Installation of Cisco IT Essentials v6 virtual pods as described in this guide requires that your NETLAB+ system is equipped with software version 2011.R5.final or later.
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1 Introduction

This document provides detailed guidance on performing the installation and configuration of the Cisco IT Essentials v6 pod on the NETLAB+ system.

1.1 Introducing the Cisco IT Essentials v6 Pod

The Cisco IT Essentials v6 pod is a 100% virtual machine pod consisting of 5 virtual machines. Linked together through virtual networking, these virtual machines provide the environment for a student or team to perform the Cisco IT Essentials v6 labs. The following image is the pod topology for this lab set.
2 Planning

This guide provides specific information pertinent to delivering the Cisco IT Essentials v6 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 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. 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), using the NETLAB+ Pod Cloning feature.
2.2 Pod Resource Requirements

The Cisco IT Essentials v6 course will consume 47 GB of storage per each user pod instance.

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

<table>
<thead>
<tr>
<th>Virtual Machine</th>
<th>OVA/OVF</th>
<th>Initial Master Pod (Thin Provisioning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win2012R2</td>
<td>4.1</td>
<td>8</td>
</tr>
<tr>
<td>Win7_1</td>
<td>3.1</td>
<td>7.5</td>
</tr>
<tr>
<td>Win7_2</td>
<td>3.3</td>
<td>7.5</td>
</tr>
<tr>
<td>Win81_1</td>
<td>6.7</td>
<td>13</td>
</tr>
<tr>
<td>Win81_2</td>
<td>6.1</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23.3 GB</strong></td>
<td><strong>47 GB</strong></td>
</tr>
</tbody>
</table>

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 the pods as described in this guide requires that your NETLAB+ system is equipped with NETLAB+ version 2011.R5 or later.

Previous versions of NETLAB+ do not support the use of VMware ESXi 5.1 on the physical host servers, which is required to support the installation and use of Cisco IT Essentials v6 pods on NETLAB+.

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

See also: 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.

<table>
<thead>
<tr>
<th>Virtual Infrastructure Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Software</strong></td>
</tr>
<tr>
<td>vSphere ESXi</td>
</tr>
<tr>
<td>vCenter Server</td>
</tr>
</tbody>
</table>

The following table lists the software that is required for the virtual machines inside the *Cisco IT Essentials v6* pod. Your organization needs to be a member of the vendor programs listed in the *Source* column to obtain and use the licenses.

<table>
<thead>
<tr>
<th>Pod Software Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Software</strong></td>
</tr>
<tr>
<td>Windows Server</td>
</tr>
<tr>
<td>Windows 7</td>
</tr>
<tr>
<td>Windows 8.1</td>
</tr>
</tbody>
</table>

2.6 Networking Requirements

To accommodate the movement of large VMs, OVA/OVFs and ISO disk images from one host to another, a gigabit Ethernet switch 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

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](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, EMC Academic Alliance, Red Hat Academy, and/or Palo Alto Networks Academy).
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 OVA/OVF Files

Deploy the virtual machine OVA/OVF files that you have downloaded on your host servers.

1. Open the vClient on your administration machine, ensure that your downloaded OVA/OVF files are accessible on this machine and then connect to your vCenter Server.
2. Select Hosts and Clusters in the address bar.
3. Click on the target ESXi Host Server.
4. Click on File > Deploy OVF Template.
5. Click on Browse and locate the OVA/OVF 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.

<table>
<thead>
<tr>
<th>Virtual Machine Topology Name</th>
<th>Virtual Machine Deployment Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win2012R2</td>
<td>Cisco_ITE_v6_Master_Win2012R2</td>
</tr>
<tr>
<td>Win7_1</td>
<td>Cisco_ITE_v6_Master_Win7_1</td>
</tr>
<tr>
<td>Win7_2</td>
<td>Cisco_ITE_v6_Master_Win7_2</td>
</tr>
<tr>
<td>Win81_1</td>
<td>Cisco_ITE_v6_Master_Win81_1</td>
</tr>
<tr>
<td>Win81_2</td>
<td>Cisco_ITE_v6_Master_Win81_2</td>
</tr>
</tbody>
</table>

8. On the Storage window, select the appropriate datastore and click Next.
10. On the Network Mapping window, ensure SAFETY NET is selected for all Destination Networks (If SAFETY NET is not available, refer to the Create a Safe Staging Network section in the Remote PC Guide Series – Volume 2). 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. Once completed, click on Close.
13. 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, 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 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.

