Welcome

Hyper-V

恆逸資訊資深講師
趙驚人

Hyper-V 在正式環境的應用

- Hyper-V 在 Microsoft Internet 領域上的能力
- TechNet: 100% Hyper-V

  http://technet.microsoft.com

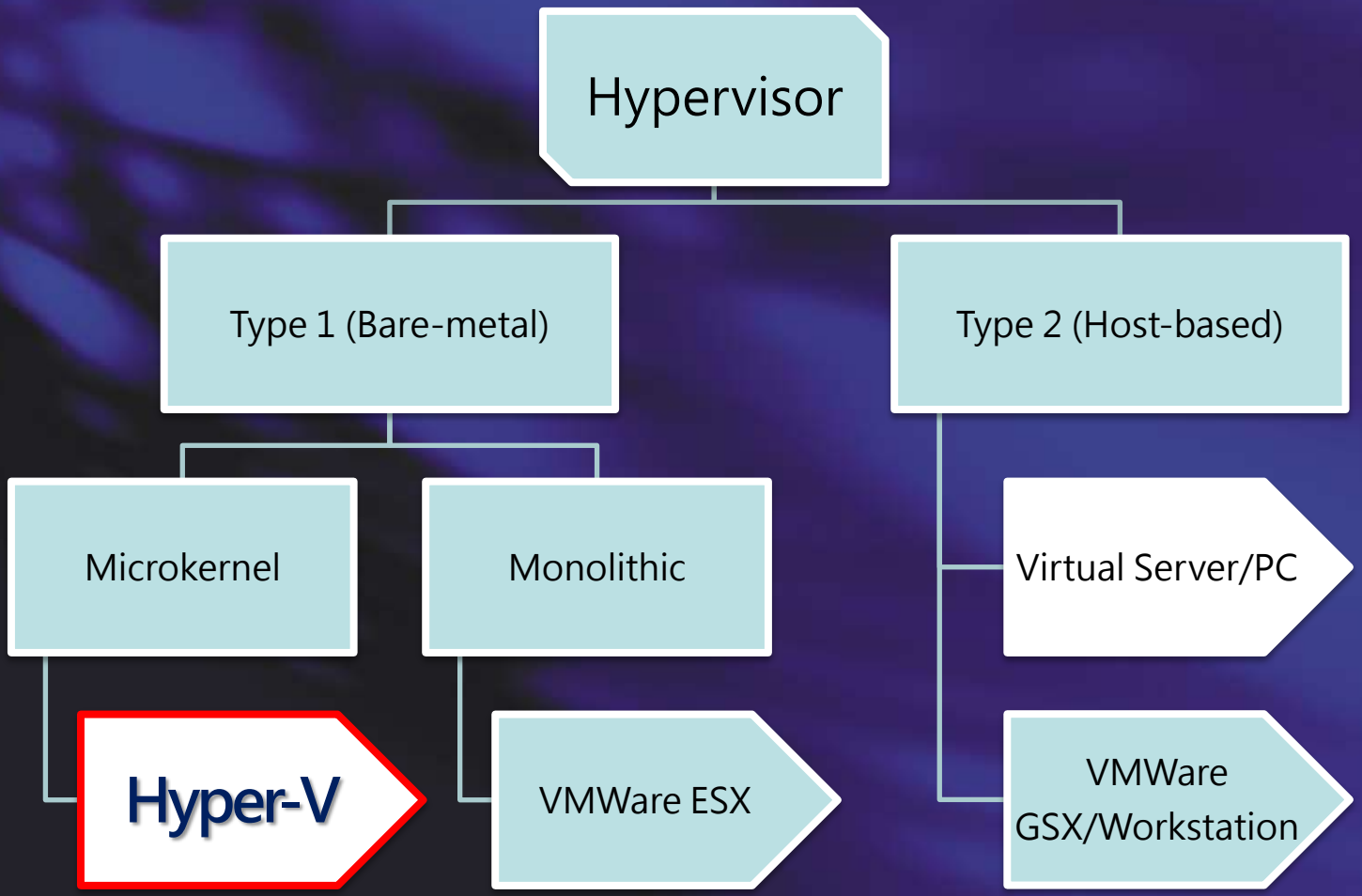
  每天超過1 million 造訪
- MSDN:

  http://msdn.microsoft.com

  每天超過3 million 造訪
- Virtualizing TechNet & MSDN 白皮書

  http://download.microsoft.com/download/6/C/5/6C559B56-8556-4097-8C81-2D4E762CD48E/MSCOM_Virtualizes_MSDN_TechNet_on_Hyper-V.docx

Hypervisor類型



新的處理器能力和即時遷移

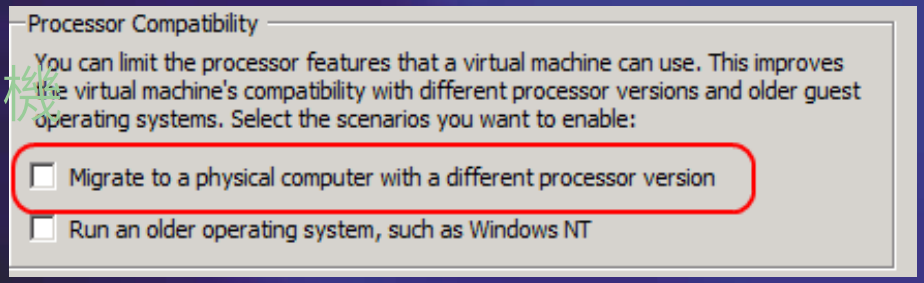
支援64 個邏輯處理器

- 概觀
  - 超越 Hyper-V R1 4倍的提升
  - Hyper-V 可以獲得更大的系統延展，更多運算資源
- 支援最多同時執行384VM，每一台伺服器支援最多512虛擬處理器
  - 384 單一虛擬處理器 或
  - 256 雙虛擬處理器 vms (512虛擬處理器) 或
  - 128 四虛擬處理器 vms (512虛擬處理器) 或
  - 最多384 個VM和最多512顆虛擬處理器

處理器相容性模式

- 概觀
  - 讓 live migration 跨同家族的不同 CPU 版本 (例如：Intel-to-Intel 和AMD-to-AMD).
    - 不能從Intel 到AMD跨平台.
  - 針對個別VM調整相容性.
  - 將VM 抽象化到較低的處理器可用指令集

- 好處
  - 在叢集中有非常高的彈性
  - 可以跨廣泛的Hyper-V 主機硬體遷移



向前與向後相容性

- 如何做到?
  - 當 VM 啟動，hypervisor會揭發處理器功能給 VM
  - 當啟用處理器相容性，VM的處理器被正規化，在VM中”隱藏”下列處理器功能。

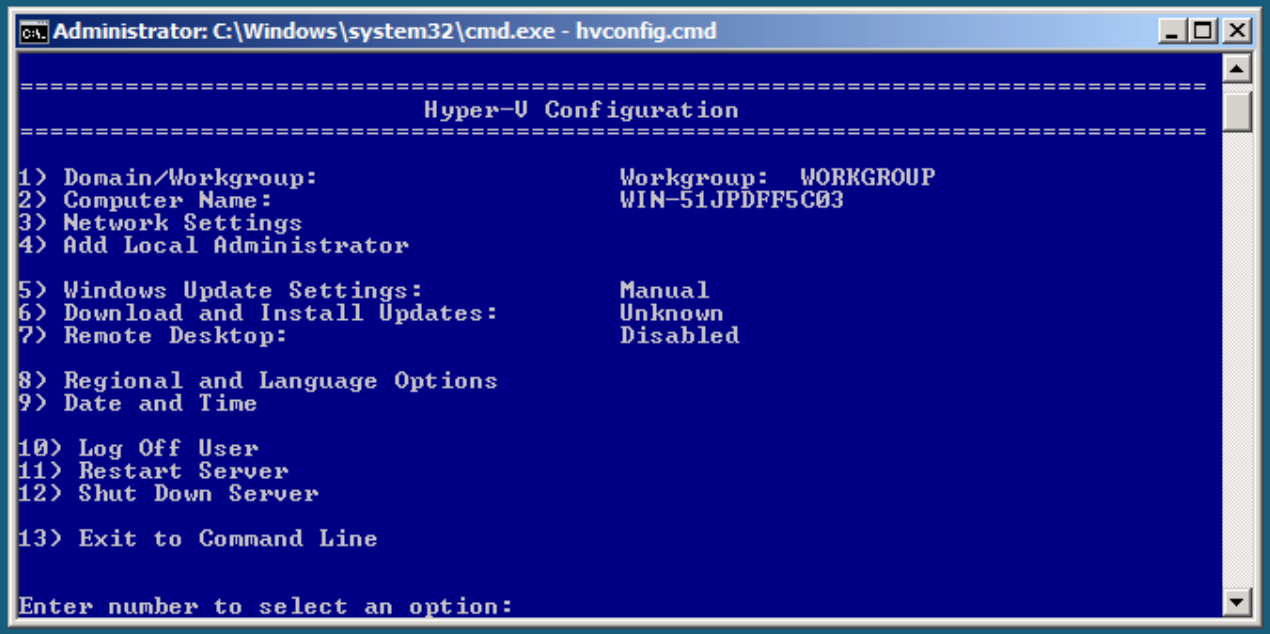
主機使用AMD型處理器	主機使用型處理器
SSSE3, SSE4.1, SSE4.A, SSE5, POPCNT, LZCNT, Misaligned SSE, AMD 3DNow!, Extended AMD 3DNow!	SSSE3, SSE4.1, SSE4.2, POPCNT, Misaligned SSE, XSAVE, AVX

Microsoft Hyper-V Server R2

Microsoft Hyper-V Server 2008

- 精簡的、最佳化、及免費
  - 提供基本虛擬化技術能力
  - 很好的單獨hypervisor型虛擬化技術產品
- Streamlined
  - 微核心的 hypervisor
- 簡單地與現有基礎架構整合
  - Active Directory 整合
  - 善用現有管理工具 (例如：System Center Virtual Machine Manager 2008)
  - 善用現有之員工具& 處理程序
  - 善用現有IT Pro 技能和知識

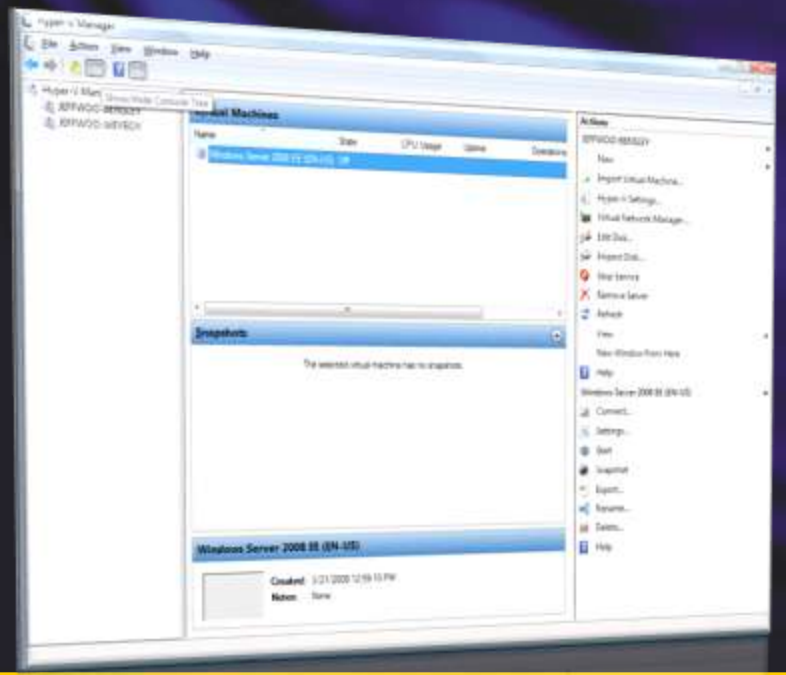
HVconfig

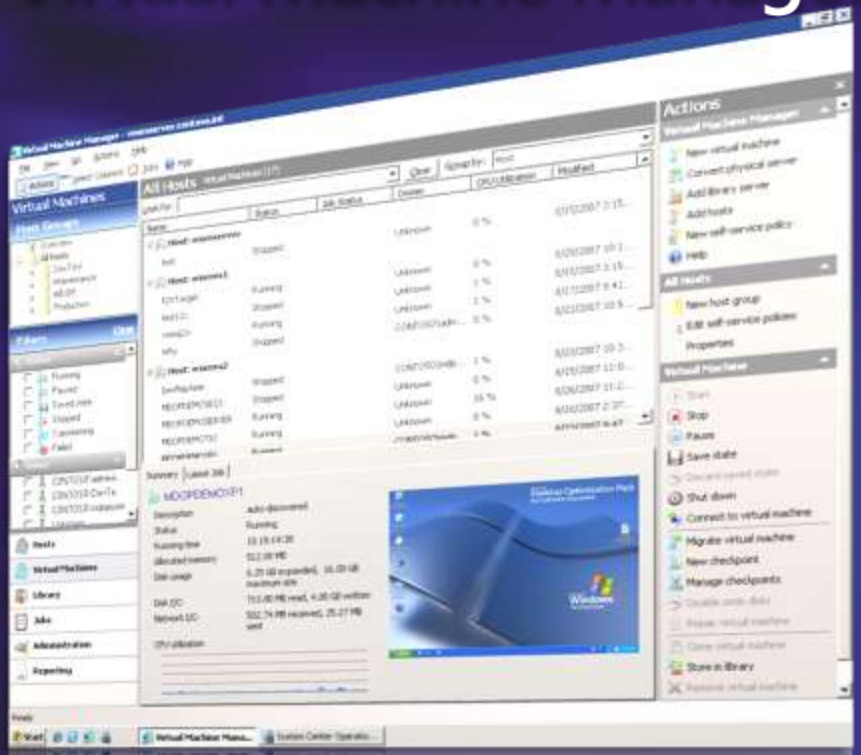


- 登入時自動啟動
- 11種在地化語言

遠端管理...

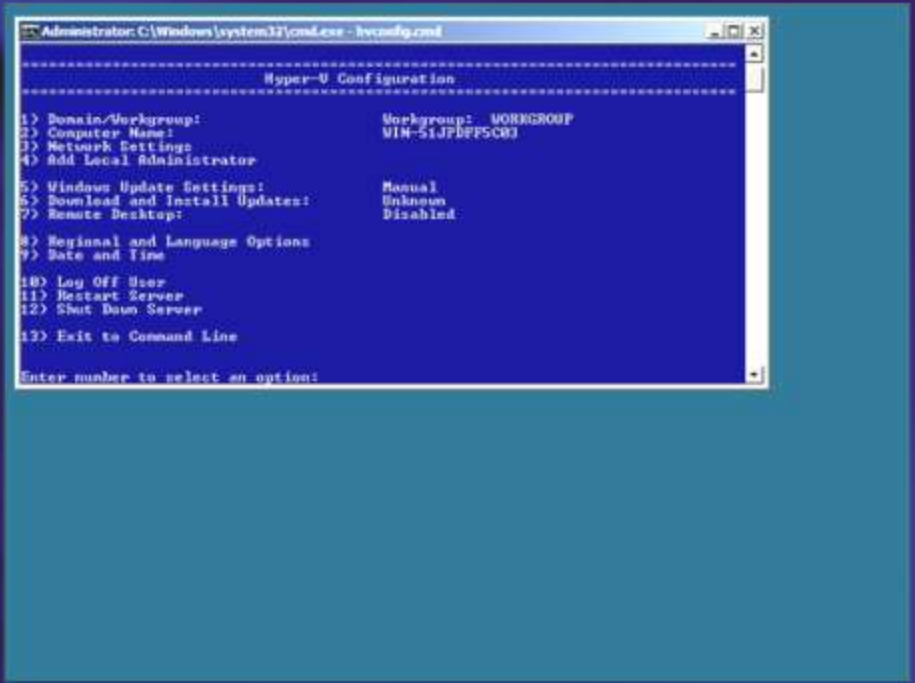
Microsoft
System Center
Virtual Machine Manager





Microsoft Hyper-V Server V2
新功能

- Live Migration
- 高可用性
- 支援新處理器
  - 第二層位址轉譯
  - Core Parking
- 網路加強
  - 支援TCP/IP Offload
  - 支援VMQ 和 Jumbo Frame
- 熱新增/移除虛擬儲存裝置
- HVCONFIG增加功能
- 增加延展性



Hyper-V Server V1 vs. V2

	Microsoft Hyper-V Server 2008	Microsoft Hyper-V Server V2
支援處理器	最多 4個處理器	最多8 個處理器
實體記憶體支援	最大32 GB	最大 1 TB
虛擬機器記憶體支援	最大總數32 GB (例如：31 個1 GB VM或5個 6 GB VM)	每一個VM最大64 GB
Live Migration	不行	可以
高可用性	不行	可以
管理選項	免費的 Hyper-V 管理員 或 SCVMM	免費的 Hyper-V 管理員 或 SCVMM

Live Migration $$ 比較表

	Hyper-V Server R2	VMware vSphere
3 Node Cluster 2 Socket Servers	免費	$13,470
3 Node Cluster 4 Socket Servers	免費	$26,940
5 Node Cluster 2 Socket Servers	免費	$22,450
5 Node Cluster 4 Socket Servers	免費	$44,900

使用VMM 2008 R2 (Workgroup Edition) 管理Hyper-V Server R2需加$500

microsoft.com/.net

Microsoft®
System Center
Virtual Machine Manager

A centralized management application solution for the virtual data center

Heterogeneous Management

- Manage Hyper-V, Virtual Server and VMware from a single console

Maximize Resources

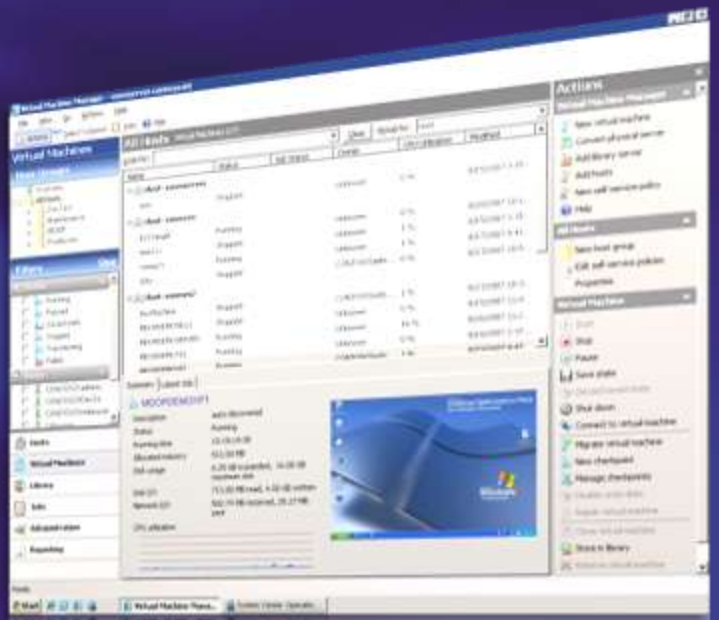
- Centralized virtual machine deployment and management
- Intelligent placement of virtual machines
- Fast and reliable Physical to Virtual (P2V) and Virtual to Virtual (V2V) conversion
- Comprehensive service-level enterprise monitoring with Microsoft® Operations Manager

