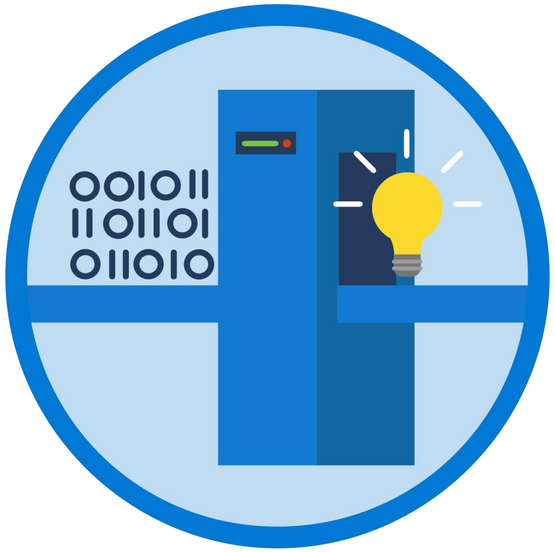
BAIT 3273 Cloud Computing

Week 7

Core Cloud Services
Azure data storage options

Lesson Objectives:

- To survey data storage options in Azure
- To discover how Azure data storage can meet users business demands
- To compare Azure data storage with on-premises storage



Introduction

Azure data storage provides large repository to Azure customers without having to increase the capacity of local storage. It also provides a variety of features to meet different business needs. These features include:

Secure

Durable

Scalable

Accessible

Azure Storage Overview

Benefits of Azure data storage

Automated backup and recovery

- Mitigates risk of losing data
- Protect data from unforeseen failure

Support for data analytics

- Support analysis of data consumption.

Replication across the globe

- Replicate data at multiple locations
- Protect data from planned or unplanned events

Encryption capabilities

- Encrypt data to ensure security
- Strictly control who can access the data.

Multiple data types

- Store almost any type of data

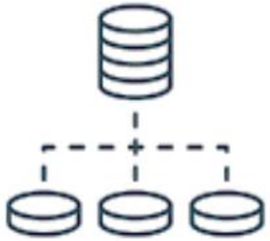
Data storage in virtual disks

- Able to store up to 32 TB of data

Storage tiers

- Prioritize access to data based on commonly used data

Types of data



Structured data

- Data follows the structure
- Stored in database table with rows and columns
- Known as relational data
- Easy to insert, query,

Semi-structured data

- Not applicable to tables, rows and columns
- Use tag or keys to organize data
- Known as non-relational data or NoSQL data

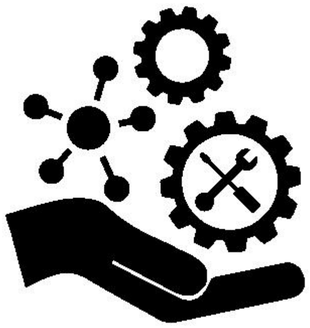
Unstructured data

- Data has no specified structure
- No restrictions on data to be stored
- Becomes more prominent

Types of Data

Azure Storage Options

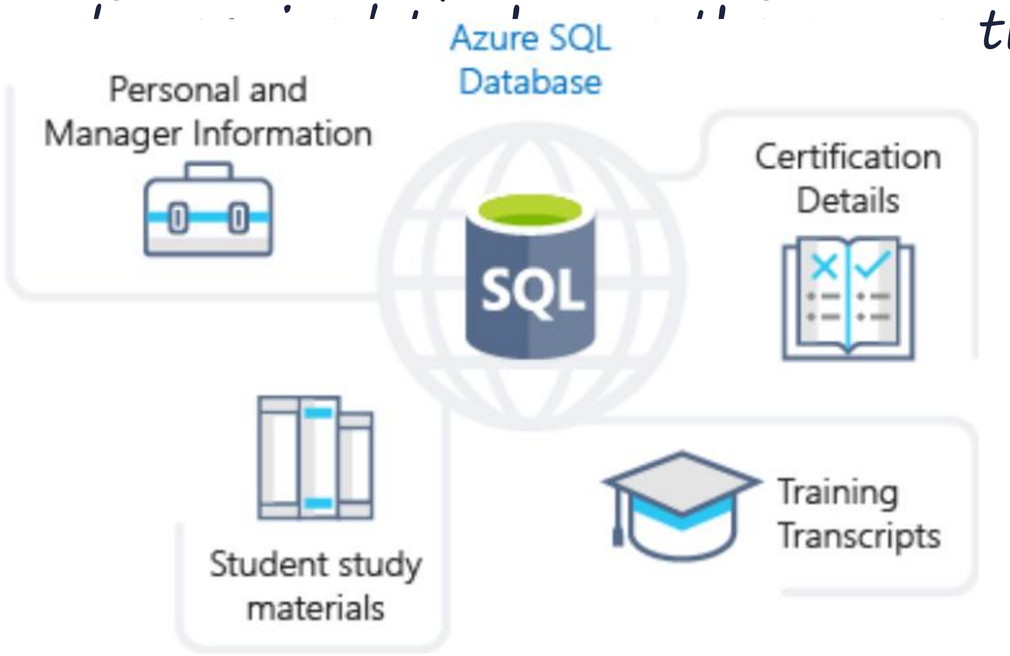
Azure provides a variety of storage options to meet specific types of data storage needs. These includes:



