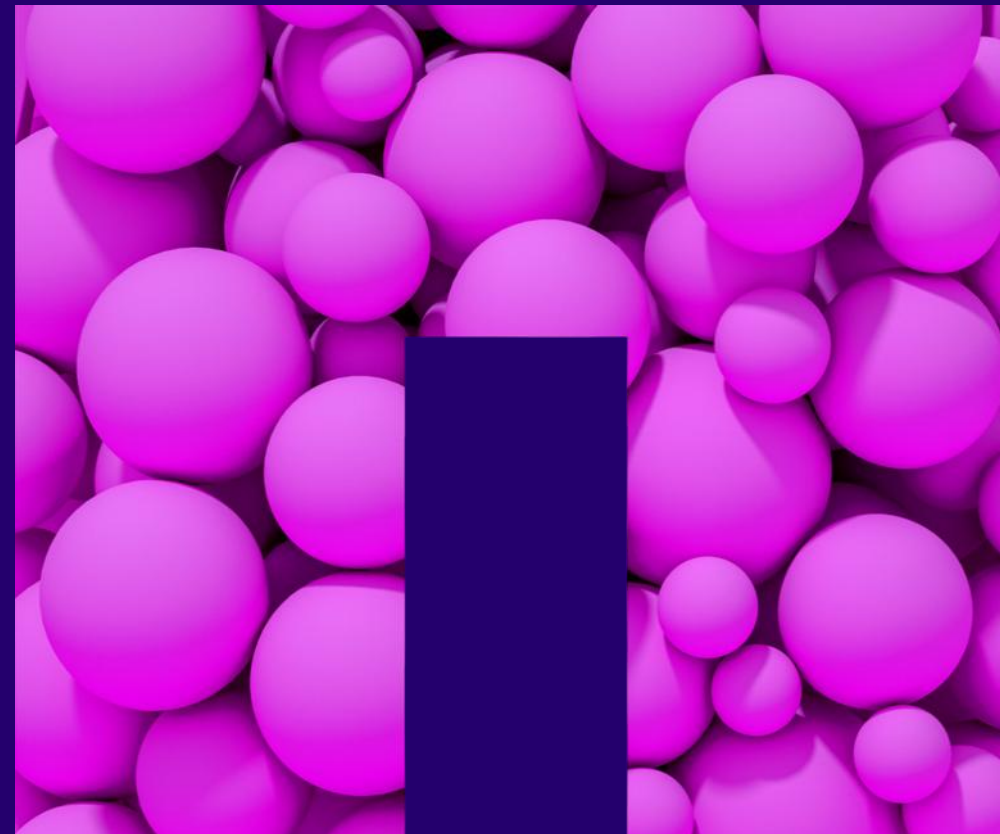


數據中心架構的演進

從多平台虛擬化整合 到彈性消費模式的思維轉變

Will Huang
資深技術顧問





全快閃陣列儲存 企業外部OEM 儲存系統

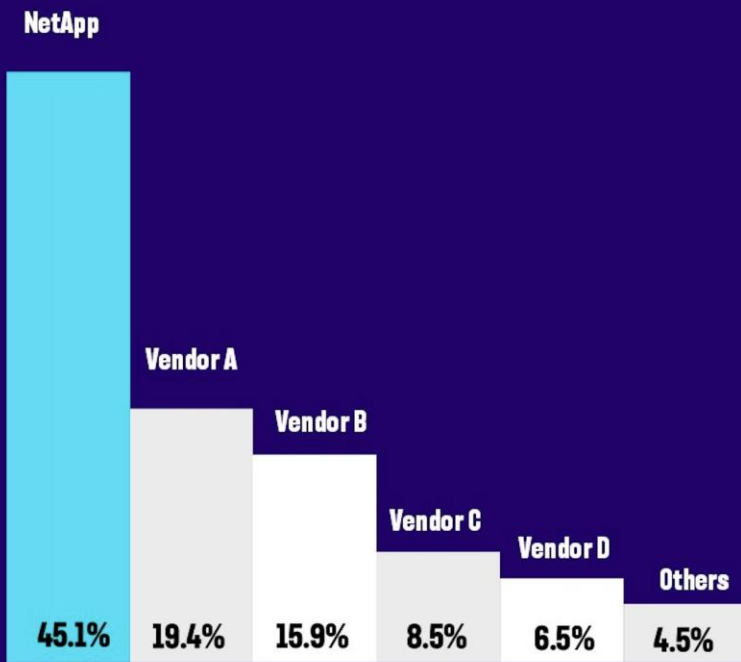
(SAN/NAS ex HCI)

#1

IN TAIWAN

連續九季穩佔領導地位
(2023Q3-2025Q3, 以營收計算)

資料來源: IDC全球企業儲存系統季度追蹤報告, 2025 Q3 (2025年12月發布)



CY2025 Q3 市场占有率以營收計算

資料來源: IDC全球企業儲存系統季度追蹤報告2025Q4 (2026年3月發布)

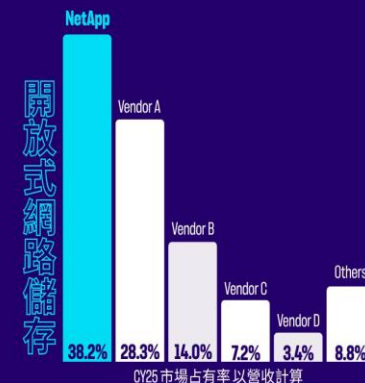


企業外部OEM 儲存系統

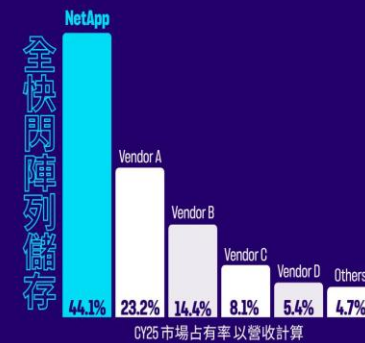
(以營收計算, SAN/NAS ex HCI)

