

NetApp Filer Training



系統整合、資訊服務的第一選擇



Simple
Fast
Reliable

麟瑞科技股份有限公司

高雄服務部

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- ✦ Unified Storage Architecture
- ✦ FAS3250 硬體介面
- ✦ NetApp 儲存空間架構
- ✦ NetApp Snapshot
- ✦ NetApp HA
- ✦ Management Software
- ✦ NetApp NFS & CIFS
- ✦ 日常維運(volume/snapshot管理)



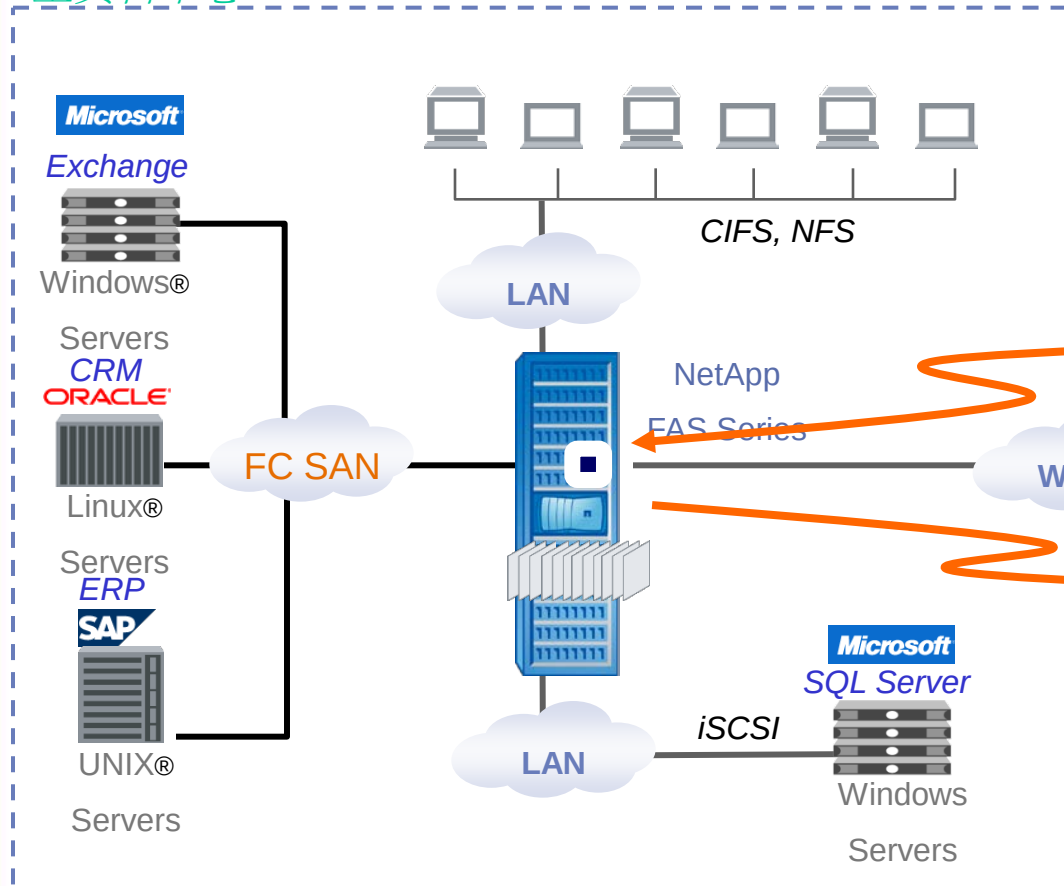


Unified Storage Architecture

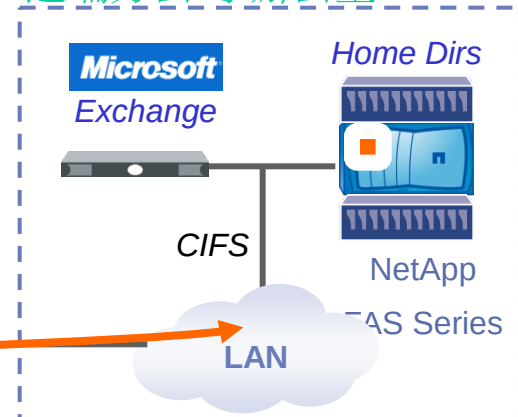


NetApp複合式儲存架構

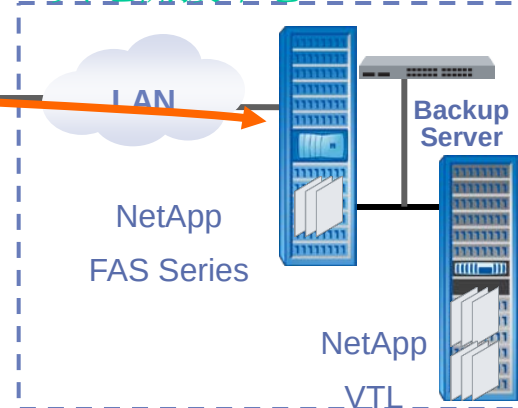
主資料中心



遠端分公司/辦公室



異地備援中心



✦簡易且單純的儲存架構，大幅降低管理複雜性與成本

簡單-可靠-快速

✦可靠且靈活有彈性，確保企業永續經營

✦快速、卓越的運作效率，有效提昇企業生產力



應用結構方式

大型SAN結構

中小型SAN結構

NAS

備份

虛擬化架構

異地備援架構

Archive & Compliance

不同的硬體設備

不一樣的軟體

需耗費大量的人力維護

不一樣的處理方式

NetApp FAS and V-Series



All run
Data ONTAP®

相同的硬體設備
相同的軟體
相同的人力維護
相同的處理方式

- 一種的作業軟體，幫助您做全部的事情
- 改進並且讓企業更有效率



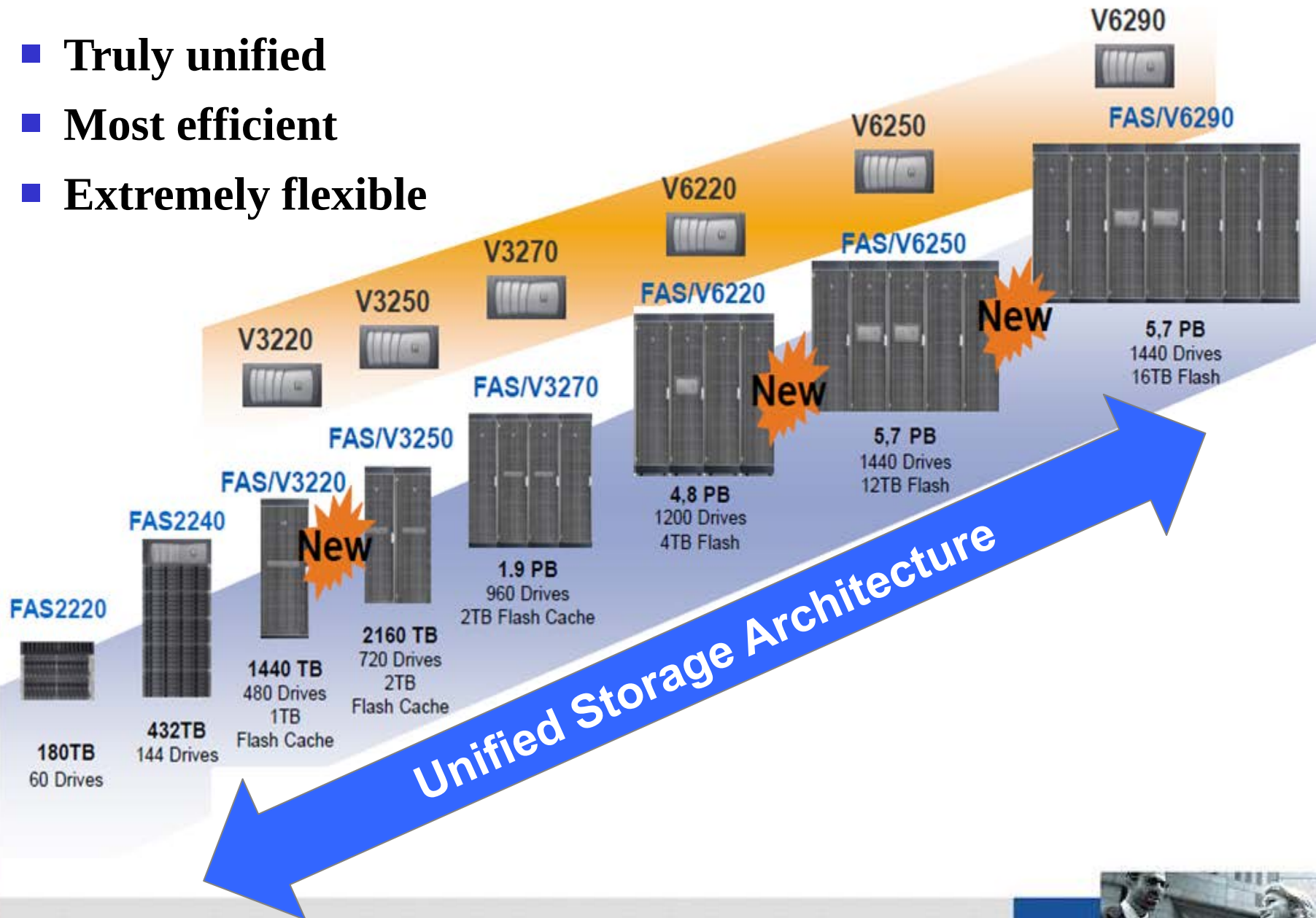


NetApp FAS 3250



New Entry System Added to Line

- Truly unified
- Most efficient
- Extremely flexible



FAS/V3200 Refresh Highlights

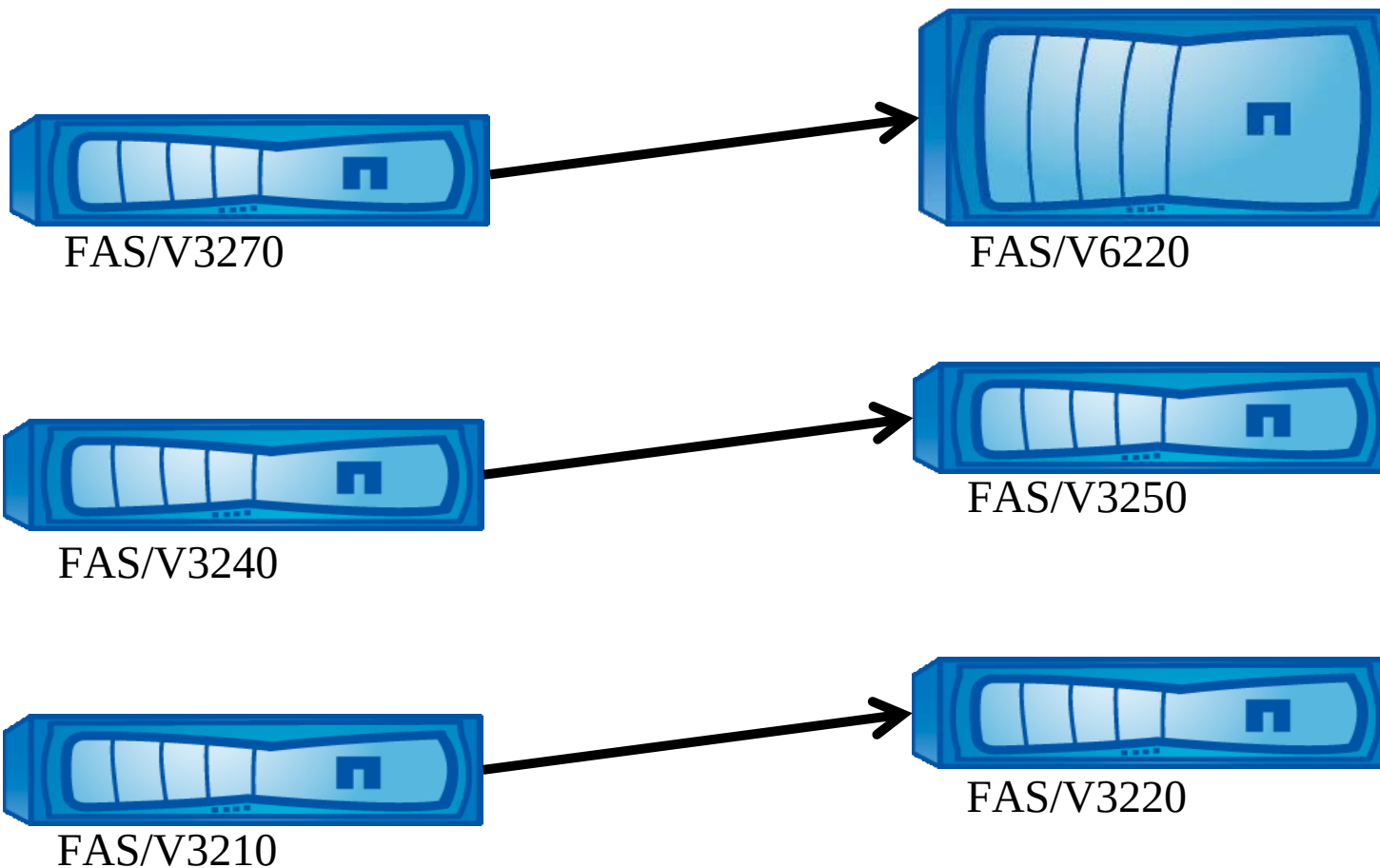
FAS3220 and FAS3250



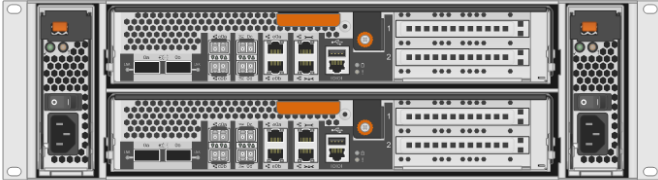
- **Two new models based on the existing FAS/V3200 architecture**
 - FAS/V3220 and FAS/V3250
- **> 50% higher benchmark throughput**
 - More cores (2x)
 - More memory on FAS/V3220 vs FAS/V3210 (2.4x)
 - More memory on FAS/V3250 vs FAS/V3240 (2.5x)
- **More NVMEM will help with write intensive workloads**
- **Standard FAS/V3250 configuration with high-bandwidth I/O card included**
 - Two base configurations with either 10GbE NIC or 8Gb FC
 - X1117A for 10GbE or X1131 for 8Gb FC
 - Similar to FAS6200 approach for FC or SAS adapter
- **Flash Cache and Flash Pool support**
 - Both models, no caveats
- **Supported in Data ONTAP® 8.1.2 RC2**



