Module 6

Introduction to Azure Storage and Data Services

Module Overview

- Understanding Azure Storage options
- Creating and managing storage
- Understanding options for relational database deployments
- Creating and connecting to Azure SQL databases

Lesson 1: Understanding Azure Storage options

- Overview of Azure Storage
- What is Blob storage?
- What is Azure Table storage?
- What is Queue storage?
- What is File storage?
- Compare storage options

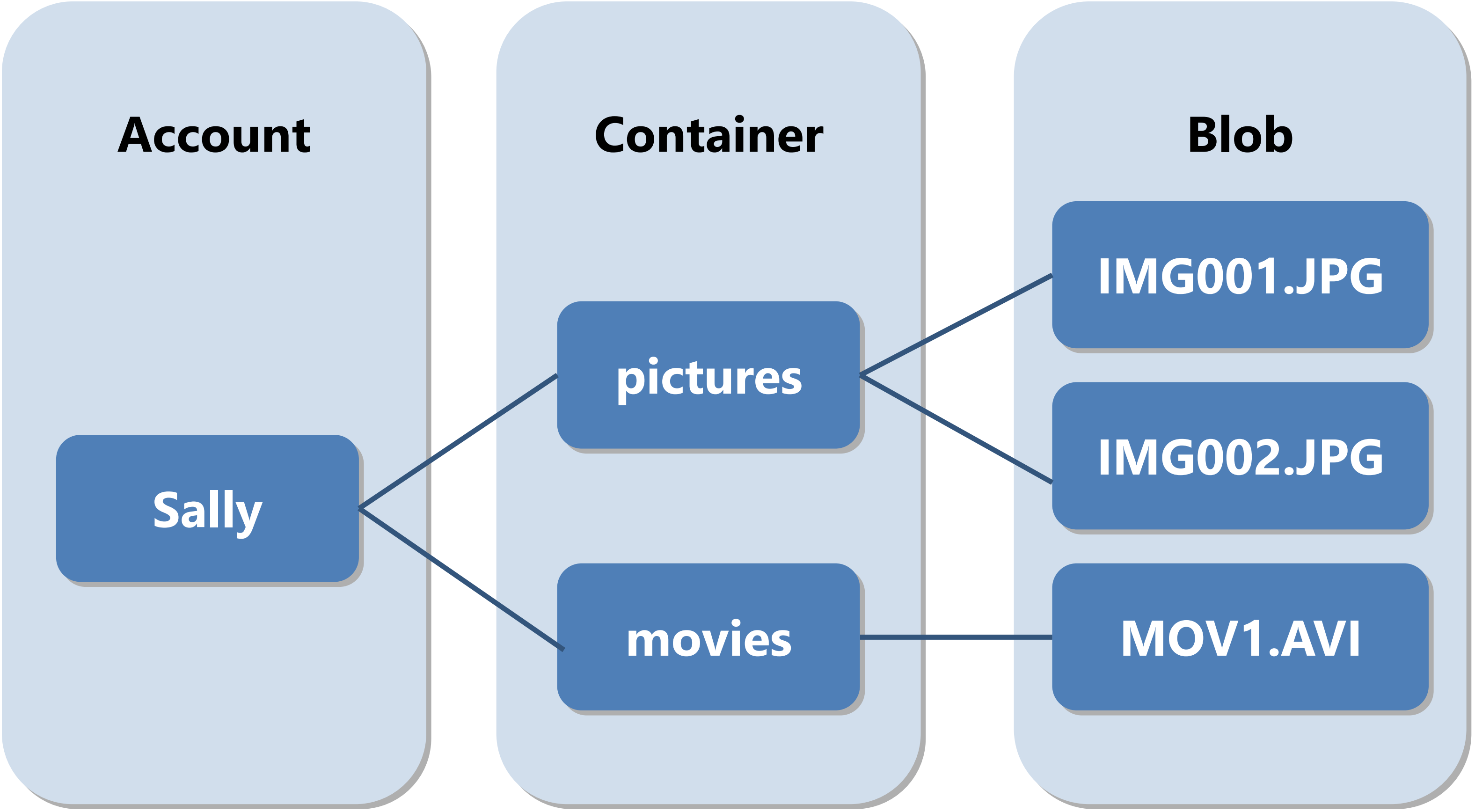
Overview of Azure Storage

- Storage types:
  - Blob storage. Containers for data blobs. The three types of blobs are:
    - Page blobs:
      - Optimized for random access
      - Ideal for Azure VM disk files
    - Block blobs:
      - Optimized for sequential access
      - Ideal for media and backups
    - Append blobs:
      - Optimized for append operations only
      - Ideal for logging
  - Table storage. Store for non-relational key/value entities
  - Queue storage. Temporary store for asynchronous exchange of messages
  - File storage. File sharing store through SMB 3.x and SMB 2.1

