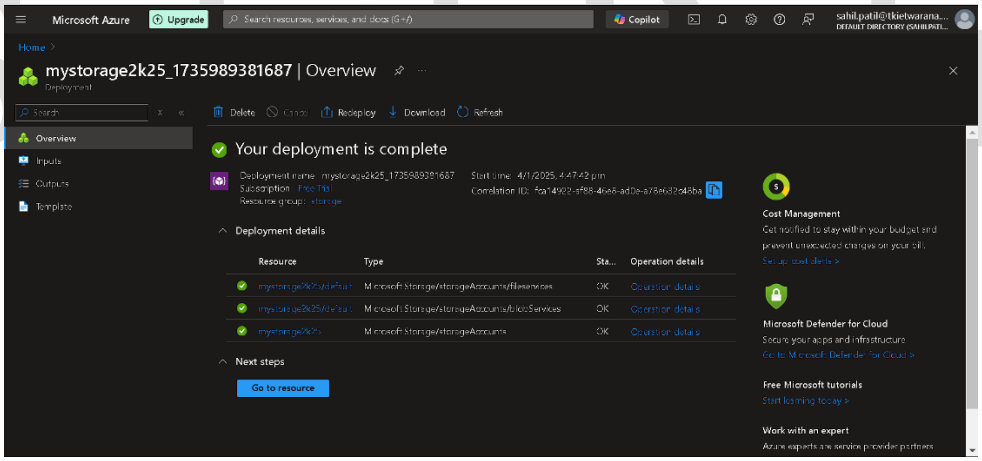
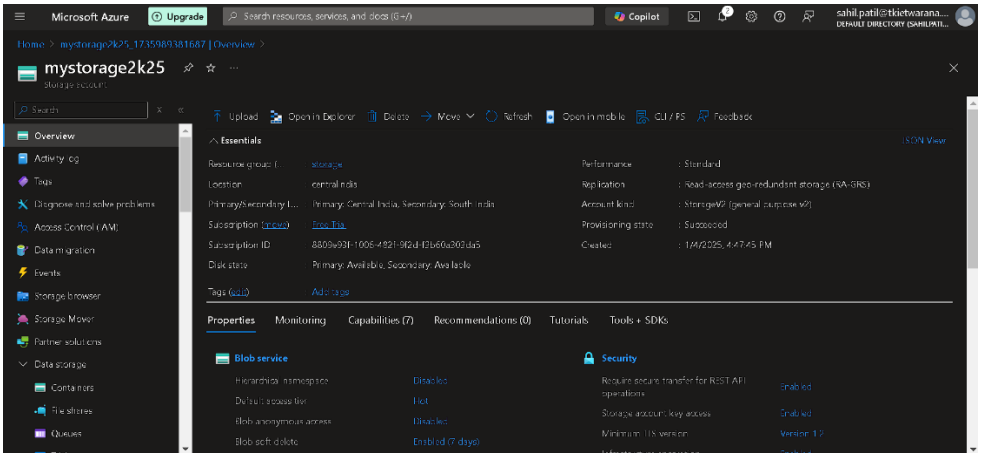
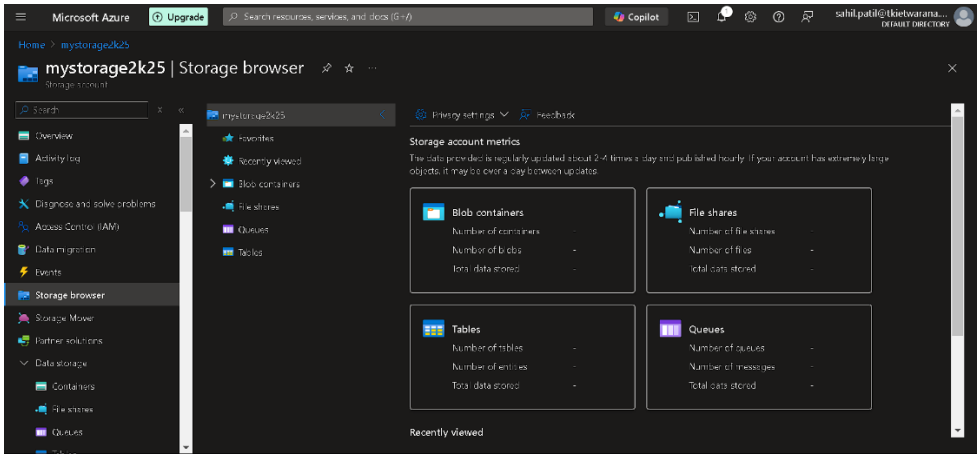
Week-9 | Azure Storage Services and Use Cases

