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新時代多雲資料中心部署

Spectrum Scale: Store Everywhere. Run Anywhere.

—

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“世界上最珍貴的資源，將不再是石油，而是數據”

- 經濟學人



掌控數據取得競爭優勢

AI 將數據價值再次提煉改變了業務型態

- 預測且塑造未來結果
- 優化人員進行更高價值的工作
- 自動化決策、流程處理及經驗再造
- 重塑商業模式

In 2019,

40%

數位化轉型來自於AI

\$4.79B

AI 相關
IT storage 支出

By 2021,

75%

商業應用軟體將使用AI相關
服務

>90%

消費者互動式服務將透過客
服機器人

>50%

新型工業機器人
將利用AI服務

2020Q1全球超過
\$290B
雲端支出

50%
以上公司工作負載
和資料預計1年內
儲存至公有雲上

93%
的大型企業採用
多雲策略

面對雲上的挑戰
您是哪種呢?

- **Security**
- **Control**
- **Cost**
- **Performance**

**Hybrid
multicloud
is the platform**

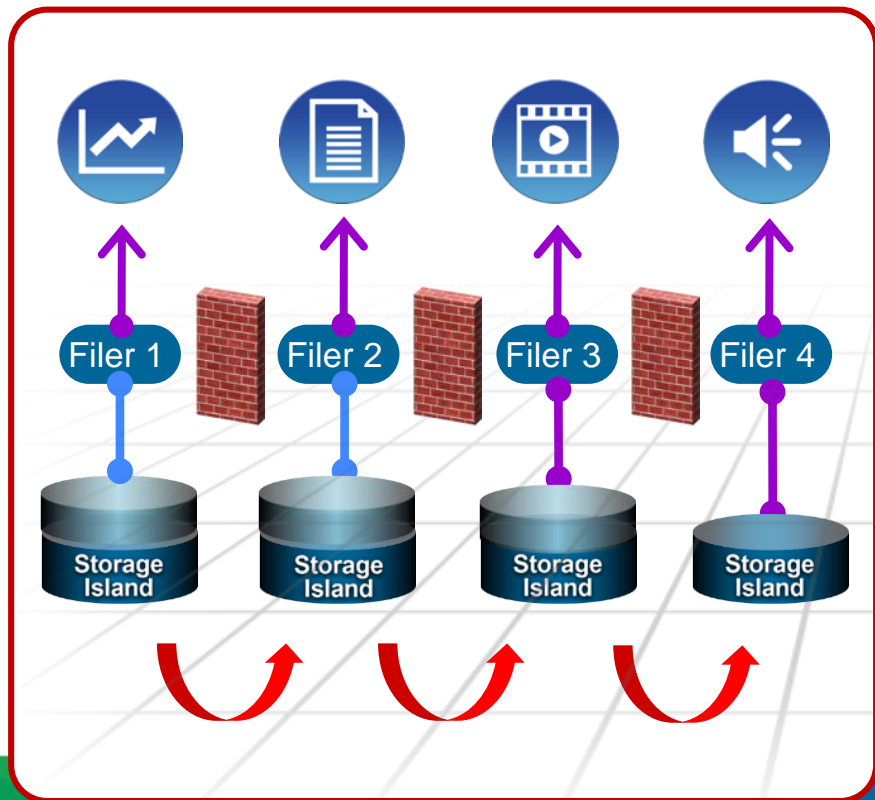
87% 超過1千名員工
以上的公司
採用多雲混和

企業資料困境: 量大、混雜、孤立、成本高

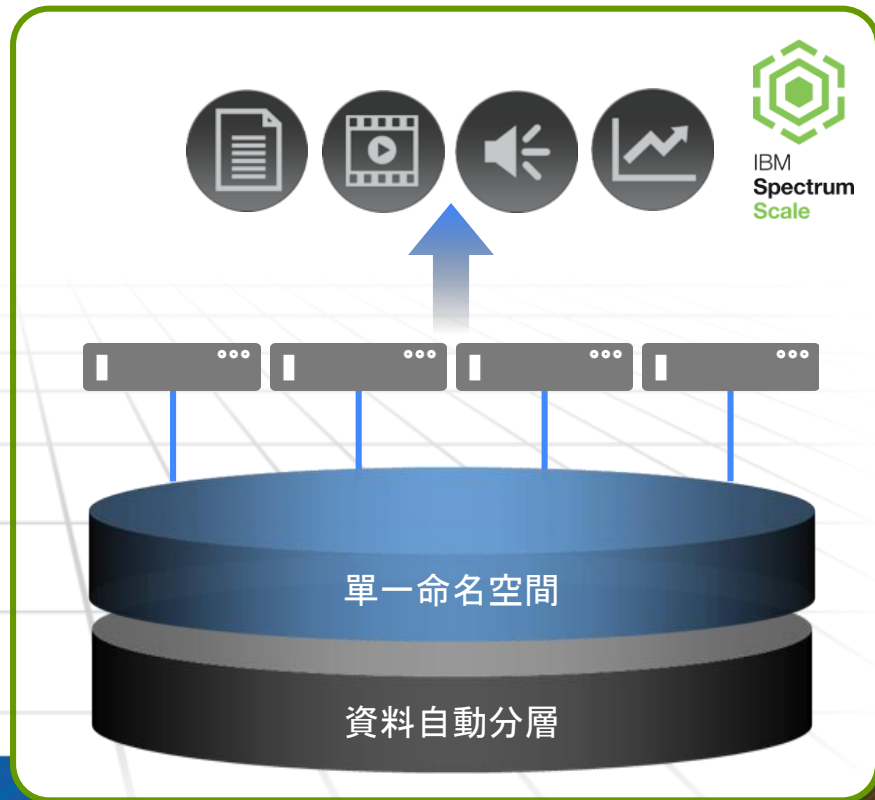


理想的檔案儲存架構

Before



After



Spectrum Scale on the Cloud

- Spectrum Scale is fully supported by IBM Service/Support for production usage in specific clouds
- Customers can exploit their existing cloud provider skill sets, expertise, cloud accounts
- Deployment characteristics:
 - IBM Cloud: IaaS bare metal servers
 - AWS and Oracle: PaaS fully automated deployment templates
- Licensing model: Bring your own license



具有雲經濟學的高性能儲存

採購、供應到佈署完成
數分鐘到小時內完成

滿足HPC架構需求的敏捷可擴展性
Off-premises bursting 多雲共生

認識

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Spectrum Scale editions and licensing

Editions have various function levels:

- Data Access edition (DAE) - often used for HPC
- Data Management edition (DME) - adds functions valuable in commercial environments
- **Free Developer edition (DE)**