- Azure SQL Database
- Azure Cosmos DB
- Azure Blob Storage
- Azure Data Lake Storage
- Azure Files
- Azure Queue
- Disk Storage
- Storage Tiers
- Encryption and Replication

Azure SQL Database

- Relational Database as a service (DaaS)
- High performance, reliable, manageable and secure database
- Supports development of data-driven application and websites in any language
- Supports migration of existing SQL Server databases with minimal downtime
- Provides guidance to perform migration
- Users [illegible] tion string in their apps

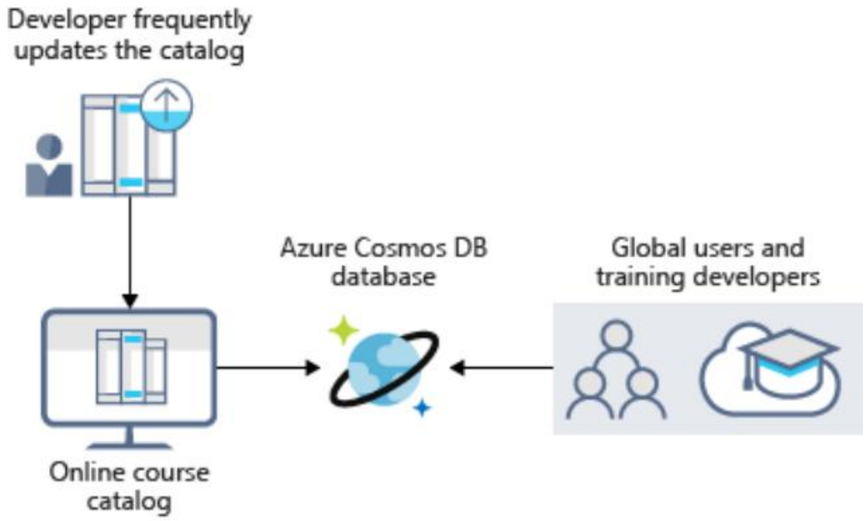


Example of online learning portal scenario that would be stored in Azure SQL Database

Azure SQL Database

Azure Cosmos DB

- Globally Distributed Database Service
- Supports schema-less data
- Supports highly responsive and Always On applications

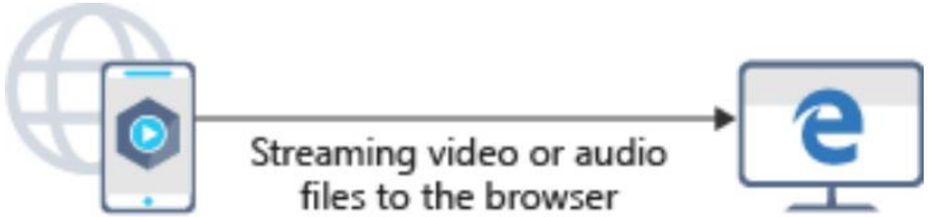


Example of an Azure Cosmos DB database, which is used to store data accessed by people all over the world.