Azure Storage Account

An Azure Storage Account is a fundamental building block that provides access to Azure's storage services. It acts as a container for multiple storage types, ensuring a unified management experience.







Key Features:

- Stores blobs, files, queues, tables, and disks under a single account.
- Supports encryption, redundancy, and access control for security.
- Provides different performance tiers (Standard, Premium) based on workload needs.
- Enables network-level security via Private Endpoints and Firewalls.

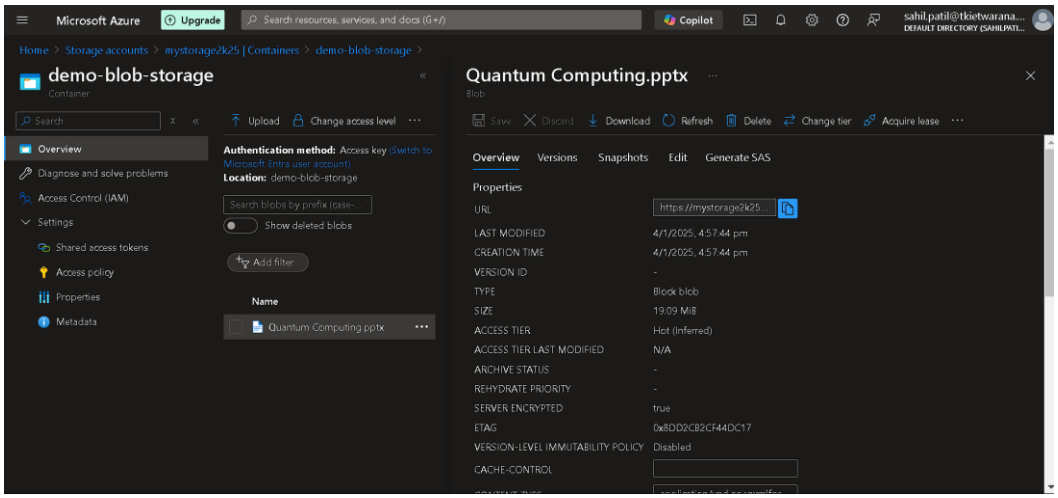
Types of Redundancy:

1. Locally Redundant Storage (LRS) – Stores copies within a single region.
2. Zone Redundant Storage (ZRS) – Spreads copies across multiple availability zones.
3. Geo-Redundant Storage (GRS) – Replicates data to a secondary region for disaster recovery.
4. Read-Access Geo-Redundant Storage (RA-GRS) – Allows read access to the replicated data.

When to Use It?

- When you need a scalable and secure storage solution.
- When using multiple storage types (Blobs, Tables, Queues, etc.).
- When ensuring high availability and redundancy for critical workloads

1. Azure Blob Storage



What is it?

Azure Blob Storage is a cloud-based object storage solution provided by Microsoft Azure. It is designed to store and manage large amounts of unstructured data, such as documents, images, videos, and other types of binary and text data.

- Blobs are organized into **containers** within a storage account.
- Each blob has a unique URL for access.
- Supports **hot, cool, and archive** access tiers for cost optimization.
- Can integrate with **Azure CDN** for faster content delivery.

When to use it?

Azure Blob Storage is useful when you need to store and retrieve large amounts of unstructured data efficiently.

Common use cases:

- Serving images and videos for web applications.
- Storing backups and disaster recovery data.
- Handling large datasets for analytics and machine learning.
- Archiving data for compliance and retention policies.

