

Unleash the Power of Microsoft Azure Intelligent Cloud with Azure NetApp Files

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Azure Storage



Disk Storage

Premium
Standard

Reliable, persistent,
high performing
storage for Virtual
Machines



Object Storage

Azure Blobs

Secure, centralized
storage target for
backup/disaster
recovery



File storage

Azure Files
Azure NetApp Files

Lift and shift of legacy
applications that
require file shares to
the cloud



Data Transport

Azure Import/Export
Azure DataBox/Disk

Move or migrate data
into Azure



Hybrid Storage

Azure StorSimple
Azure File Sync
Avere

Secure, intelligent data tiering
between on-premises and
cloud storage

OUR JOURNEY IS
POWERED BY
DATA



**DATA
GRAVITY**

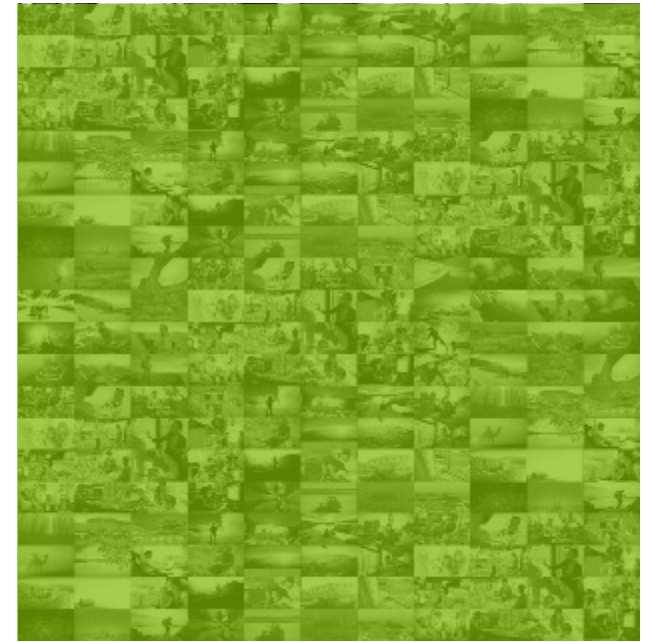
Microsoft & NetApp: Next Level Partnership

"This partnership is a significant step toward further enabling hybrid cloud data services for our mutual customers"

Tad Brockway, CVP, Microsoft Azure Storage



*Empower every person and
every organization on the
planet to achieve more*



*Enabling customers to change the
world with data*



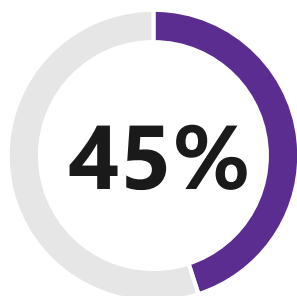
Why Azure NetApp Files?

Context – Files in the Cloud

Context – Files in the Cloud...



Enterprise workloads continue to be On-Premises¹



Enterprise workloads on external storage systems are File based²



Total File storage by 2020 @ 24% CAGR²

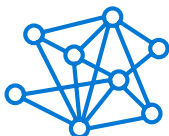
Enterprises are searching for a way to deploy file workloads in the cloud without sacrificing:



Performance



Reliability



Enterprise Data Management

No one wants to re-factor !



¹ [Survey Uptime Institute](#)

² IDC Worldwide Storage Workloads

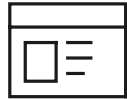
Scenarios & Workloads

Current



Migrate to Azure

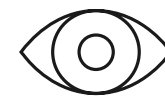
"Lift & Shift" POSIX-compliant
enterprise file workloads



Build new apps

Simple, Scalable, Fast apps using
high performant shared storage

Future



Extract insights

Leverage Azure services
HDInsight, Containers, Machine Learning

Workloads

Enterprise file apps
File-shares (incl SAP)
HPC

DevOps
Web apps
Databases

Industries

Retail
Electronic Design Automation
Oil & Gas



Open Source, Windows or Mixed Environment

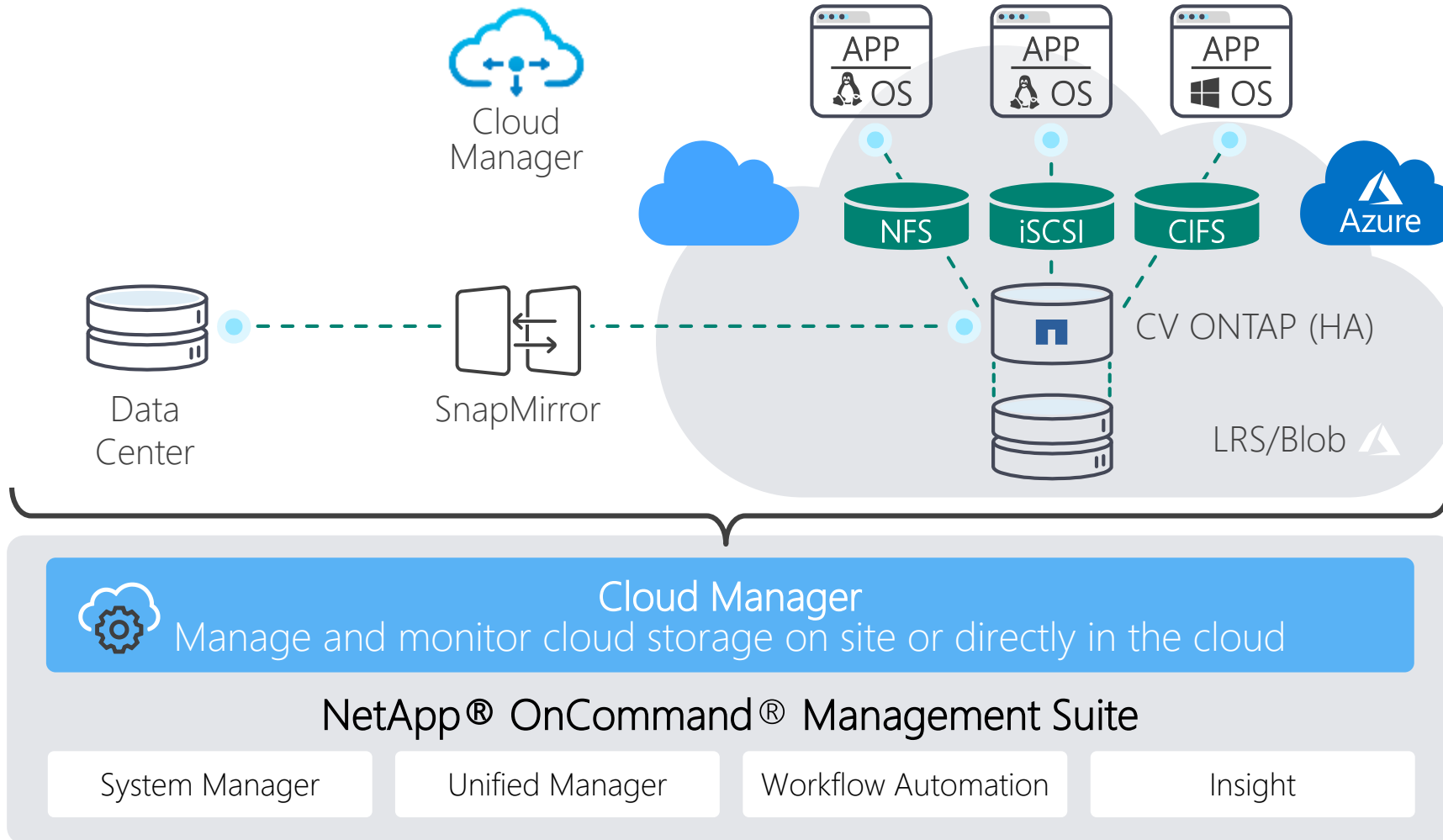


Azure Marketplace: Cloud Volumes ONTAP

- A fully fledged version of ONTAP running natively in the public cloud
- Consumes native cloud storage
- Utilizes same ONTAP tools and processes
- Mature, proven yet innovative technology
- Implemented successfully with thousands of customers



