

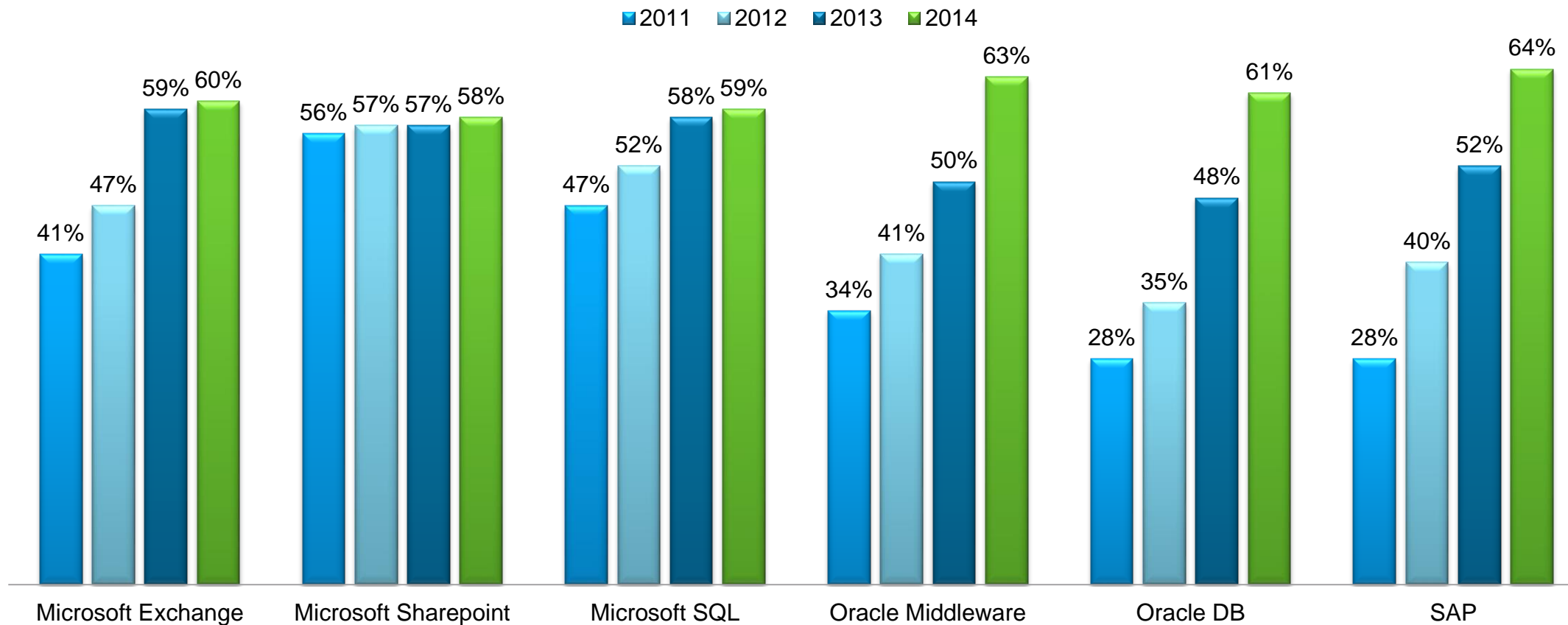
# READY FOR ANY vForum2015

9 December 2015 | Taipei, Taiwan

## VMware Non-Stop 虛擬機與混合雲的完美搭配

林俊谷  
資深技術顧問

# 關鍵應用虛擬化比率逐年提升



如果還沒有有效的保護您的應用與資料中心...



