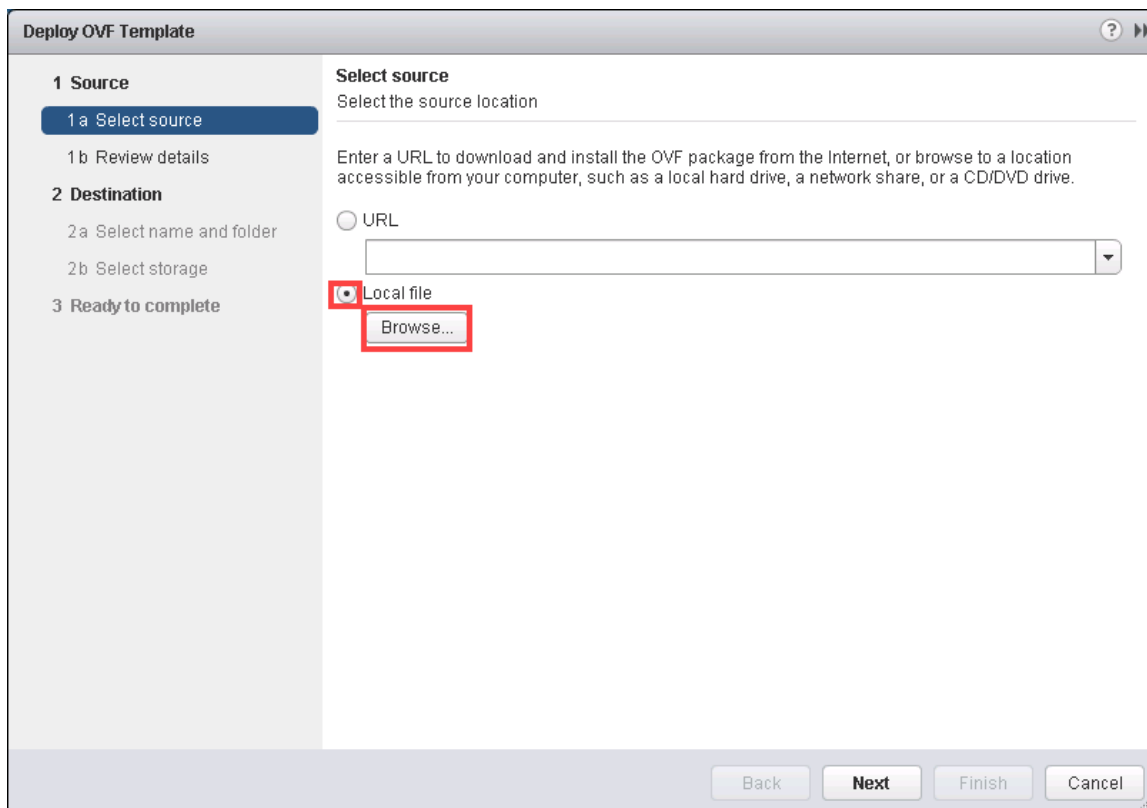2. From the *vSphere Web Client* dashboard, select **Hosts and Clusters**.
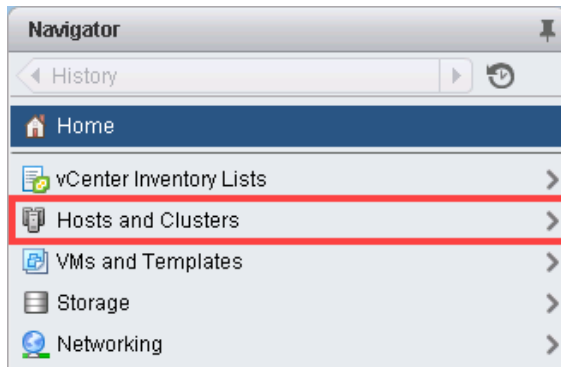
3. Right-click on the target **ESXi Host Server** and select **Deploy OVF Template**.
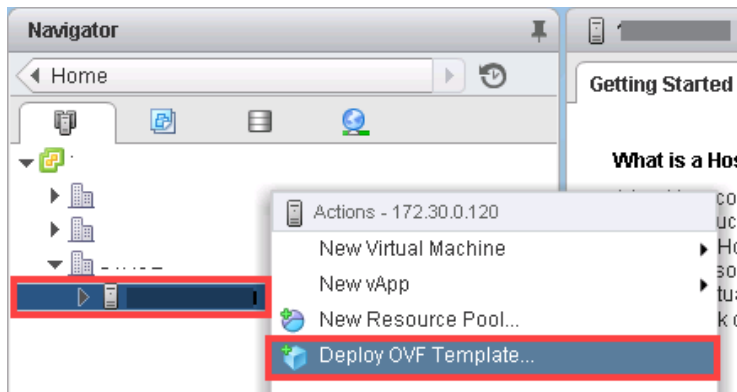
4. In the *Deploy OVF Template* window, on the *Select source* section, select the **Local File** radio button and click **Browse**.