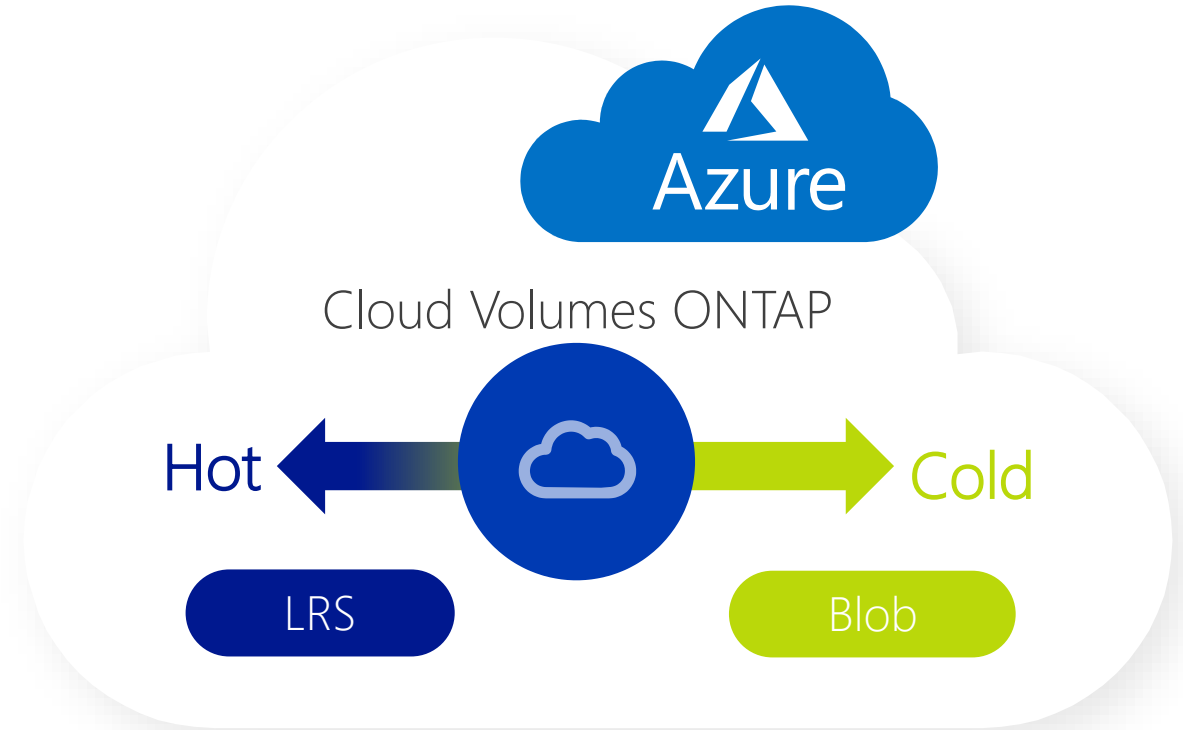
Enterprise data management in the cloud



- Migrate workloads seamlessly
- Unified management across environments
- Cost-effective **data protection**
- DR and BU to the cloud
- DevOps in the cloud
- Cost-saving cloud storage

Data Tiering to Object Storage

- Performance tier for “hot” data
 - Azure LRS
 - Capacity tier for “cold” data
 - Azure Blob
 - Reduces LRS footprint
 - Dramatic cost savings
- ✓ As low as 3¢ per GB per month



Azure NetApp Files – Value



Azure NetApp Files



Managed

Native Azure integration (Portal/REST/CLI, Billing, Monitoring, Security)



Powerful

Complete protocol support

HA, Data Protection, Data Management (instantaneous Snapshot and Restore), Performance



Trusted

FIPS 140-2 compliant Data at Rest Encryption, RBAC



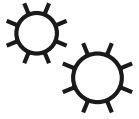
Hybrid

Data migration and replication capabilities

Azure NetApp Files – Capabilities



Azure NetApp Files



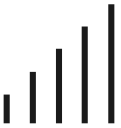
Compatible

Industry-leading “lift and shift” multi-protocol support



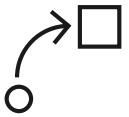
Simple to configure

Provision at-will storage with a few clicks and a few minutes



Powerful and highly performant

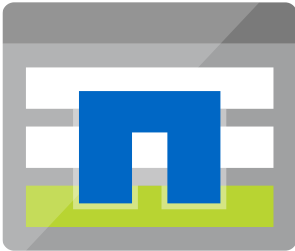
Deep integration with the Azure infrastructure and multiple performance tiers