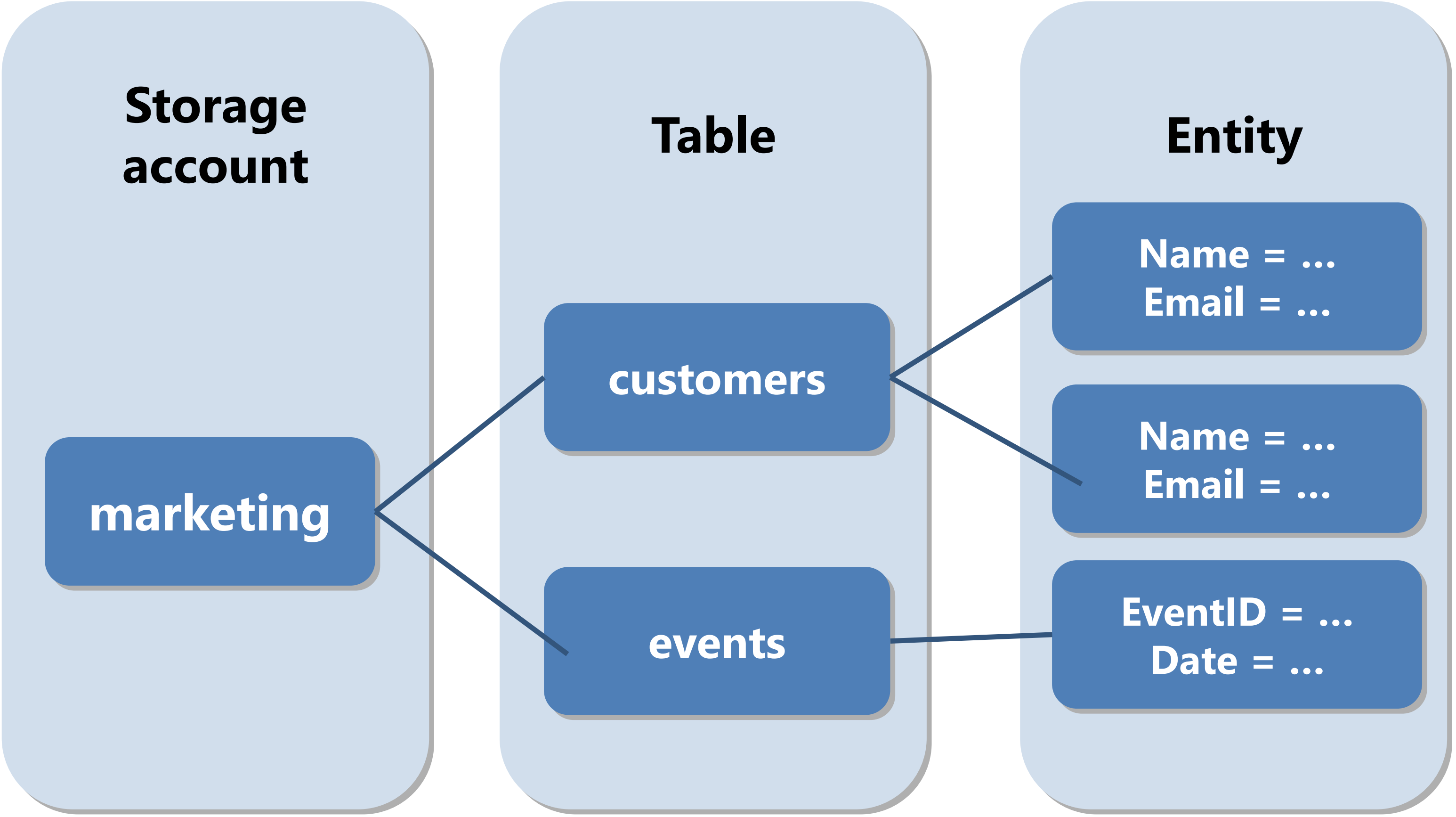
Overview of Azure Storage

- General purpose v2 storage accounts:
  - Objects: blobs (page, block, append), tables, queues, files
  - Performance: Standard or Premium (page blobs, LRS only)
  - Replication: LRS, ZRS (all objects except for VM disks), GRS, RA-GRS
  - Access tiers: hot, cool, or archive
- General purpose v1 storage accounts:
  - Objects: blobs (page, block, append), tables, queues, files
  - Performance: Standard or Premium (page blobs, LRS only)
  - Replication: LRS, ZRS classic (block blobs only), GRS, RA-GRS
- Blob storage accounts:
  - Objects: Block and append blobs only (optimized pricing)
  - Performance: Standard only
  - Replication: LRS, GRS, RA-GRS
  - Access tiers: hot, cool, or archive

What is Blob storage?



What is Azure Table storage?



