The purpose of this document is to provide best practices for deploying VMware ESX 2.5 Server Software on Dell PowerEdge Blade Servers. The document describes various possible configurations when installing ESX Server Software along with the advantages and disadvantages for each configuration.
1. Introduction

This document describes various configurations that are possible when installing VMware® ESX 2.5 Server Software on Dell™ PowerEdge™ 1855 Blade Servers. Advantages and disadvantages for each configuration along with the steps to install are detailed.

2. Configurations Options

2.1 Configuring the NICs

Each PowerEdge (PE) 1855 blade server comes with two embedded Gigabit Ethernet NICs (NIC0 and NIC1). The NICs have to be either dedicated to the Service Console, dedicated to the Virtual Machines or shared between Service Console and Virtual Machines. In a default installation, NIC0 is dedicated to the Service Console and NIC1 is dedicated to the Virtual Machine.

In order to better utilize the network bandwidth and to provide redundancy, the NICs can be configured in the following ways:

<table>
<thead>
<tr>
<th>Config</th>
<th>NIC 0</th>
<th>NIC 1</th>
<th>Fault Tolerance for VMs</th>
<th>Installation</th>
<th>Traffic Isolation?</th>
<th>VM Performance?</th>
<th>Security?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Service Console</td>
<td>VMs and VMotion</td>
<td>No</td>
<td>Standard</td>
<td>Moderate</td>
<td>Acceptable if VMotion events are infrequent</td>
<td>Good - service console on private network.</td>
</tr>
<tr>
<td>2</td>
<td>Service Console and VMotion (shared)</td>
<td>VMs</td>
<td>No</td>
<td>Command line post-Installation steps</td>
<td>Moderate</td>
<td>Acceptable if management traffic is infrequent</td>
<td>Good - service console on private network.</td>
</tr>
<tr>
<td>3</td>
<td>Service Console and VMs (shared)</td>
<td>VMotion</td>
<td>No</td>
<td>Command line post-Installation steps</td>
<td>Moderate</td>
<td>Acceptable if management traffic is infrequent and VMotion events are frequent</td>
<td>Poor - service console on production network.</td>
</tr>
<tr>
<td>4</td>
<td>NIC 0 shared between Service Console and VMs, NIC 0 and NIC 1 are teamed and used by VMs and VMotion</td>
<td>Yes</td>
<td>Command line post-Installation steps</td>
<td>Moderate and flexible</td>
<td>Acceptable if VMotion events are infrequent.</td>
<td>Poor - Service console on production network.</td>
<td></td>
</tr>
</tbody>
</table>
Configurations 2, 3 and 4 require sharing of NIC 0 between the service console and Virtual Machines.

VMotion events generate traffic that might impact the performance of other Virtual Machines. In order to ensure effective VMotion, it is recommended to have the VMotion NIC on a separate VLAN or separate physical NIC.

2.2 Boot from SAN

ESX 2.5 Server Software can be installed and booted from a LUN in a SAN. This enables diskless blade servers and isolates and simplifies storage management. For more information, refer to the ESX 2.5 Server SAN Configuration Guide at www.vmware.com.

2.3 Embedded Switch vs Pass-through with PE 1855

Customers can configure a PE1855 chassis either with a PowerConnect™ 5316M Ethernet switch module or with a pass-through Ethernet module. There are no special installation steps required for VMware ESX Server software to use the pass-through module. Steps to configure the ESX Server software and the switch module to attain fault tolerance along with VLAN setup are described in the Post Installation Section. The table below lists the advantages of using either the switch or pass-through configurations.

<table>
<thead>
<tr>
<th>Table 2: Switch vs Pass-through module</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PowerConnect 5316M Ethernet Switch Module</strong></td>
</tr>
<tr>
<td>▪ Features six 10/100/1000BaseT Ethernet uplinks, providing full Layer 2 functionality</td>
</tr>
<tr>
<td>▪ Oversubscribed 10 to 6 (ten links to the blade server and six external up-links)</td>
</tr>
<tr>
<td>▪ VMotion traffic between blade server in the same chassis is enclosed within the switch</td>
</tr>
<tr>
<td>▪ Saves on rack space and cabling</td>
</tr>
</tbody>
</table>
2.4 Virtual Center with PE1855

PE1855 can be configured with up to 10 blade servers. One of the blade servers can be installed with Virtual Center and used as a management console to manage virtual machines in other blade servers.

3. Installing ESX Server Software


3.1 Using CD-ROM

The simplest way to install ESX Server software is using a CD-ROM drive. A USB CD-ROM drive is required for installing ESX Server software on a PE1855. Even though installing via a CD-ROM is straightforward, it requires manual intervention and can be time consuming for installation on multiple blade servers. Typically, the first installation is done through a CD-ROM and the subsequent installations use a scripted installation process as described in the next section.

3.2 Using Scripted Installation

VMware installation can be scripted. This unattended installation is useful for deploying ESX server software on multiple blade servers. The following are the steps for installing ESX using Scripted Installation.