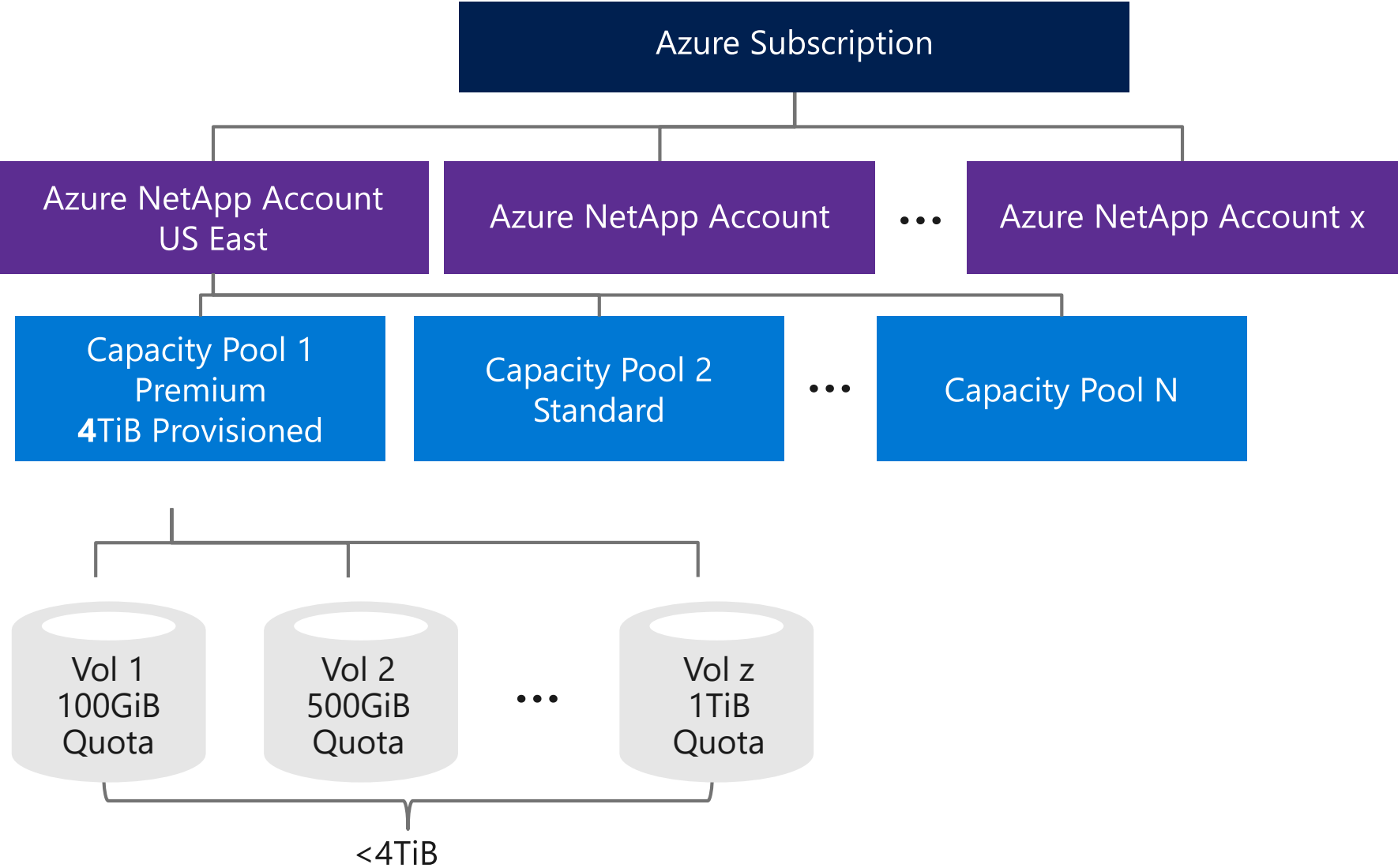
Integrated data management capabilities

No need for additional solutions to manage snapshots & restore

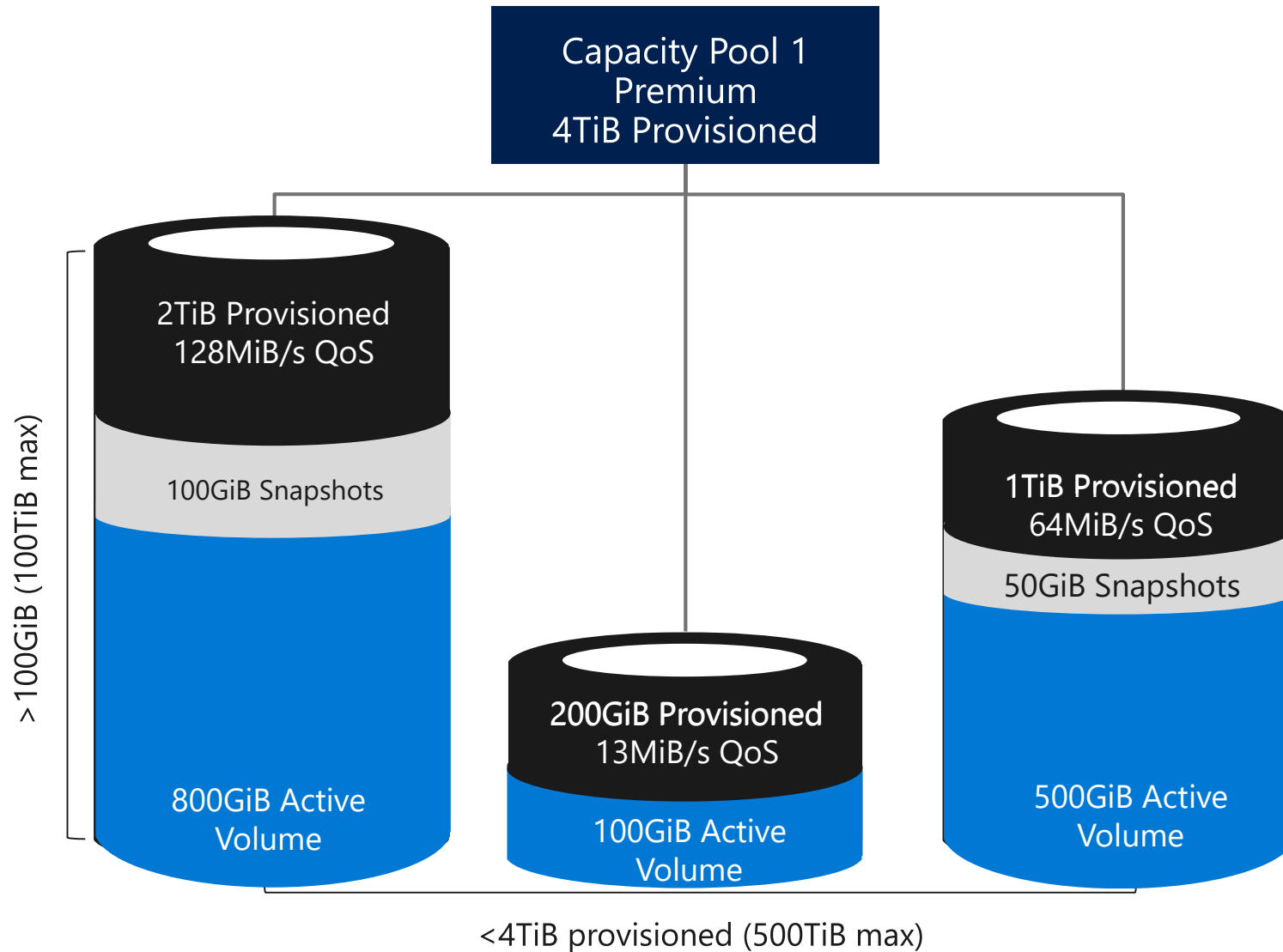
Storage Hierarchy



Azure NetApp Files



Example



Azure NetApp Files

1. **Provision Capacity Pool**
 - Provision Pool (4TiB, premium)
 - Billed hourly by provisioned amount
2. **Create Volumes**
 - Assign quota (3.2TiB)
 - Decrements from pool capacity (0.8TiB remaining)
 - QoS per volume assigned based on quota
3. **Consume Capacity**
 - Active filesystem at logical (800GiB)
 - Snapshots at incremental (100GiB)
 - Actual consumption = 1.51TiB

Service Levels and Pricing



Azure NetApp Files

Standard

\$ 0.15 per GiB / month

Throughput
16MiB / s per 1TiB

Suitable for

- Static web content
- File shares
- Database backups

Throughput comparable to mainstream HDD

Premium

\$ 0.30 per GiB / month

Throughput
64MiB / s per 1TiB

Suitable for

- Databases
- Ent apps incl SAP (File-shares only)
- Analytics
- Engineering apps
- Messaging queues

Throughput comparable to mainstream SSD

Ultra

\$ 0.40 per GiB / month

Throughput
128MiB / s per 1TiB

Suitable for

- Extreme performance / throughput intensive apps
- High Performance Computing

Throughput comparable to Flash Arrays

A minimum 4 TiB of capacity can be purchased, and then increased in increments of 1 TiB

Service Levels and Performance



	Standard	Premium	Ultra Azure NetApp Files
Performance	Good <ul style="list-style-type: none">Up to 1,000 IOPS/TiB Quota (16K)Up to 16MiB/s per TiB Quota	Better (SSD-class) <ul style="list-style-type: none">Up to 4,000 IOPS/TiB Quota (16K)Up to 64MiB/s per TiB Quota	Best (High Performance Flash) <ul style="list-style-type: none">Up to 8,000 IOPS/TiB Quota (16K)Up to 128MB/s per TiB Quota
Workload Types	<ul style="list-style-type: none">Static Web ContentFile SharesDatabase Backups	<ul style="list-style-type: none">DatabasesEnterprise ApplicationsAnalyticsMessage Queues	<ul style="list-style-type: none">Performance/ Throughput Intensive ApplicationsHPC

Performance SLA indexed against Volume quota

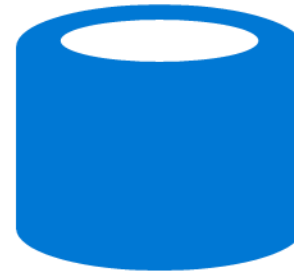
Performance Sizing

Configurable by 2 factors:

Service Level	Throughput
Ultra	128MiB/s per 1TiB quota
Premium	64MiB/s per 1TiB quota
Standard	16MiB/s per 1TiB quota

Service Level

X



Volume Quota

=



Performance



Azure NetApp Files

Performance Benchmarks



Azure NetApp Files

https://cloud.netapp.com/blog/azure-netapp-files-performance-so-good-youll-think-youre-on-premises

NetApp netapp.com Cloud Story API

Cloud Central Products Use Cases Clouds Partners Resources Blog

Azure NetApp Files – Performance So Good You'll Think You're On Premises

Feb 14, 2019 11:43:17 AM

Posted by Chad Morgenstern, Senior Cloud Solutions Architect, NetApp Cloud Data Services | Topics: Cloud Volumes Service, Azure NetApp Files

Enterprises are moving to the cloud (or rather, they're continuing to move), and Azure is hungry to have them. Some companies are being selective in their migration, moving only applications that meet specific criteria—such as those without legal restrictions—while others have an all-in mandate. The task of transforming from custom-built data centers to general-purpose cloud is not easy, especially for applications not born in the cloud. From the retail firm with its enterprise-class databases demanding gigabytes of bandwidth, to the financials firm running 10-hungry Monte Carlo simulations requiring a single nanosecond, to the genomic firm running highly demanding scale-out HPC workloads, demands are high—but is the cloud ready? Microsoft Azure certainly is, thanks in big part to Azure NetApp Files!