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.
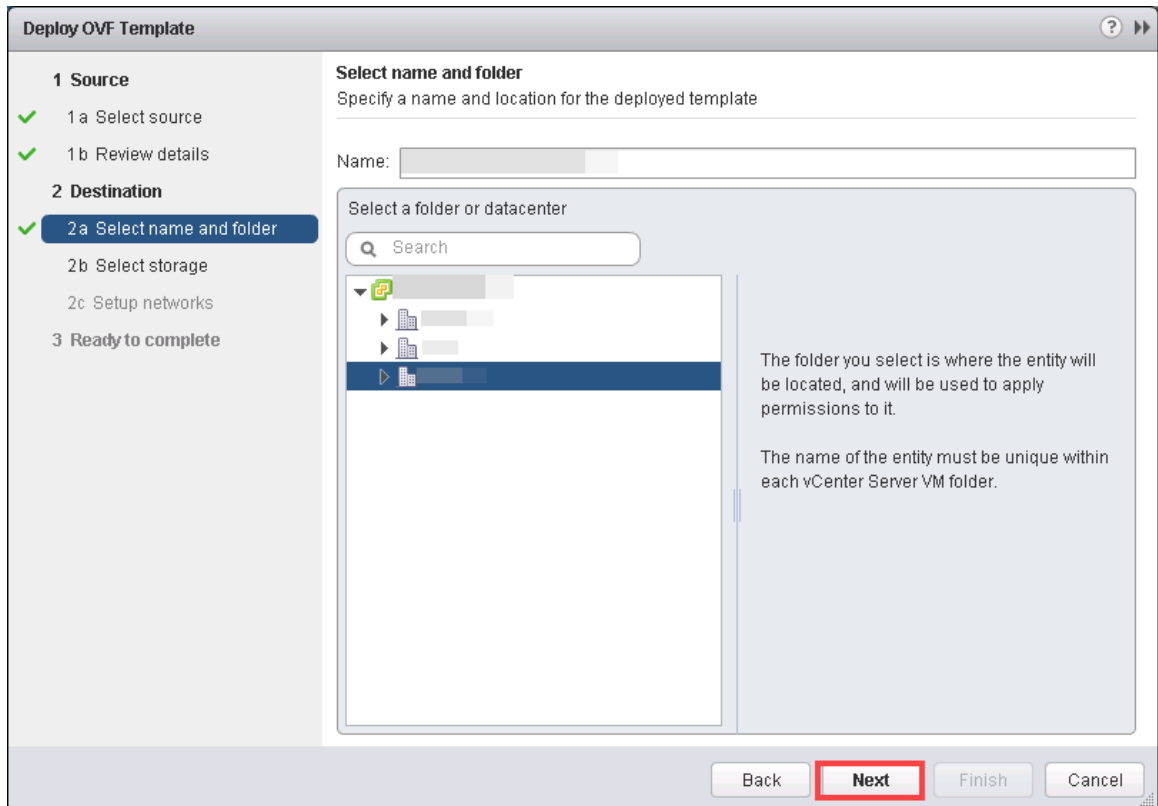
6. Verify that the VM file path and name appears next to the *Browse* button and click **Next**.