Increase Agility

- Rapid provisioning of new and virtual machines with templates and profiles
- Centralized library of infrastructure components
- Take advantage and extend existing storage infrastructure
- Allow for delegated management of virtual machines

Take Advantage of Skills

- Familiar interface, common foundation
- Monitor physical and virtual machines from one console
- Fully scriptable using Windows PowerShell™



VM
VM
VM

Server Core: 推出 SCONFIG

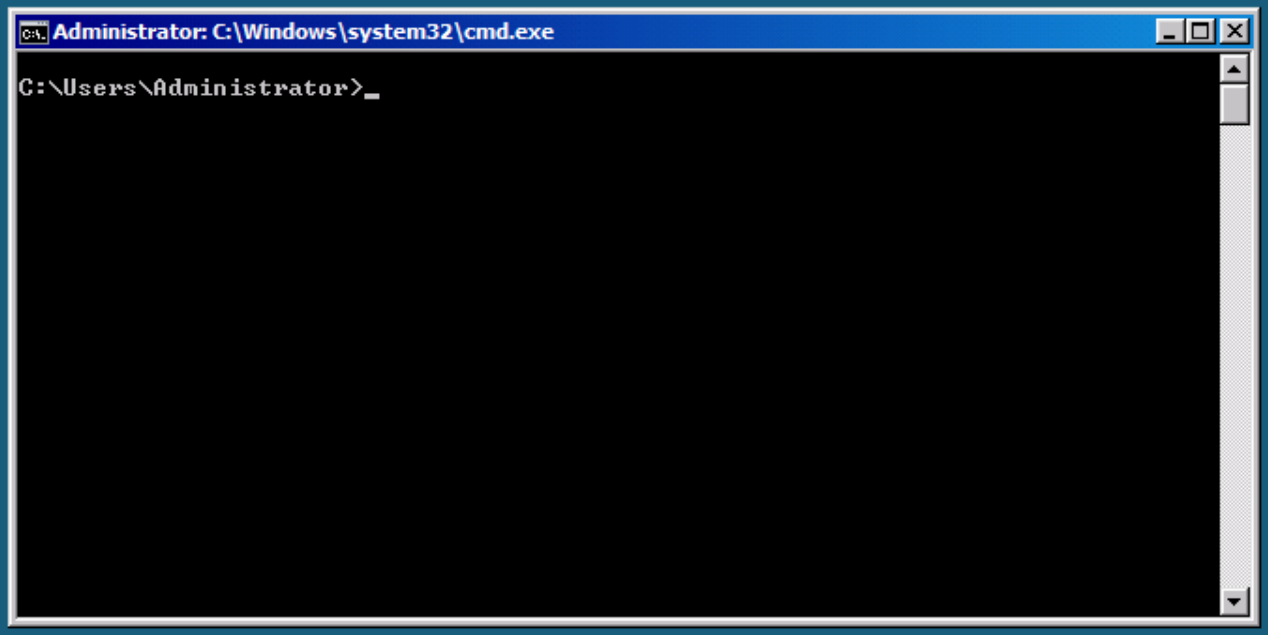
Windows Server Core

- Windows Server 最常用於部署單一角色
- Server Core: 最小安裝選項
  - 提供基本需要伺服器功能
  - 只有指令行介面，沒有圖形界面的 Shell
- 好處
  - 程式碼少，更新少，負擔少
  - 只有目標角色執行，暴露面小
- Windows Server 2008 使用者回饋
  - 喜歡它，但學習曲線陡峭

Windows Server 2008 R2推出 “SCONFIG”

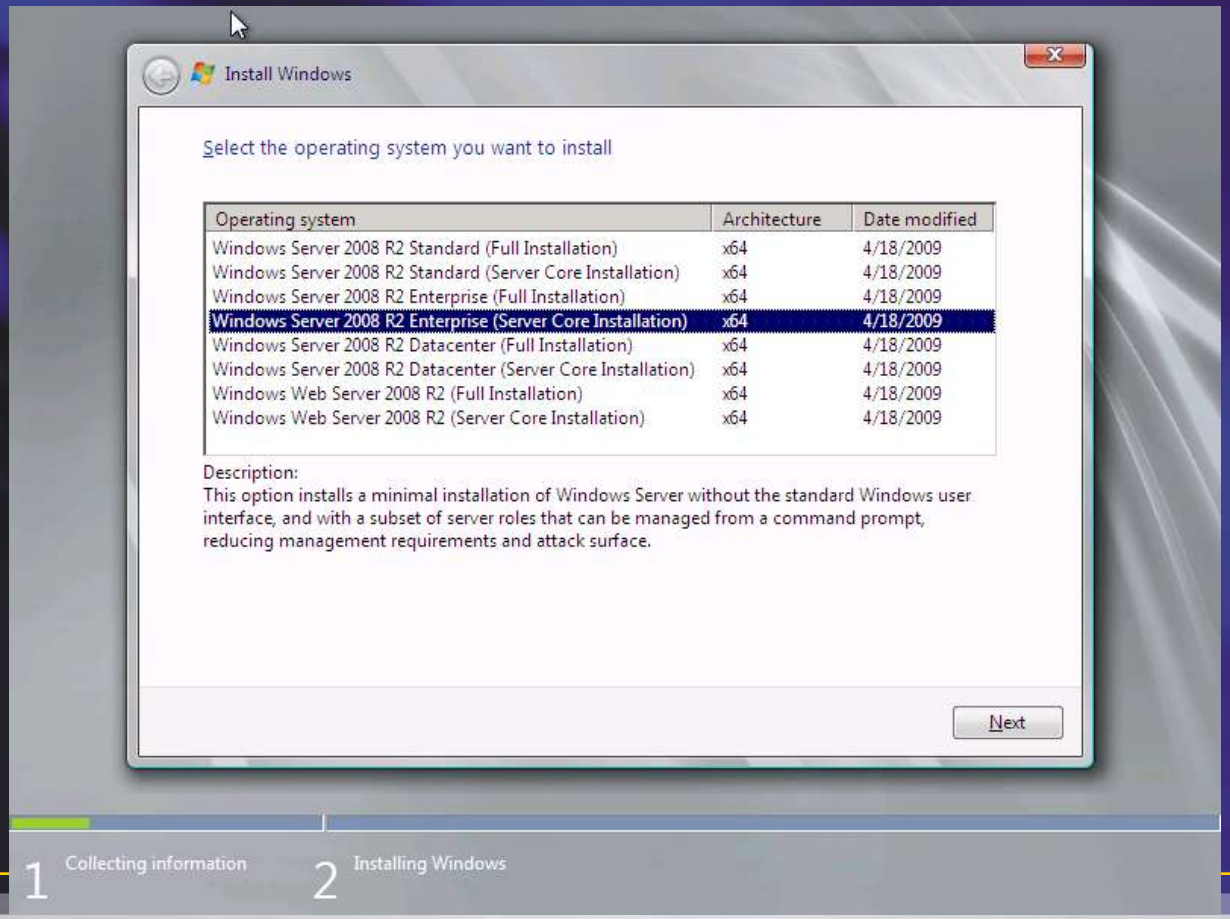
Windows Server Core

- Server Core: 指令行介面



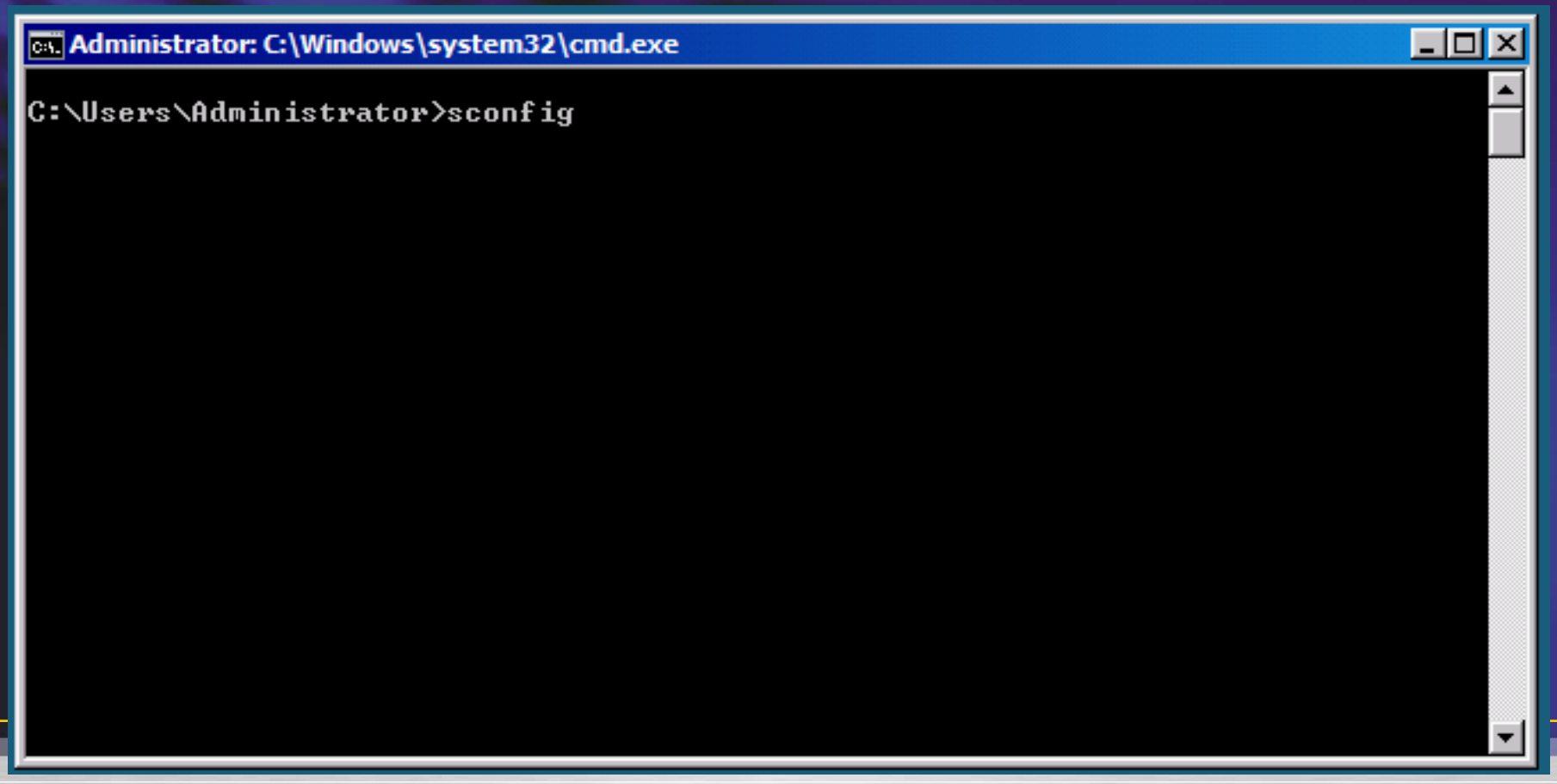
安裝Server Core

- 安裝 Windows Server及選擇 *Server Core安裝*



啟用SCONFIG

- 登入後，輸入 *sconfig*



簡易的伺服器設定

Administrator: C:\Windows\system32\cmd.exe - sconfig

```
=================================================================================
                              Server Configuration
=================================================================================

1) Domain/Workgroup:                        Workgroup:  WORKGROUP
2) Computer Name:                           WIN-CQ2EE07BORF
3) Add Local Administrator
4) Configure Remote Management

5) Windows Update Settings:                 Manual
6) Download and Install Updates
7) Remote Desktop:                          Disabled

8) Network Settings
9) Date and Time

10) Log Off User
11) Restart Server
12) Shut Down Server
13) Exit to Command Line


Enter number to select an option:
```

變更電腦名稱

- 選 2，輸入電腦名稱和密碼

Administrator: C:\Windows\system32\cmd.exe - sconfig

```
=================================================================================
                              Server Configuration
=================================================================================

1) Domain/Workgroup:                        Workgroup:  WORKGROUP
2) Computer Name:                           WIN-CQ2EE07BORF
3) Add Local Administrator
4) Configure Remote Management

5) Windows Update Settings:                 Manual
6) Download and Install Updates
7) Remote Desktop:                          Disabled

8) Network Settings
9) Date and Time

10) Log Off User
11) Restart Server
12) Shut Down Server
13) Exit to Command Line


Enter number to select an option: 2
```

加入網域

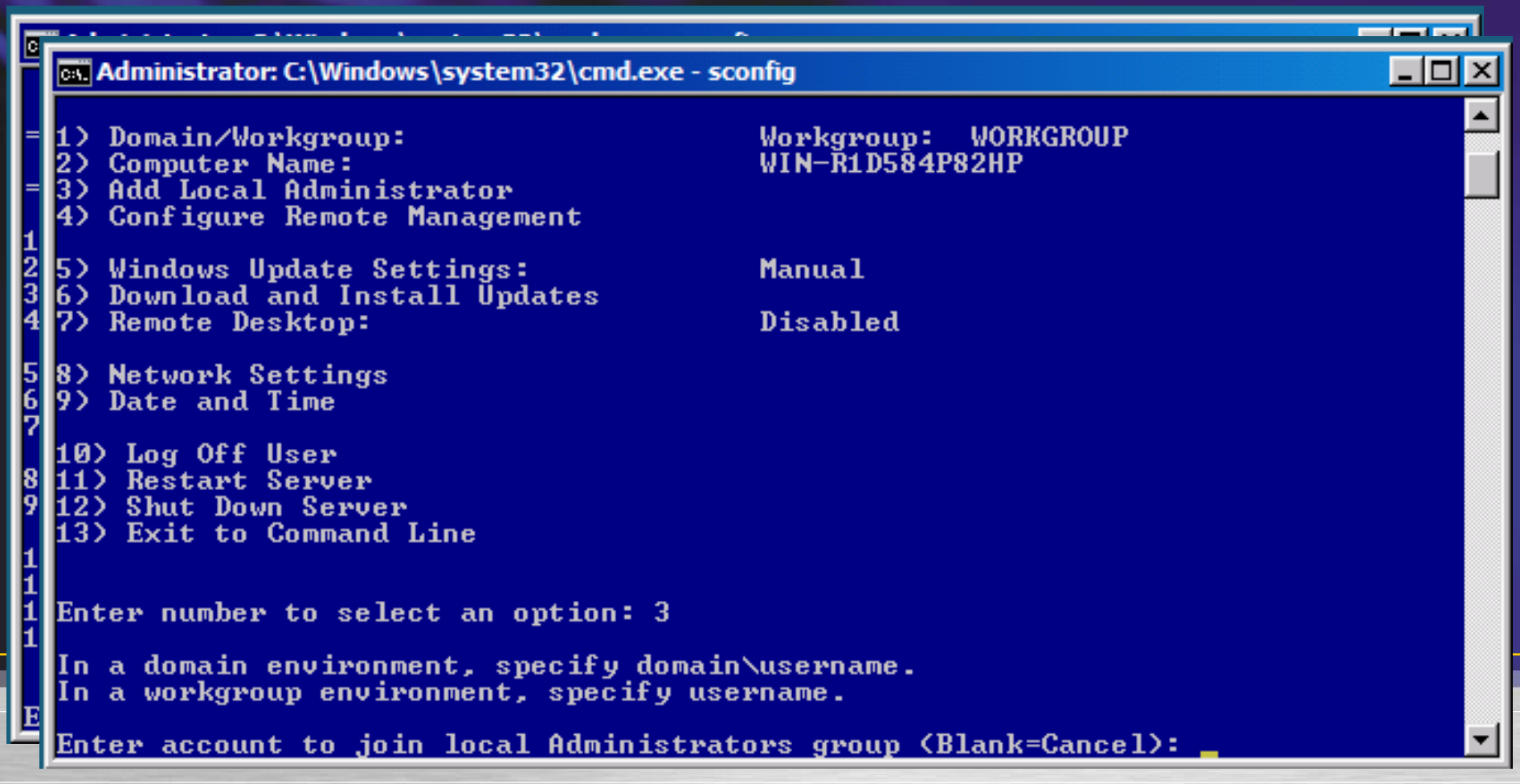
- 選 1，再選D，提供帳戶和密碼

Administrator: C:\Windows\system32\cmd.exe - sconfig

```
1) Domain/Workgroup:                    Workgroup:  WORKGROUP
2) Computer Name:                       WIN-CQ2EE07BORF
3) Add Local Administrator
4) Configure Remote Management

5) Windows Update Settings:             Manual
6) Download and Install Updates
7) Remote Desktop:                      Disabled

8) Network Settings
9) Date and Time

10) Log Off User
11) Restart Server
12) Shut Down Server
13) Exit to Command Line


Enter number to select an option: 1


Change Domain/Workgroup Membership

Join (D)omain or (W)orkgroup? (Blank=Cancel)
```

