Imagine Virtually Anything™

CISCO NetApp vmware

IT虛擬化技術與趨勢

麟瑞科技股份有限公司
區域銷售事業處
專案經理 陳中欣
Brian_Chen@ringline.com.tw

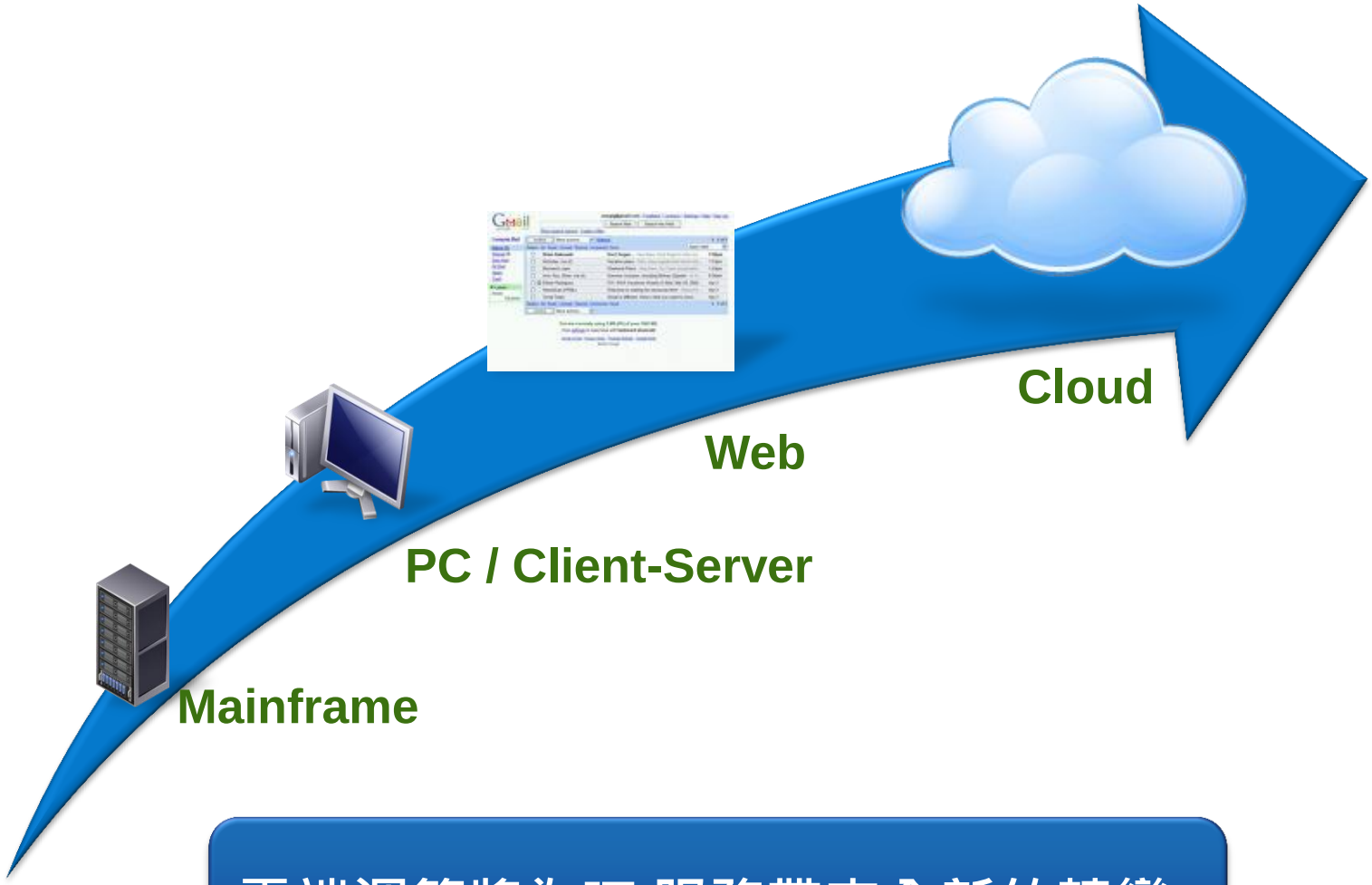
CISCO NetApp vmware

簡報大綱

- 虛擬化與雲端運算
- 虛擬化技術介紹
- 專案實績分享

- **虛擬化與雲端運算**
- 虛擬化技術介紹
- 專案實績分享

IT服務架構的演變



雲端運算將為IT 服務帶來全新的轉變

雲端運算的定義

- NIST
  - “雲端運算是一種透過網路連結存取共享的運算資源池（如網路、伺服器、儲存空間、應用程式及服務）運作模式，可以在最少的管理工作或服務提供商介入下，自動迅速的提供資源配置和發佈。”
- **維基百科**
- “雲端運算的資源是動態易擴充套件而且虛擬化的，透過網際網路提供。終端使用者不需要了解「雲端」中基礎設施的細節，不必具有相應的專業知識，也無需直接進行控制，只關注自己真正需要什麼樣的資源以及如何透過網路來得到相應的服務。”

***美國國家標準局（National Institute of Standards and Technology，NIST）**

雲運算的五個特徵

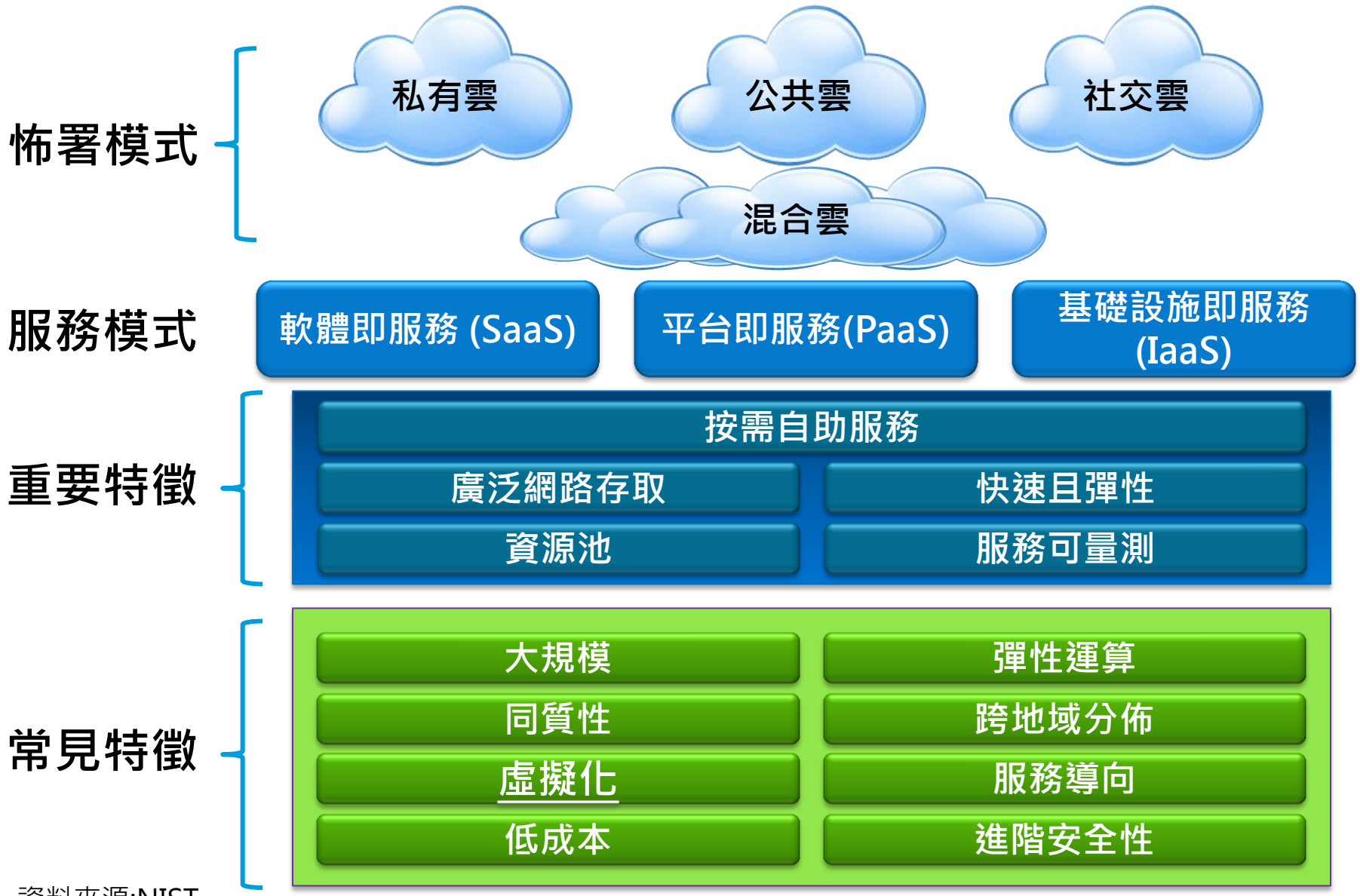
- **按需自助服務-**可在客戶需要時配置運算能力，如伺服器時間和網絡存儲空間，無需供應商服務人員介入即可自動依需求提供服務。

- **廣泛的網絡存取**-通過網絡提供服務，可支援各種標準的連線機制，包括各種精簡或厚實的客戶端(thin or thick client) 平台（如行動電話、筆記型電腦或PDA），存取其他傳統或以雲為基礎的軟體服務。

- **資源池**-運算資源彙集皆以資源池概念集中管理，使用多重用戶模型，按照使用者需要，將不同的物理和虛擬資源動態地分配或再分配給多個用戶使用。使用者不須知道資源所在地或來源。資源池範圍包括存儲、處理、記憶體、網路頻寬以及虛擬機等。

- **快速且彈性佈署**-服務能力可以自動快速、彈性地供應，實現快速擴容、快速上線。對於使用者來說，可供應的服務能力近乎無限，可以隨時按需要購買。

- **服務可測量監控**-服務可以被監視、控制資源使用、並產生報表，報表可以對提供商和用戶雙方都全然透明的提供。

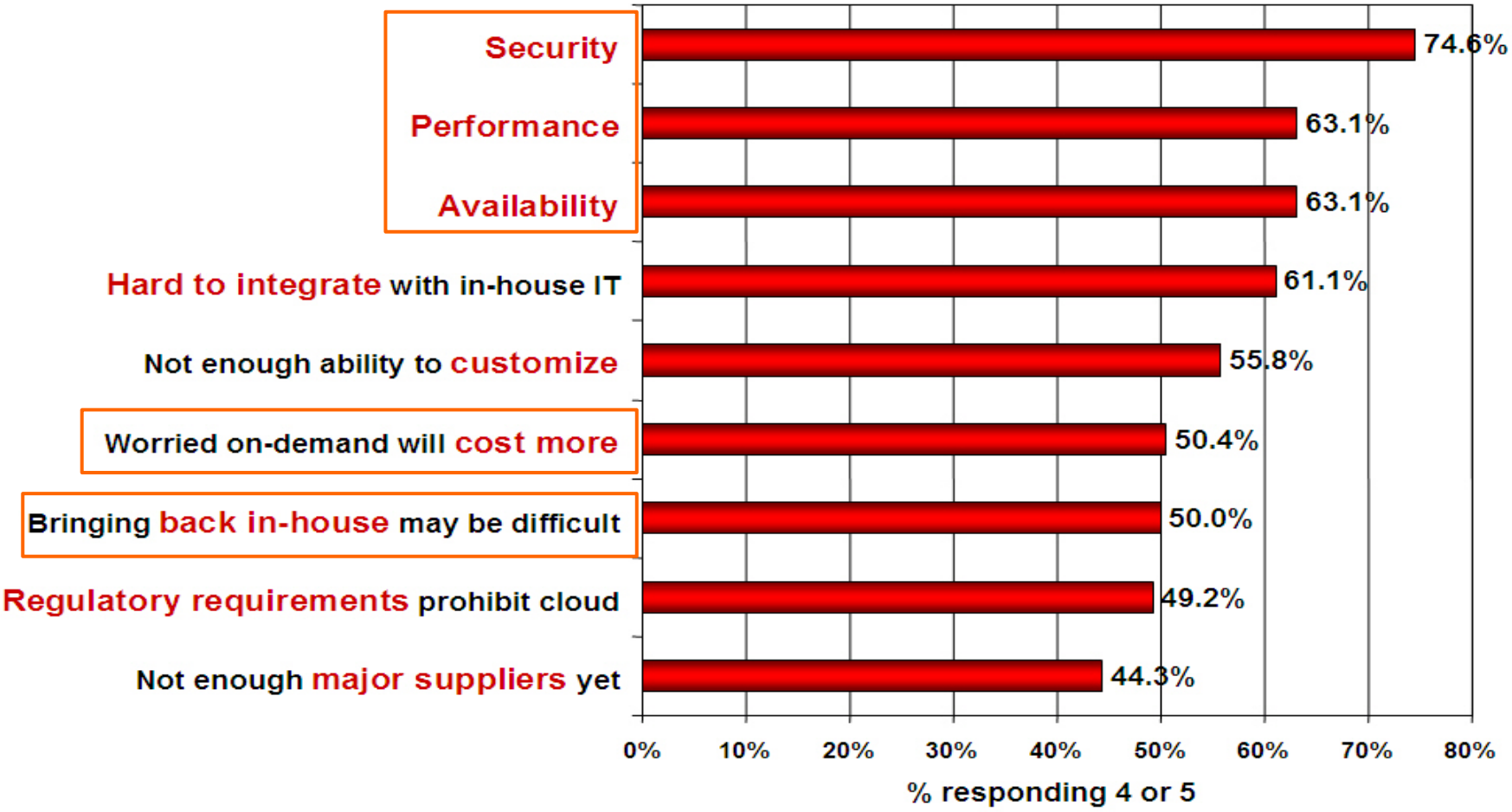

佈署模式
私有雲
公共雲
社交雲
混合雲
服務模式
軟體即服務 (SaaS)
平台即服務(PaaS)
基礎設施即服務 (IaaS)
重要特徵
按需自助服務
廣泛網路存取
快速且彈性
資源池
服務可量測
常見特徵
大規模
彈性運算
同質性
跨地域分佈
虛擬化
服務導向
低成本
進階安全性

資料來源:NIST

雲端運算平台挑戰

Q: Rate the challenges/issues ascribed to the 'cloud'/on-demand model

(1=not significant, 5=very significant)



Source: IDC Enterprise Panel, August 2008 n=244

雲端運算基本要求

- Availability
- Security
- Performance
- Lowest TCO

虛擬化與雲端運算

IaaS
基礎設施即服務
PaaS
平台即服務
SaaS
軟體即服務

資源監控與趨勢預估
高可用性與安全性
虛擬化
資源集中管理、提升設備使用率與節能減碳
自動化管理與動態擴充佈署資源

- 虛擬化與雲端運算
- **虛擬化技術介紹**
- 專案實績分享

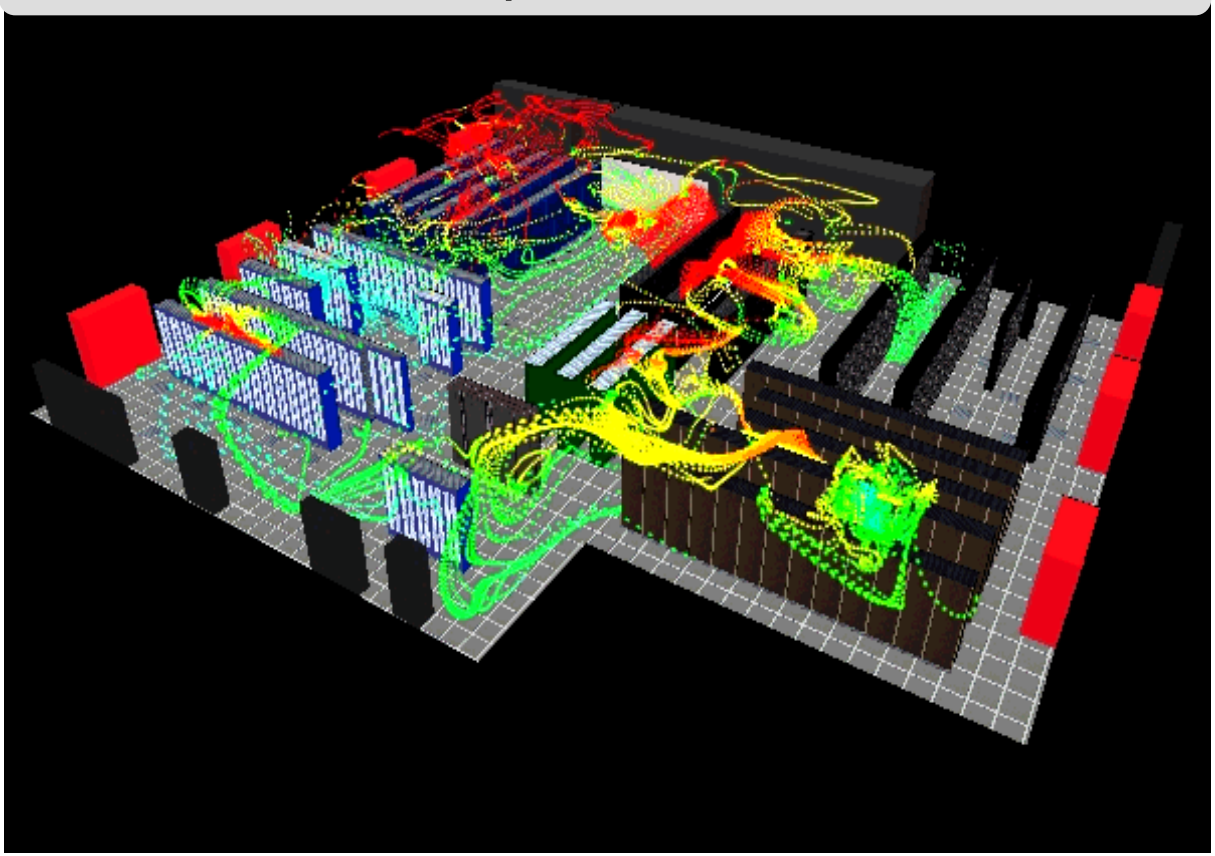
Green Impact of Data Center Change

- Datacenters are huge CO2 factories
  - 1 full rack of blade servers = 20-25 kW = peak demand of 30 homes
- Every server removed saves ~4 tons of CO2 emissions per year
  - Equivalent to taking ~1.5 cars off the road (15,000 miles @ 20 mpg)
- Un-utilized server capacity in the industry equates to:
  - $140 billion, 3 year supply, more than 20 million servers (IDC)
  - 80 million tons of CO2 per year, more than half of ALL countries in South America produce

Sources: IDC, Virtualization 2.0, John Humphreys; http://carma.org/dig/show/world+country

Where Does the Power Go?

Power Consumption in the Datacenter

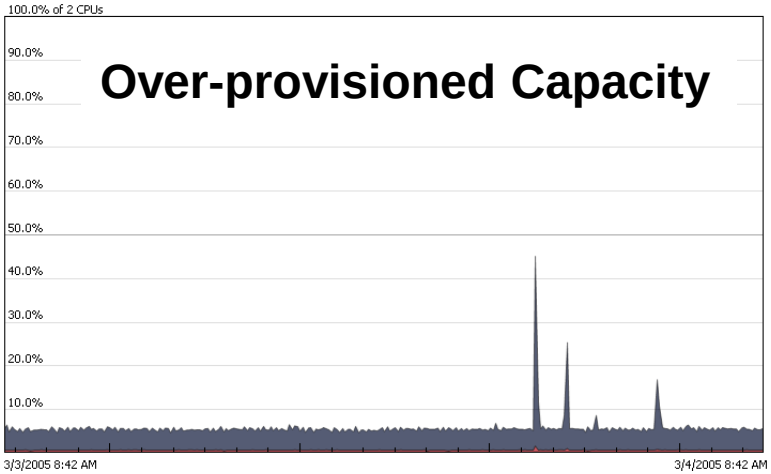


Server/Storage	**50%**
Computer Rm. AC	**34%**
Conversion	**7%**
Network	**7%**
Lighting	**2%**

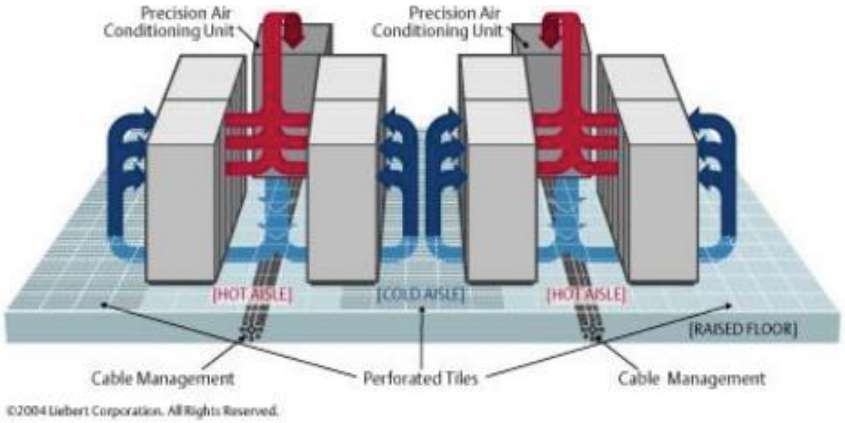
Compute resources and particularly **servers** are at the heart of a complex, evolving system!

