**AZURE STORAGE SERVICES**

**Azure Storage Building Blocks**

The fundamental building block of Azure storage service is the Azure storage account. The Storage account is more like an administrative container for most of the Azure storage services.

All the storage services are explained below.

**Azure Blob**: We can have Azure Blob storage within the storage account, which is used to store the unstructured data such as media files, documents, etc.

**Azure file:** Azure file can be used in case if we want to share files between two virtual machines, then we can create an Azure file share and access it on both of the virtual machines. We can share the data between two or more VMs.

**Archive:** Archive is recently introduced, and it is in preview. We can use the archive for cost optimization. So, we can move any infrequently accessed blobs or files into the archive to optimize the cost. However, once you move the data into an archive, it will take some time for the recovery of that data.

**Azure Queues:** It can be used to store messages.

**Azure Table:** It can be used to store entities. The Azure Table is a bit different from the SQL table. This is a NoSQL data store where the schema within the table is not enforced.

And apart from all these services, there is one other key service which is:

**Azure Disk Storage:** Any OS disk associated with the virtual machine in Azure will get stored in a disk storage account. And also, any OS image from which this OS disk is generated will get stored as a .vhd file within the disk storage.

**Azure STORSIMPLE:** In a hybrid cloud storage solution, Azure offers STORSIMPLE. STORSIMPLE is a hybrid storage solution that works at a SAN (Storage Area Network) level. It was used to be a separate company, but Microsoft brought it with them and is now offering the same services as a part of Azure and from DR (Disaster Recovery) perspective.

**Azure Site Recovery:** In case if we want to use Azure as a DR data-center, then we can use Azure site recovery to replicate the workloads from our on-premises data-center into Azure. Replicated workloads will be stored as images within a storage account. Whenever our on-premises data-center is down, we can run some automated scripts which will consider that recent image and build a virtual machine.

**Azure Data Box:** If we have terabytes of data which we want to transfer from the on-premises data center into Azure and we don't want to choose a network as an option because transferring the data over the network in terms of terabytes is not feasible. So, in that case, we can use the Azure data box. By using Azure Data Box, we can load the data into the data box and give that data box to Microsoft. Microsoft will load that data into Azure

**Azure Backup**: We can use Azure backup to backup the disks of our virtual machine into a recovery service vault and restore the same using that image. We have to be aware that Azure backup doesn't utilize storage to store the disk image. They are stored in the recovery services vault.

**Azure Monitor:** It can be used for the monitoring of all these services. We can use Azure Monitor for simple monitoring, and we can use log analytics for advance monitoring and analysis. We can also use alerts in case if we want to get alerted on certain things, for example, if the file share capacity is reaching its limit, then we configure it in such a way that we will get alert about the same.

**CDN (Content Delivery Network**): It is used for the delivery of the contents stored in the storage account. We can use a content delivery network to reduce the latency of the delivery. We'll create a CDN endpoint near to the users to reduce the latency.

Finally, the storage account will be connected to Virtual Network. The storage account will have a storage firewall where we can configure that from which virtual network you want to accept connections. So we can specify a particular IP address from where we want to allow connections or a specific subnet within a virtual network.

**Azure Storage Account**

An Azure Storage Account is a secure account, which provides you access to services in Azure Storage. The storage account is like an administrative container, and within that, we can have several services like blobs, files, queues, tables, disks, etc. And when we create a storage account in Azure, we will get the unique namespace for our storage resources. That unique namespace forms the part of the URL. The storage account name should be unique across all existing storage account name in Azure.

**Types of Storage Accounts**

General-purpose V2🡪Blob, File, Queue, Table, and Disk

General-purpose V1🡪Blob, File, Queue, Table, and Disk

Blob storage🡪Blob (block blobs and append blobs only)

**Types of performance tiers**

**Standard performance:** This tier is backed by magnetic drives and provides low cost/GB. They are best for applications that are best for bulk storage or infrequently accessed data.

**Premium storage performance:** This tier is backed by solid-state drives and offers consistency and low latency performance. They can only be used with Azure virtual machine disks, and are best for I/O intensive workload such as the database.

(So every virtual machine disk will be stored on a storage account. So, if we are associating a disk, then we will go for the premium storage. But if we are using storage account specifically to store blobs, then we will go for standard performance.)