https://cloud.netapp.com/cloud-volumes-service/azure-benchmarks

NetApp netapp.com Cloud Story API

Cloud Central Products Use Cases Clouds Partners Resources Blog

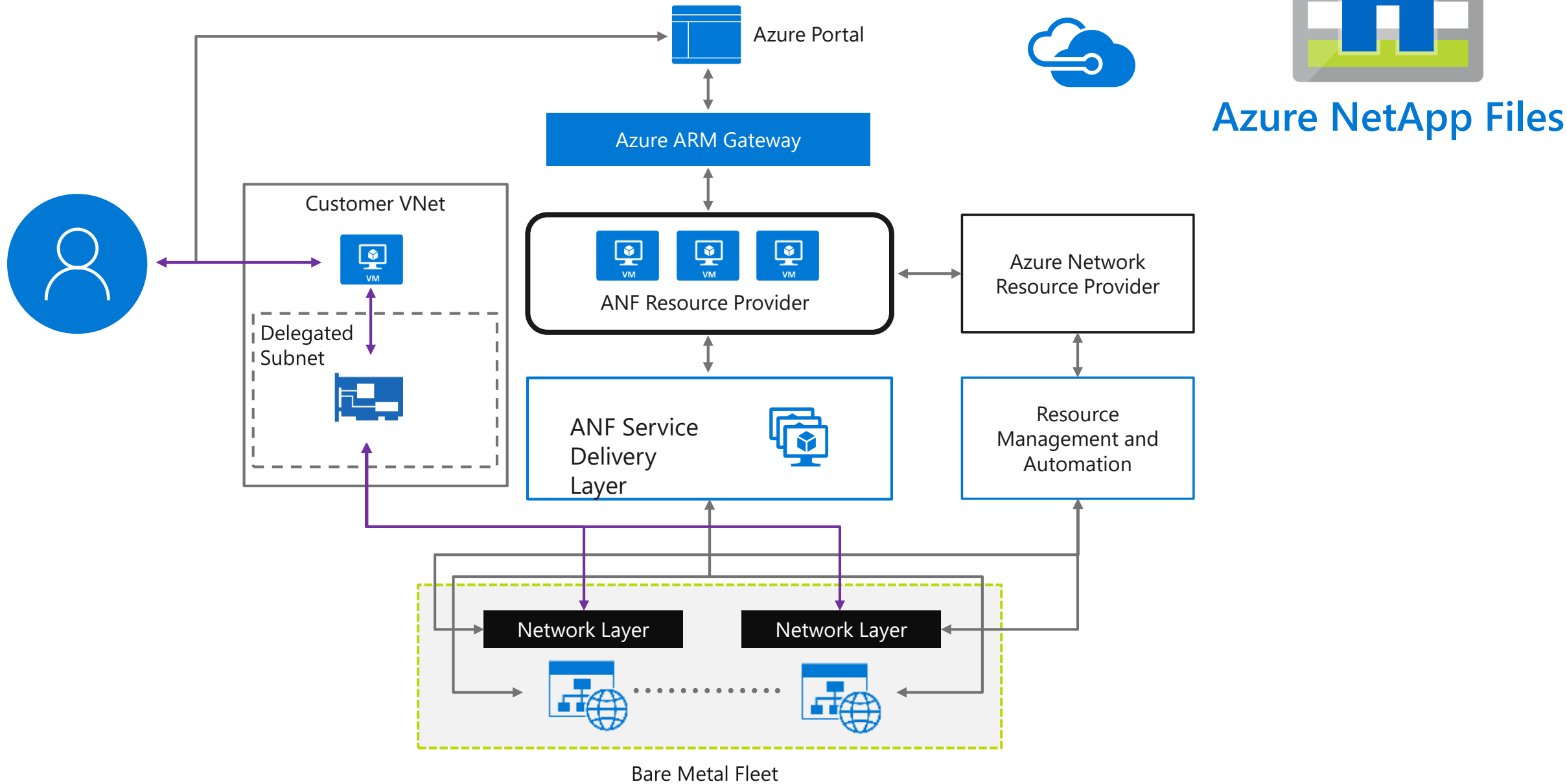
Azure NetApp Files: Benchmarks

Putting Azure NetApp Files to the test. These benchmarks show the performance that Azure NetApp Files delivers.

