修平科技大學

# 資訊網路技術系

# 實務專題報告

# Vmware VCP 5

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中華民國103年4月

現在的 x86 PC 都擁有強大的效能,並且因為 x86 架構的關係讓 我們一次只能執行一個作業系統,而這時硬體上的資源大多時候都是 處於閒置的狀態;這時虛擬化的技術就能解決硬體效能過剩問題,讓 伺服器的資源被有效利用且更有效率,還具備了許多的好處,像是伺 服器的統合、靈活的資源調度、快速且大量的佈署虛擬機器、降低維 護工作和高可用性與備份回復等功能。

VMware vSphere 是 VMware 的原生架構的產品, vSphere 中的 ESXi 則為虛擬化平台, vSphere Client 和 Web Client 為單機管理介 面、vCenter Server 為管理中心提供額外的功能。

vCenter Server 提供的功能有 vMotion(無縫轉移)、DRS(負載平衡)、ReSource Management(資源分配管理)、vSphere HA(高可用性)、架構於 HA 上的 FT(零中斷)等...。

目錄

第一章	前言
1-1	研究動機與目的4
1-2	系統簡介5
1-2-	-1 軟.硬體需求5
1-2-	-2 系統/建置架構圖6
1-3	研究進度
1-3-	-1 研究進度甘特圖8
1-3-	-2 工作分配表9
第二章	文獻探討
2-1	認識虛擬化10
2-2	認識 VMware vSphere
2-3	ESXi介紹12
第三章	系統功能介紹13
第四章	操作說明15
第五章	結論
5-1	研究結論70
5-2	未來研究方向71
第六章	參考文獻72

#### 第一章 前言

1-1 研究動機與目的

「虛擬化」是近年來 IT 產業最熱門的議題,雲端運算這個名詞 更是熱門。廣義來說,透過網際網路而來的各種應用,都可歸納在雲 端服務範圍內。

沒有虛擬化,機房、資料中心還是在,依舊可以提供服務,但會 沒有彈性且辛苦。如今虛擬化已是形成雲朵的必要條件。

虛擬化可以進一步的將資料中心裡的伺服器、儲存設備、網路設 備整合後需化出資源池,使資料中心發展出自動化、動態靈活性、可 擴展性。架構確立後,將隨之發展出各種新的商業模式服務。

使用領先業界的虛擬化和雲端管理平台 VMware vSphere with Operations Mangement 所寄至且經實證的虛擬化解決方案來簡化 IIT 基礎架構。

VMware 虛擬化能透過伺服器整合協助您降低資金支出,利用自動化減少營運成本,同時還能減少預定及非預定停機時間,大幅降低營收損失。

4

# 1-2 系統簡介

#### 1-2-1 軟.硬體需求

系 統 設 備	內容
	(1) 64 位元 Windows 7
	(2) 64 位元 Windows Server 2008 R2
	(3) 32 位元 Windows Server 2003
軟 體	(4) VMware Player
	(5) VMware vSphere 5 評估 60 天版本
	(ESXi 5.1 ,vCenter Server) (6) StarWind iSCSII SAN for free (7) VM EXPLORER for free
	(1) 64 位元 4 核心桌上型電腦 X1
	(支援 IntelVT orAMD-V)
硬 體	(2) 4GB 記憶體 X4
	(3) 1.5TB 硬碟 X1
	(4) 500G 硬碟 X1

(表 1)

#### 1-2-2 系統/建置架構圖



系統建構圖(圖1)



# 1-3 研究進度

#### 1-3-1 研究進度之甘特圖

時間	201	2013 年							2014 年		
工作項目	3 月	4 月	5 月	6 月	7 月	8 月	9 月	10 月	11 月	12 月	1 月
分組		Í									
找指導老師											
收集專題資料			ļ	) ) 		Ì		) A	l		
熟悉相關軟體											
安裝操作系統				í	l.	ľ		Í			
設定操作系統											
實作與測試功能						i I		Î	l	1	
撷取畫面資料											l.
書面資料											
口頭報告											

(圖 3)

### 1-3-2 工作分配表

項目	起	止	負責人員
蒐集有關 VMware	2013年4月	2013 年 12 月	全組人員
vSphere5 相關資料及閱			
讀			
Windows Server2008 資	2013年4月	2013 年 12 月	全組人員
料蒐集及閱讀			
Windows Server2008 な推動の文	2013年5月	2013年6月	林品丞 古晟丞
女农兴政人			王建祥 翁廉侑
安裝虛擬環境	2013年6月	2013年7月	林品丞 林家慶
			王建祥 翁廉侑
安裝 VMware vSphere	2013年7月	2013年8月	林品丞 古晟丞
			王建祥 翁廉侑
設定 vCenter Server	2013年8月	2013 年 10 月	林品丞 林家慶
			王建祥 翁廉侑
軟體功能實作與測試	2013 年 10 月	2013 年 12 月	全組組員
書面資料撰寫	2013 年 11 月	2013 年 12 月	全組組員

# (表 2)

#### 第二章 文獻探討

- 2-1 認識虛擬化
  - ■Why 虛擬化
    - ●Server Consolidation 伺服器合併:硬體建置成本降低。
    - ●避免 Service Combination:不是把許多 Service 安裝再同一 台。
    - ●Host 上,避免故障而無法完全運作。
    - ●備份與還原容易。
    - ●擺脫硬體:更換硬體主機沒有 Driver 上的安裝問題!利用

P2V(Physical to Virtual)把現有系統整個轉成 VM。

●很好的實驗環境:PoC(Procedure of Change)。

- ●降低風險:利用 Snapshot 快照 -> 很容易倒回去原本的環境 (還原點)。
- ■虛擬化程序
  - ●Step1:採購硬體,參考 HCL 的表列資料。
  - ●Step2: 虛擬化核心 Hypervisor。
  - Step3:決定 Partition,先建立 Parent Partition(Host OS)後再建立 Child Partition(VM),不同的 Partition 視為不同的硬體(VM)。

2-2 認識 VMware vSphere

■VMware vSphere 為雲端基礎架構的建立提供領導世界的虛擬 化平台。

■vSphere 能做什麼?

