Azure NetApp Files: Managed Enterprise File Shares for SMB Workloads

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Abstract

This architecture paper provides a brief overview of SMB file shares provided by Azure NetApp Files.

Table of Contents

Introduction

Microsoft Azure provides a broad portfolio of storage options for customers. One of Azure's latest portfolio additions, Azure NetApp Files, offers a fully managed enterprise class storage service. In this briefing, we'll showcase how ANF can provide feature-rich SMB file shares to applications in Azure.

The SMB Challenge

As customers migrate applications and services that require SMB from the data center—and as they deploy new ones in Azure--the available options can seem limiting. Factors such as availability, scale of capacity and performance, and complexity can create bottlenecks to successful implementation.

The Value of ANF

Azure NetApp Files is a fully managed cloud service with full Azure portal integration and access via REST API, CLI, or PowerShell. Importantly, it's sold and supported by Microsoft and is not a marketplace offering. Seamlessly migrate and run applications in the cloud, without worrying about procuring or managing storage infrastructure. Purchase Azure NetApp Files and get support through your existing Azure agreements, with no up-front or separate term agreement.

What are Key Values of ANF?

High performance with low latency

With consistently high performance of over 300k IOPS, Azure NetApp Files provides shared persistent storage with high throughput and low latency. An Azure NetApp Files volume is able to generate ~319,000 IOPS with only 1.5 millisecond (ms) latency for adjacent virtual machines and ~290,000 IOPS with less than 2ms latency for non-adjacent virtual machines.

Power of NetApp ONTAP

NetApp's ONTAP systems serve hundreds of thousands of customers and have earned enterprise organizations' trust over decades. The technology provides proven protocol support, including support for NFSv3 and SMB 3.1. It enables powerful data management with snapshots of datasets, high availability, and sub-millisecond latency.

Increased resilience with snapshot copies

You can easily create a snapshot copy of a file share using NetApp Snapshot™ Technology. Snapshots act as logical backups. They're point-in-time representations of your data, with a rapid revert function that allows you to restore your data without downtime. You create snapshot copies manually or schedule their creation using the Azure NetApp Files API or graphical user interface (GUI). If there is a need to use a snapshot, a customer can rapidly revert using the API.

Snapshot copies are fast, plentiful, and nondisruptive. A snapshot copy in Azure NetApp Files simply manipulates block pointers, creating a "frozen" read-only view of a volume that enables your applications to access older versions of files and directory hierarchies without special programming. Snapshot copy creation takes only a few seconds (typically less than 1 second) regardless of the size

of the volume or the level of activity within the environment. Since they are read-only, block-level incremental copies, you only pay for the space consumed by new data written.

Speed up the time to market: spin up cloud volumes in seconds with Instant Copy

Azure NetApp Files snapshots can be restored to new volumes in seconds. This speed allows for enhanced development and testing processes that can be performed anytime regardless of the size of your file share. Spin up a copy of a file share to test an application update and tear it down when testing is complete, all without interrupting production services.

Data durability

With Azure NetApp Files, data is protected not just against multiple drive failures, but also against numerous storage media errors that can harm your data durability and your data integrity. And with 99.9999999% durability—based on the experience of over 300,000 customers—you don't have to worry that your data is going to disappear.

High availability

Built on industry leading hardware and software, Azure NetApp Files is characterized by high availability and uptime, both of which are enabled by architectural features, such as redundant network paths, failover, and advanced data protection. In fact, we are so confident about our availability capabilities that Azure now offers an SLA for availability.

Security and encryption

Azure NetApp Files gives you FIPS-140-2-compliant data encryption at rest, role-based access control (RBAC), Active Directory authentication (enabled for SMB), and export policies for network-based access control lists. Azure NetApp Files also enhances data security through mount points exist solely within a virtual private cloud, and are not accessible through a public IP address. Azure NetApp Files is built to meet the demanding security standards that have enabled Azure to achieve more compliance certifications than any other cloud provider. View the comprehensive list.