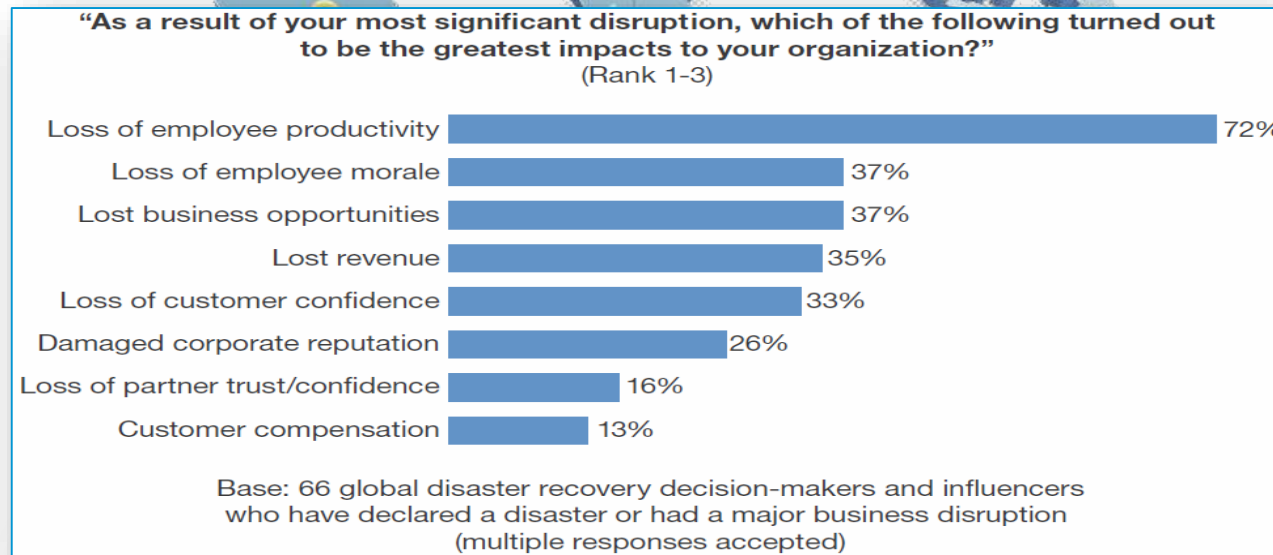
# 應用程式不中斷是將IT服務部署到全球規模的關鍵



生產力



企業聲譽



企業營收



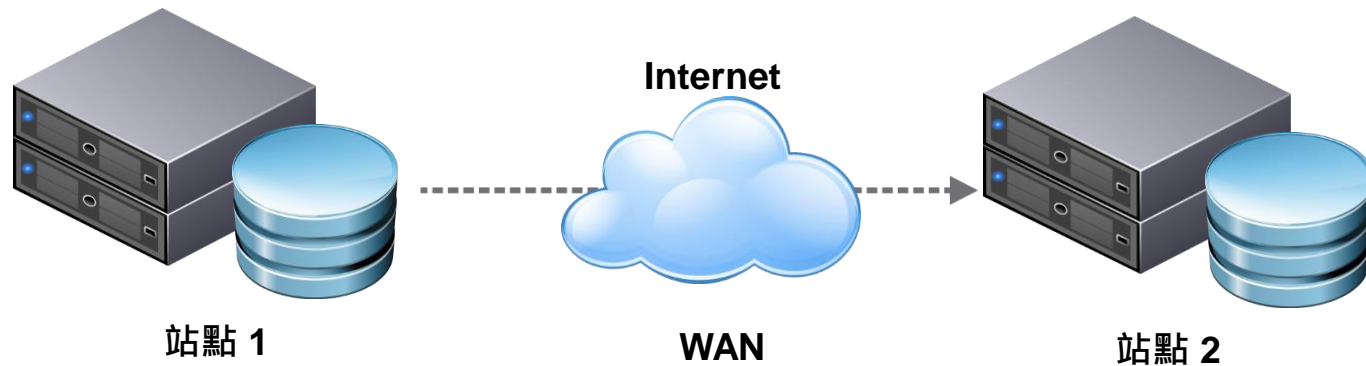
合規性

在企業經歷災害後其資料中心若超過10日以仍無法使用, 93%在災害後1年以內經歷破產命運

# 應用程式不中斷或IT災備的因應對策第一步是考慮「備份」！

如果沒有備份，自然很難將環境恢復！

將關鍵系統和資料備份到  
另一個站點！



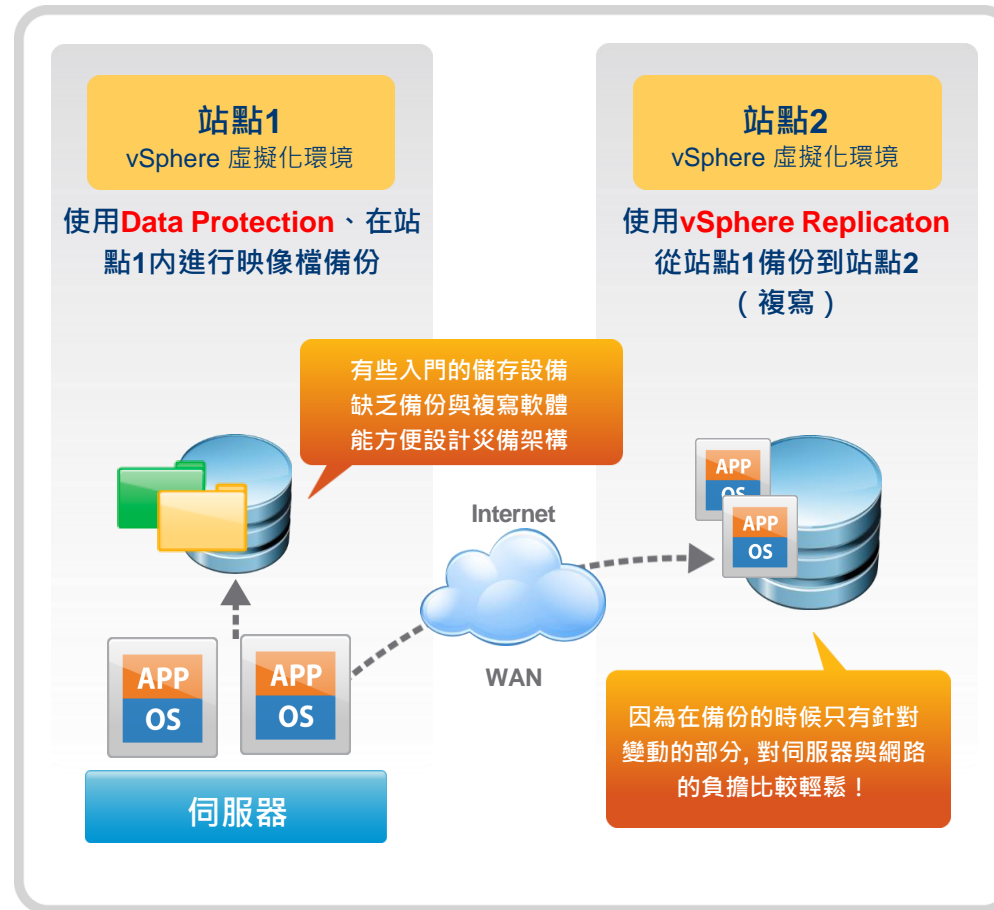
# 關鍵應用程式的高可用性與災難備援



# 可以從虛擬化的兩個功能來實現基本的環境保護！

VMware vSphere 的標準功能 (※) 能協助客戶在兩處站點可以輕鬆的實現備份與回復！

※VMware vSphere Essentials Plus 以上版本標準功能。



# vSphere 6 新功能可以進一步協助落實應用環境不中斷

具備650多項功能特性



## 混合雲基礎架構

VMware vSphere 6 新功能提供技術的革新創造無邊界資料中心



## VMware 新的OpenStack

很容易地建立OpenStack的環境



## 新一代的企業級儲存功能

VMware Virtual SAN 6 和 Virtual Volumes



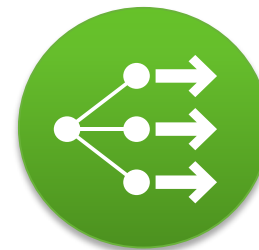
## VMware NSX 和 VMware vCloud Air

公有雲私與有雲互連在一個單一的網路



可為任何應用帶來突破性的規模和性能

規模和性能最多可提高 4 倍



業界首屈一指的可用性

針對大型應用實現“無邊界”即時遷移和持續可用性



大規模簡化管理

回應速度提高 5 倍



# vSphere 提升高可用性的功能

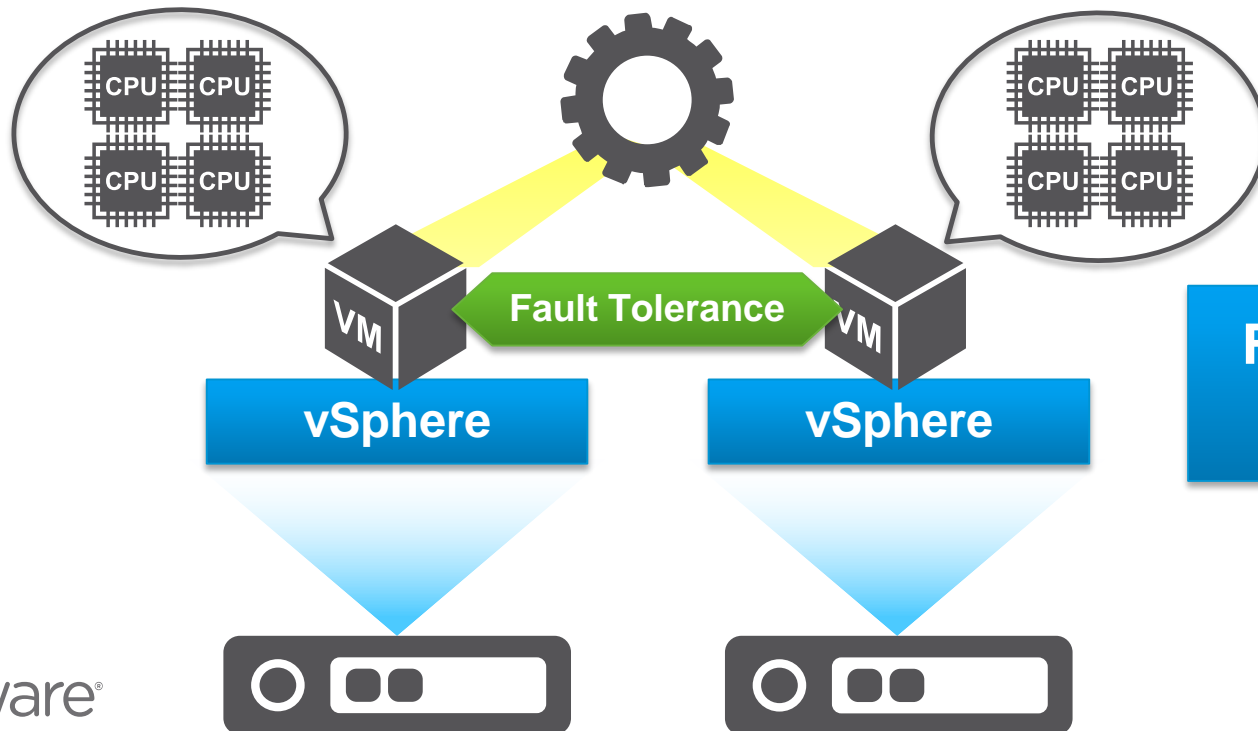
功能	目的	設定 ( 實施 ) 地方	停機時間	使用情境	操作方式
<u>vMotion</u>	計劃的遷移	以虛擬機為單位	無	實體伺服器計劃停機前 遷移到另一台實體伺服器	手動
<u>Storage vMotion</u>	計劃的遷移	以虛擬機為單位	無	儲存遷移 虛擬機配置變更 ( Tier ) 虛擬磁碟轉換	手動
<u>vSphere HA</u>	容錯機制	在叢集設定	數分	在叢集的實體伺服器發生故障的時候 重新啟動虛擬機在不同的實體伺服器	自動
<u>vSphere FT</u>	容錯機制	在叢集設定、 但以保護虛擬機為單位	無	FT保護的虛擬機實際上總是加倍， FT日誌傳輸網路是必不可少的並在另一台伺服器上的CPU、記憶體所需資源也是必要的	自動



# Fault Tolerance 說明

## 效益

- 保護任何作業系統上的關鍵型, 高效能的應用程式; 不需要特定應用程式的管理與學習機制
- 持續性的高可用環境 – 在基礎環境故障下的零停機, 零資料損失架構; TCP 連線無中斷
- 完全自動回應

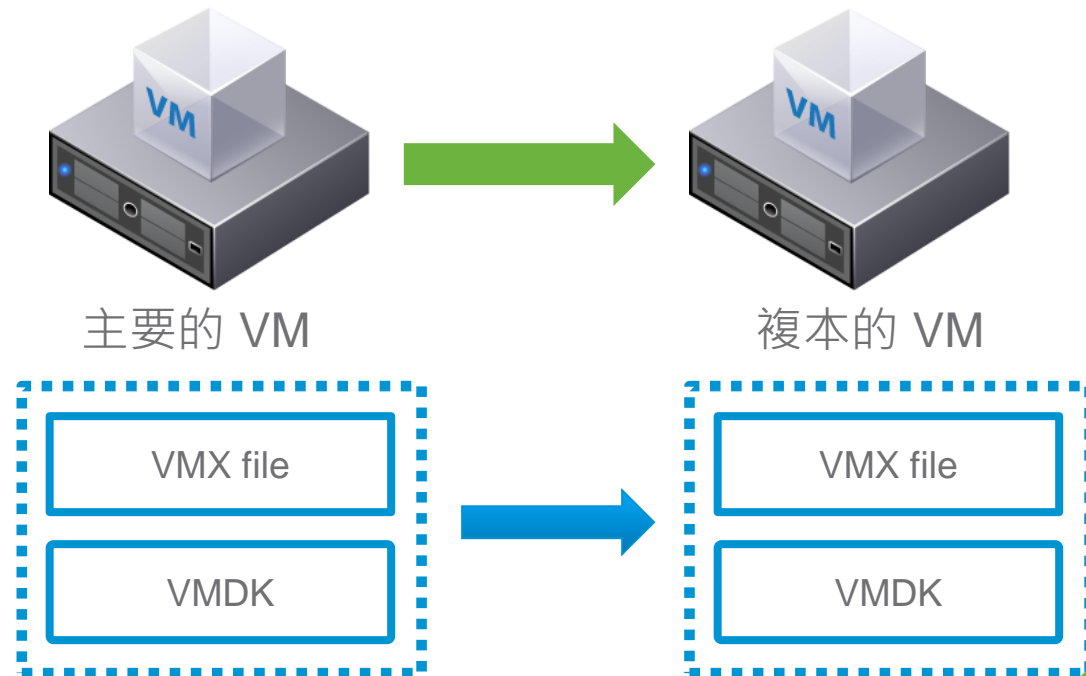


**Fault Tolerance 保障應用服務不中斷**  
→ 提供 4個CPU 的虛擬機保障

# Fault Tolerance(FT) 背後的技術

- vSphere FT 建立一個複製的VM
- 複本映射所有在執行的VM 狀態
  - 邏輯上完全相同的VMs 可以迅速接管
  - 複本VMs 一直透過檢查點(checkpoints)保持同步
  - 檢查點是正在執行的 VM狀態的完整封裝,這是跟快照和VMotion相同的概念,只是在FT更為頻繁並輕量
- 當錯誤發生時,從現行執行VM線上轉換到複本VM
  - 在錯誤移轉之後, vSphere 自動在叢集中另一台主機重新建立FT 保護機制p

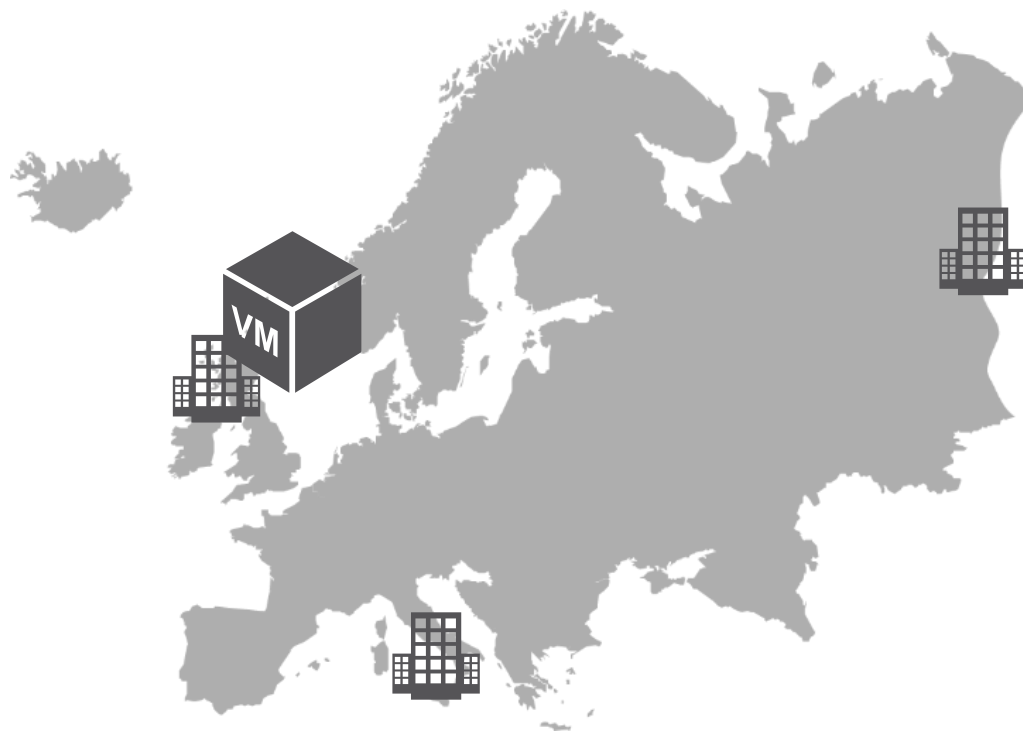
每個 FT VM 最大的vCPU	4
每個 FT VM 最大的vRAM	64GB
每台主機支援的全部FT VMs	4
每台執行FT的主機支援的全部vCPU	8
FT 網路連接速度	10 Gbps



# vMotion 功能的加強

Enterprise +

**Cross vCenter vMotion**  
**Long Distance vMotion**

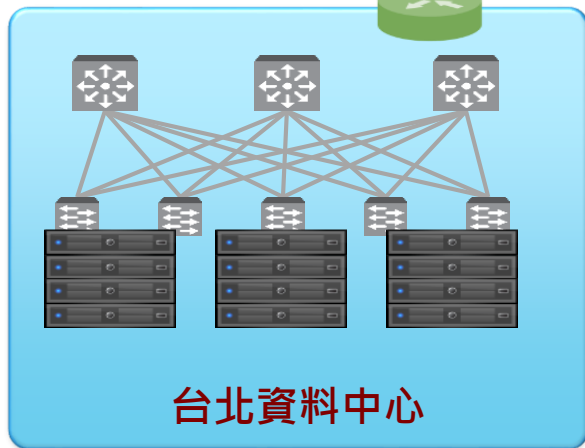
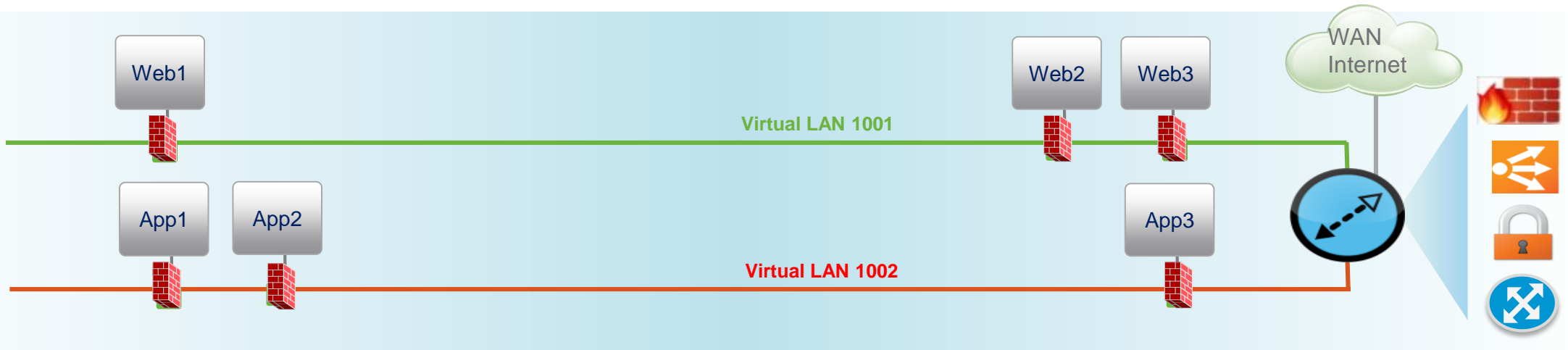