- Erasure Code edition (ECE) - aimed at hyperscale, web-scale service providers

Capacity licensing: built for simplicity

- Easy to purchase, expand, budget, renew
- Entitled to unlimited number of IBM Spectrum Scale client and server licenses

Existing IBM Spectrum Scale socket-licensed customers

- Can stay on existing sockets-based licensing for as long as they wish
- Passport Advantage site ID defines boundary

Feature	Data Access or Standard Edition	Data Management, Advanced or Developer Edition	Erasure Code Edition
Multi-protocol scalable file service with simultaneous access to a common set of data	Yes	Yes	Yes
Facilitate data access with a global namespace, massively scalable file system, quotas and snapshots, data integrity and availability and filesets	Yes	Yes	Yes
Simplify management with GUI	Yes	Yes	Yes
Improved efficiency with QoS and compression	Yes	Yes	Yes
Create optimized tiered storage pools based on performance, locality, or cost	Yes	Yes	Yes
Simplify data management with Information Lifecycle Management (ILM) tools that include policy-based data placement and migration	Yes	Yes	Yes
Enable worldwide data access using AFM asynchronous replication	Yes	Yes	Yes
Immutability (WORM / Write Once Read Many)	Yes	Yes	Yes
Asynchronous multi-site Disaster Recovery		Yes	Yes
Hybrid cloud (Transparent Cloud Tiering)		Yes	Yes
Protect data with native software encryption and secure erase, NIST compliant and FIPS certified		Yes	Yes
File audit logging		Yes	Yes
Watch folder		Yes	Yes
Erasure coding	ESS only	ESS only	Yes