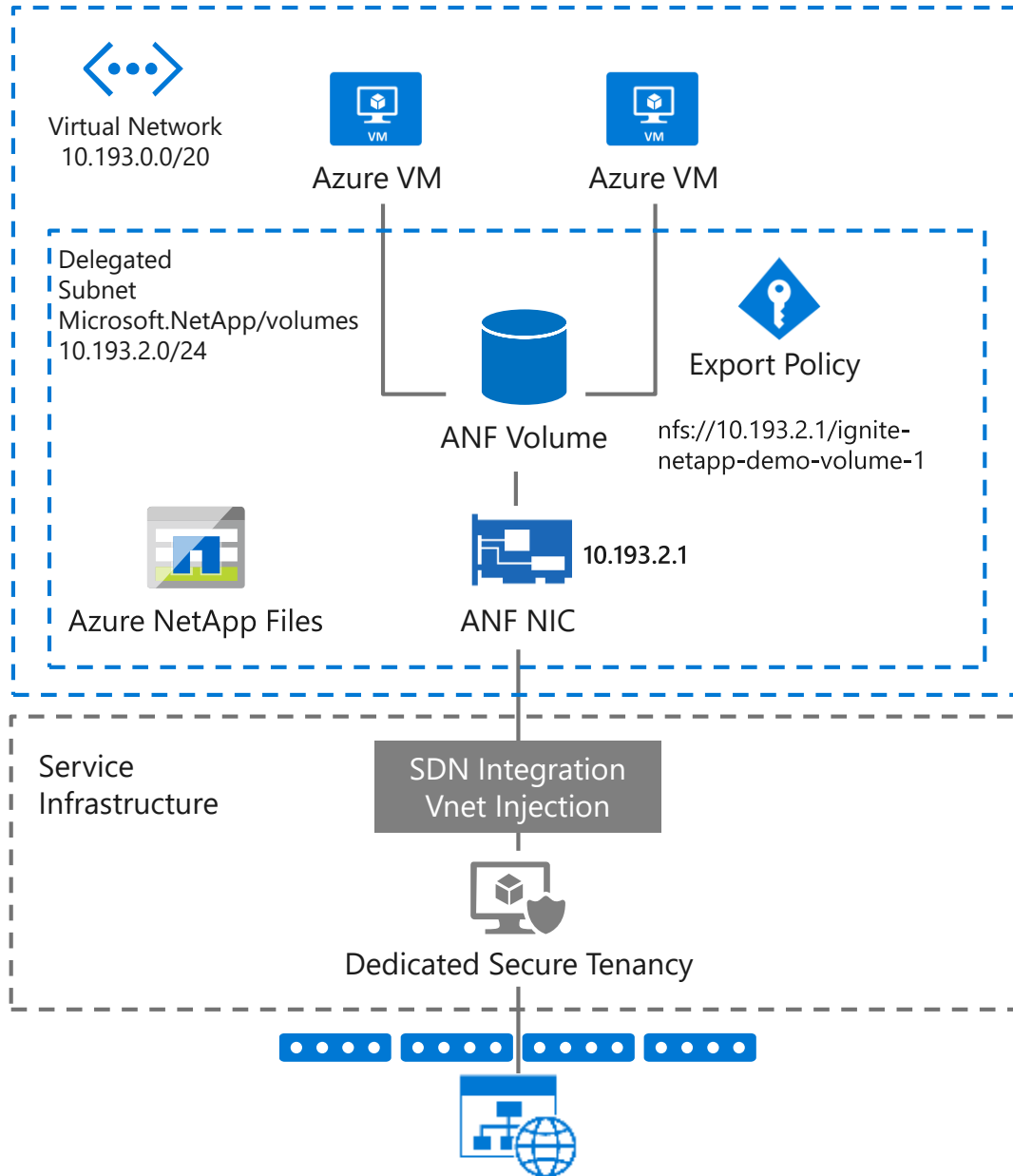
Linux | Oracle

Linux

Architecture



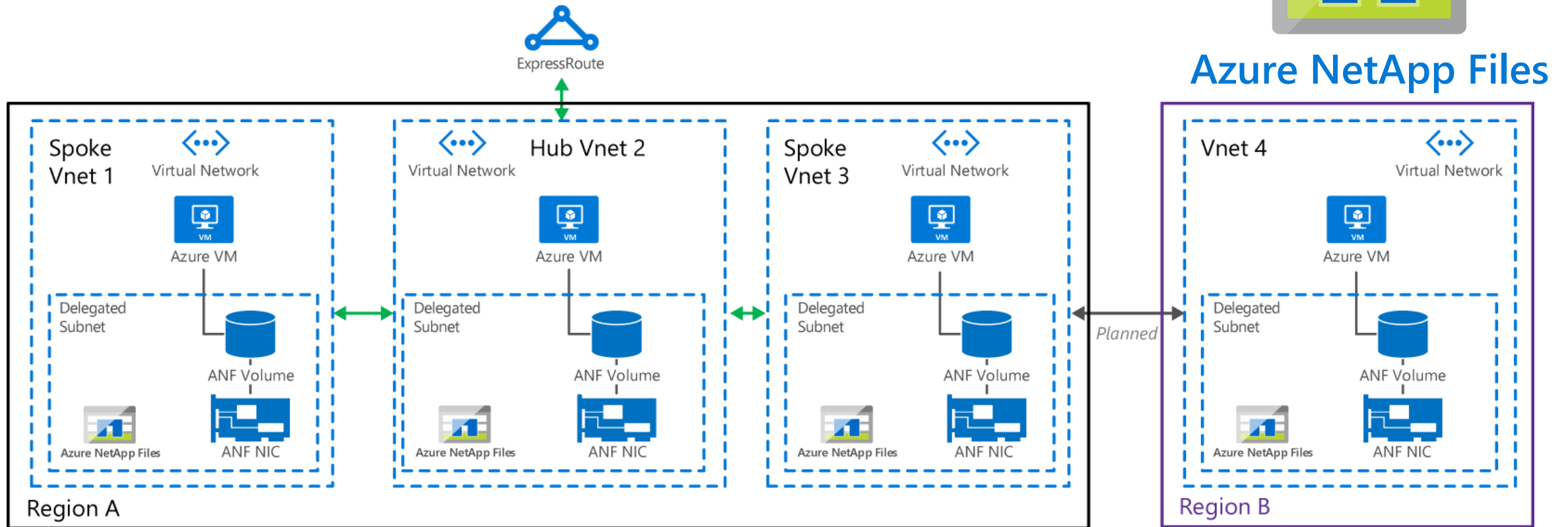
Network and Volumes



Azure NetApp Files

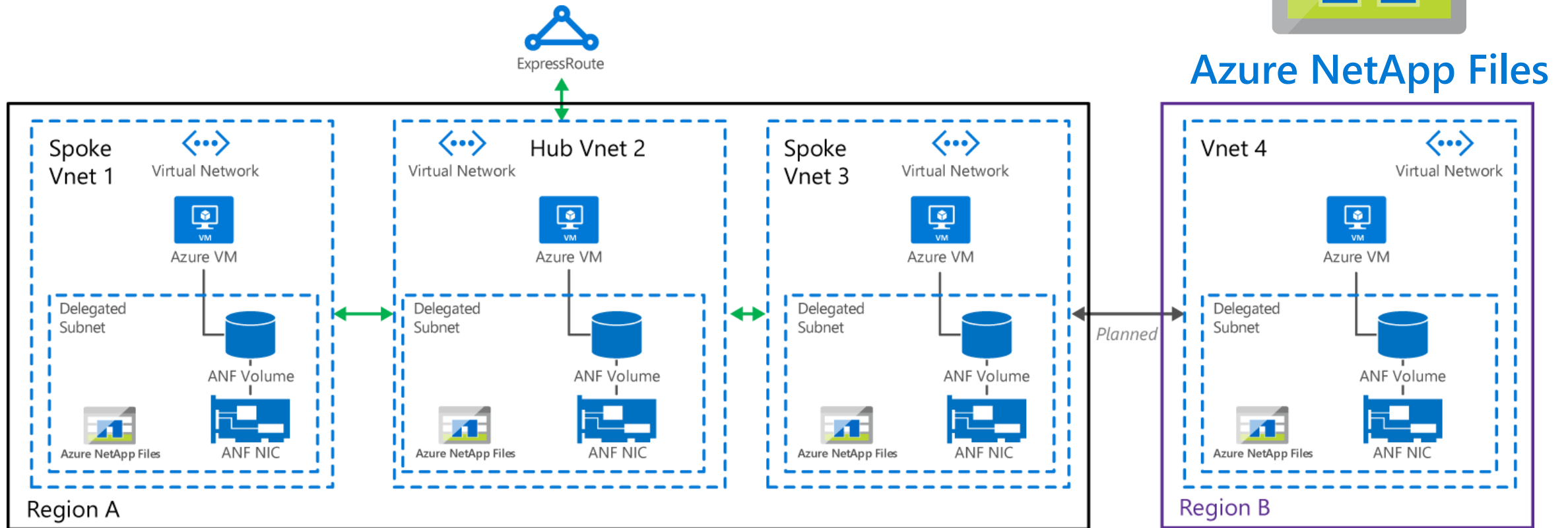
- Based on Service Vnet Injection
 - <https://docs.microsoft.com/en-us/azure/virtual-network/virtual-network-for-azure-services>
- Dedicated Delegated Subnet
- Azure NIC
- Volumes and Mount Points

Deployment Considerations



- Access within region Vnet peering is supported
 - Example - VM in Spoke Vnet 1 can access ANF in Hub Vnet 2
- Express Route is supported
 - Resources on-prem can access ANF in Hub Vnet 2
 - Transitive routing is supported, Resources on-prem can access ANF in Spoke Vnet 1

Deployment Considerations

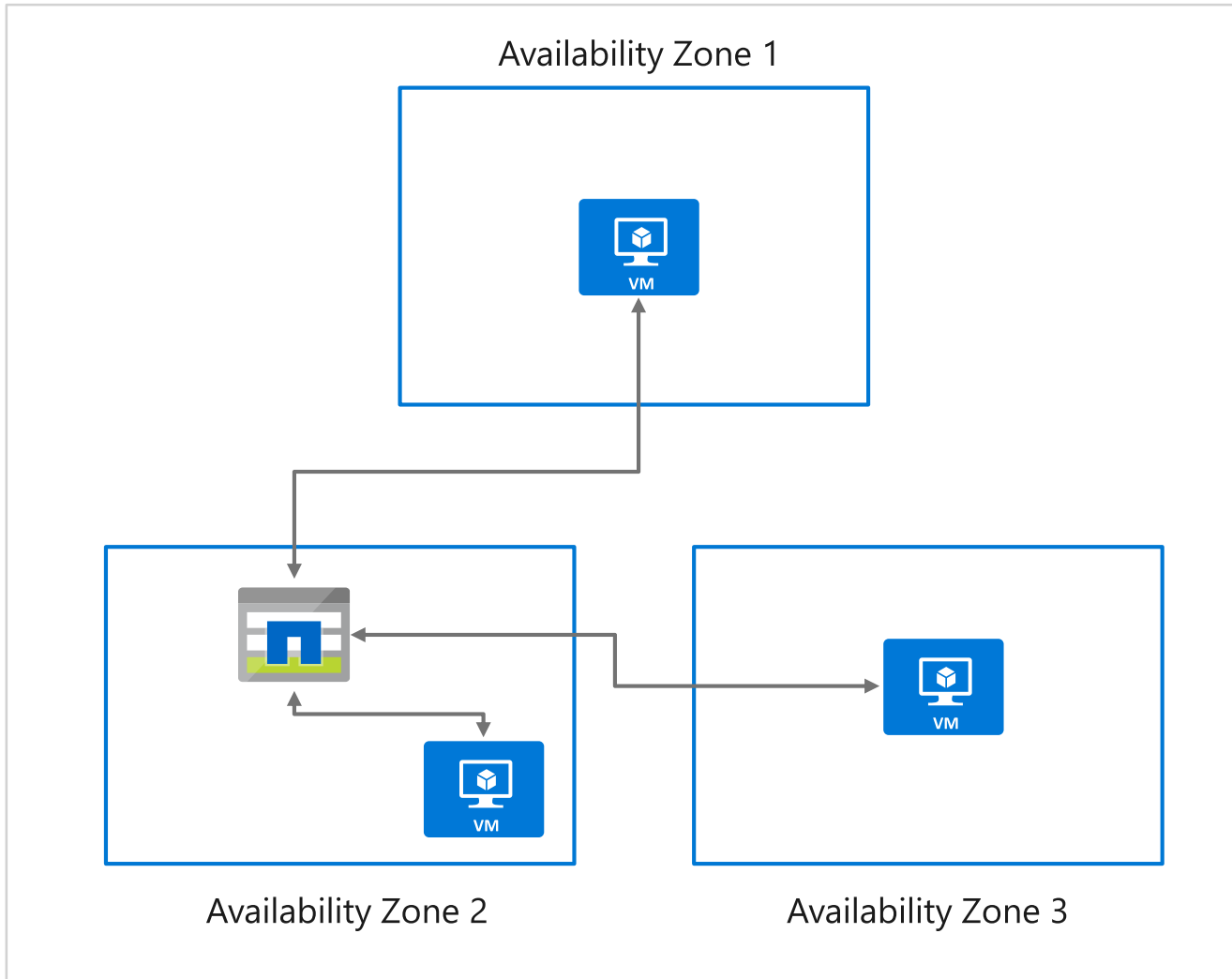


- Transitive Routing across Vnet peering relationships is not supported
 - VM in Spoke Vnet 1 cannot access ANF in Spoke Vnet 3 through peering to Hub Vnet 2. Spoke Vnet 1 would need to be directly peered to Spoke Vnet 3
- Global Vnet Peering is NOT supported
 - VM in Spoke Vnet 3 cannot access ANF in Vnet 4