2025 全年 台灣市占

#1

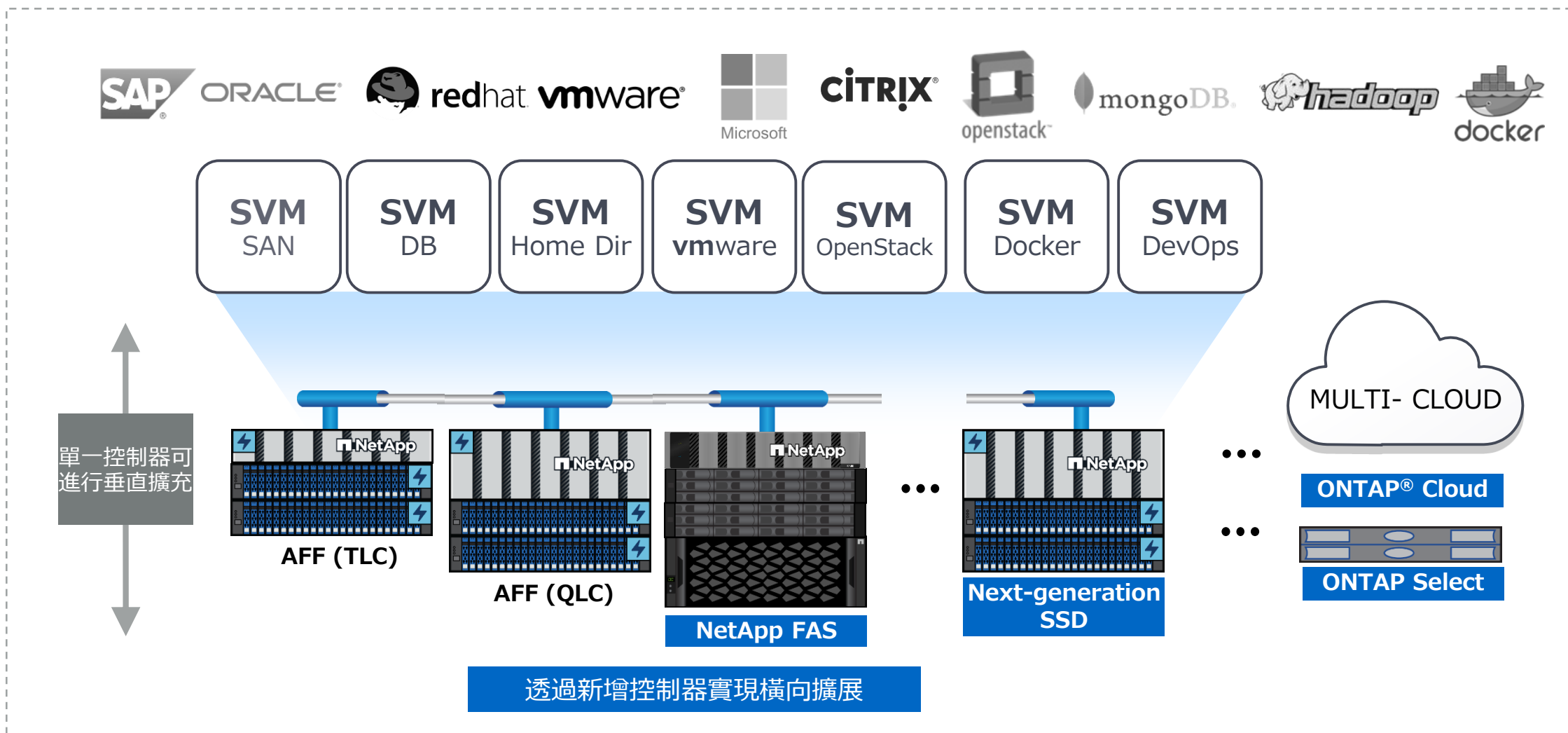


CY25 市场占有率以營收計算



CY25 市场占有率以營收計算

隨業務成長彈性擴展，同時維持統一的資料平台



- 可同時混合部署全快閃與混合式節點，依需求彈性橫向擴展
- 在不中斷使用者服務的情況下，完成硬體與軟體升級或垂直擴充
- 無縫整合軟體定義、雲端與新世代快閃技術，保護長期投資

