Azure Storage

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Azure Storage Overview

- Azure Storage is a service that you can use to store files, messages, tables and other types of information.

- Azure Storage is also used by IaaS Virtual Machines and PaaS cloud services.

- All Storage services can be accessed using a REST API

- You can conceptually think of Azure storage in three areas:

    Storage for Virtual Machines

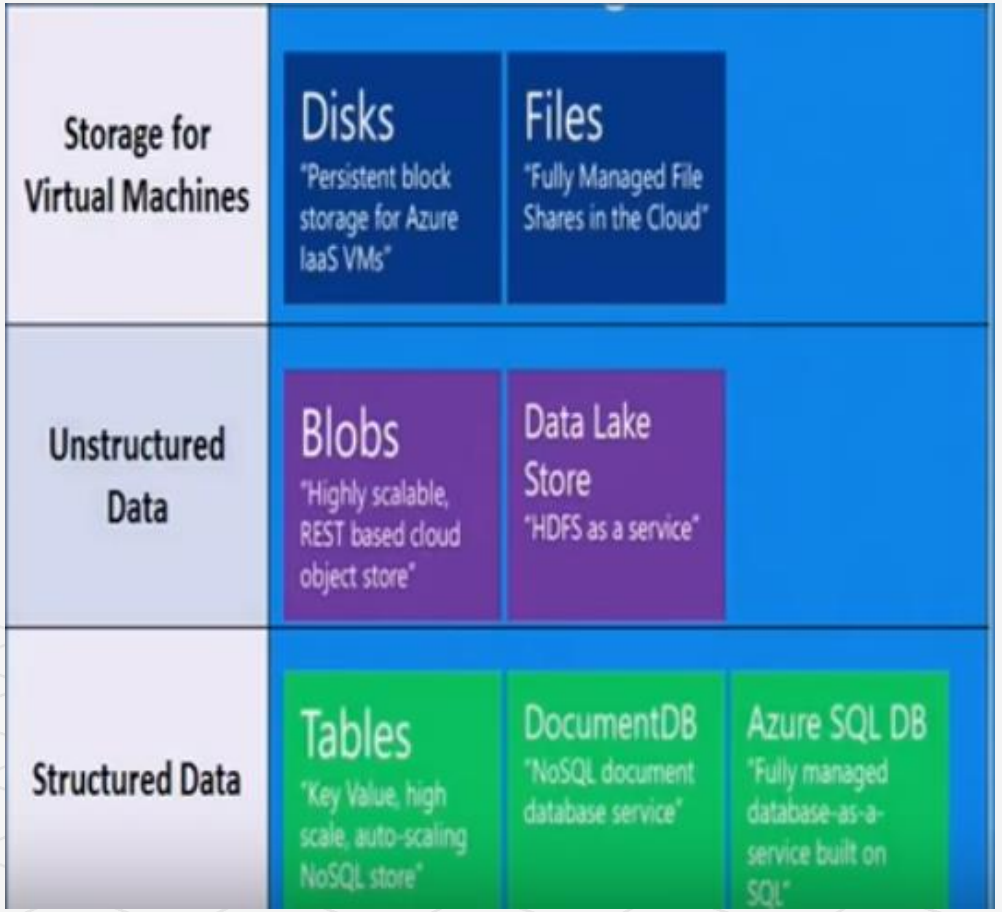
    Unstructured Data storage

    Structured Data Storage

- What is Storage Account?

An Azure storage account provides a unique namespace to store

Access your Azure Storage data objects



Storage Account

There are **two** kinds of Storage accounts:

- **General Purpose Storage Account**: A general-purpose storage account gives you access to Azure Storage services such as **Tables, Queues, Files, Blobs** and **Azure Virtual Machine Disks** under a single account. It has two performance tiers:

  Standard Storage Performance tier: It allows you to store **Tables, Queues, Files, Blobs** and **Azure Virtual Machine Disks**. It's backed by magnetic drives **(HDD)** and provide the lowest cost per GB.

  Premium Storage Performance Tier: It currently only supports Azure Virtual Machine Disks. It is backed by Solid State Drives **(SSD), up to 64 TB per VM.** It offer consistent low-latency and high performance. Microsoft gives you an SLA of 80,000 IOPS which is huge when compared with Standard storage.

- Blob Storage Account: It is specialized storage account for storing your unstructured data as blobs (objects) in Azure Storage. Blob storage has two tiers:

  - A **hot** access tier which indicates that the objects in the storage account will be more frequently accessed. This allows you to store data at a lower access cost.