●強大的運算:將您的 x86 伺服器資源虛擬化並集結成邏輯 集區,分配給多重工作負載。

●可靠的安全性:以業界最安全的「裸機」虛擬化平台保護您的資料及應用程式。

●網路服務:獲得虛擬環境所需的網路服務,並可以簡化控制與管理作業。

●高效率儲存:降低後端儲存系統的複雜性,讓虛擬環境獲得最高效率的儲存利用率。

●一致的自動化:以 vSphere 精確及可重複的解決方案簡化 例行工作,以降低營運成本及降低錯誤。

● High Availability:延長跨虛擬基礎架構的不停機時間,降低非預定停機時間,並免除預定停機時間,以進行伺服器及儲存裝置維護。

2-3 ESXi 介紹

■免費的 ESXi 版本稱之為 vSphere Hypervisor。ESXi 可以安 裝在硬碟、USB 隨身碟或 SD 卡,利用 Auto Deploy 之功能還能安 裝在無磁碟主機上(直接在 Memory 執行)。ESXi 一般只占用少於 70MB 的磁碟空間(small disk footprint)。ESXi 5.0 可以讓一部 Host 支援最多 512 部 VM,最多 2048 個 vCPU。整個系統最多可以有 160 個 logical CPU 及 2TB 的記憶體。

●"Small disk footprint"不會紀錄太多操作資訊。

●"Auto Deploy"功能讓 ESXi 不是直接安裝在 HD 上, 而是 執行時由遠端下載到 RAM 上面執行。

■ESXi 具有額外的保護措施

- Memory Hardening:包刮 ESXi 核心、使用者應用程式、 驅動程式等元件之記憶體配置為隨機的,因此記憶體位址 是無法預測的,安全性相對較高。
- Kernel Module Integrity:利用數位簽章概念確保 VMkernel 所載入的模組、驅動程式等具有 integrity 及 authenticity。
- Trusted Platform Module(TPM):硬體元件確保開機程序 及所有驅動程式的載入均是一般正常狀態。加密的 Key 是 放在硬體元件中,因此硬碟被偷走也無法解開。

#### 第三章 系統功能介紹

■vSphere 為產品線的名稱, ESXi 為虛擬平台而 vCenter Server 則 為管理功能。

●DRS(Distributed Resource Scheduler):自動調整負載。自動 根據實體主機的負載,自動調度虛擬系統的位置呢,也就是當某 台實體主機負載較高,可以透過DRS將部份子系統透過VMotion 搬到負載較輕的實體主機。

●DPM(Distributed Power Management): VMware DPM 主要執 行伺服 器工作負載集中的任務,它首先確定將各種工作負載整 合到最少物理伺服器上的最佳方式,滿足應用程式的性能需求; 隨後,VMware DPM 會關閉不需要的伺服器以降低資料中心伺服 器的能耗,一旦應用程式需要更多的物理資源時又能自動開啟伺 服器。該過程式自動的和連續的,同時還確保滿足應用程式的 SLA。

13

●HA(High Availability): Physical Host 故障時可以自動移轉到 另一部 Host 上執行(在另一部 Host 上重新啟動 VM,因此會有服 務中斷現象。HA 與 DRS 不同, DRS 是為了負載調整而設計, 無法用於突然性的故障處理)。VMware 另有 FT(Fault Tolerance) 可以達到不中斷的要求, FT 式架構在 HA 之上。

●vShield:類似防毒、防火牆軟體,非安裝在內部,保護會較完整。

■ESXi 安裝

1.VMware Player 點選新增虛擬機器候,選擇 ESXi 的 ISO 安裝檔。

A Home	New Virtual Machine Wizard	Player
	Welcome to the New Virtual Machine Wizard	
DNS	A virtual machine is like a physical computer; it needs an operating system. How will you install the guest operating system?	Machine
	Install from:	hich will then be
	◯ Installer disc:	
	▲ DVD 光碟機 (E;)	ine
		e, which will then b
	<ul> <li>Installed use image me (uso).</li> <li>C:\Users\John\Desktop\esxi5.5\VMware-VMvisor-Insta          Browse     </li> <li>VMware ESXi 5 detected.</li> <li>I will install the operating system later. The virtual machine will be created with a blank hard disk.</li> </ul>	Workstation snapshots, more.
		ents.
	Help < Back Next > Cancel	

(圖 4)

2.設定 ESXi 的存放路徑與虛擬機器名稱。

🙀 VMware Player	(Expired license)	
Player 👻 🕨 🕨	· 2 1 5	
Arr Home	New Virtual Machine Wizard	Player
DNS	Name the Virtual Machine What name would you like to use for this virtual machine? Virtual machine name:	l Machine
	UNware ESXI 5 Location: H:\VMware\ESXI01 Browse	ine t, which will then be
		Workstation snapshots, more.
		ents.
	< Back Next > Can	cel
	Your evaluation license commercial use of this p <u>Buy now.</u>	has expired. To continue product, purchase a license.

(圖 5)

3. 設定虛擬機器的磁碟大小與選擇檔案格式為單一檔案。



(圖 6)

4.選擇自定義硬體,設定硬體資源。



圖 7

#### 5.設定網路為橋接網路。

1		
dware		
Device	Summary	Device status
Memory Processors New CD/DVD (	4 GB 2 Using file C: \Users \John \Des	Connected Connect at power on
Vetwork Adapter USB Controller Display	NAT Present Auto detect	Bridged: Connected directly to the physical network     Replicate physical network connection state
		Configure Adapters          NAT: Used to share the host's IP address         Host-only: A private network shared with the host         LAN segment:         LAN Segments
	Add Remove	Close

(圖 8)

#### 6.開始安裝 ESXi。



(圖 9)



7.出現歡迎安裝訊息,按下 Enter 鍵。

(圖 10)

#### 8.License Agreement 宣告,按下 F11 鍵。



(圖 11)