Azure SQL Database and Cosmo DB

Azure Blob Storage

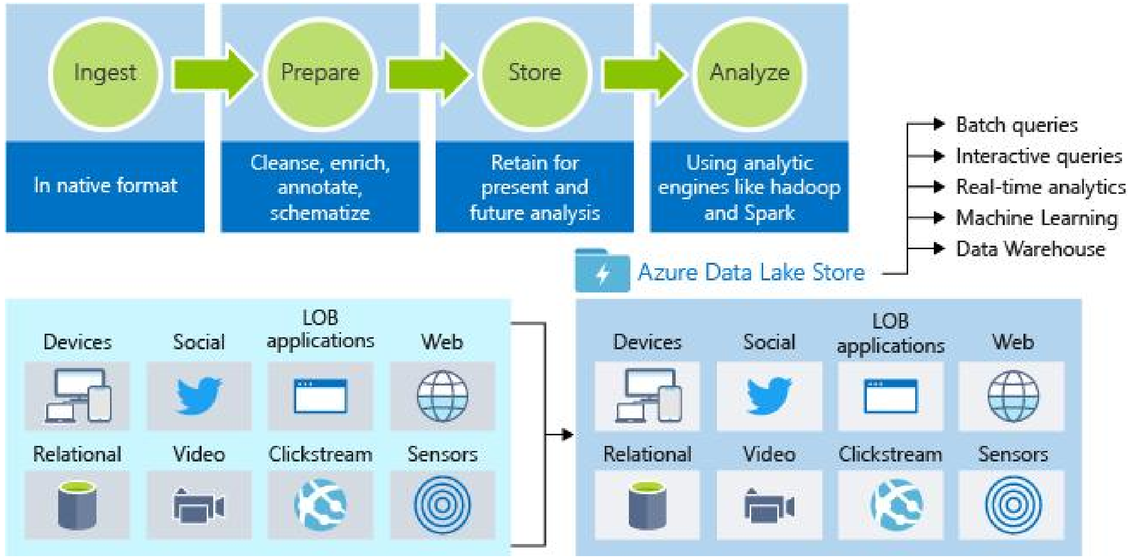
- Storage for unstructured data
- Highly scalable and almost no changes as work with files on disk
- Support variety of file formats
- Stream large video or audio files directly to the user's browser
- Support backup, recovery, archiving



Example usage of Azure blob storage.

Azure Data Lake Storage

- Storage for structured and unstructured data
- Supports data usage analytics
- Supports highly responsive and Always On applications
- Combine object storage with Big Data file system capabilities



Example of using Azure Data Lake Storage to store business data and make the data available for analysis

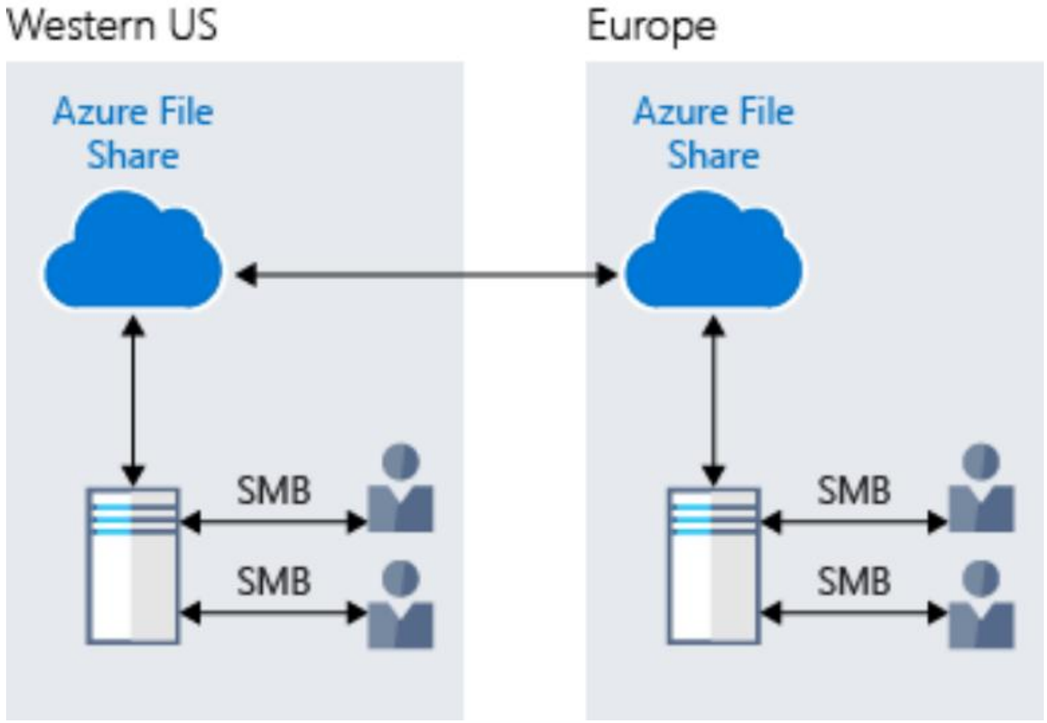
Azure Blob Storage and Data Lake Storage

