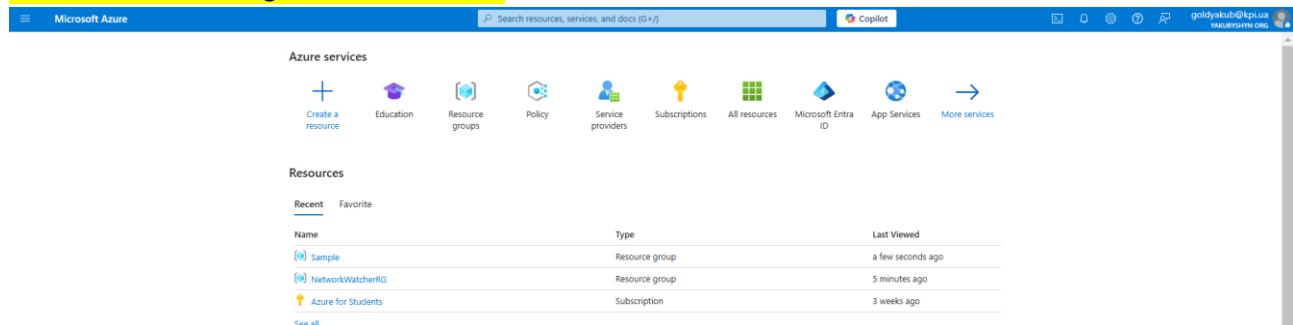


## Azure Storage and Databases Practical tasks

# Practical Task 1: Upload and Retrieve Files with Azure Blob Storage

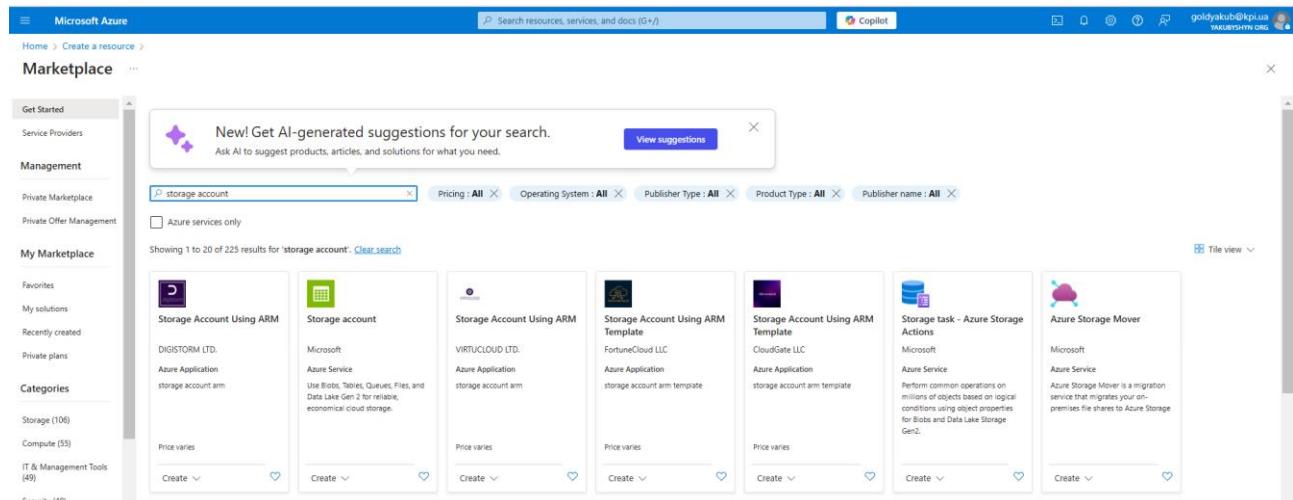
Use Azure Blob Storage for storing and retrieving files.

### 1. Create a new storage account in Azure.



The screenshot shows the Microsoft Azure portal homepage. At the top, there's a navigation bar with links for Microsoft Azure, Education, Resource groups, Policy, Service providers, Subscriptions, All resources, Microsoft Entra ID, App Services, and More services. Below the navigation bar, there's a section titled "Azure services" with a "Create a resource" button. Under "Resources", there's a table showing three recent resources: "Sample" (Resource group), "NetworkWatcherRG" (Resource group), and "Azure for Students" (Subscription). The "Recent" tab is selected in the table header.