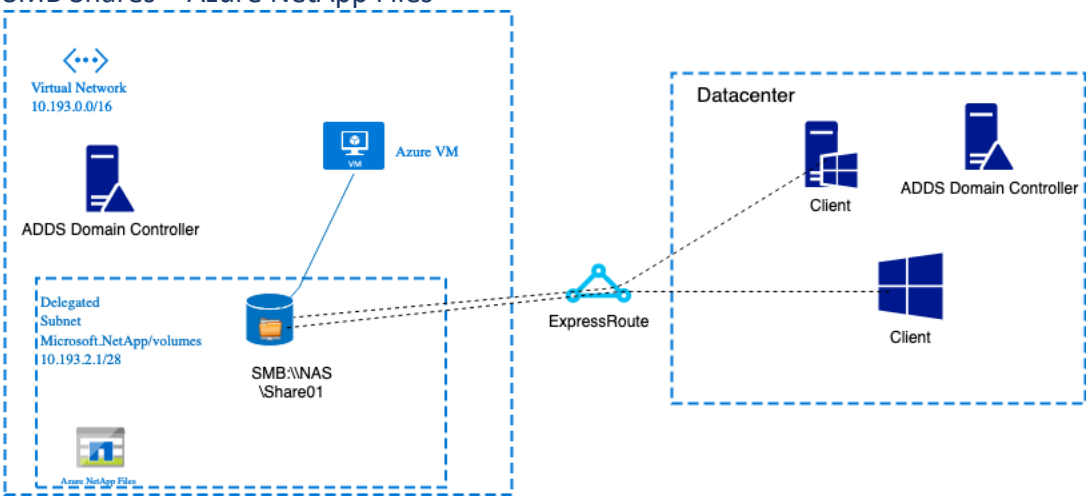
Support for hybrid scenarios

Azure NetApp Files enables easy data migration across on-premises and cloud infrastructures using Cloud Sync, a NetApp service for rapid, security-enhanced data synchronization. Cloud Sync simplifies lift and shift migrations and DevOps use cases, with capabilities like instantaneous snapshot creation and restore, as well as Active Directory integration (SMB only). These features work equally as well on premises—and in the same manner—as they do in the cloud. Integrated data replication and backup features will be available in the near future. Learn more about Cloud Sync.

Detailed Architecture

Users operating on-premises and in the cloud, within the same Azure region, can access any given SMB volume via Express Route, as depicted in the reference architecture below.

SMB Shares – Azure NetApp Files



In the diagram above, you can see:

- Azure NetApp Files can use Active Directory Domain Services for authentication (domain controller(s) can be either deployed in Azure or in the datacenter).
- Clients in the same Azure Region or in the data center can access the SMB share via ExpressRoute.

The key components of the solution include:

- Active Directory Domain Services
- Azure Virtual Machines
- Azure NetApp Files (storage)
- NetApp Snapshot™ Technology

The Cost Benefits of Azure NetApp Files

Azure NetApp Files is the lowest cost, highest quality storage solution for SMB file shares in Azure. Three performance tiers allow you to optimize Azure NetApp Files for your workload and spending requirements. Choose from Standard, Premium, and Ultra tiers.

Requirement	**Azure NetApp Files**	**"Roll your own HA File Server"**
Capacity	40TiB	40TiB
Monthly Storage Costs	$6,039.96 (40TiB Standard Service Level)	$5,946.85 (+ $540.67 for 4TB of snapshots 3x16TB disks) x2 = $ 11,893.70
Annual Storage Costs	$72,479.52	$ 142,724.40
Compute/VM Costs Monthly	$0	$253.32 (DS3v2 x2) = $506.64
Compute/VM Costs Annual	$0	$6,079.68
TCO (yearly)	$72,479.52	$148,804.08
Savings	51% savings	

Code Snippet

Azure NetApp Files has rest APIs that can be called by various orchestration engines and scripting languages. Here are some example scripts that you can leverage to get started.

