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1  Introduction

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

1.1  About the IT Essentials 5.0 Course

The Cisco ITE course provides an introduction to the computer hardware and software skills needed to help meet the growing demand for entry-level ICT professionals. The curriculum covers the fundamentals of computer hardware and software as well as advanced concepts such as security, networking, and the responsibilities of an ICT professional.

1.2  Using NETLAB+ to Deliver IT Essentials 5.0

NDG has partnered with Cisco Networking Academy® to enable NETLAB+ support of the Cisco ITE course. The use of NETLAB+ provides an opportunity for educational organizations seeking a scalable, cost effective solution to offer access to the technology required for the Cisco ITE course, which introduces students to computer support technologies and equips them with valuable technical skills.
1.3 Introducing the IT Essentials 5.0 Pod

The NDG ITE pod is a 100% virtual machine pod consisting of seven virtual machines. Linked together through virtual networking, these seven virtual machines provide the environment for a student or team to perform the Cisco ITE labs.

<table>
<thead>
<tr>
<th>Virtual Machine</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 7 PC 1</td>
<td>Student operations</td>
</tr>
<tr>
<td>Windows 7 PC 2</td>
<td>Student operations</td>
</tr>
<tr>
<td>Windows Vista PC 1</td>
<td>Student operations</td>
</tr>
<tr>
<td>Windows Vista PC 2</td>
<td>Student operations</td>
</tr>
<tr>
<td>Windows XP PC 1</td>
<td>Student operations</td>
</tr>
<tr>
<td>Windows XP PC 2</td>
<td>Student operations</td>
</tr>
<tr>
<td>Windows Server</td>
<td>Web Server, DHCP, DNS, and other services required to complete labs</td>
</tr>
</tbody>
</table>
2 Planning

This guide provides specific information pertinent to delivering the Cisco ITE 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 IT Essentials 5.0 Environment

The following diagram depicts four major components that make up the ITE training environment.

1. The NETLAB+ server provides the user interface for student and instructor access, an interface to manage virtual machines, and software features to automate pod creation. This document assumes you have already setup your NETLAB+ server.
2. VMware vCenter is used to manage your physical VMware ESXi servers, to
create virtual machines, and to take snapshots of virtual machines. NETLAB+ communicates with vCenter to perform automated tasks and virtual machine management.

3. Physical VMware ESXi servers host the virtual machines in your pods. The host servers' capabilities are identified in section 2.5.

4. The ITE pod consists of seven virtual machines that reside on your ESXi host(s).

### 2.2 Setup Tasks

The following is a summary of the setup tasks in this document.

1. Obtain virtual machine packages (OVF/OVA).
2. Deploy virtual machines for the Master Pod.
3. Attach virtual machines to NETLAB+.
4. Replicate ITE pods using the pod-cloning feature.
5. Assign ITE pods to students or instructors.

### 2.3 IT Essentials 5.0 Pod Creation Workflow

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

1. The ITE virtual machine packages are distributed by CSSIA.
2. Master VMs are created from the deployed virtual machines. The master VMs are added to a Master pod. *A Golden Snapshot* of the Master pod is taken, which becomes the foundation to clone ITE User pods.
3. The NETLAB+ pod cloning feature is used to quickly create copies from the ITE Master Pod on the first VMware host.
4. A full replica of the ITE Master Pod on Host A is made on Host B, using the NETLAB+ Pod Cloning Feature.
5. The cloning feature is used to quickly create ITE pods from the ITE Master Pod on Host B.
2.4 Pod Resource Requirements

The IT Essentials 5.0 course will consume 80 GB of storage per each user pod instance.

Details of the storage requirements for each of the lab virtual machines are provided in the tables below.

<table>
<thead>
<tr>
<th>Virtual Machine</th>
<th>Initial Master Pod (using full clones) GB</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIN7-PC1</td>
<td>16</td>
</tr>
<tr>
<td>WIN7-PC2</td>
<td>16</td>
</tr>
<tr>
<td>WINVISTA-PC1</td>
<td>11</td>
</tr>
<tr>
<td>WINVISTA-PC2</td>
<td>11</td>
</tr>
<tr>
<td>WINXP-PC1</td>
<td>5</td>
</tr>
<tr>
<td>WINXP-PC2</td>
<td>5</td>
</tr>
<tr>
<td>WIN2008</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total Recommended</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>

2.5 ESXi Host Server Requirements

The number of active pods that can be used simultaneously depends on the NETLAB+ product edition and the number of VMware ESXi host servers meeting the hardware requirements specifications below. The following table shows the number of active pods (students or teams) that can be scheduled at the same time. **You may provision more pods than the active limit.**

For current ESXi server requirements 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).