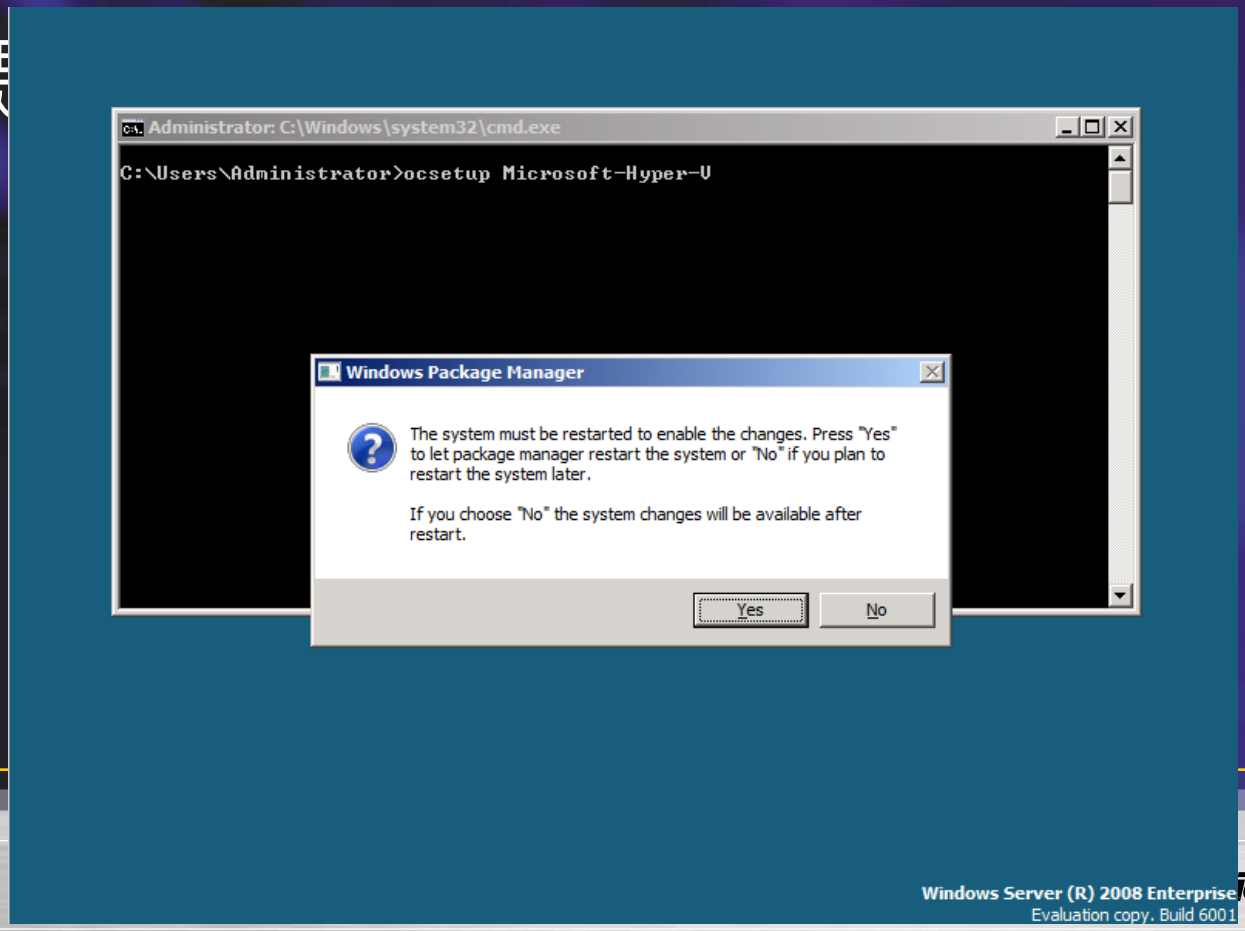
新增網域帳號

- 選 3，輸入帳戶與密碼



新增Hyper-V 角色

- ocsetup Microsoft-Hyper-V
- 在提



Hyper-V Virtual Storage

熱新增/移除儲存裝置

- 概觀

  新增和移除VHD 及直接存取磁碟（and pass-through disks）到VM，不需要重開機

  - 熱新增移除磁碟套用到掛載於虛擬SCSI控制器上的VHD和直接存取磁碟

- 好處

  在VM中可以讓儲存空間成長，而不需要停機

  新的資料中心備份情境

  新的SQL/Exchange情境

Antivirus 和 Hyper-V

- 排除

  VHD 和 AVHD (或所在目錄)

  VM 設定檔所在目錄

  VMMS.exe 和 VMWP.exe

- 伺服器上若沒有其他角色存在，可以不需要安裝

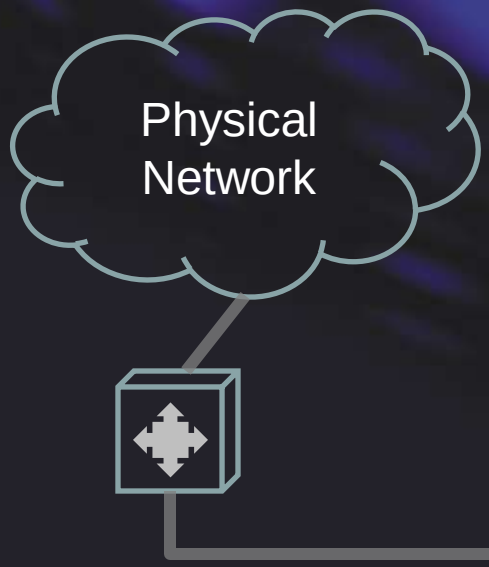
- 在VM中執行Antivirus

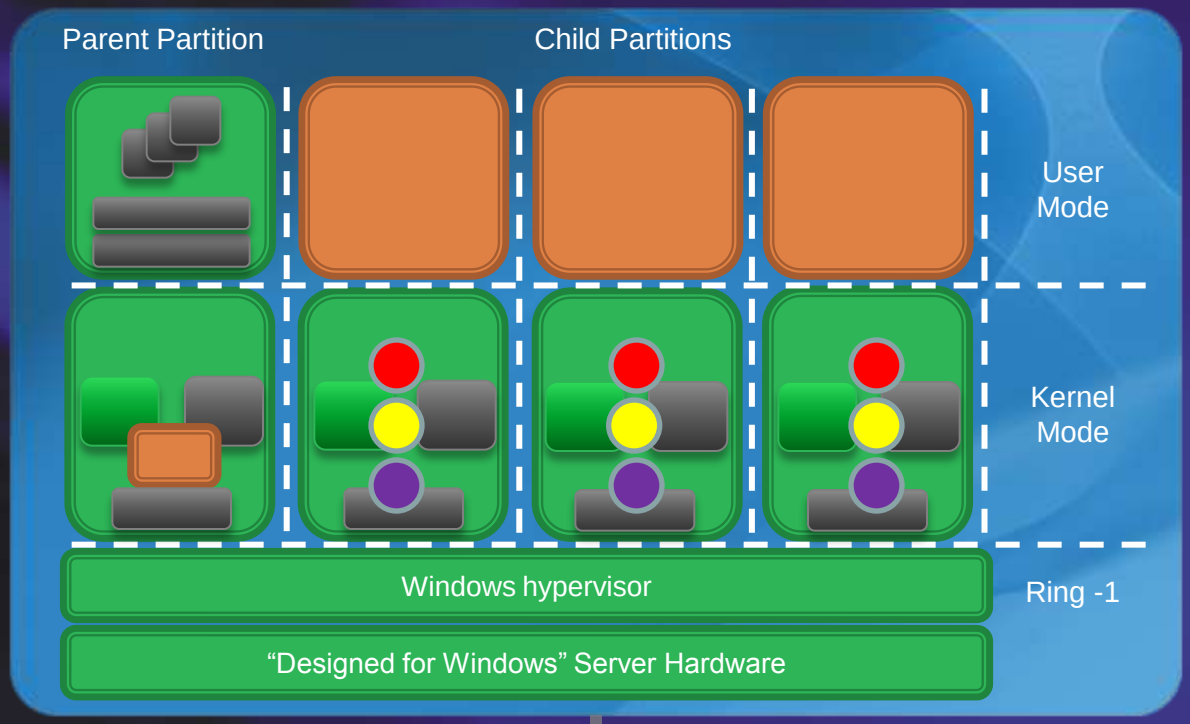
Hyper-V Networking

Hyper-V 的網路類型

三種網路類型

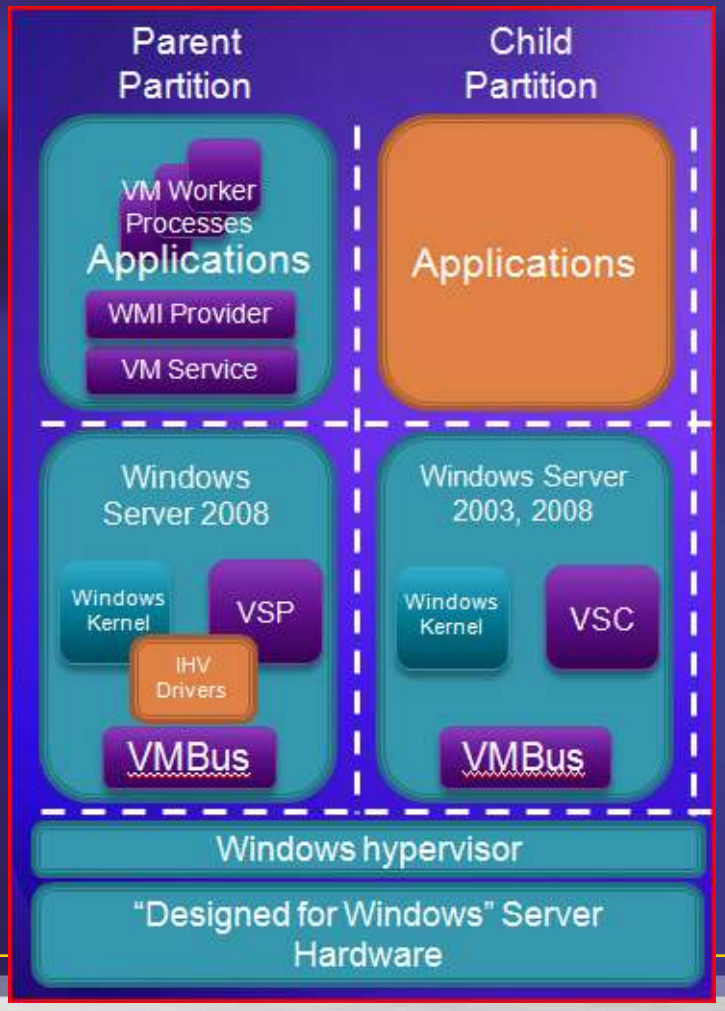
- Private
- Internal
- External





Hyper-V 的網路需求

- 最少需兩片1 Gb/E實體介面的網路卡
  - 一片給管理使用
  - 一片（或更多）給VM網路使用
  - iSCSI使用專屬的網路卡
  - 將 parent 連接到專用的管理網段



Hyper-V 網路設定

- 範例 1:

  實體伺服器有4片網路介面卡

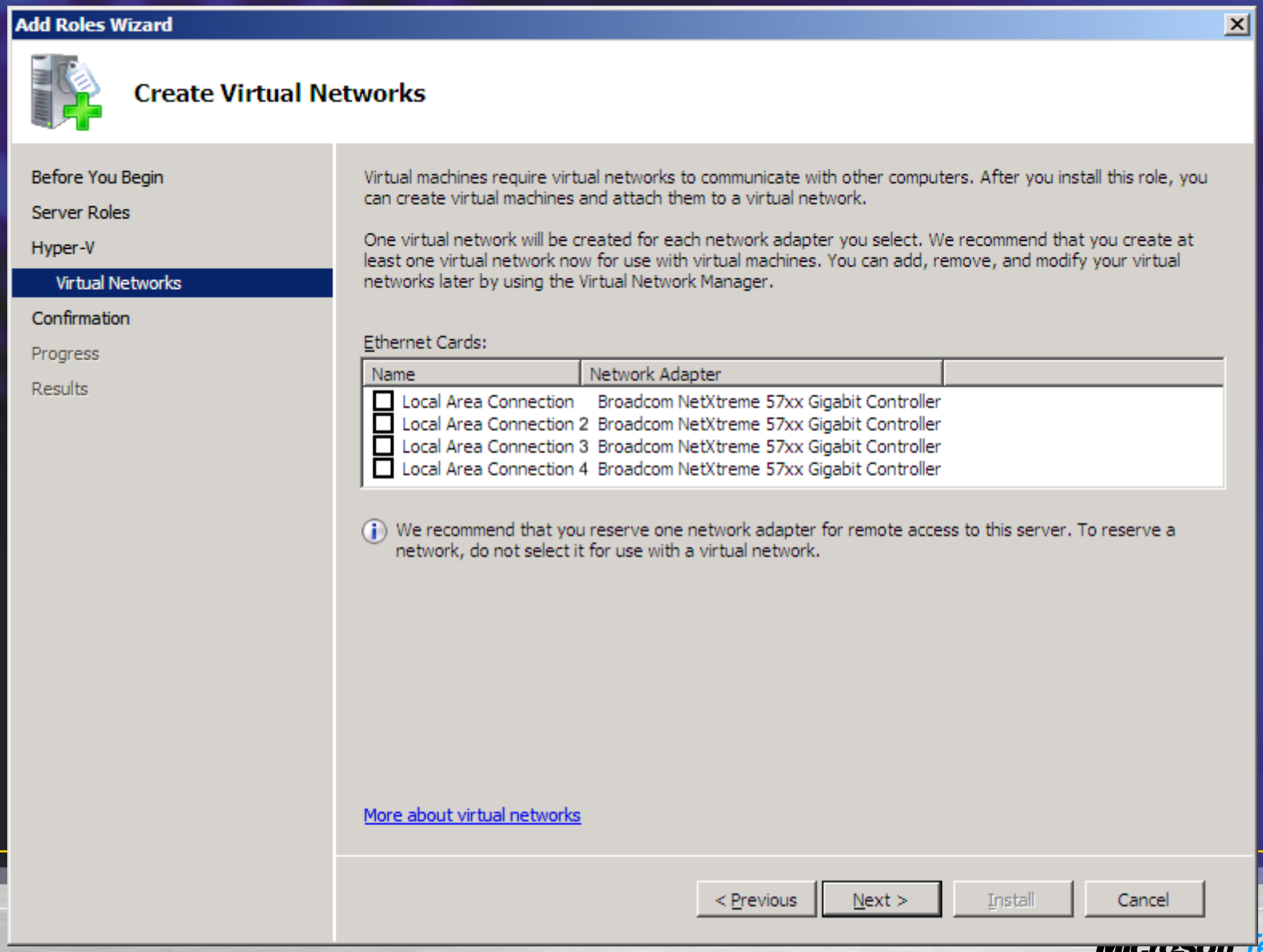
  NIC 1: 指定給parent partition用來管理

  NIC 2/3/4: 指定給虛擬機器網路的虛擬交換器

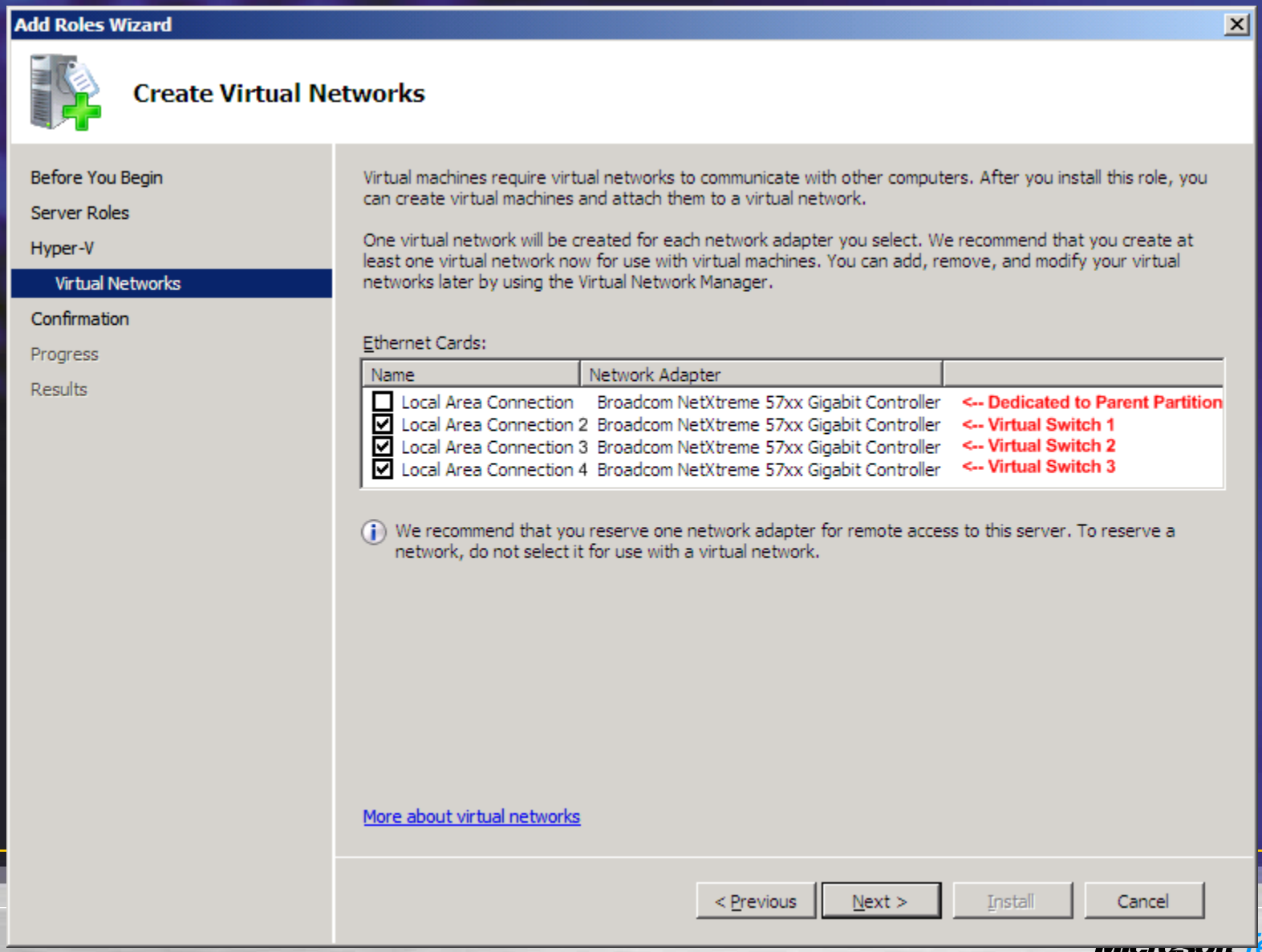
  非-iSCSI 的儲存裝置:

  - 直接連接（Direct attach）
  - SAS 或 Fibre Channel

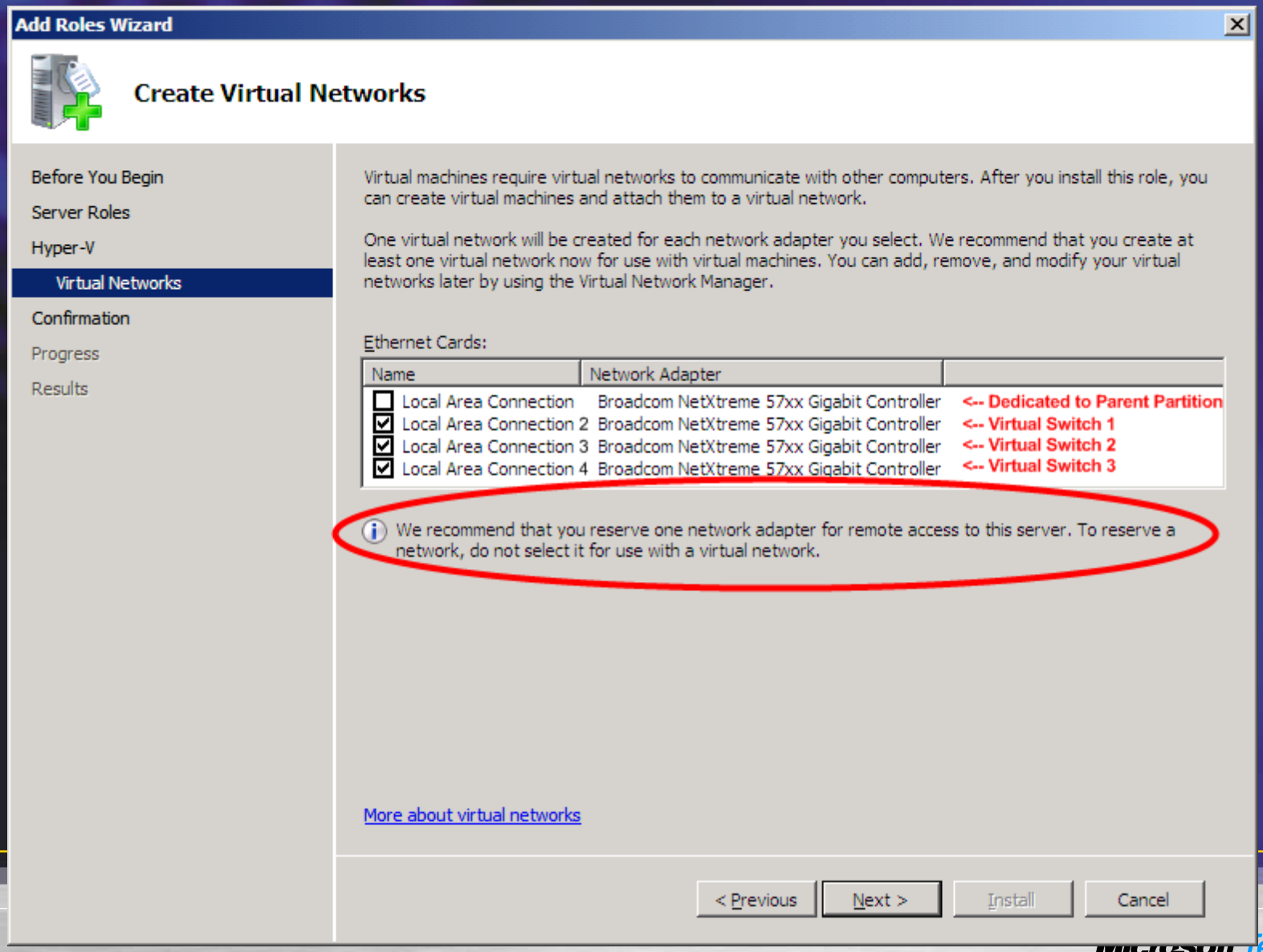
Hyper-V 設定和網路1



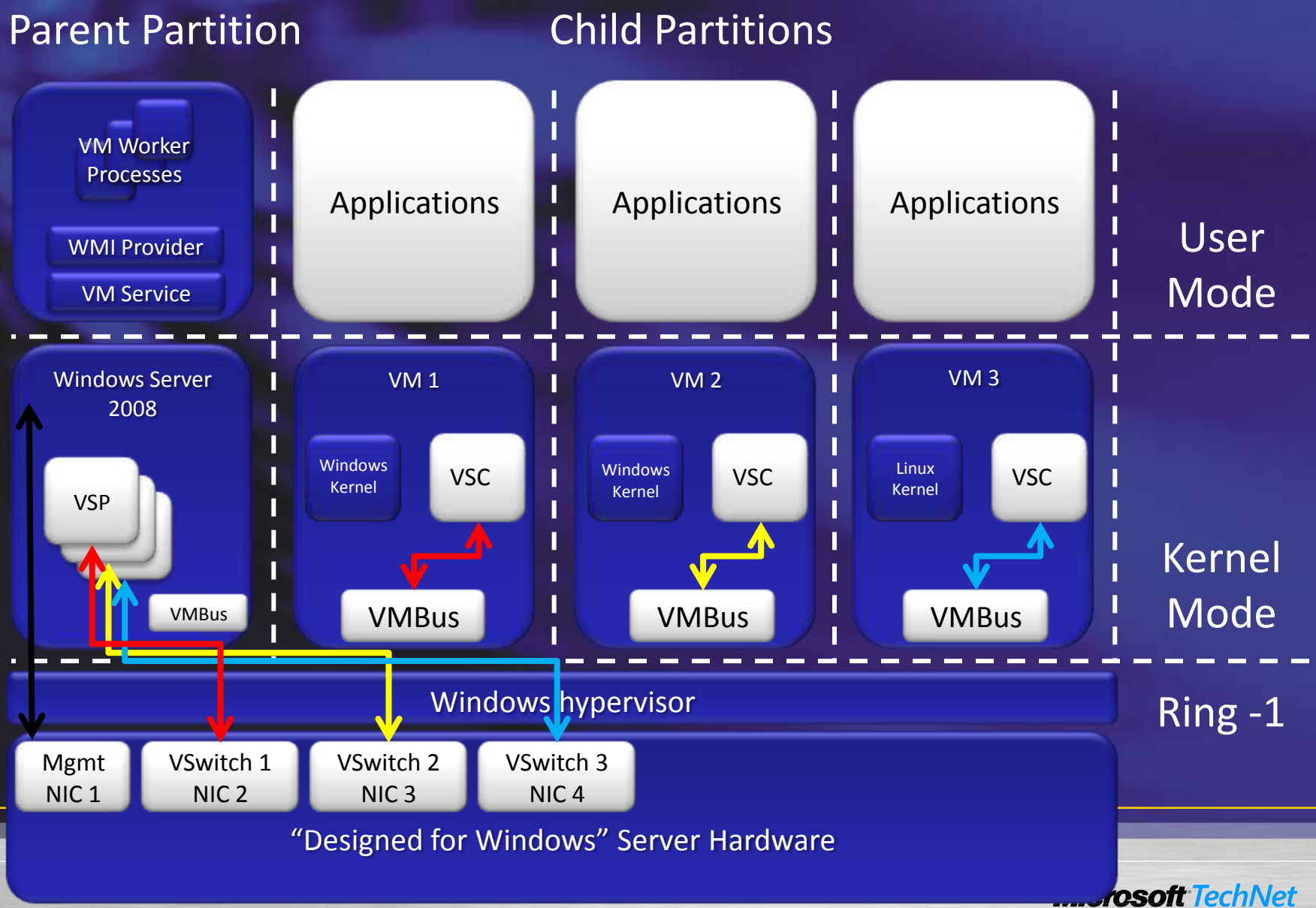
Hyper-V 設定和網路2



Hyper-V 設定和網路3



每一個VM在自己的Switch...



Microsoft TechNet

Hyper-V 網路設定

- 範例 2:

  實體伺服器有4片網路介面卡

  NIC 1: 指定給parent partition用來管理

  NIC 2: 指定給parent partition的iSCSI

  NIC 3/4: 指定給虛擬機器網路的虛擬交換器

Hyper-V 設定、網路、和 iSCSI

Add Roles Wizard

Create Virtual Networks

- Before You Begin
- Server Roles
- Hyper-V
  - Virtual Networks
- Confirmation
- Progress
- Results

Virtual machines require virtual networks to communicate with other computers. After you install this role, you can create virtual machines and attach them to a virtual network.

One virtual network will be created for each network adapter you select. We recommend that you create at least one virtual network now for use with virtual machines. You can add, remove, and modify your virtual networks later by using the Virtual Network Manager.

Ethernet Cards:

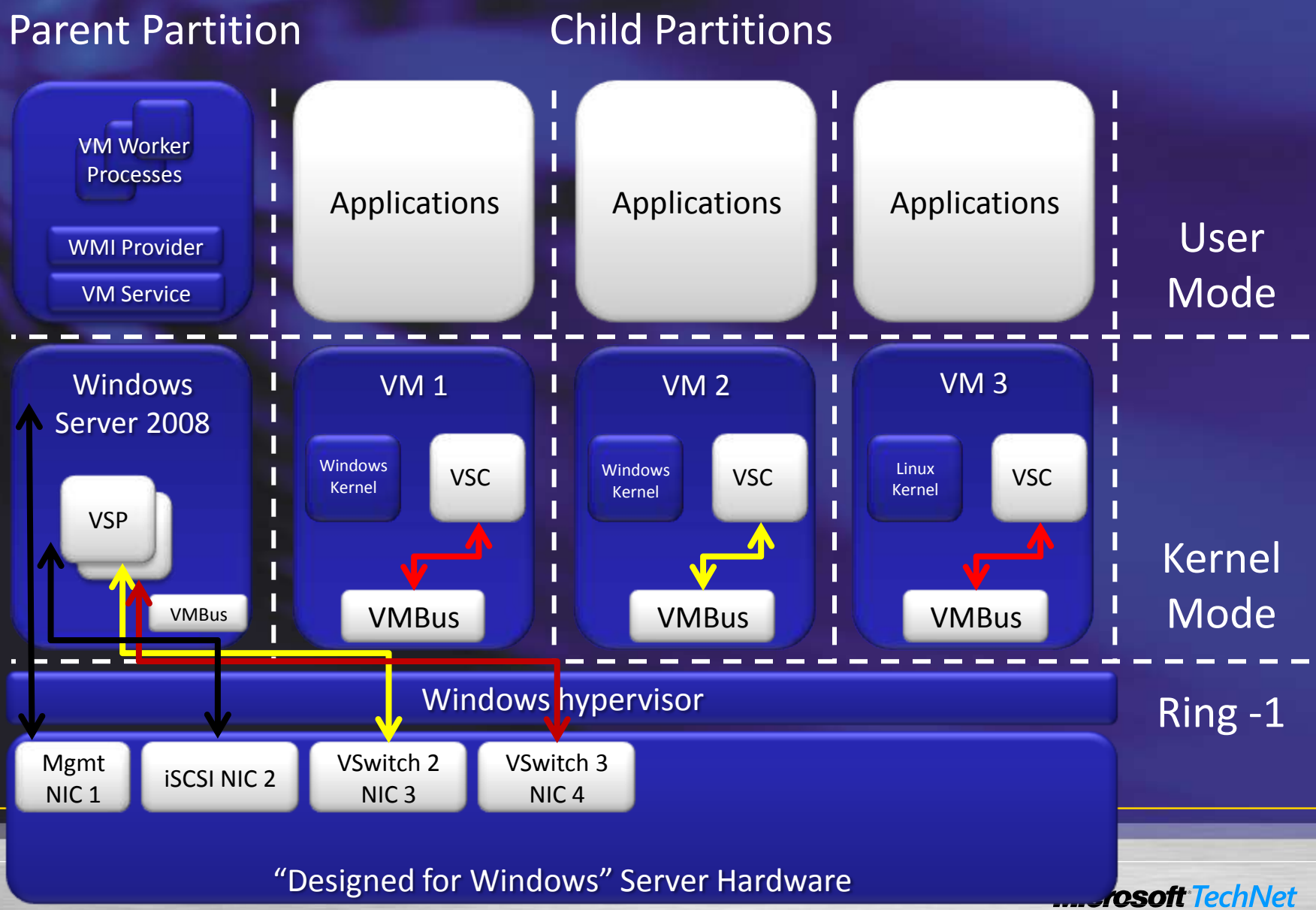
Name	Network Adapter	
☐ Local Area Connection	Broadcom NetXtreme 57xx Gigabit Controller	<-- Dedicated to Parent Partition
☐ Local Area Connection 2	Broadcom NetXtreme 57xx Gigabit Controller	<-- Dedicated to iSCSI in Parent
☑ Local Area Connection 3	Broadcom NetXtreme 57xx Gigabit Controller	<-- Virtual Switch 1
☑ Local Area Connection 4	Broadcom NetXtreme 57xx Gigabit Controller	<-- Virtual Switch 2

We recommend that you reserve one network adapter for remote access to this server. To reserve a network, do not select it for use with a virtual network.