### Create a resource



The screenshot shows the Microsoft Azure Marketplace search results for "storage account". The search bar at the top has "storage account" entered. Below the search bar, there are filters for Pricing, Operating System, Publisher Type, Product Type, and Publisher name, all set to "All". A message box says "New! Get AI-generated suggestions for your search. Ask AI to suggest products, articles, and solutions for what you need." Below the filters, it says "Showing 1 to 20 of 225 results for 'storage account'". There are six search results displayed in a grid:

Image	Name	Publisher	Description	Actions
	Storage Account Using ARM	DIGISTORM LTD.	Azure Application storage account arm	<a href="#">Create</a>
	Storage account	Microsoft	Azure Service Use Blobs, Tables, Queues, Files, and Data Lake Gen 2 for reliable, economical cloud storage.	<a href="#">Create</a>
	Storage Account Using ARM Template	VIRTUCLOUD LTD.	Azure Application storage account arm	<a href="#">Create</a>
	Storage Account Using ARM Template	CloudGate LLC	Azure Application storage account arm template	<a href="#">Create</a>
	Storage task - Azure Storage Actions	Microsoft	Azure Service Perform common operations on millions of objects based on logical conditions using object properties for Blobs and Data Lake Storage Gen2.	<a href="#">Create</a>
	Azure Storage Mover	Microsoft	Azure Service Azure Storage Mover is a migration service that migrates your on-premises file shares to Azure Storage	<a href="#">Create</a>

### Storage account

[Home](#) > [Create a resource](#) > [Marketplace](#) > [Storage account](#) >

## Create a storage account

[Basics](#)[Advanced](#)[Networking](#)[Data protection](#)[Encryption](#)[Tags](#)[Review + create](#)

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more about Azure storage accounts](#)

### Project details

Select the subscription in which to create the new storage account. Choose a new or existing resource group to organize and manage your storage account together with other resources.

Subscription \*

Azure for Students

Resource group \*

Sample

[Create new](#)

### Instance details

Storage account name \* ⓘ

anatoliyyakubyshyn

Region \* ⓘ

(Europe) Poland Central

[Deploy to an Azure Extended Zone](#)

Primary service ⓘ

Azure Blob Storage or Azure Data Lake Storage Gen 2

Performance \* ⓘ

 **Standard:** Recommended for most scenarios (general-purpose v2 account) **Premium:** Recommended for scenarios that require low latency.

Redundancy \* ⓘ

Locally-redundant storage (LRS)

[Previous](#)[Next](#)[Review + create](#)



## Create a storage account ...

[Basics](#)   [Advanced](#)   [Networking](#)   [Data protection](#)   [Encryption](#)   [Tags](#)   [Review + create](#)**Security**

Configure security settings that impact your storage account.

- Require secure transfer for REST API operations
- Allow enabling anonymous access on individual containers
- Enable storage account key access
- Default to Microsoft Entra authorization in the Azure portal
- Minimum TLS version
- Permitted scope for copy operations (preview)

**Hierarchical Namespace**Hierarchical namespace, complemented by Data Lake Storage Gen2 endpoint, enables file and directory semantics, accelerates big data analytics workloads, and enables access control lists (ACLs) [Learn more](#)

- Enable hierarchical namespace
- Access protocols
- Blob and Data Lake Gen2 endpoints are provisioned by default [Learn more](#)
- Enable SFTP   
SFTP can only be enabled for hierarchical namespace accounts
- Enable network file system v3   
To enable NFS v3 'hierarchical namespace' must be enabled. [Learn more about NFS v3](#)

**Blob storage**

- Allow cross-tenant replication
- Access tier  Hot: Optimized for frequently accessed data and everyday usage scenarios  
 Cool: Optimized for infrequently accessed data and backup scenarios  
 Cold: Optimized for rarely accessed data and backup scenarios

**Azure Files**

- Enable large file shares

[Home](#) > [Create a resource](#) > [Marketplace](#) > [Storage account](#) >

## Create a storage account

...

[Basics](#)    [Advanced](#)    [Networking](#)    [Data protection](#)    [Encryption](#)    [Tags](#)    [Review + create](#)

### Network connectivity

You can connect to your storage account either publicly, via public IP addresses or service endpoints, or privately, using a private endpoint.