vMotion 能跨越地理限制移動，實現雙活中心或備援機制設計

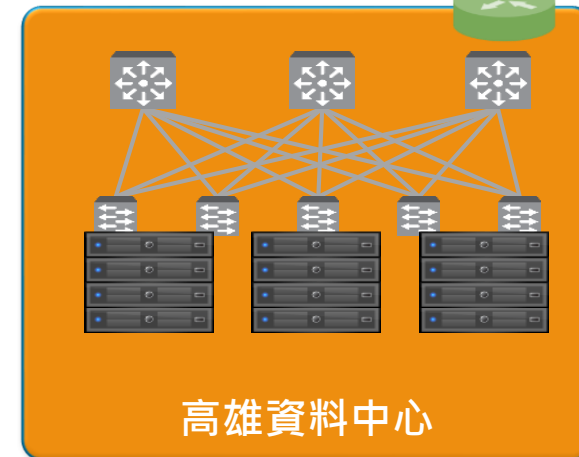
# 跨vCenter vMotion 實現無邊界資料中心的願景

Enterprise +

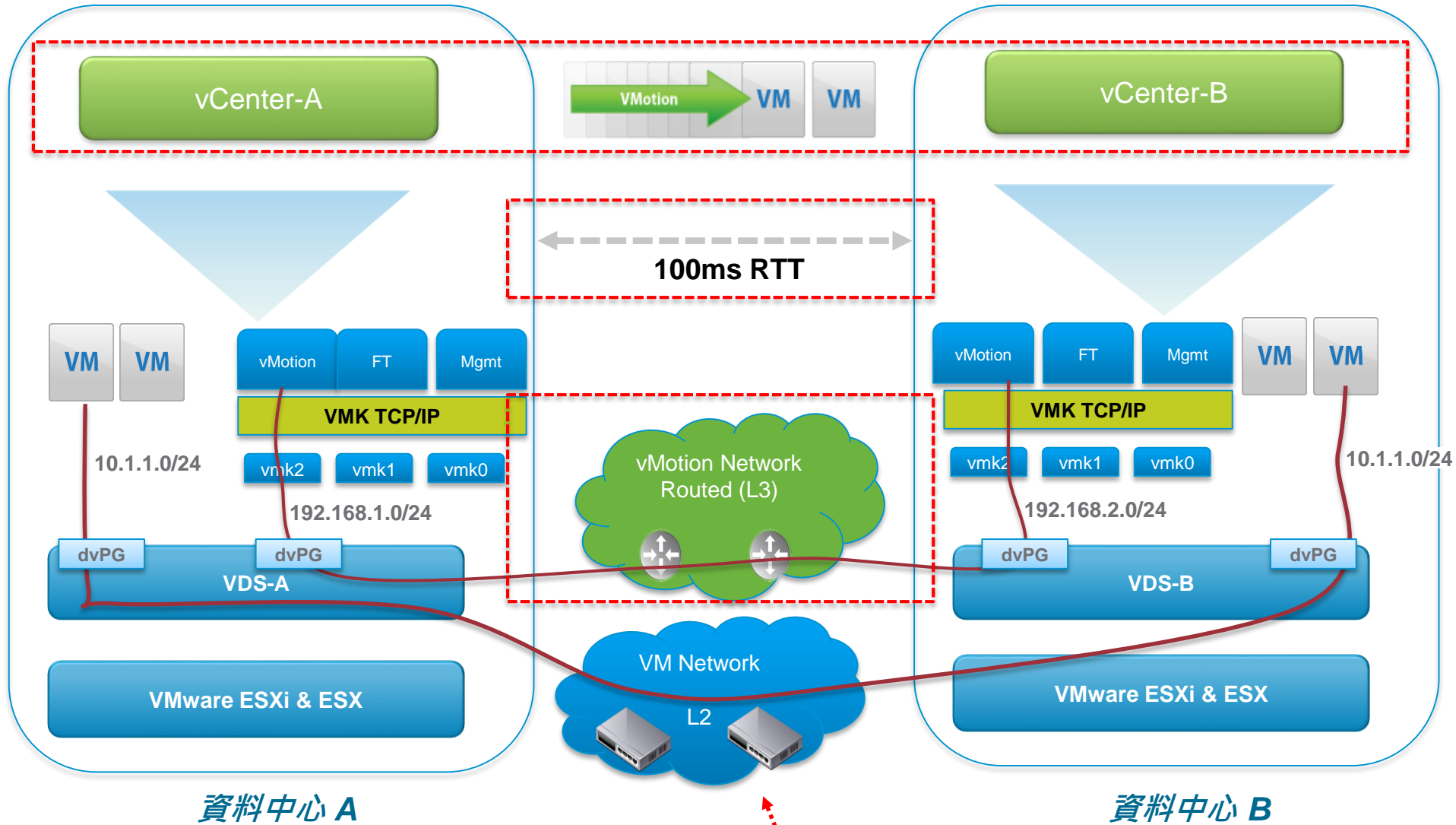
- 技術的意義：VM可以長距離傳輸至不同地域 (100 mm)
- 業務面的意義：有可能開始實現真正的混合雲以及真正的A-A雙中心



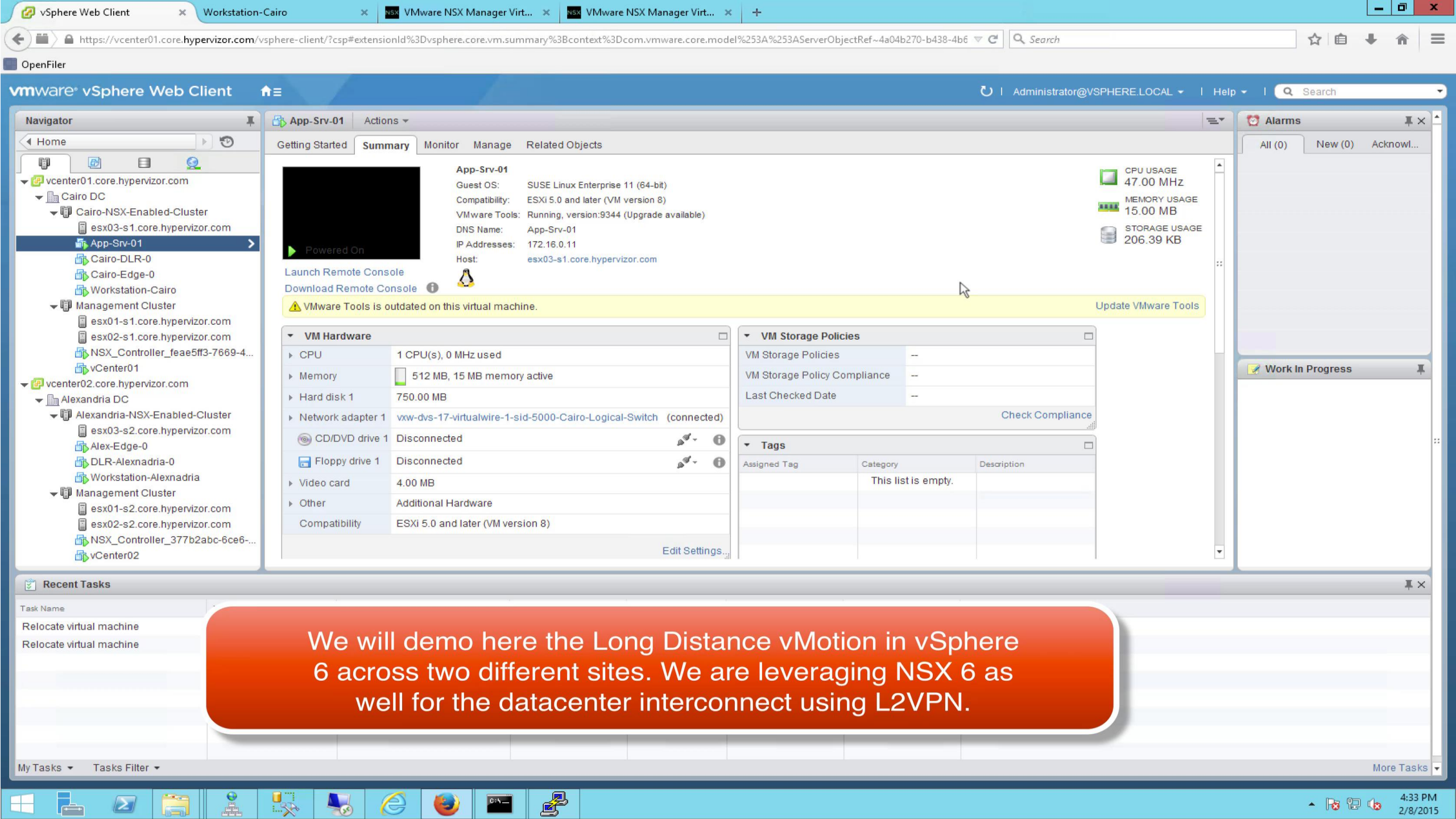
100ms RTT



# vSphere 6 vMotion 功能



但業務網路仍需L2連通，不然  
vMotion會造成網路連線中斷



We will demo here the Long Distance vMotion in vSphere 6 across two different sites. We are leveraging NSX 6 as well for the datacenter interconnect using L2VPN.

**Navigator**

Home

- vcen01.core.hypervisor.com
  - Cairo DC
    - Cairo-NSX-Enabled-Cluster
      - esx03-s1.core.hypervisor.com
        - App-Srv-01**
        - Cairo-DLR-0
        - Cairo-Edge-0
        - Workstation-Cairo
      - Management Cluster
        - esx01-s1.core.hypervisor.com
        - esx02-s1.core.hypervisor.com
        - NSX\_Controller\_feae5ff3-7669-4...
        - vCenter01
  - vcen02.core.hypervisor.com
    - Alexandria DC
      - Alexandria-NSX-Enabled-Cluster
        - esx03-s2.core.hypervisor.com
        - Alex-Edge-0
        - DLR-Alexandria-0
        - Workstation-Alexandria
      - Management Cluster
        - esx01-s2.core.hypervisor.com
        - esx02-s2.core.hypervisor.com
        - NSX\_Controller\_377b2abc-6ce6-...
        - vCenter02

**App-Srv-01** Actions

Getting Started | **Summary** | Monitor | Manage | Related Objects

**App-Srv-01**  
Guest OS: SUSE Linux Enterprise 11 (64-bit)  
Compatibility: ESXi 5.0 and later (VM version 8)  
VMware Tools: Running, version:9344 (Upgrade available)  
DNS Name: App-Srv-01  
IP Addresses: 172.16.0.11  
Host: esx03-s1.core.hypervisor.com

Powered On

Launch Remote Console  
Download Remote Console

VMware Tools is outdated on this virtual machine. Update VMware Tools

**VM Hardware**

- CPU: 1 CPU(s), 0 MHz used
- Memory: 512 MB, 15 MB memory active
- Hard disk 1: 750.00 MB
- Network adapter 1: vvxw-dvs-17-virtualwire-1-sid-5000-Cairo-Logical-Switch (connected)
- CD/DVD drive 1: Disconnected
- Floppy drive 1: Disconnected
- Video card: 4.00 MB
- Other: Additional Hardware
- Compatibility: ESXi 5.0 and later (VM version 8)

**VM Storage Policies**

VM Storage Policies	--
VM Storage Policy Compliance	--
Last Checked Date	--

Check Compliance

**Tags**

Assigned Tag	Category	Description
This list is empty.		

**Alarms**

All (0) | New (0) | Acknowl...