Source: APC

Today's Model is Broken

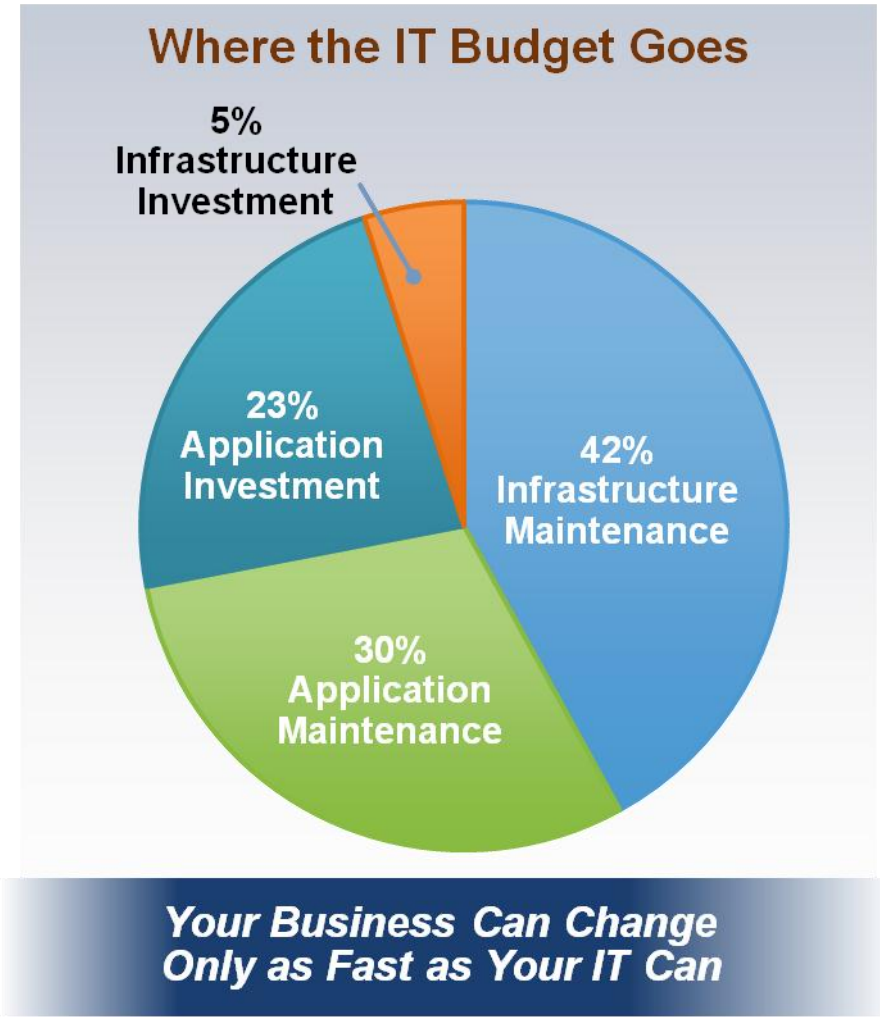


Inefficient Datacenter Design

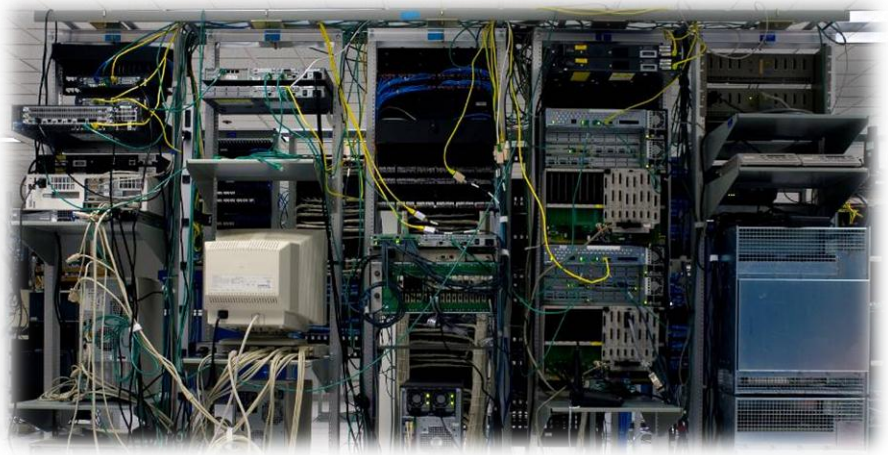


- Poor forecasting + low flexibility = excess capacity
- Typical datacenter: 3 years excess server capacity
- Servers consume >50% of average power when idle
- Datacenters are outdated and hugely inefficient
- Cooling servers often requires 2x the power consumed

The Problem



- Overwhelming complexity
- >70% of IT budgets just to keep the lights on
- <30% of IT budgets goes to innovation and competitive advantage

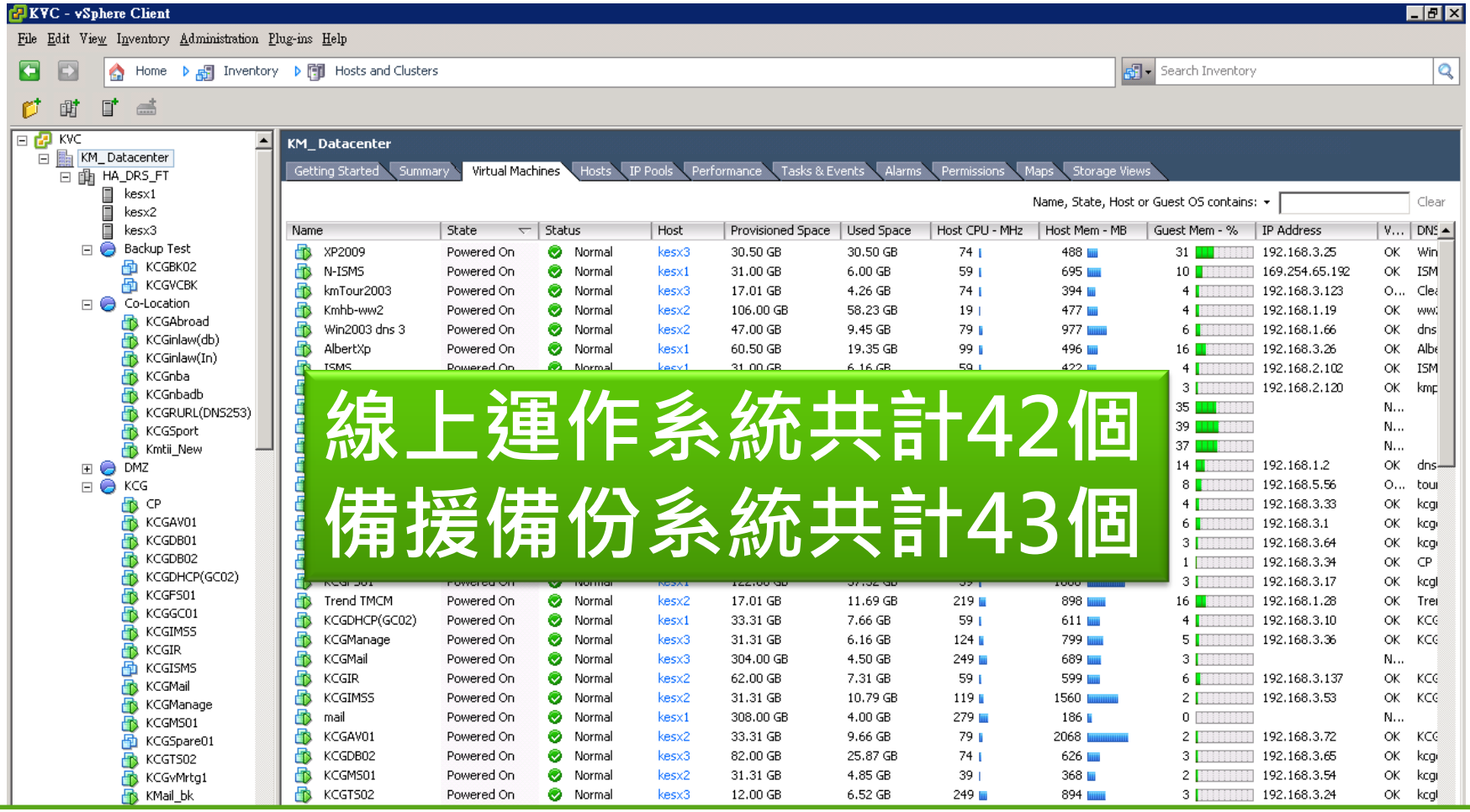


Virtualization & Cloud = Top Priorities for CIOs

Technology	2010 Priority	2009 Priority
Virtualization	1	3
Cloud Computing	2	14

Source: Gartner CIO study, Q4 2009

虛擬化帶來的效益-實際案例



系統穩定性-自民國98年11月2日(完成升級)~ 迄今，除98年12月18日配合電力施工廠商”計劃性停機”外，系統運作穩定且沒有任何意外停機狀況。

虛擬化平台高可用性

整體系統高可用性=99.73%

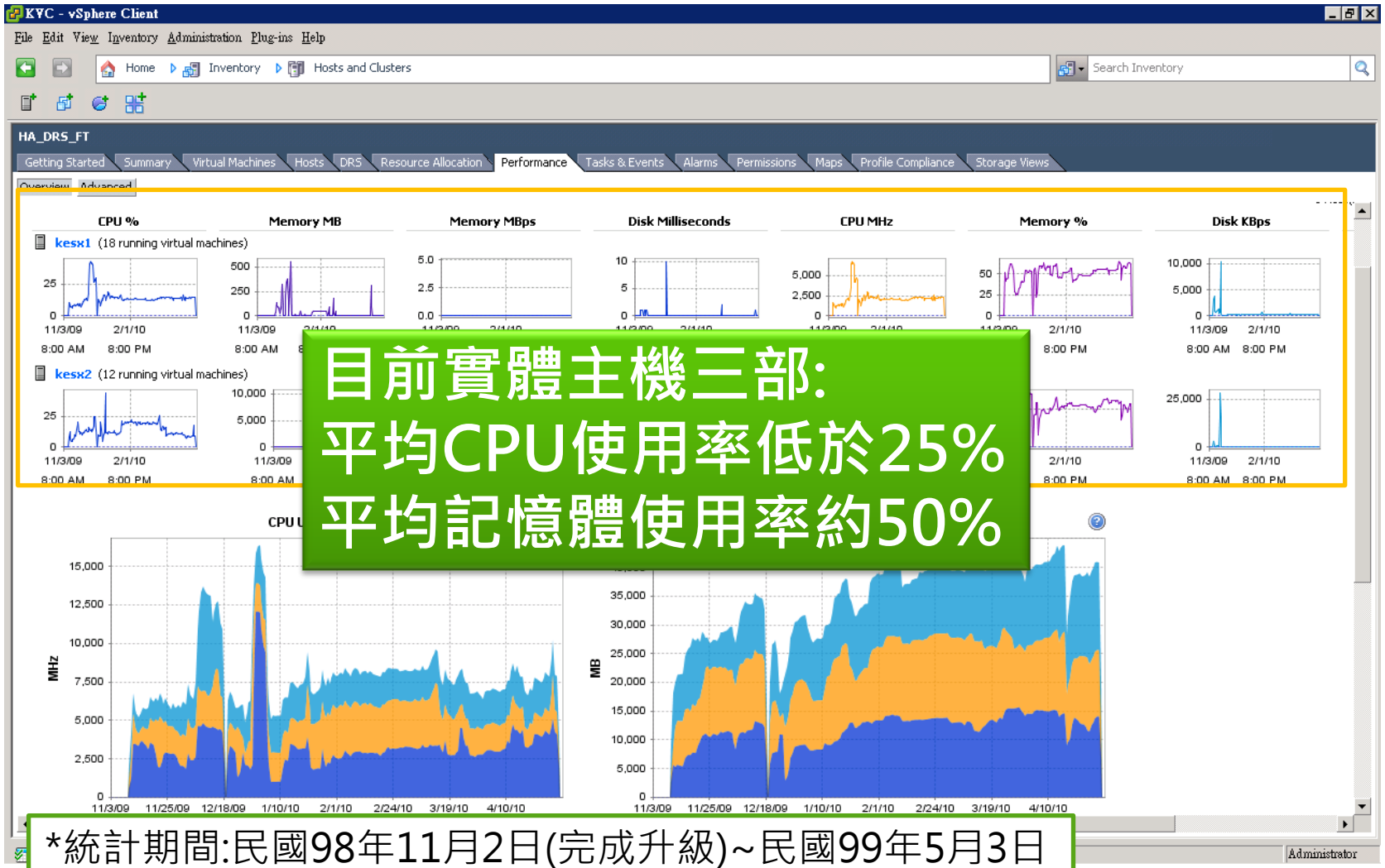
$$\text{Availability (\%)} = \frac{\text{Agreed Service Time (AST) - downtime}}{\text{Agreed Service Time (AST)}} * 100\%$$

$$\text{Availability (\%)} = \frac{\text{4368hr(整體服務時間)- 12hr(停機時間)}}{\text{4368hr(整體服務時間)}} * 100\%$$

Availability (%) =99.73%

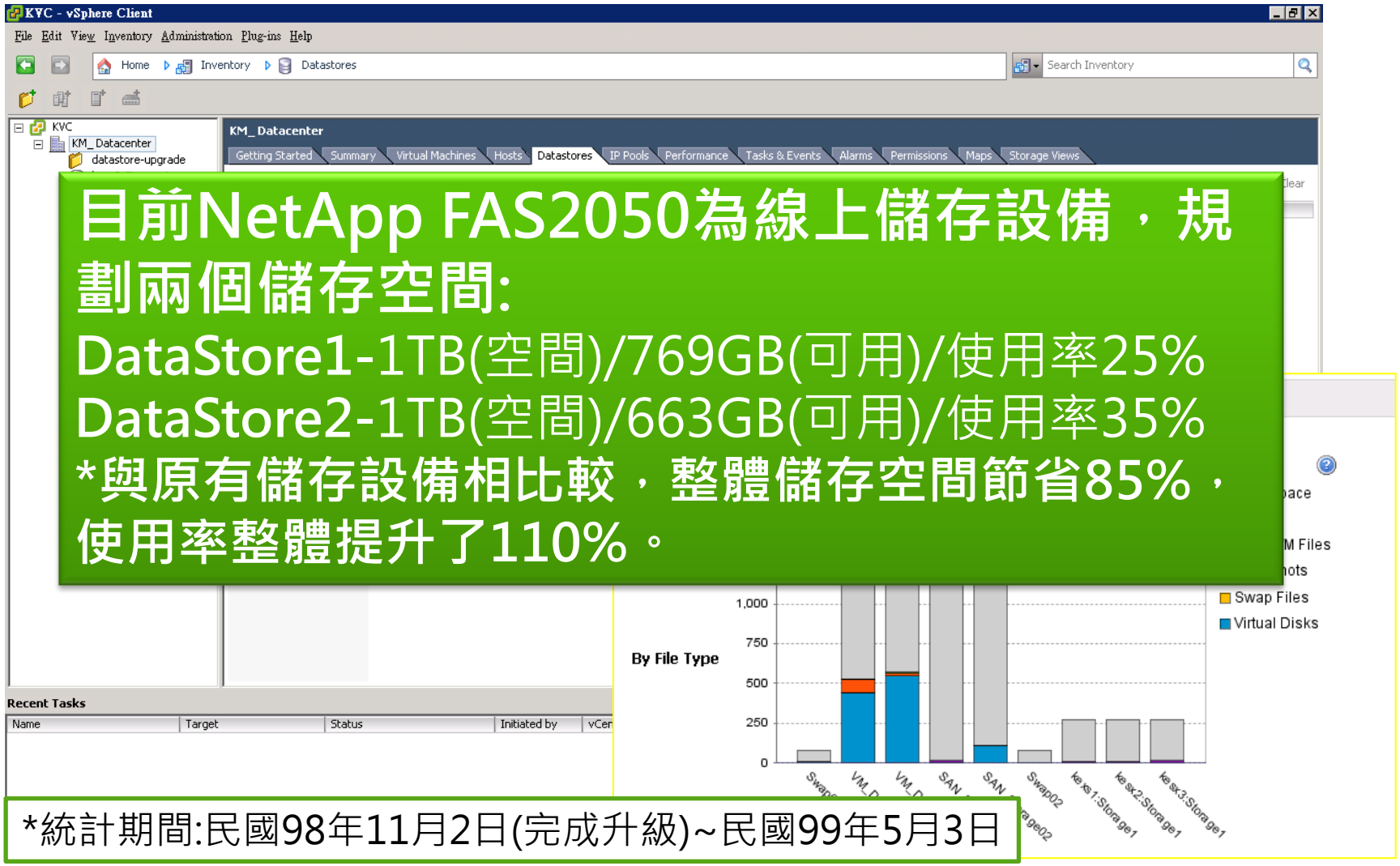
*統計期間:民國98年11月2日(完成升級)~民國99年5月3日(共計182天)。
*98年12月18日配合電力施工廠商”計劃性停機”時間12小時。

主機資源使用狀況



*統計期間:民國98年11月2日(完成升級)~民國99年5月3日

儲存資源使用狀況



目前NetApp FAS2050為線上儲存設備，規劃兩個儲存空間:

DataStore1-1TB(空間)/769GB(可用)/使用率25%

DataStore2-1TB(空間)/663GB(可用)/使用率35%

*與原有儲存設備相比較，整體儲存空間節省85%，使用率整體提升了110%。

*統計期間:民國98年11月2日(完成升級)~民國99年5月3日

主機設備投資效益

- 若單以伺服器主機汰換為議題，並以目前線上系統42個來計算:
  - **傳統42部主機汰換成本**

    NT$139,659*42=NT$5,865,678(不含作業系統)

    共計成本NT$5,865,678

  *參照中信局電腦及伺服器-第四組第38項次

  - **虛擬化平台3部主機成本**

    NT$250,000*3=NT$750,000(RAM擴充、NIC擴充)

    *額外成本虛擬化授權

    NT$194,880*6=NT$1,169,280

    NT$90,538*1=NT$90,538

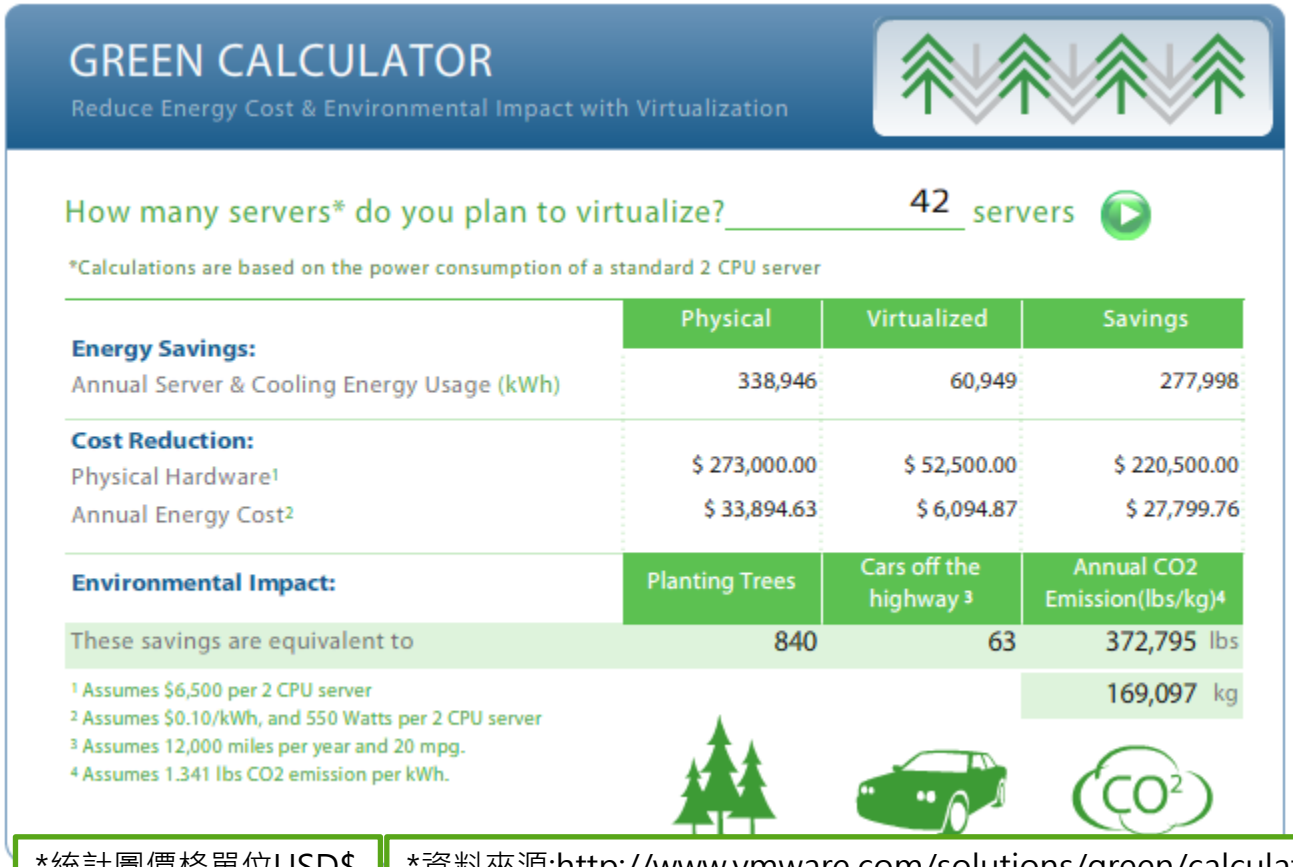
    共計成本NT$2,009,818

    節省投資NT$3,855,860
    節省預算67%

  *參照中信局電腦軟體第八組系統應用軟體(政府版)-第9、11項次

主機虛擬化節能減碳效益

- 目前線上系統共有42個導入虛擬化平台，每年將節省能源費用約NT$98萬元，每年也將減少約17噸排碳量!