More about virtual networks

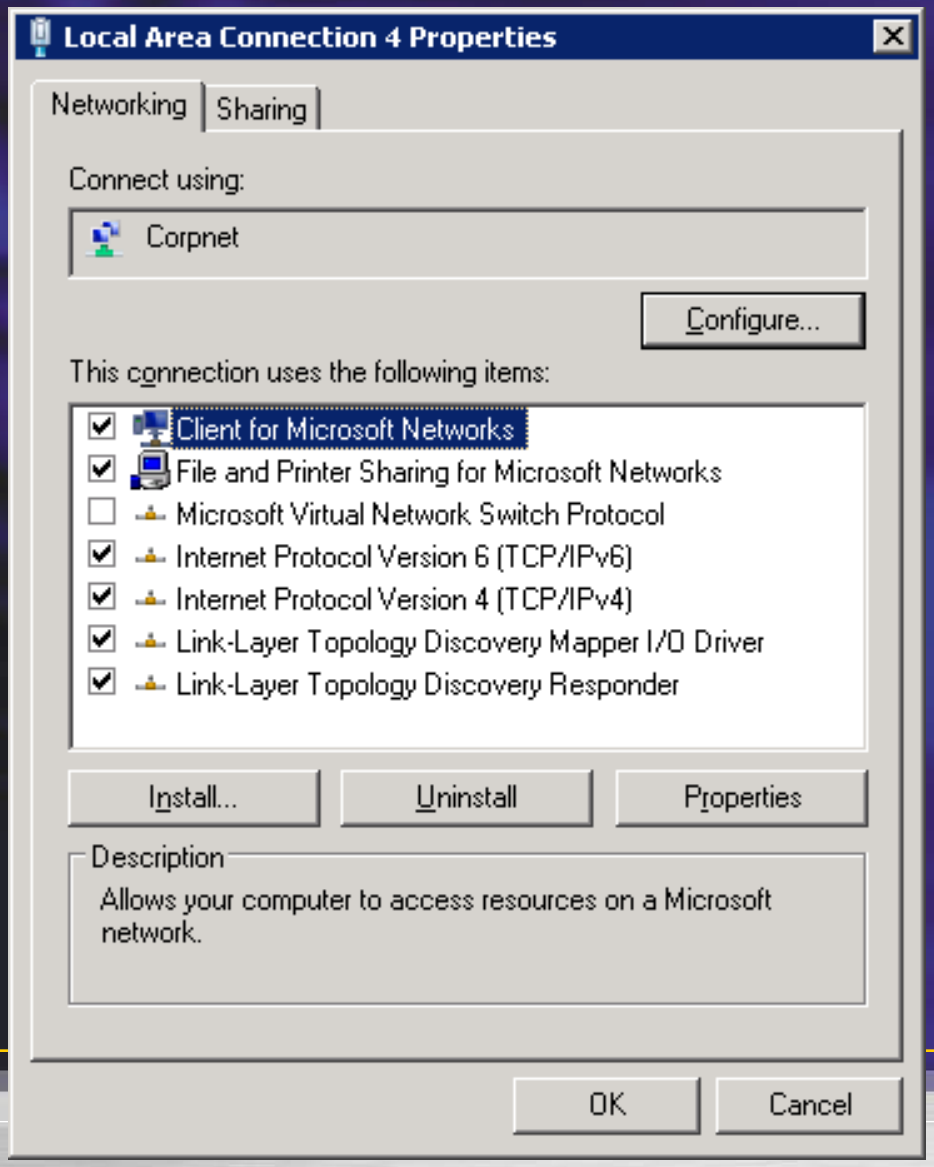
< Previous | Next > | Install | Cancel

使用iSCSI…

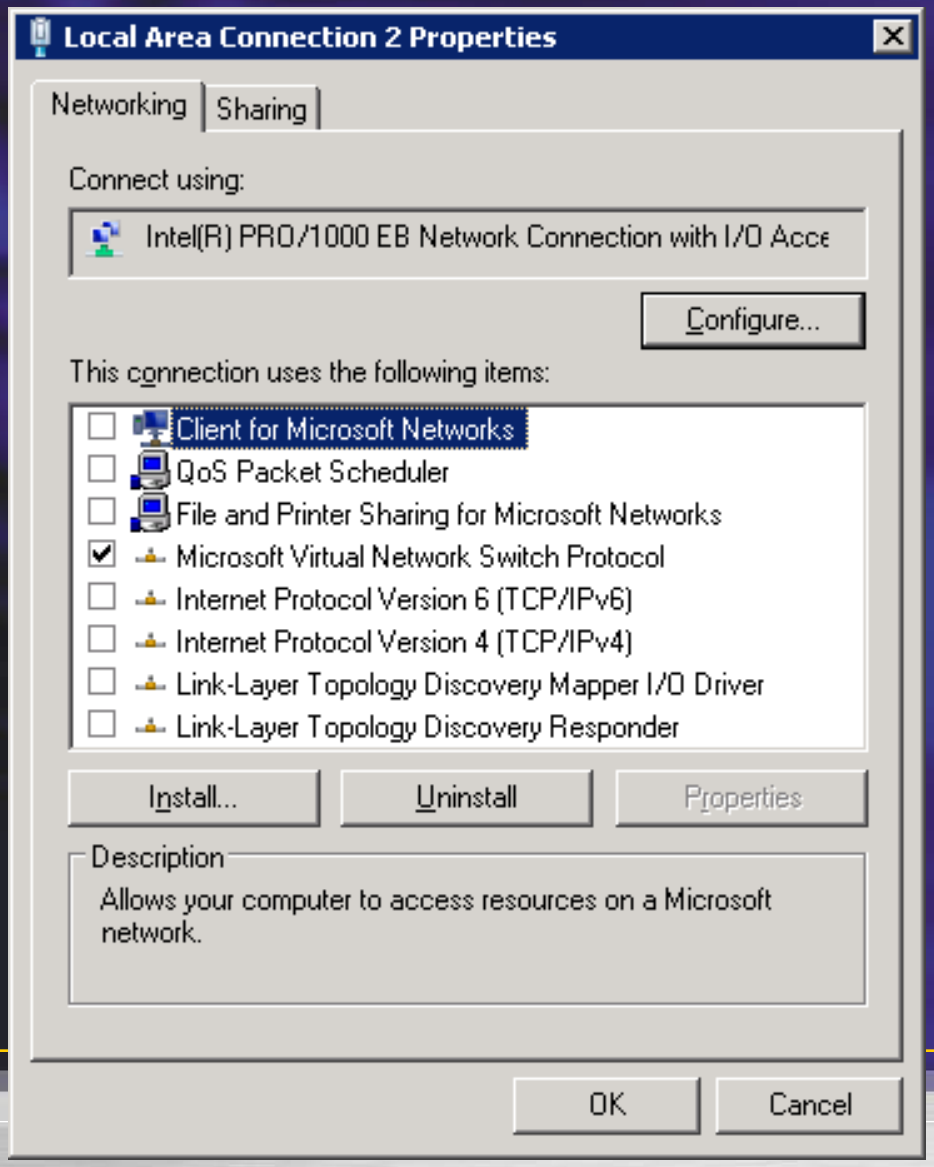


Microsoft TechNet

網路: Parent Partition

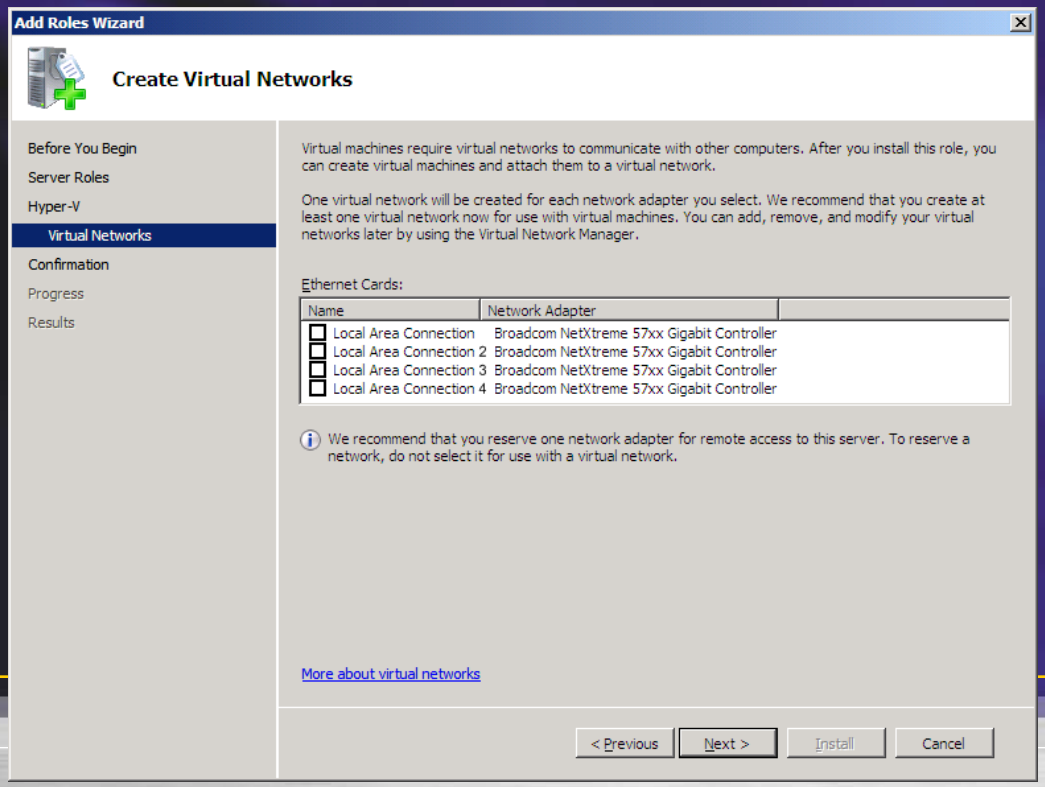


網路: Virtual Switches



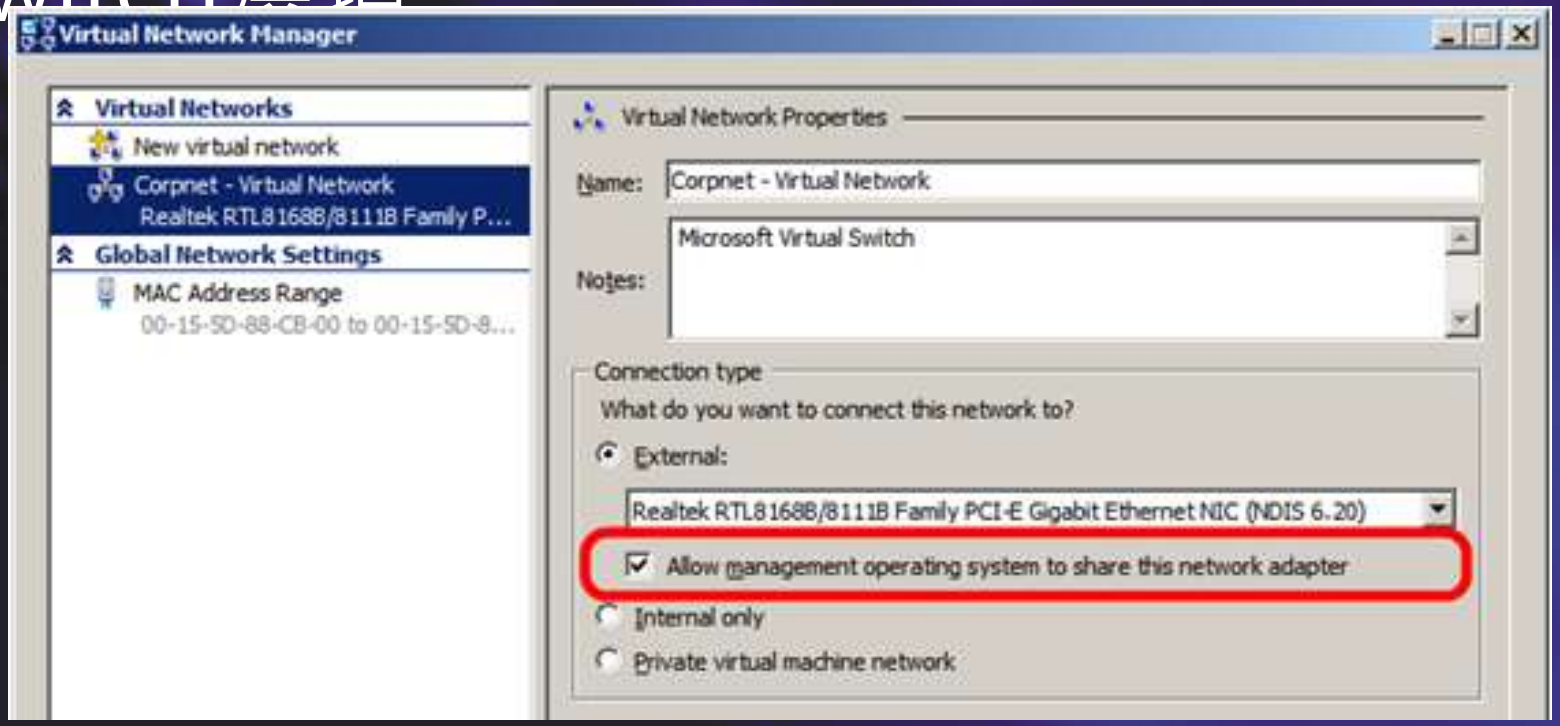
R2新功能: Server Core 部署

- Server Core沒有GUI ，如何設定NIC連結到switches會分離給parent partition ?



沒問題...

- Hyper-V R2 管理員包含設定連結virtual switch選項



網路

- TCP Offload 支援
- 概觀

  VM中的TCP/IP traffic可以卸載給主機上的實體NIC
- 好處

  減少 CPU負載

  網路卸載可以提升效能

  TCP Offload 完全支援Live Migration

網路

- 支援Virtual Machine Queue (VMQ)
- 概觀

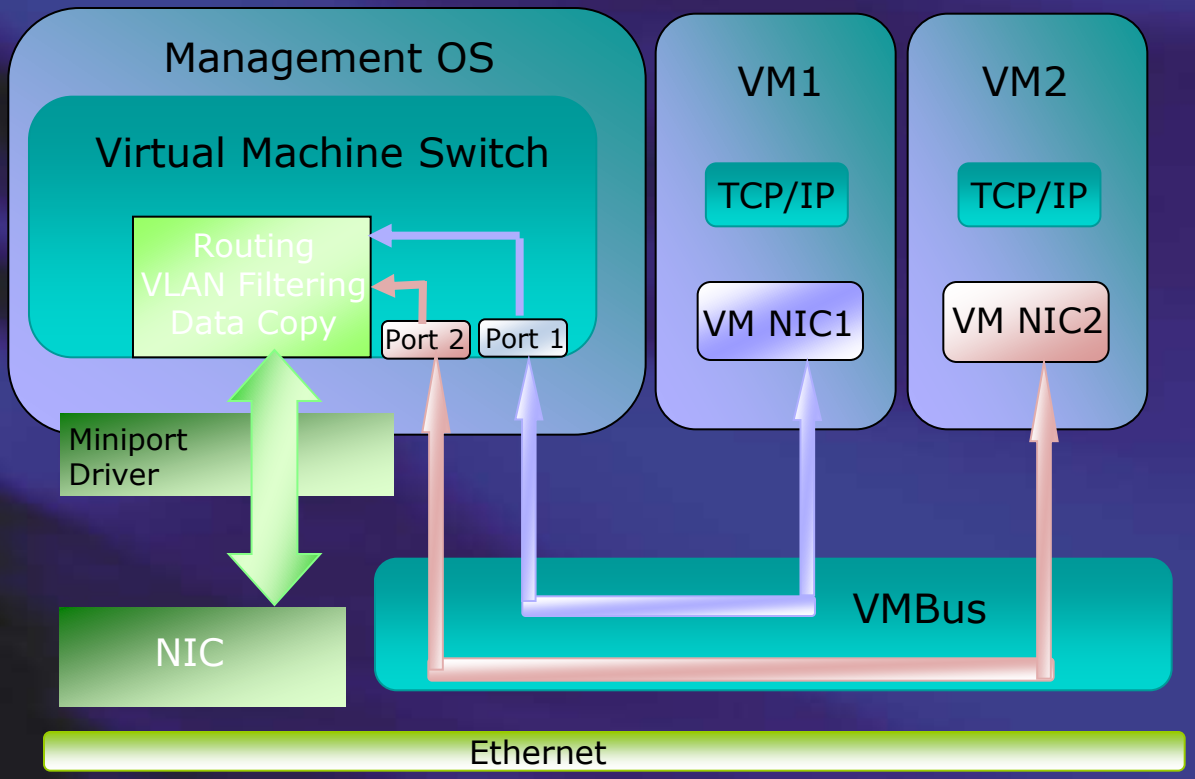
  NIC 可以直接 DMA封包到VM 的記憶體
  - VM 裝置緩衝區被指定到其中一個queues
  - 避免封包複製到VSP
  - 避免在virtual switch中路徑查詢 (VMQ Queue ID)

  讓一片NIC在實體主機(queues)上顯現成多片NIC
- 好處

  主機不再有裝置DMA 資料在緩衝區中，有較短的 I/O路徑長度 (增加效能)

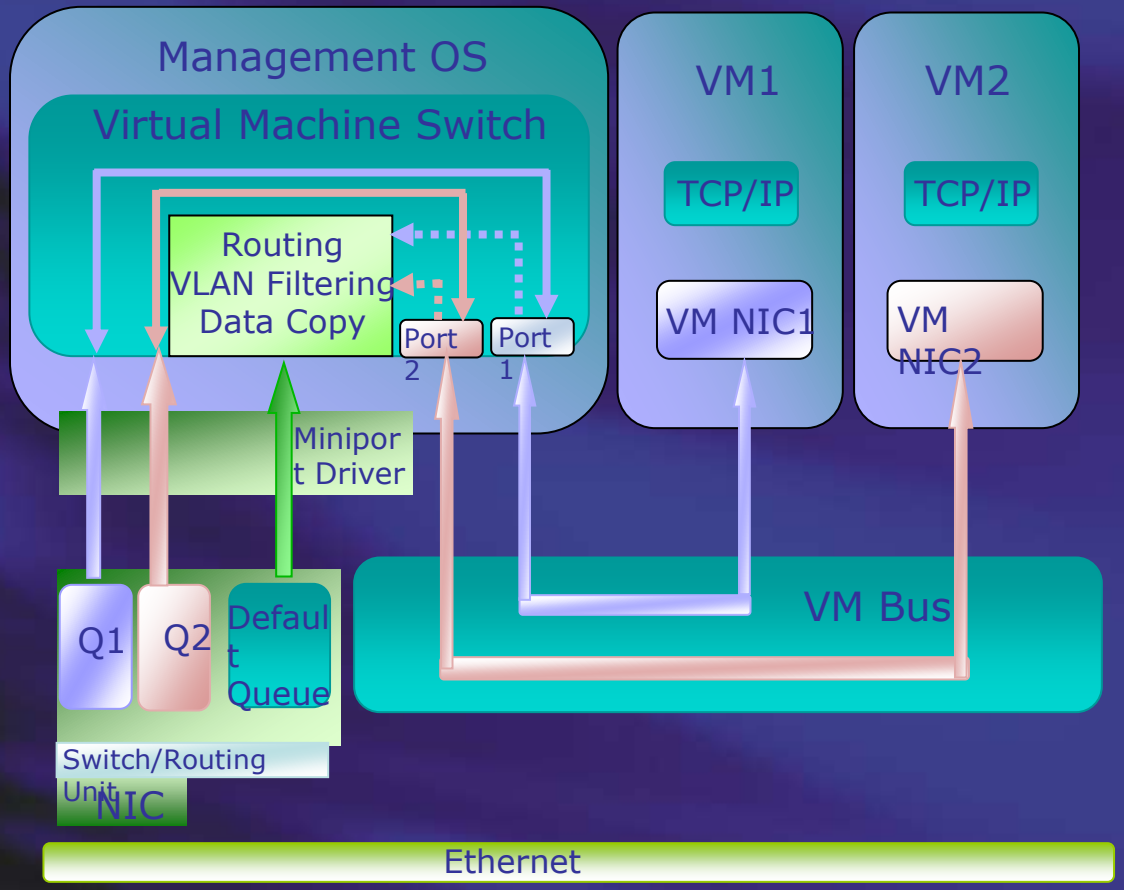
Windows* 2008 Hyper-V 網路 I/O 路徑

- 資料封包被排序並由VM交換器路由到對應的VM

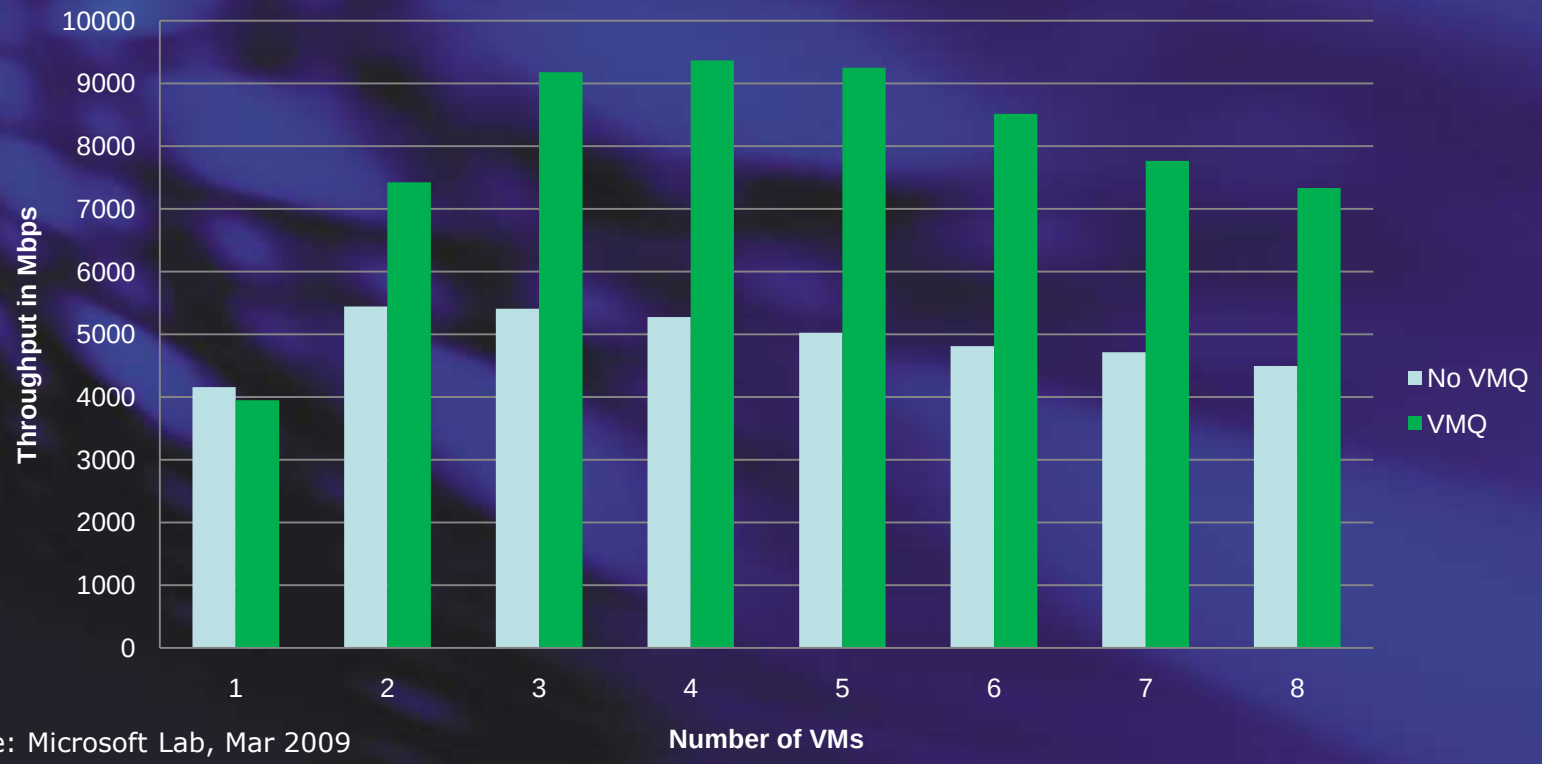


Windows Server 2008 R2 VMQ

- Data packets get sorted into multiple queues in the Ethernet Controller based on MAC Address and/or VLAN tags
- Sorted and queued data packets are then routed to the VMs by the VM Switch
- Enables the data packets to DMA directly into the VMs
- Removes data copy between the memory of the Management OS and the VM's memory



Intel 使用Microsoft VMQ測試



Source: Microsoft Lab, Mar 2009

- Quad core Intel® server, Windows* 2008 R2 Beta, ntttcp benchmark, standard frame size (1500 bytes)
- Intel® 82598 10 Gigabit Ethernet Controller
- Near line rate throughput with VMDq for 4 VMs
  - Throughput increase from 5.4Gbps to 9.3Gbps

使用VMDq/VMQ增加25% 吞吐量

*Other names and brands may be claimed as the property of others.