FAS/V3200 Refresh Transitions



FAS/V3200 Single-Chassis Configurations

	Standalone	HA
FAS/V3210 FAS/V3220		
FAS/V3220 FAS/V3240 FAS/V3270		
FAS/V3250		Not Supported



FAS/V3200 Dual-Chassis Configurations

HA Pairs

FAS/V3210
FAS/V3220



FAS/V3220
FAS/V3240
FAS/V3250
FAS/V3270



FAS Systems at a Glance

HA System Configurations

	3210	3220	3240	3250	3270	6220
HA configurations	A only	A or AE	A or AE	AE only	A or AE	A
CPU cores	4	8	8	16	8	16
Physical memory	10GB	24GB	16GB	40GB	40GB	96GB
NVMEM * / NVRAM	1GB	3.2GB	2GB	4GB	4GB	8GB
Max drive count	240	480	600	720	960	1200
Max capacity	960TB	1920TB	2400TB	2880TB	38400TB	4800TB
Onboard GbE	4	4	4	4	4	4
Onboard 10GbE	0	0	0	0	0	8
Onboard FC / speed	4 x 4Gb	4 x 4Gb	4 x 4Gb	4 x 4Gb	4 x 4Gb	8 or 16 8Gb
Onboard 6Gb SAS	4	4	4	4	4	0 or 8
PCIe slots	4	4 or 12	4 or 12	12	12	8
Flash Cache support	Limited**	✓	✓	✓	✓	✓
Flash Pool support	✗	✓	✓	✓	✓	✓

* NVMEM takes up part of physical memory

** Installed systems only that are running Data ONTAP® 7.3.5.1 or later, 8.0.x, or 8.1.1



FAS2200 Product Line Specs

HA configurations

	FAS2220	FAS2240-2	FAS2240-4
Form Factor	2U	2U	4U
Chassis Depth	20.5 in.	19 in.	24 in.
Max Storage	180 TB	374 TB	432 TB
Max Drive Count	60	144	144
Flash Pool support	✓	✓	✓
Onboard GbE	8	8	8
Onboard 6 Gb SAS	4	4	4
Other Ports Supported	N/A	4 x 8Gb FC or 4 x 10 GbE via optional I/O card	4 x 8Gb FC or 4 x 10 GbE via optional I/O card
Physical Memory *	12GB	12GB	12GB
Disk Shelf Convertible	No	✓	✓
OS Version	Data ONTAP 8.1.1+	Data ONTAP 8.1+	

Aggregate and Volume Sizes

Data ONTAP 8.1.x

	FAS3210	FAS3220	FAS3240	FAS3250	FAS3270	FAS6220
Maximum number of volumes	500					
Maximum aggregate size	75TB	90TB	90TB	105TB	105TB	162TB
Maximum volume size	50TB	60TB	50TB	70TB	70TB	70TB
Maximum volume size with dedup and/or compression	50TB	60TB	50TB	70TB	70TB	70TB



Aggregate and Volume Sizes

Data ONTAP 8.2 (updates in blue cells)

	FAS3210	FAS3220	FAS3240	FAS3250	FAS3270	FAS6220
Maximum number of volumes – 7-Mode	500					
Maximum number of volumes - cDOT	500			1000		
Maximum aggregate size	150TB	180TB	180TB	240TB	240TB	324TB
Maximum volume size	50TB	60TB	50TB	70TB	70TB	70TB
Maximum volume size with dedup and/or compression	50TB	60TB	50TB	70TB	70TB	70TB



Supported Back-End Storage

Data ONTAP 8.1.x

	Shelf Module
DS2246	IOM6
DS4243	IOM3
DS4246	IOM6
DS4486	IOM6
DS14mk4 *	ESH4
DS14mk2 *	ESH2/ESH4 **
DS14mk2-AT	AT-FCX

* Data ONTAP® 8.1.x supports 15K FC disks that are 144GB in size and larger, 10K FC disks that are 300GB in size and larger, and SATA disks that are 500GB and larger. FC disks 72GB and smaller are not supported in Data ONTAP 8.1.x.

** DS14mk2 shelves are only supported in Data ONTAP 8.1.x with ESH4 shelf modules.



DS2246 Disk Shelf



DS2246: Greater Density, Just as Reliable

- 24 x 2.5" small form factor drives in only 2U rack space
- Available with 10k RPM SAS disk drives
- 30% to 50% lower power consumption than DS4243 shelf
- Same availability and resiliency features as the DS4243



Competitive Disk Shelves

DS2246



DS4243



DS4246

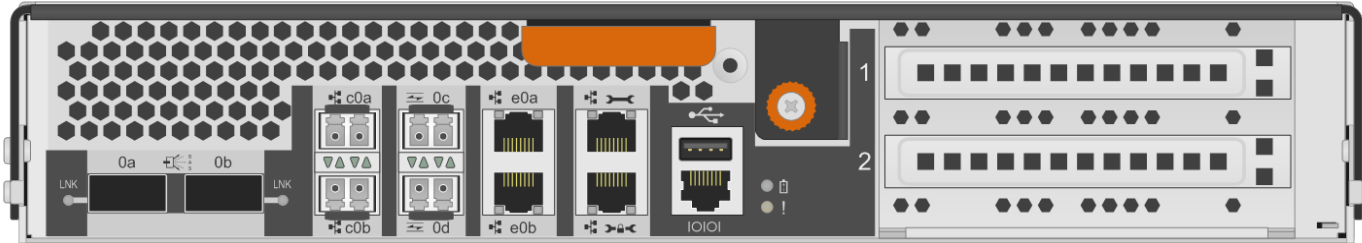


FAS3250AE Front View



FAS/V3200 Slots and Interfaces

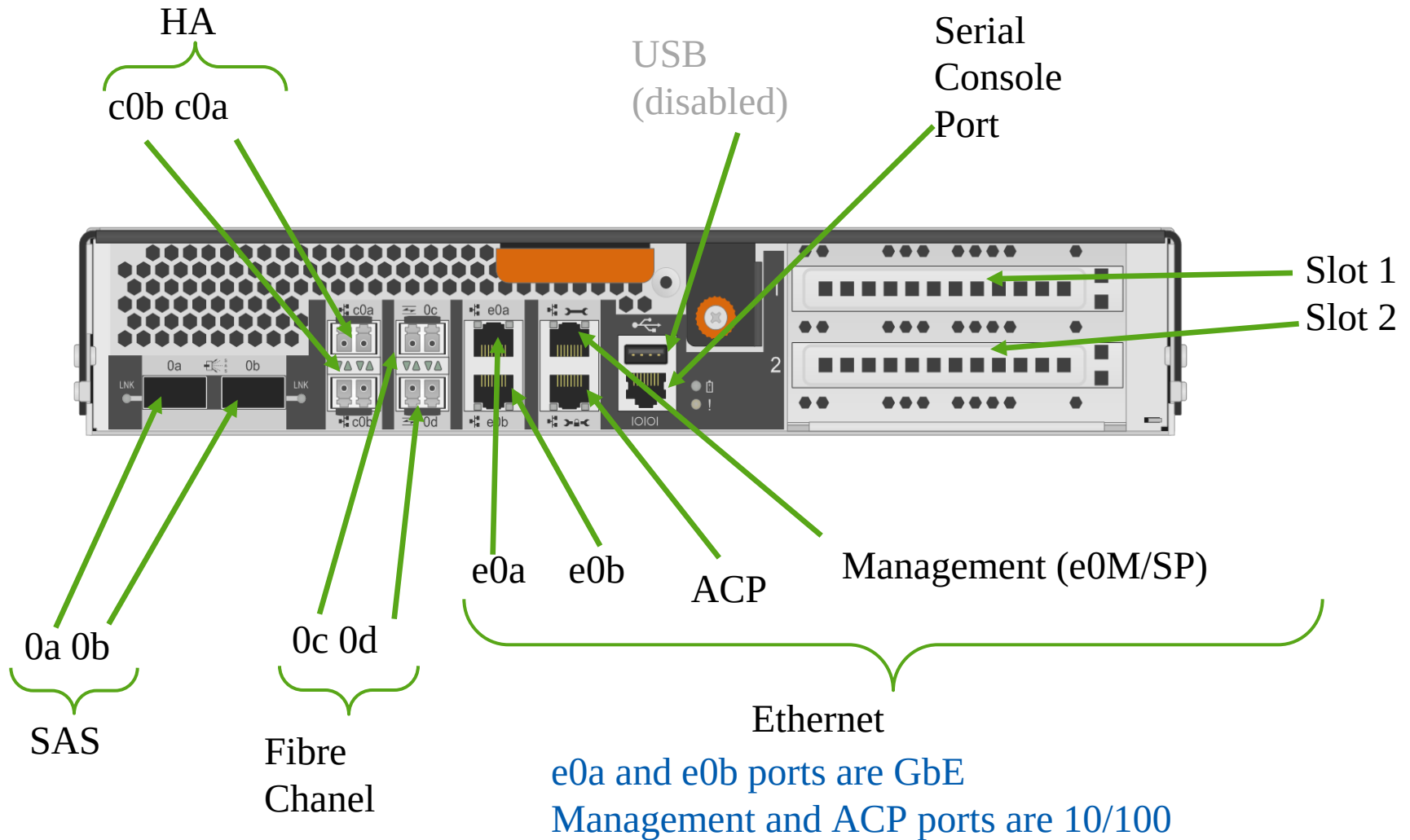
Standalone Controller (ports labeled next slide)



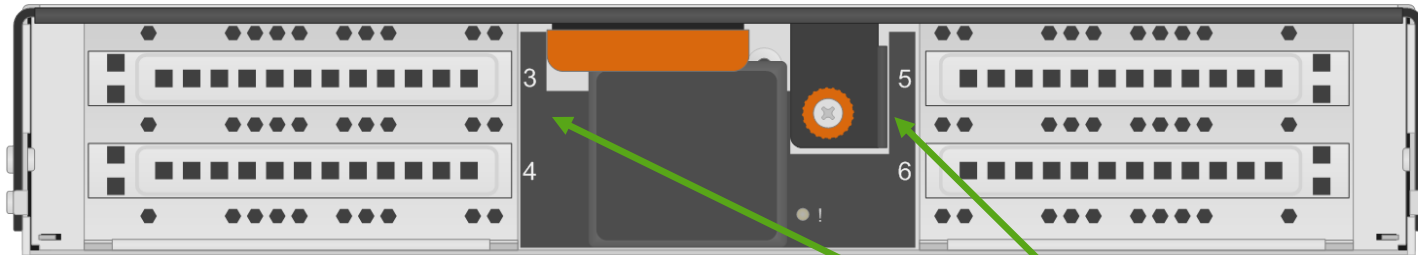
- 2 PCIe v2.0 (Gen 2) x 8 slots
 - Top full height, full length
 - Bottom full height, $\frac{3}{4}$ length
- 2 x 6Gb SAS (0a, 0b)
- 2 x HA interconnect (c0a, c0b)
- 2 x 4Gb FCP (0c, 0d)
- 2 x GbE (e0a, e0b)
- USB port (not currently used)
- Management (wrench)
 - SP and e0M
- Private management
 - ACP (wrench w/lock)
- Serial console port
- I/O expansion module
 - 4 x PCIe 8x
 - Full length, full height slots



FAS/V3200 Controller I/O



FAS/V3200 I/O Expansion Module (IOXM)