GET and PUT Request Example:

This example includes:

- All NetApp accounts;
- Capacity pools for NetApp account;
- Cloud volumes; and
- Snapshot copies of a volume.

```
#get NetApp accounts
curl -X GET -H "Authorization: Bearer TOKENGOESHERE" -H "Content-Type: application/json"
https://management.azure.com/subscriptions/SUBIDGOESHERE/resourceGroups/RESOURCEGROUPGOESHERE/providers/Microsoft.NetApp/netAppAccounts?api-version=2017-08-15

#get capacity pools for NetApp account
curl -X GET -H "Authorization: Bearer TOKENGOESHERE" -H "Content-Type: application/json"
https://management.azure.com/subscriptions/SUBIDGOESHERE/resourceGroups/RESOURCEGROUPGOESHERE/providers/Microsoft.NetApp/netAppAccounts/NETAPPACCOUNTGOESHERE/capacityPools?api-version=2017-08-15

#get volumes in NetApp account & capacity pool
curl -X GET -H "Authorization: Bearer TOKENGOESHERE" -H "Content-Type: application/json"
https://management.azure.com/subscriptions/SUBIDGOESHERE/resourceGroups/RESOURCEGROUPGOESHERE/providers/Microsoft.NetApp/netAppAccounts/NETAPPACCOUNTGOESHERE/capacityPools/CAPACITYPOOLGOESHERE/volumes?api-version=2017-08-15

#get snapshots for a volume
curl -X GET -H "Authorization: Bearer TOKENGOESHERE" -H "Content-Type: application/json"
https://management.azure.com/subscriptions/SUBIDGOESHERE/resourceGroups/RESOURCEGROUPGOESHERE/providers/Microsoft.NetApp/netAppAccounts/NETAPPACCOUNTGOESHERE/capacityPools/CAPACITYPOOLGOESHERE/volumes/VOLUMEGOESHERE/snapshots?api-version=2017-08-15


#create a NetApp account
curl -X PUT -H "Authorization: Bearer TOKENGOESHERE" -H "Content-Type: application/json"
https://management.azure.com/subscriptions/SUBIDGOESHERE/resourceGroups/RESOURCEGROUPGOESHERE/providers/Microsoft.NetApp/netAppAccounts/NETAPPACCOUNTGOESHERE?api-version=2017-08-15

#create a capacity pool
curl -X PUT -H "Authorization: Bearer TOKENGOESHERE" -H "Content-Type: application/json"
https://management.azure.com/subscriptions/SUBIDGOESHERE/resourceGroups/RESOURCEGROUPGOESHERE/providers/Microsoft.NetApp/netAppAccounts/NETAPPACCOUNTGOESHERE/capacityPools/CAPACITYPOOLGOESHERE?api-version=2017-08-15

#create a volume
curl -X PUT -H "Authorization: Bearer TOKENGOESHERE" -H "Content-Type: application/json"
https://management.azure.com/subscriptions/SUBIDGOESHERE/resourceGroups/RESOURCEGROUPGOESHERE/providers/Microsoft.NetApp/netAppAccounts/NETAPPACCOUNTGOESHERE/capacityPools/CAPACITYPOOLGOESHERE/volumes/MYNEWVOLUME?api-version=2017-08-15

#create a volume snapshot
```

```
curl -X PUT -H "Authorization: Bearer TOKENGOESHERE" -H "Content-Type: application/json"
https://management.azure.com/subscriptions/SUBIDGOESHERE/resourceGroups/RESOURCEGROUPGOESHERE/providers/Microsoft.NetApp/netAppAccounts/NETAPPACCOUNTGOESHERE/capacityPools/CAPACITYPOOLGOESHERE/volumes/MYNEWVOLUME/Snapshots/SNAPNAME?api-version=2017-08-15
```

For more details, check out our blog on Azure NetApp Files APIs.

Customer Support for Azure NetApp Files

Azure NetApp Files is fully supported by Microsoft Azure. If customers have any questions or need help with the service, they can create a support request by clicking on the question mark symbol on the top right corner of the ANF interface, and then clicking on the “Help + support” tab. Please refer to the below screenshot.