Diff Between ADLS & BLOB

USAGE	AZURE DATA LAKE	AZURE BLOB STORAGE
Structure	Hierarchical file system	Object store with flat namespace
Purpose	Optimized storage for big data analytics workloads	General purpose object store for a wide variety of storage, including big data analytics
API	REST API over HTTPS	REST API over HTTP/HTTPS
Server-side API	WebHDFS-compatible REST API	Azure Blob Storage REST API
Authentication	Based on Azure Active Directory Identities	Based on shared secrets - Account Access Keys and Shared Access Keys.
Size limits	No limits on account sizes, file sizes or number of files	Specific limits for containers sizes and files in blob. Please refre ms document.
Sanpshots	No snapshot options.	You can create no of snapshots in blob.

Azure Files

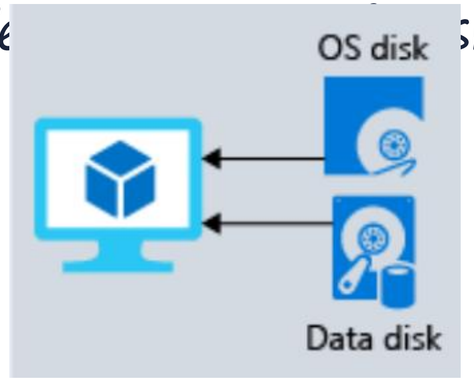
- Accessible via Server Message Block (SMB) protocol
- Azure file shares can be mounted concurrently
- File storage sharing can be mounted to access file data



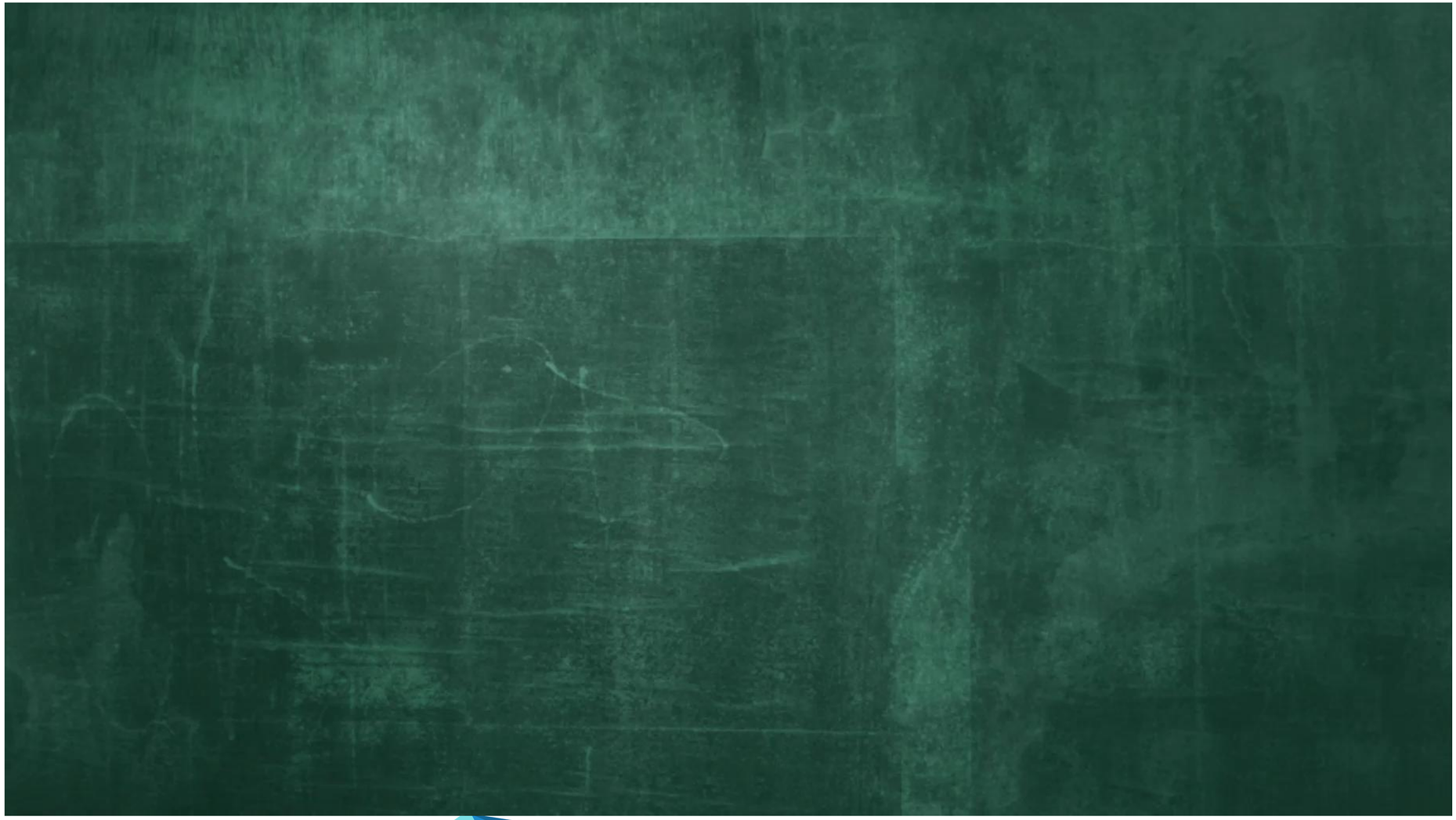
Example of using Azure files to share data between two geographic locations