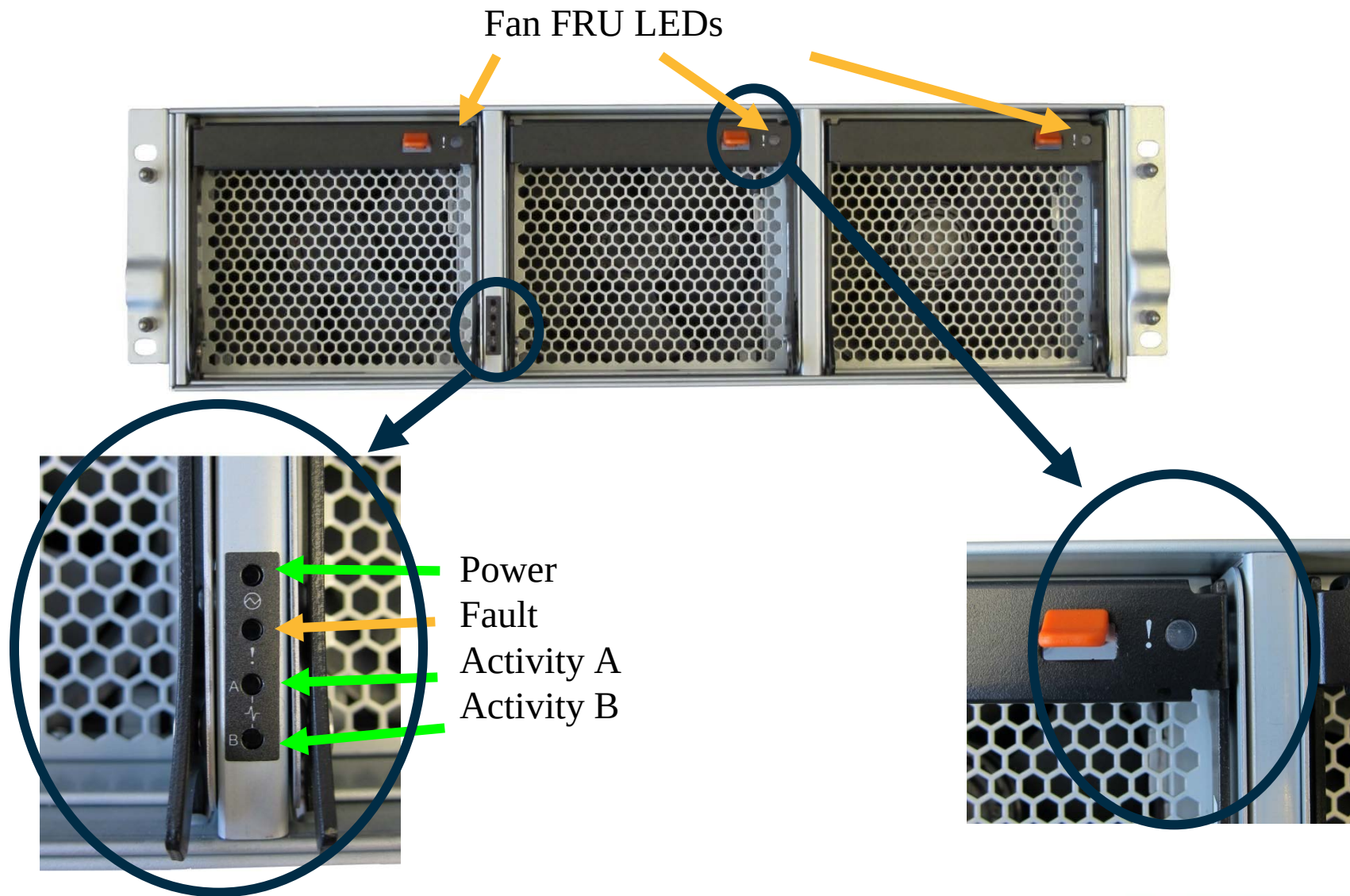


Slot
Numbers

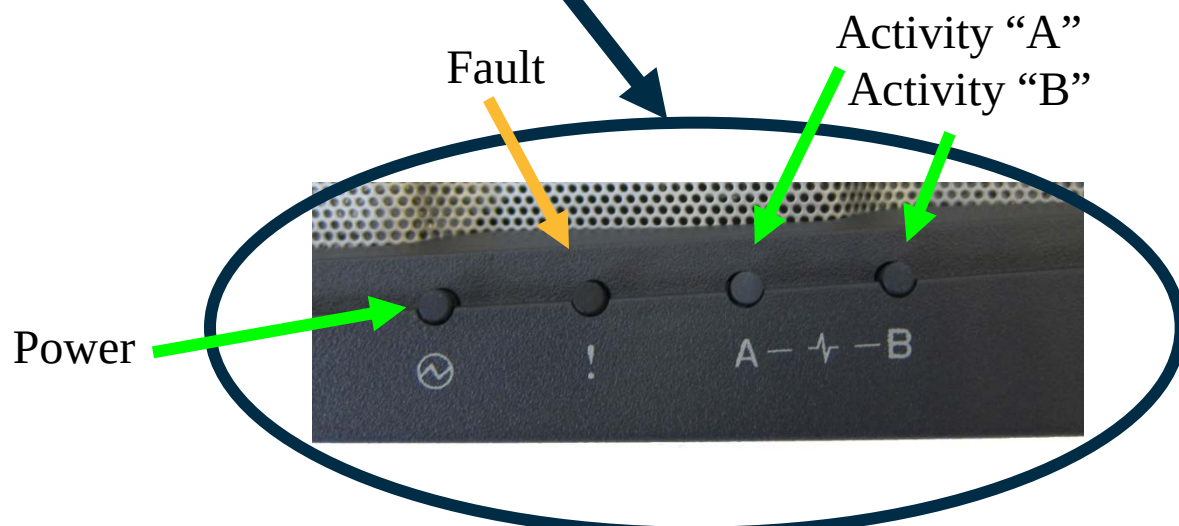
- Not hot swappable
 - Controller will panic if removed
 - If inserted into running FAS/V3200 IOXM not recognized until controller is rebooted
- 4 full-length PCIe v1.0 (Gen 1) x 8 slots



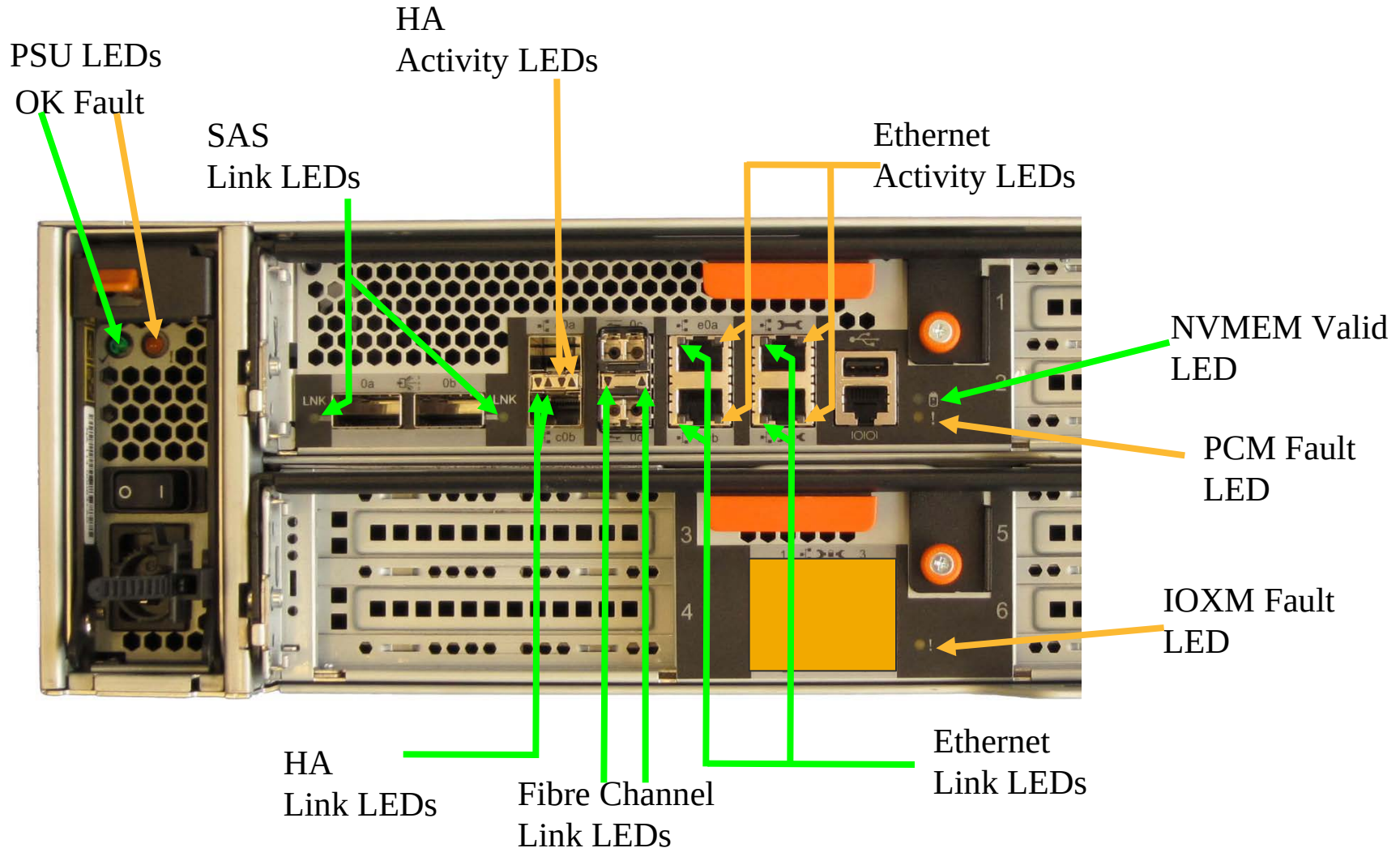
FAS3250 Front LEDs



FAS3250 Front LEDs with Bezel On



FAS3250 Rear Bulkhead LEDs





NetApp 儲存空間架構



Raid Group

- ▶ 就是指Raid 系統(常見的有Raid 0,1,4,5,6)
- ▶ 對Filer 而言 Raid group 特別指Raid4 系統
- ▶ Raid group 可以由各種不同容量的硬碟組成,各個Raid group 之間的硬碟組成容量也可以不同
- ▶ Raid4 至少2顆硬碟: data & parity
- ▶ Raid-DP(Raid6)至少3顆硬碟:data & 2 parity

RAID 6 (RAID-DP)

FC: 28 (26 data disks plus 2 parity disks)

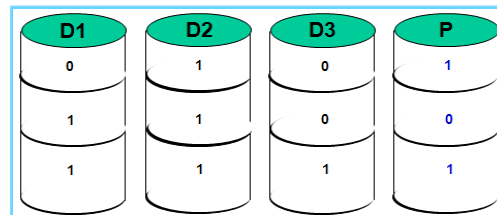
SATA: 20 (18 data disks plus 2 parity disks)



RAID 4

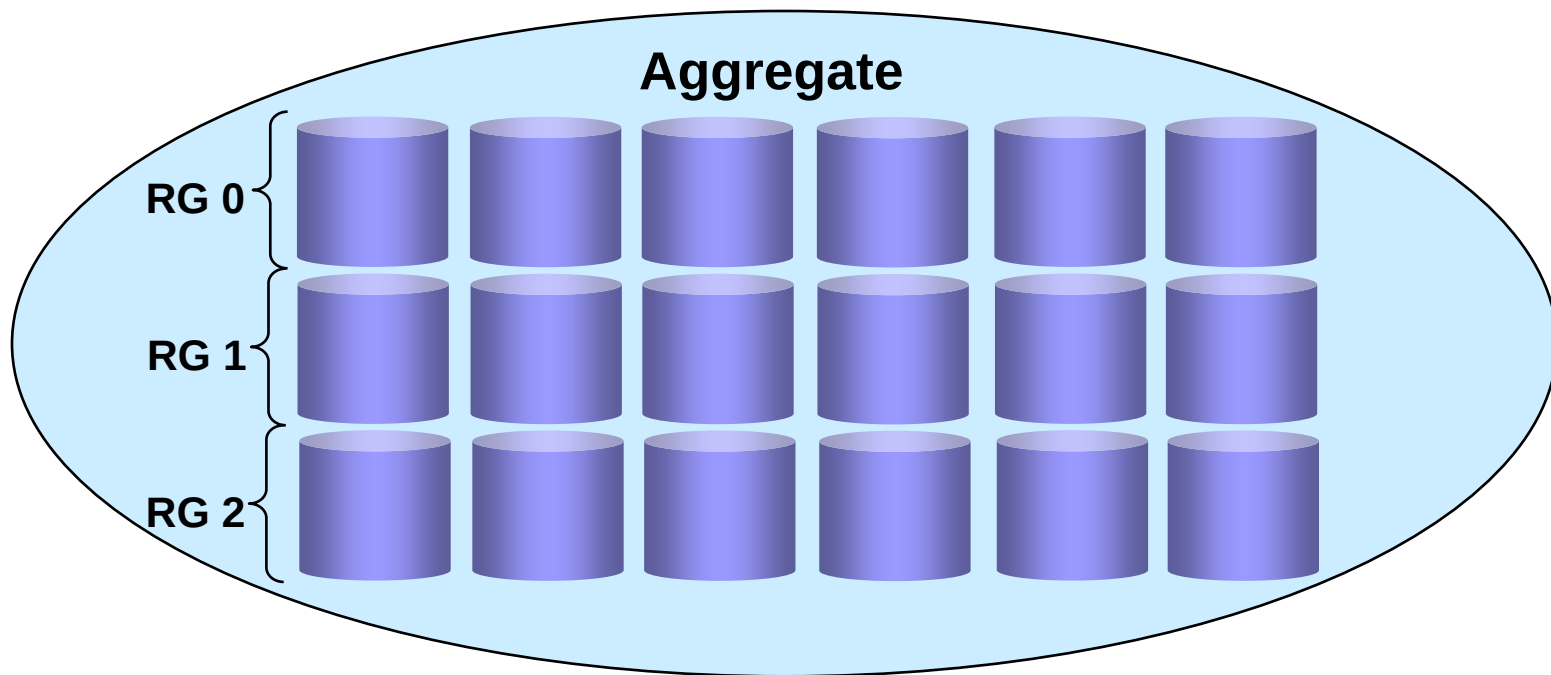
FC: 14 (13 data disks plus 1 parity disk)

SATA: 7 (6 data disks plus 1 parity disk)