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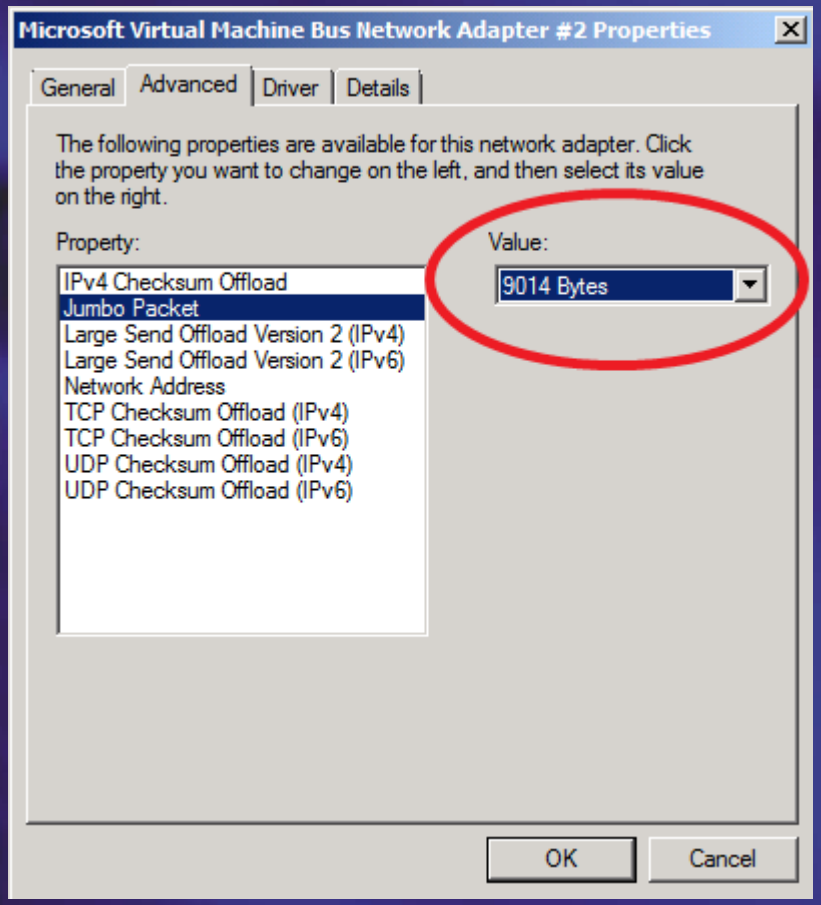
網路

- 支援Jumbo Frame
  - Ethernet frames >1,500 bytes
  - Ad hoc 標準是 ~9k
- 概觀
  - 啟用每一個封包 6倍大的承載量
- 好處
  - 提升吞吐量
  - 降低 對大檔案傳輸的 CPU 使用量



Hyper-V R2 中的Jumbo Frames

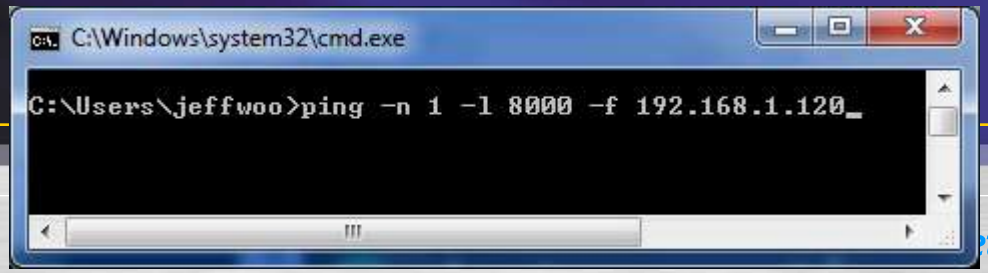
- 在虛擬交換器中增加支援
- 在虛擬NIC中增加支援
- 需要安裝整合元件
- 如何驗證 兩端 jumbo frames已經設定

  Ping –n 1 –l 8000 –f (主機名稱)

  -l (長度)

  -f (不要將封包切格成數個Ethernet frames)

  -n (count)



從零到Live Migration

Agenda

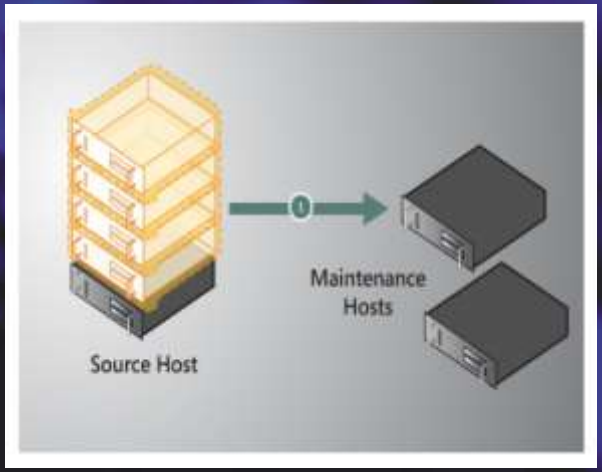
- Overview of Live Migration
- Typical Live Migration customer scenarios
- Technology overview (Live Migration)
- Storage management during Live Migration
- Walkthrough: setting up Live Migration

什麼是Live Migration?

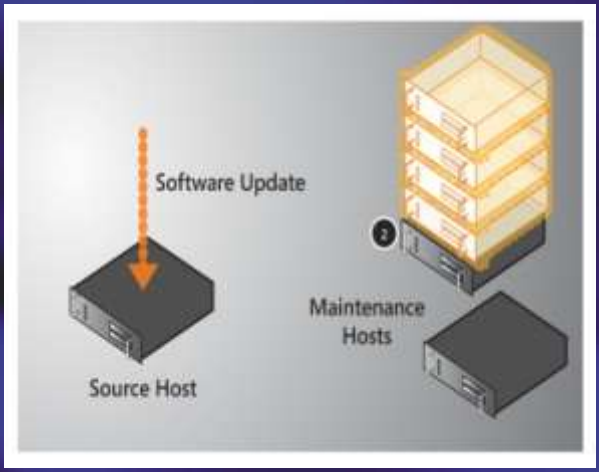
- Move a running virtual machine from one host to another host with no perceived downtime for the VM
  - VM is not aware of the migration
  - Maintain TCP connections of the guest OS
  - Building block for Dynamic Data Center through business agility, cost reduction and increase in productivity
  - VM is treated as a black box
- How is it different from Quick Migration?
  - VM is saved and restored on destination
  - Results in downtime for applications/workloads running inside VMs
- Both leverage same storage infrastructure – easy to move from QM to LM

Live Migration 是一個計畫中的容錯移轉決方案

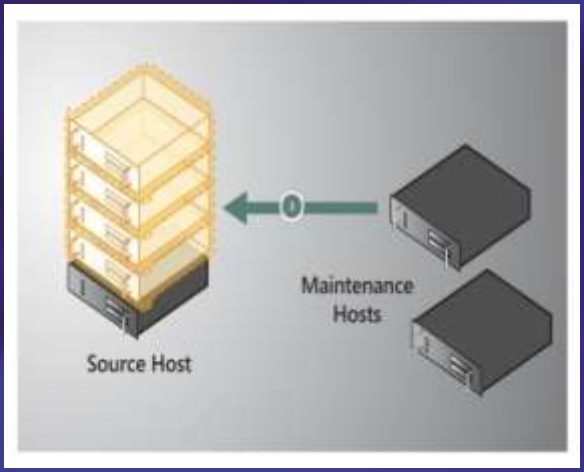
關鍵情境1: 主機服務



Live Migrate VMs from source to destination



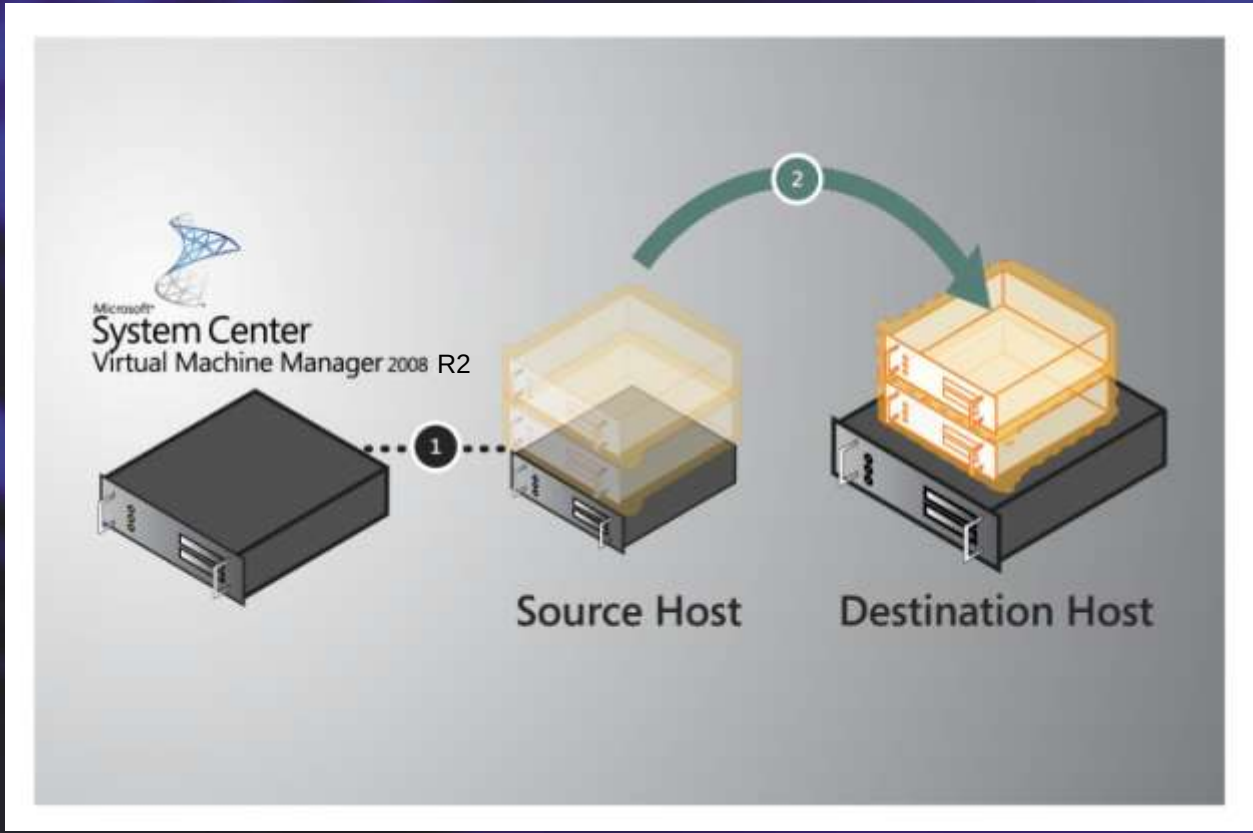
Service Source – patching or hardware servicing, no downtime seen by VMs on destination



Live Migrate VMs from back from destination to source

維護時期沒有工作負載的停止時間

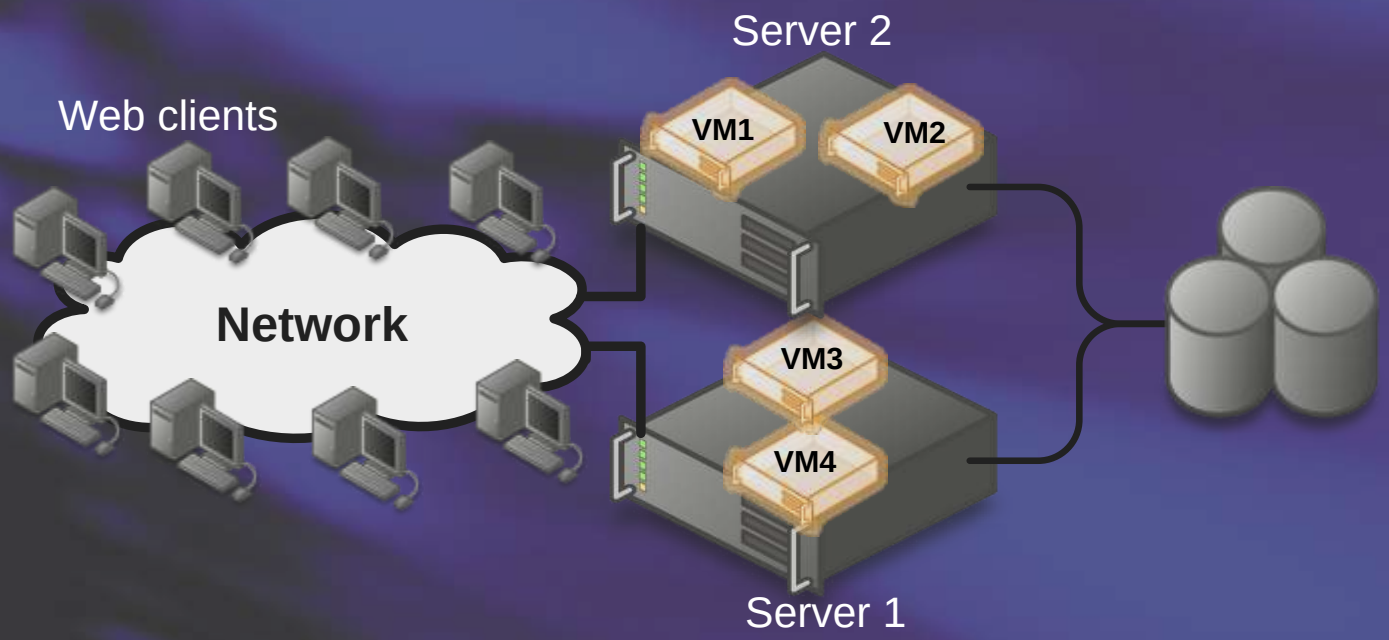
關鍵情境2: 負載平衡



SCVMM 2008 R2 driven by PRO (Performance Resource Optimization) can dynamically live migrate VMs to meet changing load

關鍵情境3: 綠色 IT – 電源管理

Day1, 8:00 AM: Web clients are connected to Web servers running in VM1 to VM4



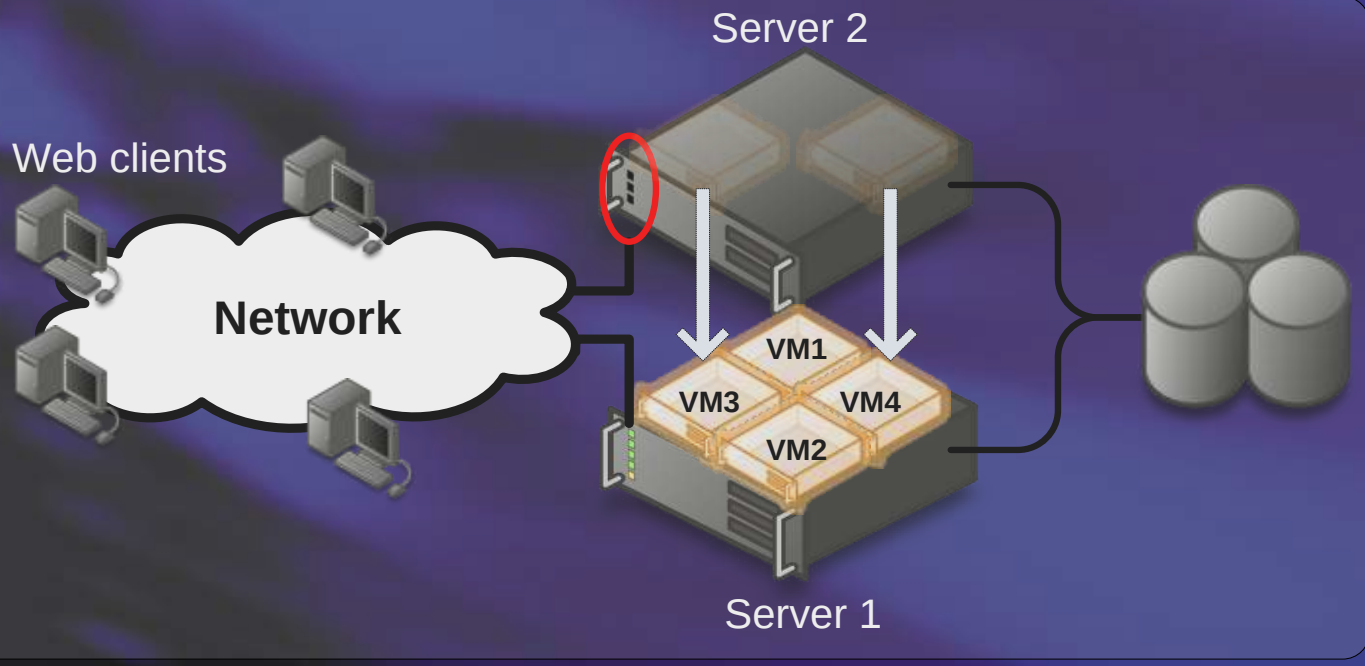
During business hours, both servers are in use

關鍵情境3: 綠色 IT – 電源管理

Day 1, 6:00 PM: Number of Web clients are dropped, load on Web servers is reduced

Day1, 8:00 PM: VM3 and VM4 are live migrated to Server 1

Day1, 8:01 PM: Server 2 is turned off



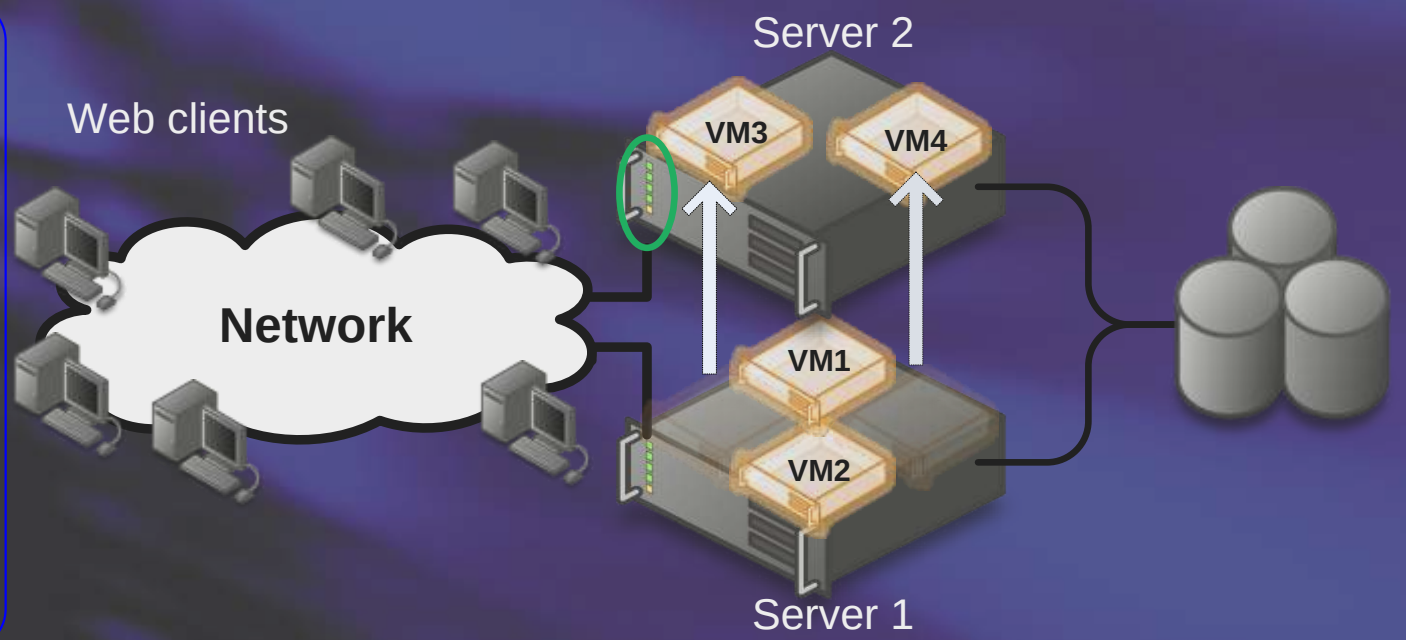
During off-peak or non-business hours, number of clients go down