#### 9.選擇安裝 ESXi 的磁碟路徑。

🍕 VMware ESXi 5 - VMware Player (Expired license)					đ	×
Player 👻 🔛 🖛 🔚 👘	» 🚐	<b>()</b>		<b>t</b> a <b>t</b> a	1	<b>E</b> ,
VMware ESXi 5.1.0 Installer						^
Select a Disk to Install or Upgrade						=
* Contains a VMFS partition						
Storage Device Capaci	y					
Renote:	8					
(none)						
(Esc) Cancel (F1) Details (F5) Refresh (Enter) Continue						
						-
K III III						•
B       Click in the virtual screen to send keystrokes       Install VMware ESXI 5 as you would on a physical computer. When you are done and the operating system boots up, I Finished installing <sup>*</sup> .	Installin	Chan	ge Disc	He	lp	×

(圖 12)

10.設定 Keyboard layout 為 US Default,按下 Enter 鍵。



(圖 13)

# 11.輸入 ESXi 的 root 密碼。

😼 VMware ESXi 5 - VMware Player (Expired license)				ð 🗙
<u>P</u> layer 🕶 🔛 🖃 📷	» 🚐 (	a 🖬 🖏	<b>1</b> 3	<b>1</b>
VMµare ESXi 5.1.0 Installer				^
				=
Please enter a root password (recommended)				
Root password:				
Confirm password:				
(Esc) Cancel (F9) Back (Enter) Continue				
< [				- +
- Click in the virtual screen Install VMware FSVi 5 as you would on a physical computer. When you are done and the operation exctam boots up of		(		
to send keystrokes dick "I Finished Installing".	I Finished Installing	Change Disc	Hel	p

(圖 14)

#### 12.按下 F11 後開始安裝 ESXi。



(圖 15)



13.安裝完成後,按下 Enter 鍵重新開機。

(圖 16)

#### 14.啟動後的 ESXi 畫面。



(圖 17)

1.按下F2 輸入ESXi 帳號及密碼後,選擇 Network 設定。



(圖 18)

#### 2.選擇 IP Configuration 設定 ESXi 的 IP address。



(圖 19)

#### 3. 測試 ESXi 網路設定有沒有問題。

😼 ESXi_5.1_01 - VMware Player (Expired	license)		
Player 🕶 🔛 🖛 🐻			» 🚐 😪 🖬 🖬 🖬 🖬 🖏
System Customization		Test Management Network	
Configure Password Configure Lockdown Mode		To perform a brief networl	k test, press <enter>.</enter>
Configure Management Networ Restart Management Network Test Management Network Network Restore Options		By default, this test uil default gateway, ping the DNS servers, and resolve	l attempt to ping the configured configured primary and alternate the configured hostname.
Configure Keyboard Troubleshooting Options			
View System Logs			
View Support Information Reset System Configuration	Test Management Network By default, this test will at and DNS servers, and resolve	tempt to ping your default gate your hostname.	емау
	Ping Address #0: Ping Address #1: Ping Address #2: Resolve Hostnane	[ [ 192.168.1.11 [ [ esxi01.vn.con	
	<up down=""> Select</up>	〈Enter〉OK 〈Esc〉	Cance 1
			-
•			11. A

(圖 20)



(圖 21)

4.設定完成後,回到主畫面可以看到剛剛設定的 IP。



(圖 22)

■使用 vSphere Client 連接到 ESXi

1.輸入 ESXi 的 IP 與帳號密碼後點選 Login。

🖉 VMware vSphere Clien	it 🔀
vmware VMware vSphere <sup>®</sup> Client	
To directly manage a sing To manage multiple hosts, vCenter Server. IP address / <u>N</u> ame: <u>U</u> ser name: <u>P</u> assword:	le host, enter the IP address or host name. , enter the IP address or name of a
	Login <u>Close</u> <u>H</u> elp

(圖 23)

#### 2.登入 ESXi 後的管理畫面。



(圖 24)

#### ■Storage vMotion 實作。



(圖 25)

# 1.點選 Server2003\_1 按右鍵,選 Migrate。

VCENTER - vSphere Client				
File Edit View Inventory Administration Plug-ins Help				
Home 🕨 🚮 Inventory 🕨 🗊 Hosts and Clusters			Search Inventory	Q
CUNTER Server2003_1 UM Summary Resource Allocation Server2003_1 Server	Performance Tasks & Events A	Alarms Console Permissions Maps Resources	Storage Views	Â
□     exil02     Guest       □     Se     Snapshot       □     □     Open Console	t Windows Server 2003 (32-bit)	Consumed Host CPU: Consumed Host Memory: Active Guest Memory:	30 MHz 212.00 MB 21.00 MB	
🔂 Edit Settings	s ling (Current) 1.12	Provisioned Storage: Not-shared Storage: Used Storage:	7.13 GB 4.20 GB 4.20 GB	E
Template		Storage 🔨 Status	Drive Type	
Fault Tolerance	03-1	🕼 datastore1 🥑 Norr	nal Non-SSD	
VM Storage Profile	On	<	•	
Add Permission Ctd+P	m.com	Network Type	Sta	
Alarm	₽.			
Report Performance				
Rename	-	VM Storage Profiles		
Open in New Window Ctrl+Alt+N Remove from Inventory	-	VM Storage Profiles: Profiles Compliance:	Refresh	
Open Console				-
Recent Tasks		Name, Target or Status	contains: •	Clear ×
Name Target Status	Details Initiated by VCe	nter Server Requested Start Time		Completed Tim
Relocate virtual machi A Server2003_2 Completed	Administrator 🛃	VCENTER 2013/12/28 下午 12:3	7:53 2013/12/28 下午 12:	2013/12/28下4
Keiocate virtual machi M Server2003_1 Completed	Administrator 🛃	VCENTER 2013/12/28 F4 12:3	2013/12/28 ト+ 12:	2013/12/28 1-2
				+
🐖 Tasks 💇 Alarms		Evalu	ation Mode: 28 days remaining	Administrator