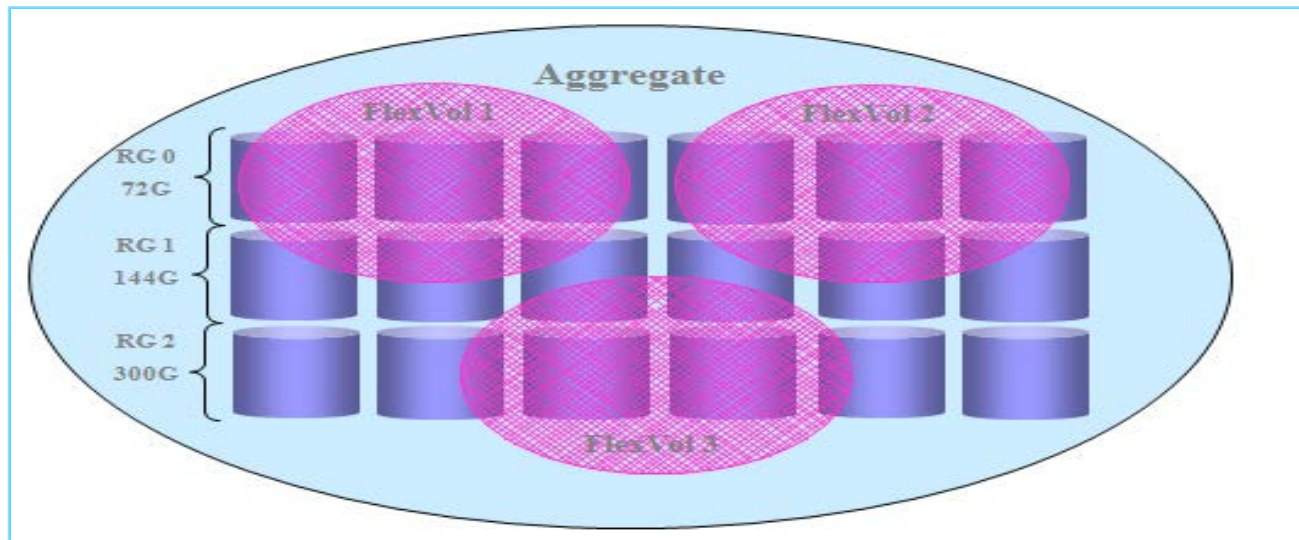
◆ Aggregate

- ▶ 由多個 Raid Group 組成, Aggregate 大小與 DataONTAP 版本和硬體規格有關。

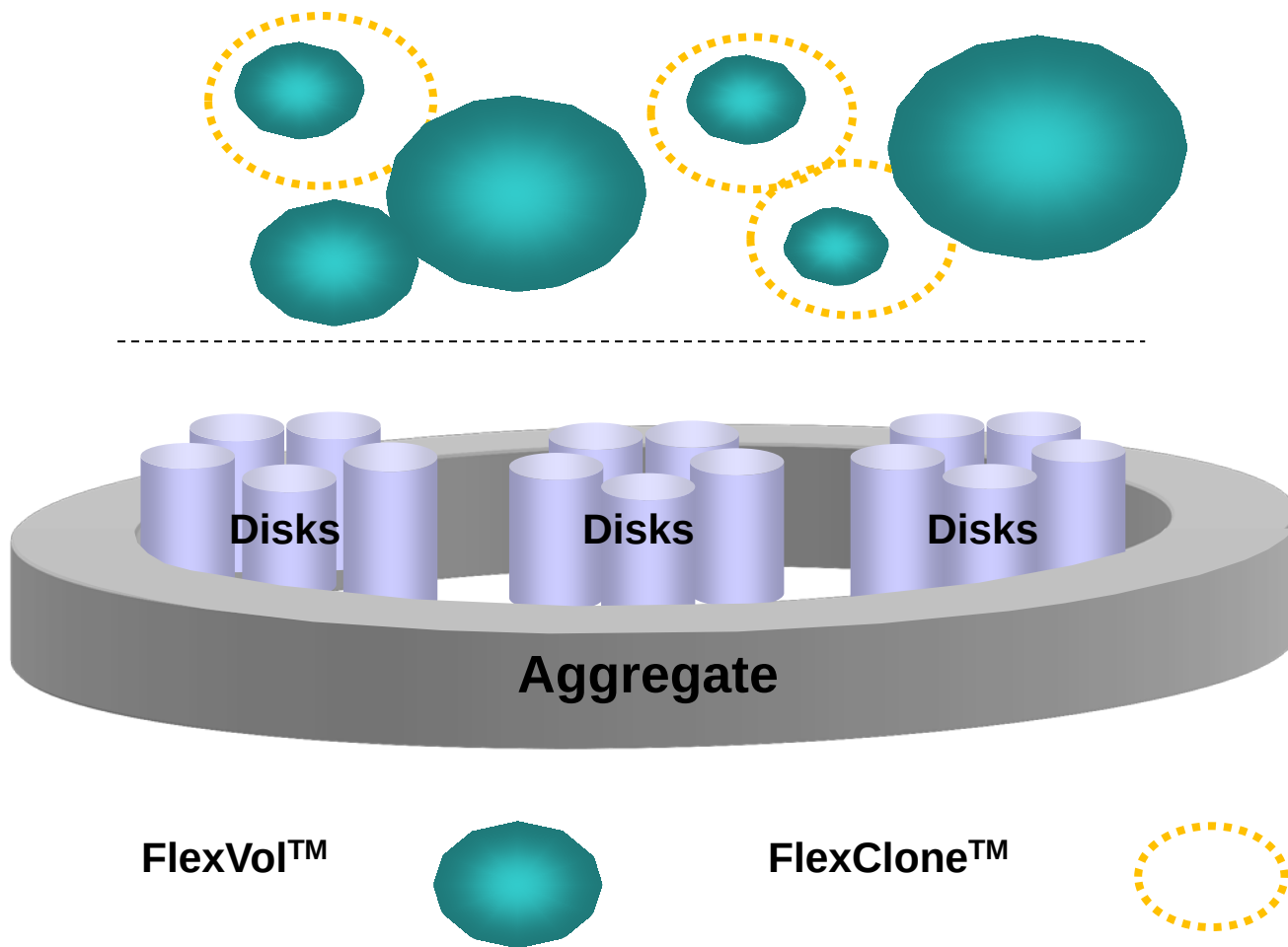


◆ FlexVol (flexible volume)

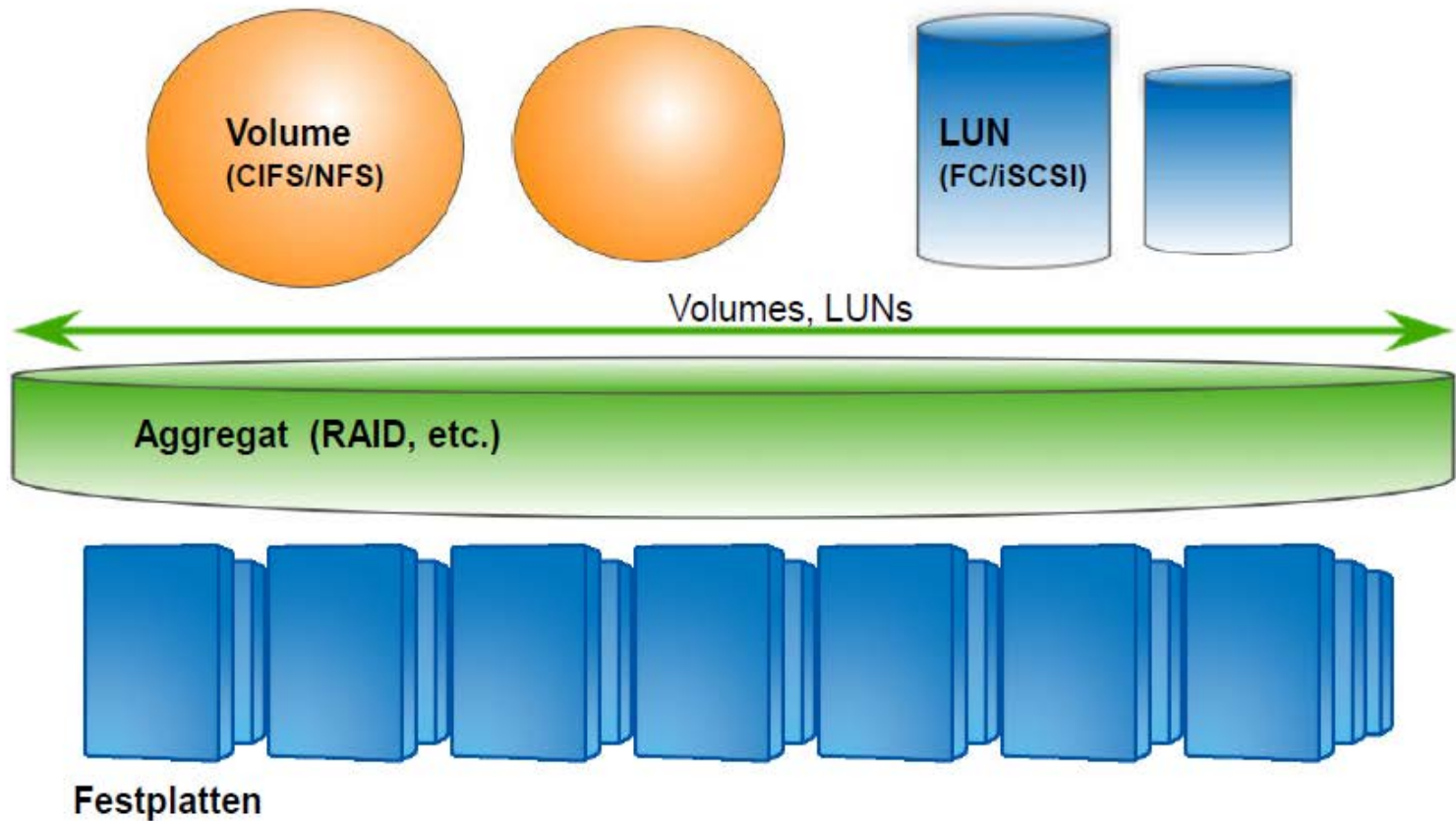
- ▶ 由 Aggregate 中取出的空間,真正給前端系統掛載的使用空間。
可以隨時彈性的放大縮小空間,只要 Aggregate 裡的空間是足夠的。



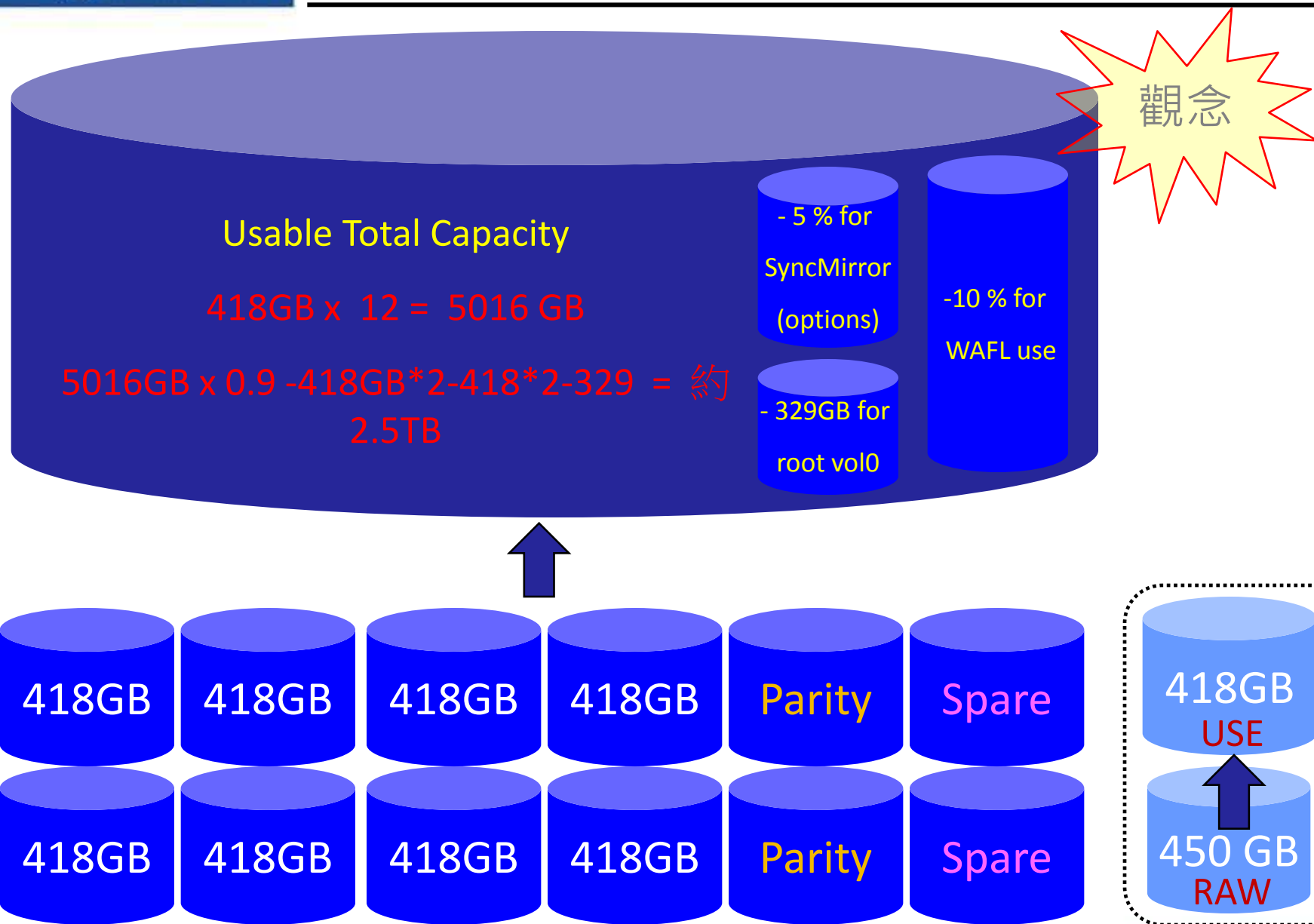
Disk/Raid/Volume/Aggregate



Aggregate, Volumen, LUNs



Usable Aggregate Capacity



~~SATA 和 SAS/FC 不能同一個Aggregate~~

觀念

Aggr1

FlexVol

FlexVol

Aggr0

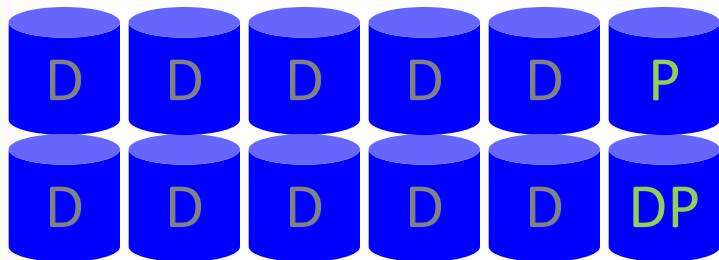
FlexVol

FlexVol

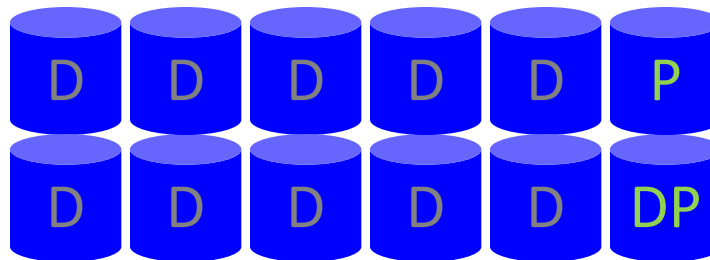
Aggregate

- RAID-DP
Default limited by
16 Disks (FC Max 28)
or Maximum 16 TB
(included Parity Disk)

- RAID-4 limited by 8



RG1: SAS / FC 300GB
15000 RPM



RG0: SATA 1TB
7200 RPM

NV-RAM

- ▶ **Filer** 主機上需要電力的儲存媒體,類似**CF** 記憶卡斷電後資料不會消失
- ▶ 主機上的**NV-RAM**電池是備援的,如果電池沒電的話表示**NV-RAM** 無法作用.則**Filer** 無法開機
- ▶ **NV-RAM** 最主要的作用就是紀錄檔案傳輸的過程,確認檔案傳輸成功.