GREEN CALCULATOR

Reduce Energy Cost & Environmental Impact with Virtualization

How many servers* do you plan to virtualize? 42 servers

*Calculations are based on the power consumption of a standard 2 CPU server

	Physical	Virtualized	Savings
Energy Savings:			
Annual Server & Cooling Energy Usage (kWh)	338,946	60,949	277,998
Cost Reduction:			
Physical Hardware[1]	$ 273,000.00	$ 52,500.00	$ 220,500.00
Annual Energy Cost[2]	$ 33,894.63	$ 6,094.87	$ 27,799.76
Environmental Impact:	Planting Trees	Cars off the highway [3]	Annual CO2 Emission(lbs/kg)[4]
These savings are equivalent to	840	63	372,795 lbs
			169,097 kg

[1] Assumes $6,500 per 2 CPU server
[2] Assumes $0.10/kWh, and 550 Watts per 2 CPU server
[3] Assumes 12,000 miles per year and 20 mpg.
[4] Assumes 1.341 lbs CO2 emission per kWh.

未使用虛擬化:
每年電費NT$119萬
每年排碳量21噸

導入虛擬化:
每年電費NT$21萬
每年排碳量3.7噸

電費節省82%
減少排碳量
82%

*統計圖價格單位USD$

*資料來源:http://www.vmware.com/solutions/green/calculator.html

儲存虛擬化節能減碳效益

NetApp Synergy Green Visualizer

儲存虛擬化可大幅提升設備使用率，改善資料中心儲存空間浪費、節省電力空調成本，並符合節能減碳要求!

Cabinet Specifications:	
Cabinet Vendor:	NetApp
Cabinet Type:	20A, 1-Phase, 2 PDU/side
Amps:	35.20
Volts:	220
Rack Units:	42
Outlets:	32
Weight:	351.20 lbs
Max. Weight:	1500.00 lbs

Cost Specifications:	
Power Cost	
Per kW-hour:	$0.05 (USD)
1 day	$0.78
7 days	$5.49
14 days	$10.99
30 days	$23.55
60 days	$47.10
Results Type:	Typical Case

每年平均排碳量僅約160公斤

每年平均電費僅約NT$9891元

Component	Qty	Amps	Inrush	Watts	VA	RUs	Outlets	BTU/hr	Weight
FAS2050 300G SAS 2 Controller	1	3.41	40.00	655.00	689.47	4	2	2,232.00	110.01 lbs
TOTALS:	1	3.41 / 35.20	40.00	655.00	689.47	4 / 42	2 / 32	2232	461.21 lbs / 1500.00 lbs

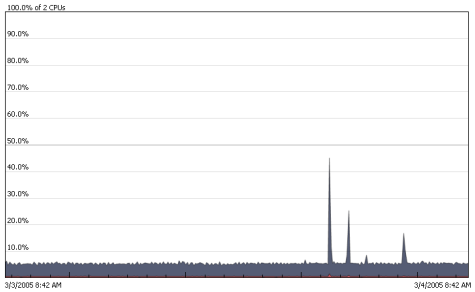
*統計圖價格單位USD$

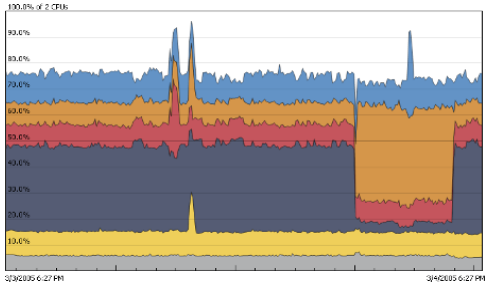
*資料來源:NetApp Synergy "Green Visualizer"

Consolidating Server, Storage, Network & Facilities

VMware consolidates servers, storage and networking infrastructure to safely achieve higher utilization

	BEFORE VMware	AFTER VMware
Servers	▪ 1,000	> 80
Storage	▪ Direct attach	> Tiered SAN and NAS
Network	▪ 3000 cables/ports	> 300 cables/ports
Facilities	▪ 200 racks ▪ 400 power whips ▪ Planning expansion	> 10 racks > 20 power whip > Defer/avoid $1k per sq. ft.





Source: Actual customer data

Compare Intel® Products - Windows Internet Explorer

http://ark.intel.com/Compare.aspx?ids=36947,36941,36937,

Products Technology Communities Downloads Reseller

Compare Queue (3) Send Feedback

Search

Home ▸ Compare Intel® Products

Compare Intel® Products

Clear Queue

	Remove Product	Remove Product	Remove Product
Name	Intel® Xeon® Processor X7460 (16M Cache, 2.66 GHz, 1066 MHz FSB)	Intel® Xeon® Processor E7450 (12M Cache, 2.40 GHz, 1066 MHz FSB)	Intel® Xeon® Processor L7455 (12M Cache, 2.13 GHz, 1066 MHz FSB)
Status	Launched	Launched	Launched
Launch Date	Q3'08	Q3'08	Q3'08
Processor Number	X7460	E7450	L7455
# of Cores	6	6	6
Clock Speed	2.66 GHz	2.4 GHz	2.13 GHz
Cache	16 MB L2 Cache	12 MB L2 Cache	12 MB L2 Cache
Bus Type	FSB	FSB	FSB
System Bus	1066 MHz	1066 MHz	1066 MHz
FSB Parity	✓	✓	✓
Instruction Set	64-bit	64-bit	64-bit
Embedded	✗	✗	✗
Supplemental SKU	✗	✗	✗
Lithography	45 nm	45 nm	45 nm
Max TDP	130 W	90 W	65 W
1ku Bulk Budgetary Price	$2729.00	$2301.00	$2729.00
Package Specifications			
Package Size	53.3mm x 53.3mm	53.3mm x 53.3mm	53.3mm x 53.3mm

The Intel Xeon processor 7400 series has already set new four-socket and eight-socket world records on key industry benchmarks for virtualization, database, enterprise resource planning and e-commerce. IBM, following the record-setting 1.2 million tpmC result on its eight-socket System x 3950 M2 platform, delivers an all-time high result for four-socket servers on System x 3850 M2 server with a score of 684,508 tpmC on the TPC-C benchmark, which measures database performance in an online transaction processing environment.

Based on Intel's 45nm high-k process technology and reinvented transistors that use a Hafnium-based, high-k metal gate formula, the new Xeon 7400 series delivers significant performance improvements with lower power consumption. This delivers almost 50 percent better performance in some cases, and up to 10 percent reduction in platform power, and has resulted in a world record VMmark (a virtualization benchmark) score for four-socket, 24 processing core servers at 18.49 on a Dell PowerEdge R900 platform using VMware ESX server v3.5.0.

These products offer frequencies up to 2.66 GHz and power levels down to 50 watts, including the first 6-core, x86 compatible 65-watt version which translates to just under 11 watts per processor core, with platforms available in rack, tower and highly dense blade form factors.

Below you can see the complete series of the Intel 7400 processors.

Model	*Number of cores*	*Frequency*	*FSB*	*L3 cache*	*TDP*
X7460	6	2,66 GHz	1,066 MHz	16MB	130W
E7450		2.40 GHz		12MB	90W
L7455		2.13 GHz			65W
E7440	4	2.40 GHz		16MB	90W
E7430		2.13 GHz		12MB	
E7420				8MB	
E7445				12MB	50W

網際網路 | 受保護模式: 啟動 100%

IBM System p 570

Benchmark Stats

Result ID:	107052001
Result Status:	Accepted
TPC-C Rev:	5.8
Report Date:	05/21/07

System Information

Total System Cost	5,713,181 USD
TPC-C Throughput	1,616,162
Price/Performance	3.54 USD
Availability Date	11/21/07
Database Manager	IBM DB2 Enterprise 9
Operating System	IBM AIX 5L V5.3
Transaction Monitor	Microsoft COM+

Server Information

CPU Type:	IBM POWER6 - 4.7 GHz
Total # of Processors:	8
Total # of Cores:	16
Total # of Threads:	32
Cluster:	N

Client Information

# of Clients:	64
CPU Type:	Intel Xeon - 3.2 GHz
Total # of Processors:	2
Total # of Cores:	2
Total # of Threads:	4

IBM System x3950 M2

Benchmark Stats

Result ID:	108081902
Result Status:	Accepted
TPC-C Rev:	5.10
Report Date:	08/19/08

System Information

Total System Cost	2,386,768 USD
TPC-C Throughput	1,200,632
Price/Performance	1.99 USD
Availability Date	12/10/08
Database Manager	IBM DB2 ESE 9.5
Operating System	Red Hat Enterprise LInux Adv. Platform 5 Update 2
Transaction Monitor	Microsoft COM+

Server Information

CPU Type:	Intel Xeon X7460 - 2.66 GHz
Total # of Processors:	8
Total # of Cores:	48
Total # of Threads:	48
Cluster:	N

Client Information

# of Clients:	32
CPU Type:	Intel Xeon Dual-Core X5130 - 2.0 GHz
Total # of Processors:	32
Total # of Cores:	112
Total # of Threads:	112

何謂虛擬化(Virtualization)?

- 將電腦資源以邏輯群組方式呈現，使用者可以用比原本的組態更好的方式來存取這些虛擬化資源資源(包括CPU、Memory、Storage及Network)，這些資源是不受現有資源的架設方式、地域或物理組態所限制。

- **虛擬化常見技術**

實體	虛擬化
作業系統	虛擬機器-VM(Virtual Machine)
應用程式	虛擬應用程式(VMware ThinApp)
儲存設備	儲存虛擬化(Thin Provisioning)
網路設備	網路虛擬化(vSwitch、Cisco Nexus 1000v)
個人電腦	桌面虛擬化-VDI(Virtual Desktop Infrastructure)

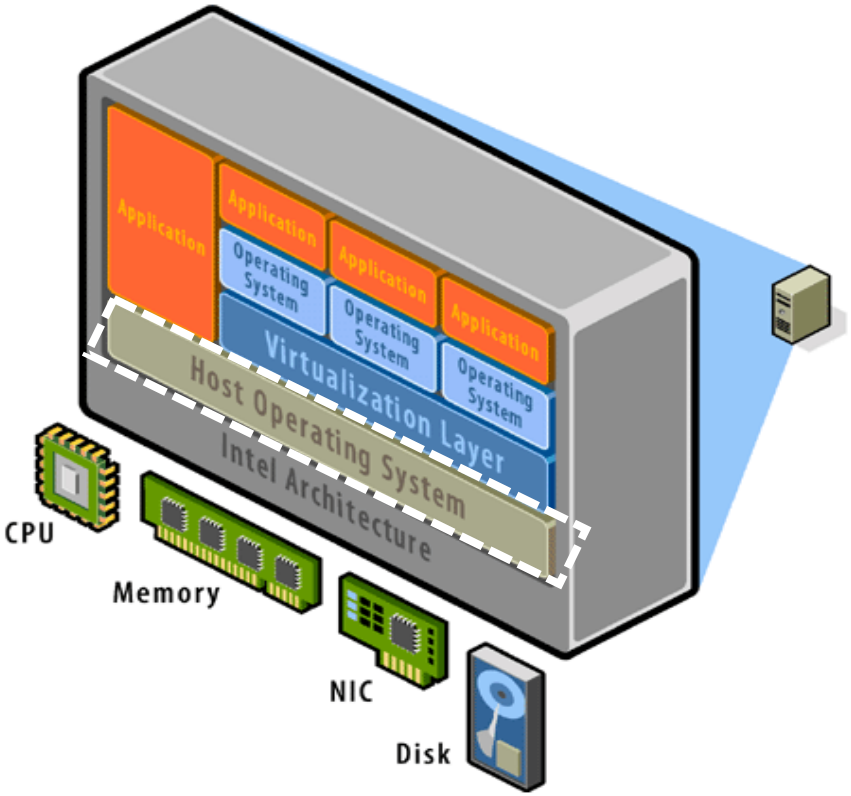
虛擬化市場現況

根據iThome 2010年CIO大調查，有6成4的企業用戶主要採用VMware虛擬化平臺，位居亞軍的是微軟Hyper-V虛擬化平臺，有18.6%的企業用戶使用微軟平臺。

虛擬平台

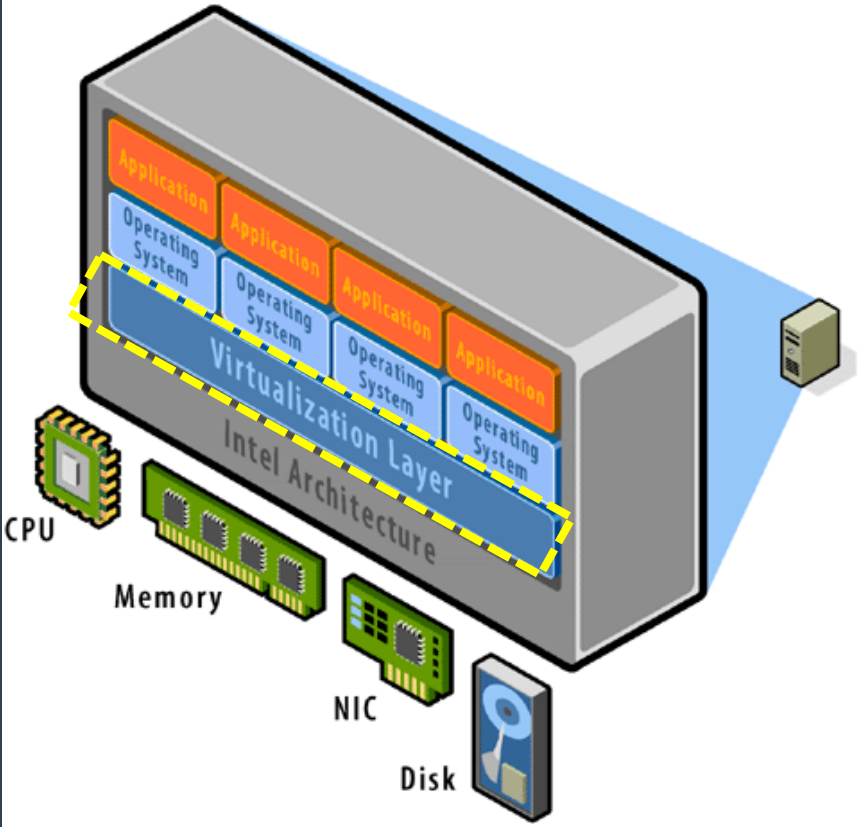
寄居架構 (Hosted Architecture)

- ■彈性佳
- ■效能40-60%



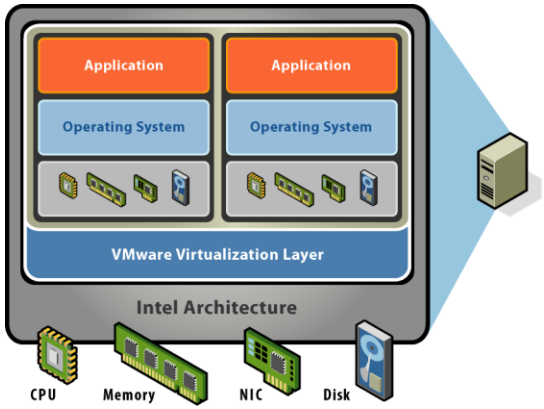
高級架構 (“Bare Metal” Architecture)

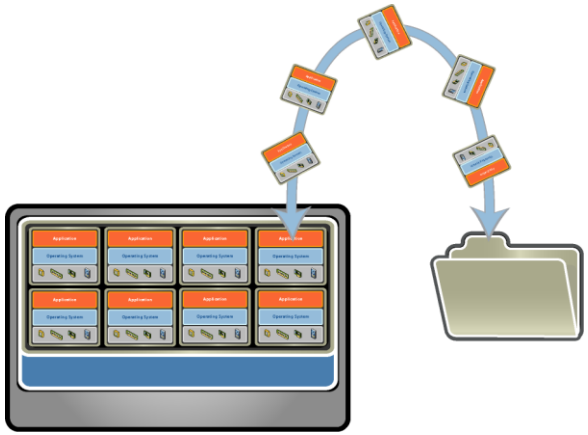
- ■企業級應用功能
- ■高效能
- ■80-90%



cisco NetApp vmware

虛擬化科技：三大特性





相容性

- 虛擬機器可以任意的在不同硬體平台上運作。
- 虛擬機器使用一致的虛擬硬體規格。
- 沒有硬體轉換時的困擾

分隔性

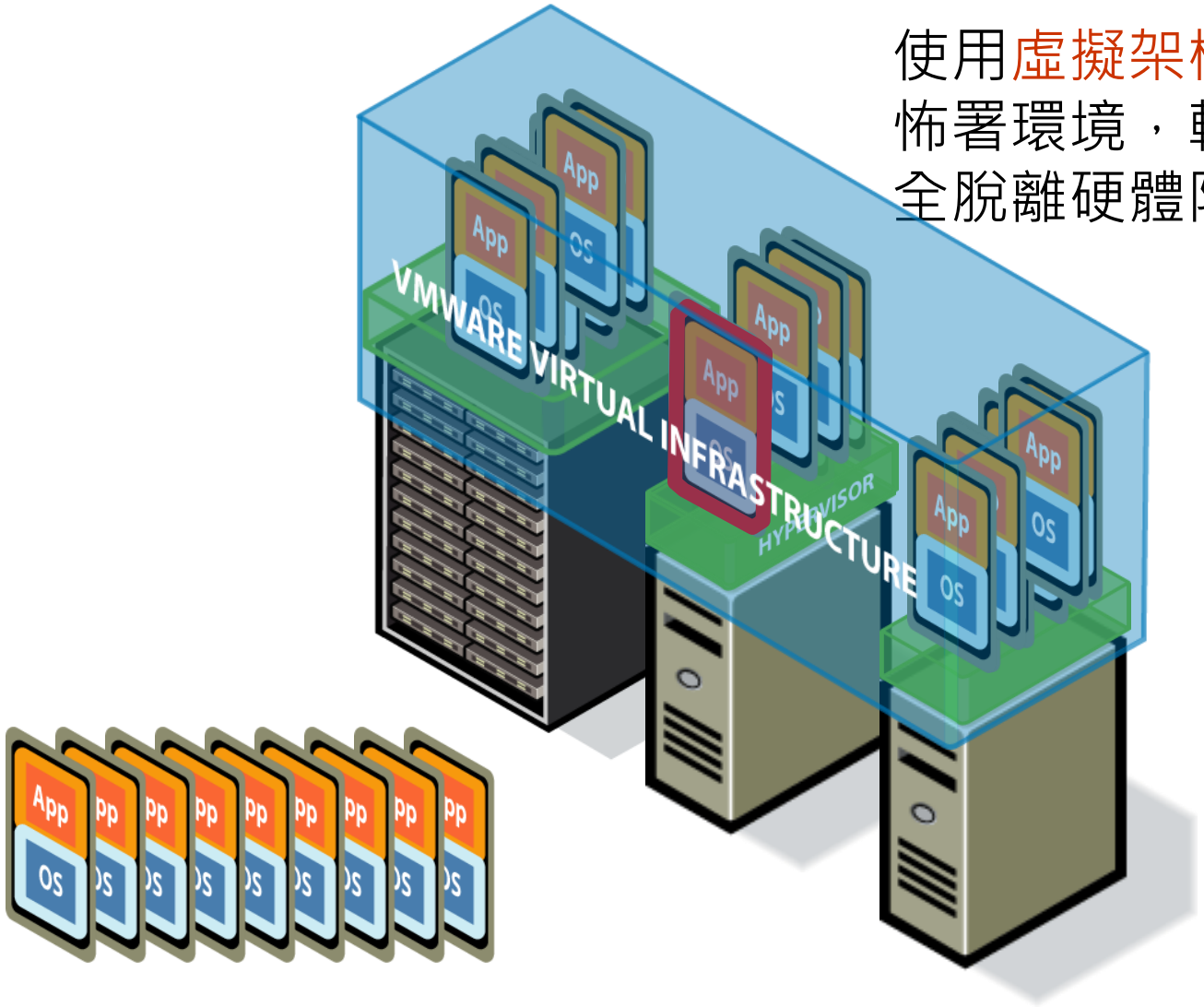
- 每個虛擬機器的運作是獨立進行, 不受其它虛擬機器影響。
- 能夠動態調配虛擬機器的中央處理器 (CPU), 記憶體 (Memory), 貯存硬碟 (Disk), 及 網絡(Network) 等等資源。
- 確保服務質素承諾 (SLA)。

封裝性

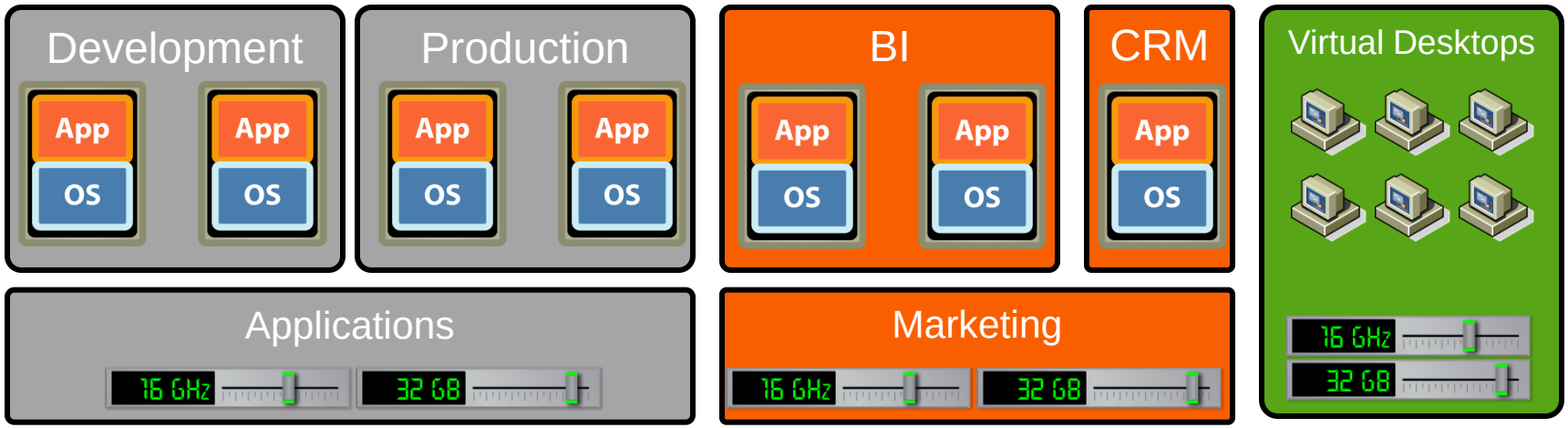
- 每一虛擬機器的主機跟運作狀態都是以一個檔案代表, 提高可攜性。
- 能將虛擬機器的運作狀態貯存,透過→快照,或冷熱備份機制。

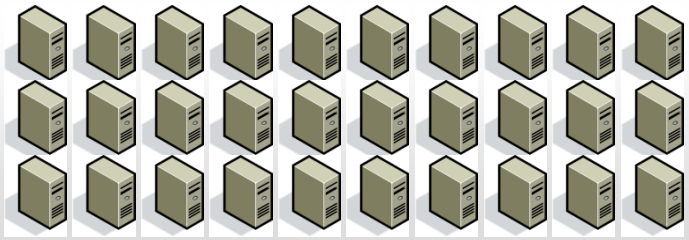
豈只是一台小小的虛擬伺服器？

使用虛擬架構轉移或是
佈署環境，輕而易舉完
全脫離硬體限制與包袱!