Storage account

marketing

Table

customers

events

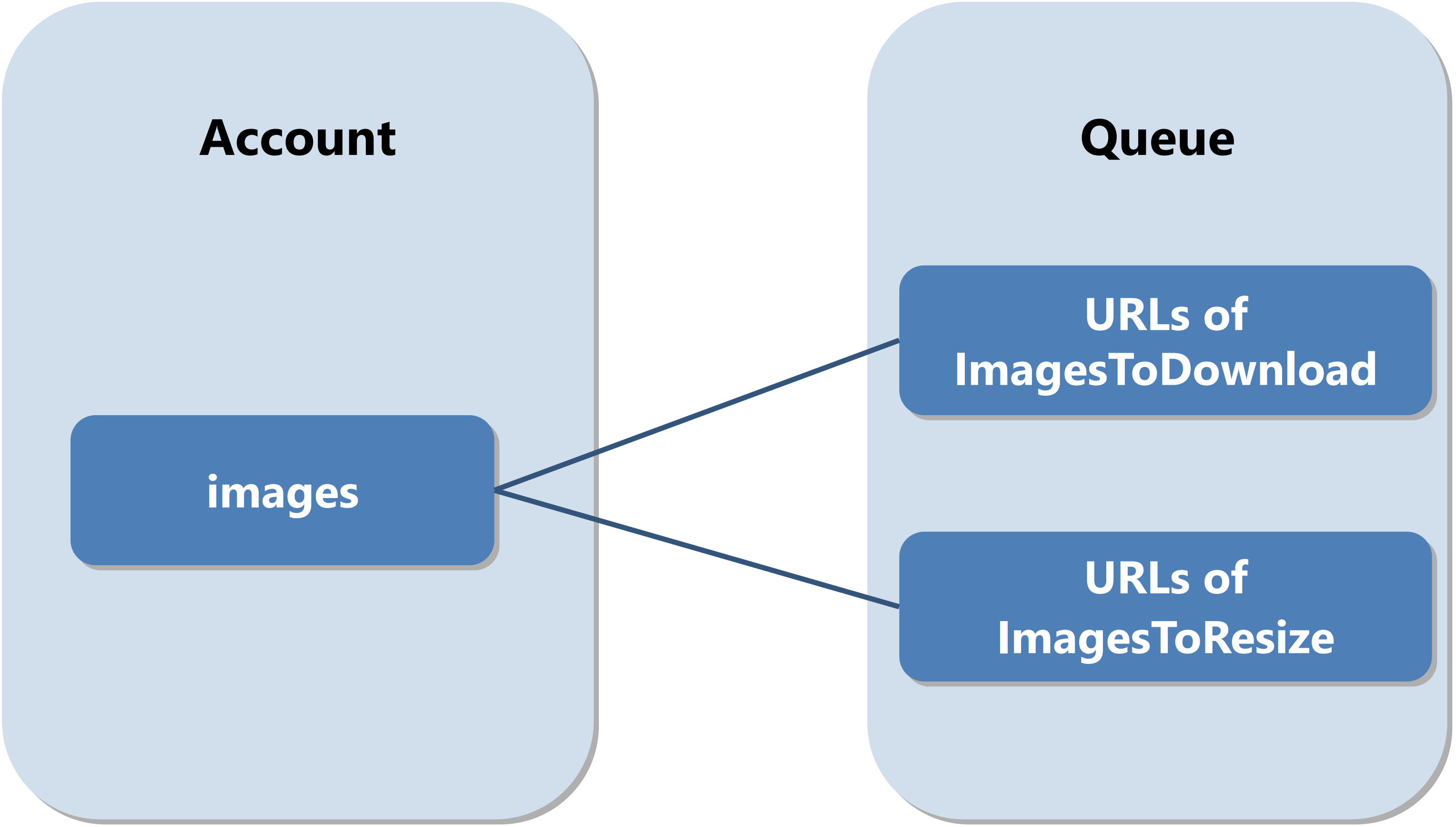
Entity

Name = …
Email = …

Name = …
Email = …

EventID = …
Date = …

What is Queue storage?