Snap shot 的相關名詞

- ▶ **Snap shot** : 檔案快照,針對**整各volume** 做紀錄
- ▶ **Inode** : 檔案系統的索引檔,一各**inode** 對應一個**block**
- ▶ **Block size** : 不同檔案系統的區塊位址所佔磁碟容量亦不同,例如 **ntfs 4K ,Fat16 32K,WAFL 4K bytes**
- ▶ **File folding** : 針對**snap shot** 功能進一步做**snap shot** 最佳化的處理讓**snap shot** 不浪費多餘的空間



Snap 稱號的技術或軟體都是根據**snap shot** 的功能演進而來

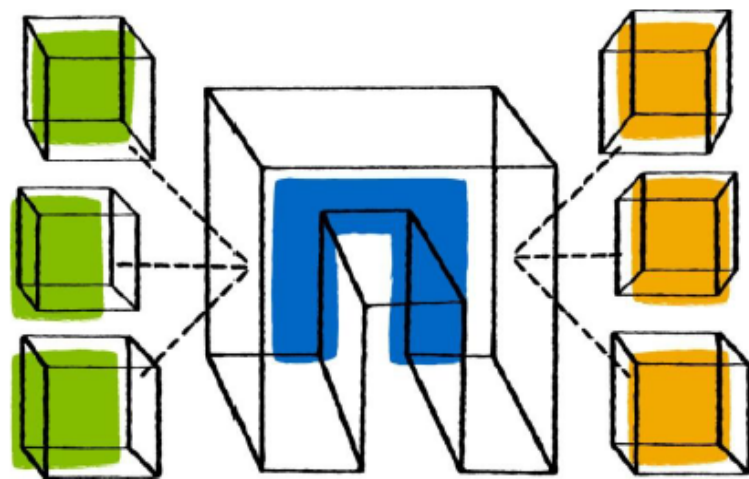
- ▶ **Snap shot** : 複製**inode map** 後鎖定單一時間點檔案系統使用的磁碟區塊狀況
- ▶ **Snap mirror** : 不同地點**Filer** 間的檔案系統複製異地備援方案
- ▶ **Snap restore** : 在很短時間內快速回復單一時間點的檔案系統使用狀態
- ▶ **Snap drive** : 在**client** 端安裝軟體將**mount** 上來的**Filer** 網路檔案系統模擬成本機硬碟



- ▶ **Snap manager** : 安裝完**snap drive** 後, 分別針對 **Lotus Domino, Exchange 5.5 , Exchange 2000** 的 **windows clinet** 軟體, 可非常簡易的利用 **snap shot** 功能來備份及還原上面三種**AP server**
- ▶ **Snap Vault** : 分為 **snap vault client** 跟 **snap vault server** 兩種角色, 主要是針對需要大量備份**Filer**上資料所開發的功能, 可以快速備份及還原**Filer** 上的資料.

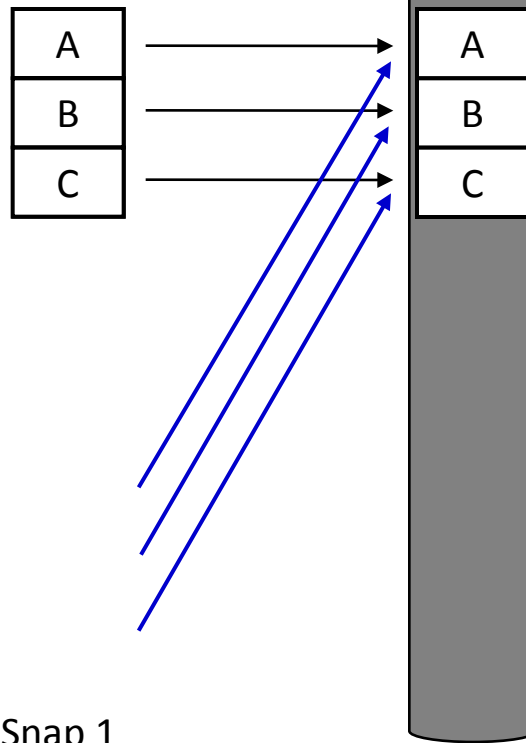


Snapshots



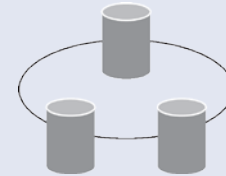
Blocks in
LUN or File

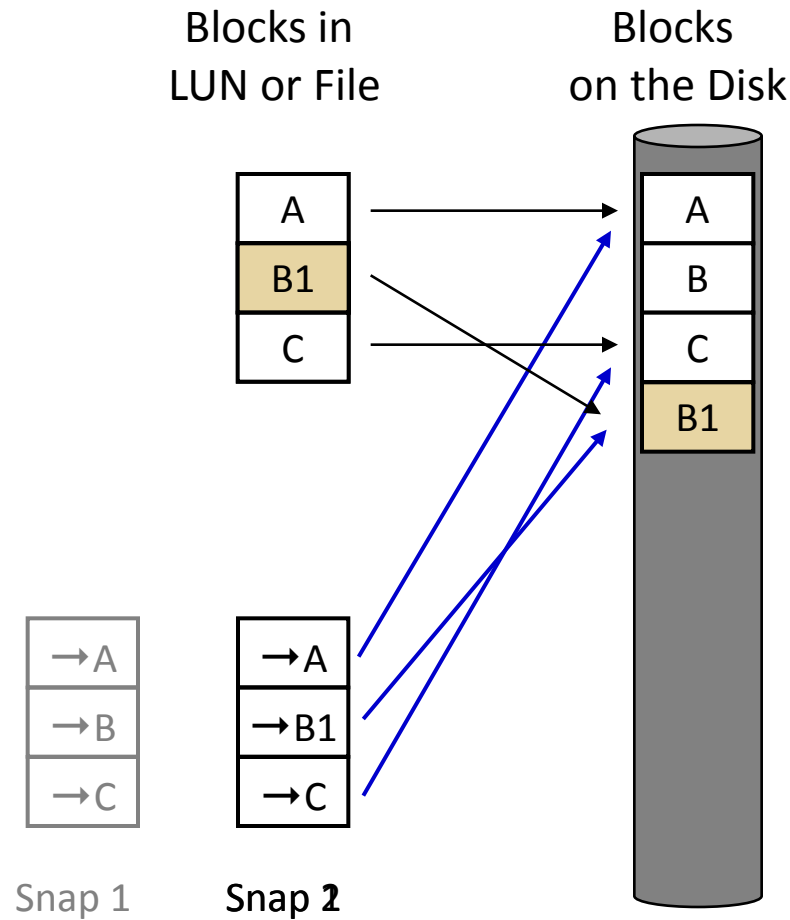
Blocks
on the Disk



✦ Take snapshot 1

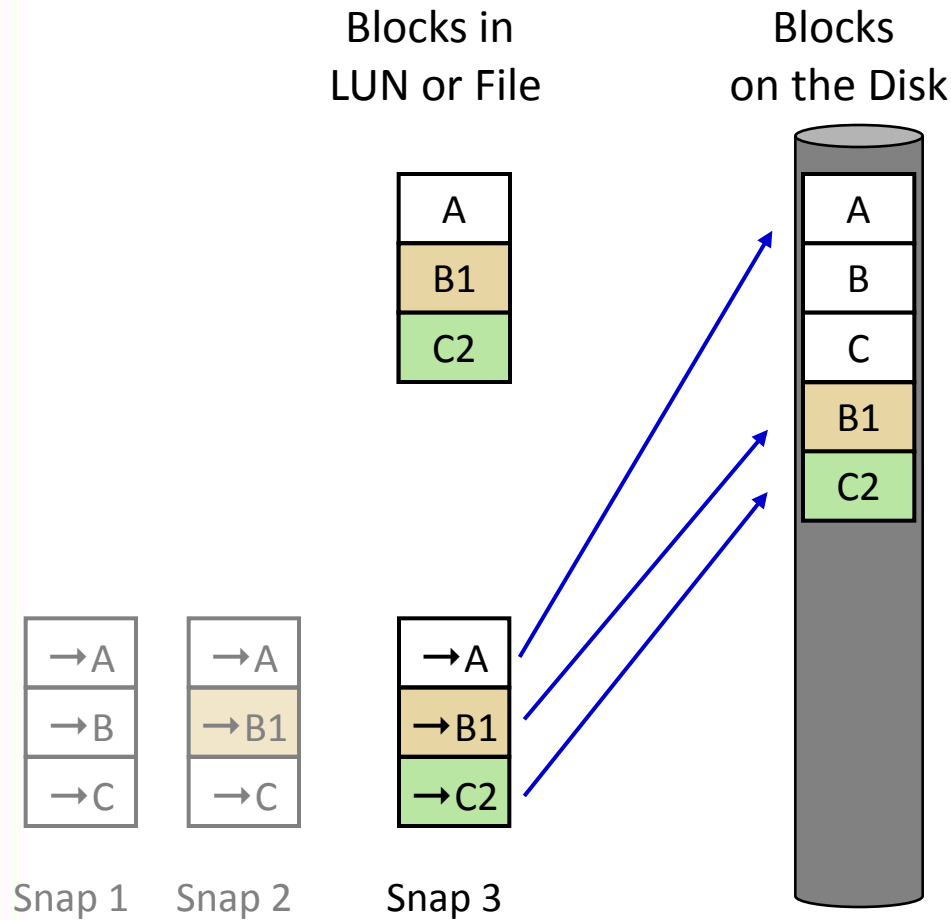
- ▶ Copy pointers only
- ▶ No data movement





- ✦ Take snapshot 1
- ✦ Continue writing data
- ✦ Take snapshot 2
 - ▶ Copy pointers only
 - ▶ No data movement



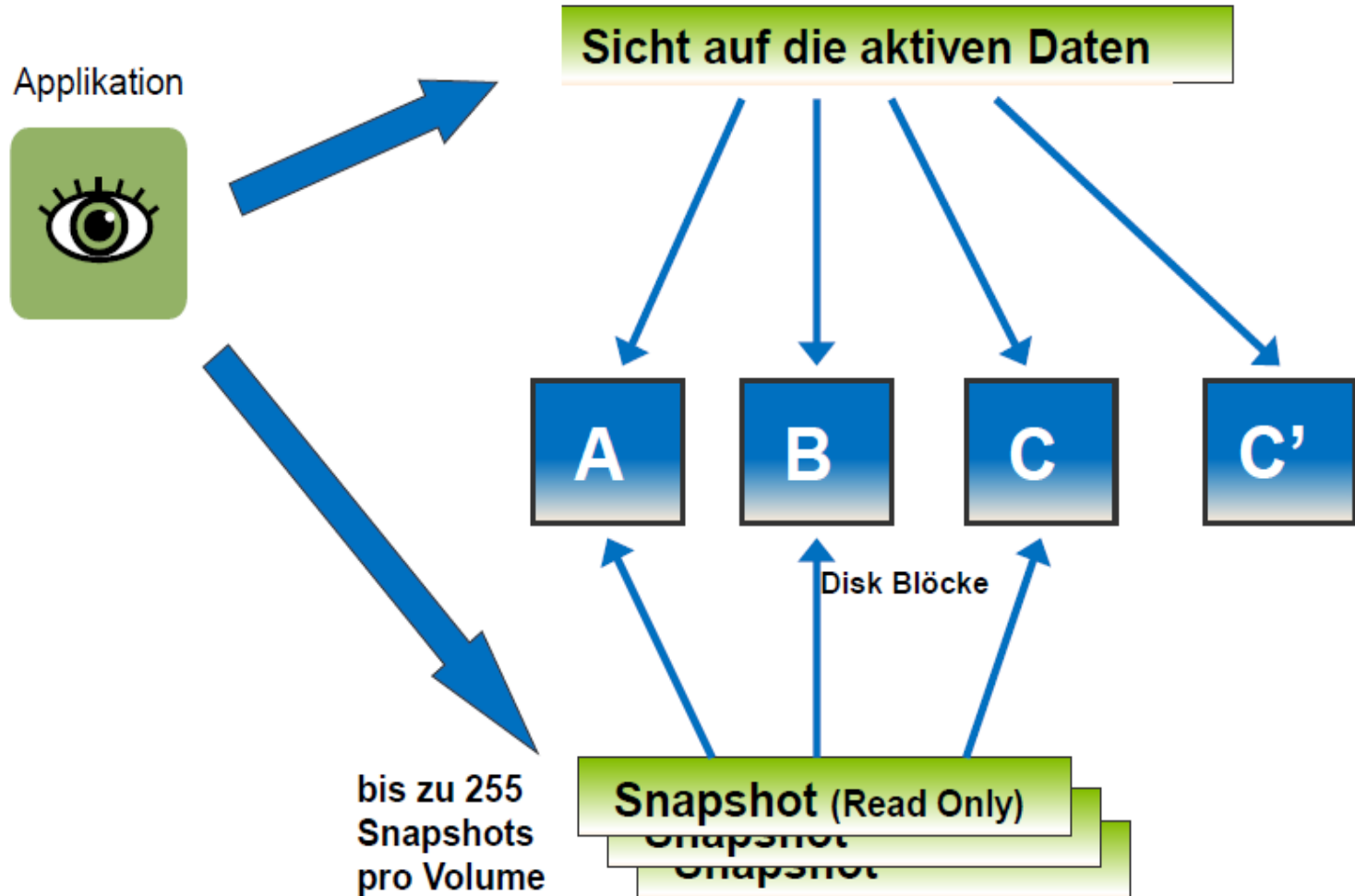


- ✦ **Take snapshot 1**
- ✦ **Continue writing data**
- ✦ **Take snapshot 2**
- ✦ **Continue writing data**
- ✦ **Take snapshot 3**
- ✦ **Simplicity of model =**
 - ▶ **Best disk utilization**
 - ▶ **Fastest performance**
 - ▶ **Unlimited snapshots**