CYBER RESILIENCY

for any
workload

hosted
anywhere

SECURE BY DESIGN

唯一獲得美國國家安全局 (NSA) CSfC 驗證, 可用於儲存「極機密 (Top-Secret)」數據的企業級儲存設備



Policy engine

自動封鎖已知的惡意檔案類型



WORM primary data and tamper-proof snapshots

透過「不可變 (Immutable)」與「不可刪除 (Indelible)」的快照技術



AI-powered autonomous ransomware protection

針對檔案 (File)、區塊 (Block)、原生雲端及使用者行為, 提供即時的偵測與應變



Multi-admin / multi-factor verification

阻斷惡意管理員與非法使用者的破壞行為



End-to-end encryption

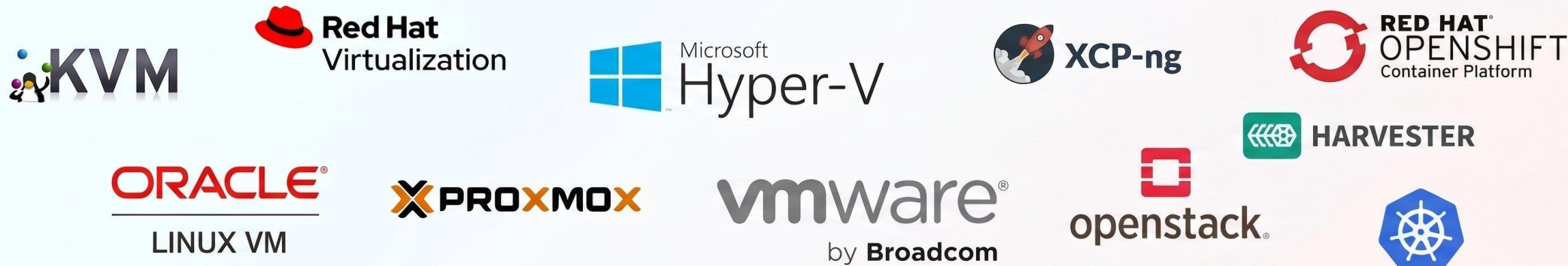
確保數據在「靜態儲存」、「傳輸過程」及「使用中」均安全無虞



1. 需要注意架構穩定性

NAS? SAN? 差別在哪

虛擬化儲存解決方案



ONTAP

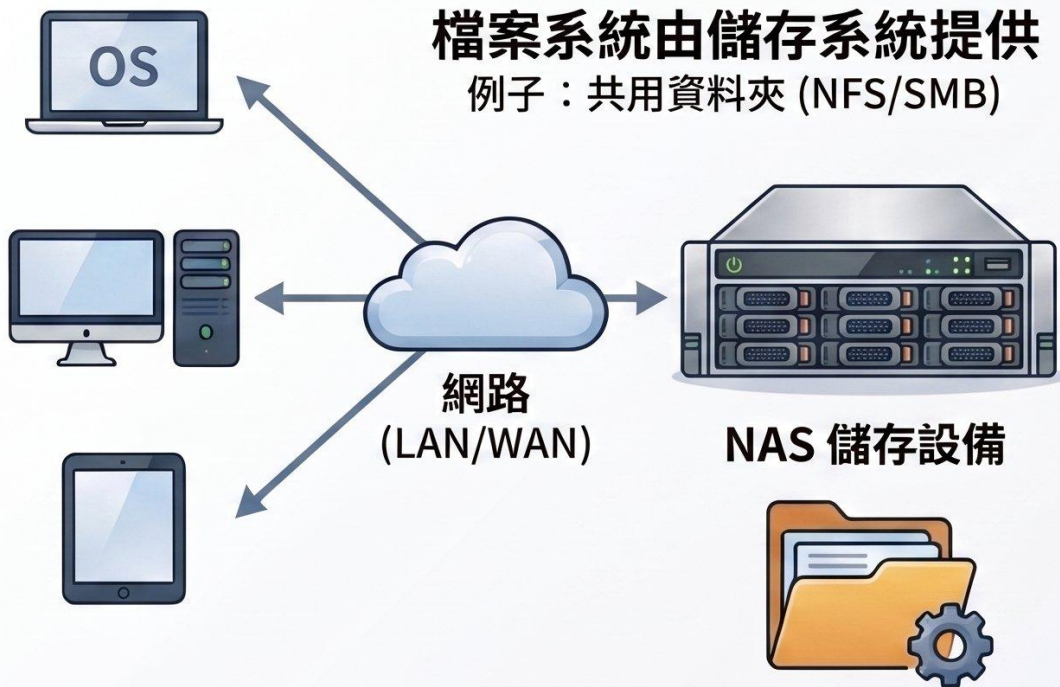
ONLY NETAPP

全方位資料管理軟體，提供自動化、效率優化、資料保護與安全防護能力，涵蓋檔案、區塊與物件儲存。

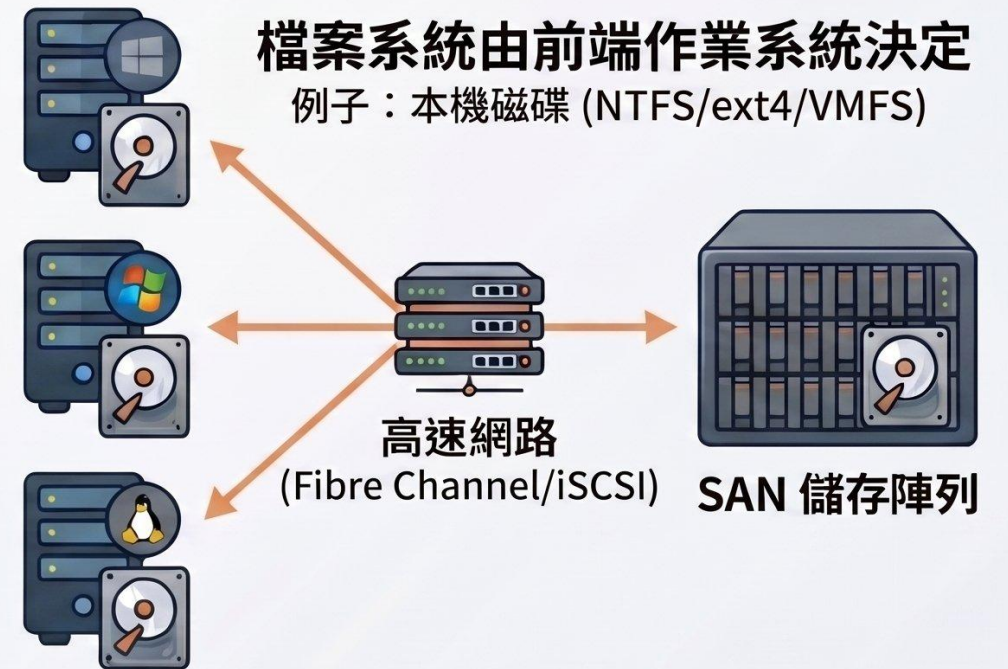


NAS 與 SAN 基本概念：檔案系統的差異

NAS (網路附加儲存)



SAN (儲存區域網路)



VMware VMFS 的核心優勢



1. 穩定性 (Stability)

叢集檔案系統，確保高可用性與持續運行。



2. 安全性 (Security)

內建鎖定機制，保護資料完整不受損。



3. 效能 (Performance)