Work In Progress

**Recent Tasks**

Task Name
Relocate virtual machine
Relocate virtual machine

My Tasks | Tasks Filter



## 沒有NSX時，碰到的問題

即使vMotion Kernel Network可以跨越L3，但虛擬機器接取的業務網路仍必須L2打通



如果虛擬機器接取的是NSX提供的邏輯交換器 (Logical Network)，就可解決此問題，因為Logical Network可以跨底層L3網路建立

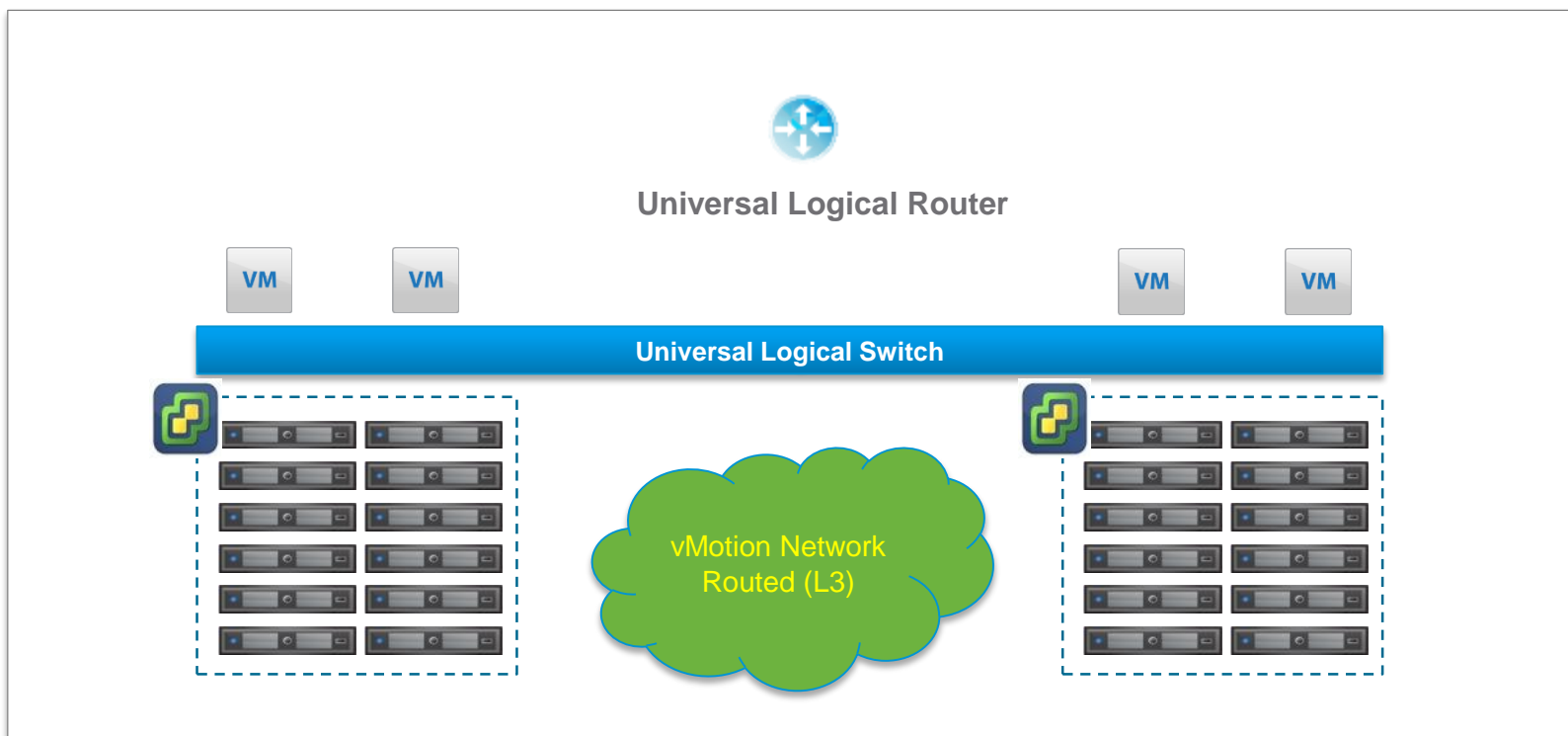
但 vSphere 6 支援在兩個中心使用不同的vCenter



可是NSX 6.1之前，不支援Multi-vCenter環境

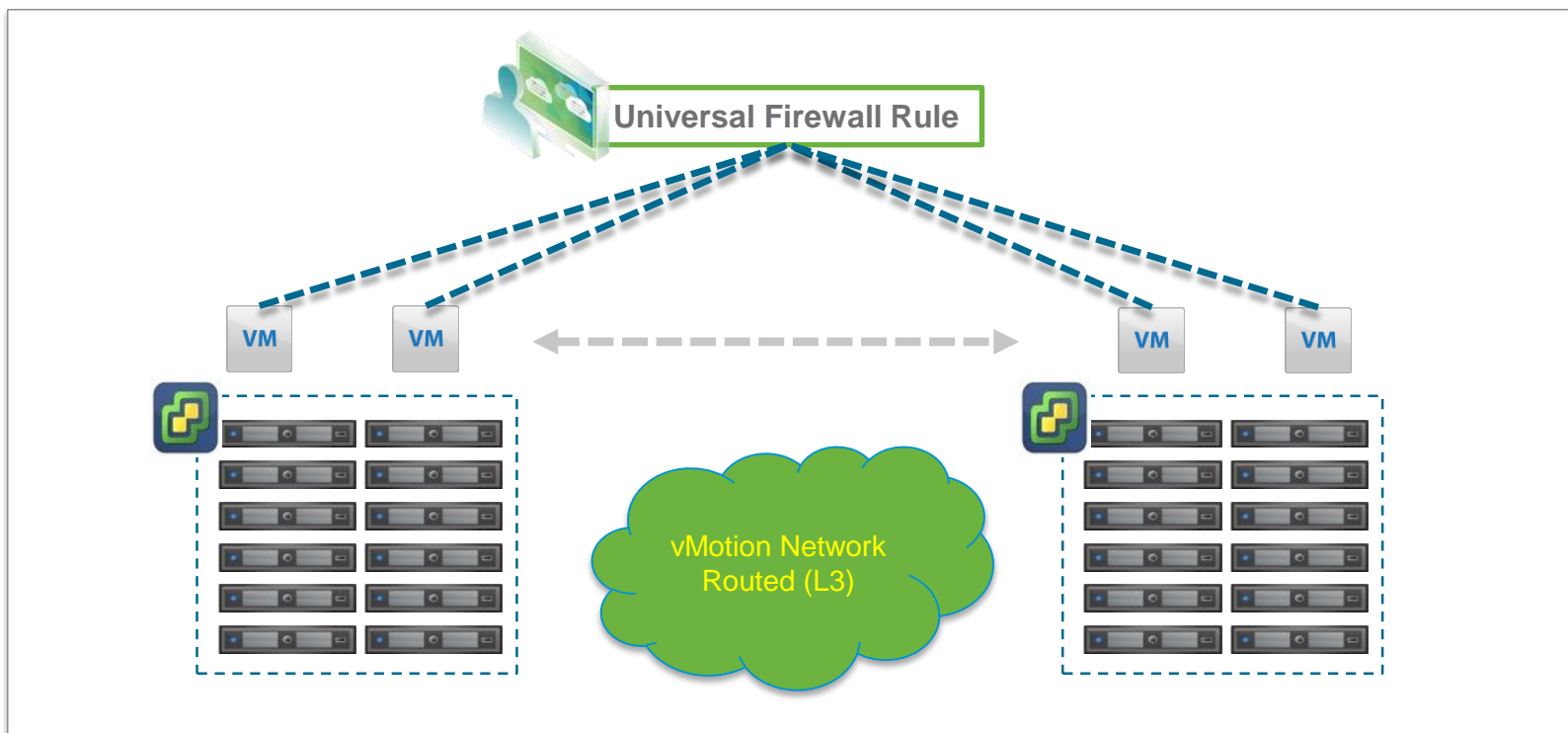
# NSX 6.2 技術簡介：跨越vCenter邊界，建立邏輯交換器與邏輯路由器

- 技術的意義：可以跨機櫃、樓層、地域，於不同vCenter內的環境，建立單一的全域邏輯交換器與邏輯路由器

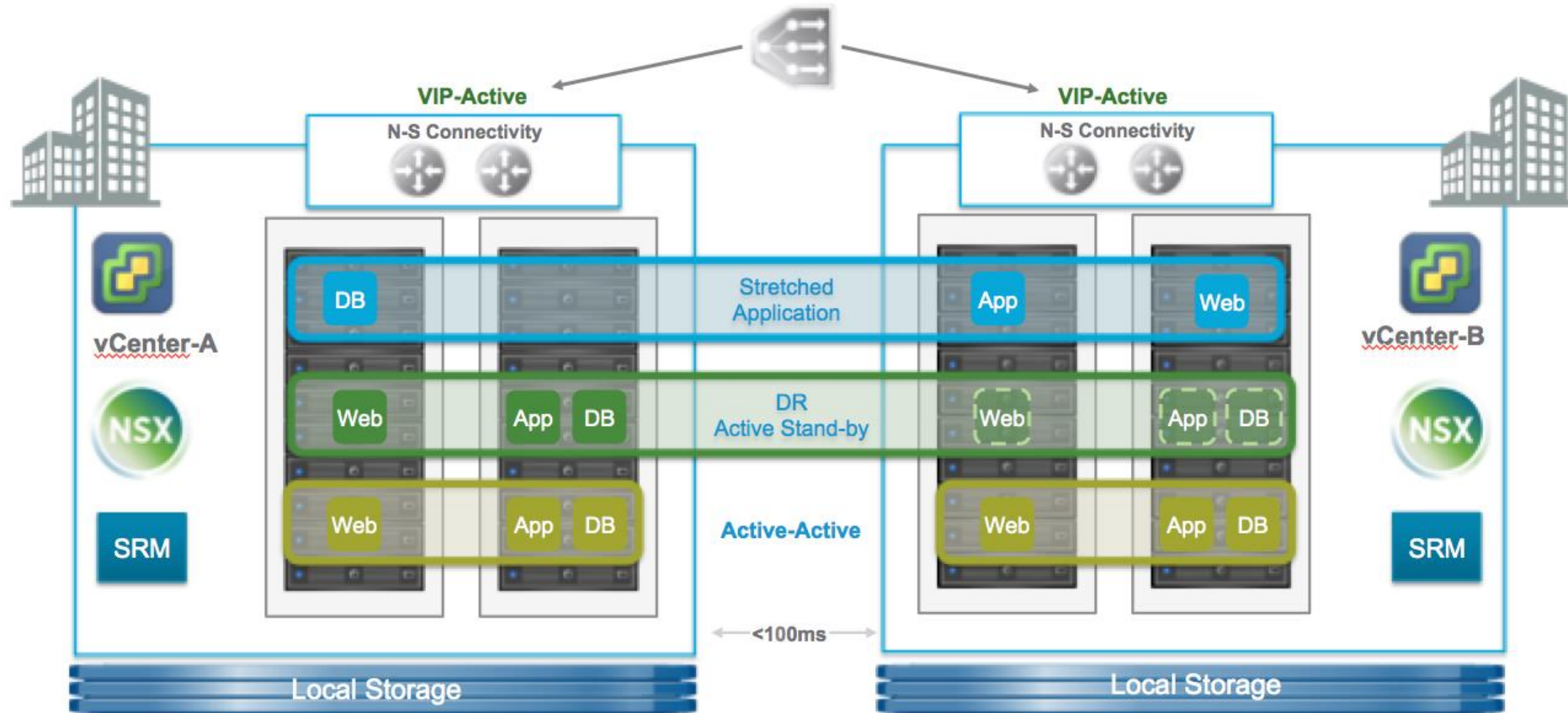


# NSX 6.2 技術簡介：跨越vCenter邊界，進行邏輯防火牆設定

- 技術的意義：VM跨vCenter飄來飄去時，邏輯防火牆的功能仍然可以使用且集中設定 (IP Only)



# 雙中心或混合雲的Scenario：業務系統延伸、DR、Active-Active業務、資訊系統On-Line vMotion



# 為什麼我們在實行災備預防有許多疑問？

## IT 災害對策課題 ①

復原手動程序覺得複雜？

回復計畫手動程序相當複雜  
並且不容易進行實施！



## IT 災害對策課題 ②

真的能恢復環境？

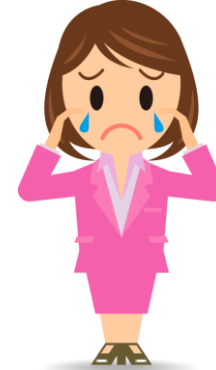
實際上較難進行移轉測試演練並  
且缺乏信心是否能回復



## IT 災害對策課題 ③

建設成本過高？

用於生產和備援要準備兩套基礎  
架構環境, 成本過大！



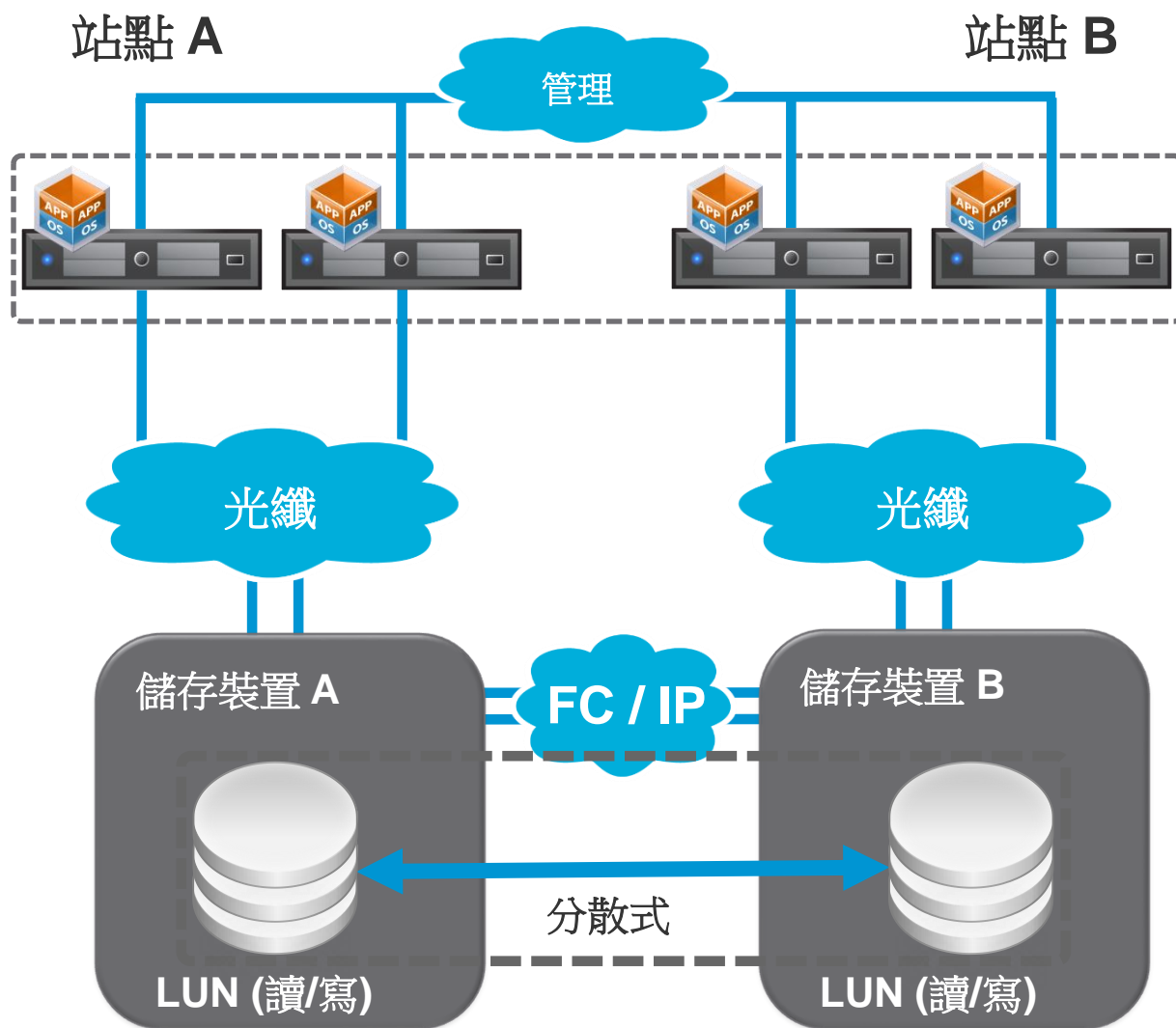
請將這些問題交由VMware來解決！

# vSphere Metro Storage Cluster

- 延伸叢集解決方案，並非功能！
- 需要：
  - 跨站點「延伸」的儲存系統
  - 跨站點的延伸網路
- 硬體相容清單 (HCL) – 經認證的 vMSC
  - “iSCSI Metro Cluster Storage”
  - “FC Metro Cluster Storage”
  - “NFS Metro Cluster Storage”