(圖 26)
# 2.點選 Change datastore,按下 Next。

Migrate Virtual Machine		- 6 2
Select Migration Type Change the virtual machin	ne's host, datastore or both.	
Colored Minuschine Trans	-	
Storage Ready to Complete	C Change host Move the virtual machine to another host.	
	Change datastore Move the virtual machine's storage to another datastore.	
	<ul> <li>C change both host and datastore</li> <li>Move the virtual machine to another host and move its storage to another datastore.</li> <li>▲ The virtual machine must be powered off to change the VM's host and datastore.</li> </ul>	
Help	_≤Back	Next ≥ Cancel

(圖 27)

# 3.將 Server2003\_1 搬移,更換 Datastore 到 iSCSI Lun。

Migrate Virtual Machin	ne						
Storage	ntorago for this with all machin	o migration					
Select the description's	storage for this virtual machin	ie migrauori.					
Select Migration Type Storage	Same format as source	nat	-				
Ready to Complete	Same format as source Thick Provision Lazy Zer	roed					
	Thick Provision Eager Ze Thin Provision	eroed	<u>A</u>				
	N.	2	ned ned	Free Type	Thin Provisioning		
	datastore1	Non-SSD	35.00 GB 5.90 GB 98.75 GB 9.21 GB	29.10 GB VMFS5 95.92 GB VMFS5	Supported		
	iSCSI stor02	Non-SSD	9.75 GB 2.62 GB	7.13 GB VMFS5	Supported		
	Disable Storage DI	RS for this virtual r	machine				
	Select a datastore						
	Name	Drive Type	Capacity Provisioned	Free Type	Thin Provisioning		
	1						
							<u>A</u> dvanced :
	Compatibility:						
	validation succeeded						
						< Pade	Next > Care
Help							Next 2 Canc
						~ <b>~ P</b>	下午12:4
		<u> 3</u>				📼 😲 🤤	😽 🖬 👍
		<b>I</b>	(圖	] 28)			<b>x in t</b> 2013/12/2
		<b></b>	(圖	] 28)			2013/12/2
Migrate Virtual Machin	р Р Пе		(圖	] 28)			2013/12/2
Migrate Virtual Machin Storage Select the destination s	ne	ne migration.	(圖	] 28)			2013/12/2
Migrate Virtual Machin storage Select the destination s	ne	ne migration.	(圖	] 28)	_		2013/12/2
Migrate Virtual Machin Storage Select the destination s	ne	ne migration.	(	] 28)	_		2013/12/2
Migrate Virtual Machin Storage Select the destination s	ne Select a virtual disk forr Same format as source	ne migration.	(圖	] 28)	_		2013/12/2
Migrate Virtual Machin Storage Select the destination s Select Migration Type Storage Ready to Complete	ne Select a virtual disk forr Same format as source Select a destination sto	ne migration. mat:	(日 I machine files:	] 28)	_		2013/12/2
Migrate Virtual Machin Storage Select the destination s Select Migration Type Storage Ready to Complete	ne Select a virtual disk form Same format as source Select a destination sto VM Storage Profile:	ne migration. nat: rage for the virtue to not change the i	( B al machine files: profiles V &	] 28)			2013/12/2
Migrate Virtual Machin storage Select the destination s select Migration Type storage Ready to Complete	ne Select a virtual disk form Same format as source Select a destination sto VM Storage Profile: Name datastore1	ne migration. nat: rage for the virtue o not change the j Drive Type Non-SQ	( al machine files: profiles Capacity Provisioned 35.00.08 F sou CB	28)	Thin Provisioning		2013/12/2
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Migrate Virtual Machin Storage Select the destination s Select Migration Type Storage Ready to Complete	A storage for this virtual machine storage for this virtual disk form Same format as source Select a virtual disk form Same format as source VM Storage Profile: Same format as source in the storage Profile: Select a datastore: Name Compatibility: Validation succeeded	ne migration. mat: rage for the virtue to not change the i Drive Type Non-SSD Non-SSD Non-SSD R5 for this virtual r Drive Type	( al machine files: profiles S.00 GB 5.90 GB 98.75 GB 9.21 GB 9.75 GB 2.62 GB 1.62	28)	Thin Provisioning Supported Supported Supported		2013/12/2
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(圖 29)

## 4.完成,開始執行 Storage vMotion

ration		
Host:	Current Location	
Datastore:	iSCSIstor	
vMotion Priority:	Default Priority	
Disk Storage:	Same format as source	
		<u>≤</u> Back <u>Fi</u> nish Cano
	Host: Datastore: vMotion Priority: Disk Storage:	Host: Current Location Datastore: iSCSI stor VMotion Priority: Default Priority. Disk Storage: Same format as source



(圖 31)



(圖 32)

## ■vMotion Host



(圖 33)

#### VCENTER - vSphere Client <u>File Edit View Inventory Administration Plug-ins Help</u> 🖸 🛐 Home 🕨 🚮 Inventory 🕨 🎁 Hosts and Clusters Search Inventory Q ∀VCENTER WM Sxi01.vm.com exi01.vm.com 5erver2003\_3 Summar Server2003\_1 Server2003\_2 esxi02.vm.com General Resources Microsoft Windows Server 2003 (32-bit) Guest OS: Consumed Host CPU: 30 MHz Server2002 2 Consumed Host Memory: 468.00 MB Power Active Guest Memory: 269.00 MB Guest Refresh Storage Usage 3.61 GB • <u>S</u>napshot Provisioned Storage: Not-shared Storage: Used Storage: 1.88 GB 🔄 Open Conso<u>l</u>e Current) Edit Set Storage Status Drive Type E. Migrate. iSCSI stor Normal Non-SSD Clone.. . . Template Þ Network Туре Sta Fault Tolerance • 🧕 Pro Standard port group 0 VM Storage Profile . F. • Add Permission... Ctrl+P VM Storage Profiles Alarm Refresh Report Performance... VM Storage Profiles: Re<u>n</u>ame Profiles Compliance: Open in New Window... Ctrl+Alt+N Remove from Inventory Delete from Dis<u>k</u> Recent Tasks Name, Target or Status contains: -Clear × Name Requested Start Time 🗢 Start Time Completed 🔺 Target Status Details Initiated by vCenter Server M VM 2013/12/28 下午 12:11:16 2013/12/28 下午 12:... 2013/12/28 下午 12:10:43 2013/12/28 下午 12:... Add standalone host Add standalone host VCENTER Completed Administrator Administrator 2013/12/28 2013/12/28 🚽 Completed + 4 III 🛜 Tasks 🙍 Alarms Evaluation Mode: 28 days remaining Administrator