<table>
<thead>
<tr>
<th>NETLAB+ Edition</th>
<th>Number of VMware ESXi Servers</th>
<th>Active Pods (Dell R710)</th>
<th>Active Pods (Dell R720)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academy Edition</td>
<td>1</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Professional</td>
<td>3</td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>
2.6 NETLAB+ Requirements

Installation of ITE 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 ITE Pods on NETLAB+.

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

Please verify that your NETLAB+ system is running NETLAB+ version 2011.R5 or later, prior to upgrading your VMware ESXi servers to version 5.1.

2.7 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.

<table>
<thead>
<tr>
<th>Software</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>vSphere ESXi</td>
<td>5.1</td>
</tr>
<tr>
<td>vCenter Server</td>
<td>5.1</td>
</tr>
</tbody>
</table>

The pod software requirements as shown in the following table lists the licensed software that is required for virtual machines inside the ITE pod. Your organization needs to be a member of the vendor programs listed in the source column to obtain and use the licenses appropriately.

<table>
<thead>
<tr>
<th>Software</th>
<th>Version</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows Server</td>
<td>2008 R2</td>
<td>Dreamspark</td>
</tr>
<tr>
<td>Windows 7</td>
<td>Professional</td>
<td>Dreamspark</td>
</tr>
<tr>
<td>Windows Vista</td>
<td>Business</td>
<td>Dreamspark</td>
</tr>
<tr>
<td>Windows XP</td>
<td>SP3</td>
<td>Dreamspark</td>
</tr>
</tbody>
</table>
2.8 Networking Requirements

To accommodate the movement of large VMs, OVF/OVAs 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

NDG has built the virtual machines, 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, 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 IT Essentials 5.0 Pod Configuration

4.1 Deploying Virtual Machine OVF/OVA Files

The OVF/OVA files that you downloaded from CSSIA must be deployed to your host server.

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 to CITE_Master. Click Next.
8. On the Datastore window, select the appropriate datastore and click Next.
10. On the Network Mapping window, select SAFETY NET. Click Next.

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. Use the MAC addresses in the following table and statically apply them to the NIC of the associated virtual machine.

<table>
<thead>
<tr>
<th>Virtual Machine</th>
<th>MAC Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>CiscoITE_Win2008</td>
<td>00:50:56:90:ce:38</td>
</tr>
<tr>
<td>CiscoITE_Win7-PC1</td>
<td>00:50:56:90:d4:7d</td>
</tr>
<tr>
<td>CiscoITE_Win7-PC2</td>
<td>00:50:56:90:bd:bc</td>
</tr>
<tr>
<td>CiscoITE_WinVista-PC1</td>
<td>00:50:56:90:f4:c9</td>
</tr>
<tr>
<td>CiscoITE_WinVista-PC2</td>
<td>00:50:56:90:af:dc</td>
</tr>
<tr>
<td>CiscoITE_WinXP-PC1</td>
<td>00:50:56:90:a3:62</td>
</tr>
<tr>
<td>CiscoITE_WinXP-PC2</td>
<td>00:50:56:90:96:f4</td>
</tr>
</tbody>
</table>

12. To change the MAC address, select the Network adapter and click on the **Manual** radio button and type in the MAC Address from the table above in the MAC Address text box.
13. On the Ready to Complete window, confirm the information and click **Finish**.

14. vCenter will begin deploying the virtual machine. This may take some time depending on the speed of your connection, HDDs, etc. When completed, click on **Close**.

15. Move the virtual machines from the CITE_Master vApp to the root of the host by **highlighting**, **right-click** and **drag** the virtual machines to the host. Virtual machine names may be different than those shown in the image below.

![ITE_MASTER](image)

16. Once all virtual machines are located on the root of the vSphere host, delete the CITE_Master vApp.

**vApp** is used to provide a single container (OVF) deployment of the virtual machines required for this lab and is not used for anything else in the NETLAB+ environment.

### 4.2 Modify and Activate Virtual Machines

Once the virtual machines are imported onto the host, you will need to activate Microsoft Windows on each virtual machine. This needs to be done prior to snapshot, pod assignment and cloning.

You will need to turn on each of the Windows machines. Accessing them via remote console, you can follow the steps offered in the Microsoft KB articles listed below:

- Windows XP: [http://support.microsoft.com/kb/307890](http://support.microsoft.com/kb/307890)
Listed below are the images that may require activation once the OVF is deployed. The table also includes the passwords required to access the virtual machines for account activation.