Account

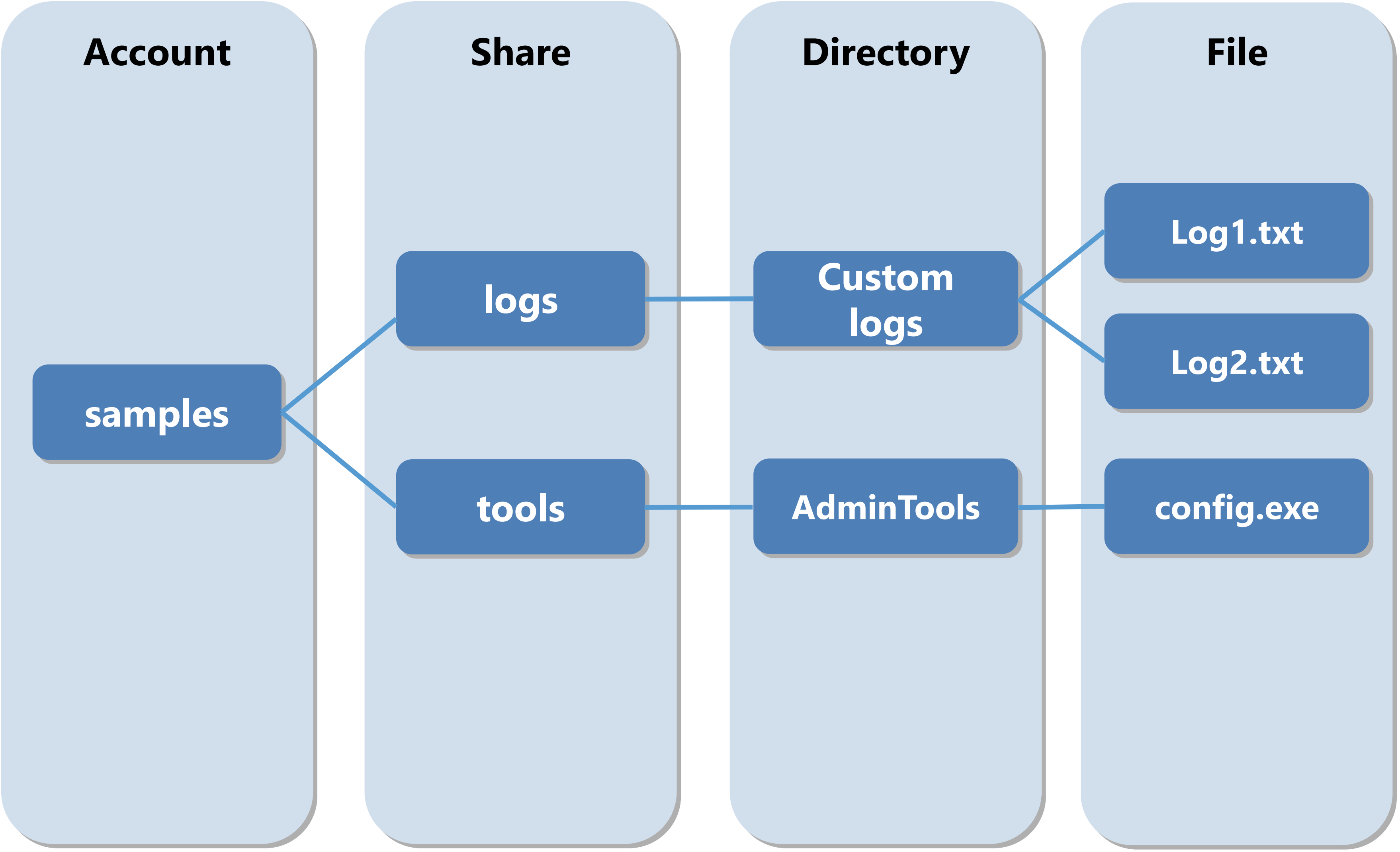
images

Queue

URLs of ImagesToDownload

URLs of ImagesToResize

What is File storage?



Compare storage options

- Blob storage:
  - Virtual hard disk files for Azure VMs
  - Static media content
  - Archiving infrequently accessed data
  - Incremental dumps or log storage
- Table storage:
  - Large amounts of structured but non-relational data
  - Data sets that can be fully de-normalized
- Queue storage:
  - Passing messages
  - Graceful handling of unreliable or uneven message flow
- File storage:
  - Sharing content across multiple Azure virtual machines
  - Migrating SMB-dependent apps to Azure
  - Synchronizing on-premises file shares

Lesson 2: Creating and managing storage

- Creating and managing Azure Storage non-programmatically
- Creating and managing storage programmatically
- Demonstration: Creating a storage account and uploading a blob
- Creating and managing tables programmatically

Creating and managing Azure Storage non-programmatically

- To create a storage account, specify the following:
  - Name
  - Deployment model
  - Account kind
  - Location
  - Replication
  - Performance
  - Access tier
  - Secure transfer required
  - Subscription
  - Resource group
  - Virtual networks
- To create and manage a storage account, use:
  - Microsoft Azure Storage Explorer
  - Azure Web Storage Explorer
  - AzCopy.exe
  - PowerShell
  - Import/Export service

Creating and managing storage programmatically

- To connect to Azure Storage from a Visual Studio .NET project:
  - Add a Cloud Storage with Azure Storage connected services connection