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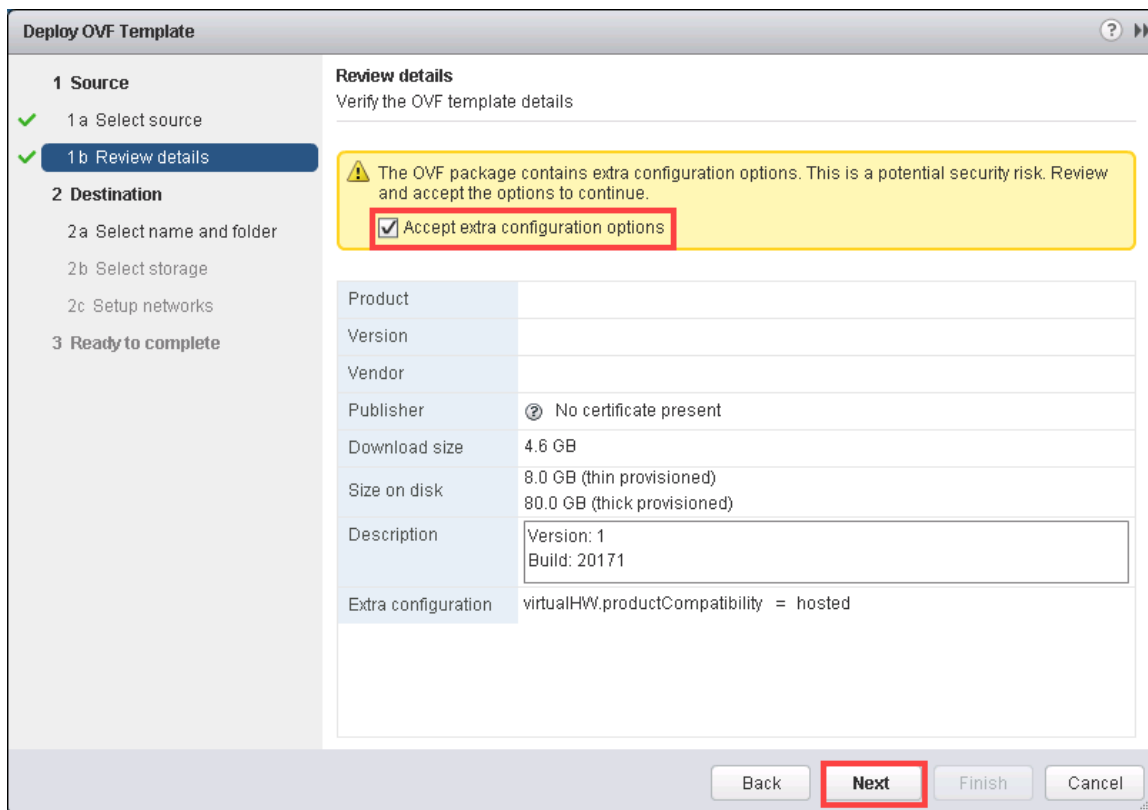
8. In the *Select name and folder* section, change the name of the virtual machine to something that is easy to manage. You can use the names provided in the list below as names for the virtual machines if you do not have a set naming convention. Select the appropriate datastore and click **Next**.

Virtual Machine Topology Name	Virtual Machine Deployment Name
All-in-One	RHOSA_Master_Allinone
Classroom	RHOSA_Master_Classroom
Compute1	RHOSA_Master_Compute1
Workstation	RHOSA_Master_Workstation