<table>
<thead>
<tr>
<th>Image</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>CiscoITE_Win2008</td>
<td>Pa55w0rd</td>
</tr>
<tr>
<td>CiscoITE_Win7-PC1</td>
<td>password</td>
</tr>
<tr>
<td>CiscoITE_Win7-PC2</td>
<td>password</td>
</tr>
<tr>
<td>CiscoITE_WinVista-PC1</td>
<td>password</td>
</tr>
<tr>
<td>CiscoITE_WinVista-PC2</td>
<td>password</td>
</tr>
<tr>
<td>CiscoITE_WinXP-PC1</td>
<td>password</td>
</tr>
<tr>
<td>CiscoITE_WinXP-PC2</td>
<td>password</td>
</tr>
</tbody>
</table>
4.3 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.

4.4 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+ 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 your ITE 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 drop down box for the correct operating system for each imported virtual machine.
   b. Add any comments for each virtual machine in the box to the right.
   c. Verify your settings and click Import Selected Virtual Machines.
   d. Click OK when the virtual machines have finished loading.
   e. Verify that your virtual machines show up in the inventory.

For additional information, please refer to the NETLAB+ Remote PC Guide - Volume 3.

4.5 Install the Master ITE

This section will assist you in adding the Master ITE 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.

5. Then select the Cisco ITE 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 ITE pods you are going to install. The Pod ID number determines the order in which the ITE pods will appear in the scheduler.

7. Type in **Cisco_ITE_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*.

### 4.6 Create Snapshots for the ITE Master Virtual Machines

In order to proceed with pod cloning, snapshots must be created for the ITE Master 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.

![Home, Inventory, Hosts and Clusters](image)

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 have completed, log out of the vClient software.
4.7 Update the ITE Master Pod

1. Update the ITE Master Pod on your NETLAB+ system.
   a. Login into NETLAB+ with the administrator account.
   b. Select the **Equipment Pods** link.

![Equipment Pods](image)

2. Click on the Magnifying Glass icon next to Win7-PC1. Please note that your PC IDs will not match the graphic below.

<table>
<thead>
<tr>
<th>PC Name</th>
<th>PC ID</th>
<th>Status</th>
<th>Type</th>
<th>Operating System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win7-PC1</td>
<td>4107</td>
<td>ONLINE</td>
<td>ABSENT</td>
<td></td>
</tr>
<tr>
<td>Win7-PC2</td>
<td>4108</td>
<td>ONLINE</td>
<td>ABSENT</td>
<td></td>
</tr>
<tr>
<td>WinVista-PC1</td>
<td>4109</td>
<td>ONLINE</td>
<td>ABSENT</td>
<td></td>
</tr>
<tr>
<td>WinVista-PC2</td>
<td>4110</td>
<td>ONLINE</td>
<td>ABSENT</td>
<td></td>
</tr>
<tr>
<td>WinXP-PC1</td>
<td>4111</td>
<td>ONLINE</td>
<td>ABSENT</td>
<td></td>
</tr>
<tr>
<td>WinXP-PC2</td>
<td>4112</td>
<td>ONLINE</td>
<td>ABSENT</td>
<td></td>
</tr>
<tr>
<td>Win2000</td>
<td>4113</td>
<td>ONLINE</td>
<td>ABSENT</td>
<td></td>
</tr>
</tbody>
</table>

3. Click on **Modify PC Settings**.

![Modify PC Settings](image)

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

![Virtual Machine Inventory](image)
5. In the Base Virtual Machine window, select your ITE virtual machine to associate with the spot held for it in the pod.

6. 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 2-9 for the remaining ITE 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 ITE 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 ITE 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 ITE 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_ITE_Pod_1**. Click **Next**.

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

   ![Pod Management Screen](image)

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, click the dropdown menu and verify that **Linked** is selected.
   
   c. Under Clone Role, click the dropdown menu and select **Normal**. A normal VM resets to a snapshot after each lab reservation. Since the ITE labs are independent, it is important that each VM resets to the snapshot configuration prior to the start of each reservation.

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. 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**.

13. 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, NE TLAB+ will automatically configure virtual machines and virtual networking for your new ITE pod.

The **Golden Snapshot** is the starting point for all ITE pods. We recommend that you reserve the 1st ITE pod and conduct some ITE labs to make sure the Golden Snapshot is correct. You should correct any defects on the Master ITE pod and Golden Snapshot before creating additional pods.

You may repeat the pod cloning process to create up to 15 more ITE user pods on this host.
**Time Saver:** If you clone the 1st ITE 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. 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 2nd host.

1. Login into NETLAB+ with the administrator account.
2. Select the **Equipment Pods** link.
3. Click on your ITE 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_ITE_Master_Pod_2*. Click **Next**.
8. When the action has finished processing, you are presented with a settings screen.

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 clone the snapshots of the Cisco ITE Master VMs. It is necessary to login into your Management Workstation and create the snapshots manually as you did in section 4.6.

11. When the cloning process is complete, you should create a Golden_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 6), substituting the 2nd 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.