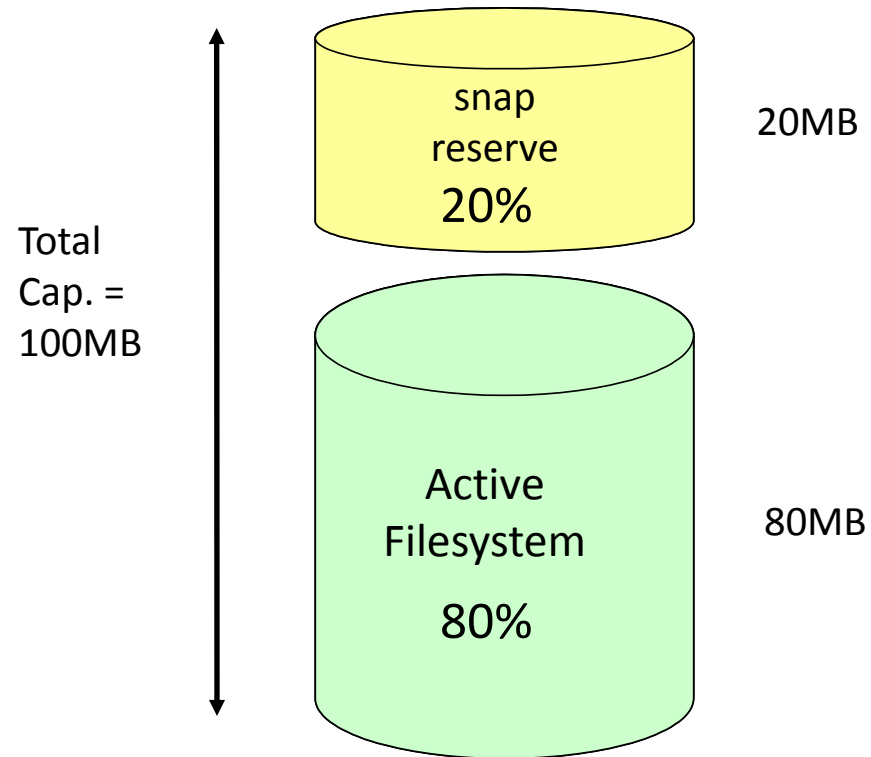


NetApp® *(Basis für Backup/Recovery/Clone)*

NetApp: 1 I/O vorher = 1 I/O mit SnapShot
gegenüber Copy on Write: 3 I/O's



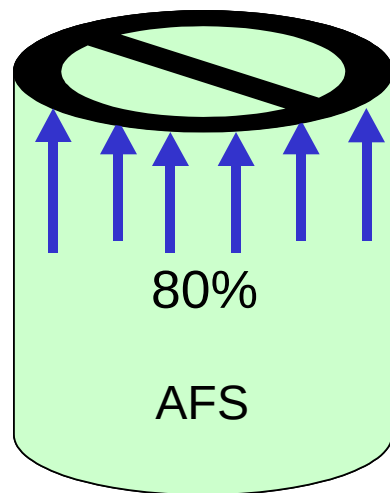
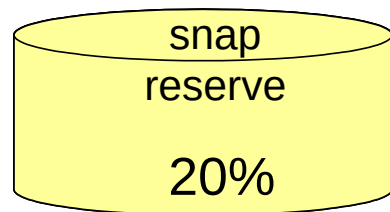
A Volume with 20% Snap Reserve



Snapped Blocks May Encroach on AFS

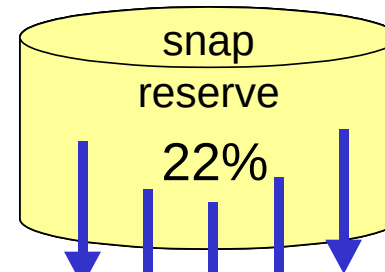
Snap Reserve = 20%

AFS blocks may not encroach upon Snap reserve area

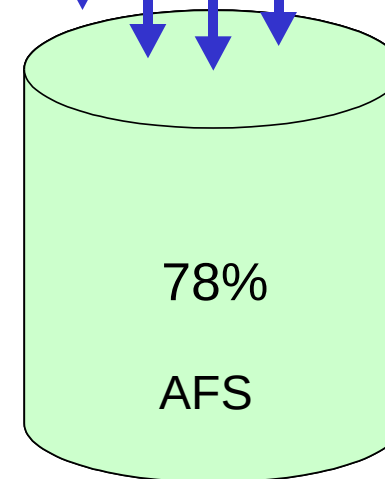


hard
limit

no
limit



Snapped blocks may encroach upon usable AFS space



AFS:Active File System



◆ 不搬動區塊的快照功能

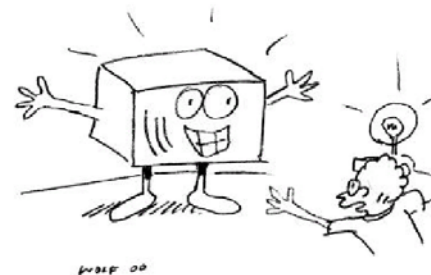
- ▶ 空間最省效率最高，每個volume都有255份的快照備份

◆ 如果資料沒有異動

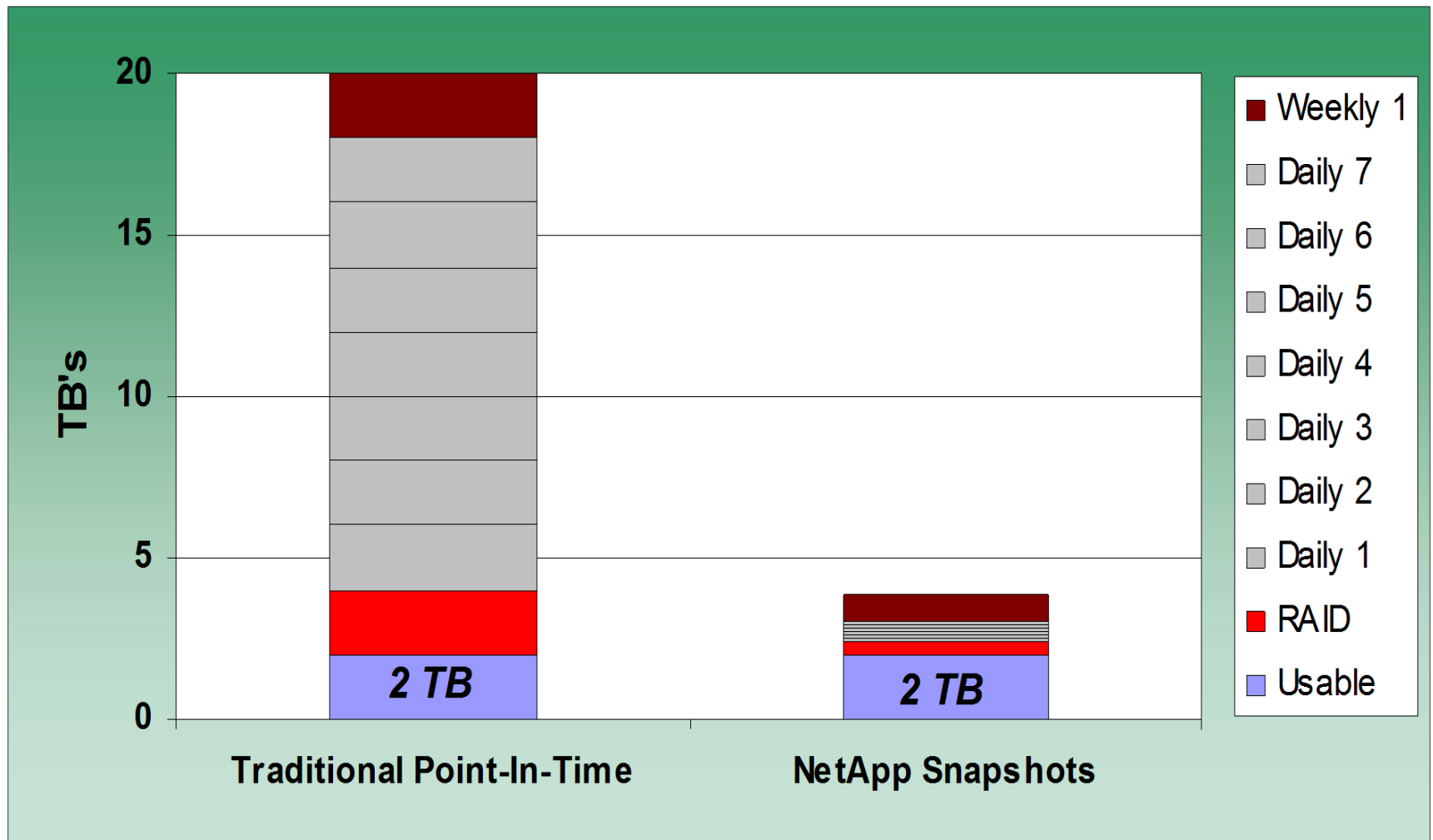
- ▶ 不管快照多份以上都不會佔空間

◆ 勿系統管理人員可以

- ▶ 隨時刪除任一快照時間的備份資料而不影響其他快照備份的內容
- ▶ 依據<時>,<天>,<週>為週期混合使用進行快照或隨時依需要進行快照
- ▶ 隨時動態調整快照空間所佔比率(0-50%)
 - 調整時不會失去原有快照備份內容
 - 超過設定保留空間上限時會發出警告，仍可正常進行快照，不會覆蓋原有快照內容