- Configure one ESX Server software as the Master Server. This server will deploy the image
- Using the ESX MUI, create a boot floppy (or a kick-start file)
- Boot the target server using the boot floppy (or kick-start file deployed through PXE)

Note that if a static IP address is configured into the boot-floppy image then a unique boot floppy must be created for each blade server. If the boot-floppy is configured for DHCP address, then the same image can be used on multiple blade servers. It is highly recommended to use a static IP address for the ESX Server software.

### 3.3 Using LUN Cloning

If ESX Server software is installed in a SAN, then one can take advantage of LUN cloning to deploy ESX for multiple servers. The boot LUN of a pre-installed ESX server system can be cloned to multiple LUNs and the newly cloned LUNs can be used to boot other blade servers. To do LUN cloning, SnapView™ is required, which is a layered application in Navisphere®. Note that the cloned LUN will have the hostname and IP address of the source LUN. New hostname and IP address MUST be configured for the cloned LUN.

### 4. Post Installations

Once ESX Server system is installed using the above methods, the following post installation steps must be executed.

#### 4.1 Configuring the NICs

Table 1 lists four configurations for NICs when installing ESX Server software. This section provides instructions for enabling the four different configurations.

**4.1.1 Configuration 1:**

In this configuration, NIC 0 is dedicated to the service console and NIC 1 is dedicated to the VMkernel. NIC 1 is used both by VMs and VMotion.

This is the default configuration and no special steps are required to enable configuration 1.

**4.1.2 Configuration 2:**

In this configuration, NIC 0 is shared between the service console and the VMkernel. NIC 1 is dedicated to the VMkernel. NIC 0 is used by VMotion, in addition to the service console. NIC 1 is used by VMs.

The steps to enable this configuration are:
1. Log in with root level privileges to the service console and execute the command `vmkcpcidivy -i`. This is an interactive command to allocate devices between the service console and virtual machines. Configure NIC 0 to be shared between service console and the Virtual Machines.

2. Create two virtual switches: one for Virtual Machines (NIC 0), and one for VMotion (NIC 1). This can be done by adding the following lines to the file `/etc/vmware/netmap.conf`:

   ```
   network0.name = "<VM virtual switch name>"
   network0.device = "vmnic0"
   network1.name = "<VMotion virtual switch name>"
   network1.device = "vmnic1"
   ```

   To do VMotion, the switch names should be identical across all blade servers.

3. Reboot the server

4.1.3 Configuration 3:

In this configuration, NIC 0 is shared between the service console and the VMkernel. NIC 1 is dedicated to the VMkernel. NIC 0 is used by VMs, in addition to the service console. NIC 1 is used only for VMotion.

The steps to enable this configuration are:

1. Log in with root level privileges to the service console and execute the command `vmkcpcidivy -i`. This is an interactive command to allocate devices between the service console and virtual machines. Configure NIC 0 to be shared between the service console and Virtual Machines.

2. Reboot the server

4.1.4 Configuration 4:

In this configuration, NIC 0 is shared between the service console and the VMkernel. NIC 1 is dedicated to VMkernel. NIC 0 and NIC 1 are teamed by the VMkernel to provide a bond. This bonding provides for NIC redundancy and load balancing.
The steps to enable this configuration are:

3. Log in with root level privileges to the service console and execute the command `vmkpcidivy -i`. This is an interactive command to allocate devices between the service console and virtual machines. Configure NIC 0 to be shared between service console and Virtual Machines.

4. Create a NIC team by adding the following lines to the end of the file `/etc/vmware/hwconfig`:

   ```
   nicteam.vmnic0.team = “bond0”
   nicteam.vmnic1.team = “bond0”
   ```

5. In the default NIC team configuration, NIC 0 maybe used as the primary NIC in the bond. One can make NIC 1 as the primary NIC for the bond, so that NIC 1 will be used for the VMs and Vmotion, while NIC 0 will be used by the service console. This is optional. To make NIC 1 the primary NIC, add the following line to `/etc/vmware/hwconfig`

   ```
   nicteam.bond0.home_link = “vmnic0”
   ```

6. Reboot the server

4.2 Setting up VLANs

In all four NIC configurations, it is highly recommended to have the VMotion NIC in a separate VLAN. Having the VMotion NIC in a separate VLAN will ensure that there is minimal impact on virtual machines during VMotion. To set up VLANs in the Virtual Switches of the ESX Server software, refer to *ESX 2.5 Server Administration Guide*.


4.3 Setting up fault tolerance when using PowerConnect 5316M switch module

To enable NIC failover when using PowerConnect 5316M and configuration 4, click on the advanced configuration in the Options tab of the ESX Server Management User Interface (MUI). Change the following parameters default value to 1:

   ```
   Net.ZeroSpeedLinkDown = 1
   ```
5. Reference:


¹This term does not connote an actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.