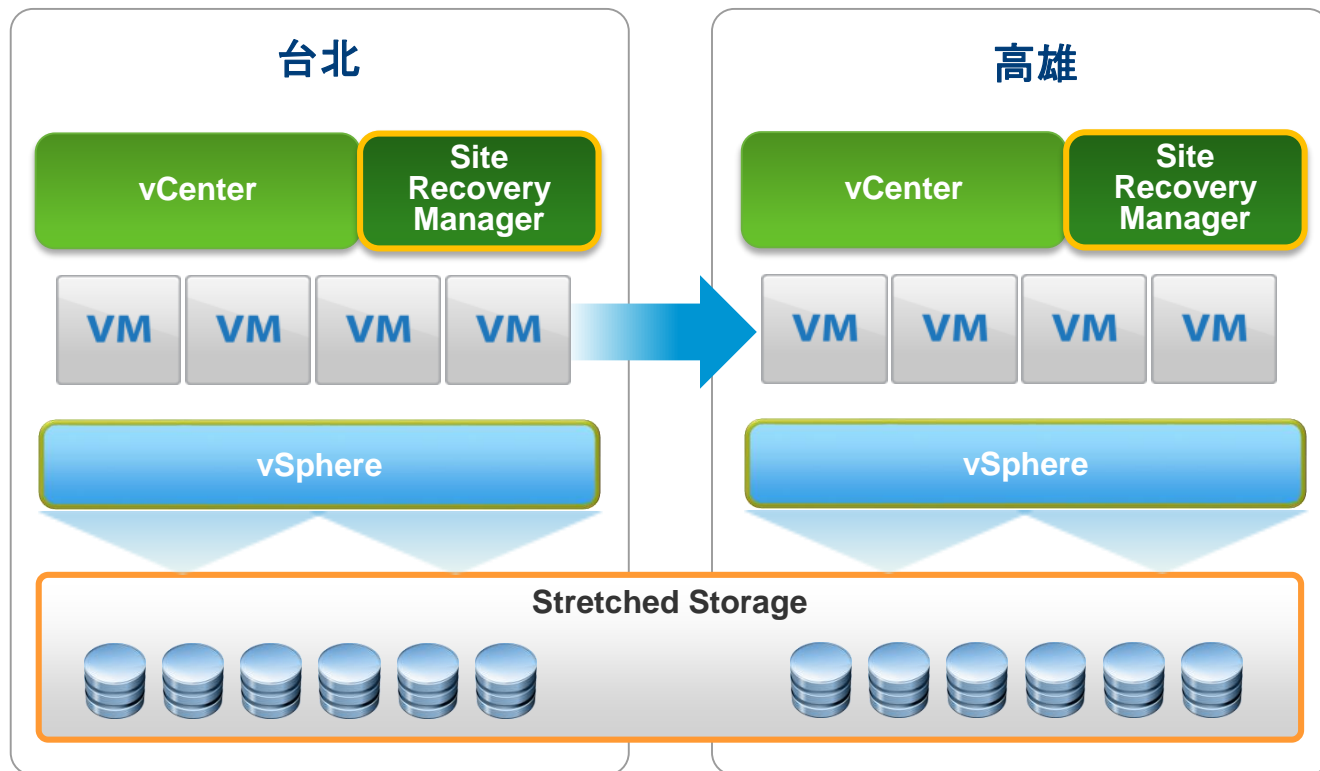


# vSphere Metro Storage Cluster 一般架構說明



- 兩個站點
- 總共四部主機
- 延伸網路
- 延伸儲存裝置
- 一個 vCenter Server
- 一個 vSphere HA 叢集

# Stretched Storage 結合SRM能提供計畫性的vMotion環境移轉



- 整合stretched storage 以及SRM
  - 規劃跨vCenter vMotion
- 針對災難預防, 災難回復以及行動性提供整合的計畫
- 針對預期性維護和災難預防進行零停機時間的移轉
- 能夠無中斷的測試災難復原計畫 (只靠vMSC無法做到)
- 利用雙活中心以及兩個vCenter 帶來更好的高可靠性




# Stretched Storage 計畫性移轉

Recovery - RP-Finance Application

**1 Confirmation options**

2 Ready to complete

**Recovery confirmation**

 Running this plan in recovery mode will attempt to shut down the VMs at the protected site and recover the VMs at the recovery site.

Protected site: w2-srmapi-65-20.eng.vmware.com

Recovery site: w2-srmapi-65-21.eng.vmware.com

Server connection: Connected

Number of VMs: 5

I understand that this process will permanently alter the virtual machines and infrastructure of both the protected and recovery datacenters.

**Recovery type**

**Planned migration**

Replicate recent changes to the recovery site and cancel recovery if errors are encountered. (Sites must be connected and storage replication must be available.)

**Enable vMotion of eligible VMs**

Disaster recovery

Attempt to replicate recent changes to the recovery site, but otherwise use the most recent storage synchronization data. Continue recovery even if errors are encountered.

Forced recovery - recovery site operations only

Back Next Finish Cancel

# 在 Stretched Storage 內的vMotion回復計畫

vmware vSphere Web Client Updated at 4:41 PM Administrator@VSPHERE.LOCAL Help Search

Navigator: Site Recovery (5) Recovery Plans  
RP-All SPPGs  
RP-CustServ Application  
RP-ERP Application  
RP-Finance Application  
RP-HR Application

RP-Finance Application Actions  
Summary Monitor Manage Related Objects

Recovery Steps History

Plan status: Recovery in progress 1%  
Description: Recovery in progress

Recovery Step	Status	Step Started	Step Completed
1. Discover protected VMs information	Success	August 14, 2015 at 4:50:0...	August 14, 2015 at 4:50:03 PM PDT
2. Restore hosts from standby for live migration	Success	August 14, 2015 at 4:50:0...	August 14, 2015 at 4:50:03 PM PDT
3. Suspend non-critical VMs at recovery site for live migration			
4. Preparing stretched storage for VM migration at protected site	Success	August 14, 2015 at 4:50:0...	August 14, 2015 at 4:50:28 PM PDT
5. Live migration of VMs to recovery site	Running	August 14, 2015 at 4:50:2...	74%
5.1. Protection Group SPPG-Finance Application	Running	August 14, 2015 at 4:50:2...	74%
5.1.1. Discover VMs for live migration	Success	August 14, 2015 at 4:50:2...	August 14, 2015 at 4:50:28 PM PDT
5.1.2. Stop monitoring live migration capable VMs at pr...	Success	August 14, 2015 at 4:50:28...	August 14, 2015 at 4:50:28 PM PDT
5.1.3. Live migration of VMs	Running	August 14, 2015 at 4:50:2...	23%
5.1.3.1. VM Fin-App01	Running	August 14, 2015 at 4:50:4...	99%
5.1.3.2. VM Fin-Web02			
5.1.3.3. VM Fin-App02	Running	August 14, 2015 at 4:50:4...	99%
5.1.3.4. VM Fin-Web01			
5.1.3.5. VM Fin-DB01	Success	August 14, 2015 at 4:50:2...	August 14, 2015 at 4:50:41 PM PDT
6. Synchronize protected VM information			
7. Pre-synchronize storage			

View: Recovery Steps

37 Items

(22) Recent Tasks

(0) Alarms (0) Work In Progress

# Stretched Storage 的 DR 模式

Recovery - RP-Finance Application

**1 Confirmation options**

2 Ready to complete

**Recovery confirmation**

! Running this plan in recovery mode will attempt to shut down the VMs at the protected site and recover the VMs at the recovery site.

Protected site: w2-srmapi-65-20.eng.vmware.com

Recovery site: w2-srmapi-65-21.eng.vmware.com

Server connection: Connected

Number of VMs: 5

I understand that this process will permanently alter the virtual machines and infrastructure of both the protected and recovery datacenters.

**Recovery type**

Planned migration

Replicate recent changes to the recovery site and cancel recovery if errors are encountered. (Sites must be connected and storage replication must be available.)

Enable vMotion of eligible VMs

Disaster recovery

Attempt to replicate recent changes to the recovery site, but otherwise use the most recent storage synchronization data. Continue recovery even if errors are encountered.

Forced recovery - recovery site operations only

Back Next Finish Cancel

# Stretched Storage 的 DR 模式

vmware vSphere Web Client Administrator@VSPHERE.LOCAL Help Search

Navigator  
Site Recovery  
Recovery Plans 5  
RP-All SPPGs  
RP-CustServ Application  
RP-ERP Application  
RP-Finance Application  
RP-HR Application

RP-Finance Application Actions  
Summary Monitor Manage Related Objects

Recovery Steps History

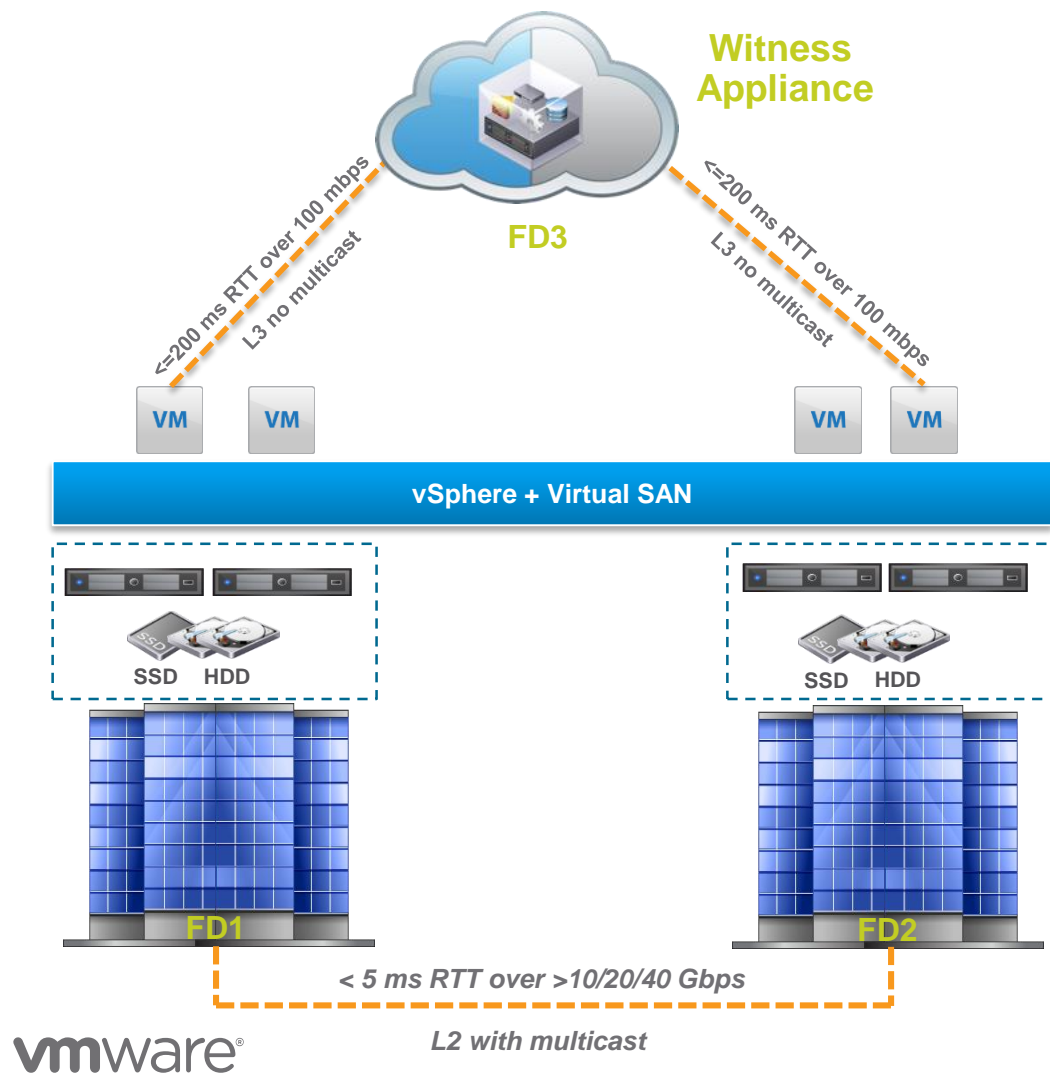
Plan status: Recovery in progress 11 %  
Description: Recovery in progress

