POD INSTALLATION AND CONFIGURATION GUIDE

Python Security

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Contents

1 Introduction

This document provides detailed guidance on performing the installation and configuration of the Python Security pod on the NETLAB+ system.

1.1 Introducing the Python Security Pod

The Python Security pod is a 100% virtual machine pod consisting of 2 virtual machines. Linked together through virtual networking, these 2 virtual machines provide the environment for a student or team to perform the Python Security labs.
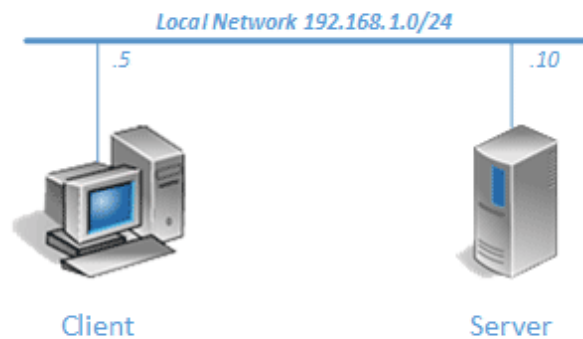
2   Planning

This guide provides specific information pertinent to delivering the Python Security course. 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. 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.
5. Create copies of the virtual machines in the master pod on a VMware host using the NETLAB+ Pod Cloning feature.
6. 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   Python Security Pod Resource Requirements

The course will consume 16.5 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	10
Server	6.5
Total Recommended	**16.5 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 number of **active** pods that can be used simultaneously depends on the NETLAB+ product edition, appliance version and number of VMware ESXi host servers meeting the hardware requirements specifications.

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

2.4   NETLAB+ Requirements

Installation of Python Security pods, as described in this guide, recommends that your NETLAB+ system is equipped with NETLAB+ version 2015.R1.final or later.

Previous versions of NETLAB+ do not support the requirements for the Python Security course on the physical host servers.

For additional information regarding NETLAB+ requirements, please see: http://www.netdevgroup.com/content/cybersecurity/requirements/

Please also refer to: *NETLAB+ Remote PC Guide Series*

> Please verify that your NETLAB+ system is running NETLAB+ version **2015.R1.final** or later, prior to upgrading your VMware ESXi servers to version 5.1.

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 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.

Two standard networking models are used to interconnect your servers, which are described in detail in the *Networking Models* section of the *Remote PC Guide Series – Volume 1*.

3   Obtaining Software and Licenses

3.1   Downloading OVF Files

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 vClient 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. Open the vClient on your administration machine where you downloaded the
   files from NDG. Connect to your vCenter Server.
2. Select **Hosts and Clusters** in the address bar.
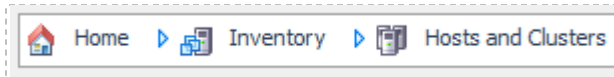
3. Click on the first ESXi Host Server.
4. Click on **File -> Deploy OVF Template.**
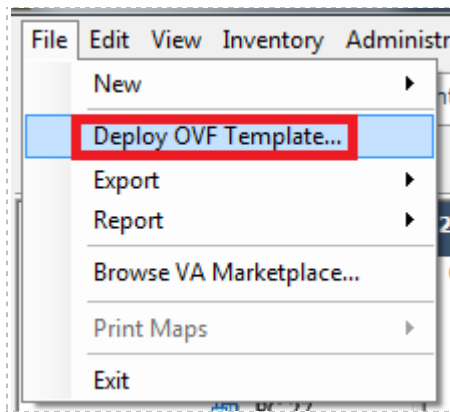
5. Click on **Browse** and locate the OVF/OVA file you downloaded from CSSIA. Click
   Next to continue.
6. On the OVF Template Details window, click **Next.**

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
Client	NISGTC_PySec_Master_Client
Server	NISGTC_PySec_Master_Server

8. On the Datastore window, select the appropriate datastore and click **Next**.
9. On the Disk Format window, select **Thin provisioned** format and click **Next.**
10. On the Network Mapping window, ensure SAFETY NET is selected for all Destination Networks.

> If SAFETY NET is not available, please refer to the *NETLAB+ Remote PC Guide - Volume 3* for the installation and configuration of the virtual network.
>
> 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**.
14. Repeat steps 4 – 13 for the remaining virtual machine files.