  - A **Cool** access tier which indicates that the object in the storage account will be less frequently accessed. This allows you to store data at a lower data storage cost.

Note:

- A Storage Account name has to be in lowercase and it also has to be a globally unique name (DNS)

Storage Account Limits:

https://docs.microsoft.com/en-us/azure/azure-subscription-service-limits#storage-limits

Storage Replication Option

- The data in your Microsoft Azure Storage account is always replicated to ensure durability and high availability

- When you create a storage account, you have four replication options: **LRS, ZRS, GRS, RA-GRS**

- You can switch from LRS to GRS or RA_GRS but **ZRS can't be converted**.

- **ZRS** is supported only for **Block** blobs and its only available during Storage account creation.

Replication Option	Number of copies	Strategy
Locally redundant storage (LRS)	Maintains three copies of your data.	Data is replicated three time within a single facility in a single region.
Zone-redundant storage (ZRS)	Maintains three copies of your data.	Data is replicated three times across two to three facilities, either within a single region or across two regions.
Geo-redundant storage (GRS)	Maintains six copies of your data.	Data is replicated three times within the primary region, and is also replicated three times in a secondary region hundreds of miles away from the primary region.
Read access geo-redundant storage (RA-GRS) (Default)	Maintains six copies of your data.	Data is replicated to a secondary geographic location, and also provides read access to your data in the secondary location.

Types of Storage

- Azure Storage is compared of four primary types of Storage services:

Blobs: Azure Blob storage also called **Object Storage** is a service that stores **unstructured data** in the cloud as objects / blobs. It offers three types of blobs:

Block Blobs: Ideal for storing text or binary files, such as documents, backups and media files

Append Blobs: Similar to block blobs in that they are made up of blocks, but they are optimized for append operations, so they are useful for **logging scenarios**

Page Blobs: Can be upto 4 TB in size and are more efficient for frequent read/write operations. **Azure Virtual Machines use page blobs as OS and data disks**

Files: File storage offers shared storage for applications using the standard SMB (Server Message Block) 3.0 protocol. Tables

Queues: It is service for storing large numbers of **messages** that can be accessed from anywhere in the world via authenticated calls using **HTTP** or **HTTPS**. Common use cases are:

- Creating a backlog of work to process asynchronously

- Passing messages from an Azure Web role to an Azure Worker role.

Table: Azure Tables are ideal for storing structured, non-relational data. It can be thought as spreadsheet of information where there is no linkage or relationship (joins) between the information

Azure Storage Managed Disks

Managed Disk:

- Azure Managed Disks simplifies disk management for Azure IaaS VMs by **managing the storage accounts** associated with the VM disks

- It is designed for 99.999% availability

- Managed disks provides better reliability for Availability Set by automatically placing the disks in **different** storage scale units **(stamps**)

- Billing for managed disks depends on the provisioned size of disk and not the actual consumption

Azure Storage Security

Security:

- **SSE (Storage Service Encryption):** Azure SSE provides encryption-at-rest and safeguard your data to meet your organizational security and compliance commitments. Any new data written to existing storage account are automatically encrypted-at-rest with keys managed by Microsoft.

- **ADE (Azure Disk Encryption):** ADE allows you to encrypt the **OS and Data disks** used by an IaaS Virtual Machine. For Windows, the drives are encrypted using **BitLocker** encryption technology. For Linux, the disks are encrypted using the **DM-Crypt** technology. This is integrated with **Azure Key Vault.**

- **Secure access to your data:** There are two methods for controlling access to your data objects: Using **Storage Account Keys** and **Shared Access Signatures** to grant access to specific data objects for a **specific amount of time**.

- **Secure Transfer Required:** The "**Secure Transfer Required"** option enhances the security of your storage account by only allowing requests to the storage account from secure connections. For example, when calling REST APIs to access your storage account, you must connect using **HTTPS**. Any queries using HTTP are rejected.

Azure Storage Access Tools

Access Tools:

- **PowerShell:** PowerShell offers storage cmdlets to work with Azure Storage

- **Azure Storage Explorer:** It id a standalone app from Microsoft that allows you to easily work with Azure Storage data on Windows, macOS and linux

- **AzCopy:**: AzCopy is a windows command line utility designed for copying data to and from Microsoft Azure Blob, File and Table Storage.

- **Azure CLI**

Questions?

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