  - Configure the connection string
- Develop by leveraging:
  - Azure SDK for .NET.
  - Azure Storage SDK for Java
  - Azure Storage SDK for C++
  - Azure SDK for PHP
  - Azure SDK for Python
  - Azure Storage Client Library for iOS
  - Azure Storage Client Library for Xamarin
  - REST APIs for Azure

Demonstration: Creating a storage account and uploading a blob

In this demonstration, you will see how to:

- Manage the Azure Storage blob service by using the Azure portal
- Manage the Azure Storage blob service by using the Azure Storage Explorer

Creating and managing tables programmatically

- The Azure portal offers limited access to the Table service
- To manage tables from a Visual Studio .NET project:
  - Add the required libraries:
    - Add Cloud Storage with Azure Storage connected service connection
    - Add Azure Storage Common Library for .NET (preview), Microsoft Cosmos DB Table Library for .NET, and Microsoft Azure Configuration Manager Library for .NET
  - Configure connection strings
  - Add **Microsoft.Azure**, **Microsoft.Azure.Storage**, and **Microsoft.Azure.CosmosDB.Table** using directives
  - Use the **CloudTableClient** class to access a table

Lab A: Configuring Azure Storage

- Exercise 1: Creating and configuring an Azure Storage account
- Exercise 2: Creating and managing blobs

Logon Information

Virtual machine:	**10979F-MIA-CL1**
User name:	**Admin**
Password:	**Pa55w.rd**

Estimated Time: 20 minutes

Lab Scenario

Adatum Corporation uses its on-premises file servers to store its data. You want to test transferring these files to Azure Storage.