Efficient Resource Pooling on a Shared Infrastructure



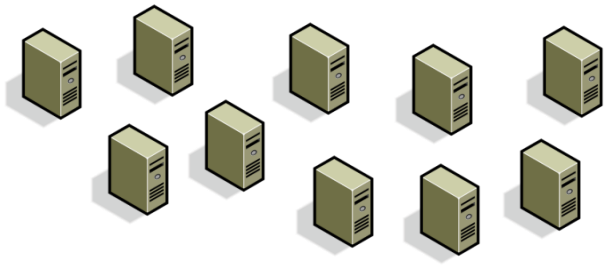


SHARED HARDWARE INFRASTRUCTURE

Aggregate capacity:
30 x (3GHz, 16GB) = 90GHz, 480GB

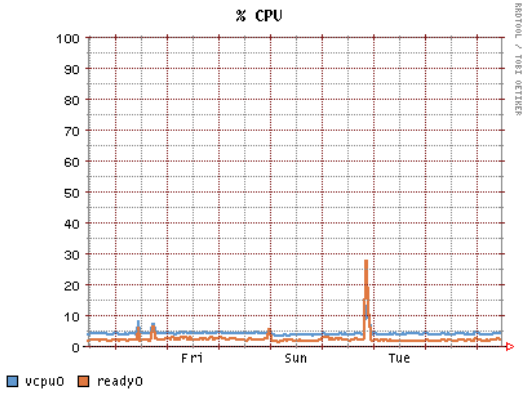
Challenge: Server Proliferation

Server Sprawl



- Consolidate servers
- Increase utilization
- Reduce hardware, power, cooling

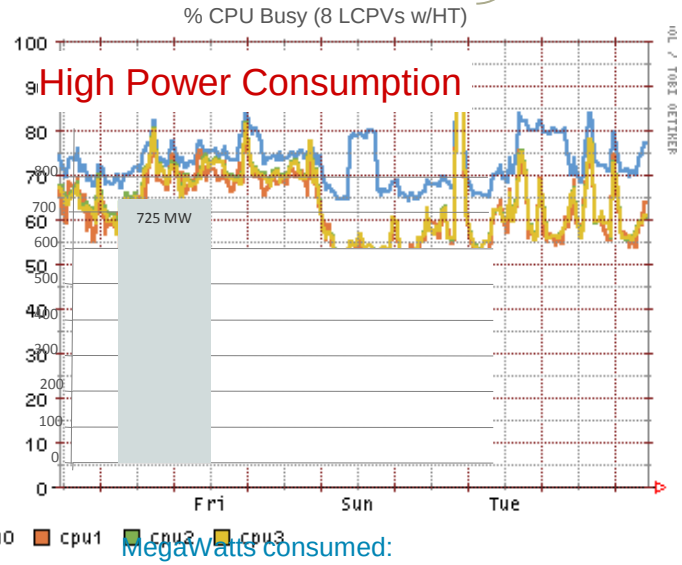
Low Utilization



Avg. utilization rate/server

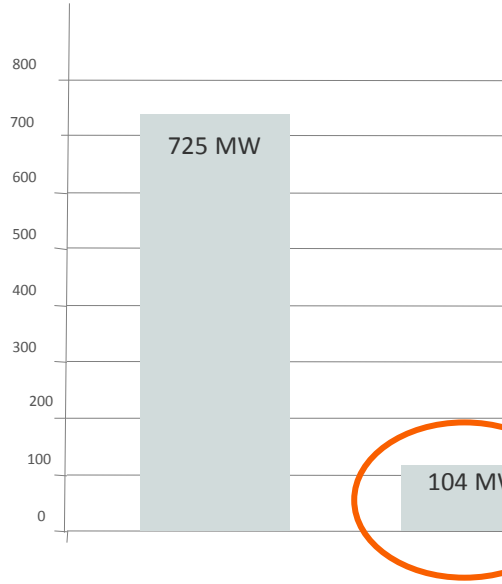
% CPU Busy (8 LCPVs w/HT)

High Power Consumption



MegaWatts consumed:
100 servers (peak)

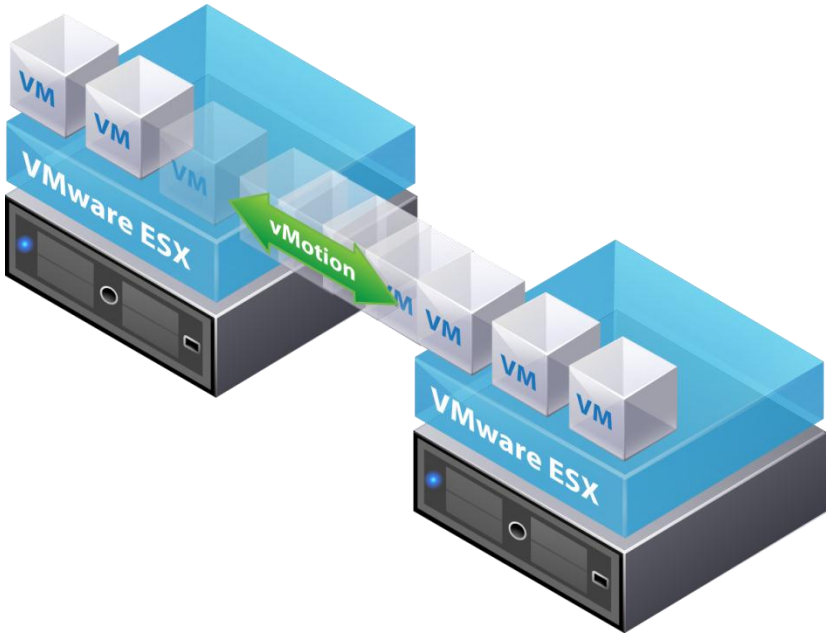
Higher Utilization



Lower Consumpt

Key Features

- VMotion
  - Live migration of VMs from one host to another with zero downtime
  - Used by other vSphere Features
    - Fault Tolerance
    - Storage VMotion
    - DRS and DPM



DRS 能確保依需求調整資源

- 依據需求和優先順序縮減和擴充應用程式
- 動態回應式的負載平衡

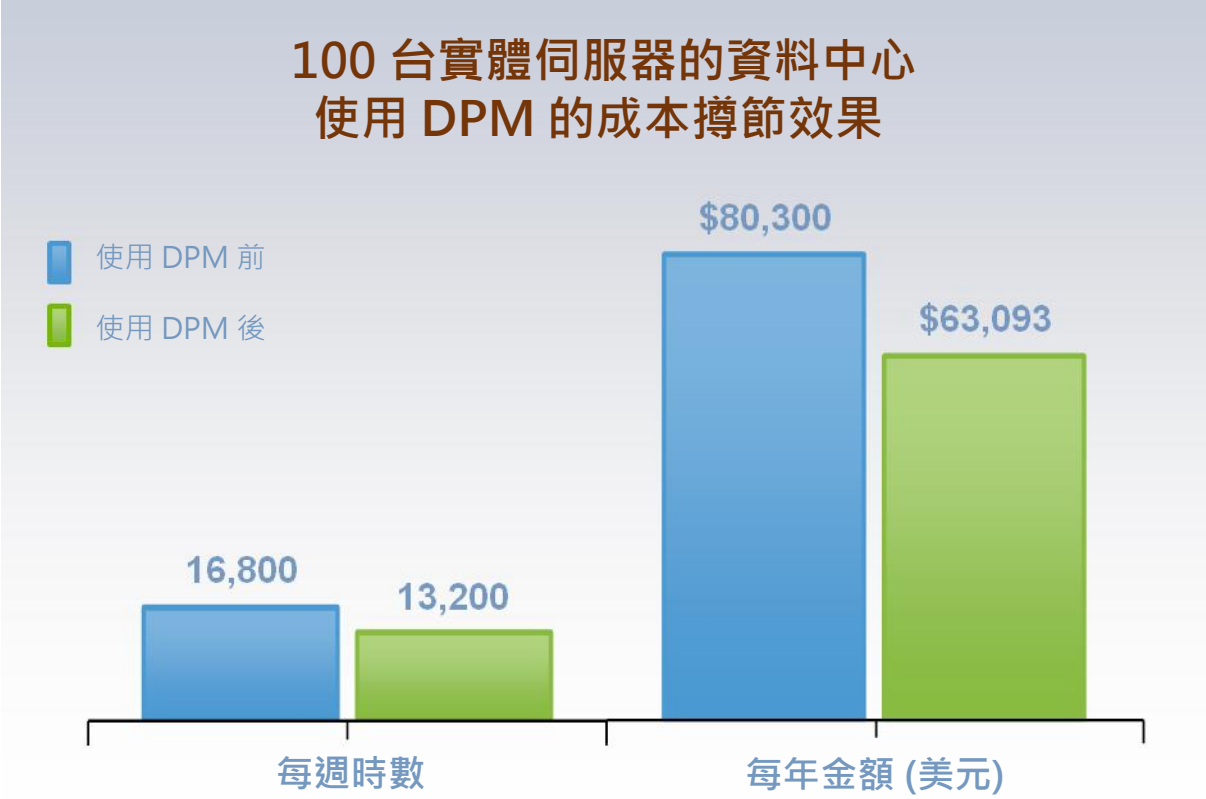
DPM 資源最佳化

當負載增加時
DPM 重新上線
DPM 讓伺服器
重新上線

當負載增加時
DPM 重新上線
DPM 讓伺服器
重新上線

- 當叢集需要較少資源時，DPM 將工作負載整合到少數幾台伺服器上執行
  - 將用不到的伺服器設為待機模式
  - 當工作負載增加時，讓伺服器重新上線
- ESX 現在支援 Intel Speed Step/AMD Power，力求個別主機資源最佳化
- 在保障服務層級的同時，將電源耗用降到最低
- 虛擬機保證不中斷或停機

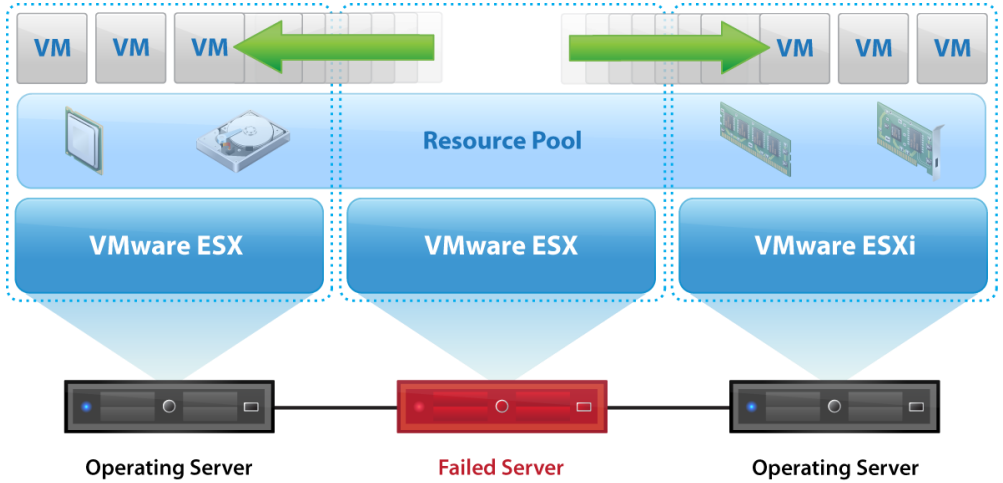
DPM 能夠多削減 20% 的電力成本...



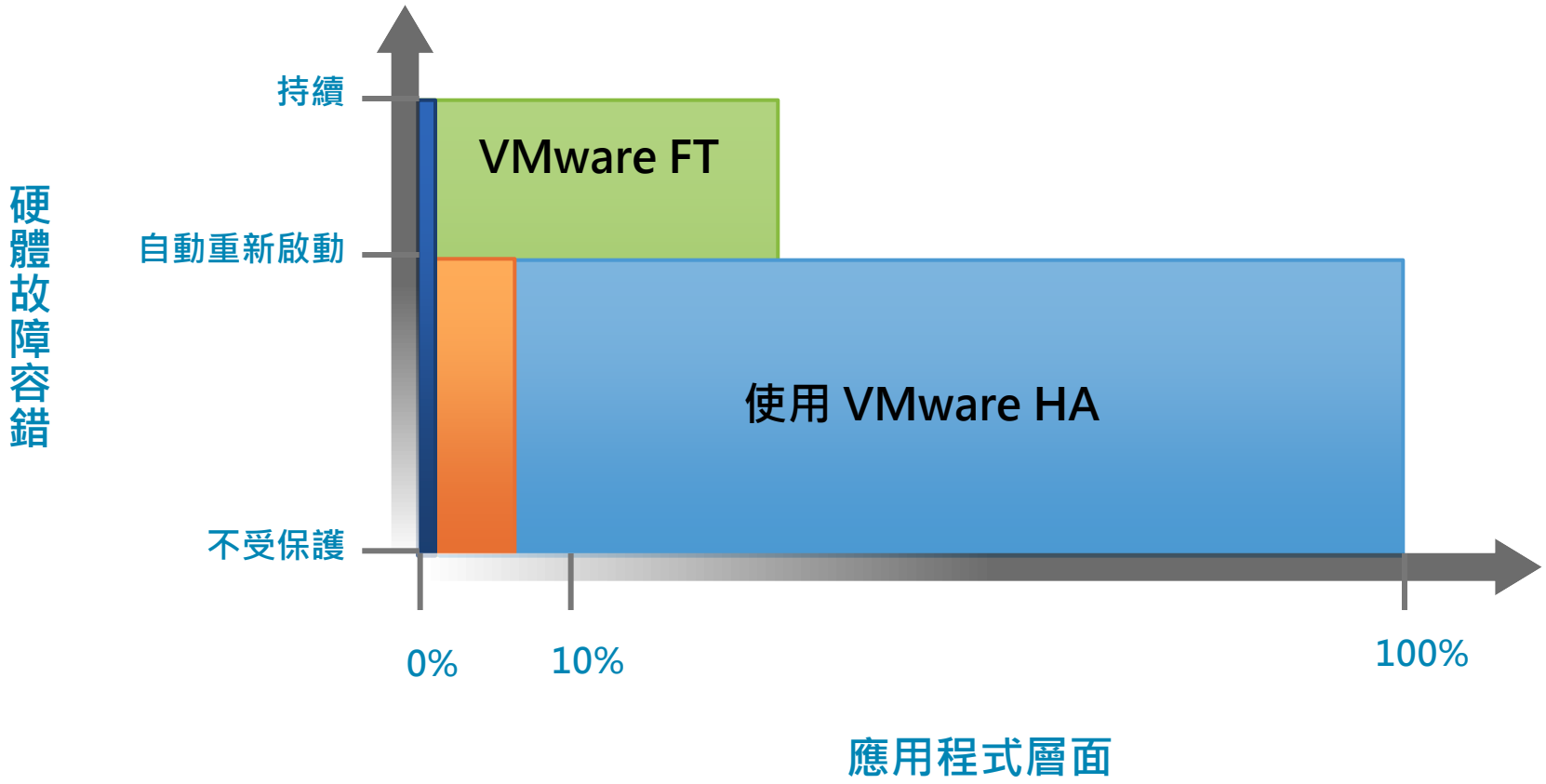
假設：100 台伺服器中有 50 台能在工作日每天關機 8 小時、週末每天關機 16 小時。
每台伺服器的總耗電量 (運作電源 + 冷卻電源) = 每小時 1130.625 瓦
能源成本 = 每千瓦 0.0813 美元 (資料來源：美國能源部能源情報局)

Key Features

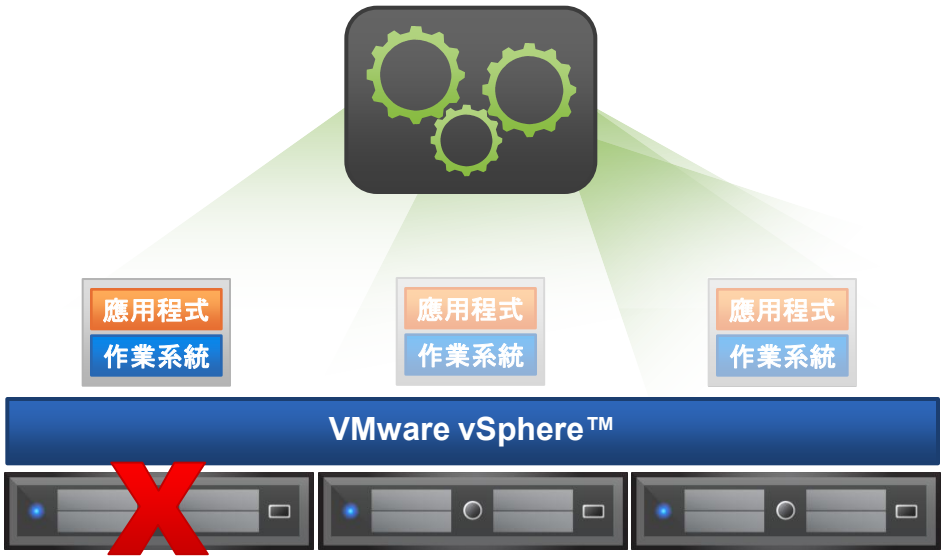
- High Availability (HA)
  - Protects VMs and automatically restarts VMs in the event of
    - Host failure
    - VM failure (loss of heartbeat)



轉換可用性服務層級

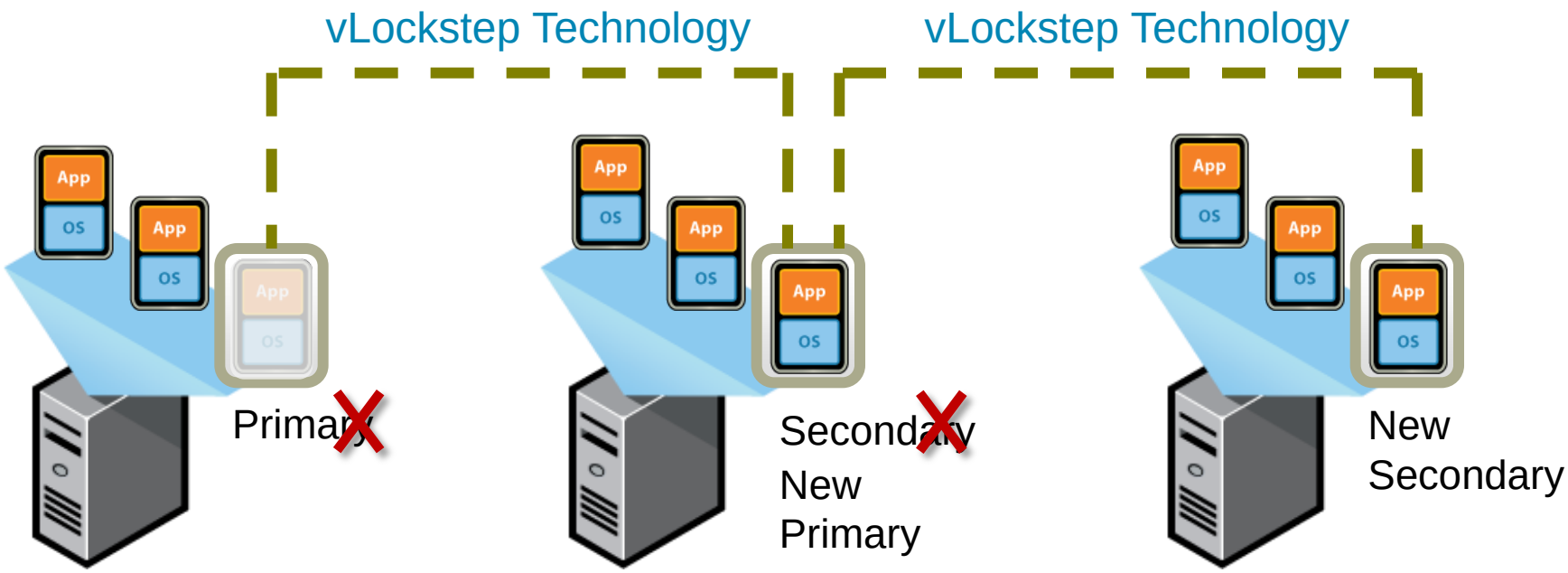


VMware Fault Tolerance



- 同一 VM 在不同主機以步鎖 (Lockstep) 方式執行
- 硬體故障時，所有的虛擬機都不需停機、不需資料遺失容錯移轉
- 不需停機、不遺失任何資料
- 不需複雜叢集或特殊硬體
- 單一通用機制適用於所有的
  應用程式和作業系統

VMware Fault Tolerance (FT)



VMware FT provides zero-downtime, zero-data-loss protection to virtual machines in an HA cluster.