9. In the *Select Storage* section, select **Thin Provision** and choose the appropriate storage device. Click **Next**.

10. In the *Setup 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.

4.2   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, verify the configurations. 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. 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
All-in-One	1	52:54:00:00:FA:0B
	2	52:54:00:01:FA:0B
Classroom	1	00:50:56:8A:0B:E2
	2	52:54:00:00:00:FE
Compute1	1	52:54:00:00:FA:0C
	2	52:54:00:01:FA:0C
Workstation	1	52:54:00:00:FA:FE
	2	52:54:00:01:FC:01
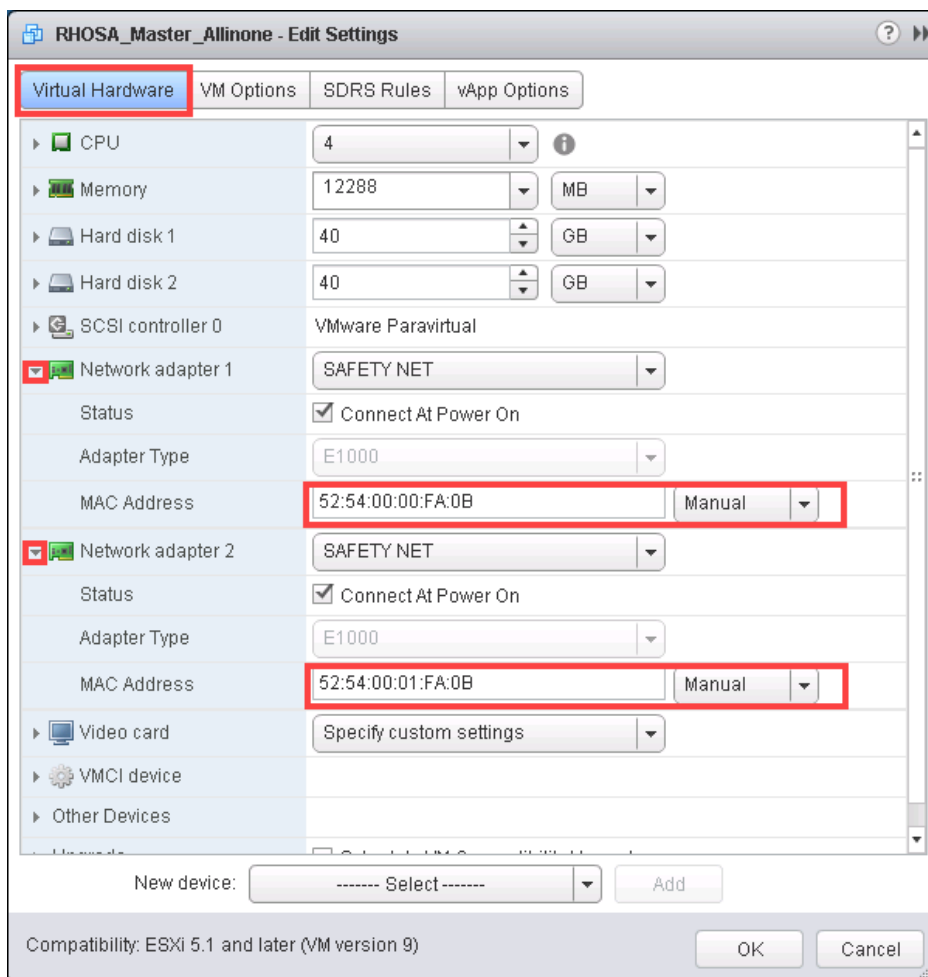
3. Repeat the previous steps for each of the remaining virtual machines in the master pod.

4. Verify that *hardware virtualization* is exposed to the **All-in-One** and **Compute1** VMs by using the **Edit Settings** tool.
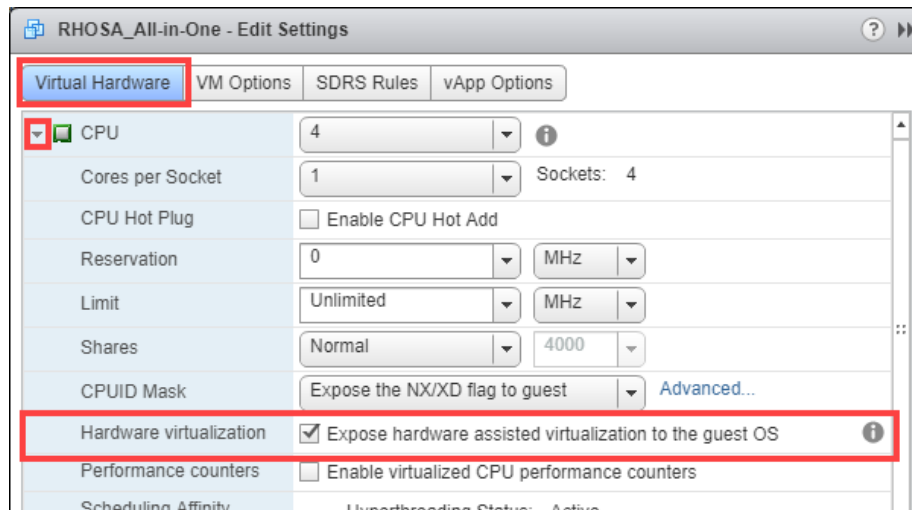
> **Please Note**
>
> The hardware virtualization configuration setting can only be modified using the *vSphere Web Client* and not the traditional thick client (*C#*).

4.2.2 VM Credentials

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

Machine	User name	Password
All-in-One	root	redhat
Classroom	n/a	n/a
Compute1	root	redhat
Workstation	student	student

4.3 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.

4.4   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+ VE* system using the administrator account.
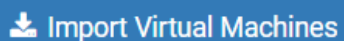2. Select the **Virtual Machine Infrastructure** icon.