Example from a DevOps Engineer's perspective:

A DevOps engineer may use Azure Blob Storage to store **build artifacts, logs, and binaries** generated during CI/CD pipelines. By integrating it with **Azure DevOps** or **GitHub Actions**, they can store and retrieve artifacts dynamically during deployments.

Automation tools:

- **Azure Storage Explorer** for managing storage manually.
- **Azure CLI & PowerShell** for automated uploads/downloads.
- **Azure SDKs** for programmatic access in applications.

Equivalent service in AWS:

The AWS counterpart of Azure Blob Storage is **Amazon Simple Storage Service (S3)**, which provides scalable object storage for a wide range of applications.

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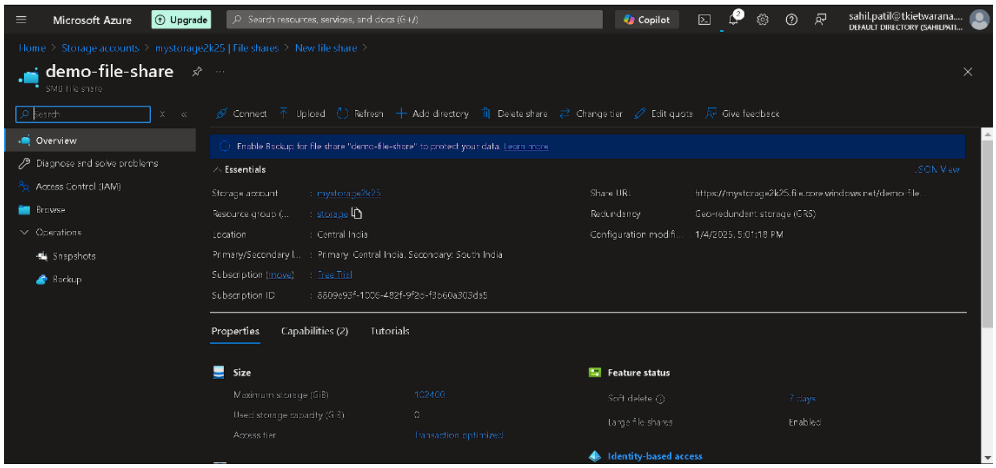
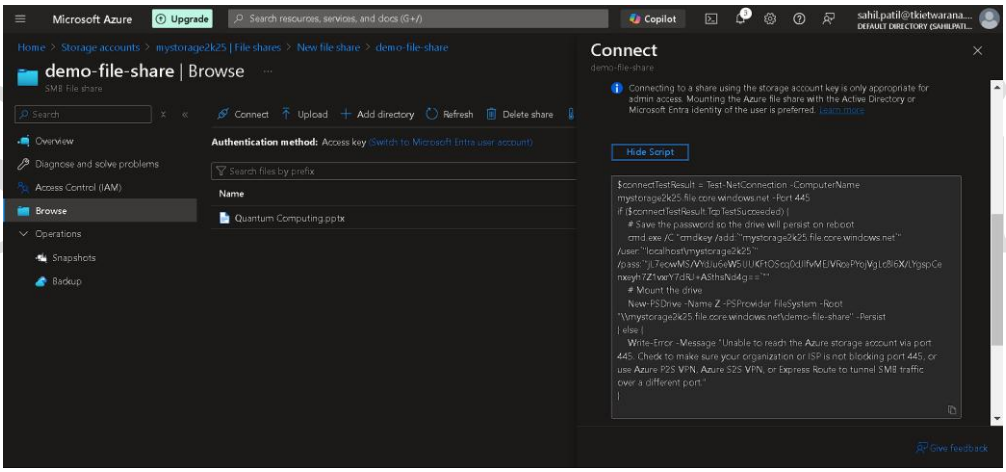
2. Azure File Storage





What is it?

Azure File Storage is a **fully managed, cloud-based file sharing service** that provides **Server Message Block (SMB) and NFS protocols** for sharing files across applications, VMs, and users in Azure.

- Supports **Azure File Sync** to cache data on-premises for hybrid cloud setups.
- Can be mounted like a network drive in Windows, Linux, or macOS.
- Provides encryption, snapshots, and high availability features.