優化 I/O 處理，滿足虛擬化高負載需求。



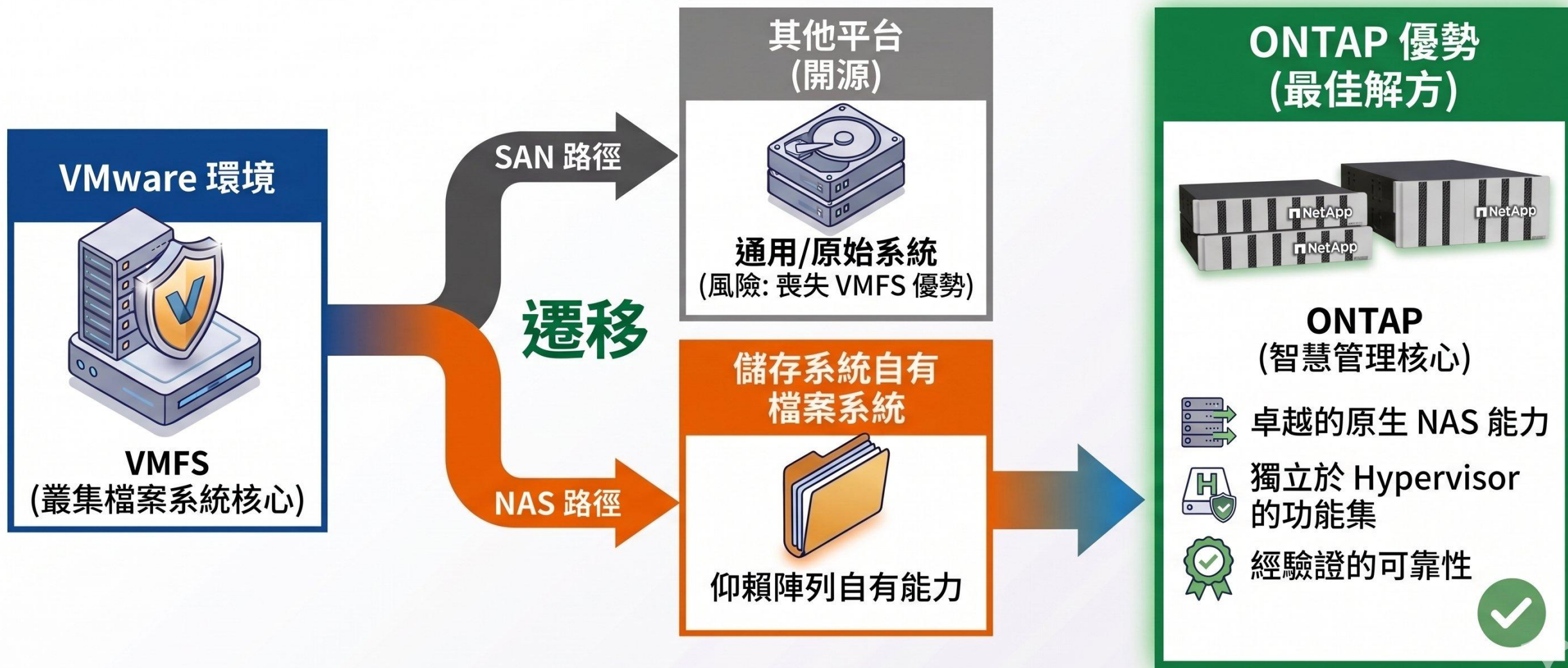
關鍵連動：儲存與虛擬化叢集



儲存的穩定性是虛擬化叢集可靠運行的基石！



NetApp ONTAP 最佳解方：VMFS 遷移



2. 需要注意虛擬化遷移

方法 停機時間 支援類型 負載

簡化遷移 NetApp Shift Toolkit

Convert and migrate in minutes

Reduced downtime and disruption



Microsoft
Hyper-V

NUTANIX

Red Hat
OpenShift

ORACLE®
LINUX VM

PROXMOX

KVM

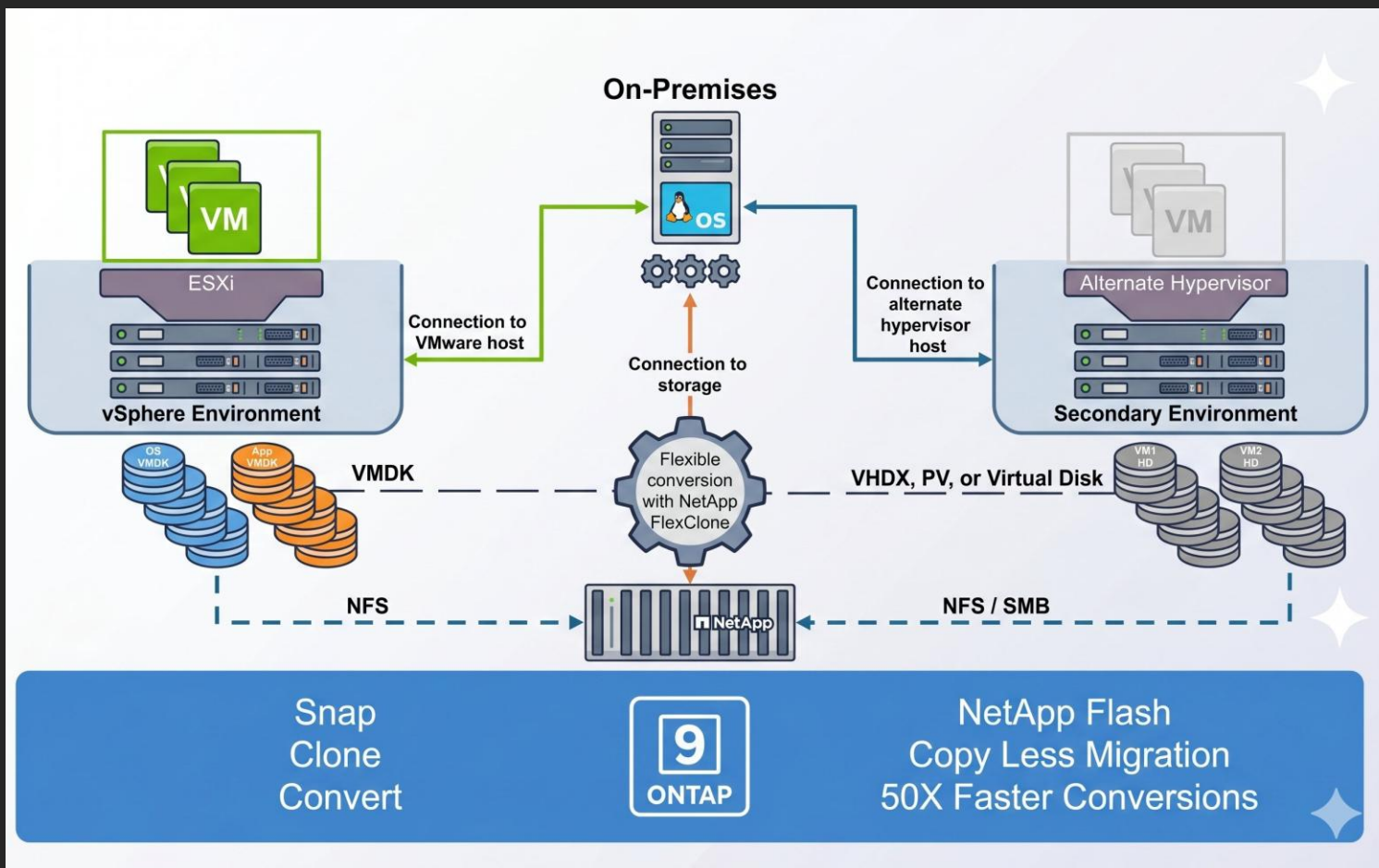
Reduce migration & licensing costs

Separate dev/test & production

簡化遷移 NetApp Shift Toolkit

在轉換過程中，Shift 工具組會連接至 VMware ESXi 與 Microsoft Hyper-V 主機，以及 NetApp 共用儲存設備。Shift 工具組利用 FlexClone 技術，透過三項核心 NetApp 技術，將虛擬機硬碟從一個 Hypervisor 格式轉換至另一個：

- 單一磁碟區多協定支援 — NetApp ONTAP 可在單一磁碟區上輕鬆啟用多種存取協定。例如，VMware ESXi 可透過 NFS 協定存取某一磁碟區，而 Microsoft Hyper-V 則可透過 CIFS/SMB 協定存取同一磁碟區。
- FlexClone 技術 — FlexClone 可在不複製實體資料的情況下，快速複製整個檔案或磁碟區。儲存系統上的共用資料區塊可由多個檔案或磁碟區共享，因此即使是大型虛擬機磁碟也能極速完成複製。
- 虛擬機磁碟格式轉換 — NetApp PowerShell 工具組與 Shift 工具組內建大量工作流程，可對 NetApp 儲存控制器執行各種操作，其中包含可將虛擬磁碟轉換為不同格式的 PowerShell cmdlet。



簡化遷移 NetApp Shift Toolkit

2
Sites

1
Resource Group

1
Blueprint

8
VMs

VMs

0
Migrated

1
Converted

0
Yet to Move

Environments

2
Virtual Environments

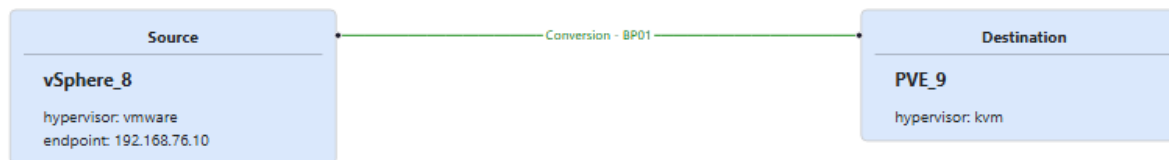
2
Storage Environments

Workflow

Blueprint	Source	Destination	Action
BP01	vmware	kvm	Convert

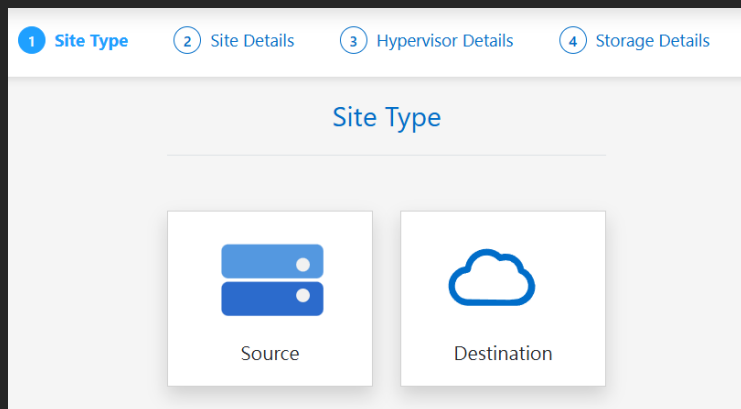
Topology Canvas

[Immersive View](#)