Spectrum Scale

容器 / 雲

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Cloud Native Storage

傳統式 Storage

提供基本的基礎設施用以支援企業所需
集中式管理

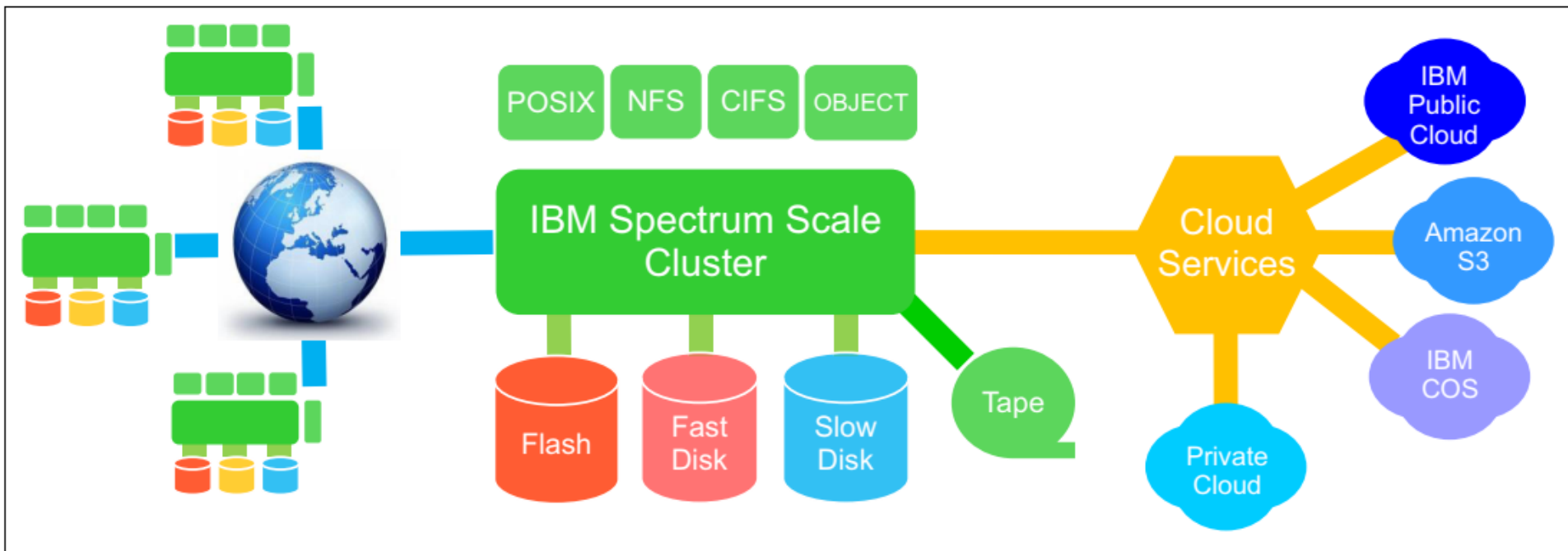
Container-Ready Storage

利用現有投資設備來支援容器化佈署
快照、Clone、抄寫都支援但對於容器化架構缺少支援
並無針對K8S進行優化，潛在成為實現敏捷化和彈性的瓶頸

Container-Native Storage

佈署於容器內支援關鍵任務應用
企業級數據管理服務
直接連結外部儲存，支援不同性能和容量需求
透過K8S control plane 中的自助式服務提高服務效率

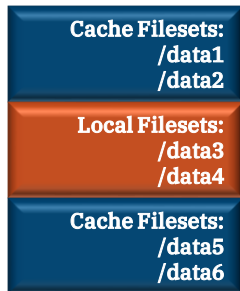
transparent cloud tiering



Active File Management

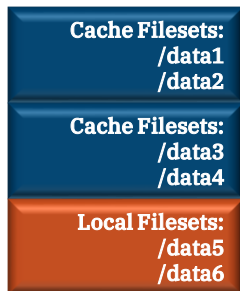
File System: 台北

Client access:
 /Taiwan/data1
 /Taiwan/data2
 /Taiwan/data3
 /Taiwan/data4
 /Taiwan/data5
 /Taiwan/data6



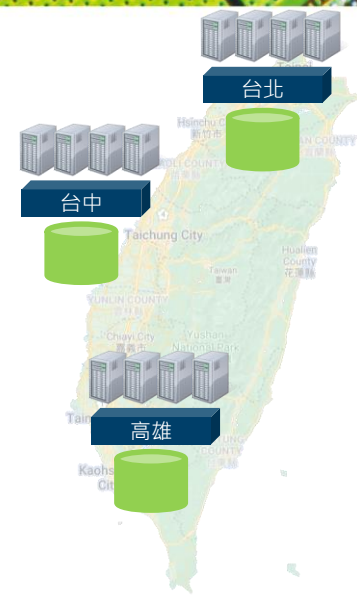
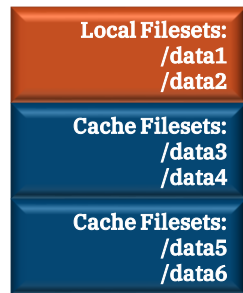
File System: 高雄

Client access:
 /Taiwan/data1
 /Taiwan/data2
 /Taiwan/data3
 /Taiwan/data4
 /Taiwan/data5
 /Taiwan/data6



File System: 台中

Client access:
 /Taiwan/data1
 /Taiwan/data2
 /Taiwan/data3
 /Taiwan/data4
 /Taiwan/data5
 /Taiwan/data6



Spectrum Scale supports OpenShift and Container Storage Interface



- The IBM Spectrum Scale Container Storage Interface (CSI) driver enables container orchestrators, such as Kubernetes and Red Hat OpenShift, to manage the life-cycle of persistent storage for containers
- Spectrum Scale supports new CSI and Red Hat OpenShift releases
- Open source CSI driver available at: <https://github.com/IBM/ibm-spectrum-scale-csi>



Spectrum Scale

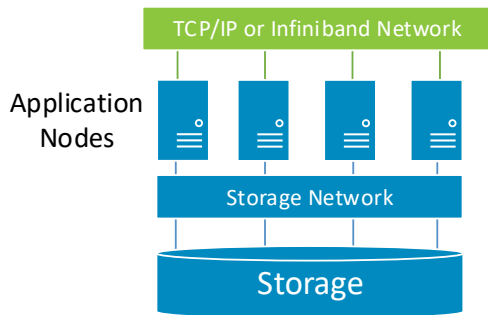
應用方案介紹

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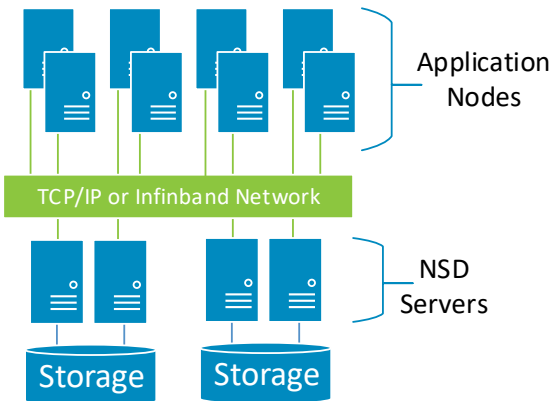
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Spectrum Scale at on-premise

Storage Area Network (SAN) Model

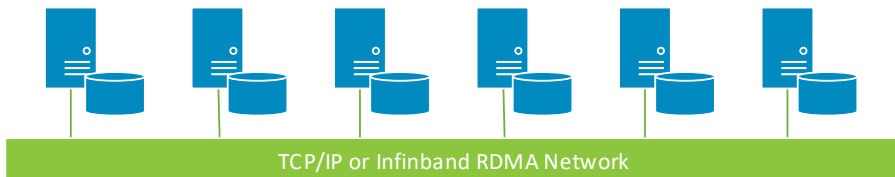


Network Shared Disk (NSD) Server Model



- 高可用
- 高效能
- 支援多平台
- 平行檔案系統
- SAN-Attached
- Network-attached
- Share Nothing Cluster