View: Recovery Steps

Recovery Step	Status	Step Started	Step Completed
1. Discover protected VMs information	Success	August 15, 2015 at 3:18:2...	August 15, 2015 at 3:18:20 PM PDT
2. Restore hosts from standby for live migration	Skipped		
3. Suspend non-critical VMs at recovery site for live migration			
4. Preparing stretched storage for VM migration at protected site	Skipped		
5. Live migration of VMs to recovery site	Skipped		
6. Synchronize protected VM information	Success	August 15, 2015 at 3:18:2...	August 15, 2015 at 3:18:21 PM PDT
7. Pre-synchronize storage	Success	August 15, 2015 at 3:18:2...	August 15, 2015 at 3:18:30 PM PDT
8. Stop monitoring VMs at protected site	Success	August 15, 2015 at 3:18:3...	August 15, 2015 at 3:18:30 PM PDT
9. Shut down VMs at protected site	Running	August 15, 2015 at 3:18:3...	0%
10. Resume VMs suspended by previous recovery			
11. Restore recovery site hosts from standby			
12. Restore protected site hosts from standby			
13. Unregister VMs at protected site			
14. Unmount protected site storage			
15. Complete migration of protection groups			
16. Synchronize storage			

(1) Alarms  
(0) Work In Progress  
(0) Recent Tasks  
28 Items

# Virtual SAN Stretched Clusters 概述



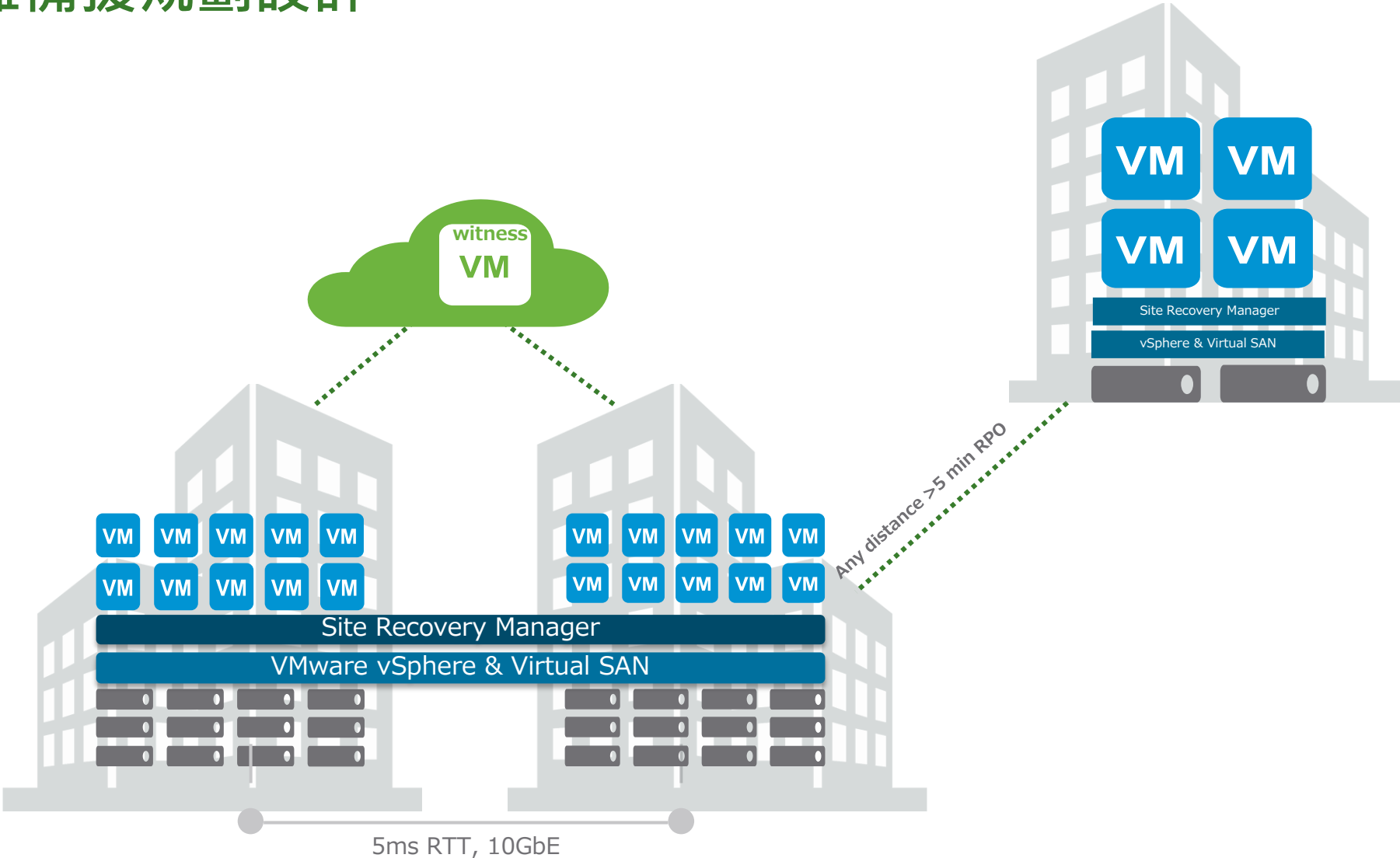
## 概述

- 零資料丟失和近乎即時的站點層級的保護。有助於實現使雙活資料中心
- 架構於Fault Domains的Virtual SAN 技術使叢集能切分成三個區塊
- 兩個主站點的RTT網路延遲必須小於5毫秒(milliseconds)
- 見證VM 存在於第三地 ( 可以是另一個資料中心, vCloud Air, 或主機代管). 見證VM僅用來保存meta-data
- 當站點失效時自動移轉
- 主要站點和見證VM之間的通信是unicast ( FD1和FD2共享一個L2網域。FD1和FD2只有通過L3與FD3溝通 )
- 每個VSAN stretched cluster 可擴充到15+15+1, 明年可以到31+31+1
- 客戶可以有多个VSAN stretched clusters

## 效益

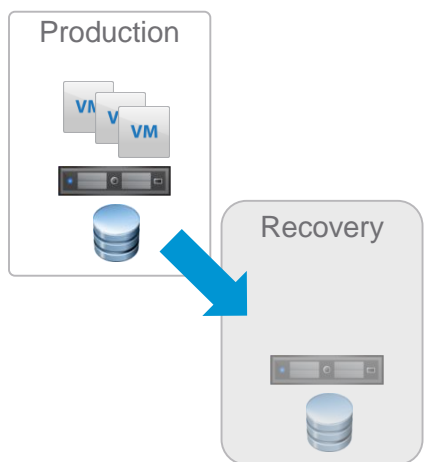
- 災害預防(Disaster avoidance)
- 計畫性維護

# Virtual SAN Stretched Cluster 與 SRM 的結合提供資料中心 完整災難備援規劃設計



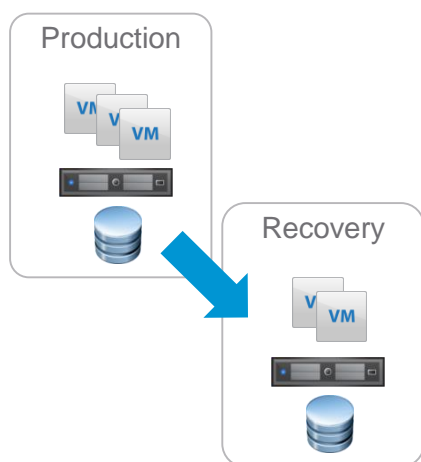
# SRM 支援彈性的抄寫架構

## Active-Passive Failover



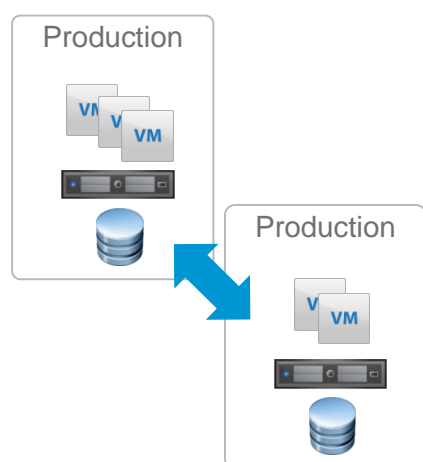
- 傳統式架構
- 昂貴的專屬設備資源

## Active-Active Failover



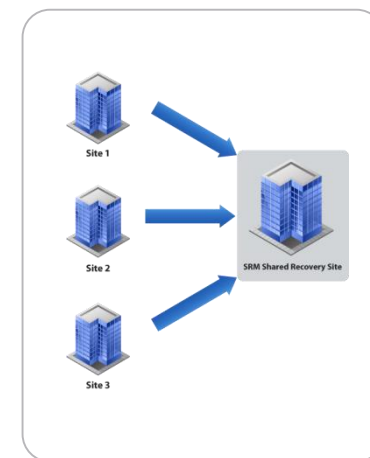
- 平時備援中心當作測試開發和訓練之用
- 可有效利用備援中心

## Bi-directional Failover



- 兩邊sites都是生產線上環境
- 彼此互為備援中心

## Shared Recovery Sites



- 多對一failover架構
- 特別適用分公司架構

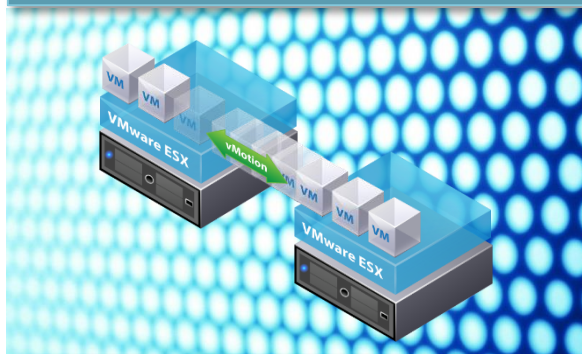
# Site Recovery Manager 能協助您...