Lab Review

- Can you change performance of an Azure Storage account from standard to premium?
- Is it possible to upload a file to an Azure Storage blob by using the Azure portal?

Lesson 3: Understanding options for relational database deployments

- Reviewing relational database deployment options
- Comparing Azure SQL Database with SQL Server in an Azure VM
- SQL database resiliency and scalability

Reviewing relational database deployment options

- DBaaS:
  - Azure SQL Database
  - Azure Database for MySQL
  - Azure Database for PostgreSQL
- IaaS:
  - SQL Server in an Azure VM
  - MySQL in an Azure VM
  - PostgreSQL in an Azure VM
  - Any other RDBMS that Azure VMs support, for example:
    - DB2
    - Oracle DB
    - SAP ASE
    - SAP HANA

Comparing Azure SQL Database with SQL Server in an Azure VM

Azure SQL Database	**SQL Server in an Azure VM**
DBaaS	IaaS
Minimized management overhead	Higher management overhead (support for automated patching and backups)
Database operational cost	Cost includes VM compute charges
Fast provisioning	Provisioning requires a VM deployment
Partial feature parity with on-premises SQL Server	Full feature parity with on-premises SQL Server
Service endpoints support	Virtual network support
Managed high availability and scalability	Support for traditional on-premises high availability and scalability features