Shared Nothing Cluster (SNC) Model



佈署 Spectrum Scale 於 AWS

<https://aws.amazon.com/marketplace/pp/B07DRLMG2W>

Deployment on AWS

On AWS, IBM Spectrum Scale is available from the AWS Marketplace

1

BYOL



IBM Spectrum Scale

Purchase IBM Spectrum Scale License

Offered through IBM Passport Advantage

2



aws marketplace

Deploy IBM Spectrum Scale from AWS Marketplace

Find IBM Spectrum Scale on **AWS Marketplace**. Select BYOL option for Spectrum scale configuration

3



CloudFormation template configuration

Select VPC, EC2 Instance and EBS Volume types and other desired parameters for your workload.

Choose a template A template is a JSON/YAML-formatted text file that describes your stack's resources and their properties. [Learn more](#)

Select a sample template

Upload a template to Amazon S3

No file selected.

Specify an Amazon S3 template URL

[View/Edit template in Designer](#)

Parameters

File System Configurations:

Block Size File system block size.

Data replica Number of replica copies of data across the cluster nodes.

GPFS Mount Point The mount point for the Spectrum Scale volume (e.g. /gpfs/fs1).

NSD Configurations:

EBS Type

EBS volume type for each H20 server node H20 (m5). Options are: General Purpose SSD (gp2), Provisioned IOPS SSD (pi3), Throughput Optimized HDD (st1), Cold HDD (sc1) and EBS Magnetic (standard).

佈署Spectrum Scale於IBM Cloud

Deployment on IBM Cloud

On IBM Cloud, IBM Spectrum Scale is built manually on bare metal servers using Standard installer tool kit similar to the on-premise environment

1



“Rent” Bare Metal Servers

Bare Metal access, which enables unmatched control of Public Cloud infrastructure

2



...with Appropriate Network

Select Private VLAN Options for Internode Clustering and Public or Private IP Addresses for Installation,