When to use it?

Azure File Storage is useful when multiple applications or virtual machines need access to a shared file system.

Common use cases:

- Storing **configuration files, logs, and shared application data**.

- Hosting **persistent storage for containerized workloads**.
- Centralized **storage for legacy applications** requiring SMB access.
- Storing **user profile data for remote desktops**.

Example from a DevOps Engineer's perspective:

A DevOps engineer may use Azure File Storage to store **CI/CD pipeline scripts, YAML files, and shared environment variables** that need to be accessible across multiple VMs.

Example tools for automation:

- **Azure PowerShell** to automate file storage provisioning.
- **Terraform** to manage infrastructure-as-code for Azure File Shares.
- **Azure File Sync** to replicate files across regions.

Equivalent service in AWS:

The equivalent service in AWS is **Amazon Elastic File System (EFS)**, which provides scalable file storage for EC2 instances with **NFS protocol support**.

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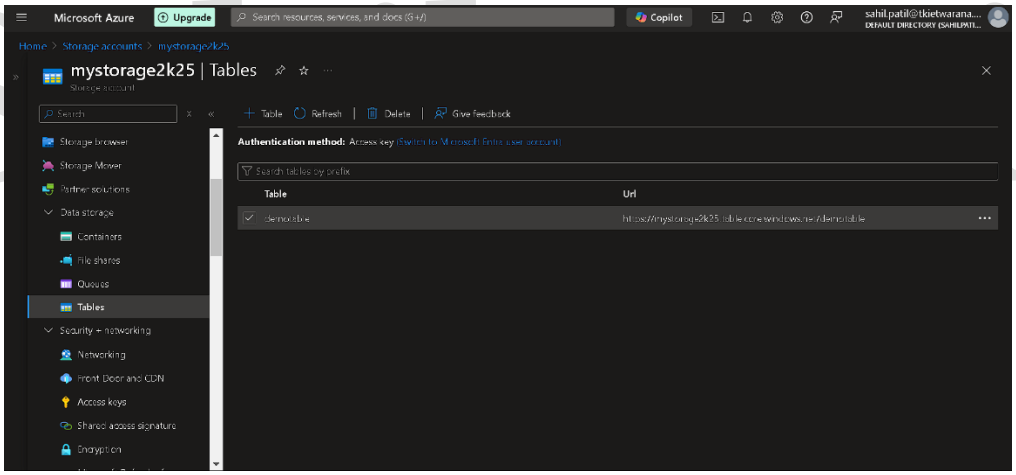
3. Azure Table Storage



What is it?

Azure Table Storage is a **NoSQL key-value store** for storing structured data at scale. It allows for **fast retrieval** using partition keys and row keys.

- **Schema-less storage**, meaning it can store different types of data.
- Used for large-scale, structured datasets with fast lookups.
- Supports **querying via OData and LINQ queries**.

When to use it?

Azure Table Storage is useful when you need a highly scalable and cost-efficient key-value store.

Common use cases:

- Storing **configuration settings and metadata** for applications.
- Managing **user profiles, IoT telemetry data, and logs**.
- Archiving large amounts of structured, time-series, or transactional data.

Example from a DevOps Engineer's perspective:

A DevOps engineer may use **Azure Table Storage** to store **feature flags and configuration data** for dynamic application deployments.