## 快速並穩定的回復



- 無中斷的測試
- 自動化移轉與遷移
- 自動化故障恢復 (failback)
- 整合 VMware NSX

## 零停機的移動性



- 整合 vMotion
- 支援 Stretched 儲存
- 支援 Array-based 複寫機制
- 支援 vSphere 複寫機制

## 以政策為 導向的簡易管理



- 集中化復原計畫
- 以政策規則為基礎的儲存管理
- vSphere Web Client 整合
- vRealize Orchestrator 整合

## 降低TCO 高達 50%

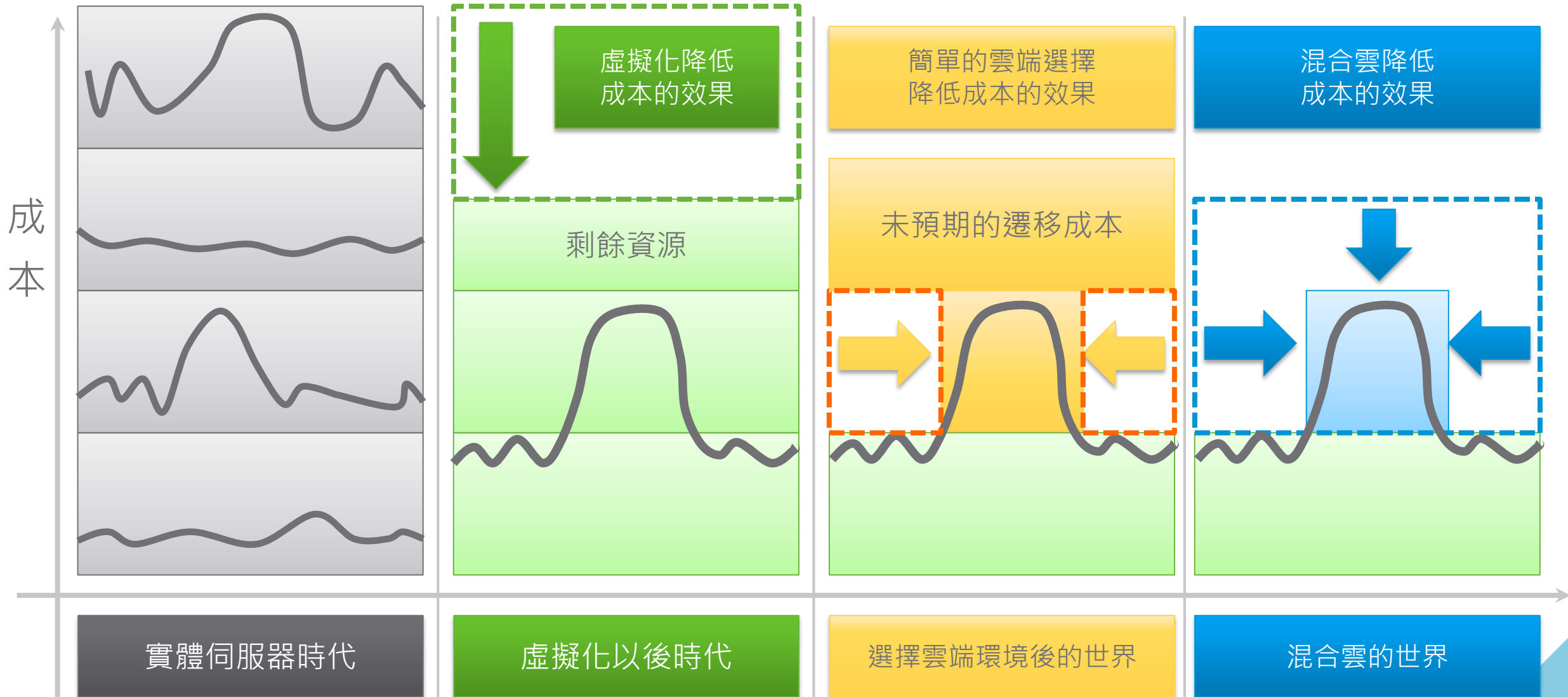


- 透過管理與測試自動化可降低 TCO 達30%<sup>(1)</sup>
- 減少複寫軟體需求可降低TCO 達 20%<sup>(1)</sup>

(1) The Total Economic Impact of VMware vCenter Site Recovery Manager, Forrester, May 2013



# 企業IT基礎設施的成本結構的變化



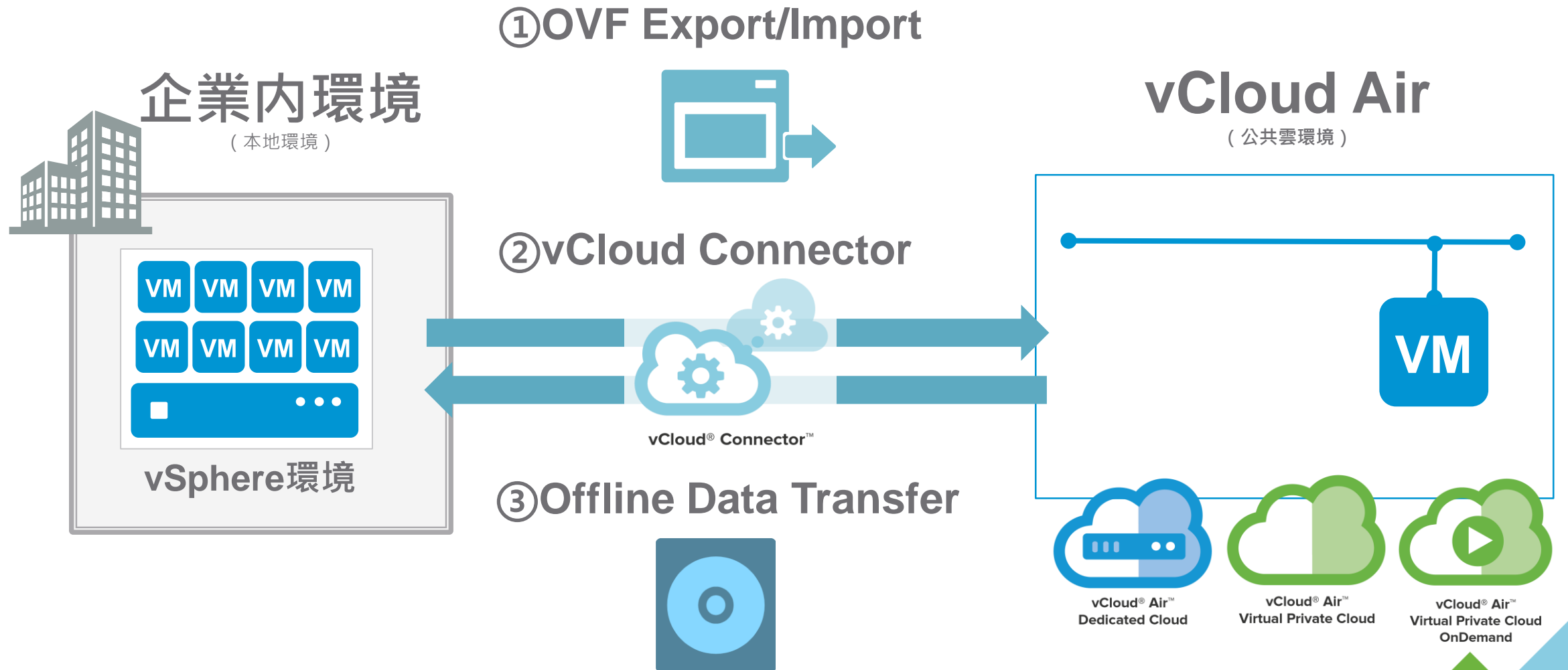
# 從私有雲環境延伸到混合雲的架構



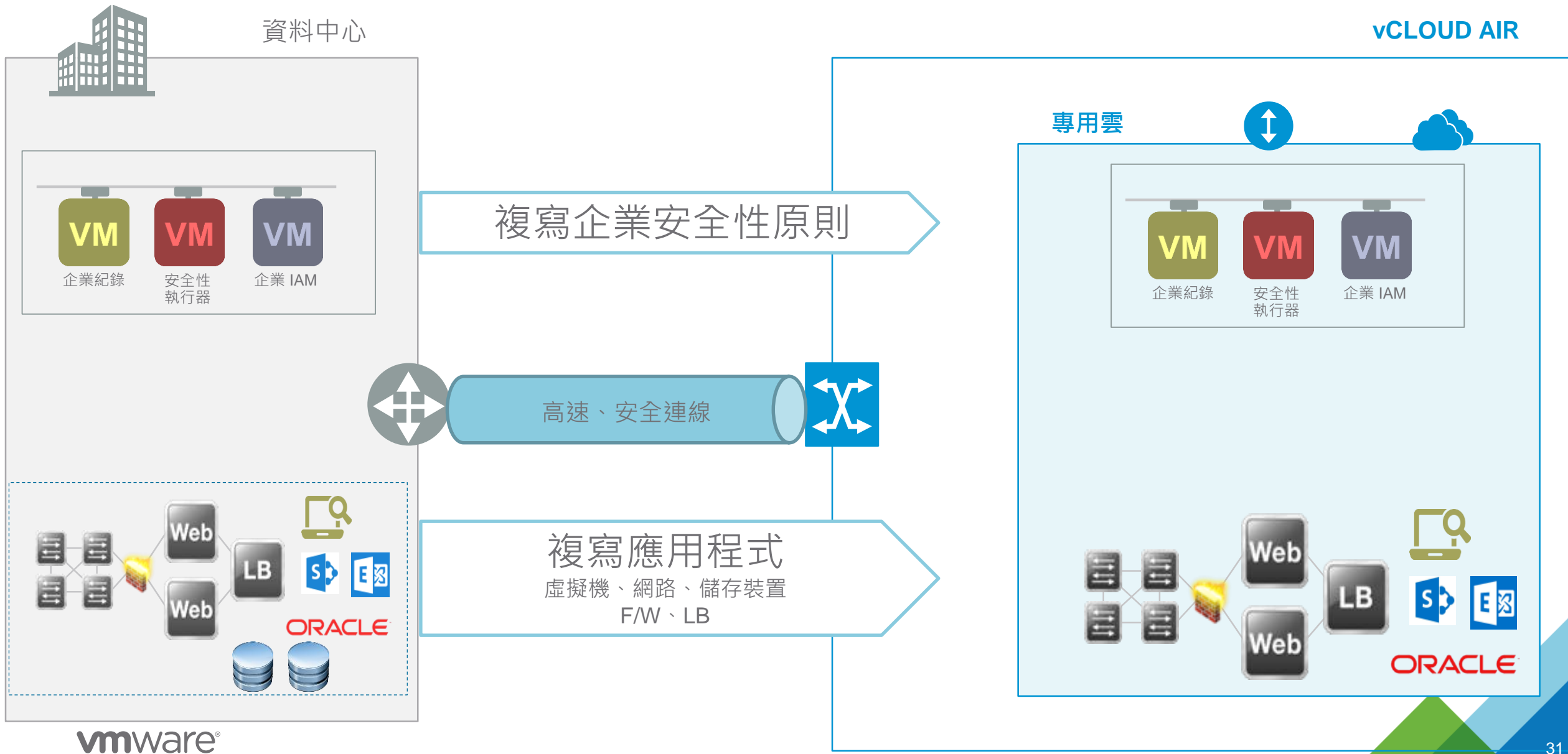
# 在不需要更動應用程式環境的情形行移動到vCloud Air 可以為客戶提供在整個混合雲的高可用性