3



“Rent” IBM Cloud Block Storage

Deploy flash-backed block storage (**Performance Tier**) or **Endurance Tier**

4

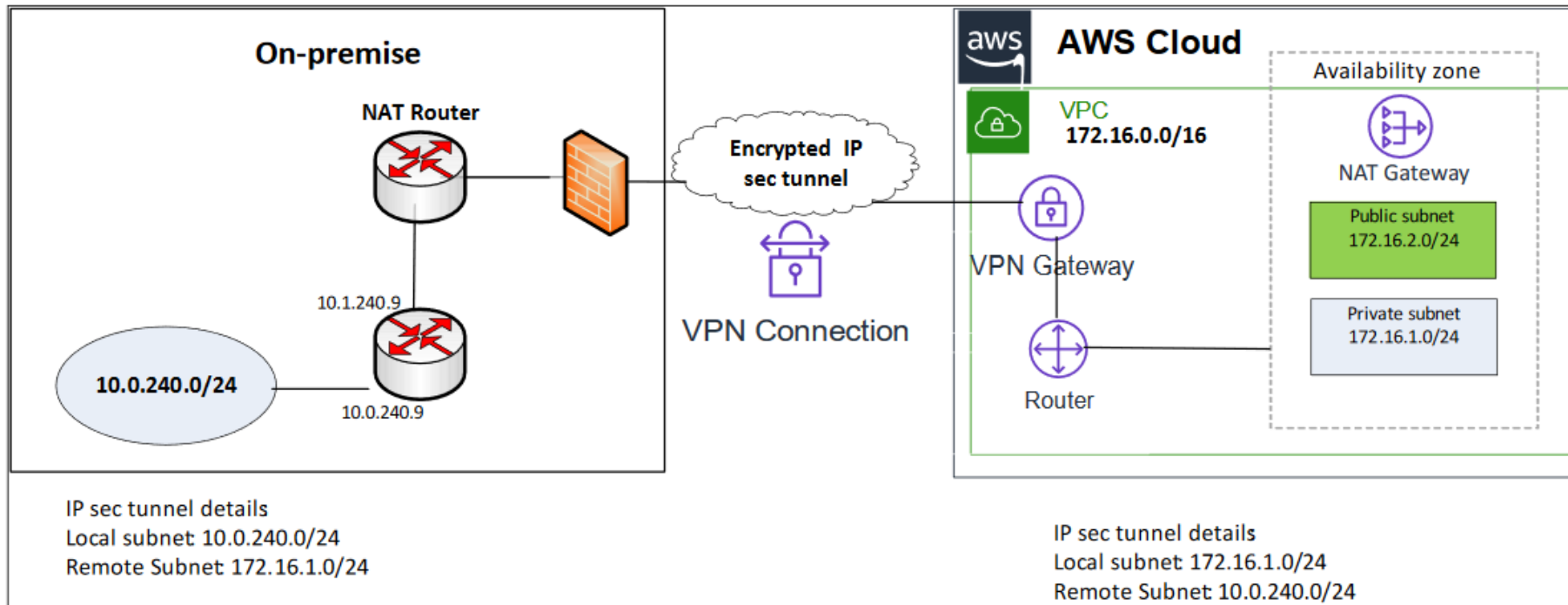


BYOL

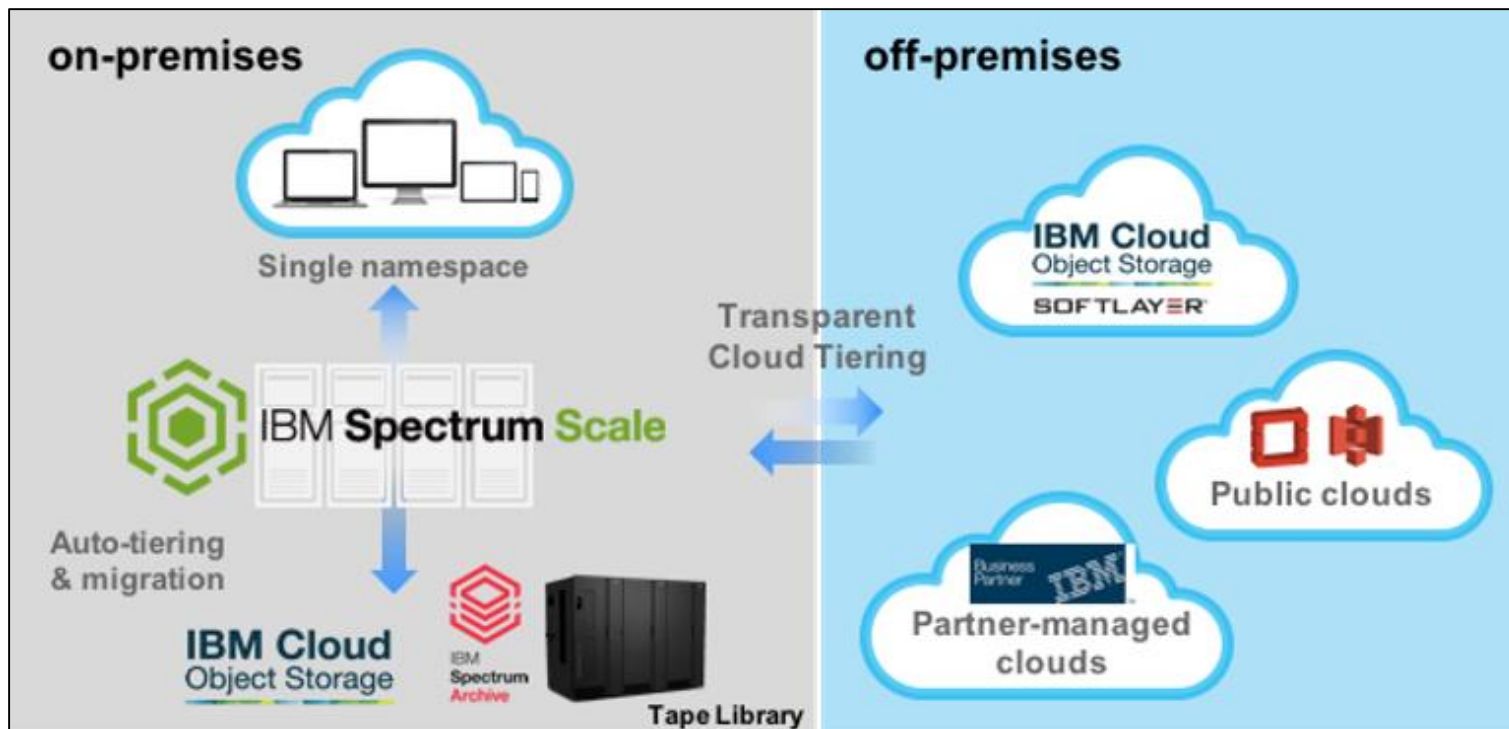
Purchase IBM Spectrum Scale

Offered through Passport Advantage. Install using the standard install tool kit similar to the on-premise environment