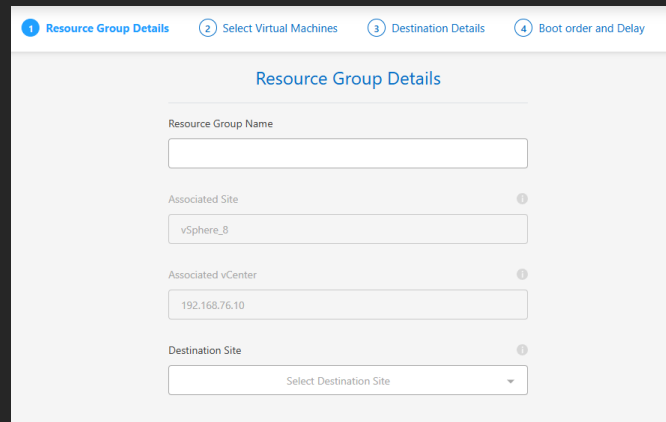


簡化遷移 NetApp Shift Toolkit

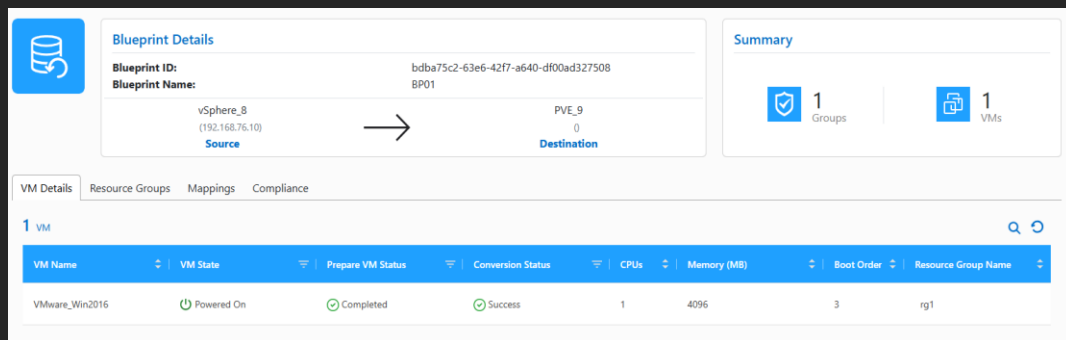
1. Add Source/Destination site



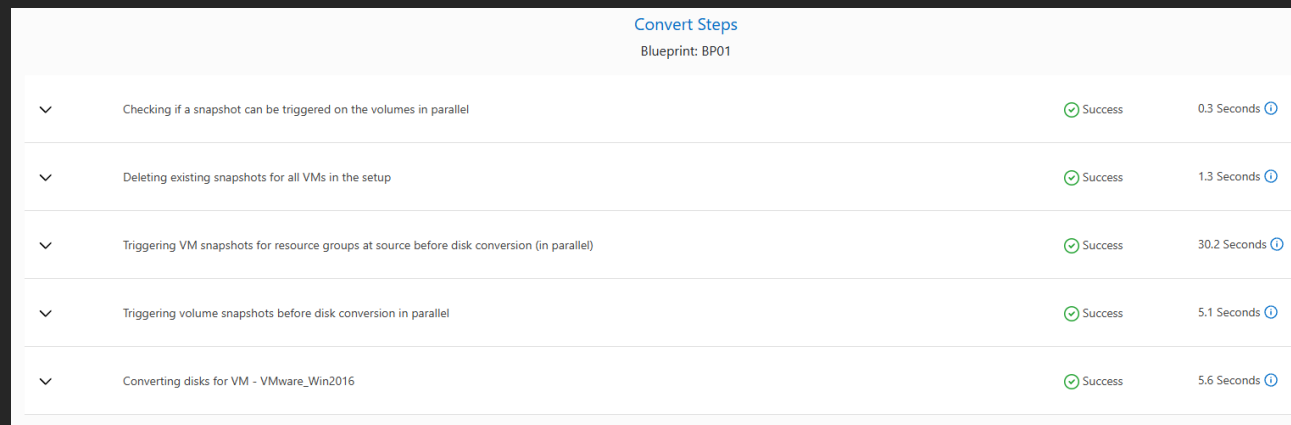
2. Create Resource Group



3. Define Blueprint



4. Migration



簡化遷移 NetApp Shift Toolkit

Edit Settings | lamWin2025

Virtual Hardware | VM Options | Advanced Parameters

ADD NEW DEVICE ▾

> CPU	2 ▾ ⓘ
> Memory	8 ▾ GB ▾
> Hard disk 1	80 GB ▾
> SCSI controller 0	LSI Logic SAS
> Network adapter 1	VM Network ▾ <input type="checkbox"/> Connected
> CD/DVD drive 1	Datastore ISO File ▾ <input type="checkbox"/> Connect At Power On
> Video card	Specify custom settings ▾
> Security Devices	Not Configured
> Other	Additional Hardware



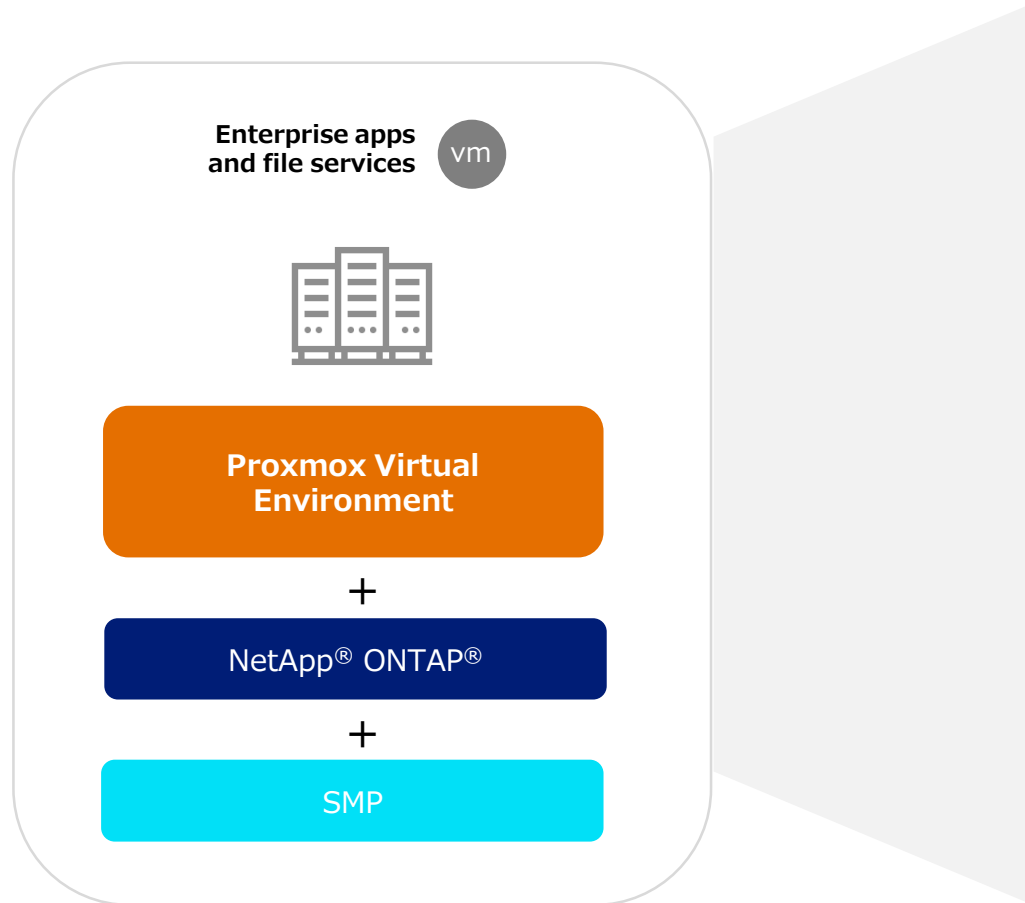
Success	0.3 Seconds ⓘ
Success	1.3 Seconds ⓘ
Success	30.2 Seconds ⓘ
Success	5.1 Seconds ⓘ
Success	5.6 Seconds ⓘ

3. 虛擬化整合

簡化管理

Proxmox, ONTAP and Storage Manager for Proxmox (SMP)

Preview



Proxmox Virtual Environment (VE): Open-source hypervisor-based on Debian Linux, capable of hosting both VMs and Linux containers.

NetApp ONTAP: A unified, intelligent data management platform that enables hybrid and multicloud environments across a variety of hypervisors and use cases.

Storage Manager for Proxmox (SMP): A native Proxmox integration that allows orchestration, provisioning, protection, and cloning of ONTAP storage.