#### Network access \*

 Enable public access from all networks Enable public access from selected virtual networks and IP addresses Disable public access and use private access

i Enabling public access from all networks might make this resource available publicly. Unless public access is required, we recommend using a more restricted access type. [Learn more](#) ↗

### Private endpoint

Create a private endpoint to allow a private connection to this resource. Additional private endpoint connections can be created within the storage account or private link center.

 [Add private endpoint](#)

Name	Subscription	Resource g...	Region	Target sub...	Subnet	Private DN...
------	--------------	---------------	--------	---------------	--------	---------------

*Click on add to create a private endpoint*

◀ ▶

### Network routing

Determine how to route your traffic as it travels from the source to its Azure endpoint. Microsoft network routing is recommended for most customers.

#### Routing preference \* ⓘ

 Microsoft network routing Internet routing

[Previous](#) [Next](#) [Review + create](#)



## Create a storage account

...

[Basics](#)[Advanced](#)[Networking](#)[Data protection](#)[Encryption](#)[Tags](#)[Review + create](#)

### Recovery

Protect your data from accidental or erroneous deletion or modification.

- Enable point-in-time restore for containers

Use point-in-time restore to restore one or more containers to an earlier state. If point-in-time restore is enabled, then versioning, change feed, and blob soft delete must also be enabled. [Learn more](#)

- Enable soft delete for blobs

Soft delete enables you to recover blobs that were previously marked for deletion, including blobs that were overwritten. [Learn more](#)

- Enable soft delete for containers

Soft delete enables you to recover containers that were previously marked for deletion. [Learn more](#)

- Enable soft delete for file shares

Soft delete enables you to recover file shares that were previously marked for deletion. [Learn more](#)

### Tracking

Manage versions and keep track of changes made to your blob data.

- Enable versioning for blobs

Use versioning to automatically maintain previous versions of your blobs. [Learn more](#)

Consider your workloads, their impact on the number of versions created, and the resulting costs. Optimize costs by automatically managing the data lifecycle. [Learn more](#)

- Enable blob change feed

Keep track of create, modification, and delete changes to blobs in your account. [Learn more](#)

### Access control

- Enable version-level immutability support

Allows you to set time-based retention policy on the account-level that will apply to all blob versions. Enable this feature to set a default policy at the account level. Without enabling this, you can still set a default policy at the container level or set policies for specific blob versions. Versioning is required for this property to be enabled. [Learn more](#)

<https://portal.azure.com/#>

[Review + create](#)

[Home](#) > [Create a resource](#) > [Marketplace](#) > [Storage account](#) >

## Create a storage account

...

[Basics](#)[Advanced](#)[Networking](#)[Data protection](#)[Encryption](#)[Tags](#)[Review + create](#)

Encryption type \* ⓘ

 Microsoft-managed keys (MMK) Customer-managed keys (CMK)

Enable support for customer-managed keys ⓘ

 Blobs and files only All service types (blobs, files, tables, and queues)

 This option cannot be changed after this storage account is created.

Enable infrastructure encryption ⓘ

[Previous](#)[Next](#)[Review + create](#)

## Create a storage account ...

[Basics](#)   [Advanced](#)   [Networking](#)   [Data protection](#)   [Encryption](#)   [Tags](#)   [Review + create](#)[View automation template](#)**Basics**

Subscription	Azure for Students
Resource group	Sample
Location	Poland Central
Storage account name	anatoliyyakubshyn
Primary service	Azure Blob Storage or Azure Data Lake Storage Gen 2
Performance	Standard
Replication	Locally-redundant storage (LRS)

**Advanced**

Enable hierarchical namespace	Disabled
Enable SFTP	Disabled
Enable network file system v3	Disabled
Allow cross-tenant replication	Disabled
Access tier	Cool
Enable large file shares	Enabled

**Security**

Secure transfer	Enabled
Blob anonymous access	Disabled
Allow storage account key access	Enabled
Default to Microsoft Entra authorization in the Azure portal	Disabled
Minimum TLS version	Version 1.2
Permitted scope for copy operations (preview)	From any storage account

**Networking**

Network connectivity	Public endpoint (all networks)
Default routing tier	Microsoft network routing

**Data protection**

Point-in-time restore	Disabled
Blob soft delete	Disabled
Container soft delete	Disabled
File share soft delete	Disabled
Versioning	Disabled
Blob change feed	Disabled
Version-level immutability support	Disabled