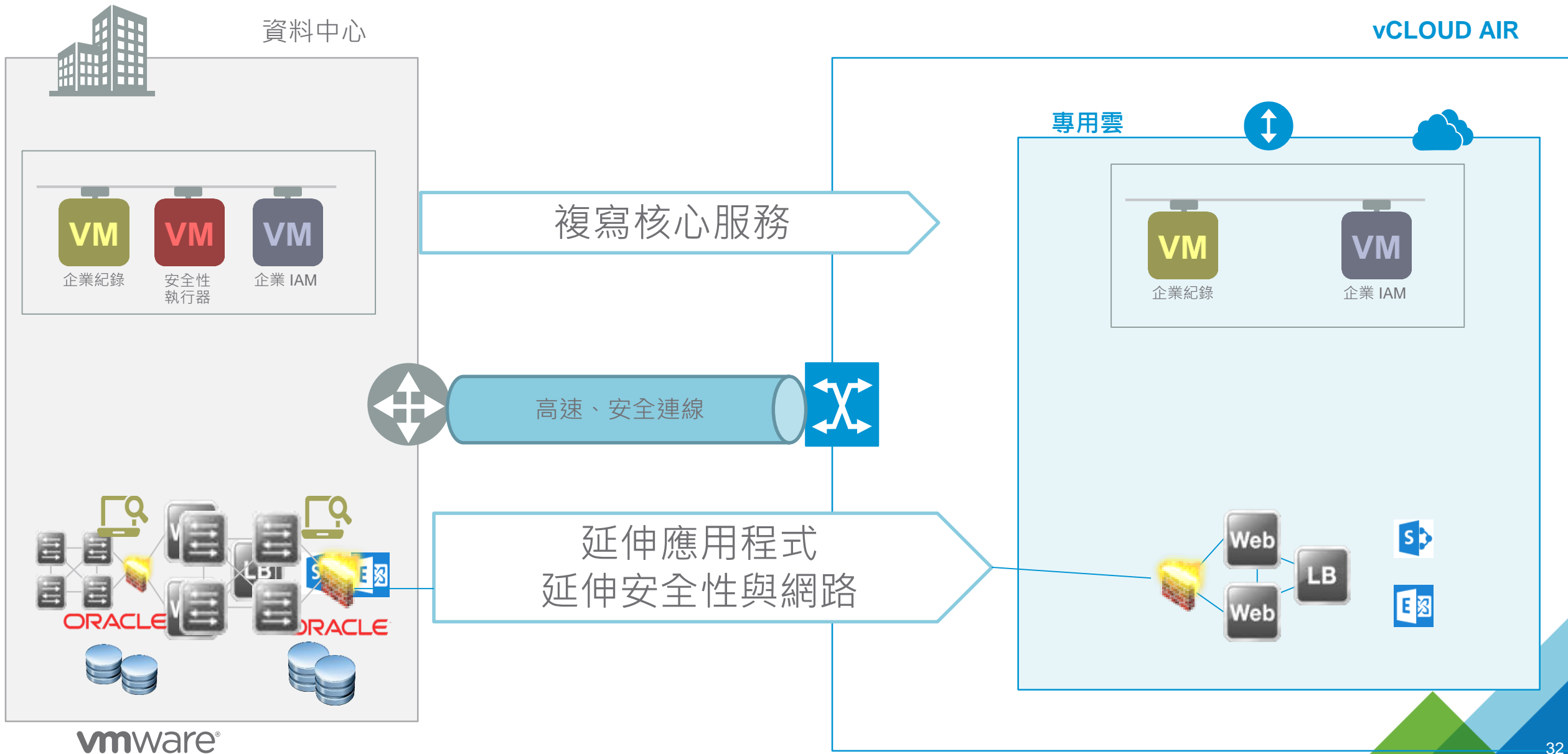
# vCloud Air的遷移方法



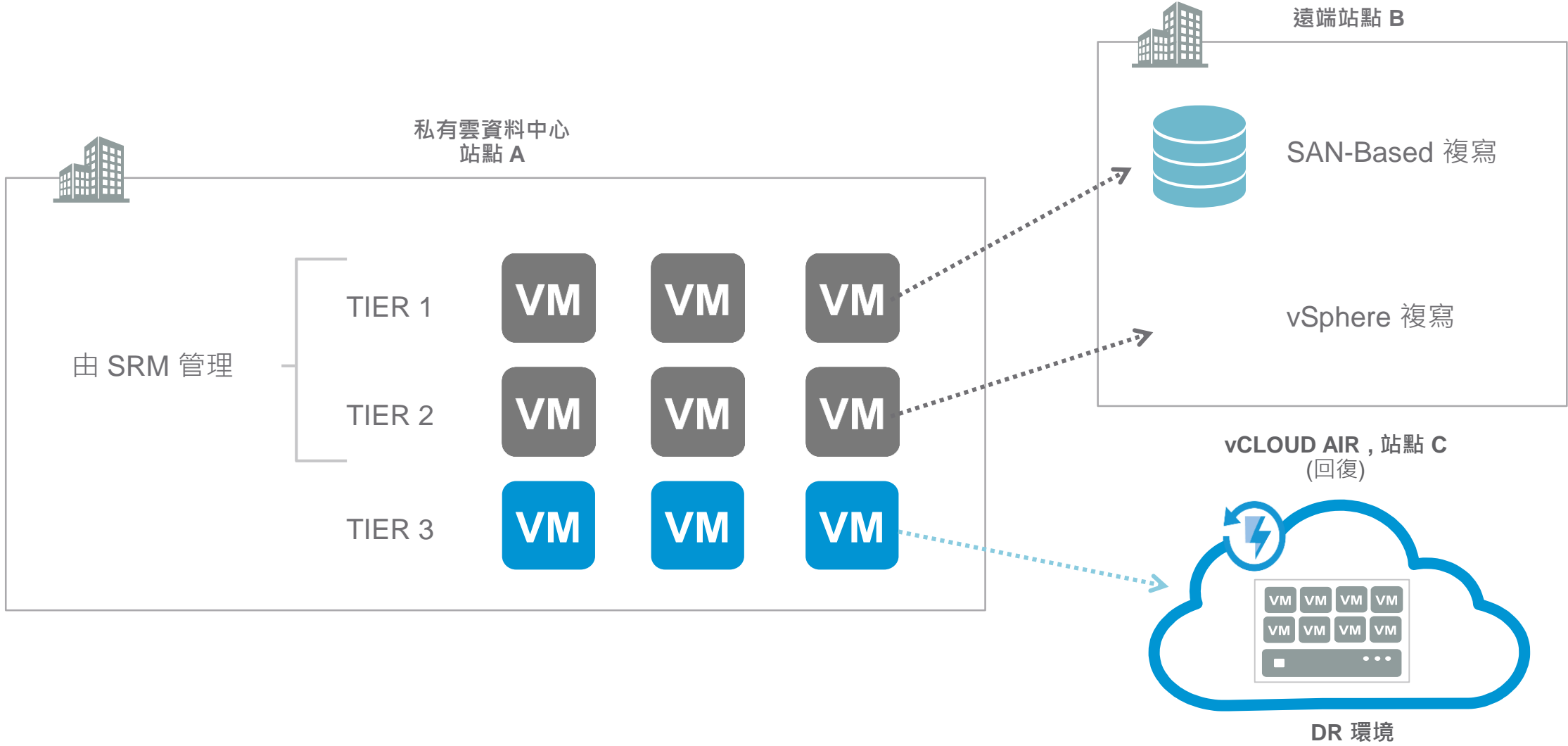
# 基礎架構複寫 — 完全在 vCloud Air 上進行



# 基礎架構延伸功能 – 延伸至 vCloud Air



# vCloud Air DR 可以與SRM共同提供更彈性的保護



# 災難備援環境復原的目標



## 課題

使用vSphere 環境、但覺得因應災害的對策成本相對較高而覺得困擾

想做一個簡單的災難復原方案，不依賴於應用程式和儲存

無論是否已經建立災害備援機制、擔心是否能夠容易地進行測試

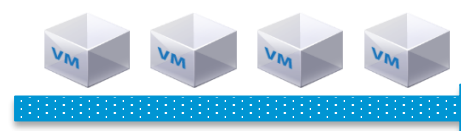
選擇要保護的VM  
對象

現有環境



內部部署

DR的復原對象  
持續地複寫到公有雲端環境



雲端DR環境



複製的虛擬機通常  
處於停止狀態

使用vSphere  
Replication複寫機  
制

## 概念和優勢

↓  
低成本的災難恢復

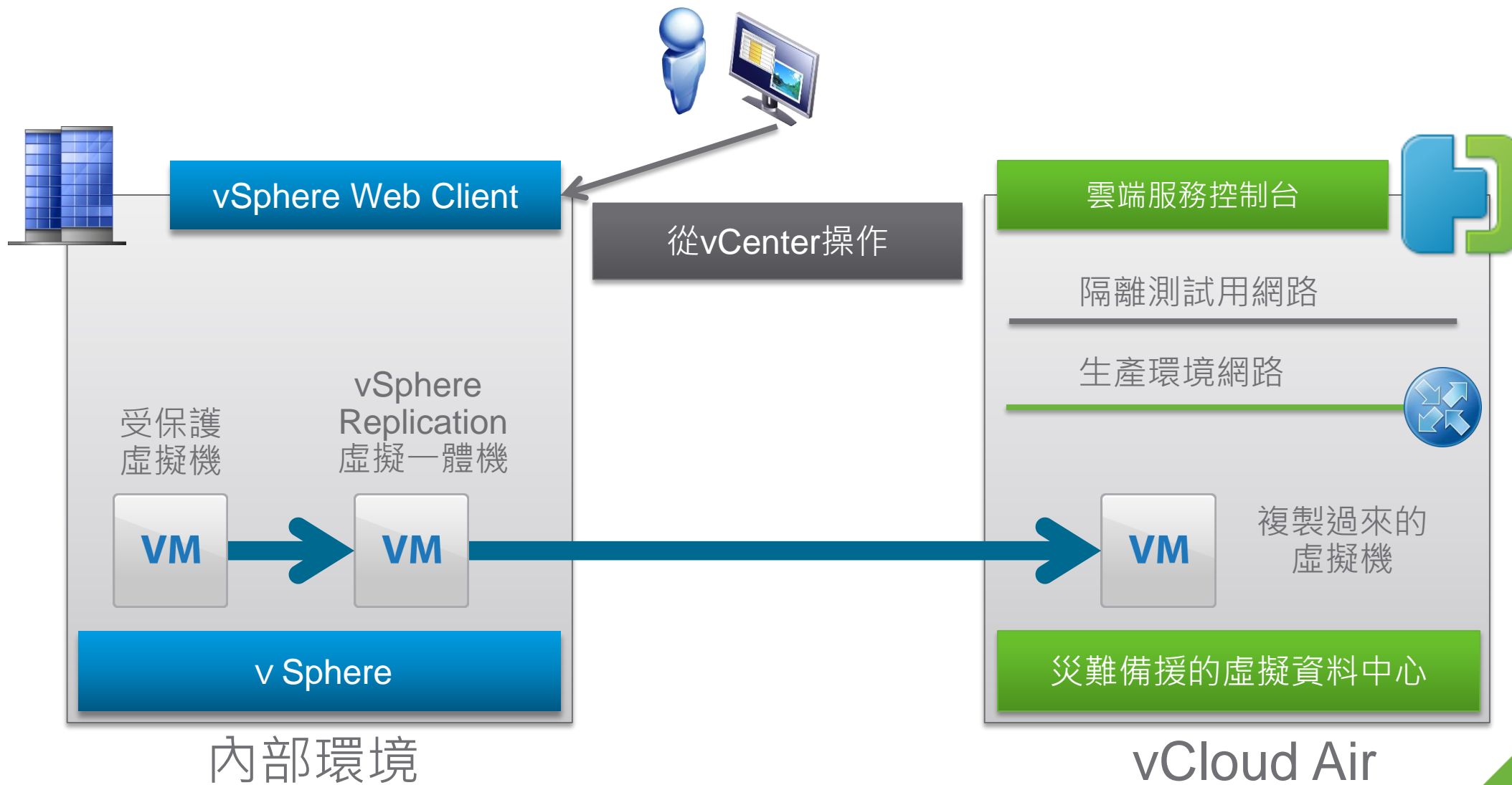
簡易的災難恢復

↑  
更大的靈活性

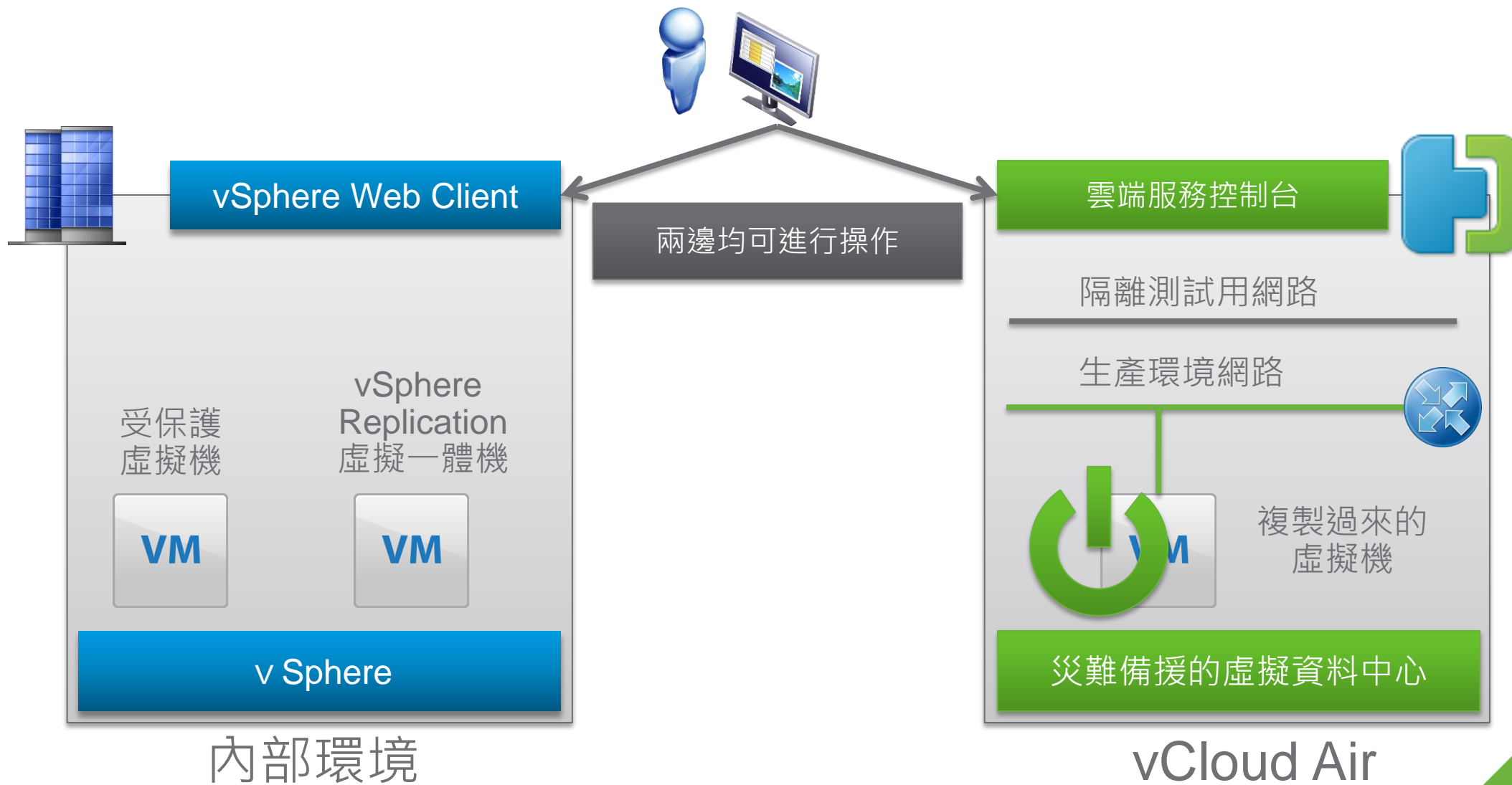
方便測試故障轉移



# 設置虛擬機複寫機制



# 實現故障切換



# VMware 提供一個完整的服務不中斷解決方案選擇

跨站點應用環境可靠性以及移動性

災難備援



更快速

災難預防



零服務中斷

資料中心移轉



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