Snapshots optimize usable capacity



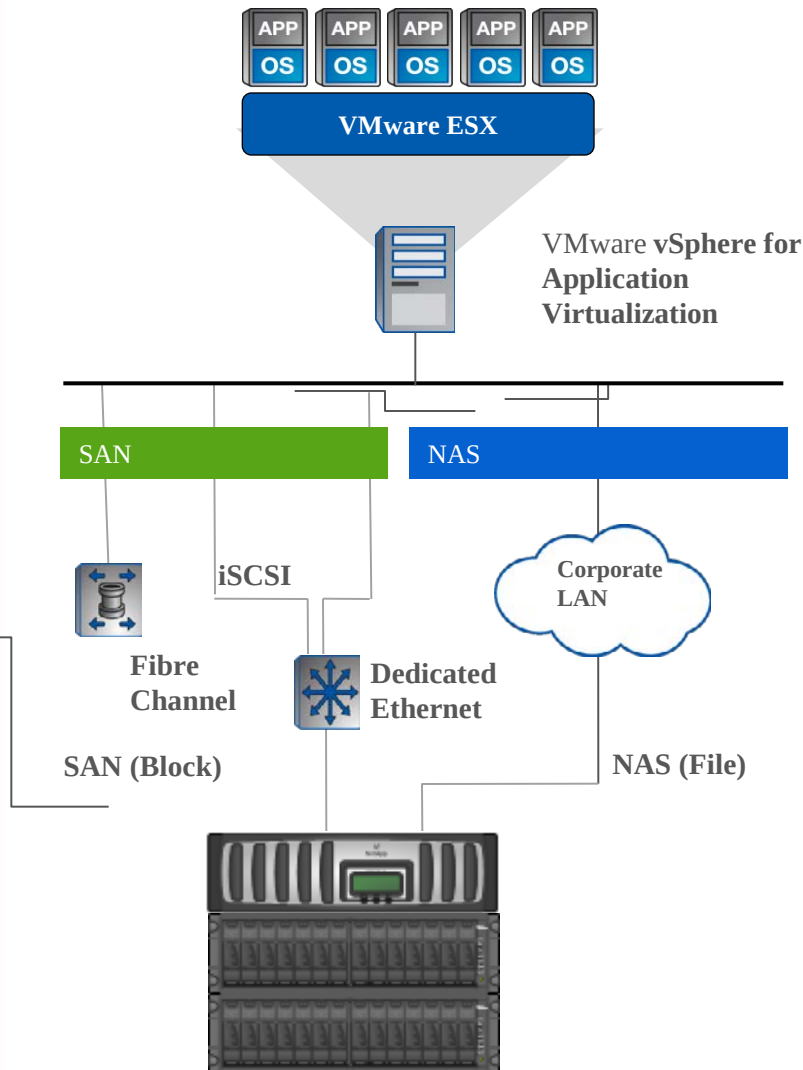
Assumes 5% data change per Snapshot





NetApp HA Solution



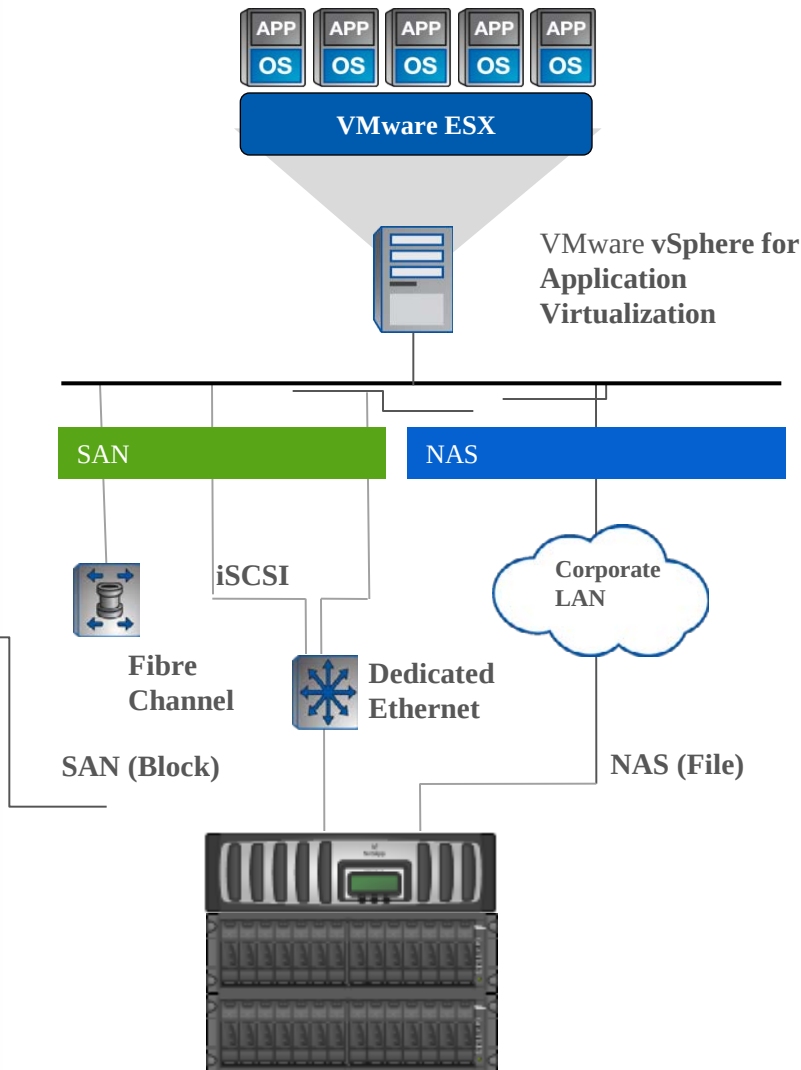


- **VMware for server and application virtualization and consolidation**
- **NetApp for storage virtualization and consolidation**
 - Unified storage—CIFS, NFS, FC, FCoE, and iSCSI
 - Common software, interface, and management tools
- **Improve data protection**

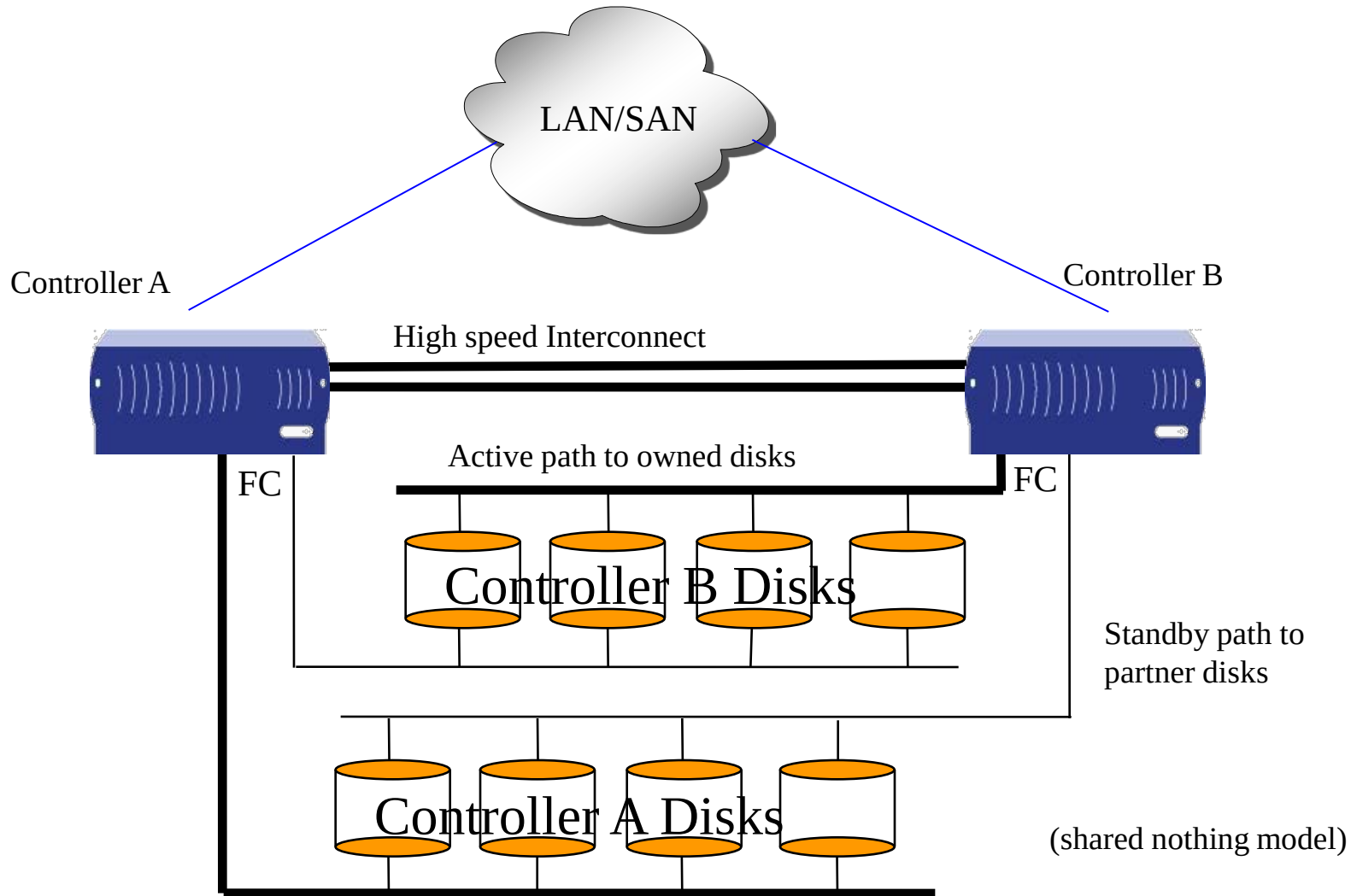


When Storage Failed ? (Non-HA)

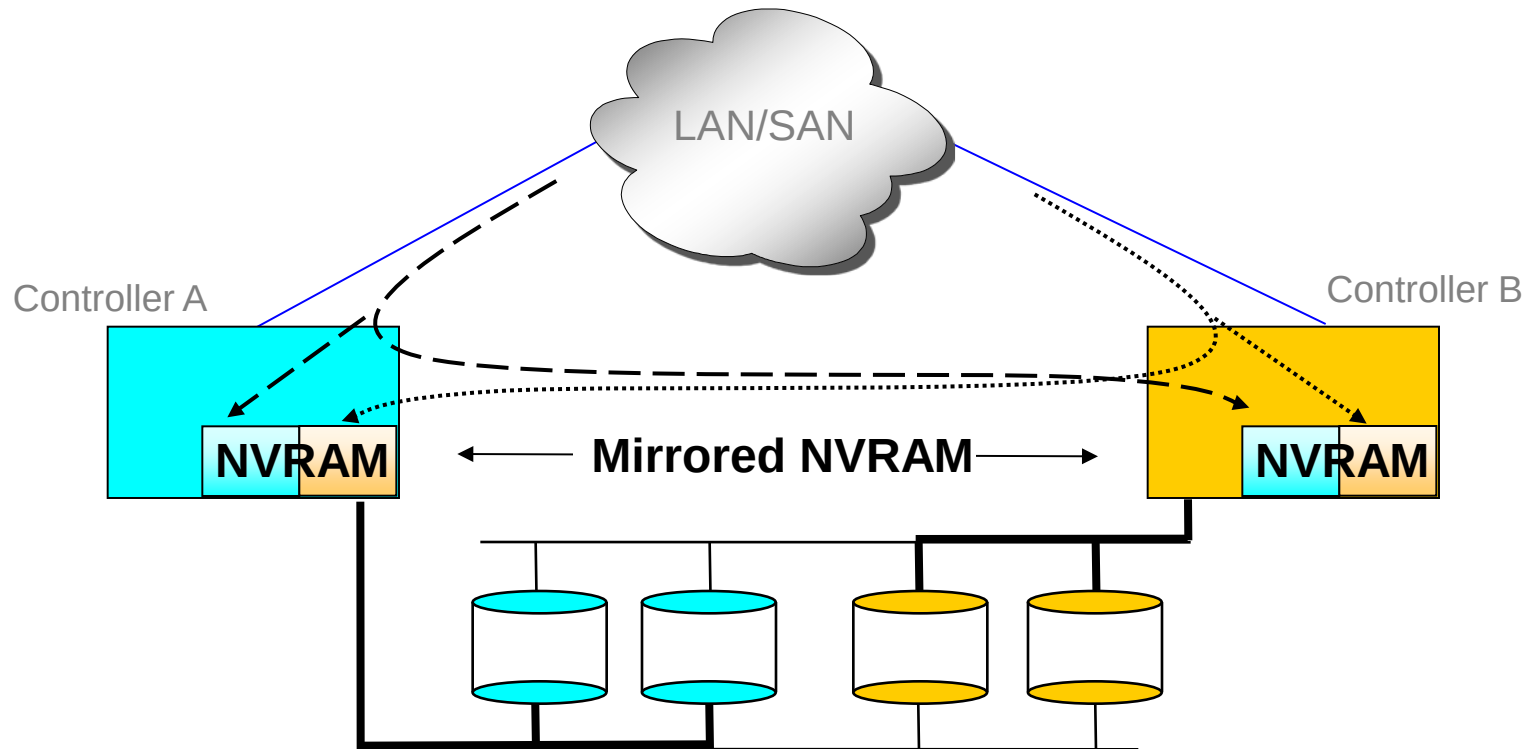
- If Storage Failed
 - Service Broken
 - OS FSCK (All VM)
 - FSCK long time
 - Disk I/O Increase
 - Network Congestion
 - Virtual Machine Slowly
 -



High Availability Architecture



Mirrored NVRAM

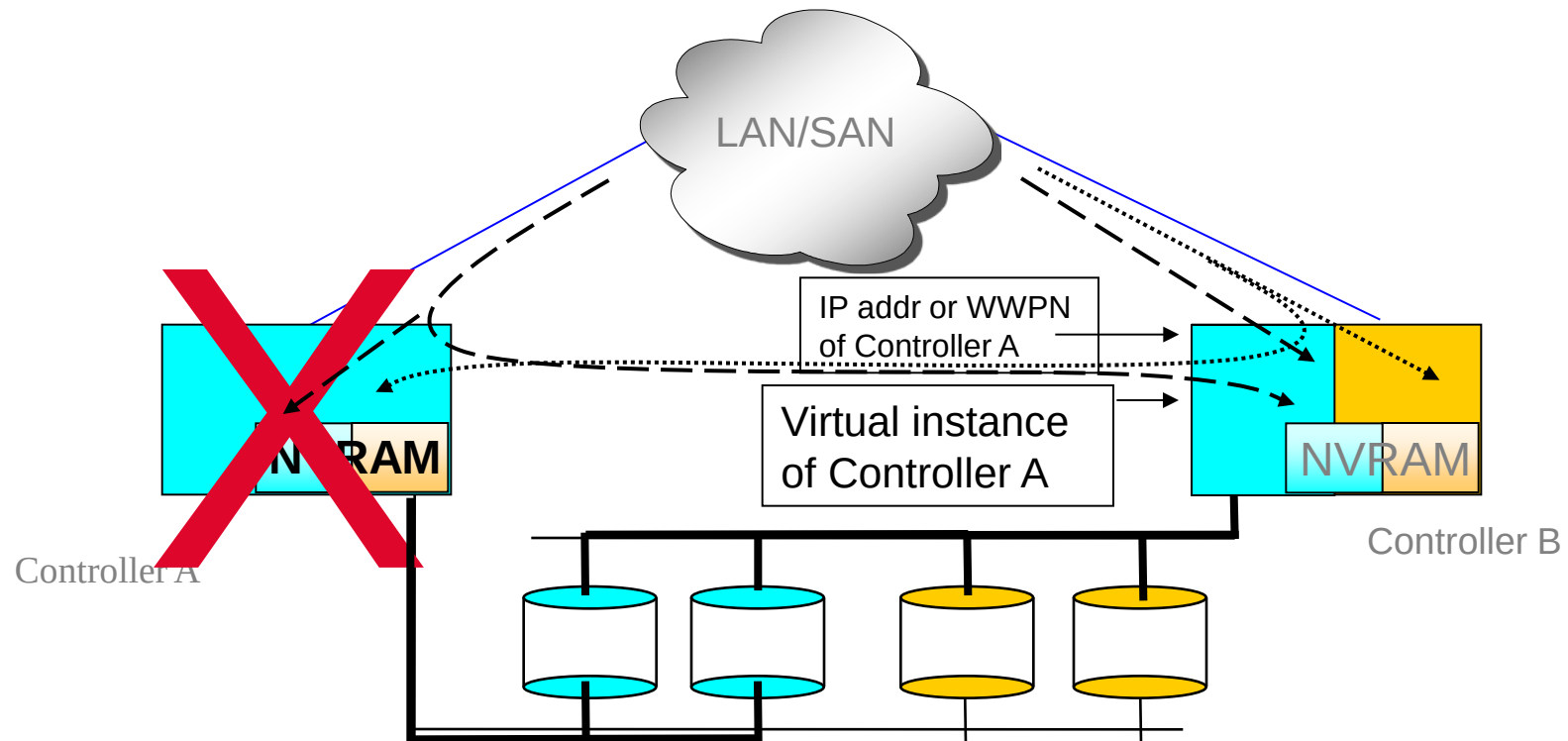


When a client request is received

- The controller logs it in its local NVRAM
- The log entry is also synchronously copied to the partner's NVRAM
- Acknowledgement is returned to client



Failover mode



During the failover process:

- Virtual instance of partner is created on surviving node
- Surviving node takes over the partner's disk and replays it's intended NVRAM log entries
- Partner's IP addresses (or WWPNS) are set on standby NICs (or HBAs), or aliased on top of existing NICs (or HBAs).