**Access Tiers**

There are four types of access tiers available:

**Premium Storage (preview):** It provides high-performance hardware for data that is accessed frequently.

**Hot storage:** It is optimized for storing data that is accessed frequently.

**Cool Storage**: It is optimized for storing data that is infrequently accessed and stored for at least 30 days.

**Archive Storage:** It is optimized for storing files that are rarely accessed and stored for a minimum of 180 days with flexible latency needs (on the order of hours).

**Azure Storage Replication**

Azure Storage Replication is used for the durability of the data. It copies our data to stay protected from planned and unplanned events, ranging from transient hardware failure, network or power outages, and massive natural disasters to man-made vulnerabilities.

**Azure blob storage**

It is Microsoft's object storage solution for the cloud. Blob storage is optimized for storing a massive amount of unstructured data, such as text or binary data.

**Blob storage usages:**

* It serves images or documents directly to a browser.
* It stores files for distributed access.
* We can stream video and audio using blob storage.
* Easy writing to log files.
* It stores the data for backup, restore, disaster recovery, and archiving.
* It stores the data for analysis by an on-premises or Azure-hosted service.

Azure blob storage is fundamental for the entire Microsoft Azure because many other Azure services will store the data within a storage account, inside the blob storage, and act upon that data. And every blob should be stored in a container.

**Container**

The container is more like a folder where different blobs are stored. At the container level, we can define security policies and assign those policies to the container, which will be cascaded to all the blobs under the same container.

A storage account can contain an unlimited number of containers, and each container can contain an unlimited number of blobs up to the maximum limit of storage account size (up to 500 TB).

Blob storage is based on a flat storage scheme. So you can't create a container within a container. Let's take an example - once we create a container like videos and if we want to differentiate between professional videos and personal videos. Then we can prefix the blob names with personnel for personal videos and professional for professional videos. The blob name will be shown as personal-video1, personal-video2 for personal videos, and for professional videos - professional-video1, professional-video2. Like this, we can create a virtual hierarchy, but we can't create a container within a container inside the Azure blob storage service.

**Blob Types:**

Azure offers three types of blob service:

**Block blob:** It stores text binary data up-to about 4.7 TB. It is the block of data that can be managed individually. We can use block blobs mainly to improve the upload-time when we are uploading the blob data into Azure. When we upload any video files, media files, or any documents. We can generally use block blobs unless they are log files.

**Append blob:** It is made up of blocks like block blobs, but are optimized for append operations. It is ideal for an application like logging data from virtual machines. For example - application log, event log where you need to append the data to the end of the file. So when we are uploading a blob into a container using the Azure portal or using code, we can specify the blob type at that time.

**Page blob:** It stores random access files up-to 8 TB. Page blobs store the VHD files that backs VMs.

Most of the time, we operate with block blob and append blobs. Page blobs are created by default. When we create a virtual machine, the storage account gets created, and the disks associated with the virtual machine will be stored in the storage account. But for most of the storage solutions like we know, we are developing an application like YouTube, or we are developing a monitoring application, in that case, either we use block blobs or append blobs based on the requirement.

**Naming and Referencing**

The names of container and blob should adhere to some rules. Because the container name and blob name will be a part of the URL when you are trying to access them.

They need to adhere to some rules which are specified below.

**Container Names**

* The name of containers must start with a letter or a number, and can contain only letters, numbers, and the dash (-) character.
* All the letters in a container name must be in lowercase.
* Container names must be 3 to 63 characters long.

**Blob Names**

* The name of blobs can contain any combination of characters.
* The name of blobs must be at least one character long and cannot be more than 1024 characters long.
* The Azure Storage emulator supports blob names up-to 256 characters long.
* The name of the blobs is case-sensitive.
* The reserved URL characters must be escaped properly.

**Metadata & Snapshots**

We can store some amount of information against a container or blob as metadata. It is a name-value pair associated with the container or blob. Metadata names must adhere to the name rules for C# identifiers. For example - when we are developing any video streaming application with backend as Azure blob storage, then in that case, when the user uploads a video, we want to store the user information as metadata against that video. It is very useful once we start developing an application based on blob storage.

**Blob Snapshots**

Snapshot is a read-only version of the blob storage. We can use snapshots to create a backup or checkpoint of a blob. A snapshot blob name includes the base blob URL plus a date-time value that indicates the time when the snapshot was created. Again if we are developing a YouTube-like application and want to retain the previous version of the video, then we can take a snapshot of it and store it once the user updates the video. So, a user like SharePoint can see the previous version of the video and the current version of the video.

To access the snapshot, we have to add a query string at the end of the URL. And a snapshot with a similar date and time when the snapshot was created.