關鍵情境3: 綠色 IT – 電源管理

Day2, 7: 00 AM: Number of Web clients are increasing, load on Web servers is going up

Day2, 7:30 AM: Server 2 is turned on

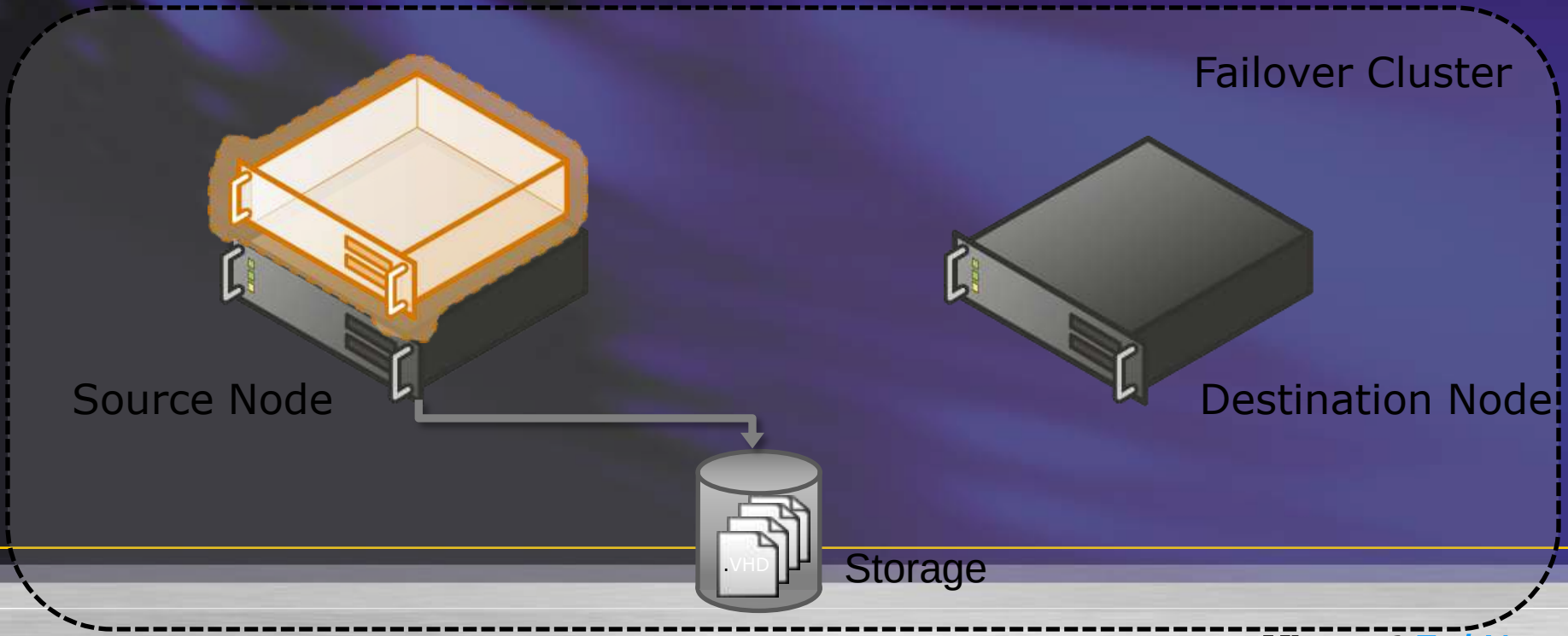
Day2, 7: 45 AM: VM3 and VM4 are live migrated to Server 2



Following day as business starts, load/demand go up, VMs are live migrated back

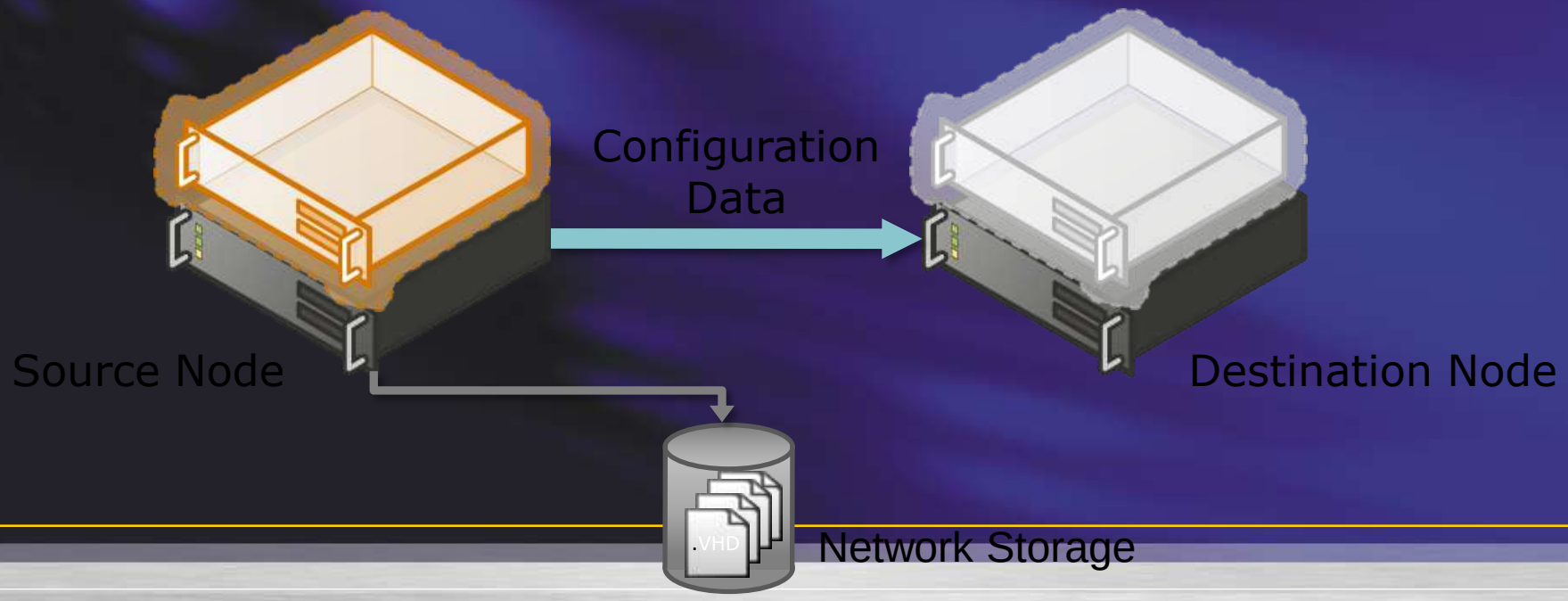
Live Migration如何運作?

- Prerequisites:
  - Source and Destination computers running WS08 R2
  - Source and destination nodes must be part of a Failover Cluster
  - Files used by the VM must be located on shared storage



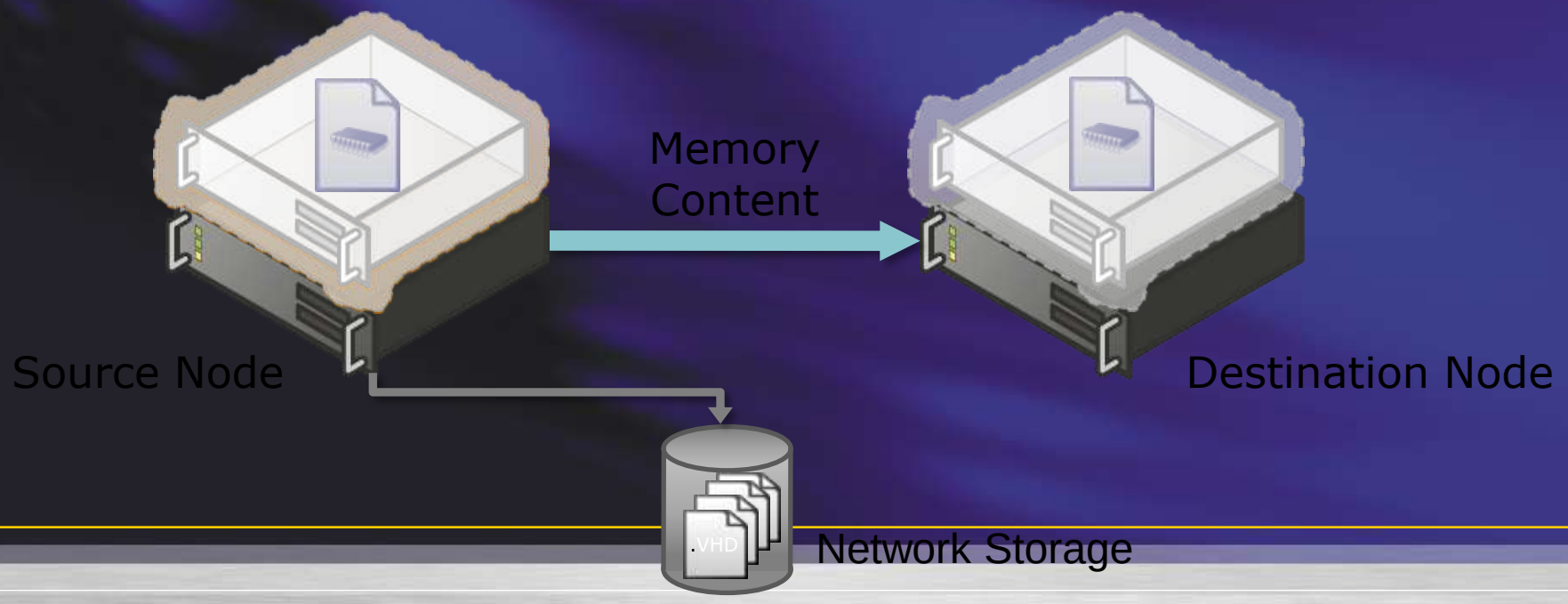
Live Migration如何運作?

- Phase 1: Setup
  - Create TCP connection between source and destination nodes
  - Transfer VM configuration data to destination node
  - Create a new VM on the destination node



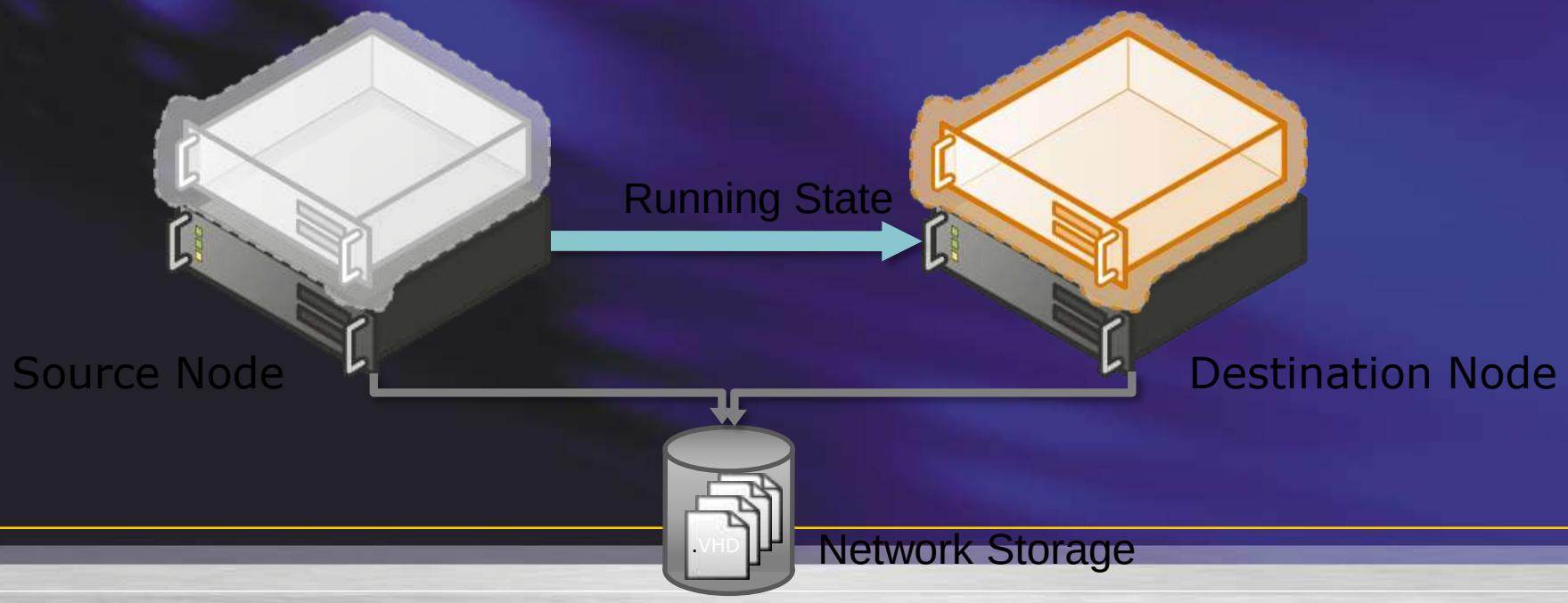
Live Migration如何運作?

- Phase 2: Memory transfer
  - Transfer the content of the VMs memory to the destination node
  - Track pages modified by the VM, retransfer these pages
  - Pause the VM before the final transfer pass



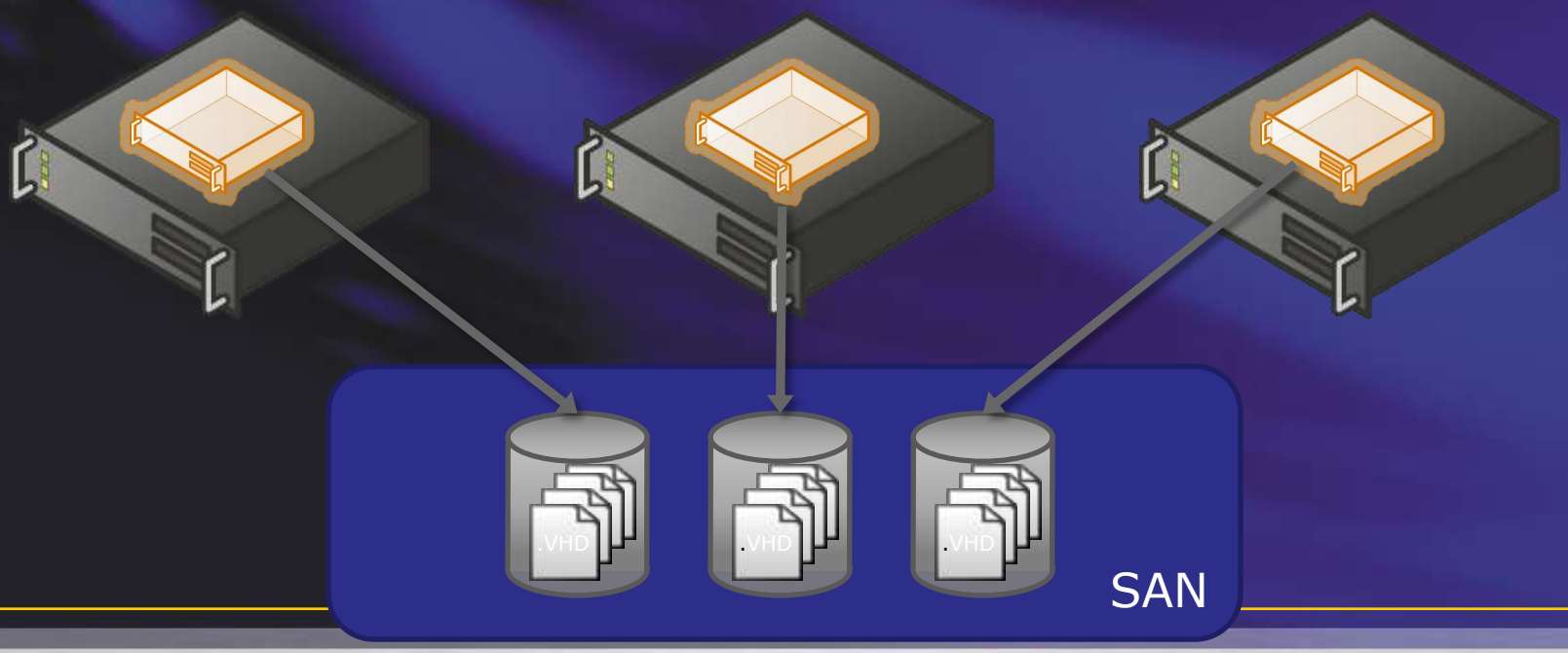
Live Migration如何運作?