## 1.點選 Sever2003\_3 按右鍵,選 Migrate

(圖 34)

# 2.點選 Change host

Migrate Virtual Machine			9 6
Select Migration Type Change the virtual machine's	host, datastore or both.		<u>1</u> 2
Select Migration Type Select Destination Select Resource Pool vMotion Priority Ready to Complete	<ul> <li>Change host Move the virtual machine to another host.</li> <li>Change datastore Move the virtual machine's storage to another datastore.</li> <li>Change both host and datastore Move the virtual machine to another host and move its storage to another datastore.</li> <li>▲ The virtual machine must be powered off to change the VM's host and datastore.</li> </ul>		
Help	<u></u>	3ack Next≥	 Cancel

(圖 35)

3.選擇目的端的 host,將 Server2003\_3 轉到 ESXi01 host。

Migrate Virtual Machir	ne		
Select Destination Select the destination I	host or cluster for this virtual machine migration.		
Select Migration Type Select Destination VMotion Priority Ready to Complete			
	Compatibility: Validation succeeded		
Help	≤Back	Next ≥	Cancel

(圖 36)

4.點選 High Prioriity(Recommended),縮短轉移時間。

🖉 Migrate Virtual Machine			
vMotion Priority Set the priority of the vM	otion migrations, relative to the other operations on the destination host.		
Select Migration Type Select Destination <b>vMotion Priority</b> Ready to Complete	<ul> <li>High priority (Recommended)</li> <li>Standard priority</li> <li>High priority vMotions are favored over standard priority vMotions and are expected to perform better.</li> <li>If using an ESX 4.0 host or ESXI 4.0 host, dick Help for additional information.</li> </ul>		
Help		lext≥	Cancel

(圖 37)

5-1. 開始執行 vMotion。在轉移期間 PING Server2003\_3 確認主機

還在運作。



(圖 38)

5-2. Server2003\_3 已成功轉移到 ESXi01 host。



(圖 39)

## 5-3. Server2003\_3 轉移到 ESXi01 host 後的狀態圖。



(圖 40)

#### ■DRS 的設置與配置



(圖 41)

## 1. 輸入一個 Cluster 名稱,勾選 Turn On vSphere DRS。





2.將 Automation Level 改成全自動(Fully automated)。

🕗 New Cluster Wizard	
vSphere DRS What level of automation do	you want this duster to use?
Cluster Features <b>vSphere DRS</b> Power Management VMware EVC VM Swapfile Location Ready to Complete	Automation level            • Manual         vCenter will suggest migration recommendations for virtual machines.             • Partially automated         Wirtual machines will be automatically placed onto hosts at power on and vCenter will         suggest migration recommendations for virtual machines.             • Fully automated         virtual machines will be automatically placed onto hosts when power on and vCenter will         suggest migration recommendations for virtual machines.             • Fully automated         virtual machines will be automatically placed onto hosts when powered on, and will be         automatically migrated to attain best use of resources.             Migration threshold: Conservative
Help	≤ Back Next ≥ Cancel

(圖 43)

#### 3.由於 ESXi host 是虛擬的,所以 DPM 沒有用途,選擇 Off。



(圖 44)

## 4. 由於 ESXi host 是虛擬的關係,沒有上的 CPU 差別,所以不用開

## 啟 EVC,選擇 Disable EVC。

VHware EVC         Do you want to enable Enhanced vMotion Compatibility for this duster?         Cluster Features         vSphere DRS         VMware EVC         VM Swapfile Location         Ready to Complete         Image: Disable EVC         Ima	🕗 New Cluster Wizard		- • ×
Cluster Features VSchere DRS       Enhanced vMotion Compatibility (EVC) configures a duster and its hosts to maximize vMotion compatibility. Once enabled, EVC will also ensure that only hosts that are compatible with those in the duster may be added to the duster.         VM Swapfile Location Ready to Complete       Image: Compatibility (EVC) configures a duster and its hosts to maximize vMotion compatibility. Once enabled, EVC will also ensure that only hosts that are compatible with those in the duster may be added to the duster.         Image: Complete       Image: Complete compatibility (EVC) configures a duster and its hosts to maximize vMotion compatibility. Once enabled, EVC will also ensure that only hosts that are compatible with those in the duster may be added to the duster.         Image: Complete compatibility (EVC) configures a duster and its hosts to maximize vMotion compatibility. Once enabled, EVC for AMD Hosts         Image: Complete compatibility (EVC) configures a duster and its hosts to maximize vMotion compatibility. Once enabled, EVC for AMD Hosts         Image: Complete compatibility (EVC) configures a duster and its hosts to maximize vMotion compatibility. Once enabled, EVC for AMD Hosts         Image: Complete compatibility (EVC) configures a duster and its hosts to maximize vMotion compatibility. Once enabled, EVC for AMD Hosts         Image: Complete compatibility (EVC) configures a duster and its hosts to maximize vMotion compatibility. Once enable, EVC for AMD Hosts         Image: Complete compatibility. Complete compatibility. Once enable, EVC for AMD Hosts         Image: Complete complet	VMware EVC Do you want to enable Enhanced vN	Motion Compatibility for this duster?	
VMware EVC Mode: Disabled	Cluster Features vSphere DRS VMware EVC VM Swapfile Location Ready to Complete	Enhanced vMotion Compatibility (EVC) configures a duster and its hosts to maxim compatibility. Once enabled, EVC will also ensure that only hosts that are compa- the duster may be added to the duster.	nize vMotion tible with those in nr Intel® Hosts
		VMware EVC Mode: Disabled Description	Y
Help Sack Next > Cancel	Help	< Back Next >	Cancel

