Azure Storage

Understanding Azure Storage Capabilities
VM Storage
Storage Tools

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Importance and Types of Storage

- Different workloads have needs for ephemeral and durable storage
- Types of data vary greatly as well
- Different types of capabilities are needed across types of data
- There is not one storage to rule them all

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Azure Storage 101

- Azure does not use traditional storage such as Storage Area Networks (mostly)
- Instead it uses a 3-tier architecture within storage stamps
- DNS is used for the namespace which is why URIs used to access, e.g. http(s)://<account>.<service>.core.windows.net/<partition>/<object>
- Data is replicated in two ways
  - Intra-stamp replication (stream layer) – Synchronous and keeps data durable within the stamps
  - Inter-stamp replication (partition layer) – Asynchronous replication of data across stamps

Front-End Layer
Partition Layer
Stream Layer

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Storage Accounts

- Top-level namespace for storage services
- Created in a region
- Different types of storage account
- Can have various types of resiliency
- Supports API access then other means based on type
- Have 2 all-powerful account keys (protect them)
- Capacity, IOPS and throughput vary based on performance tier and service
- Different access tiers (hot, cool, archive)
- Can enable monitoring and logging

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Money

- Standard performance is consumption-based
- Some premium performance is provision-based
- Managed disks always provision-based
- Don't forget about operations and data transfer!

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Storage Account Services

- Blob
  - Block [ADLSGen2 (hierarchical namespace)]
  - Page
  - Append
- Table
- Queue
- Files

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Host a website!

- If you only have static content you can host via blob
- Enable at account level
- Populate content into created $web folder
- Place vanity domain in front of provided

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Not using account key

- Azure AD integration
- Shared Access Signatures and Policy
  - Service SAS
  - Account SAS
  - Signed with account key
  - Cannot early revoke without regenerating the signing account key
  - Ad hoc vs Service SAS with stored access policy
- Azure Files AD Integration

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DON'T PANIC ABOUT SAS "PLAIN" TEXT HTTPS DOES NOT WORK THAT WAY

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Lifecycle Management

- Consider access tiers
- Will want to move/delete based on modify and access of data
- Lifecycle management enables rules to be defined for blob

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Encryption

- Always encrypted at rest
- You can choose your own key via Key Vault
- Encryption scopes enable container/blob level
- Encryption in transmit can be enforced at storage account level

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Special Features

- Snapshots
  - Point-in-time view of blob or files share that is read-only
  - Incremental storage
- Blob versioning
- Soft delete
- Blob undelete (using versioning and soft delete)

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Azure File Sync

- Consider have existing SMB file shares running on Windows Server
- Azure File Sync enables
  - Single cloud endpoint per sync group
  - Up to 50 servers per sync group
  - Replicates between via the cloud endpoint
  - Enables cloud tiering of data off local storage to cloud endpoint to optimize local capacity

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Azure NetApp Files

- First-party offering using NetApp hardware in Azure datacenters
- Provides different performance tiers
- SMB and NFS support (multi for single share)
- Uses delegated subnet of Vnet
- Cross-region replication

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Managed Disks

- As the name suggests provides a managed disk experience by abstracting the storage account
- Disks are created with no visibility of storage account removing worries around IOPS per storage account
- Disks and snapshots become ARM resources
- Available for Standard HDD, SSD, Premium SSD and Ultra SSD
- Price based on provisioned capacity not the consumed capacity
- Can be expanded by deallocating attached VM
- LRS only
- Can convert unmanaged to managed and between tiers of managed
- Add resiliency to Availability Sets by aligning
- Premium SSD and Ultra disk have maxShares property

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VM Storage

- A VM is provisioned onto a host
- VM has an OS disk that is normally durable but for some can be ephemeral if state not required
- MOST VMs have a temporary drive (D: or /dev/sdb1 by default) which is not-persistent
  - Pagefile
  - Can be used as scratch drive
  - Do not put anything you care about on this drive
  - HDD based (A series), SSD based (all other series)
- You can add additional data disks (1-64 depending on VM size) with configurable caching
- Others have special types of local storage such as NVMe
- The VM has data disk, IOPS and throughput limits which must be considered along with the storage limits
- Some have burst capabilities

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Volumes Bigger than Max Size

- Depending on the size of the VM you can add up to 64 data disk
- Use Storage Spaces inside the VM to create a simple space combining the separate data disks (if more than 8 disk set number of columns to match number of disks)
- Do NOT use RAID sets
- Do NOT use parity or mirrored Storage Spaces, only simple (the storage is already replicated 3 times and is resilient)
- For SQL workloads you could choose to use SQL's own file group capabilities
- This also gives higher IOPS which is another reason to use multiple disks in a Storage Space
- With Ultra this is likely not needed!

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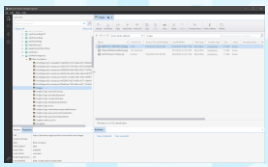
Microsoft Azure Storage Explorer

- Free
- HTML 5 based tool
- Uses account or key authentication
- Works with blobs, disks, tables, queues and files
- Supports the server-side copying of data



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AzCopy

- AzCopy provides a server side, copy of blobs and files to, from and between storage accounts
- Can set concurrency to optimize throughput
- Has sync mode to only replicate changes

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Import/Export

- If you have large amounts of blob/file/disk storage to store in Azure or take from Azure can use Import/Export
- Enables data to be copied to a 2.5 and 3.5 inch SSD and HDD drives that are SATA
- Data is encrypted using BitLocker
- Azure Data Box Disk with Azure provided SSDs
- Larger jobs via Azure Data Box [Heavy]

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Questions?

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When to use IaaS and Understanding Cost and Options

Understanding Azure Pricing and Licensing
Creating a Virtual Machine
Sizes of Virtual Machine

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