Disk Storage

- Provides disks for Azure services
- Data can be stored persistently and accessed from virtual hard disk
- Can be managed by Azure or the users
- Ideal for storing data that is only accessed internally
- Consists of diffe sk storage

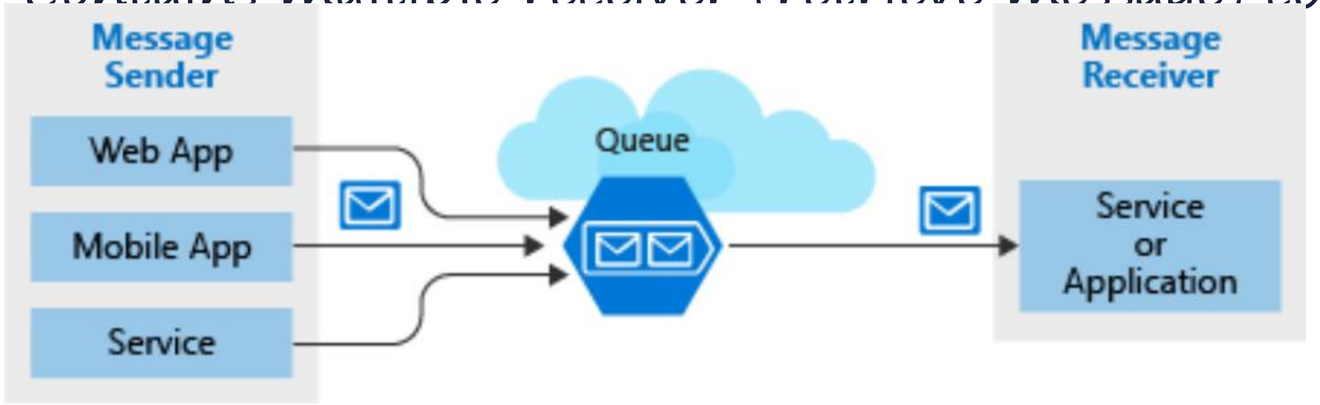


Example of using separate disks in Azure Virtual Machine



Azure Queue

- Store a large number of messages accessible from all over the world
- Support building flexible applications and separate functions
- Scale decoupled application components independently
- Provides asynchronous message queueing
- Contains multiple sender (add message to queue) components
- Contains multiple receiver (retrieve message) components



Example of adding and retrieving messages using Azure Queue.