**Virtual
Machine
Infrastructure**

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

⬇ Import Selected Virtual Machines
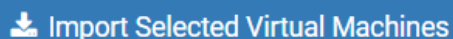
7. When the *Configure VMs* window loads, you can set your virtual machine parameters.

    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 (4) 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*.

4.5 Create the Master Red Hat OpenStack Administration Pod

This section will assist you in adding the *Red Hat OpenStack Administration* pod to your *NETLAB+* system.

1. Login into **NETLAB+ VE** with the *administrator* account.
2. Select the **Pods** icon.

Pods

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

⊕ Create New Pod

4. On the *New Pod Wizard*, page click **Next**.
5. Then click on the **Red Hat OpenStack Administration** pod entry.

🔴 **redhat**
OpenStack Admin

Red Hat OpenStack Administration
Red Hat OpenStack Administration
2017
http://www.netdevgroup.com/support/

6. On the *New Pod* window, input a value into the **Pod ID** field.

> 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 `Red_Hat_OpenStack_Master` for the *Pod Name* and click **Next**.
8. To finalize the wizard, click **OK**.

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

4.6   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+ VE** with the *administrator* account.
   b. Select the **Pods** link.

2. Select **Red Hat OpenStack Administration** master pod from the pod list.

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

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

💻 AllinOne (select virtual machine)				Search
Virtual Machine Name ▲	**Operating System** ⇕	**Role** ⇕	**Datacenter** ⇕	**Runtime Host/Group** ⇕
🖥 RHOSA_Master_Allinone	Linux	Master		
🖥 RHOSA_Master_Classroom	Linux	Master		
🖥 RHOSA_Master_Compute1	Linux	Master		
🖥 RHOSA_Master_Workstation	Linux	Master		

5. On the virtual machine's settings page, verify the information and make sure that the *Base Snapshot/Revert to Snapshot* is set to **GOLDEN_MASTER**. To configure, click on the **Settings** button.

⚙ Settings

6. Modify the settings for the virtual machine and click **Submit**.

✓ Submit

7. Once redirected back to the master pod view, repeat the previous steps 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.

4.7   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. Login into **NETLAB+ VE** with the *administrator* account.

2. Select the **Pods** link.

3. Select **Red Hat OpenStack Administration** master pod from the pod list.

| 1 | redhat OpenStack Admin | Red_Hat_Openstack_Master |

4. Click on the **Action** dropdown next to the virtual machine you are about to assign and select **Snapshots**.

	PC Name	VM	Operating System	VM Role	Runtime Host	Action
	AllinOne	RHOSA_Master_Allinone	Linux	MASTER	172.30.0.120	▼
	Classroom	RHOSA_Master_Classroom	Linux	MASTER	1	👁 View ⚙ Settings
	Compute1	RHOSA_Master_Compute1	Linux	MASTER	1	➕ Attach VM ➖ Remove VM From...
	Workstation	RHOSA_Master_Workstation	Linux	MASTER	1	📷 Snapshots