VMware vSphere™：最全面的作業系統支援

VMware vSphere™

- Windows NT 4.0
- Windows 2000
- Windows Server 2003
- Windows Server 2008
- Windows Vista
- Windows XP
- RHEL5
- RHEL4
- RHEL3
- RHEL2.1
- SLES10
- SLES9
- SLES8
- Ubuntu 7.04
- Solaris 10 for x86
- NetWare 6.5
- NetWare 6.0
- NetWare 6.1
- Debian
- CentOS
- FreeBSD
- Asianux
- SCO OpenServer
- SCO Unixware
- ..

MS Hyper-V

- Win Server 2008 (最高可達 4P vSMP)
- Win Server 2003 SP2 (最高可達 2P vSMP)
- Win Server 2000 SP4 (僅 1P)
- SLES10 (僅 1P)
- Windows Vista SP1
- Windows XP Pro SP2/SP3

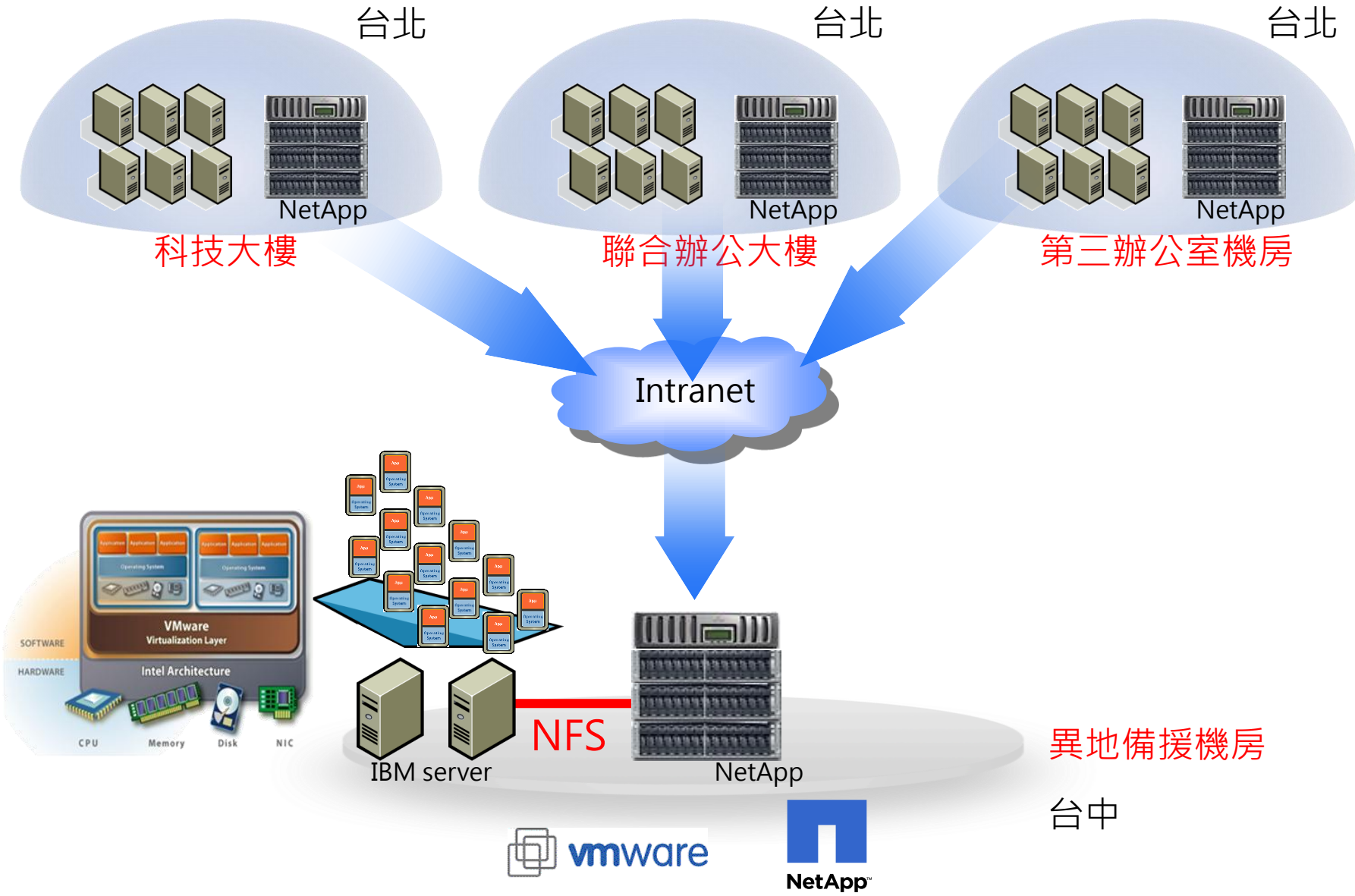
- 虛擬化與雲端運算
- 虛擬化技術介紹
- **專案實績分享**

教育部主機異地備援專案

- 專案遭遇之挑戰
  - 核心系統需建立異地備援機制
    - 核心系統部份超過40台的不同品牌的x86主機
    - 嚴苛的RPO與PTO要求標準
  - 非核心系統需建置異地備份/還原機制
    - 非核系統部份超過200台主機
    - 多種作業系統
  - 系統分部於科技大樓、聯合辦公大樓、教育部第三辦公室機房
  - 有限的預算
  - 不可能的任務：無法成案，一延再延，沒有廠商敢投標!!!

教育部專案目標

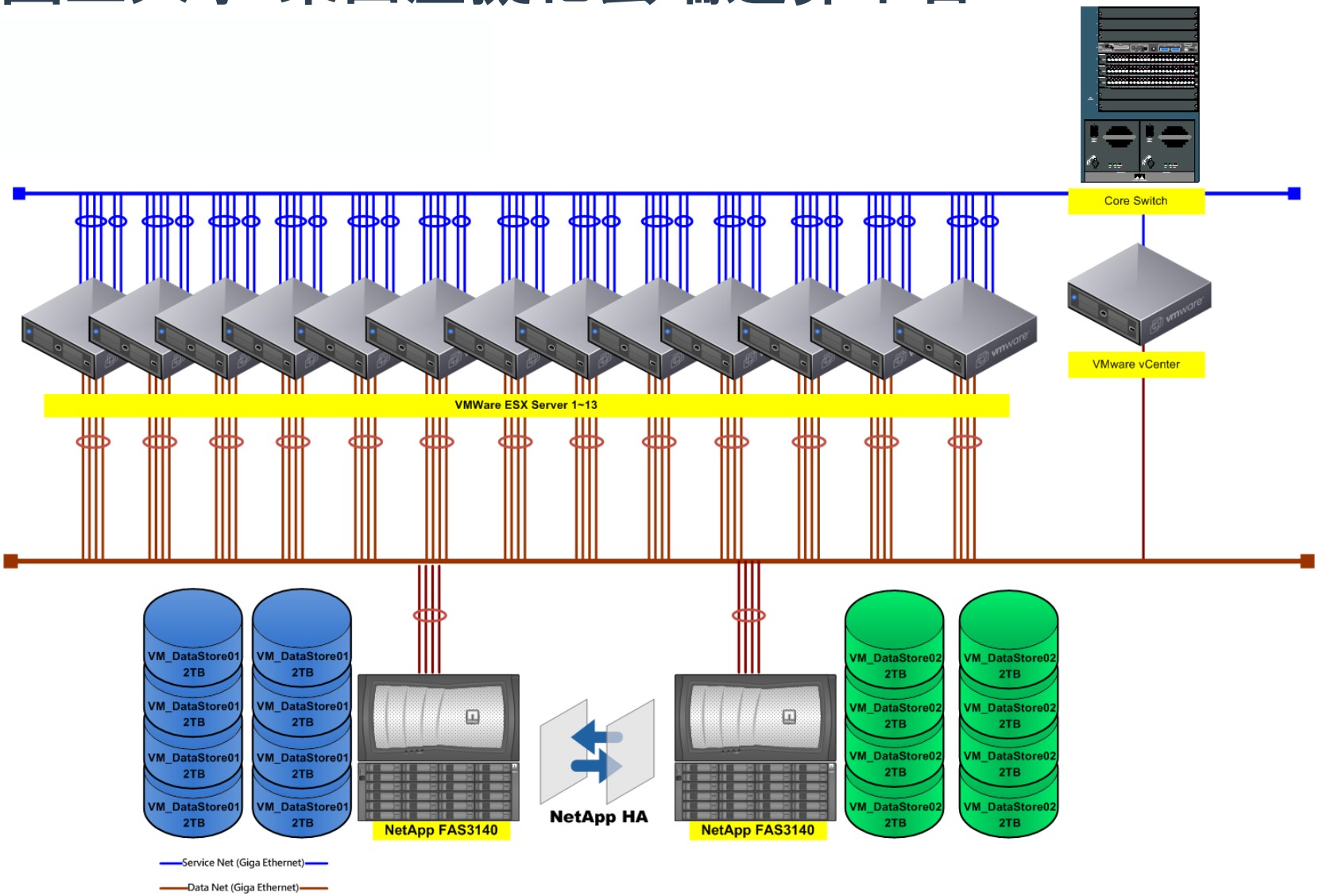
系統名稱	RPO要求標準	RTO要求標準	主機數量
教育部首頁	10分鐘	20分鐘	>40台
公費留學考試線上報名系統	10分鐘	20分鐘	
留學獎學金甄試線上報名系統	10分鐘	20分鐘	
成語典	1小時	2小時	
國語辭典	1小時	2小時	
重編國語辭典修訂本	1小時	2小時	
教育部電子報	1小時	2小時	
教育部英文網站	1小時	2小時	
部長民意信箱	1小時	2小時	
地方教育發展基金會計系統	1小時	2小時	
非核心系統	-	-	>200台


台北
台北
台北
NetApp
NetApp
NetApp
科技大樓
聯合辦公大樓
第三辦公室機房
Intranet
SOFTWARE
HARDWARE
VMware
Virtualization Layer
Intel Architecture
CPU
Memory
Disk
NIC
IBM server
NFS
NetApp
異地備援機房
台中
vmware
NetApp

虛擬化導入的效益

- 成本效益
  - 核心系統部份將異地備援端原本需要超過40台 x86 server 透過VMware整合到2台IBM Server上(40多台降至2台)
  - 節省數十套WINDOWS 2003 ENTERPRICE LICEN
  - 節省IDC機房租用空間(3個rack降至1個rack)
  - 節省網路設備(只需2台switch)
  - 節省主機維護與管理成本
- 系統可用性
  - 滿足專案要求嚴苛的RPO與RTO標準
  - 災難備援機制更穩定、更可靠

某國立大學-桌面虛擬化雲端運算平台



Desktop as a managed Service-DaaS

資源池-運算資源彙集皆以資源池概念集中管理，使用多重用戶模型，按照使用者需要將不同的物理和虛擬資源動態地分配或再分配給多個用戶使用。使用者不須知道資源所在地或來源。資源池範圍包括存儲、處理、記憶體、網路頻寬以及虛擬機等。

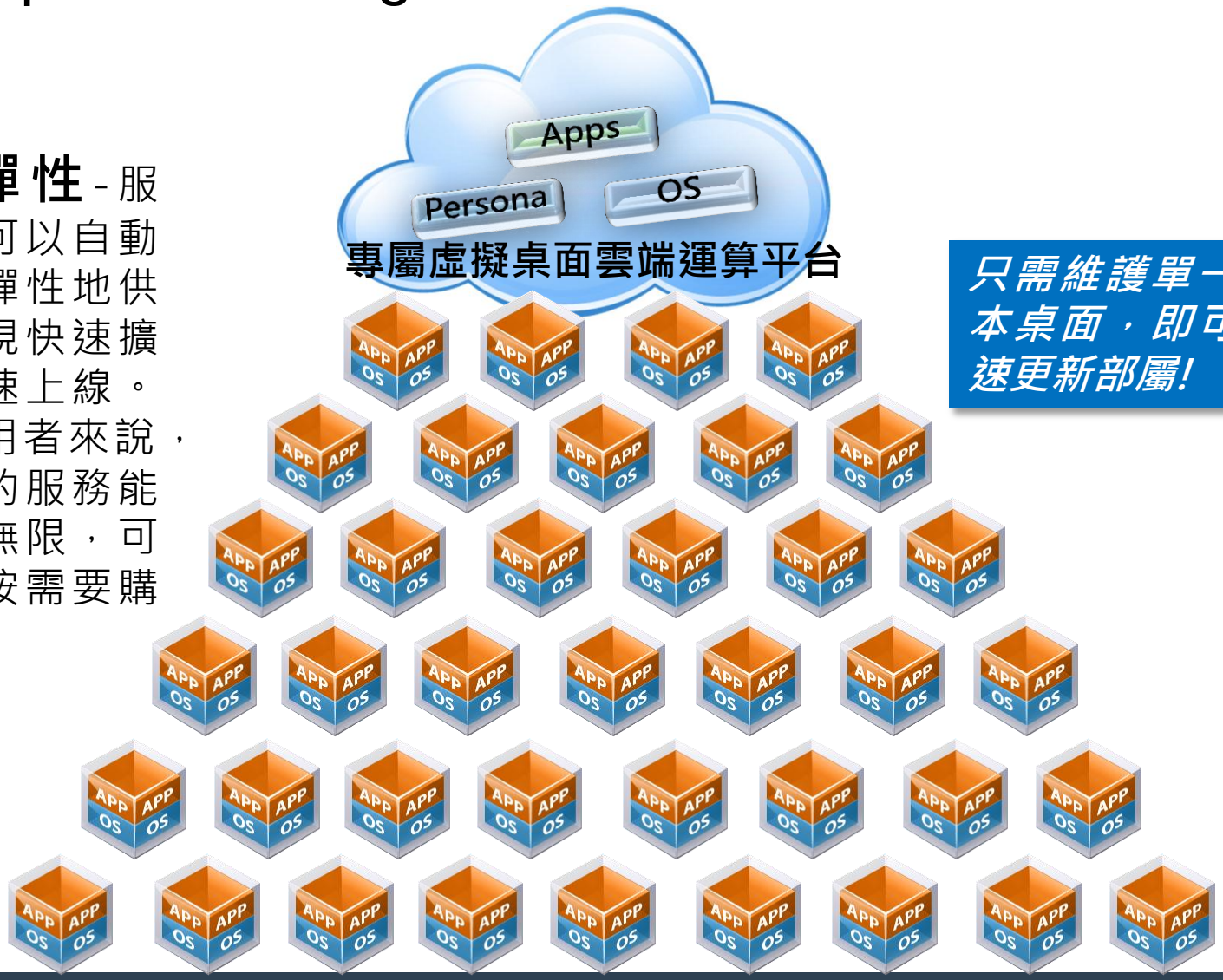
Desktop as a managed Service-DaaS

廣泛的網絡存取-通過網絡提供服務，可支援各種標準的連線機制，包括各種精簡或厚實的客戶端(thin or thick client) 平台（如行動電話、筆記型電腦或PDA），存取其他傳統或以雲為基礎的軟體服務。

按需自助服務-可在客戶需要時配置運算能力，無需供應商服務人員介入即可自動依需求提供服務。

Desktop as a managed Service-DaaS

快速彈性-服務能力可以自動快速、彈性地供應，實現快速擴容、快速上線。對於使用者來說，可供應的服務能力近乎無限，可以隨時按需要購買。



只需維護單一版本桌面，即可快速更新部屬!

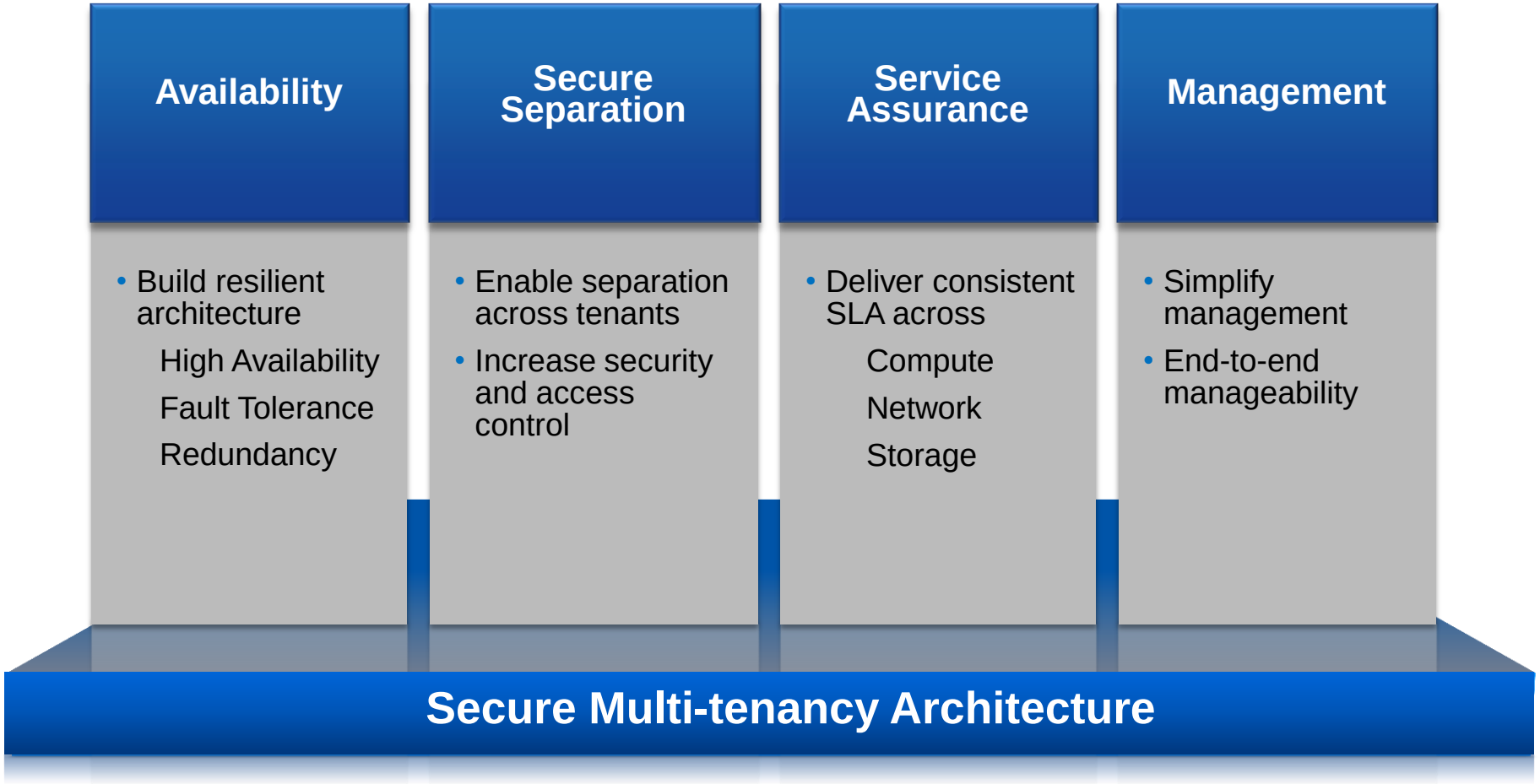
思科、NetApp和VMware聯手推出面向動態資料中心的創新設計架構

全新的安全多租戶設計架構為在虛擬化和企業級的雲端環境裏共用資料中心資源增強安全性-（2010年2月1日，中國北京）思科公司、NetApp公司和全球桌面到資料中心及雲端的虛擬化解決方案領導廠商VMware公司宣佈，隨著企業轉向百分之百虛擬化的資料中心，三家公司正在拓展相互之間的長期合作，以提供全新的設計架構，幫助客戶變革虛擬化動態資料中心，使之更加高效、動態化並且更安全。三家公司於日前推出了點到點的安全多租戶設計架構（**Secure Multi-tenancy Design Architecture**），該架構能夠隔離那些共用一個通用IT基礎架構的不同客戶、業務單位或部門所使用的IT資源和應用，從而加強雲端環境的安全性。

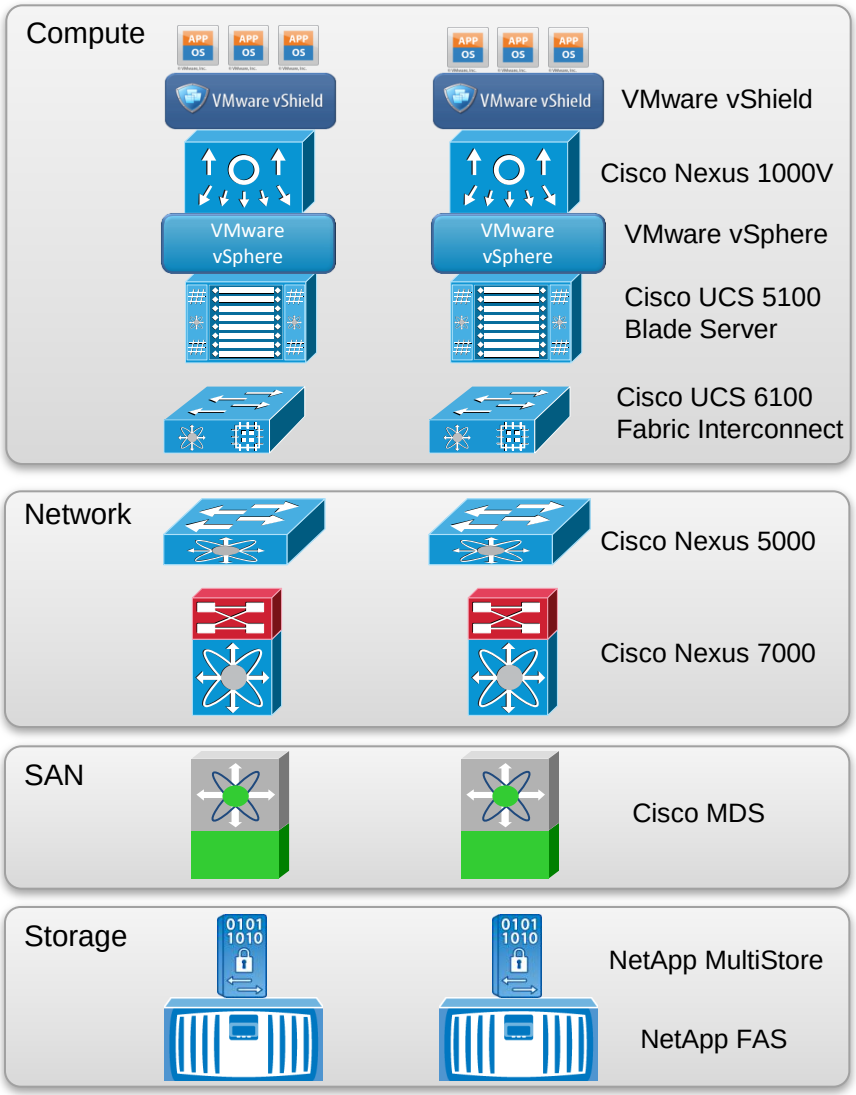
Cisco、NetApp and VMware
A common approach