(圖 45)

5.VM Swapfile Location ,  $mathbb{S}$  Store the swapfile in the same directory

as the virtual machine(recommended)





New Cluster Wizard Ready to Complete Review the selected options for	this duster and dick Finish.		
Cluster Features VSohere DRS VMware EVC VM Swapfie Location Ready to Complete	The duster will be created with the Cluster Name: vSphere DRS: vSphere DRS Automation Level: vSphere DRS Migration Threshold: VMware EVC Mode: Virtual Machine Swapfile Location:	following options: Cluster Enabled Fully Automated Apply all recommendations. Disabled Same directory as the virtual machine	
Help		<u>≤</u> Back <u>F</u> inish	Cancel

(圖 47)

6.完成後可以看到 ESXi 的兩部機器集中在 Cluster 底下,並可以看 到 ESXi01 上有 Server2003\_1 與 Server2003\_2, ESXi02 上有 Server2003\_3。

VCENTER - vSphere Client									
<u>File Edit View</u> Inventory Administration Plug-ins	Help								
🔄 💽 🏠 Home 🕨 🚮 Inventory 🕨 🗊 Hosts and	d Clusters	🖅 - Search Inventory 🔍							
nt at at at	Server2003_2								
CUSTER VCENTER VM Server2003_1 Server2003_2 Server2003_3 VM Server2003_3 VM Server2003_2 VM Server2003_3 VM Server2003_3 VM VM Server2003_3 VM VM Server2003_2 VM VM Server2003_3 VM VM Server2003_3 VM VM Server2003_3 VM VM Server2003_3 VM VM Server2003_3 VM VM Server2003_3 VM VM Server2003_3 VM Server2003_3 VM VM VM Server2003_3 VM VM Server2003_3 VM VM VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM VM Server2003_3 VM VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 VM Server2003_3 S	Consumed 143.00 MB Active 19.00 MB DelS Entitlement 309.00 MB Entitled Resources Delivered 46.00 % Sum of VMs' Memory Utilization - Per Ho So% sxi01.vm.com Memory utilization displayed reflects only memory consumption of the VMs on the chart	Refresh Chart st 100%							
Total Memory: Total Storage: Number of Hos Total Processo Number of Dat Total Datastor Virtual Machine Total Migration Commands Mew Virtu		capacity 35.00 GE 35.00 GE 98.75 GE 9.75 GE ,							
Add Host									
Recent Tasks Name, Target or Status contains: -									
Name Target Status	Details Initiated by vCenter Server Requested Start Tin	ne 🤝 Start Time Completed 🔺							
Move host into cluster Cluster @ Com	npleted Administrator 🔐 VCENTER 2013/12/28 下午 02	:16:44 2013/12/28 下午 02: 2013/12/28							
Cluster Com	npieteo Administrator 🙀 VCENTER 2013/12/28 F+ 02	10:40 2013/12/28 P+ 02: 2013/12/28 +							
Taba 🗢 Alama		Institut Mada, 20 Januaria in Antoini Antoini							
	<u>3</u>	▲ 20 08 20 08 ys remaining Administrator 一 ② デ 記 訳 い 下午 02:18 2013/12/28							

(圖 48)

# 7.測試 DRS 運作,讓 Server2003\_1 與 Server2003\_2 滿載。

2 v	CENT	ER - v	Sphere	Clier	t														(		
<u>F</u> ile	<u>E</u> dit	Vie	<u>v</u> I <u>n</u> ve	ntory	Adm	inistra	tion <u>P</u>	ug-ins	<u>H</u> elp												
-	-	6	Home	• •	JInv	entory	Þ 🗊	Hosts a	nd Clusters								<b>6</b> 7 •	• Search In	iventory		Q
E,	HT.	ø	B																		
			ster esxi01. Server2 Server2	vm.cc vm.cc 2003_ 2003_	m m 1 2 3	Cluss Get	ter ing Star Server2 Server2	ed Sur 2003_3 2003_2 2003_1	nmary V State Powere Powere	'irtual M id On id On id On	achines Hosts Host CPU - MHz 30 4 896 4 896 4	DRS Res Host Me 215 260 236	ource Allo m - MB	Guest M Guest M 1 17 9	erformann State, Hu em - %	ce Task Subst or Guest Micros Micros	s & Event	<ul> <li>Alarms</li> <li>IP Addre</li> <li>192.168.</li> <li>192.168.</li> <li>192.168.</li> </ul>	Permissio	n: Maj UU 5 5 5	A Diagonal
Recer	t Tasl	ks						-							Name, Ta	arget or Sta	itus contan	ns: •		C.	ear ×
Name	Migrat	e virte	almachi	10	Target	muar?/	03.2	Status	molated	Detail	s Initiate	d by VC	NCENTE	er F	Requeste	d Start Ti	me 🗸	Start Time 2013/12/2	8 下午 0.2-	2012	oleted Tin /12/28 도소
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🖉 T	asks	<b>@</b> A	larms													Ev	aluation h	víode: 28 da	ys remaining	Admin	strator
-				9	3	3	6		Í									o 🖞 🖡	6 🖬 😡		

(圖 49)