Proxmox, ONTAP and Storage Manager for Proxmox (SMP)

Preview

NetApp Storage Manager for Proxmox Preview

Dashboard

- Plan
- Provision
- Protect
 - Backup
 - Restore
 - Clone
- Preserve
- Process Logs

Proxmox Cluster 1

Hosts 3

Datastores 81

ONTAP Clusters 2

SVM 19

Capacity Used
10% Used
0.68 TiB / 7.03 TiB

Storage Volumes 512

Restored Count 0

Cluster Health
Healthy
Nodes: 3/3 Online
SMPProxClus: 3/3

Protection Policies 1

Resource Group 2

Virtual Machines
Total: 19, Protected: 1, Running: 2, Stopped: 17

Proxmox Utilization
Memory: 10.51 GiB / 70.41 GiB (14.92%)
Storage: 1.44 TiB / 12.63 TiB (11.40%)
CPU: 9.43%

Proxmox, ONTAP and Storage Manager for Proxmox (SMP)

Preview

ONTAP DETAILS

- Storage Cluster: SMPProxClus
- Volume Name: SMPDemoVol
- Size: 2 GB
- Storage Virtual Machine: svm_sie_dev_func01
- Aggregate Name: NSOL_NetApp_A400_T11U3_02_NV...
- LIF: 192.168.118.223 (Preferred LIF)
- Export Policy: demoExportPolicy

PROXMOX DETAILS

- Proxmox: SMPProxmox-ApiToken
- Nodes: sie-dev-proxmox-node01
- NFS Version: 3
- Content:
 - Select All
 - Container template
 - Snippets
 - Disk image
 - Backup
 - Import
 - ISO image
 - Container

Content Dropdown:

- nconnect = 3
- M...

Storage	LIF	NFS Version	Total Storages
testing_110	192.168.118.223	3	10

Buttons: Cancel, Provision

Proxmox, ONTAP and Storage Manager for Proxmox (SMP)

Preview

NetApp Storage Manager for Proxmox Preview 🔔 ⚙️ ?

Dashboard
Plan
Provision
Protect
Backup
Restore
Clone
Preserve
Process Logs

VMs ✖ Storage 🗄 Resource Groups 🗄 Policies 🗄

Total 34 Protected 0 Total 16 Protected 0 Total 0 Protected 0 Policies 0

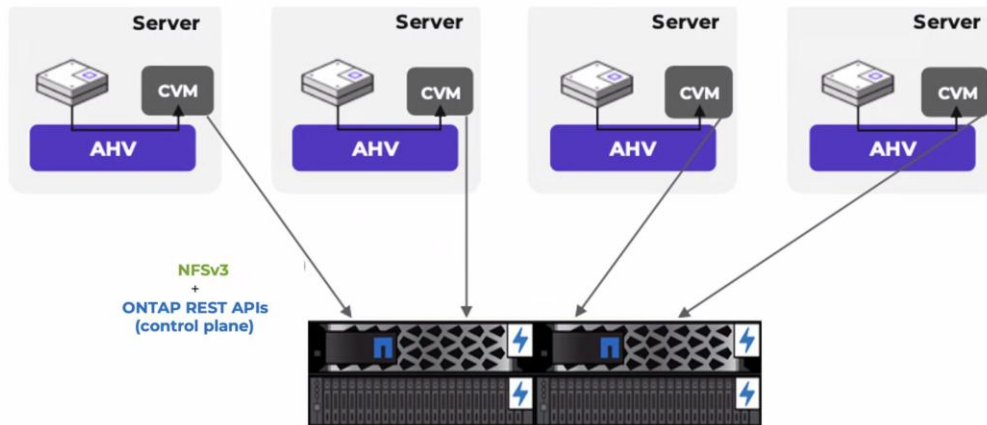
34 VMs VMs Storage Resource groups Policies 🔄

VMID	Name	Backup	Backup Status	Last Backup Date	Proxmox Cluster	ONTAP Clust
102	TVM-U18	🔄	-	-	DemoPVE	-
103	ewafead	🔄	-	-	DemoPVE	DemoClus56
114	localvm	🔄	-	-	DemoPVE	-
115	localvm02	🔄	-	-	DemoPVE	-
105	nim01	🔄	-	-	DemoPVE	DemoClus56
106	nim02	🔄	-	-	DemoPVE	DemoClus56
107	nim03	🔄	-	-	DemoPVE	DemoClus56
101	nimnfs01	🔄	-	-	DemoPVE	DemoClus56

NetApp + Nutanix Joint Solution

- External Enterprise Storage for AHV

Nutanix+NetApp Design



Corporate Narrative

10

Nutanix Cloud Platform

3 AHV Hosts (*minimum*)

AHV Enterprise Features

- Flow virtual networking & security
- Disaster Recovery
- Managed by Prism

Runs on Industry Standard Servers

NetApp Storage & Data Management

Storage Efficiency, Security, Cyber Resiliency

Powered by ONTAP

- Snapshots, clones, space reclamation offloaded to ONTAP
- Autonomous Ransomware Protection

NFSv3 – virtual disks are files on NFS volume

NetApp Shift Toolkit enables migration to Nutanix AHV

Availability

General Availability

2H CY26

NVMe/TCP

Future Availability

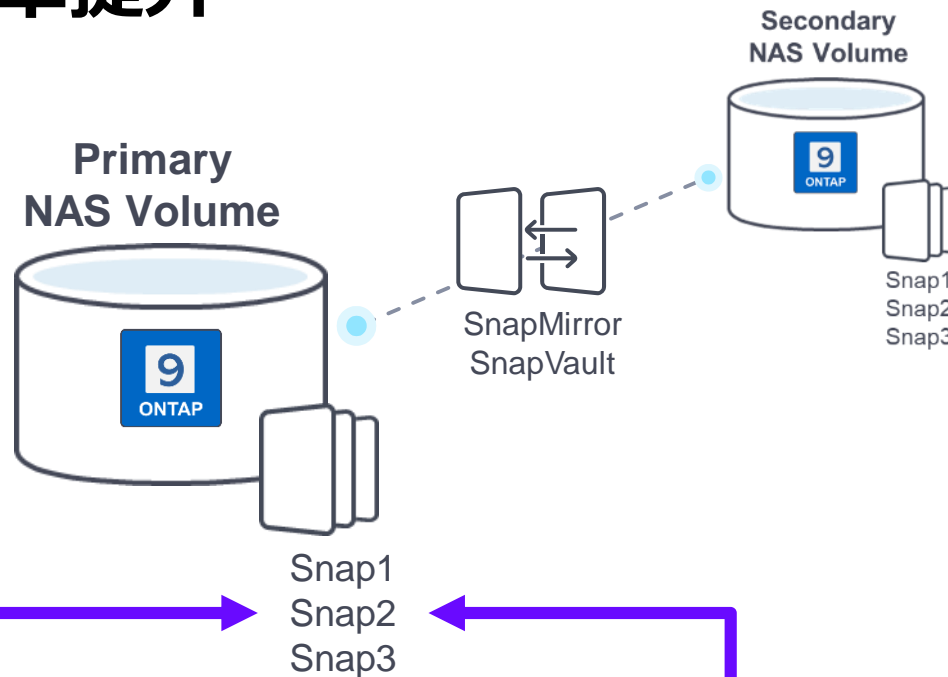
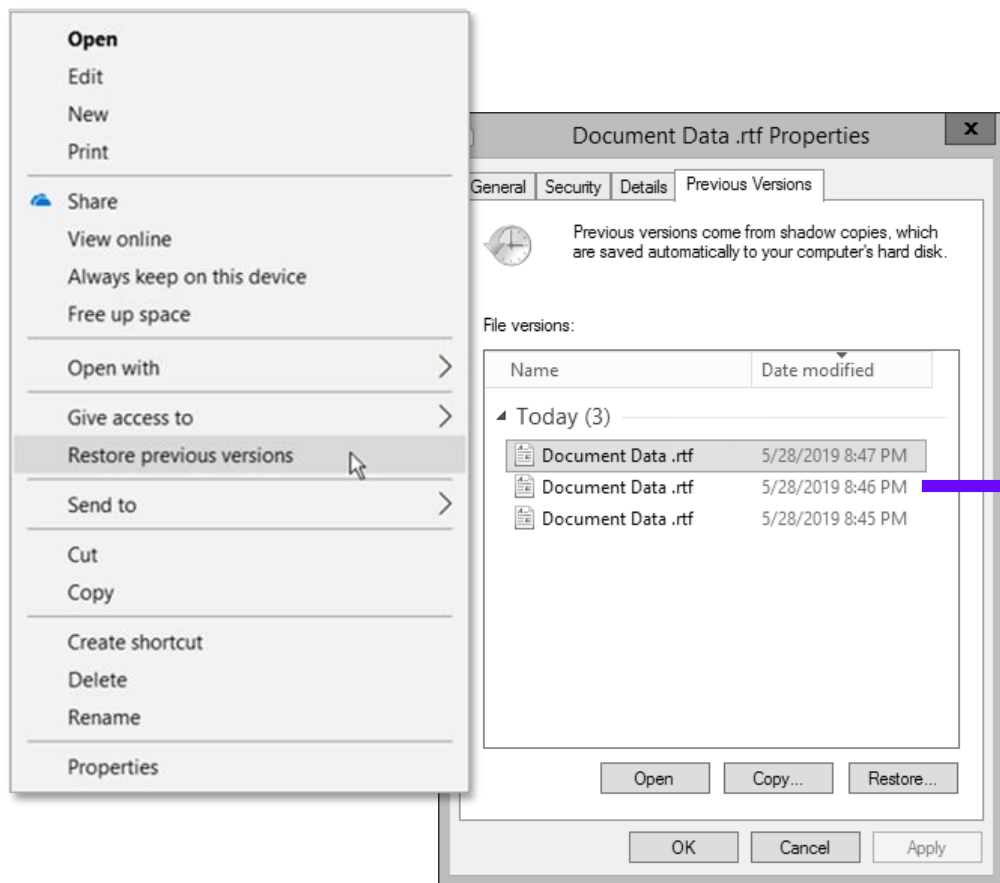
Nutanix Cloud Clusters (NC2)