5. In the *Snapshot Manager* window, click on **Take**.
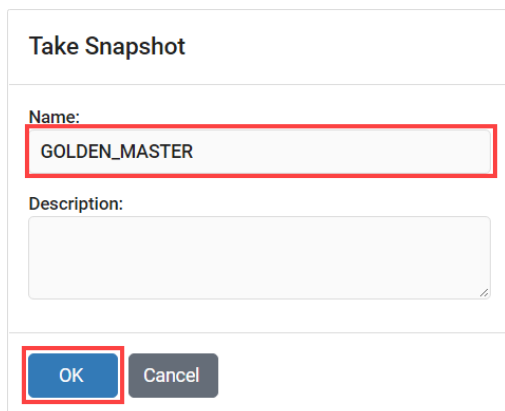
6. In the *Take Snapshot* window, type `GOLDEN_MASTER` into the *Name* field and click **OK**.
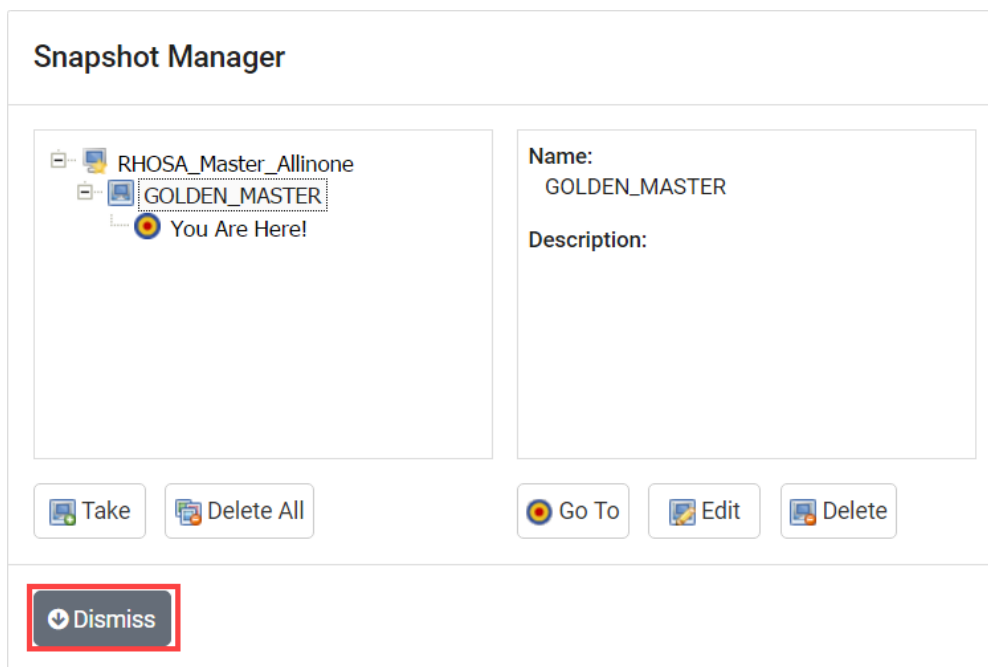
Take Snapshot

Name:

GOLDEN_MASTER

Description:

OK   Cancel

7. Notice the new snapshot appear in the *Snapshot Manager*. Click **Dismiss**.

Snapshot Manager

RHOSA_Master_Allinone
 GOLDEN_MASTER
  You Are Here!

Name:
 GOLDEN_MASTER

Description:

Take   Delete All   Go To   Edit   Delete

Dismiss

8. Repeat the previous steps for the remaining VMs in 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. Login into **NETLAB+ VE** with the *administrator* account.
2. Select the **Pods** icon.

3. Click on your master pod.
4. Click the **Clone Pod** button to create a new pod based on the settings and snapshots of this pod.
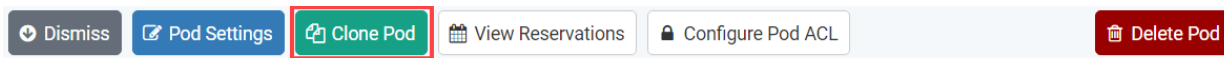
5. Input a new ID value into the **New Pod ID** field. It is advised to keep the pods in numerical order. If the pod IDs are not in numerical order, they will not show up in the scheduler in numerical order. Click **Next**.
6. Enter a name for the cloned pod into the **New Pod Name** field. For example, **Red_Hat_OpenStack_Pod1**. Click **Next**.

7. 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 **Normal** role is selected.
    c. For Take Snapshot, verify that **GOLDEN_MASTER** s inputted.

8. When you are done changing settings, click **Clone Pod**. This should complete within a minute as we are creating linked virtual machines.
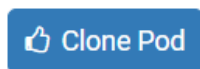
9. When the pod clone process is finished, click **OK**.
10. If you want to dedicate this pod to a particular class, team, or student, use the *Pod ACLs* feature. For details, see the [NETLAB+ VE Instructor Guide](#).
11. Click the **Online** Button in the *Pod Management* page to activate the pod.

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.
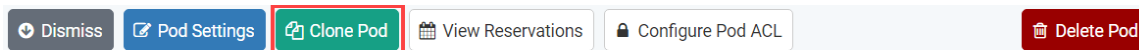
5.3   Copying Your Master Pod to the Second Host

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 **Pods** icon.

Pods

3. Click on the master pod.
4. 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 |

5. 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**.
6. Enter a name for the cloned pod into the **New Pod Name** field. For example, **Red_Hat_OpenStack_Master2**. Click **Next**.
7. 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 **Master** role is selected.
   c. For Take Snapshot, verify that **GOLDEN_MASTER** s inputted.
   d. For *Runtime Host*, select the second host system (which should be different than the system you are cloning from).

8. 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.
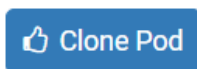
9. When the pod clone process is finished, click **OK**.

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 (*Section 5.2 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.