Redundancy – Current Implementation



Azure NetApp Files



- ANF is locally redundant
- Deployed in a single zone without location awareness
- Latency is subject to regional envelope based on relative VM or resource location

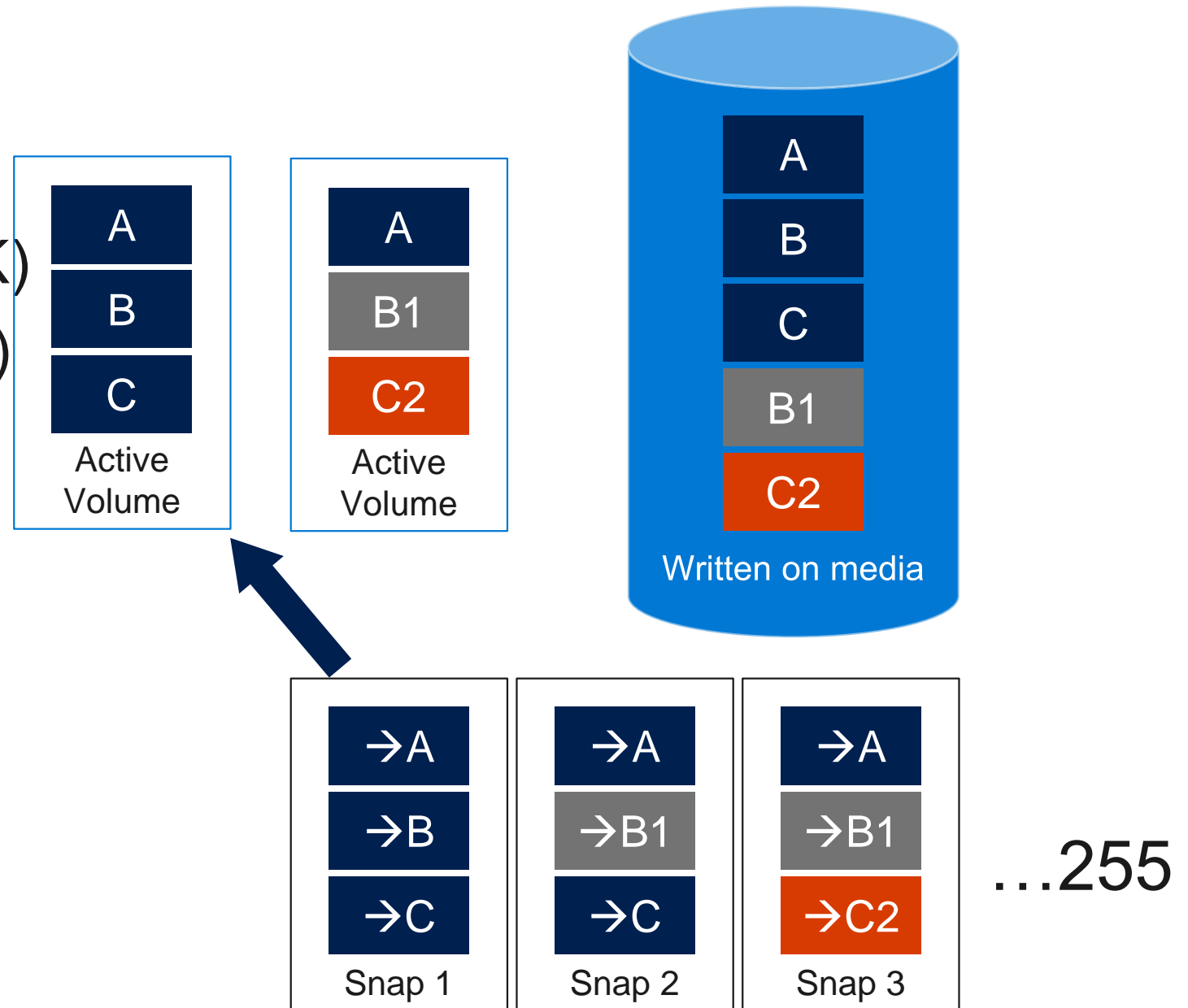
Snapshots

Performant (“ROW”)

Space Efficient (changed 4K)

Immediate restores (“ROW”)

Many restore points (<255)



Service Consumption Model

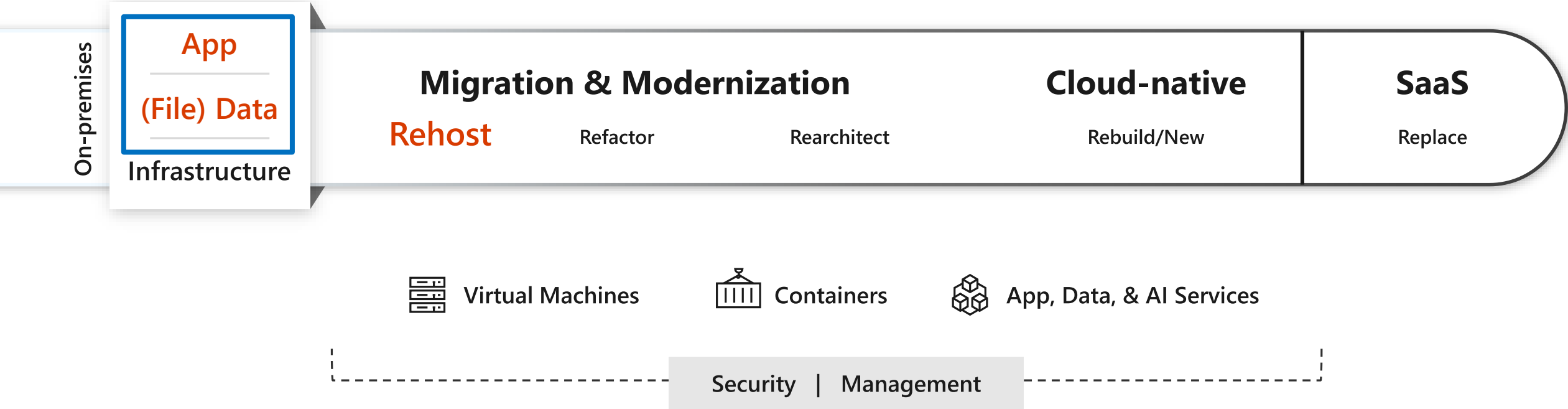
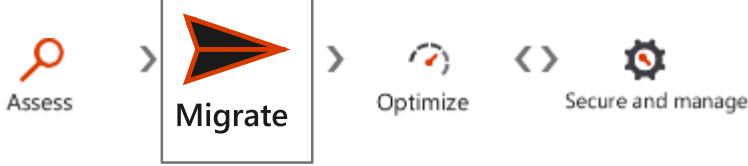