Future Availability

4. 需要注意備份備援 支援度？跟你想像的不一樣

以快照技術為核心，實現營運簡化與效率提升

使用者可自行還原檔案，無需 IT 管理員介入



OR

```
root@unix1:/home/user1/data
[root@unix1]# ls -la
total 16
drwxr-xr-x  2 root root 4096 28 mai  21:45 .
dr-xr-xr-x 28 root root 4096  2 avril 15:54 ..
-rw-r--r--  1 root root   69 28 mai  21:45 Document Data.rtf
drwxrwxrwx  5 root root 4096 28 mai  21:45 .snapshot
[root@unix1]#
[root@unix1]#
[root@unix1]# ls -la .snapshot/
total 20
drwxrwxrwx 5 root root 4096 28 mai  20:45 .
drwxr-xr-x 2 root root 4096 28 mai  20:45 ..
drwxr-xr-x 2 root root 4096 28 mai  20:45 snap1
drwxr-xr-x 2 root root 4096 28 mai  20:45 snap2
drwxr-xr-x 2 root root 4096 28 mai  20:45 snap3
```

NetApp Replication Technology

超高效率的資料移動能力

■ SnapMirror 提供高效率的資料移動與複寫能力

- 支援混合雲與多雲架構，資料可在不同環境間自由流動
- 透過持續且可排程的同步機制，確保資料即時且一致
- 僅複寫資料變更（deltas），並結合儲存效率技術，大幅降低傳輸成本