- Phase 3: State transfer and VM restore
  - Save register and device state of VM on source node
  - Transfer running state and storage ownership to destination node
  - Start running VM on destination node
  - Cleanup VM on source node



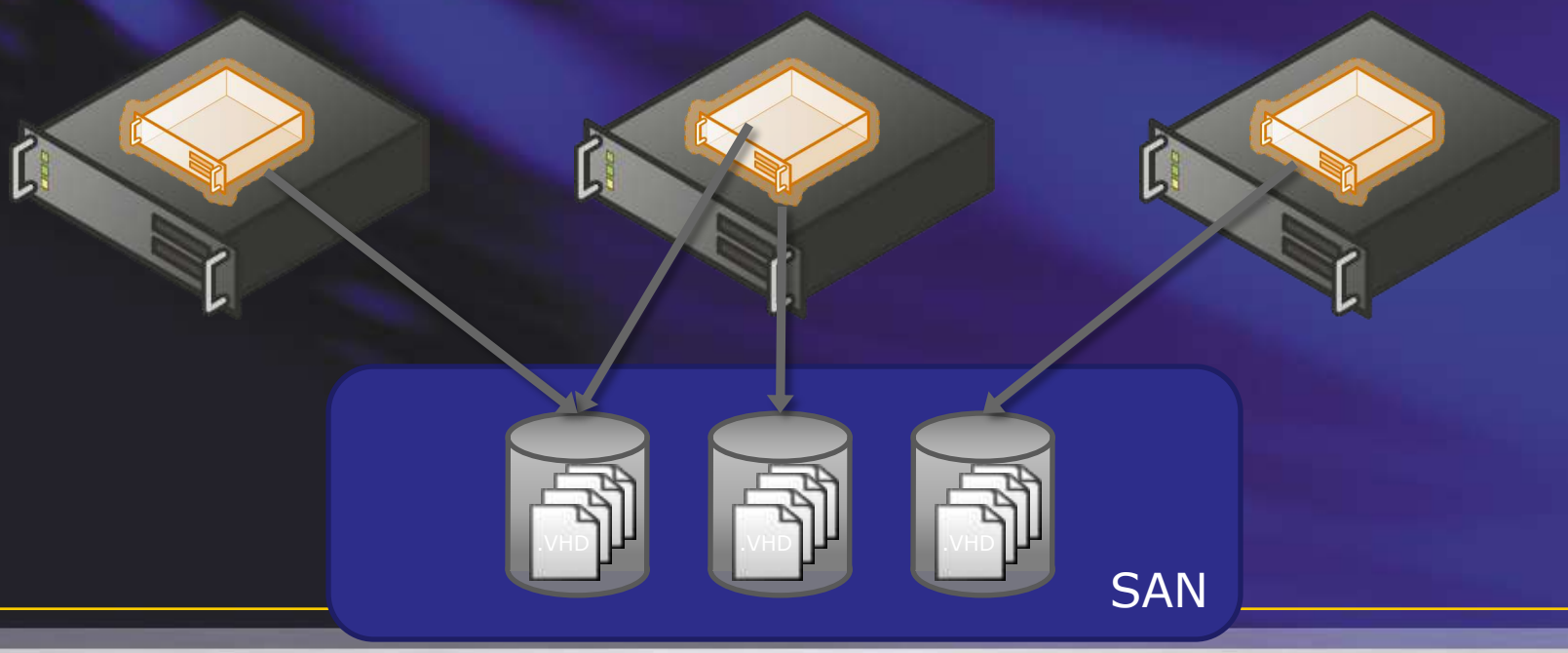
在Live Migration其間的儲存裝置管理

- Live Migration requires VMs to use shared storage
  - SAN LUNs managed by the Failover Clustering service
- Traditionally, each VM needs its own LUN
  - Volumes cannot be concurrently mounted on multiple nodes



在Live Migration其間的儲存裝置管理

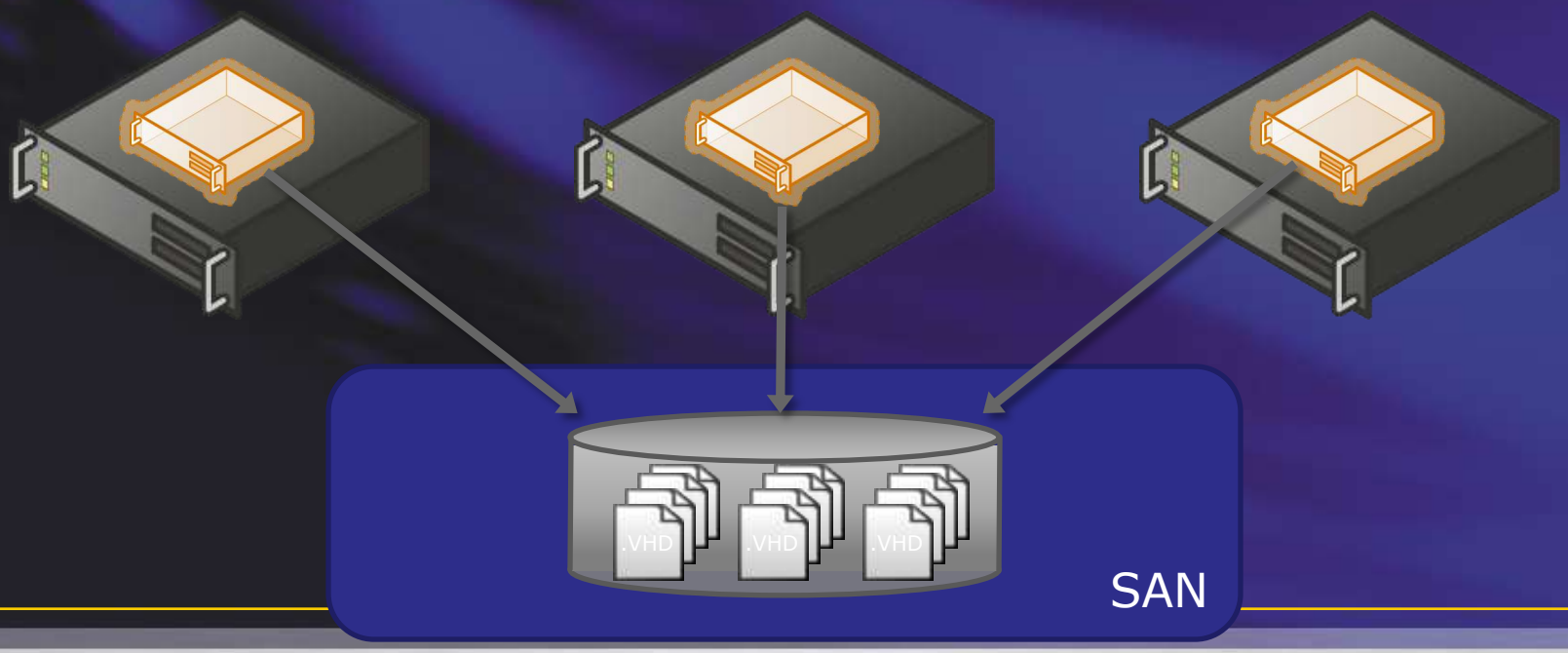
- The migration of a VM with a dedicated LUN requires that the ownership of the LUN is moved from the source to the destination node
  - Time-consuming, requires the volumes on the LUN to be offlined on the source node and onlined on the destination node
  - Is part of the blackout period



Cluster Shared Volumes (CSV)

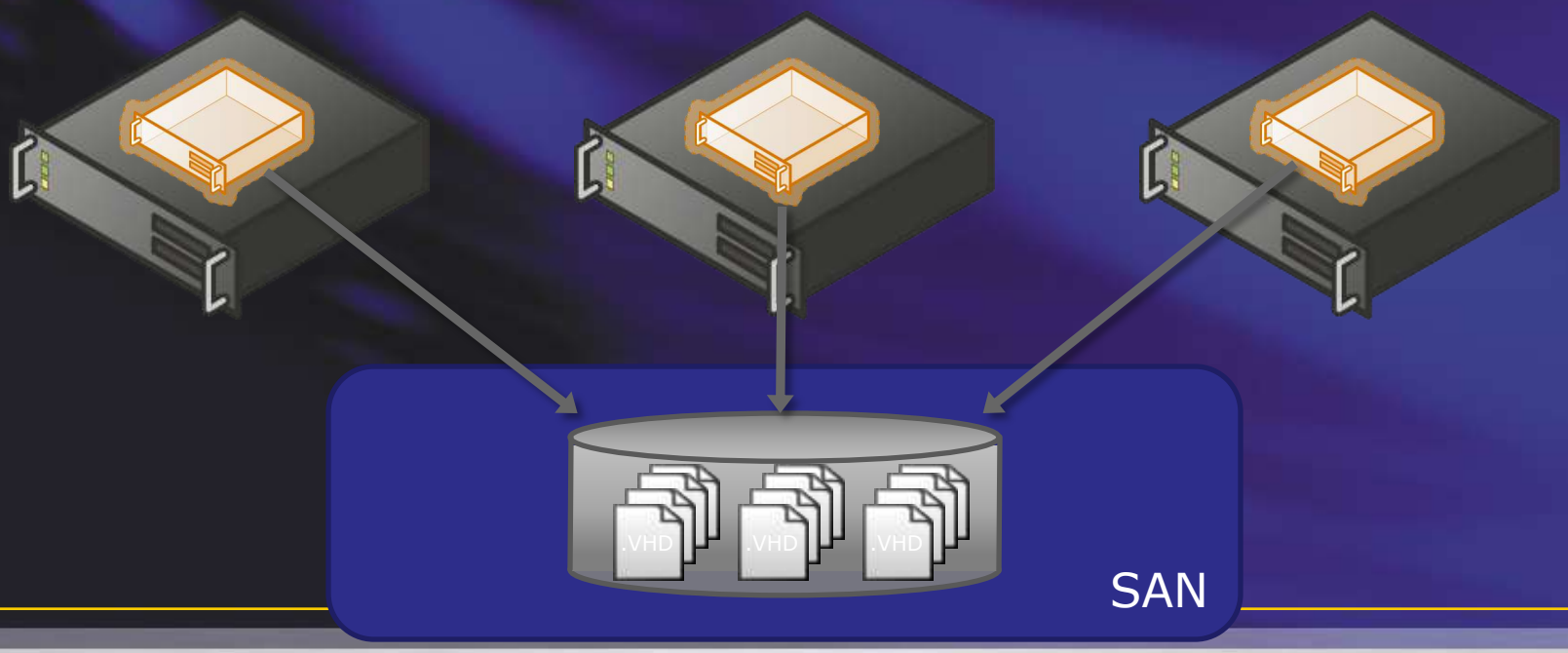
- Windows Server 2008 R2容錯移轉叢及的新功能
- 在所有節點上的磁碟有單一一致的名稱空間

  %SystemDrive%\ClusterStorage\VolumeX



CSV 和 Live Migration

- Moving the files of a VM during a migration becomes as simple as closing the files on the source node and opening the files on the destination node
- Additionally, CSV significantly simplifies the administration of the SAN



LEARNING LIVES HERE

設定Live Migration

Mike Sterling
Program Manager
Virtualization

Microsoft TechNet

儲存需求

- CSV + Live Migration

  需要嗎? 不

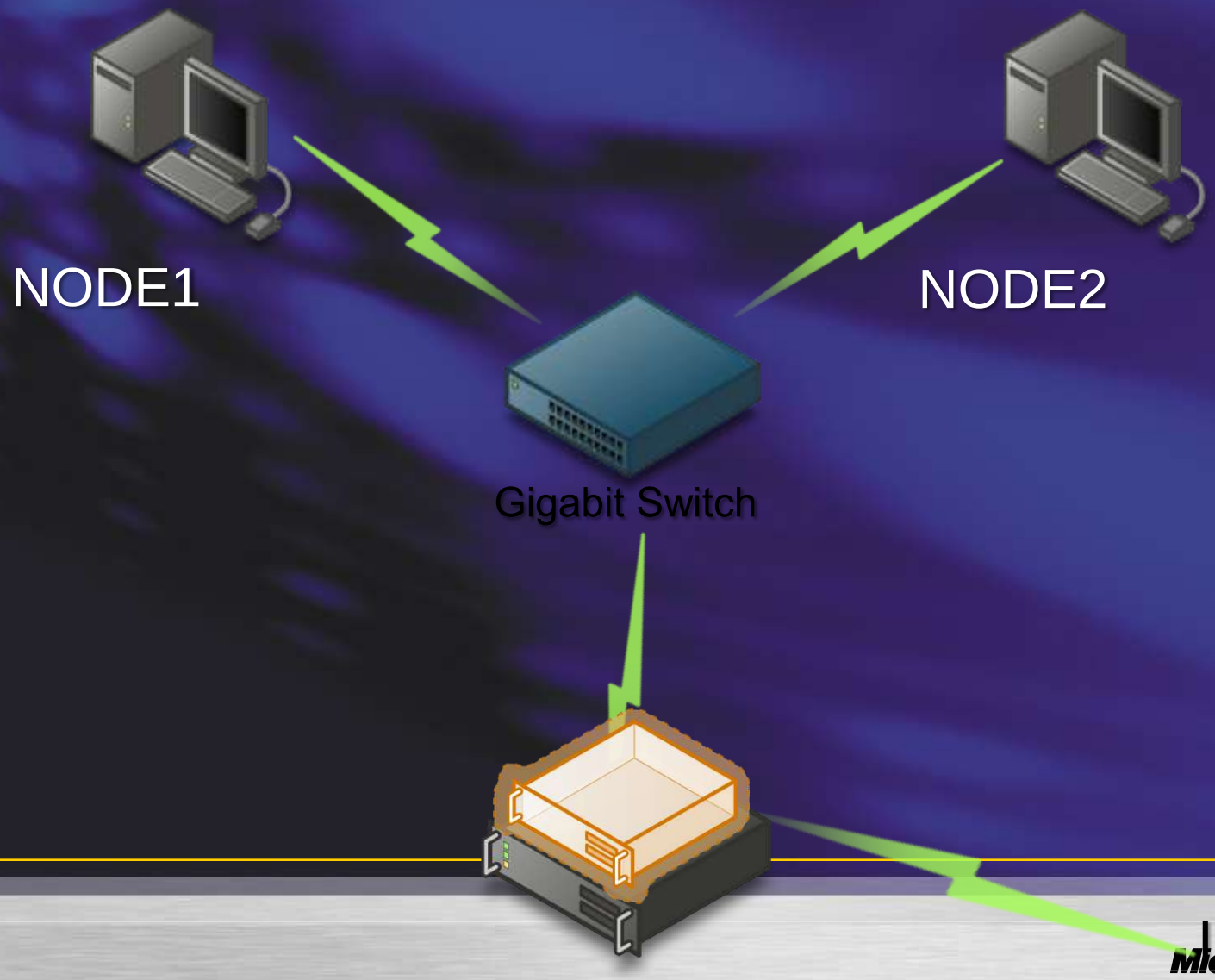
  建議嗎? 是

- 其他解決方案包含:

  3rd party Clustered File System

  - SanBolic Melios
  - HP PolyServe

示範環境



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Live Migration 透過 CSV: 步驟 1

- 安裝WS08 R2 在所有機器
- 新增 Hyper-V 角色
- 新增容錯移轉叢集在節點上

Live Migration 透過 CSV: 步驟 2

- iSCSI Target 組態
  - Windows Storage Server 包含Microsoft iSCSI Software
- 其他 iSCSI Targets
  - Starwind iSCSI Target
  - SANFly
- Create Volumes
  - 1 GB 給 quorum
  - 剩餘空間給 CSV
- Ensure bindings are correct!

Live Migration 透過 CSV: 步驟 3

- 在節點設定網路
  - 建立 Hyper-V 外部虛擬網路
  - 指定固定IP給虛擬NIC
- 啟動 iSCSI 控制台
  - 開始 -> 系統管理工具 -> iSCSI 啟動器
- 登入iSCSI target

Live Migration 透過 CSV: 步驟 4

- 為叢集建立 iSCSI Target
  - 使用 IQN (iSCSI Qualified Name)
  - 加入兩個節點
- Assign volumes to target
- 在Node 1，開啟磁碟管理，設定成線上，格式化磁碟
  - Disk 1: 代號 Q, 標籤: Quorum
  - Disk 2: 代號 S, 標籤: CSV

Live Migration 透過 CSV: 步驟 5

- 開啟容錯移轉管理員
- Form Cluster
  - Cluster Validation Wizard
- 啟用 CSV
- 將磁碟機加入 CSV

Live Migration 透過 CSV: 步驟 6

- 在CSV volume 建立VM (c:\clustervolume\volume1)
- 新增成叢集資源
- 開啟VM
- Live Migrate!

SCVMM 2008 R2 維護模式

Microsoft®

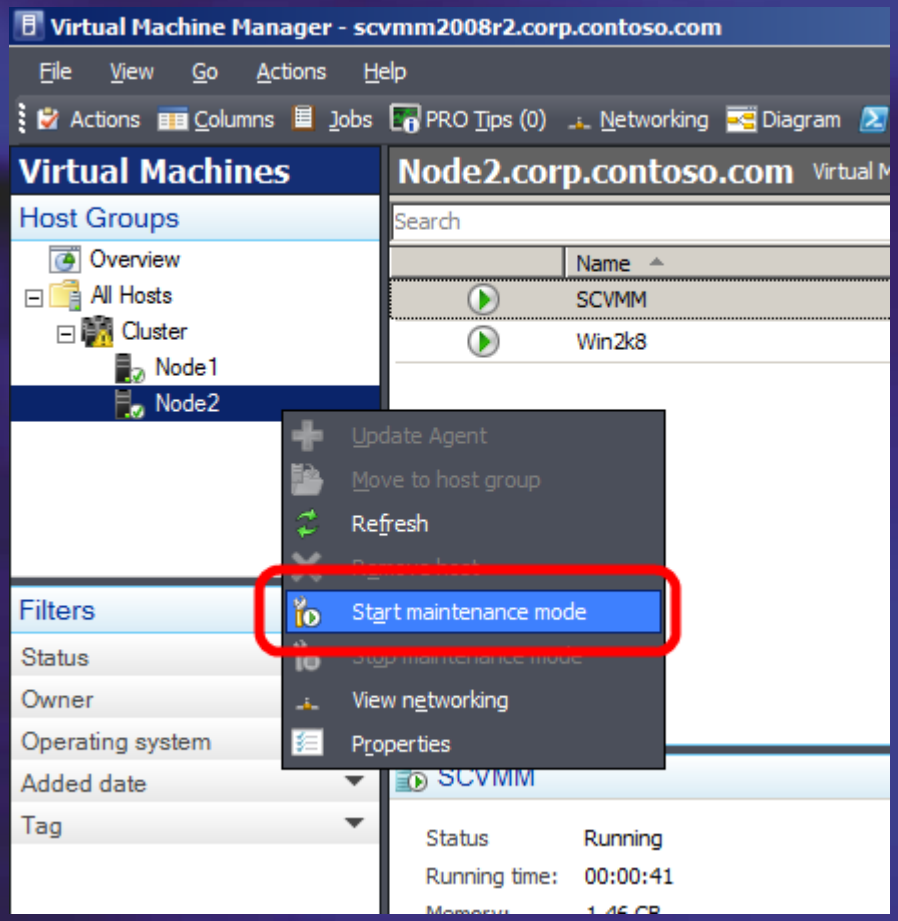
System Center Virtual Machine Manager 2008 R2

A centralized, heterogeneous management solution for the virtual datacenter

- **Support for new WS2008 R2 features**
  - Live migration: Includes compatibility checks
  - Network optimization: VMQ and Chimney
  - Hot add/remove of VHDs, Pass-through disks
- **Storage migration** (migrate storage of running VM)
- **Rapid provisioning** (templates)
- **Support for CFS** (CSV and 3rd party solutions)
- **SAN-related enhancements**
  - Migration in and out of clusters
  - Support for single target iSCSI with multiple LUNs
- **Host maintenance mode** (host evaluation)
- **VDI (RDS integration)**

維護模式

- Apply to all host and host clusters
- Two options
  - Save-state (no migration)
  - Live-migrate all running HA VMs and save-state for



在維護模式

- 當主機在維護模式
  - Host state is not monitored;
  - No VM creation is allowed;
  - No VM can be moved into the host;
  - Host is excluded from any placement.
- 使用者能做什麼?
  - Request to remove host;
  - Request to start / stop VMs;
  - Request to change host properties;
  - Request to move VM out of the host; …

離開維護模式

- 當主機從維護模式離開
  - The next host refresher will update host to its current state;
  - No VM is auto-migrated back;
  - No VM is auto-restarted;
  - Host is now available for placement.

在何處取得 TechNet 相關資訊？

- 訂閱 TechNet 資訊技術人快訊
  http://www.microsoft.com/taiwan/technet/flash/
- 訂閱 TechNet Plus

http://www.microsoft.com/taiwan/technet/

- 參加 TechNet 的活動
  http://www.microsoft.com/taiwan/technet/
- 下載 TechNet 研討會簡報與錄影檔
  http://www.microsoft.com/taiwan/technet/webcast/

Your potential. Our passion.™