## 8.之後可以看到 Server2003\_2 因為 DRS 正常運作的關係,

Server2003\_2 自動被 vMotion 到 ESXi02 上。

VCENTER - vSphere Client						
<u>File Edit View</u> Inventory Adm	iinistration <u>P</u> lug-ins <u>H</u> elp					
🖸 🔂 🔥 Home 🕨 🚮 Inv	ventory 👂 🎁 Hosts and Cluste	rs			Search	Inventory Q
I & & #						
CUNTER WM CUST Server2003_1 Server2003_2 Server2003_3 Server2003_2 Server2003_3	Cluster Getting Started Summary View: Tasks Events Show all entries • Name More host into duster Move host into duster Move host into duster Cluster Move host into duster	Virtual Machines Hos	Status Status Completed Completed Completed	Details	Performance     Tasks & Event     Alarr       Name, Target or Status contains: •     Initiated by     vCenter Server       Initiated by     vCentre     vCentre       Administrator	15 Permissiona Map2 () Scheduled Taska Clear Requested Start Time 2013/12/28 下午 02:25:44 2013/12/28 下午 02:15:44 2013/12/28 下午 02:15:44 2013/12/28 下午 02:15:44
Recent Tasks					Name, Target or Status contains: -	Clear ×
Name Target	Status	Details Initia	ited by VCenter 9	Server	Requested Start Time 🤝 Start Tim	ne Completed Tin
<		1				•
Tasks 💇 Alarms				I	Evaluation Mode: 28 days remaining Sho	wing all entries Administrator



🖉 VCEN	NTER - vSphere Client							
<u>File</u>	dit Vie <u>w</u> Inventory Administration	<u>P</u> lug-ins <u>H</u> elp						
	🖉 Cluster - DRS Resource Distribution	1		- • •	Search Inventory			
	CPU         Memory         %         MHz           50%			Refresh Cher 100	iance Tasks & Events Alarms Permissions Maps			
	CPU utilization displayed reflects only	CPU consumption of the VMs on the Percent for each VM of Entitled Resources Delivered 10	chart.	50% 25% 0	Dr Level: Fully Automated Automation Level: Off Ons: 0 Off Ons: 0 O Apply al recommendations. andard deviation: 0-049 ( Capacity Coution Chart chooting Guide  Status Drive Type Capacity O Normal Non-SSD 95.00 GE Normal Non-SSD 98.75 GE Normal Non-SSD 98.75 GE			
Recent T. Name	asks Target	Host 🇌 Edit Resource Pool	Initiated by	vCenter Server R	Ame, Target or Status contains: • Clear > equested Start Time < Start Time Completed Ti Evaluation Mode: 28 days remaining (Administrator			
<b>1</b>		? 🛛 🚿			○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○			

(圖 51)

# ■vSphere HA 實作

1. 在 lab cluster 按滑鼠右鍵,點選 Edit Setting。

2 \	/CEN	ITER - v	Spher	e Client													×
Eile	Ed	it Vie <u>v</u>	Inv	entory Adm	inistration P	lug-ins <u>H</u> elp											
	E		Hor	ne 🕨 🚮 Inv	ventory 🕨 🛐	Hosts and Clusters								<b>6</b> -	Search Inventory	y l	Q
	6	1 付	86	•													
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•								III		_	_						۲
8	Tasks	<b>@</b> Al	arms										Ev	aluation M	ode: 28 days rema	ining Administrator	

(圖 52)

## 2. 勾選 Turn On vSphere HA。



(圖 53)

## 3. 可在看到 Recent Tasks 看到 vCenter 正在安裝 HA agent



(圖 54)

4. HA 安裝完成後。準備測試 HA 功能。

圖中所示所有 VM 都已經 vMotion 到 ESXi01 上,而 ESXi02 上沒有 任何的 VM。



(圖 55)

#### 5. 模擬實體 host 突然故障斷線的情形。對 ESXi01 進行 Reboot 動

作。



(圖 56)

6.ESXi01 斷線後,ESXi01 上的 VM 也跟著斷開連接。

VCENTER - vSphere Client								
<u>File Edit View</u> Inventory Admi	inistration <u>P</u> lug-ins <u>H</u> elp							
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CLUSTER UM CLUSTER Sexk01.vm.com (no. Server2003_1 (disc Server2003_2 (disc Server2003_3 (disc	Server2003_1 Summary Resource Allocation Performance Tasks & Events General Guest OS: Microsoft Windows Server 2003 (32-bit) WM Version: 8 CPU: 1 VCPU Memory: 528 MB Memory Overhead: 47.95 MB VMware Tools: Running (Current) IP Addresses: 192.168.1.12 DNS Name: server2003-1 EVC Mode: N/A State: Powered On	Narms     Console     Permissions     Maps     Storage Views       Resources     0     MHz       Consumed Host CPU:     0     0 MHz       Consumed Host CPU:     0.00 MB       Active Guest Memory:     0.00 MB       Refresh Storage Usage     7.13 GB       Provisioned Storage:     4.20 GB       Used Storage:     4.20 GB       Used Storage:     9 Journal       Istrage     Status       Drive Type     10 Journal       Image:     10 Journal       Network:     Type	A E					
	Active Tasks:	Pro Standard port group Standard port group						
	VSphere HA Protection: 💟 Protected 🖓	4 m >>						
	Commands	VM Storage Profiles						
	<ul> <li>Shut Down Guest</li> <li>Suspend</li> <li>Restart Guest</li> <li>Edit Settings</li> </ul>	Refresh VM Storage Profiles: Profiles Compliance:						
	Open Console		*					
Recent Tasks		Name, Target or Status contains: -	Clear ×					
Name Target	Status         Details         Initiated by         vCe           x01.vm.com         Ø         Completed         Administrator         Image: Completed         Administrator         Image: Completed         Administrator         Image: Completed         Ima	nter Server Requested Start Time マ Start Time VCENTER 2013/12/28 下午 02:47:55 2013/12/28 下午 02: VCENTER 2013/12/28 下午 02:46:20 2013/12/28 下午 02:	Completed 2013/12/28 2013/12/28					
🚰 Tasks 🞯 Alams		Evaluation Mode: 28 days remaining	Administrator					

(圖 57)

7.ping ESXi01 上的 VM 會發現會有一段時間沒有回應之後又開始運作,表示因為 vSphere HA 的關係 ESXi02 接手了 ESXi01 上的所有 VM。



(圖 58)

8.ESXi01 還在斷線中,而 ESXi01 上的 VM 已經全都 vMotion 到

ESXi02 上並且正常運作中,而 ESXi01 上沒有任何的 VM。



(圖 59)