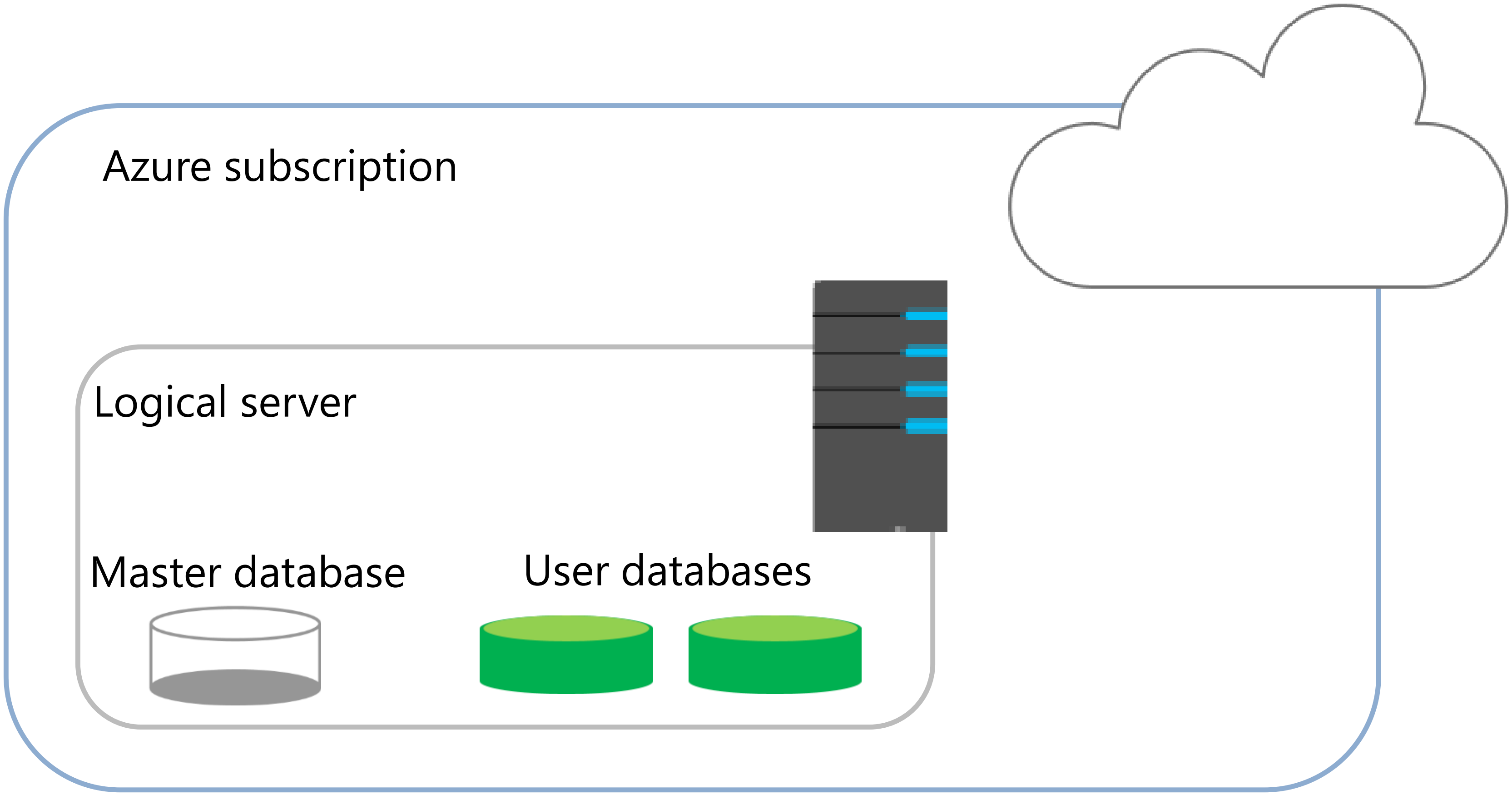
SQL database resiliency and scalability

- Resiliency:
  - Three synchronously replicated copies in a single datacenter
  - Three synchronously replicated copies in separate zones in the same region (preview)
  - Up to four asynchronously replicated copies in different regions
  - Automatic failover with failover groups
  - Point-in-time restore and geo-restore that leverage automatic backup:
    - Full weekly
    - Differential daily
    - Incremental (transaction log) every five minutes
- Scalability:
  - Vertical scaling:
    - DTU-based purchasing model
    - vCore purchasing model
  - Horizontal scaling through federations and sharding
  - Grouping databases into elastic database pools

Lesson 4: Creating and connecting to Azure SQL databases

- Creating Azure SQL databases
- Demonstration: Creating an Azure SQL database by using the Azure portal
- Demonstration: Configuring geo-replication settings of an Azure SQL database by using the Azure portal
- Connecting to an Azure SQL database
- Demonstration: Connecting to an Azure SQL database by using SQL Server Management Studio

Creating Azure SQL databases



- Create a logical server
- Create one or more user databases (import and copy are supported)

Demonstration: Creating an Azure SQL database by using the Azure portal

In this demonstration, you will see how to:

- Create an Azure SQL database by using the Azure portal
- Identify the Azure SQL database and the logical server properties in the Azure portal

Demonstration: Configuring geo-replication settings of an Azure SQL database by using the Azure portal

In this demonstration, you will see how to:

- Configure geo-replication

Connecting to an Azure SQL database

- Interactive tools:
  - SQL Server Management Studio
  - sqlcmd
  - Visual Studio
- Applications:
  - Connection strings (ADO.NET, ODBC, PHP, JDBC)
- Access and security:
  - SQL Server firewall rules
  - SQL Server or Azure Active Directory-based authentication

Demonstration: Connecting to an Azure SQL database by using SQL Server Management Studio

In this demonstration, you will see how to:

- Connect to an Azure SQL database by using SQL Server Management Studio
- Run sample queries against the Azure SQL database from SQL Server Management Studio

Lab B: Creating a SQL Database in Azure

- Exercise 1: Creating a new Azure SQL database in Azure and configuring SQL Server firewall rules
- Exercise 2: Managing content of an Azure SQL database by using SQL Server Management Studio

Logon Information

Virtual machine:	**10979F-MIA-CL1**
User name:	**Admin**
Password:	**Pa55w.rd**

Estimated Time: 20 minutes

Lab Scenario

To accommodate a steadily increasing volume of internet-based customers, Adatum Corporation has decided to store its marketing data in a dedicated database hosted in Microsoft Azure. You are considering using Azure SQL Database for this purpose and have decided to test its capabilities.

Lab Review

- In the lab, you connected to an Azure SQL database by using SQL Server Management Studio. What configuration change must you make first in the Azure portal before successfully establishing the connection?
- What authentication method do you have to use when connecting to Azure SQL Database?

Module Review and Takeaways

- Review Questions
- Tools
- Best Practices