VMware Virtualization	NetApp Unified Storage	Cisco Unified Computing
■ Virtualization leadership	■ Storage efficiency	■ Compute & network efficiency
■ Data Center Solutions	■ Multiprotocol architecture	■ Multiprotocol architecture
■ Desktop Solutions	■ Simplified data management	■ Simplified network
■ Cloud Services	■ Ethernet storage leadership	■ Ethernet leadership
■ Virtualization management	■ Virtualization optimized	■ Virtualization optimized

Secure Multi-tenancy – Four Pillars



Secure Multi-tenancy Components



Compute

- VMware vShield
- VMware vSphere
- Cisco Unified Computing System

Network

- Cisco Nexus 1000V
- Cisco Nexus 5000
- Cisco Nexus 7000
- Cisco MDS

Storage

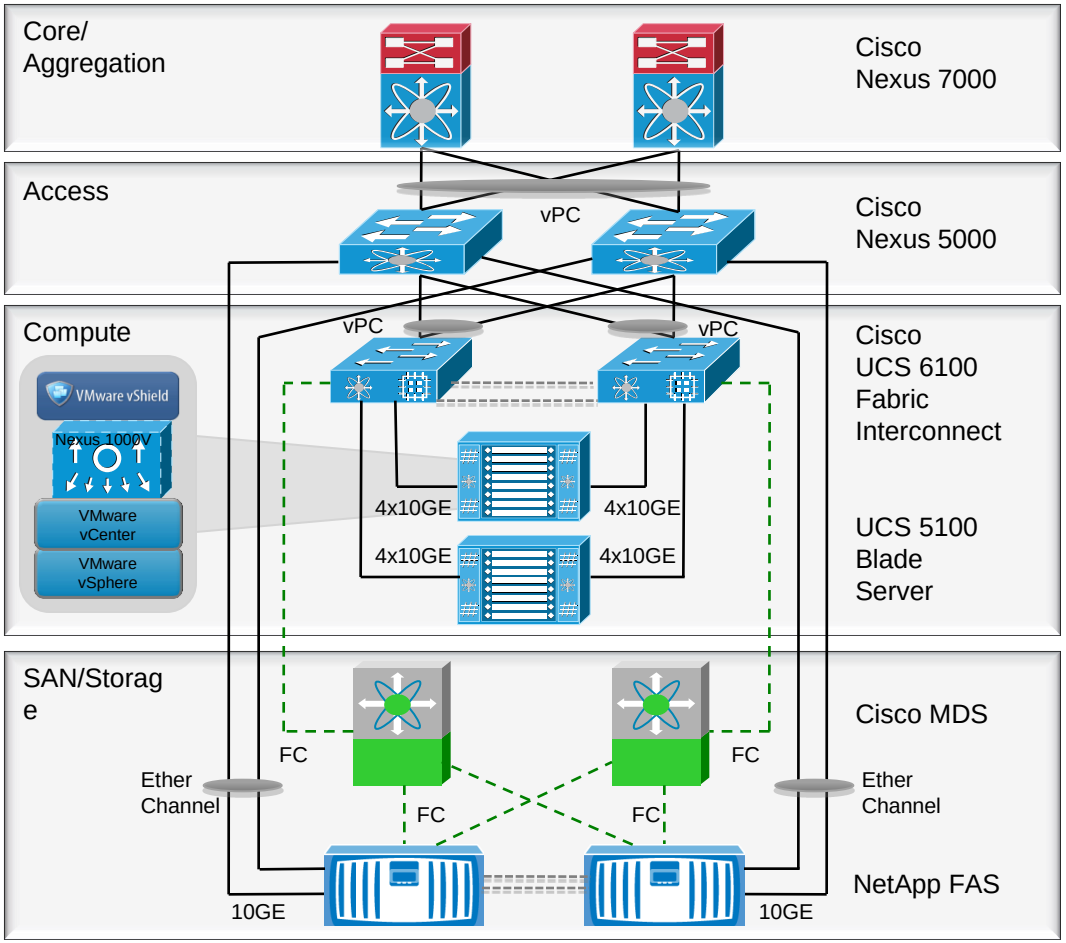
- NetApp FAS
- NetApp Multistore

Management

- VMware vShield Manager
- VMware vCenter
- Cisco UCS Manager
- Cisco DC Network Manager
- NetApp Operations Manager
- NetApp Provisioning Manager
- NetApp SANscreen & SnapManager

Resilient End-to-End Architecture

Availability



Compute

- vCenter Heartbeat
- VMware HA
- vMotion/Storage vMotion
- UCS Fabric Redundancy

Network

- vPC
- EtherChannel
- N1KV Active/Standby VSM
- Link/Device Redundancy

Storage

- RAID-DP
- NetApp HA
- Snapshot
- SnapMirror/SnapVault

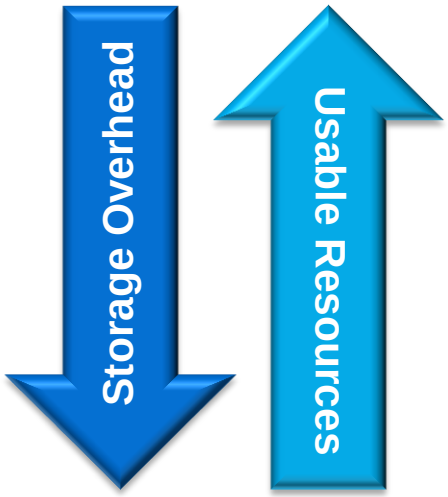
Increased Availability and Resiliency through VMware vSphere

Availability

Site Level	• Mirrored sites for disaster recovery • Site Recovery Manager (SRM)
VM Cluster Level	• Primary and shadow workloads • VMware FT
Host Cluster Level	• Host failover and automated load balancing • VMware HA and DRS
Host Level	• Transparent workload migration • vMotion and Storage vMotion
VM Level	• Encapsulation and isolation • VM cloning and VM Data Recovery

Protecting Data

Availability



- A key focus in providing a 100% resilient infrastructure
- NetApp protection requires less overhead, more usable storage and resources available for valuable data.
- Mix and match data protection features to create a customized data protection plan

✔NetApp RAID-DP
✔NetApp SnapShot
✔NetApp SnapRestore
✔NetApp SnapMirror
✔NetApp SMVI

NetApp SnapShot
Data Protection

Availability

- A reference to a complete "point-in-time" image of a NetApp volume, captured as read-only, residing within the active volume.
  - *reference* to the original data blocks, *not* a copy of them
  - *complete* image, *not* incremental
  - *within* the volume, *not* on a separate set of disks
- Taken manually or automatically on a schedule
  - hourly, nightly, weekly
- Revert current volume to any "point-in-time" captured in a SnapShot with NetApp SnapRestore

Secure Separation

Secure Separation

Compute

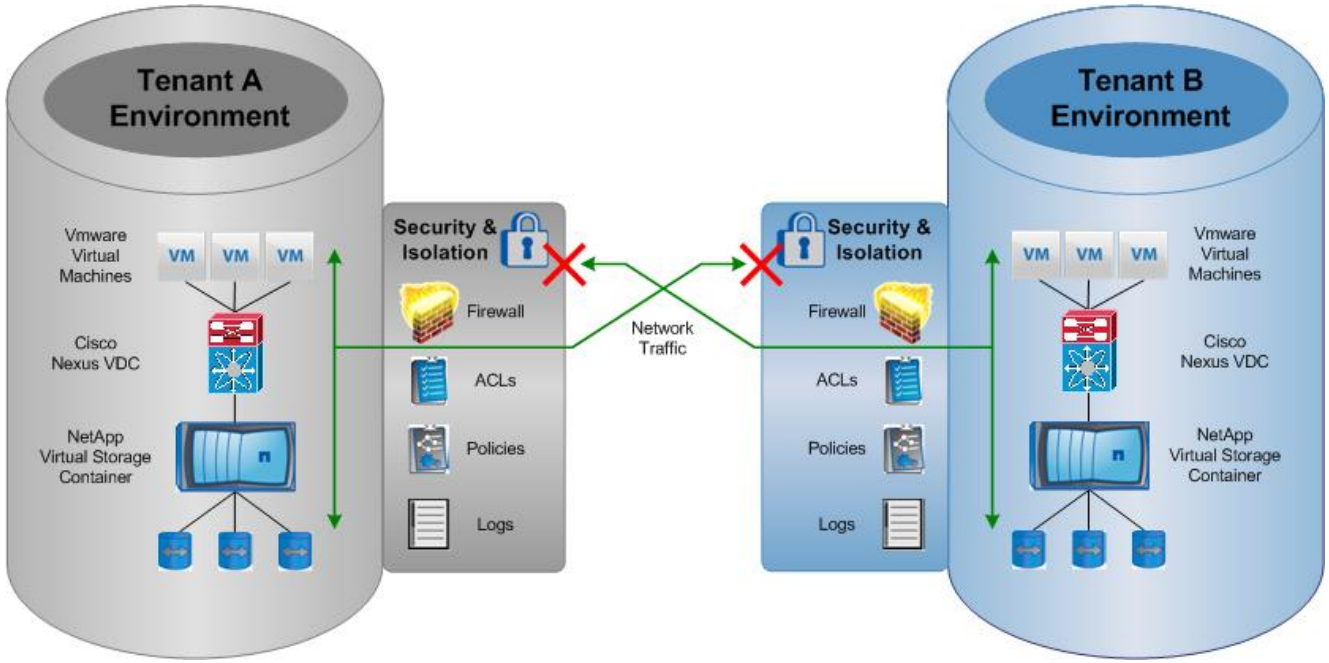
- UCS & vSphere RBAC
- VM Security with vShield and Nexus 1000V
- UCS Resource Pool Separation

Network

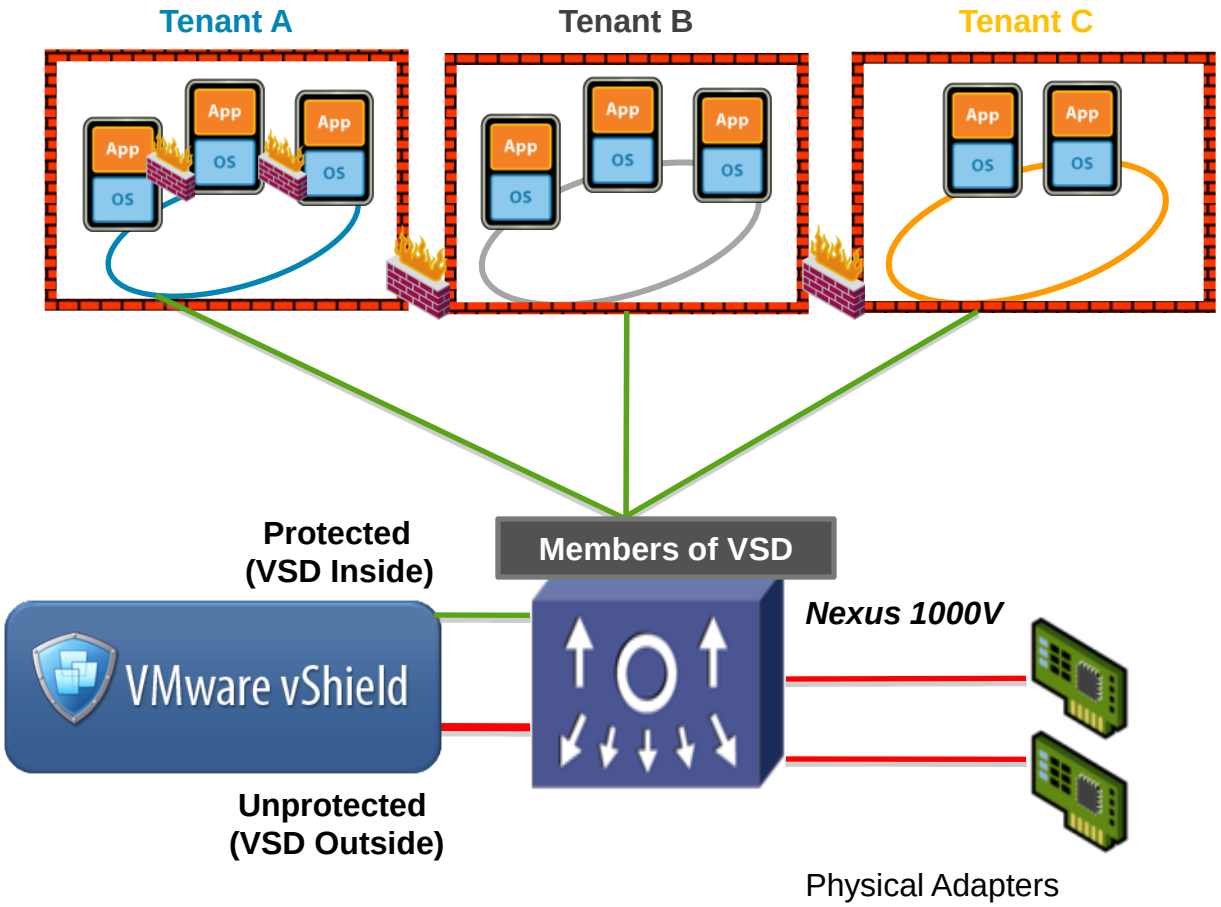
- Access Control List
- VLAN Segmentation
- QoS - Classification

Storage

- vFiler units
- IP Spaces
- VLAN Segmentation



VM Security with vShield and Nexus 1000V



Full integration with N1KV

•Virtual Service Domain (VSD) feature leveraged by vShield to intercept VM-destined flows

Secure Isolation

•Simple container-based rule creation leveraging vCenter inventory objects

•Point of enforcement close to VM

•Policy based separation between tenants

•Policy based separation for multi-tier application

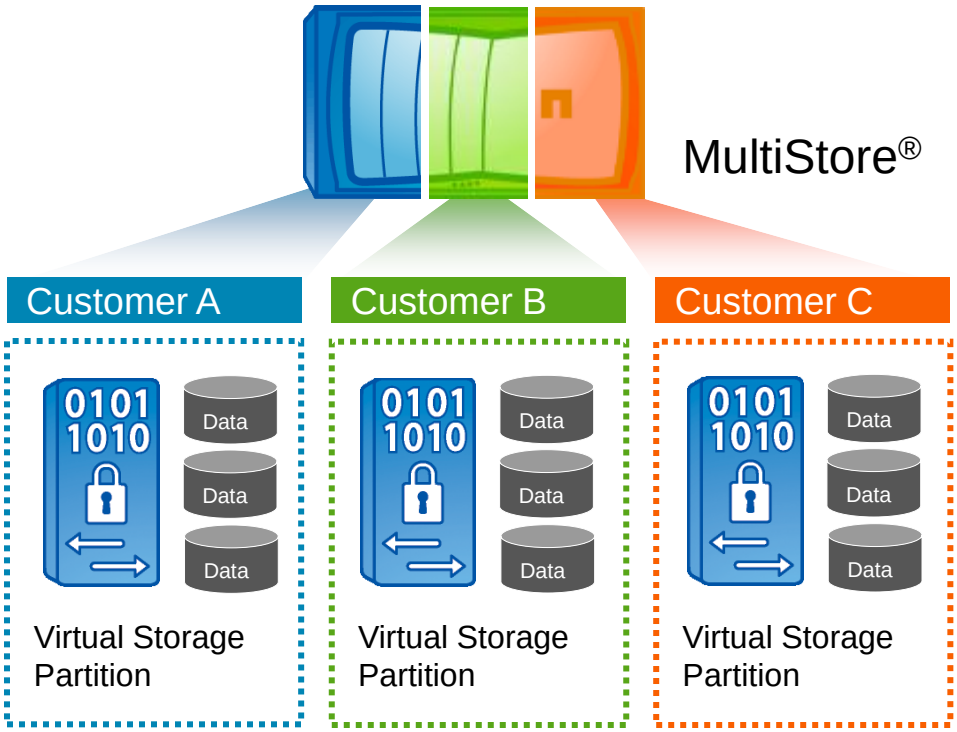
vMotion awareness

• vShield session state tables follow the VM

•Cisco VN-Link maintains VM protection policy consistency during vMotion

NetApp Secure Multi-Tenancy
Partitioning clients & workloads

Secure Separation



Challenges

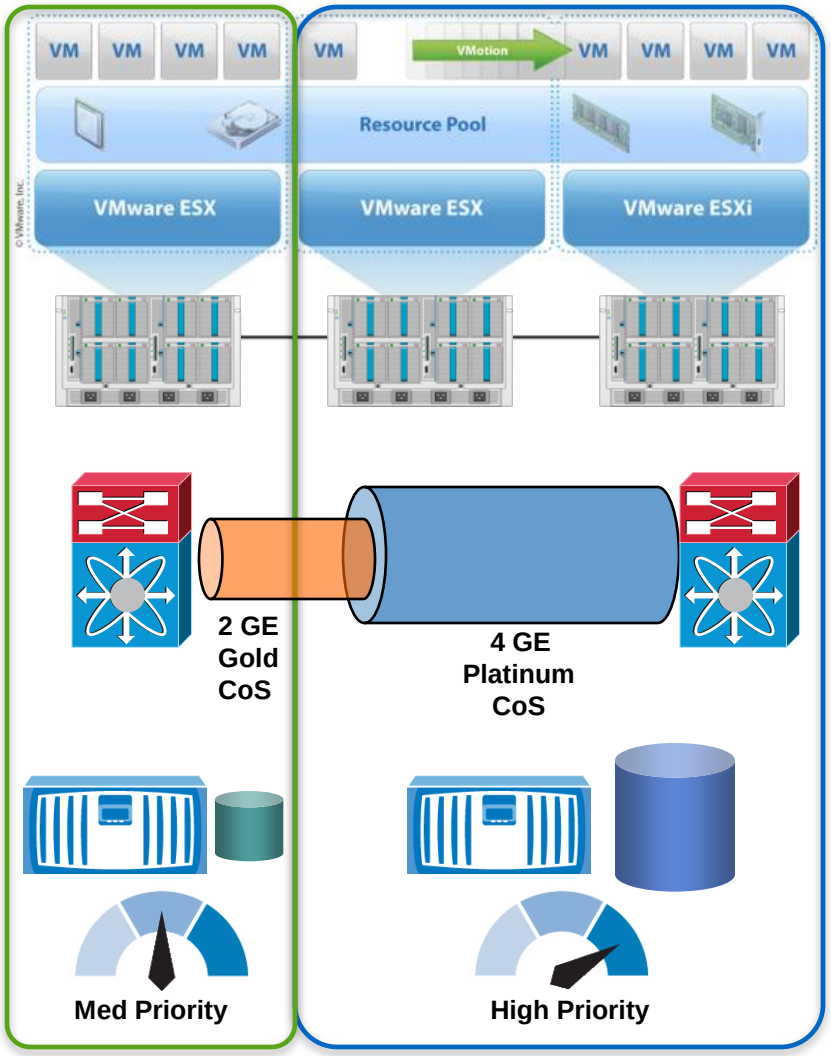
- Resource utilization
- Secure separation
- Resource hogs

Secure multi-tenancy MultiStore

- Secure partition of storage and networking
- Proven technology: 16,000 licenses
- Third-party valid security testing

Service Assurance – Delivering SLA

Service Assurance



Compute

- Expandable Reservation
- Dynamic Resource Scheduler
- UCS QoS System Classes for Resource Reservation and Limit

Network

- QoS - Classification
- QoS - Queuing
- QoS - Bandwidth control
- QoS - Rate Limiting

Storage

- FlexShare
- Storage Reservations
- Thin Provisioning

Compute Resource Service Assurance

- Built-in vCenter Resource Pool settings to provide:
  - resource guarantee for infrastructure and tenant services