Azure NetApp Files

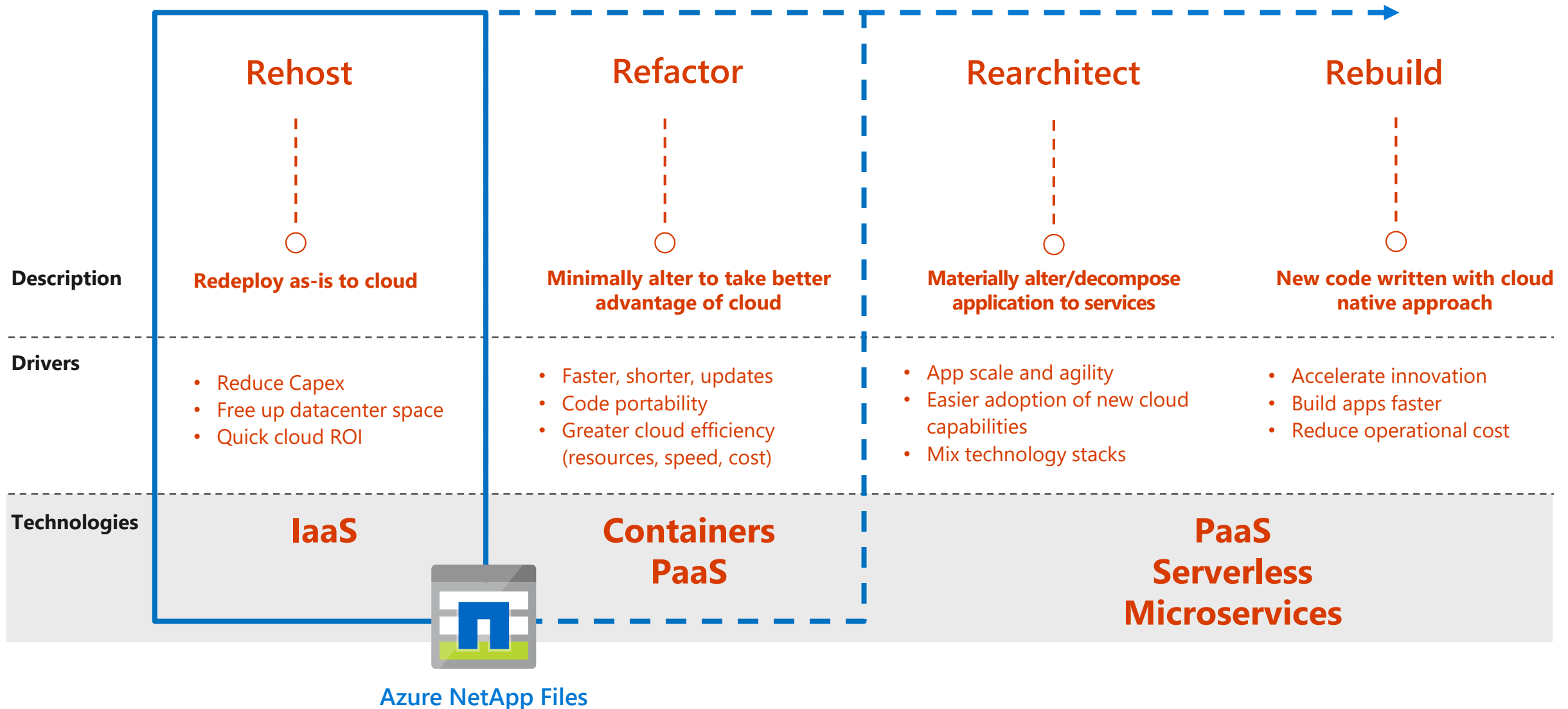
	On-Prem ONTAP AFF „Full control & ownership“	Cloud Volumes ONTAP „Full control & SW ownership“	Azure NetApp Files „Service Consumption“
Mount Volumes	Customer	Customer	Customer
Provision Volumes	Customer	Customer	Customer
Performance	High	Low, Medium	High
Space/Time-efficient Snapshots	Yes	Yes	Yes
Space/Time-efficient Cloning	Yes	Yes	Yes
Dedupe & Compression	Yes	Yes	No
Protocols	NFS, SMB, iSCSI, etc.	NFS, SMB, iSCSI	NFS, SMB
Endpoint replication / migration	SnapMirror, CloudSync	SnapMirror, CloudSync	CloudSync
Encryption	Yes (Customer managed)	Yes (Customer managed)	Yes (Azure managed)
Purchasing commitment	Typically 3-5 Years	Paygo (hourly)/BYOL (yearly)	Paygo (hourly)
Disk Capacity Planning	Customer	Azure	Azure
ONTAP Upgrades	Customer	Customer	Azure
ONTAP Service Deployment	Customer	Customer on Azure IaaS	Azure
Hardware Deployment/Refresh	Customer	Azure	Azure

Move Today To
Achieve More Tomorrow

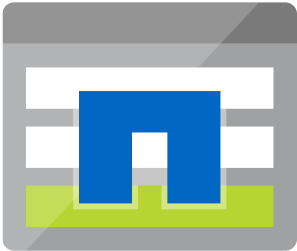
Azure migration scenarios



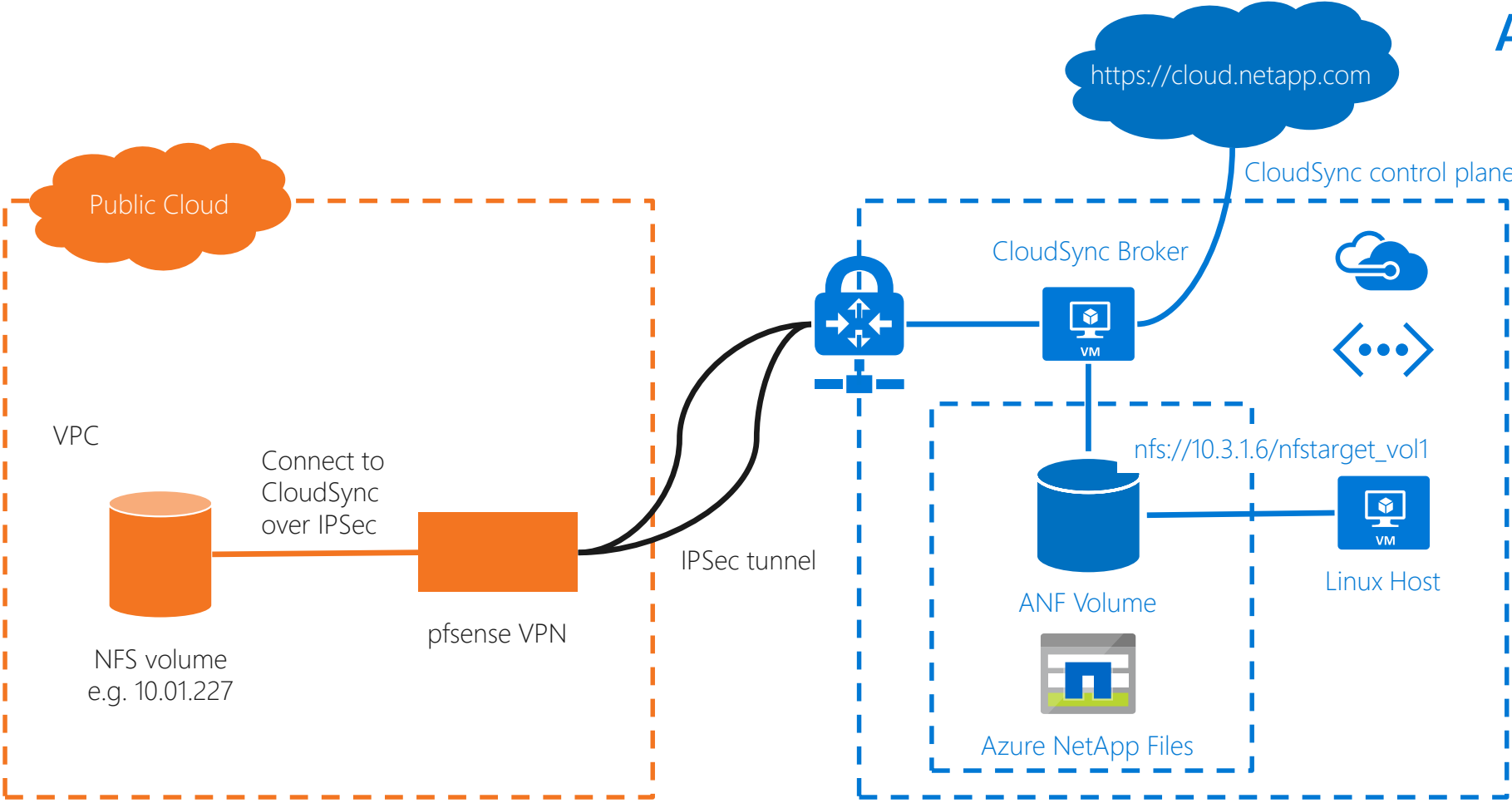
Applying to cloud migration strategies



CloudSync Data Migration



Azure NetApp Files



SAP on Azure – Improve Agility with ANF

Simple to Manage

- Native Azure experience for easy deployment & scale

Highly Performant

- On-prem like performance
- On-demand scalability

Ent Data Management

- Space / Time efficient snapshot and cloning

Hybrid

- Cloud Sync integration for hybrid cloud deployments



At GA

SAP Application Server



Compute layer
Azure IaaS VMs



Planned

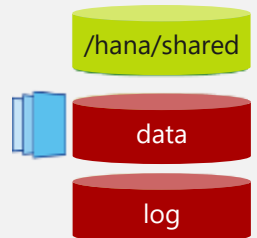
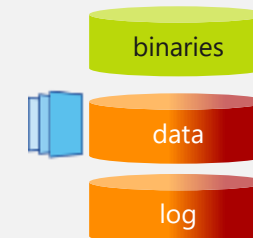
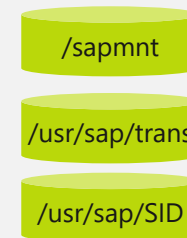
SAP AnyDB