# 9.之後 ESXi01 已經 Reboot 完成,而 VM 都在 ESXi02 上執行中

-				
VCENTER - vSphere Client				PX
<u>File Edit View Inventory Adm</u>	inistration <u>P</u> lug-ins <u>H</u> elp			
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I & @ 88				
	Cluster			
E B Cluster	Getting Started Summary Virtual M	Aachines Hosts DRS Resource Alloca	tion Performance Tasks & Events Alarms Permissions Map	os d ⊳
esxi01.vm.com		Name, State, Host or Guest OS contains: -	Clear	
Server2003_1	Nome Chate	Host CPU - MHz Host	Mem - MB Guest Mem - % Guest Uptime IP Address	
Server2003_2	Server2003_2 Powered On	esxi02.vm.c 30 🖬 3:	19 17 Micros 11 mi 192.168.1.15	
Server2003_3	Server2003_3 Powered On	esxi02.vm.c 30 🖬 30	01 Micros 19 mi 192.168.1.4	
	Server2003_1 Powered On	esxi02.vm.c 61 18	30 11 Micros 5 sec 192.168.1.12	
	·	III		+
Recent Tasks			Name, Target or Status contains: - Cl	ear ×
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約 Migrate virtual machine 🏻 🛔 Se	erver2003_1 🔮 Completed	Administrator 🛃 VCENTER	2013/12/28 下午 03:33:29 2013/12/28 下午 03: 2013	/12/28 下
👋 Relocate virtual machi 👘 Se	erver2003_1 🔮 Completed	Administrator 🛃 VCENTER	2013/12/28 下午 03:30:32 2013/12/28 下午 03: 2013	/12/28 下
•		III		÷.
🚰 Tasks 🎯 Alarms			Evaluation Mode: 28 days remaining Admini	strator

(圖 60)

10.過一段時間後,因為有 DRS 負載平衡的功能, Server2003\_3 被

#### vMotion 到 ESXi01上。



(圖 61)

■測試 VM 在 local storage 上執行 vSphere HA 功能

1.下圖可以看到 ESXi01 上有 Server1 與 Server2 在執行,而 ESXi02

上有 Server3 在執行。

🕗 VCENTER - vSphere Client 💿 💽										
Ele Edit View Inventory Administration Plug-ins Help										
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I & & #										
CUNTER VCM Custer Server2003_1 Server2003_2 Server2003_3 Server2003_3	Cluster Getting Started Summary Name Started Server2003_2 Powe Server2003_3 Powe Server2003_1 Powe	Virtual Machines Hosta Host H red On esxi01.vm.c red On esxi01.vm.c	DRS Resource Allocation Na ost CPU - MHz Host Men 61 226 30 5589 0 5699	Performance Tasks & Events Alar me, State, Host or Guest OS contains:	Permission         Maps         1           Clear           Untime         IP Address           14 se         192.168.1.15           3 min         192.168.1.4           51 se         192.168.1.12					
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nitiate host reboot	sxi01.vm.com 😵 Completed	Administ	trator 🛃 VCENTER	2013/12/28 下午 03:11:59 2013/1	2/28 下午 03: 2013/12/28 下生					
•					•					
🔄 Tasks 🞯 Alarms				Evaluation Mode: 28	days remaining Administrator					

(圖 62)

2.下圖可以看到 Server2003\_1 的檔案是放在 ESXi01 的 local storage,而 Server2003\_2 是放在 Share iSCSI 上。



(圖 63)

模擬 ESXi01 故障後發現只有放在 Share iSCSI 的 Server2003 被
 vMotion 到 ESXi02 上,而 Server2003\_1 因為檔案是放在 ESXi01
 的 local storage 而無法進行 vMotion。

VCENTER - vSphere Client     Image: Client										
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CUENTER	Cluster Getting Started Summary V Name State Server2003_2 Powere Server2003_3 Powere Server2003_1 Powere	Host Host DRS	Resource Allocation Per Name, S J - MHz Host Mem - ME 425 423	formance Tasks & Events Alarm tate, Host or Guest OS contains: • Guest Mem - % Guest L 79	A     2     2     Permissions Mapp 4 h     Clear      Dytime IP Address 9 se 192.168.1.15 min 192.168.1.4      Perc 192.168.1.4					
			-							
I ← III →	•		III.		•					
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Tigrate virtual machine 👘 Ser	ver2003_2 😵 Completed	System	VCENTER 20	13/12/28 下午 03:16:45 2013/12/	28 ト+ 03: 2013/12/28 下4					
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🖉 Tasks 🞯 Alarms				Evaluation Mode: 28 d	ays remaining Administrator					

(圖 64)

#### 第五章 結論

5-1 研究結論

找好組員選好專題題目跟指導老師時,起初我們毫無頭緒不知從 何下手,後來找了老師詢問請教後,老師給了我們一些書本和紙本的 參考資料,建議我們先熟悉裡面的內容在開始進行軟體安裝架構。

剛開始安裝時,常常遇到些問題,有全英文的網頁、軟體的使用 期限、軟體安裝架設時出現的種種問題等等...不過都透過詢問老師、 翻閱書籍、上網蒐查資料、翻閱文件資料後,一一的解除了問題,也 順利的安裝完成,並嘗試了軟體的某些功能。

透過這次的專題實作,我們學到了許多,不論是面對問題的態度 還是學業方面的知識;也了解了虛擬化的好處和程序,也稍微了解了 雲端運算的名詞意義,這些對我們在面對人事物和資訊方面都有很大 的幫助。

70

5-2 未來研究方向

這次專題做到了使用 VMware vSphere 的一些現有功能, vMotion\_datastore、vMotion\_host 實作、DRS 負載平衡、HA\_in iSCSI、HA\_in localstorage。

總結出雲端是未來的一大趨勢,由虛擬化揭開序幕。傳統的商業 資料中心面臨重大改變。

期望在外來能發展出更多不論是人們食、衣、住、行上或是資訊 科技上都能讓大家更為便利更為快速的技術;但也必須考量到要面對 大自然與環保的種種問題,才能使地球能永續發展經營。

71

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