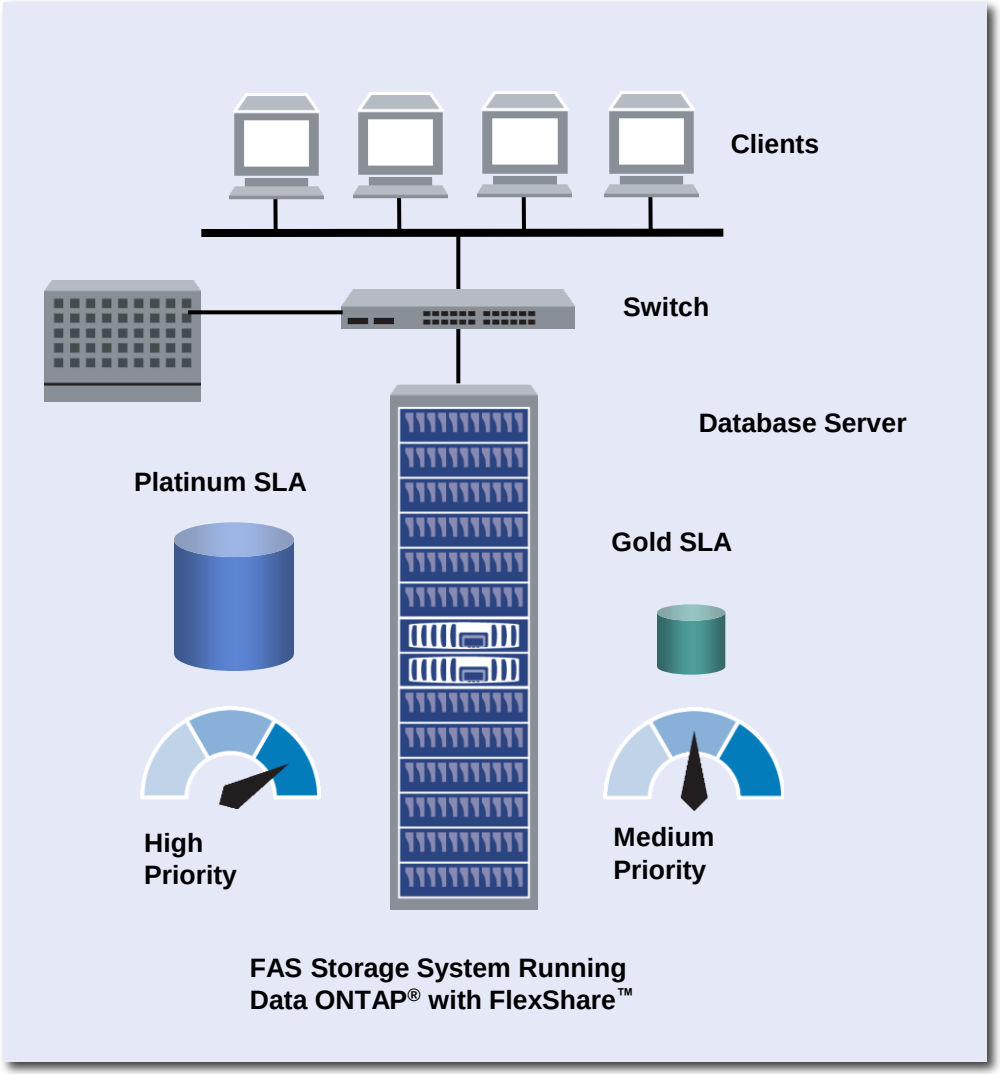
- Resource pool settings to be set based on tenant SLA:

Resource Pool Settings	Platinum Tenant	Gold Tenant	Silver Tenant
Reservation	Reserved	Reserved	No reservation
Limits	Unlimited	Limited	Limited
Shares	High	Medium	Low
Expandable Reservation	Enabled	Disabled	Disabled

- VMware DRS provides fully automated load distribution across all UCS blades in the ESX Cluster
  - During VM/vApp power on
  - During steady and non-steady state

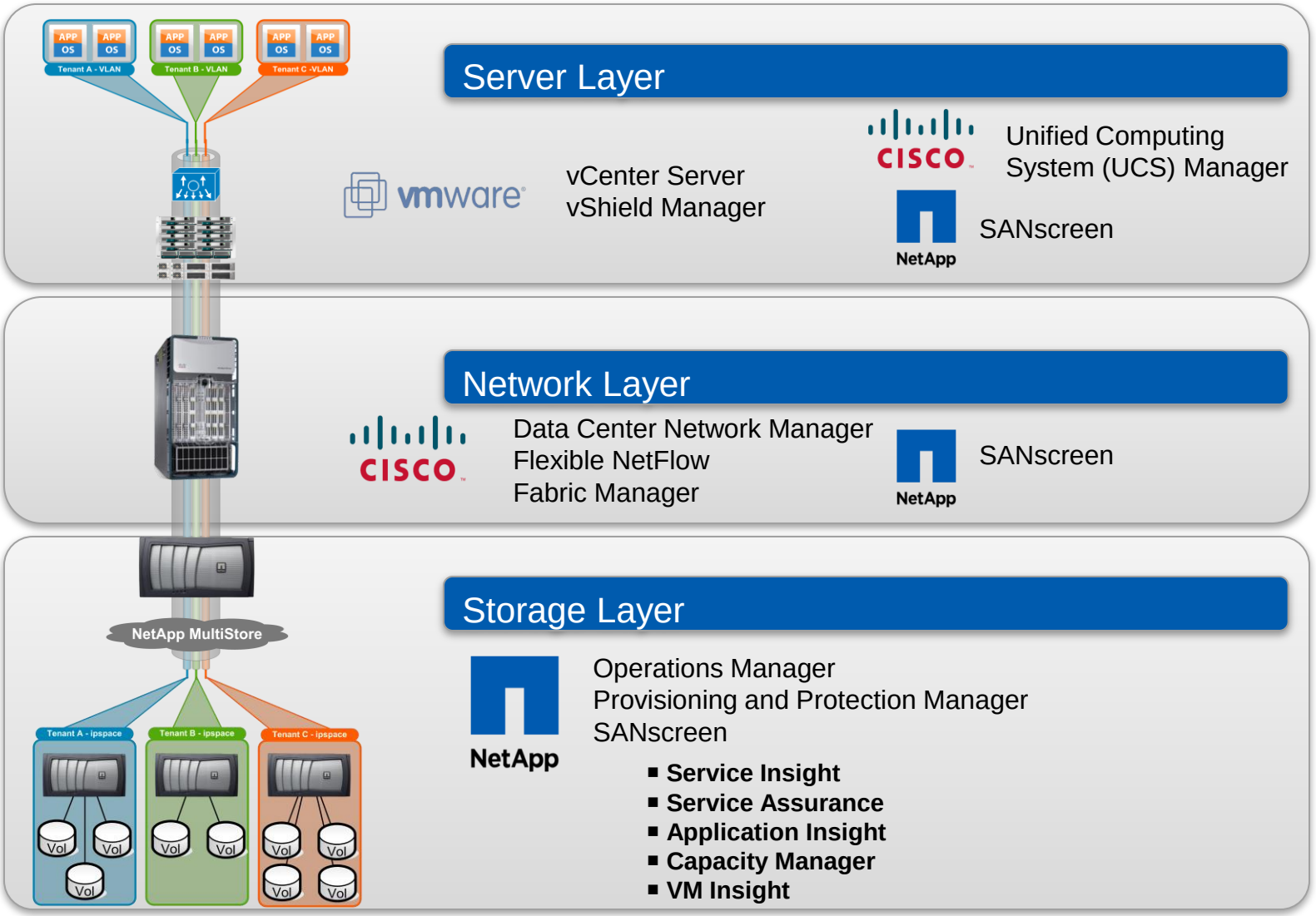
Storage SLA Assurance

Service Assurance



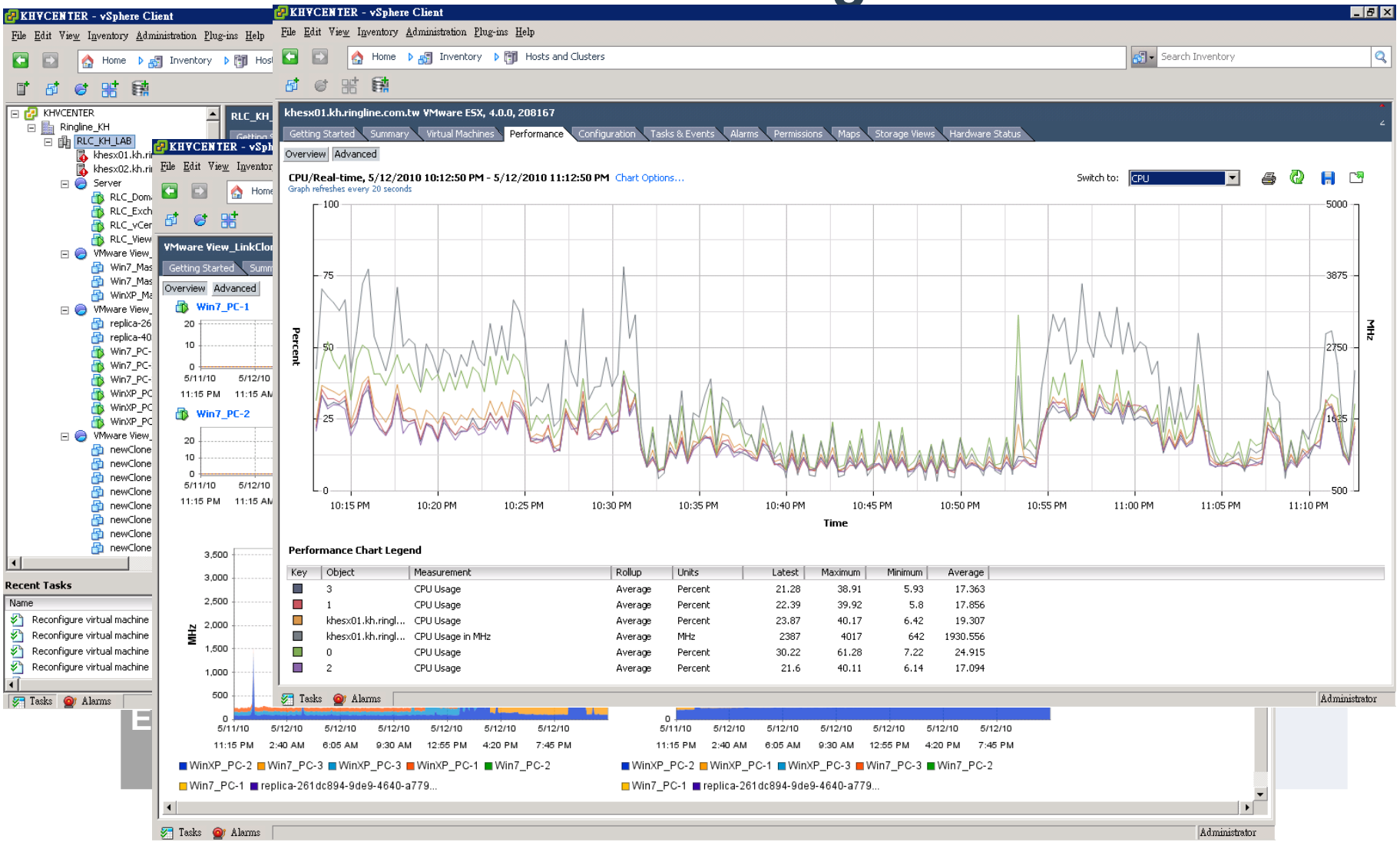
- Set high priority for database (or Platinum) SLA
- Five levels of prioritization available
- Isolates tenant performance, other tenants will not impact properly provisioned SLAs.

End-to-End Management



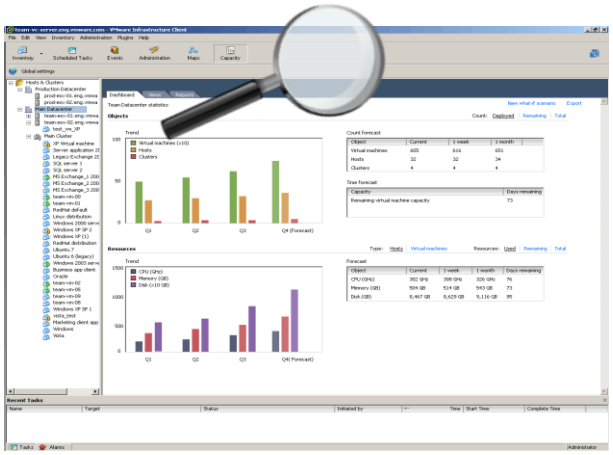
vCenter Infrastructure Management

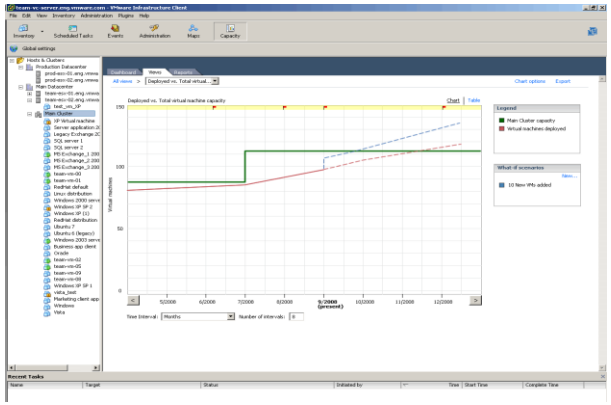
Management



VMware vCenter CapacityIQ

Management



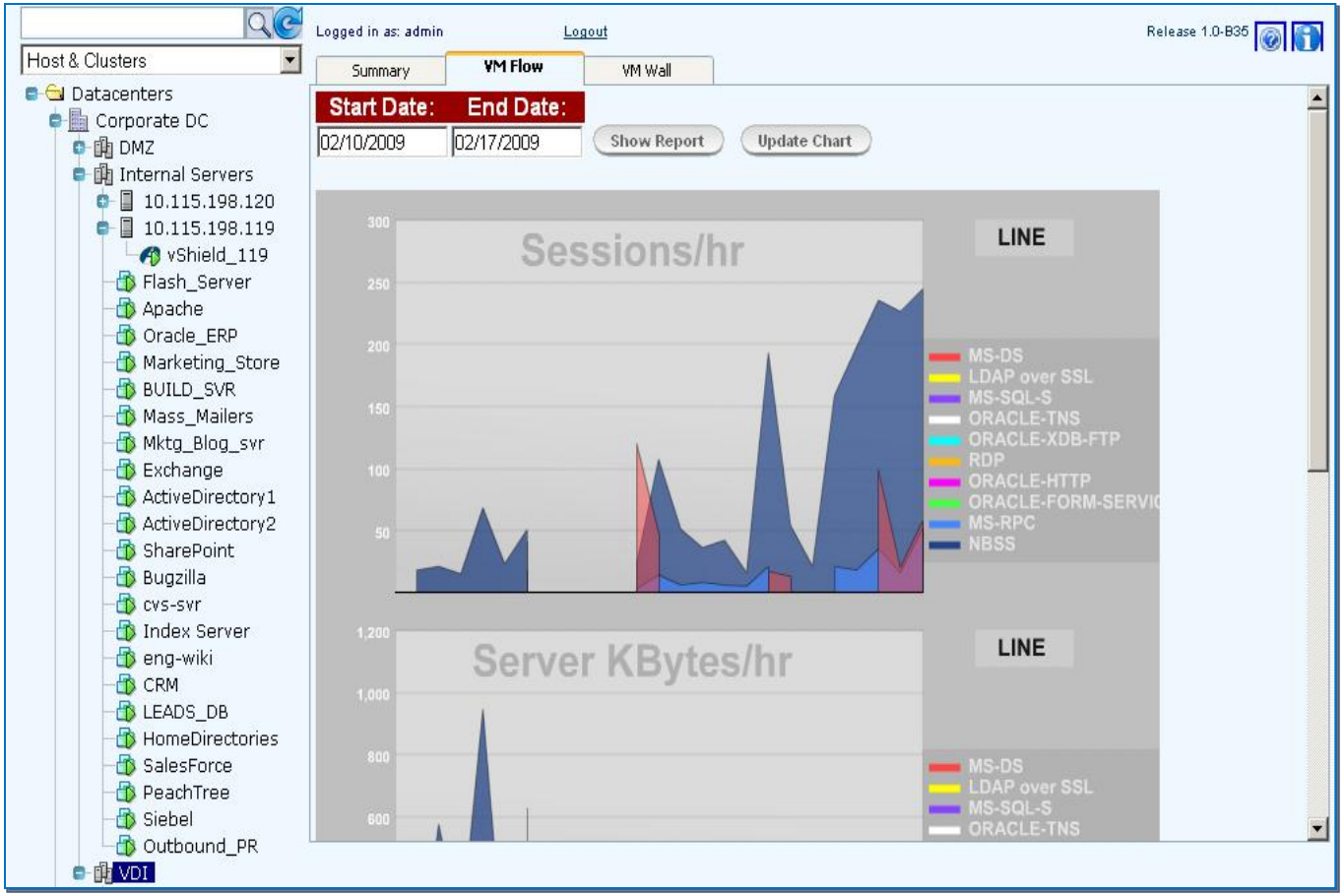


- Capacity management solution for VMware vCenter, enabling users to analyze, forecast, and plan capacity needs of their virtual datacenter

- Benefits
  - **Deliver the right capacity at the right time**
  - **Make informed planning, purchasing, and provisioning decisions**
  - **Enable capacity to be utilized most efficiently and cost-effectively**

- Key Features
  - **Perform "What-If" impact analysis to model effect of capacity changes**
  - **Identify and reclaim unused capacity**
  - **Forecast timing of capacity shortfalls and needs**

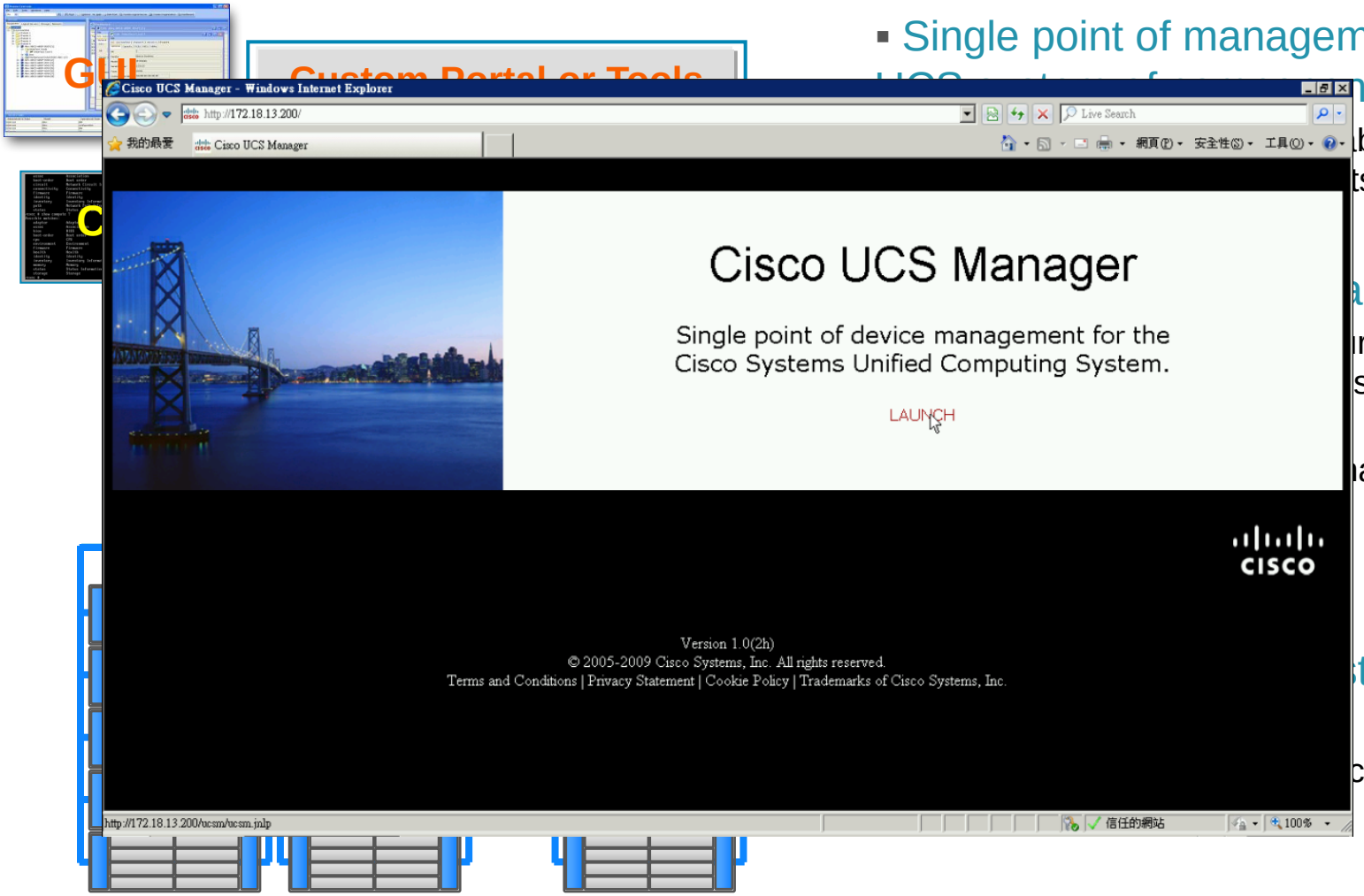
vShield Manager



- Integrates with vCenter server
  - Policy Overview
  - Traffic flow
  - Historical flowchart
  - Real Time flowchart