Azure Queue

Storage tiers

- **Hot storage tier** – Storing frequently accessed data.
- **Cool storage tier** – Storing not frequently accessed data for at least 30 days
- **Archive storage tier** – Storing rarely accessed for at least 180 days

Encryption and Replication

Encryption for storage services

- **Azure Storage Service Encryption (SSE)** – Protect user data by encrypting data before storing and decrypting it before retrieval
- **Client-side encryption** – Data is encrypted by client libraries and decrypted during retrieval

Replication for storage availability

- Ensure durability and availability of data
- Disaster recovery

Storage tiers

Comparison between Azure data storage and on-premises storage

Cost effectiveness

On-premises storage:

- Requires investment on new hardware for handling peak demand

Azure data storage:

- Pay-as-you-go
- Scaling automatically based on demand

Reliability

On-premises storage:

- Requires investment on hardware for data backup, load balancing, etc.

Azure data storage:

- Provides data backup, load balancing, disaster recovery, etc.

Comparison between Azure data storage and on-premises storage

Storage types

On-premises storage:

- Requires numerous servers and tools for different storage types.

Azure data storage:

- Provides a variety of different storage options

Agility

On-premises storage:

- Technologies change require provisioning and deploying new servers

Azure data storage:

- Provides flexibility to change storage back-ends

Needs	On-premises	Azure data storage
Compliance and security	Dedicated servers required for privacy and security	Client-side encryption and encryption at rest
Store structured and unstructured data	Additional IT resources with dedicated servers required	Azure Data Lake and portal analyses and manages all types of data
Replication and high availability	More resources, licensing, and servers required	Built-in replication and redundancy features available
Application sharing and access to shared resources	File sharing requires additional administration resources	File sharing options available without additional license
Relational data storage	Needs a database server with database admin role	Offers database-as-a-service options
Distributed storage and data access	Expensive storage, networking, and compute resources needed	Azure Cosmos DB provides distributed access
Messaging and load balancing	Hardware redundancy impacts budget and resources	Azure Queue provides effective load balancing
Tiered storage	Management of tiered storage needs technology and labour	Azure offers automated tiered storage of data

Database Migration To

Summary

- Azure provides storage for both structured and unstructured data
- High security data storage that supports global compliance standards
- Azure provides load balancing, high availability, and redundancy capabilities
- Capable of sharing massive amount of data

Check your knowledge

1. Suppose you work at a startup with limited funding. Why might you prefer Azure data storage over an on-premises solution?

- ○ To ensure you run on a specific brand of hardware, which will let you form a marketing partnership with that hardware vendor.
- ○ The Azure pay-as-you-go billing model lets you avoid buying expensive hardware.
- ○ To get exact control over the location of your data store.

2. Which of the following situations would yield the most benefits from relocating an on-premises data store to Azure?

- ○ Unpredictable storage demand that increases and decreases multiple times throughout the year.
- ○ Long-term, steady growth in storage demand.
- ○ Consistent, unchanging storage demand.

3. A newly released mobile app using Azure data storage has just been mentioned by a celebrity on social media, seeing a huge spike in user volume. To meet the unexpected new user demand, what feature of pay-as-you-go storage will be most beneficial?

- ○ The ability to provision and deploy new infrastructure quickly
- ○ The ability to predict the service costs in advance
- ○ The ability to meet compliance requirements for data storage

Answer

1. Suppose you work at a startup with limited funding. Why might you prefer Azure data storage over an on-premises solution?

- ○ To ensure you run on a specific brand of hardware, which will let you form a marketing partnership with that hardware vendor.
- ◉ The Azure pay-as-you-go billing model lets you avoid buying expensive hardware. ✓

  There are no large, up-front capital expenditures (CapEx) with Azure. You pay monthly for only the services you use (OpEx).
- ○ To get exact control over the location of your data store.

2. Which of the following situations would yield the most benefits from relocating an on-premises data store to Azure?

- ◉ Unpredictable storage demand that increases and decreases multiple times throughout the year. ✓

  Azure data storage is flexible. You can quickly and easily add or remove capacity. You can increase performance to handle spikes in load or decrease performance to reduce costs. In all cases, you pay for only what you use.
- ○ Long-term, steady growth in storage demand.
- ○ Consistent, unchanging storage demand.

3. A newly released mobile app using Azure data storage has just been mentioned by a celebrity on social media, seeing a huge spike in user volume. To meet the unexpected new user demand, what feature of pay-as-you-go storage will be most beneficial?

- ◉ The ability to provision and deploy new infrastructure quickly ✓

  As the user demand increases, the agility to deploy new servers or services as needed can help scale to meet the increased user load.
- ○ The ability to predict the service costs in advance
- ○ The ability to meet compliance requirements for data storage

Thanks!