<table>
<thead>
<tr>
<th>Virtual Machine</th>
<th>MAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win2012R2</td>
<td>00:50:56:00:00:12</td>
</tr>
<tr>
<td>Win7_1</td>
<td>00:50:56:00:07:01</td>
</tr>
<tr>
<td>Win7_2</td>
<td>00:50:56:00:07:02</td>
</tr>
<tr>
<td>Win81PC1</td>
<td>00:50:56:00:81:01</td>
</tr>
<tr>
<td>Win81PC2</td>
<td>00:50:56:00:81:02</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Machine</th>
<th>User name</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win2012R2</td>
<td>administrator</td>
<td>Train1ng$</td>
</tr>
<tr>
<td>Win7_1</td>
<td>ITEuser</td>
<td>cisco12345</td>
</tr>
<tr>
<td>Win7_2</td>
<td>ITEuser</td>
<td>cisco12345</td>
</tr>
<tr>
<td>Win81_1</td>
<td>ITEuser</td>
<td>cisco12345</td>
</tr>
<tr>
<td>Win81_2</td>
<td>ITEuser</td>
<td>cisco12345</td>
</tr>
</tbody>
</table>

4.3 Activate Virtual Machines

In order to enable all features of the Windows-based virtual machines, licenses will be required for activation. You will need to activate Microsoft Windows on the Windows-based virtual machines. This needs to be done prior to snapshot, pod assignment, and cloning.

There are two options for institutions to access Microsoft licenses. First option is by visiting the MSDN Subscription Portal. Second option is by accessing your institution's Kivuto WebStore via Microsoft Imagine.

For more information on obtaining Microsoft license keys, visit the following URL: https://catalog.imagine.microsoft.com/en-us/Institutions/Access

It is recommended to acquire the Multiple Activation Key (MAK) lab key license for a specified Windows product (reference Section 2.5). This type of key enables you to activate multiple installations of a product with the same key.

To identify and distinguish the different key types that Microsoft provides, refer to this link: https://msdn.microsoft.com/en-us/subscriptions/cc137104.aspx

Please note that activating licenses is only required on master pods. Doing a Link Clone of the master pod will preserve the activation on the cloned VMs in the user pods. It is important to note that when activating Windows, the VMs have temporary Internet access so that they can contact Microsoft Licensing Servers. There are multiple ways of providing temporary Internet access for VMs in a vSphere environment. The most common way is to temporarily assign the vNIC of the desired VM to connect to the virtual switch that is connected to an outside facing physical NIC.

For additional guidance on how to specifically activate Microsoft Windows products, Microsoft has written a KB article: https://support.microsoft.com/en-us/kb/950929
4.4 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**.
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.

4.5 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.
4.6 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 boxes next to your Cisco IT Essentials v6 virtual machines and click Import Selected Virtual Machines.

6. When the Configure Virtual Machines window loads, you can set your virtual machine parameters.
   a. Check the dropdown box for the correct operating system for each imported virtual machine.
   b. Change the Role to Master for each VM.
   c. Add any comments for each virtual machine in the box to the right.

   It is advised to leave the Version and Build numbers for reference when requesting NDG support.
d. Verify your settings and click **Import Selected Virtual Machines**.

![Import Selected Virtual Machines](importselectedvirtualmachines.png)

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*.

### 4.7 Create the Master Cisco IT Essentials v6 Pod

This section will assist you in adding the Cisco IT Essentials v6 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 **Cisco IT Essentials v6** 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 **Cisco_ITEv6_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*. 
4.8 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 the Cisco IT Essentials v6 master pod.

3. Click on the magnifying glass icon next to the virtual machine you are about to assign. Please note that your PC IDs will not match the graphic below.

4. Click on Modify PC Settings.

5. Change the PC Type dropdown box to Use Virtual Machine Inventory.
6. In the Base Virtual Machine dropdown, select the corresponding virtual machines from the Virtual Machine Inventory.

![Virtual Machine Inventory]

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. Since this is our master pod used for cloning other pods, we will keep it offline in order to use it to create the instructor and student pods.
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, **Cisco_ITEv6_Master_Pod1**. Click **Next**.

8. When the action has finished processing, you are presented with a settings screen.

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 the virtual machines in the pod:
   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** 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 in the master pod and retake the GOLDEN_MASTER snapshot before creating additional cloned 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 and Clone Role each time. The NETLAB+ system will still assume you want to link to the master VMs since 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 your 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, **Cisco_ITEv6_Master2**. Click **Next**.

8. When the action has finished processing, a settings screen will be present.

9. The four key columns for this master pod clone are **Source Snapshot**, **Clone Type**, **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 second host system (which should be different from 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/clone 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 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), targeting 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.