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 Network Interface Cards (NIC's) MAC address via the VMware vSphere 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. 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
Client	1	00:50:56:9c:9e:df
Server	1	00:50:56:9a:69:32
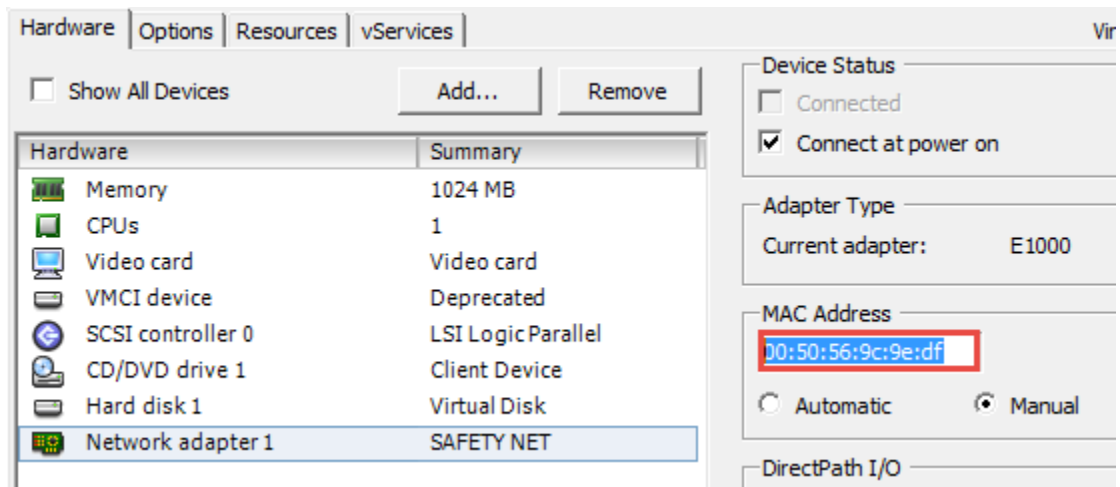
3. Repeat steps 1 – 2 for each of the virtual machines in the pod.

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
Client	sysadmin	Train1ng$
Server	sysadmin	Train1ng$

This pod utilizes open source technology and so license activations will not be needed.

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.
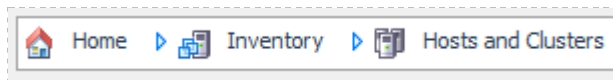
3. Right-click on each virtual machine and select **Snapshot > Take Snapshot**.
4. Enter **GOLDEN_MASTER** as the Snapshot Name.
5. Enter a description. It is a good idea to include the date in the description for later reference.
6. Click **OK**.
7. Repeat Steps 3-6 for the remaining virtual machines 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 *Remote PC Guides for NETLAB+*:

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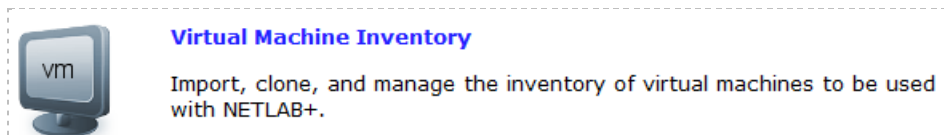
4. Click the **Import Virtual Machines** button.

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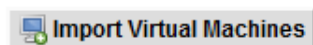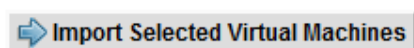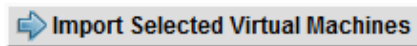   c. Add any comments for each virtual machine in the box to the right.
    d. Verify your settings and click **Import Selected Virtual Machines**.

    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*.

4.6   Install the Master Python Security Pod

This section will assist you in adding the Python Security 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.
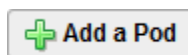
4. On the New Pod Wizard page, click **Next**.
5. Then select the NISGTC Python Security pod radio button and click **Next**.
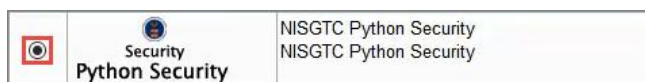
6. Select a Pod ID and click **Next**.

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

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

4.7   Update 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 Python Security master pod.

3. Click on the **Magnifying Glass** icon next to the first VM. Please note that your PC IDs will not match the graphic below.