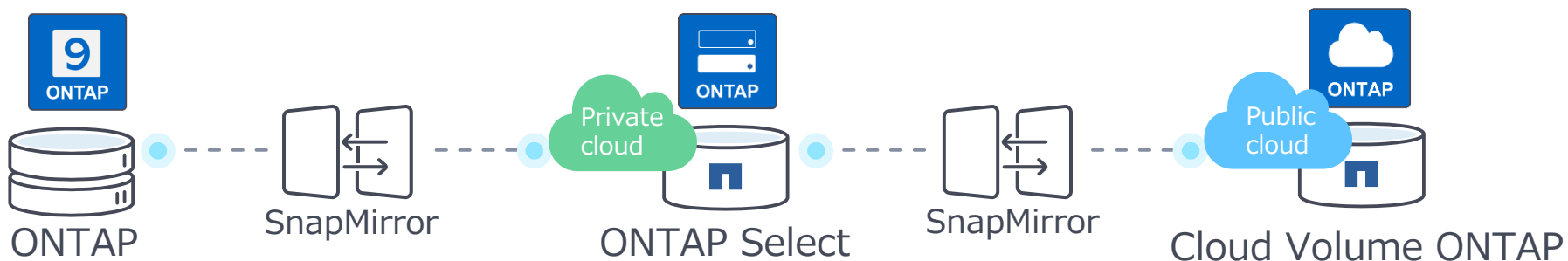
■ 適用於災難復原（DR）、備份，以及應用與系統的快速遷移

■ 支援快速還原、即時接管與無縫切回，確保業務不中斷

aws Cloud Volume ONTAP AWS

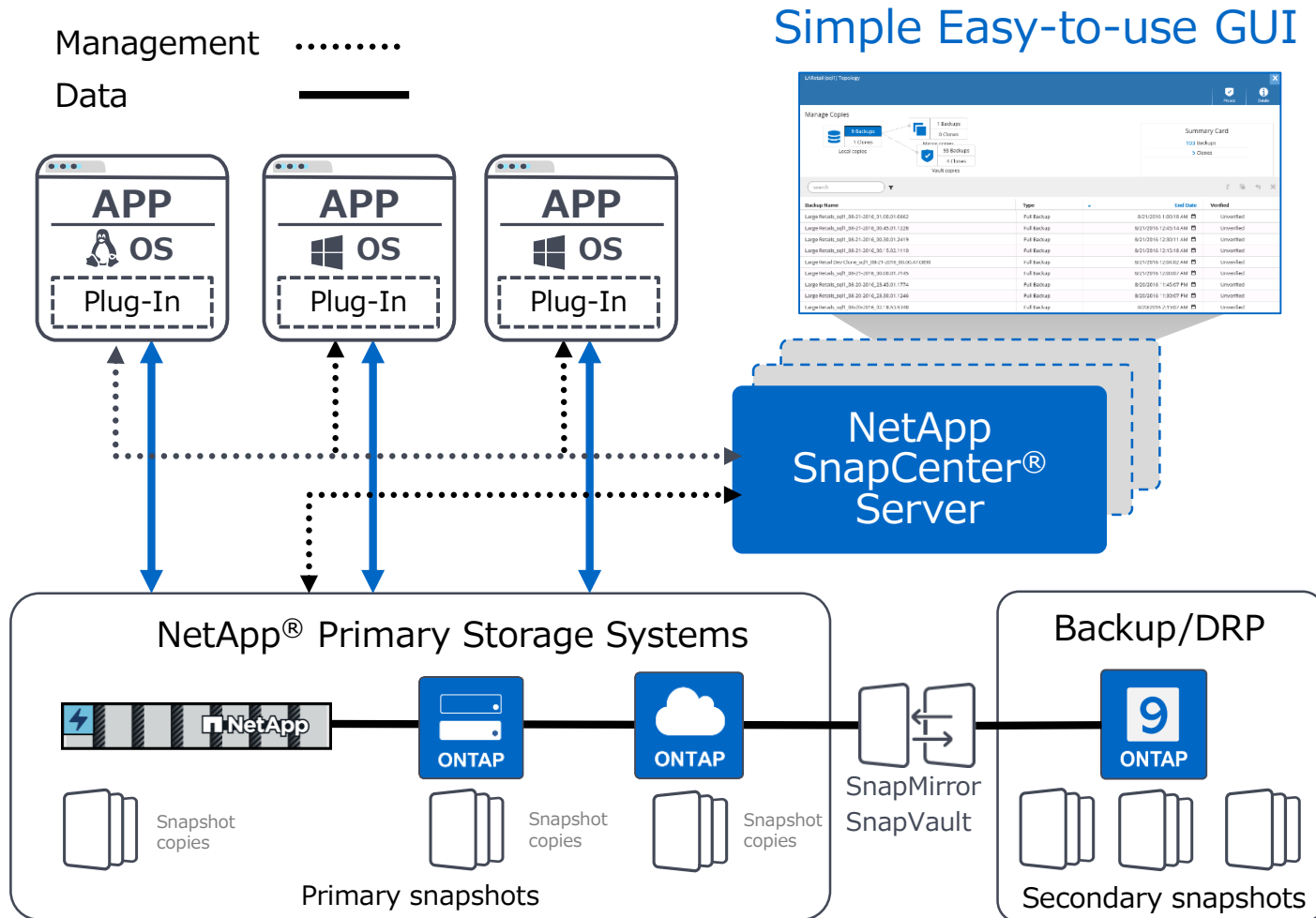
Cloud Volume ONTAP Azure

Cloud Volume ONTAP Google



NetApp SnapCenter

應用程式與虛擬機的一致性備份與復原



NetApp Supported:



Community Supported:



末日工具箱 SnapLock

不可變 (Immutable) 且不可刪除 (Indelible) 的快照副本

Immutable, indelible NetApp® Snapshot™ copies

在數位金庫內實施數據鎖定，結合嚴密的存取監控與高強度安全加固，構築無法逾越的防線

Same API and orchestration

提供與所有 ONTAP® 系統完全一致的全套技術支援

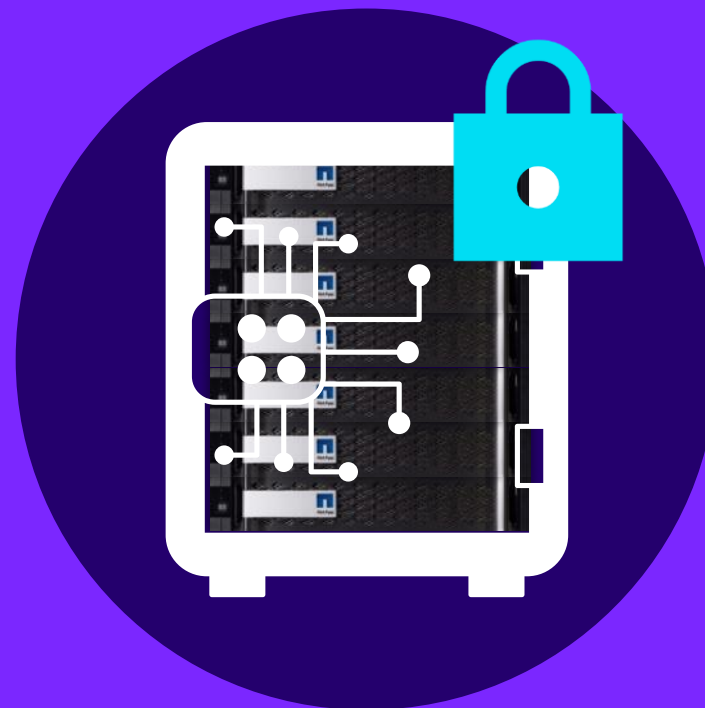
You can leverage the full spectrum of ONTAP® storage:

提供從經濟型的大容量快閃 (Capacity Flash) 與混合快閃 (Hybrid Flash)，到極致效能快閃 (Performance Flash) 的多樣化選擇，以滿足各類復原時間目標 (RTO)

Integrated storage efficiency:

數據在整個生命週期中始終保持「重複數據刪除」與「壓縮」狀態，從而大幅加速復原過程

NETAPP CYBER VAULT



Immutable and indelible snapshots

5. 一直漲價怎麼辦

兼具彈性、自由度、未來的消費方式

Keystone offering



ON-PREM SERVICES

Mandatory commitment to one or more NetApp® Keystone® STaaS on-premises services



CLOUD SERVICES

- 500GiB free CVO capacity pre-commitment
- CVO Add-on: 1TiB Increments, 4TiB Min (Co-termed with Keystone STaaS)

Flexible **20%, 40% or 60% burst capacity** for on-prem and cloud at **same rate** as that of committed capacity

1-to-5 year* term commitments

Cloud capacity reallocation – shift up to **25%** of on-prem spend to cloud per quarter

Capacity reduction** of up to **25% annually**

Billing Frequency: monthly, quarterly, semi-annual, annual upfront***

* 4th and 5th year not applicable if cloud services is included
** Minimum subscription term should be 24 months
*** Not available if cloud services is included in the subscription

Unified Performance Service Levels

	EXTREME	PREMIUM	STANDARD	VALUE
Protocols	FC, iSCSI, NVMe/FC, NVMe/TCP, NFS, NFSv4/RDMA, SMB, S3*	FC, iSCSI, NVMe/FC, NVMe/TCP, NFS, NFSv4/RDMA, SMB, S3*	FC, iSCSI, NVMe/FC, NVMe/TCP, NFS, NFSv4/RDMA, SMB, S3*	FC, iSCSI, NVMe/FC, NVMe/TCP, NFS, NFSv4/RDMA, SMB, S3*
Example Workloads	AI	DB	Virtualization / VDI	Backup, Moodle影音
Target Latency	<1 ms	<1 ms	<4 ms	>4 ms
Target IOPs (max)	1M	550K	500K	N/A
Target Throughput (max)	40 GB/s	20 GB/s	20 GB/s	N/A
Min committed capacity	50 TiB	50 TiB	100 TiB	100 TiB
Capacity increment	25 TiB	25 TiB	25 TiB	25 TiB

Block Optimized Service Levels

	EXTREME	PREMIUM
Protocols	NVMe/TCP, NVMe/FC, FC, iSCSI	NVMe/TCP, NVMe/FC, FC, iSCSI
Example Workloads	Oracle, MS SQL Server	Oracle, MS SQL Server
Target Latency	<1 ms	<1 ms
Target IOPs (max)	850K	450K
Target Throughput (max)	65 GB/s	25 GB/s
Min committed capacity	50 TiB	50 TiB
Capacity increment	25 TiB	25 TiB

Object and Cloud Performance Service Levels

	OBJECT		CLOUD
	CAPACITY	VALUE	CVO
Protocols	S3	S3	NFS, CIFS, iSCSI, S3* (*AWS & Azure only)
Min committed capacity	200 TiB	500 TiB	4 TiB
Capacity increment	25 TiB	100 TiB	1 TiB
Platform	SGF6112 (30.7 or 61.4T QLC)	SG6160 (HDD)	CVO

儲存即服務 做到恰到好處

彈性、可擴展且無縫的資料管理

Pay for outcomes



SLO-based performance service levels to meet workload requirements

Pay as you grow



Predictable billing that aligns with business growth

Predictable Availability



99.999% data availability that comes as standard

Cloud ready from the start



Leverage cloud services and on-premises services, with one simple operating model

Managed for you



Assets owned, managed, and supported 24x7 by NetApp

企業可以依照最符合自身利益的條款來消費，並自由選擇要由企業內部的 IT 團隊自行管理，或者是交由 NetApp 認證的合作夥伴 (Certified Partner) 來協助維運

THANK YOU