Management Software



With System Manager, you don't need to be a storage expert to manage NetApp® storage

- Easy to install and simple to use
- Wizards and intuitive graphics guide you through configuration and ongoing administration
- Improves storage and service efficiency
- Graphic interface to Data ONTAP® features
- Comes free with your NetApp storage

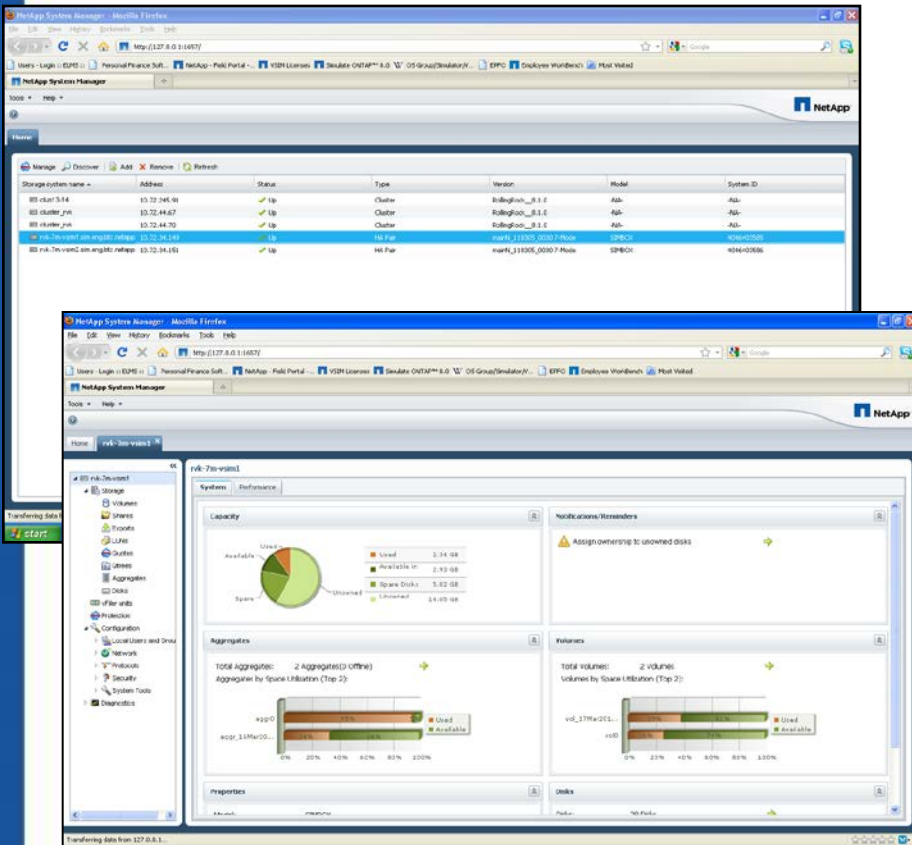


System
Manager with
FAS2200
Series



New Features: Easier, More Powerful than Ever

- Builds on value of v2.0
 - Simple web-based management
 - Wizards for common workflows
 - One view for File/Block, NAS/SAN
 - Installs on Windows[®] or Linux[®]
 - VMware[®] ESX[®] integration
- Enhanced Cluster management
 - Data ONTAP 8.x Cluster-Mode
- Graphic view to Data ONTAP[®]
 - New: Flash Pools, InfiniteVol, SnapVault
 - Enhanced: vFilers, 64Bit
- Support for new hardware
 - Flash Cache, High-density Shelves
- AutoSupport configuration/testing





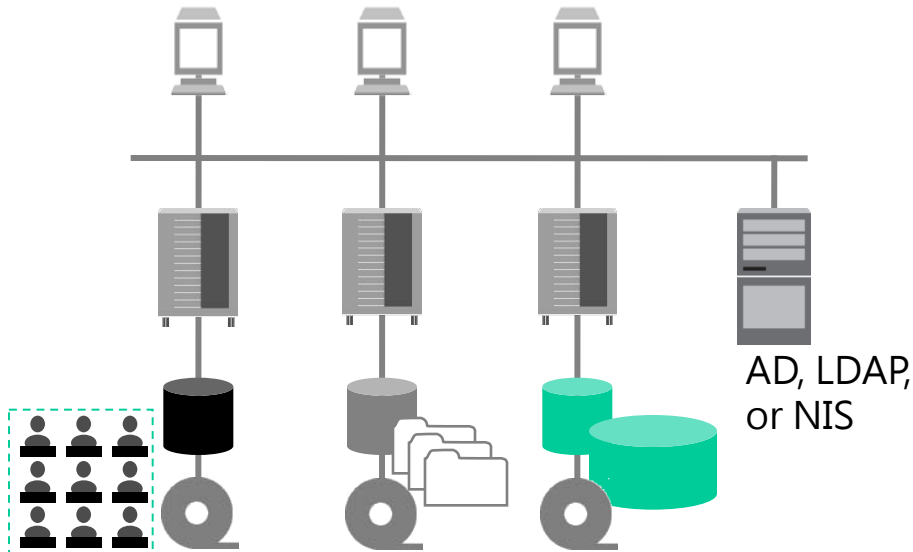
NetApp NFS & CIFS



Integration with Server and Network Infrastructure

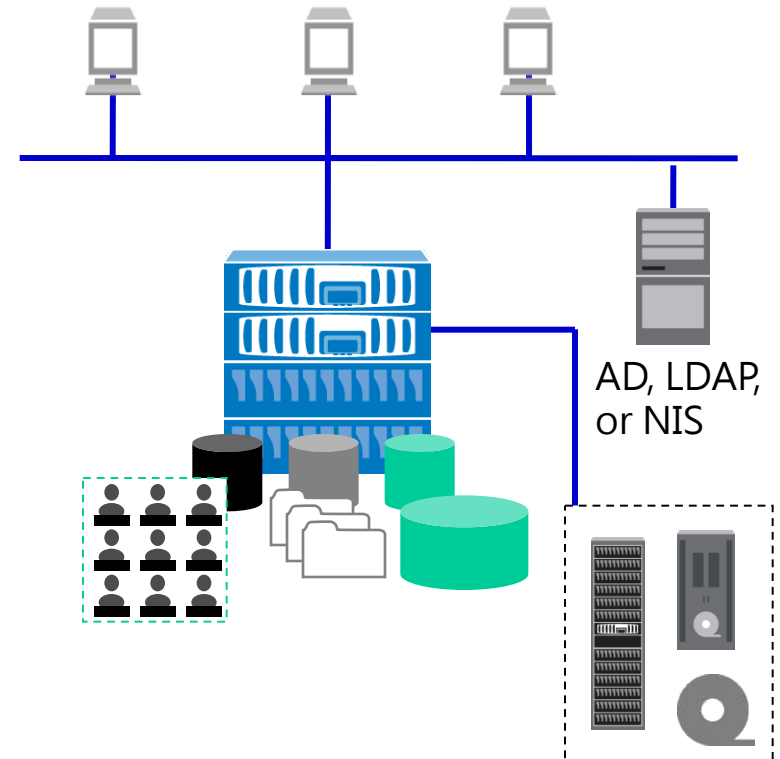
Before NetApp

Home Directories Shared Storage Software Development

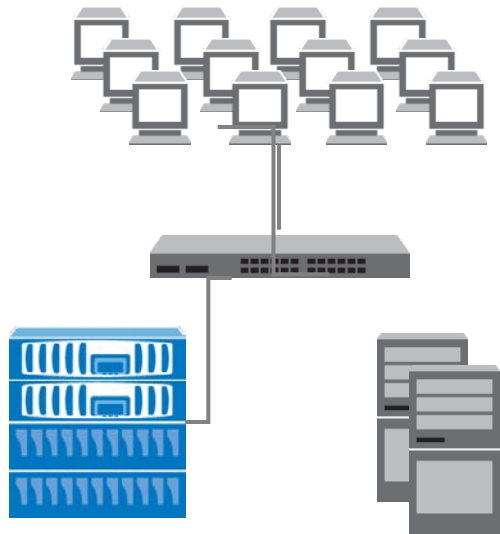


With NetApp

Home Directories Shared Storage Software Development



Integrating with Your Existing Environment



Supported clients

- CIFS: Windows® 2000, XP, 2003, and Vista, and 2008
- SMB 2.0: Windows® Vista, and Server 2008
- Any NFS v2, v3, and v4 client, including Oracle® DNFS and VMware®

Supported servers

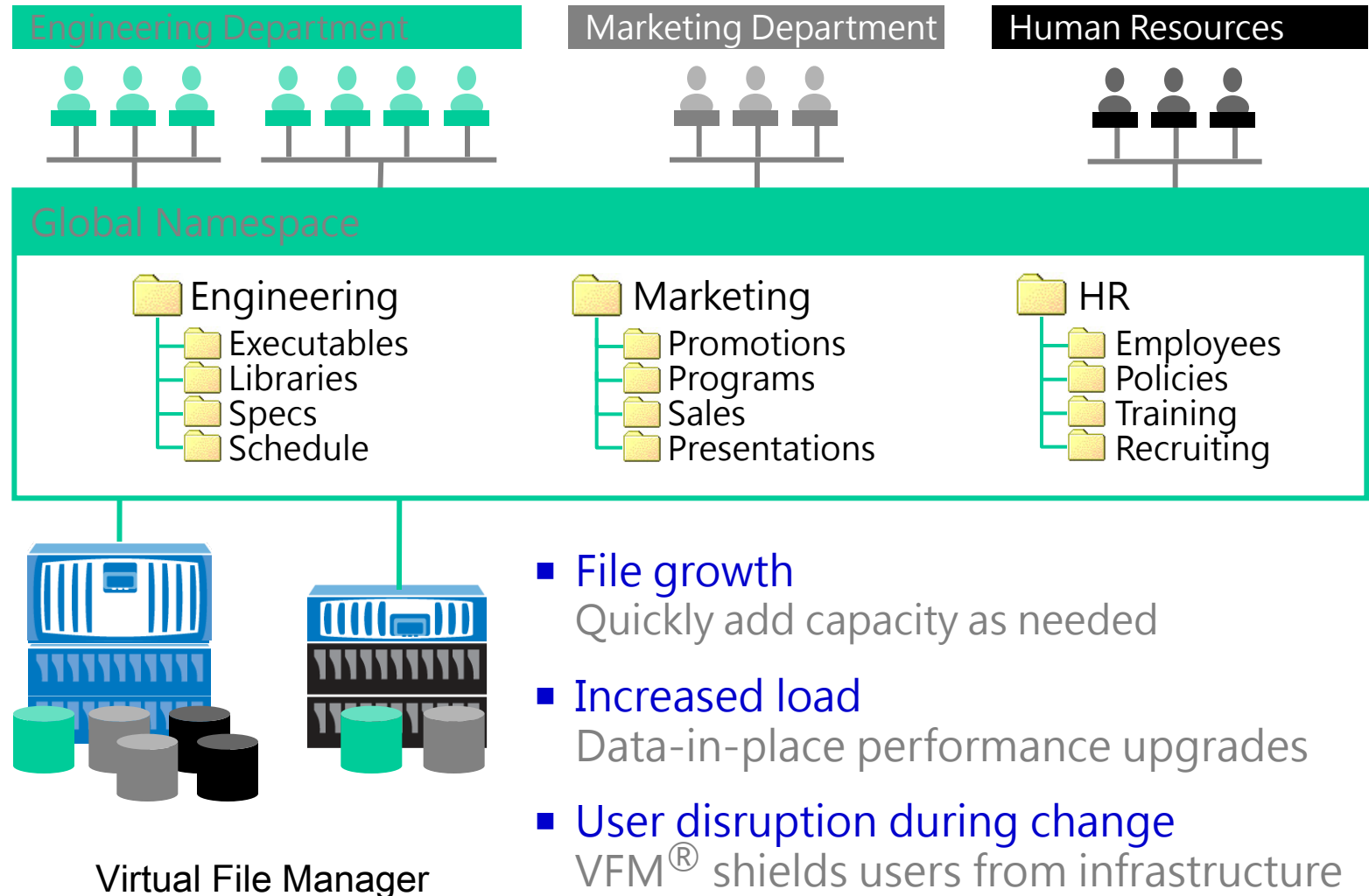
- Windows Server 2000, 2003, 2003 R2, and 2008
- Any UNIX® or Linux® supporting NFS v2, v3 and V4 (NFS RFC)

Support for network services

- DNS and DHCP
- Active Directory, NIS, LDAP
- Kerberos, NTLM v2
- DFS and GPO



Infrastructure Agility



- **File growth**
Quickly add capacity as needed
- **Increased load**
Data-in-place performance upgrades
- **User disruption during change**
VFM[®] shields users from infrastructure changes



NetApp Deduplication: End-to-End

Data Type	Measured Space Savings	Range
VMware Virtual Machines (ESX vmdk files)	70%	50–90%
FileNet P8 (document revision management)	46%	40-50%
E-Mail PSTs	30%	20–40%
Mixed Enterprise Data	30%	20–40%
SharePoint®	30%	25-35%



- Volume 新增/刪除/增大/縮小
- Snapshot 新增/刪除
- 開、關機步驟及方法





Thank you