4. Click on **Modify PC Settings**.
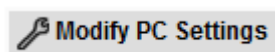
5. Change the PC Type drop-down box to **Use Virtual Machine Inventory**.

PC Type	ABSENT ▾
	ABSENT
	Use Virtual Machine Inventory
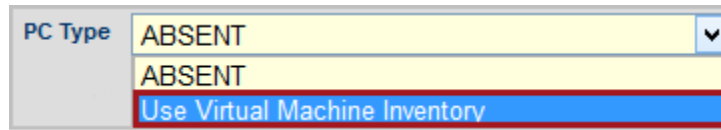
6. In the Base Virtual Machine window, select the corresponding virtual machine from the inventory.

Select the base virtual machine that will be used for this PC.
<select a virtual machine> ▾
<select a virtual machine>
NISGTC_PySec_Master_Client
NISGTC_PySec_Master_Server
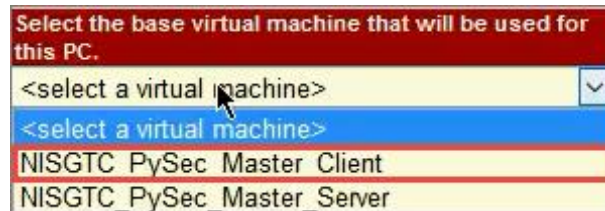
7. Update **Base Snapshot** to your *GOLDEN_MASTER* snapshot.
8. Review the information on the screen and click **Update PC Settings**.

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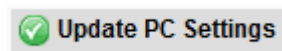
9. Click on **Show Pod**.
10. Repeat steps 3 - 9 for the remaining virtual machines.

> Make sure the pod status is **Offline** prior to continuing. The cloning process requires the pod be offline, and since this is our master pod used for cloning other pods with, 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.

Equipment Pods

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

	Online	Bring this pod ONLINE and make it available for reservations.
Test	Tell me if this pod is working properly.
Clone	Create a new pod based on the settings of this pod.
Rename	Rename this pod.
Options	View and change special options for this pod.
Delete	Remove this pod from NETLAB.

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, **NISGTC_PySec_Pod01**. Click **Next**.
8. When the action has finished processing, a setting 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	NISGTC_PySec_Master_Client	GOLDEN_MASTER		NISGTC_PySec_Pod01 Client	Linked	Normal			On Demand
Server	NISGTC_PySec_Master_Server	GOLDEN_MASTER		NISGTC_PySec_Pod01 Serv	Linked	Normal			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 8 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 *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.
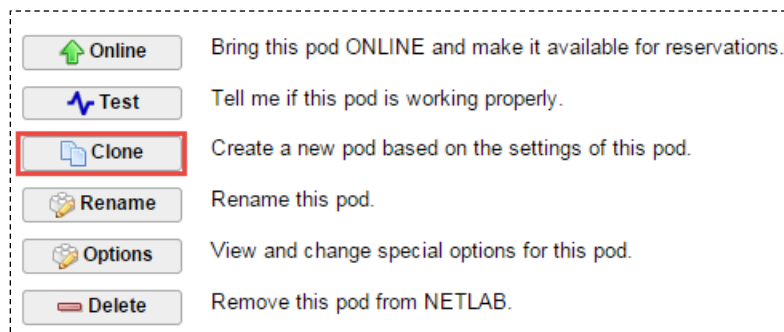
5.3   Copying Your Master Pod to the Second Host

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.

Equipment
Pods

3. Click on 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.

⬆ Online	Bring this pod ONLINE and make it available for reservations.
⋀ Test	Tell me if this pod is working properly.
⎗ Clone	Create a new pod based on the settings of this pod.
⚙ Rename	Rename this pod.
⚙ Options	View and change special options for this pod.
⊟ Delete	Remove this pod from NETLAB.

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, **NISGTC_PySec_Master2**. 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	NISGTC_PySec_Master_Client	GOLDEN_MASTER		NISGTC_PySec_Master2_Clier	Full	Master			On Demand
Server	NISGTC_PySec_Master_Server	GOLDEN_MASTER		GTC_PySec_Master2_Server	Full	Master			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_MASTER** snapshot on each virtual machine in the 2nd 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 *Pod Assignment Guide* for details on using the Pod Assignment feature.