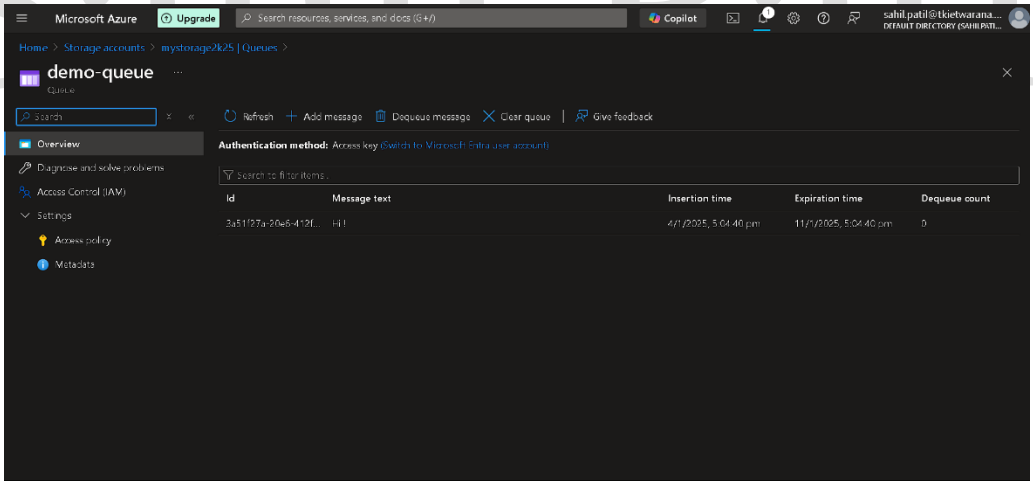
Example tools for automation:

- **Azure SDKs** for integrating with applications.
- **PowerShell scripts** for reading and writing data dynamically.
- **Azure Functions** to trigger updates based on data changes.

Equivalent service in AWS:

Azure Table Storage has no direct equivalent in AWS, but **Amazon DynamoDB** is a similar NoSQL database that provides **key-value and document storage** with auto-scaling capabilities.

4. Azure Queue Storage



What is it?

Azure Queue Storage is a **message queue service** designed for **decoupling components** of distributed applications.

- Supports **asynchronous message processing**.
- Can store **millions of messages** with high availability.
- Messages are stored until they are retrieved and deleted.

When to use it?

Azure Queue Storage is useful for enabling communication between **distributed application components**.

Common use cases:

- **Decoupling microservices** for better scalability.
- **Processing background jobs** (e.g., video processing, email sending).
- Implementing **retry mechanisms for failed jobs**.

Example from a DevOps Engineer's perspective:

A DevOps engineer may use **Azure Queue Storage** to **trigger deployment actions**, such as notifying an application to pull new updates from a repository.

Example tools for automation:

- **Azure Logic Apps** to automate workflows.
- **Azure Functions** to trigger event-driven tasks.
- **Azure Monitor** to track message queue performance.

Equivalent service in AWS:

The AWS equivalent is **Amazon Simple Queue Service (SQS)**, which provides a fully managed message queuing system for **asynchronous communication** between services.

Additional Azure Storage Services

5. Azure Disk Storage

Azure Disk Storage provides **managed disks** for virtual machines (VMs). It supports SSDs and HDDs with different performance tiers.

Use cases:

- Persistent storage for **VMs and databases**.
- High-performance workloads like SAP HANA and SQL Server.
- Backing up and restoring critical VM data.

Equivalent AWS service: **Amazon Elastic Block Store (EBS)**.

6. Azure Data Lake Storage

Azure Data Lake Storage is optimized for **big data analytics**. It integrates with **Apache Spark, Hadoop, and Azure Synapse Analytics**.

Use cases:

- Storing massive **structured and unstructured datasets**.
- Running **big data analytics and AI/ML workloads**.
- Secure, scalable, and cost-effective data lake solutions.

Equivalent AWS service: **Amazon S3 with AWS Lake Formation**.

7. Azure Managed Disks

Managed Disks simplify storage management for Azure VMs by handling **provisioning, encryption, and scaling** automatically.

Use cases:

- Simplifying VM storage provisioning.
- Enhancing performance with **Premium SSDs**.
- Supporting **snapshot-based backups**.

Equivalent AWS service: **Amazon Elastic Block Store (EBS)**.

Conclusion

Azure Storage offers a variety of solutions for **object, file, table, and queue storage**, catering to different workloads and requirements. Whether you're storing application logs, running a distributed system, or managing configuration files, Azure provides **scalable, cost-efficient, and high-performance** storage services.

For DevOps engineers, **automating storage management** with **Azure CLI, Terraform, and Azure SDKs** can significantly improve efficiency and reliability in cloud environments.