SAP HANA



Compute layer
Azure IaaS VMs



Storage layer
Azure NetApp Files



- SAP on Azure w/ Azure NetApp Files <http://aka.ms/tr-4746>

Performance Requirement

Low

Medium

Med-High

High

Oracle on Azure – Improve Agility with ANF

Simple to Manage

- Native Azure experience for easy deployment & scale

Highly Performant

- On-prem like performance
- On-demand scalability



Ent Data Management

- Space / Time efficient snapshot and cloning

Hybrid

- Cloud Sync integration for hybrid cloud deployments

At GA

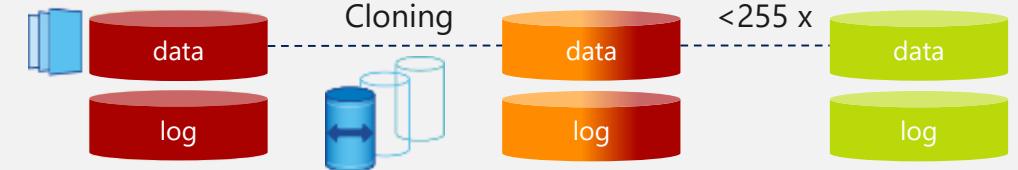
Database layer



Compute layer
Azure IaaS VMs



Planned (T&D at Scale)



Storage layer
Azure NetApp Files

Performance Requirement

Low

Medium

Med-High

High

Globally Distributed Enterprise File Sharing

with Azure NetApp Files and Talon FAST™

Distributed File Storage

Transparent and fast
access to data stored in
cloud – even in remote
locations

Centralized Data Management

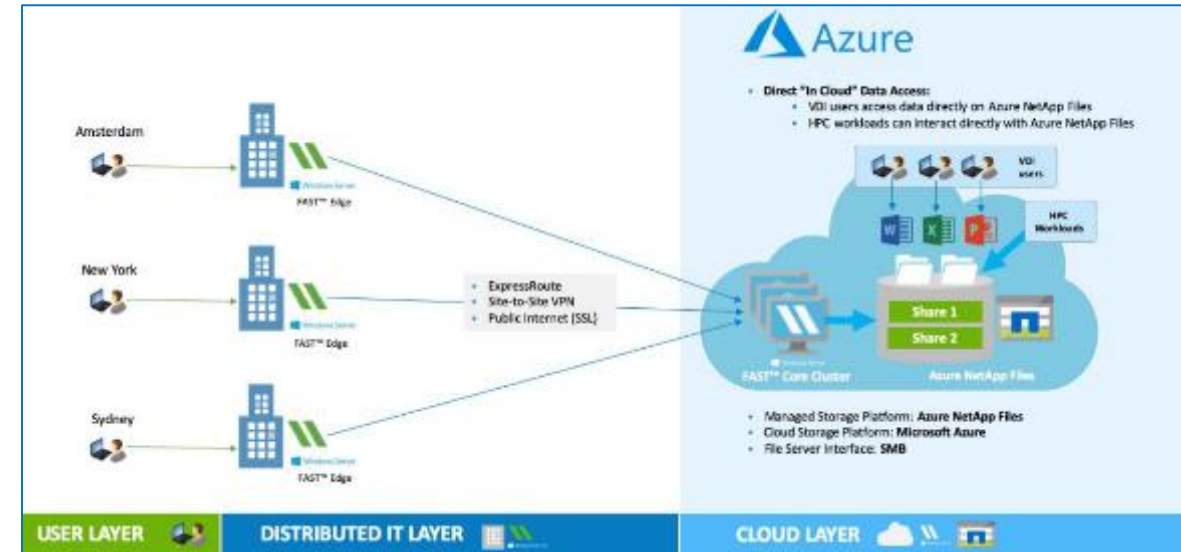
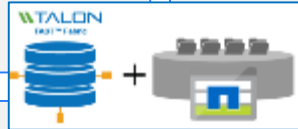
*Store-in-cloud and cache-
on-prem* allows for worry
free centralized data
management

Scalable

ANF and Talon FAST™
scalability allows for PB
scale file sharing
environments

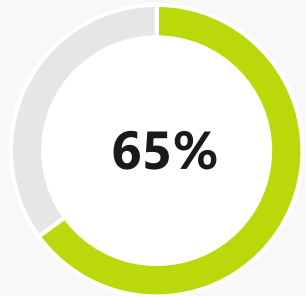
Hybrid

Both remote and in-cloud
access to file data

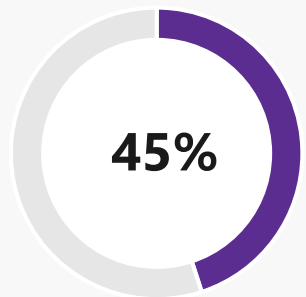


Azure NetApp Files (ANF) - GA May 28 | At a glance

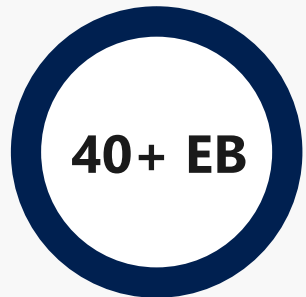
File Migration Opportunity



Enterprise workloads continue to be On-Premises¹



Enterprise workloads on external storage systems are File based²



Total File storage by 2020 @ 24% CAGR²



Why ANF?

- File-workloads in the cloud : Performance, Reliability, Data Management?
- No one wants to re-factor or re-architect



ANF

- Powerful, enterprise file-storage service powered by NetApp
- An Azure first-party service, sold and supported by Microsoft



Value Prop

- Migrate & run complex file-workloads with no code modification
- Minutes to spin-up, scale, & near on-prem-like performance



Deal Size

- \$30 – \$300K+ ACR / Y , 1.5-2 x compute, weeks to ACR
- 12+ dedicated NetApp sellers > 100+ large customers in preview



Az Priority

- App Migration (Linux / OSS / Win)
- SAP Migration (File-system at GA, HANA certification pending) | HPC



GA

- **May 28 - 5 regions (3 US + 2 EMEA)**
- White-listed on-boarding. Capacity for ~ 200 customers at GA

¹ Survey Uptime Institute

² IDC Worldwide Storage Workloads

Azure Files vs Azure NetApp Files

Azure File Services: When to use what..

- Most workloads that require cloud file storage work well on either Azure Files or NetApp Files
- Finding the best fit requires digging into feature details. However, there some cases where you should clearly lead with one vs. the other

Azure Files

- Customers using Windows File Servers on-premises
- Need flexible data access - direct cloud, on-premises, or hybrid (Azure file sync)
- Need REST, SMB 2.1, 3.0, *3.1.1, NFS v4.1*
- Need regional redundancy (LRS/GRS/ZRS)
- Need global regional availability

Azure NetApp Files

- Customers using NetApp on-premises and looking to migrate to cloud with ONTAP format compatibility
- Need higher performance than Azure Premium Files (Ultra tier)
- Need NFS v3.0, SMB 3.1, *NFS v4.1*
- Looking for advanced ONTAP capabilities
 - *FlexClones*
 - *SnapMirror*

Legend : Planned

9 July 2019

Tuesday 11:39

Hye Carmelo, can you remember how long it took to move the 210TB of FCA data with CCloudSync?

*204TB



Carmelo Ferrara Tuesday 11:55
few days

3 days

Tuesday 11:55
Not bad!



Carmelo Ferrara Tuesday 11:55
incredible....

we did a lot of fine tuning

the end result was spectacular