Cisco UCS Manager

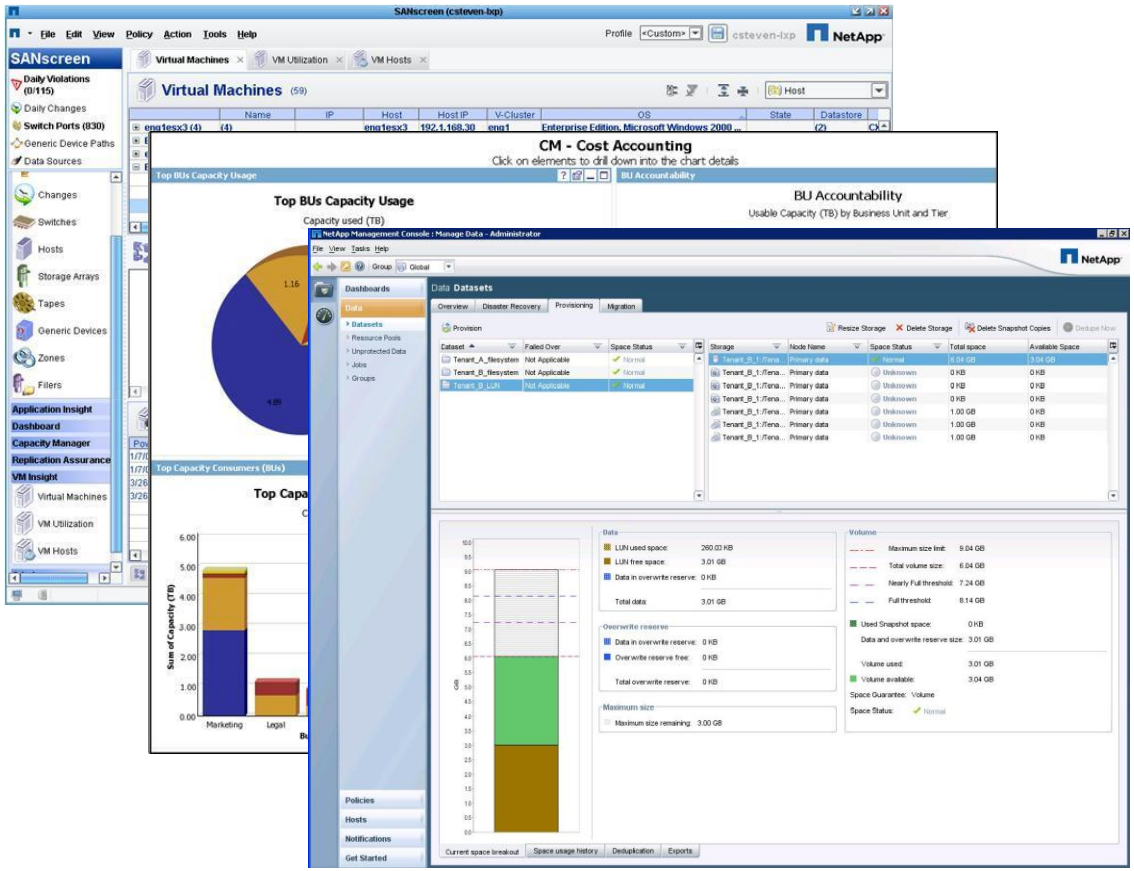
Management



- Single point of management for
  nts
  bric
  ts
  ager
  ration,
  stics
  anaged
  new and
  tructure
  cial & custom

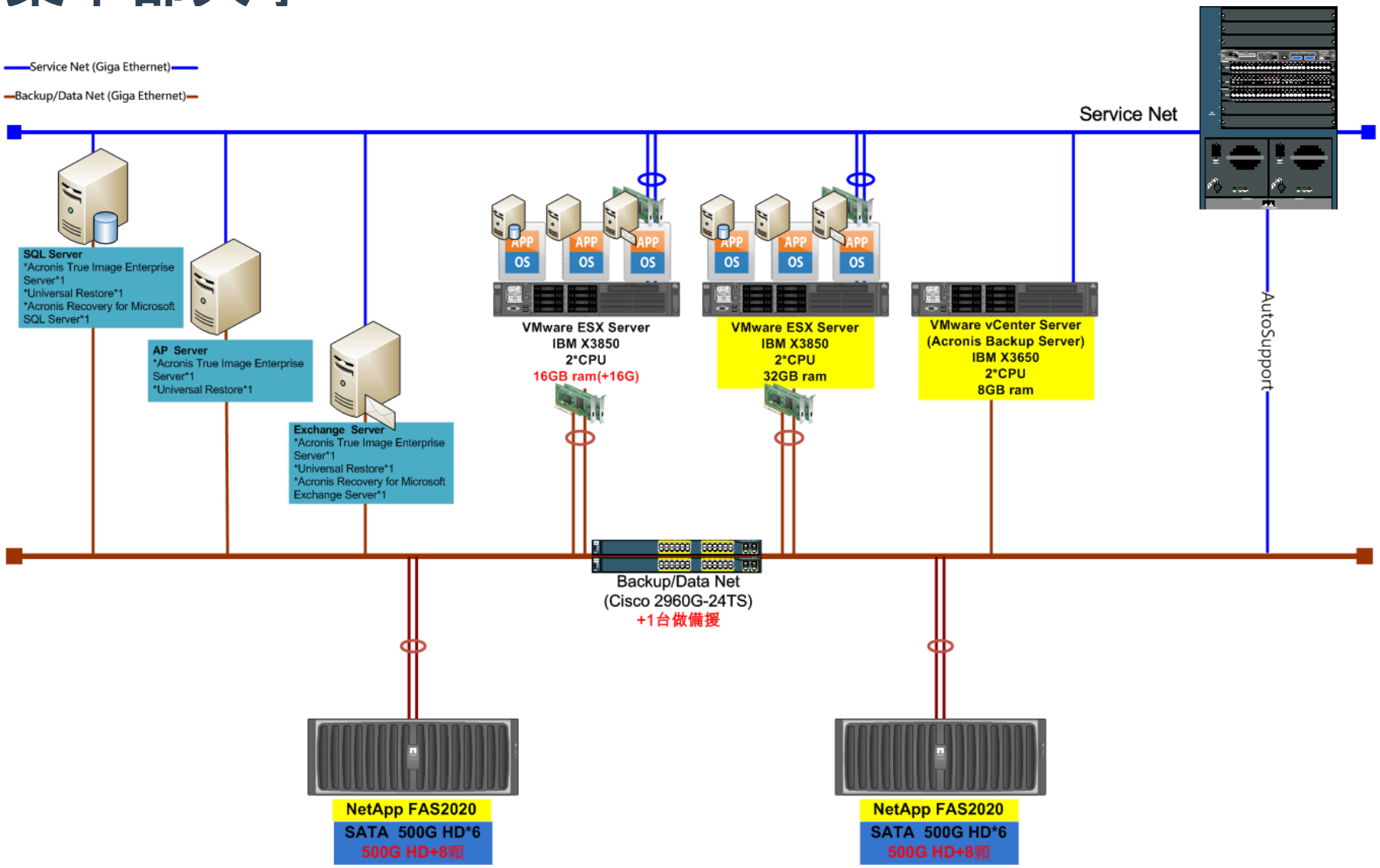
cisco NetApp vmware

NetApp Management

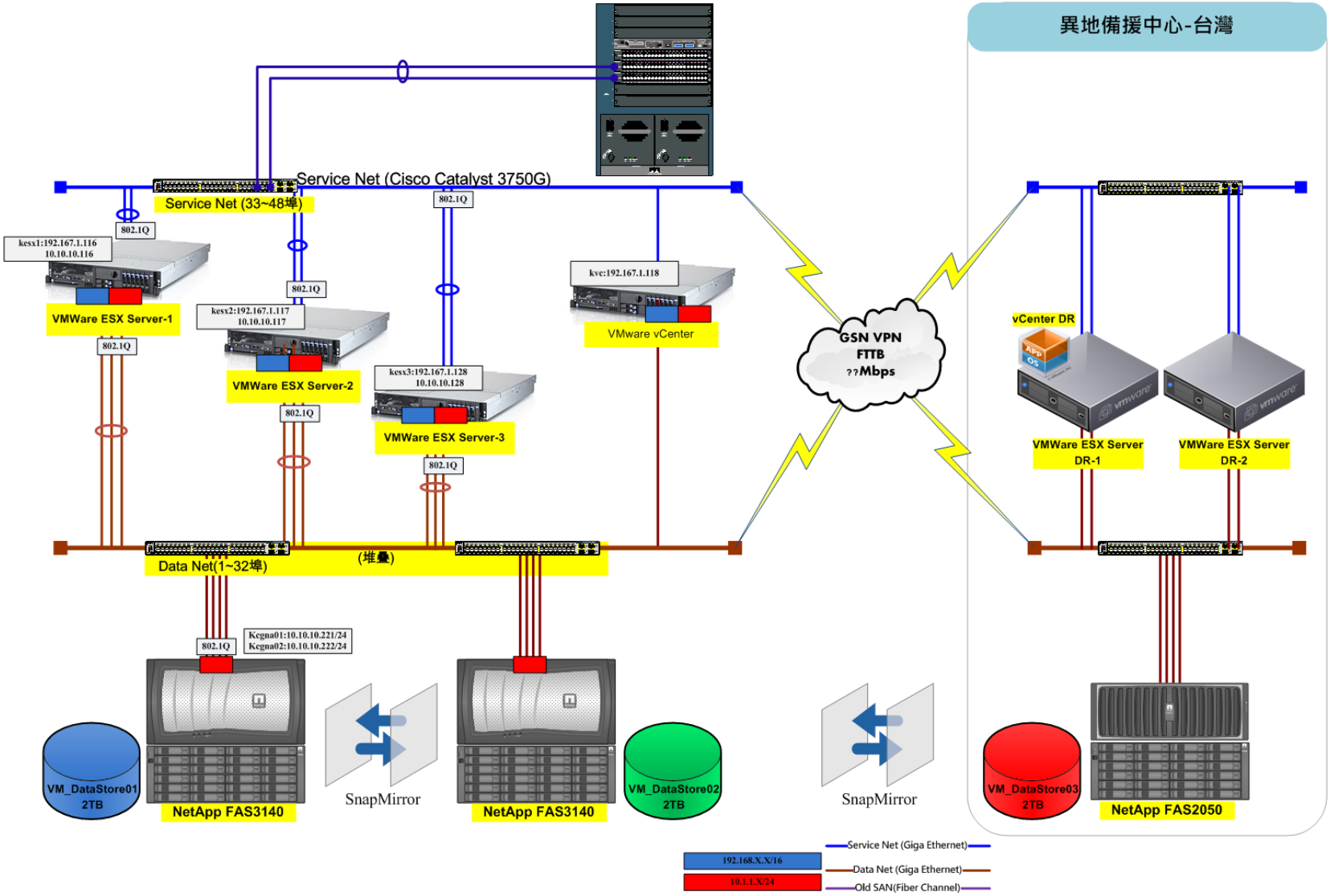


- SANscreen allows providers and tenants visibility into full storage path
- Provisioning Manager eases providers deployment
- Protection manager makes backups and recovery a snap.
- Operations Manager offers chargeback reporting and monitoring

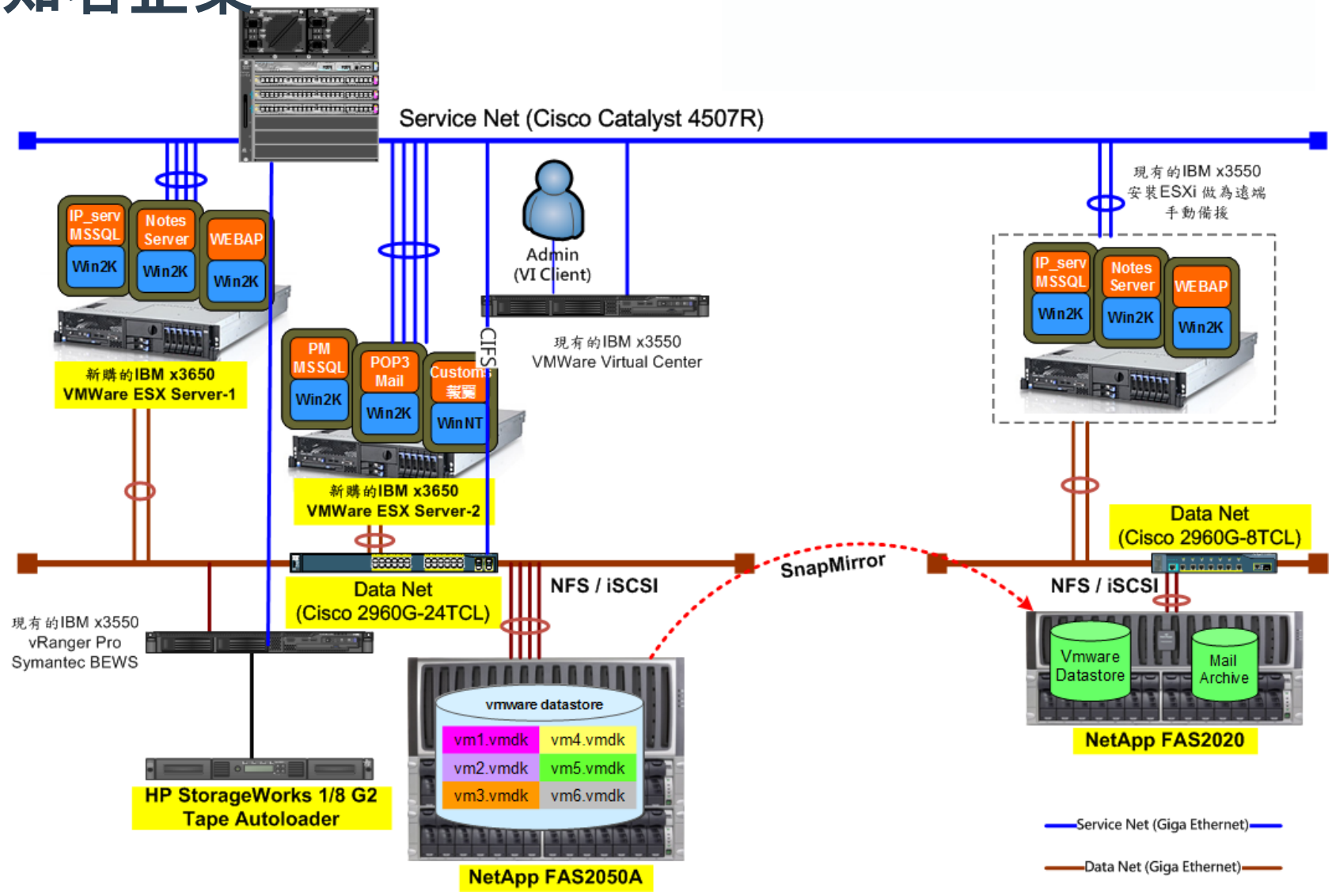
某中部大學


Service Net (Giga Ethernet)
Backup/Data Net (Giga Ethernet)
Service Net
AutoSupport
SQL Server
*Acronis True Image Enterprise Server*1
*Universal Restore*1
*Acronis Recovery for Microsoft SQL Server*1
AP Server
*Acronis True Image Enterprise Server*1
*Universal Restore*1
Exchange Server
*Acronis True Image Enterprise Server*1
*Universal Restore*1
*Acronis Recovery for Microsoft Exchange Server*1
APP
OS
VMware ESX Server
IBM X3850
2*CPU
16GB ram(+16G)
VMware ESX Server
IBM X3850
2*CPU
32GB ram
VMware vCenter Server
(Acronis Backup Server)
IBM X3650
2*CPU
8GB ram
Backup/Data Net
(Cisco 2960G-24TS)
+1台做備援
NetApp FAS2020
SATA 500G HD*6
500G HD+8顆
NetApp FAS2020
SATA 500G HD*6
500G HD+8顆

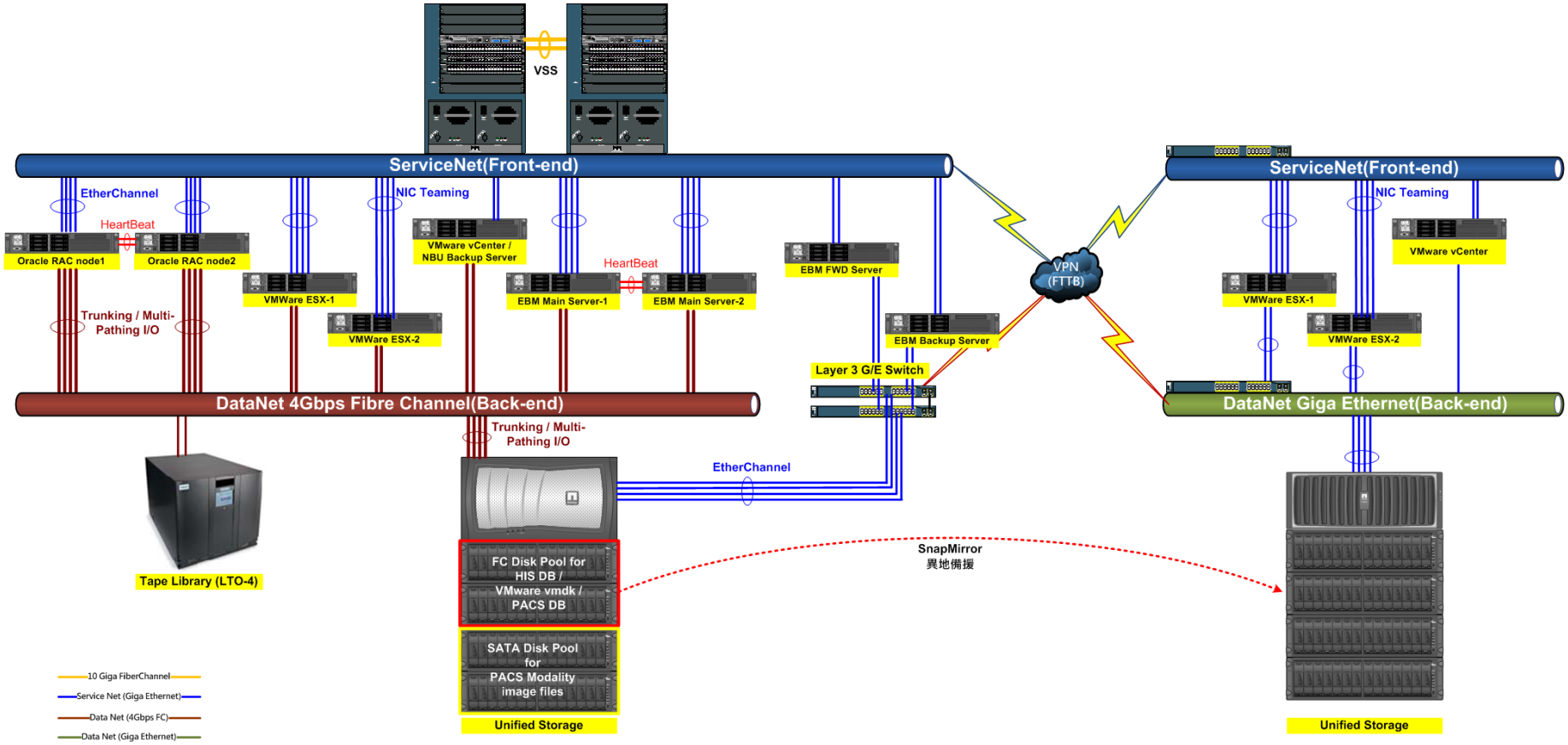
某政府機關


異地備援中心-台灣
Service Net (Cisco Catalyst 3750G)
Service Net (33~48埠)
802.1Q
kesx1:192.167.1.116
10.10.10.116
VMWare ESX Server-1
kesx2:192.167.1.117
10.10.10.117
VMWare ESX Server-2
kesx3:192.167.1.128
10.10.10.128
VMWare ESX Server-3
kvc:192.167.1.118
VMware vCenter
GSN VPN
FTTB
??Mbps
vCenter DR
VMWare ESX Server
DR-1
VMWare ESX Server
DR-2
Data Net(1~32埠)
(堆疊)
Kegna01:10.10.10.221/24
Kegna02:10.10.10.222/24
VM_DataStore01
2TB
NetApp FAS3140
SnapMirror
NetApp FAS3140
VM_DataStore02
2TB
SnapMirror
VM_DataStore03
2TB
NetApp FAS2050
192.168.X.X/16
10.1.1.X/24
Service Net (Giga Ethernet)
Data Net (Giga Ethernet)
Old SAN(Fiber Channel)

某知名企業


Service Net (Cisco Catalyst 4507R)
IP_serv MSSQL
Win2K
Notes Server
Win2K
WEBAP
Win2K
新購的IBM x3650
VMWare ESX Server-1
Admin
(VI Client)
現有的IBM x3550
VMWare Virtual Center
CIFS
PM MSSQL
Win2K
POP3 Mail
Win2K
Custom
報價
WinNT
新購的IBM x3650
VMWare ESX Server-2
現有的IBM x3550
安裝ESXi 做為遠端
手動備接
IP_serv MSSQL
Win2K
Notes Server
Win2K
WEBAP
Win2K
Data Net
(Cisco 2960G-24TCL)
NFS / iSCSI
SnapMirror
NFS / iSCSI
Data Net
(Cisco 2960G-8TCL)
現有的IBM x3550
vRanger Pro
Symantec BEWS
vmware datastore
vm1.vmdk
vm4.vmdk
vm2.vmdk
vm5.vmdk
vm3.vmdk
vm6.vmdk
Vmware Datastore
Mail Archive
HP StorageWorks 1/8 G2
Tape Autoloader
NetApp FAS2050A
NetApp FAS2020
Service Net (Giga Ethernet)
Data Net (Giga Ethernet)

某知名醫學中心


VSS
ServiceNet(Front-end)
EtherChannel
HeartBeat
Oracle RAC node1
Oracle RAC node2
NIC Teaming
VMware vCenter / NBU Backup Server
VMWare ESX-1
VMWare ESX-2
Trunking / Multi-Pathing I/O
EBM Main Server-1
HeartBeat
EBM Main Server-2
EBM FWD Server
EBM Backup Server
Layer 3 G/E Switch
VPN (FTTB)
ServiceNet(Front-end)
NIC Teaming
VMware vCenter
VMWare ESX-1
VMWare ESX-2
DataNet 4Gbps Fibre Channel(Back-end)
Trunking / Multi-Pathing I/O
DataNet Giga Ethernet(Back-end)
EtherChannel
Tape Library (LTO-4)
FC Disk Pool for HIS DB / VMware vmdk / PACS DB
SATA Disk Pool for PACS Modality image files
Unified Storage
SnapMirror
異地備援
Unified Storage
10 Giga FiberChannel
Service Net (Giga Ethernet)
Data Net (4Gbps FC)
Data Net (Giga Ethernet)

Imagine Virtually Anything™

CISCO NetApp vmware

Thank you!