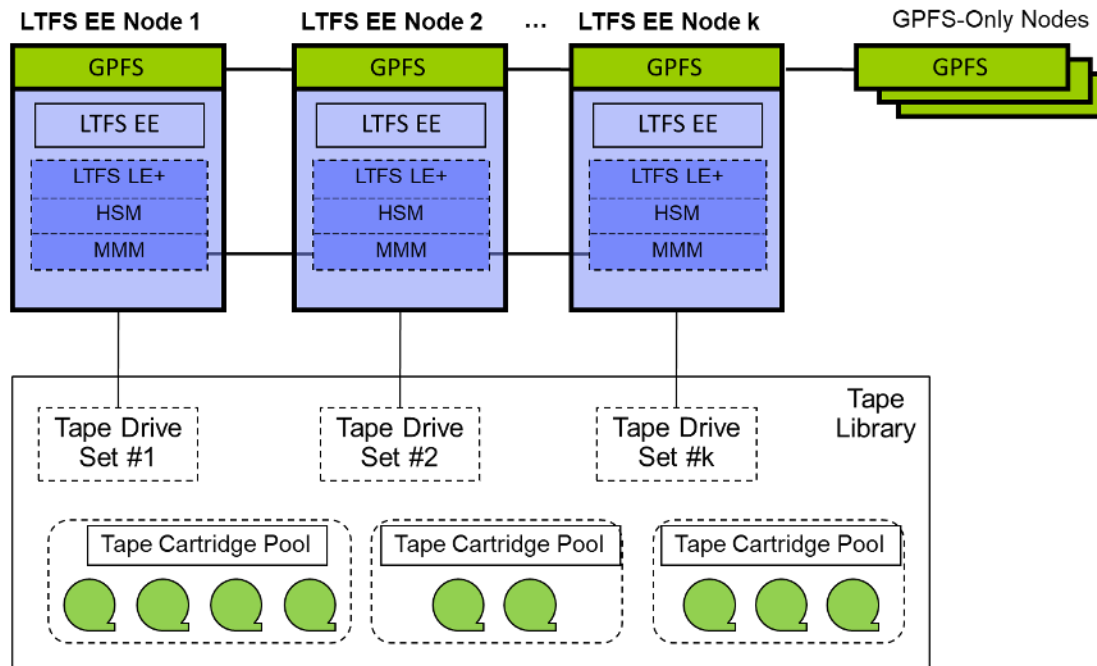
on-premise 透過 Site-to-Site VPN 串接 AWS



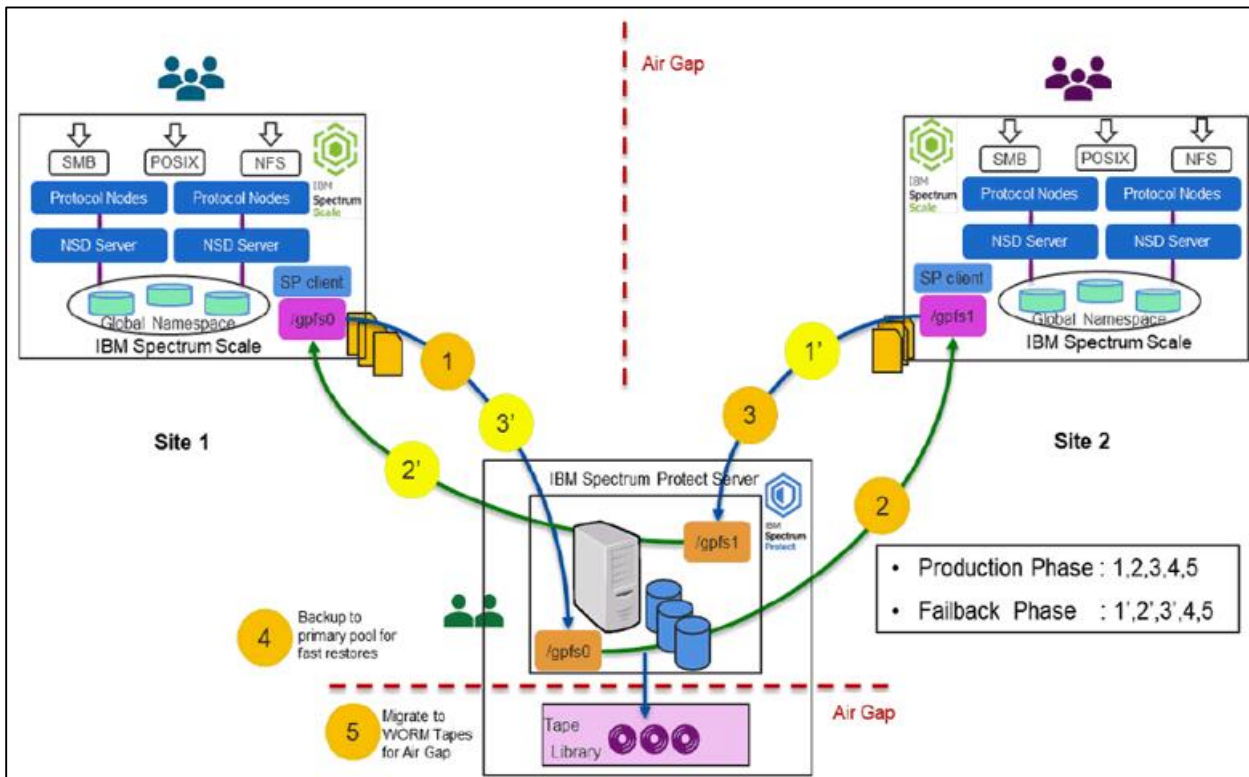
Spectrum Scale with IBM Cloud Object Storage



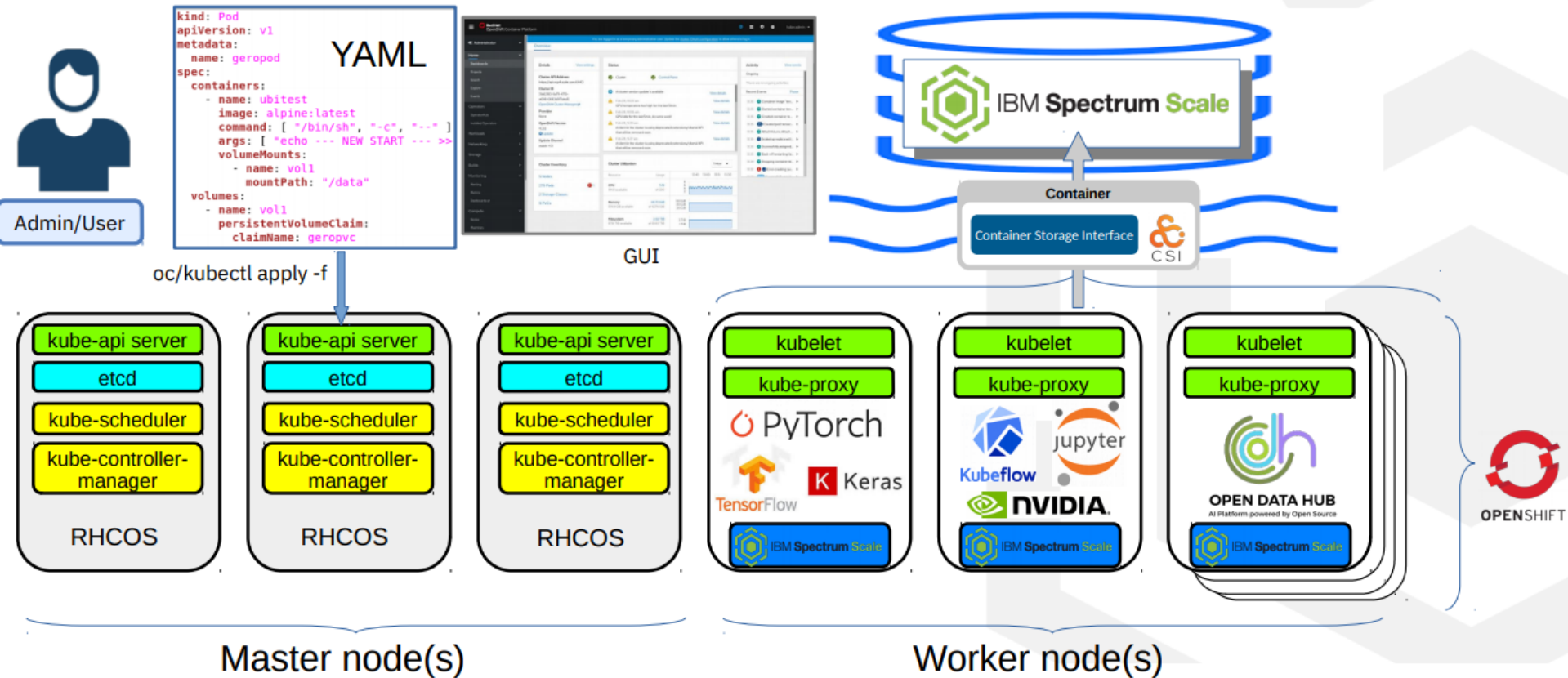
Spectrum Scale with Spectrum Achieve EE



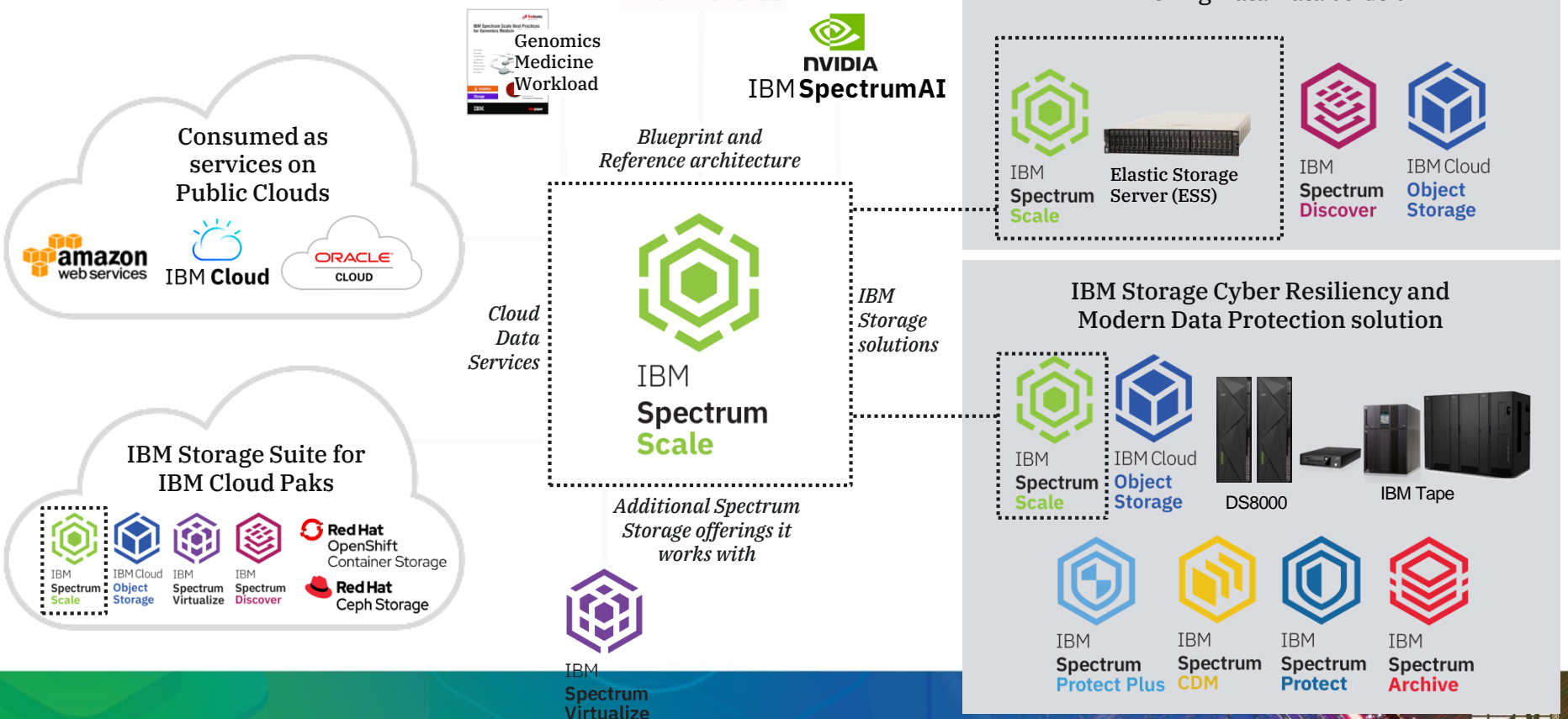
Spectrum Scale with Spectrum Protect



Spectrum Scale with OpenShift 4.x Architecture



IBM儲存產品及定位



Elastic Storage Server: Spectrum Scale 軟硬體整合架構

整合、測試、調教
花時費工

Elastic Storage Server 解決方案
高度整合、效能保證、管理簡單

架構設計

方案設計, 儲存設備, 主機選擇
網路設備, 機房空間...

安裝

作業系統, 軟體相容匹配
韌體版本

佈署、測試、調校

效能測試、調校

管理維護

作業系統
硬體、軟體、韌體



- ESS 軟硬體高度整合
- 更新一次搞定



Entry
ESS 3000

ESS 3000
cluster

Elastic Storage
Server cluster

近期應用案例

硬體 - 整體規格

- 252 nodes / 9072 CPU cores
- 2016 GPUs
- 193.5 TB memory
- 10 PB storage
- EDR InfiniBand 100 Gbps
- 1.2 PUE (Warm Water Cooling)

硬體 - 單一節點規格

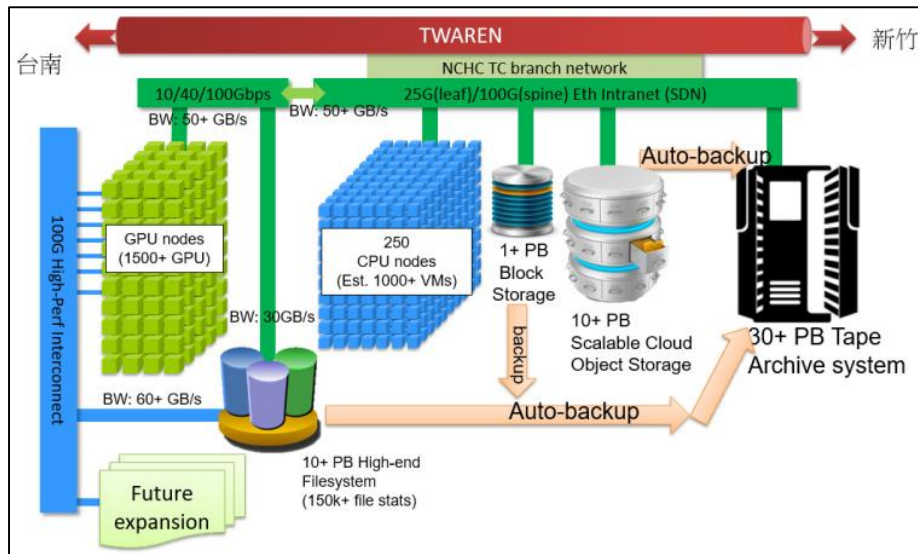
- Intel Xeon Gold CPU x 2
- Nvidia Tesla V100 w/32GB x 8
- 768 GB memory
- 240 GB SSD + 4TB NVMe

軟體環境

- Slurm / Kubernetes
- Nvidia NGC Docker
- Ceph
- **Spectrum Scale (GPFS)**
- CentOS

AI 架構

- Tensorflow
- Caffe / Caffe 2
- PyTorch / Torch
-and more



Questions?

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Spectrum Scale 精選學習資源

1. **IBM Spectrum Scale Trial VM (FREE!)**
<https://www.ibm.com/account/reg/us-en/signup?formid=urx-21182>
2. Spectrum Scale Vagrant
<https://github.com/IBM/SpectrumScaleVagrant>
3. **IBM Client Demonstration Center**
<https://www.ibm.com/systems/clientcenter/demonstrations/>
4. IBM Systems Client Center
<https://www.ibm.com/it-infrastructure/services/client-centers>
5. IBM Systems Technical Universities
<https://www.ibm.com/services/learning/ites.wss/zz/en?pageType=page&c=a0002173>
6. Spectrum Scale Knowledge Center
https://www.ibm.com/support/knowledgecenter/STXKQY/ibmspectrumscale_welcome.html
7. Spectrum Scale Redbooks
<https://www.redbooks.ibm.com/redbooks.nsf/searchsite?SearchView=&query=spectrum+scale>
8. IBM Partner World
<https://www-356.ibm.com/partnerworld/wps/servlet/mem/ContentHandler/learning>
9. **IBM Systems Lab Services**
<https://www-03.ibm.com/systems/campaignmail/services/labservices/contact.html>
10. Spectrum Scale User Group
<https://www.spectrumscale.org/>



THANK YOU

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