**Encryption**

Encryption type	Microsoft-managed keys (MMK)
Enable support for customer-managed keys	Blobs and files only
Enable infrastructure encryption	Disabled

[Previous](#)[Next](#)[Create](#)

Microsoft Azure

Home > anatoliyakubshyn\_1737748824433 | Overview

Deployment

Search Delete Cancel Redeploy Download Refresh

Overview

Your deployment is complete

Deployment name: anatoliyakubshyn\_1737748824433  
Subscription: Azure for Students  
Resource group: Sample

Start time: 1/24/2025, 10:09:26 PM  
Correlation ID: 65f78e7c-e86d-4e93-a669-9c4cf1de02e

Deployment details

Next steps

Go to resource

Give feedback

Tell us about your experience with deployment

Cost Management

Get notified to stay within your budget and prevent unexpected charges on your bill.  
Set up cost alerts >

Microsoft Defender for Cloud

Secure your apps and infrastructure

2. Set up a Blob container named "my-container" with public access.

Microsoft Azure

Home > anatoliyakubshyn\_1737748824433 | Overview > anatoliyakubshyn

Storage account

Search Container Change access level Restore containers Refresh Delete Give feedback

Tags

Diagnose and solve problems

Access Control (IAM)

Data migration

Events

Storage browser

Storage Mover

Partner solutions

Data storage

Containers

File shares

Queues

Tables

Security + networking

Containers

Name Last modified Anonymous access level Lease state

You don't have any containers yet. Click '+ Container' to get started.

The screenshot shows the 'Containers' section of the Azure Storage account overview. It includes a search bar, a 'Create Container' button, and a table header for 'Name', 'Last modified', 'Anonymous access level', and 'Lease state'. A message at the bottom indicates there are no containers yet.

New container X

Name \*

my-container

Anonymous access level (i)

Private (no anonymous access)



is level

**i** The access level is set to private because anonymous access is disabled on this storage account.

^ Advanced

Encryption scope

Select from existing account scopes

 Use this encryption scope for all blobs in the container Enable version-level immutability support (i)

**i** In order to enable version-level immutability support, your storage account must have versioning turned on.

Create

Give feedback

### 3. Upload a sample text file to the Blob container using the Azure portal.

The screenshot shows the Microsoft Azure portal interface. On the left, there's a sidebar with 'my-container' selected under 'Containers'. The main area shows a table with one row labeled 'No results'. On the right, a modal window titled 'Upload blob' is open. It contains a large dashed box with a cloud icon and the text 'Drag and drop files here or Browse for files'. Below this box, there's a checkbox for 'Overwrite if files already exist' and a 'Advanced' section. At the bottom are 'Upload' and 'Give feedback' buttons. The URL in the browser bar is partially visible as '0-8e22-4425-b3ea-29f6acfb32428%2Fresou...'. The top navigation bar includes 'Copilot' and user information 'goldiyakub@kpi.ua YAKUBSHYN.ORG'.

Upload blob

Drag and drop files here  
or  
Browse for files

Overwrite if files already exist

Advanced

Upload

Give feedback

Upload

Microsoft Azure

Home > anatoliyakubshyn\_1737748824433 | Overview > anatoliyakubshyn | Containers >

**my-container** Container

Overview

Diagnose and solve problems

Access Control (IAM)

Settings

Authentication method: Access key ([Switch to Microsoft Entra user account](#))

Location: my-container

Search blobs by prefix (case-sensitive) Show deleted blobs

Add filter

Name	Modified	Access tier	Archive status	Blob type
sample_text.txt	1/24/2025, 10:18:58 ...	Cool (Inferred)		Block blob

Notifications

More events in the activity log → Dismiss all ▾

Successfully uploaded blob(s) a few seconds ago

Successfully created storage container 'my-container'. 3 minutes ago

Deployment succeeded Deployment 'anatoliyakubshyn\_1737748824433' to resource group 'Sample' was successful.

[Go to resource](#) [Go to dashboard](#)

#### 4. Download the uploaded file to verify successful retrieval.

Microsoft Azure

Home > anatoliyakubshyn\_1737748824433 | Overview > anatoliyakubshyn | Containers > my-container >

**sample\_text.txt** Blob

Save Discard Download Refresh Delete Change tier Acquire lease Break lease Give feedback

Overview Versions Snapshots Edit Generate SAS

downloaded

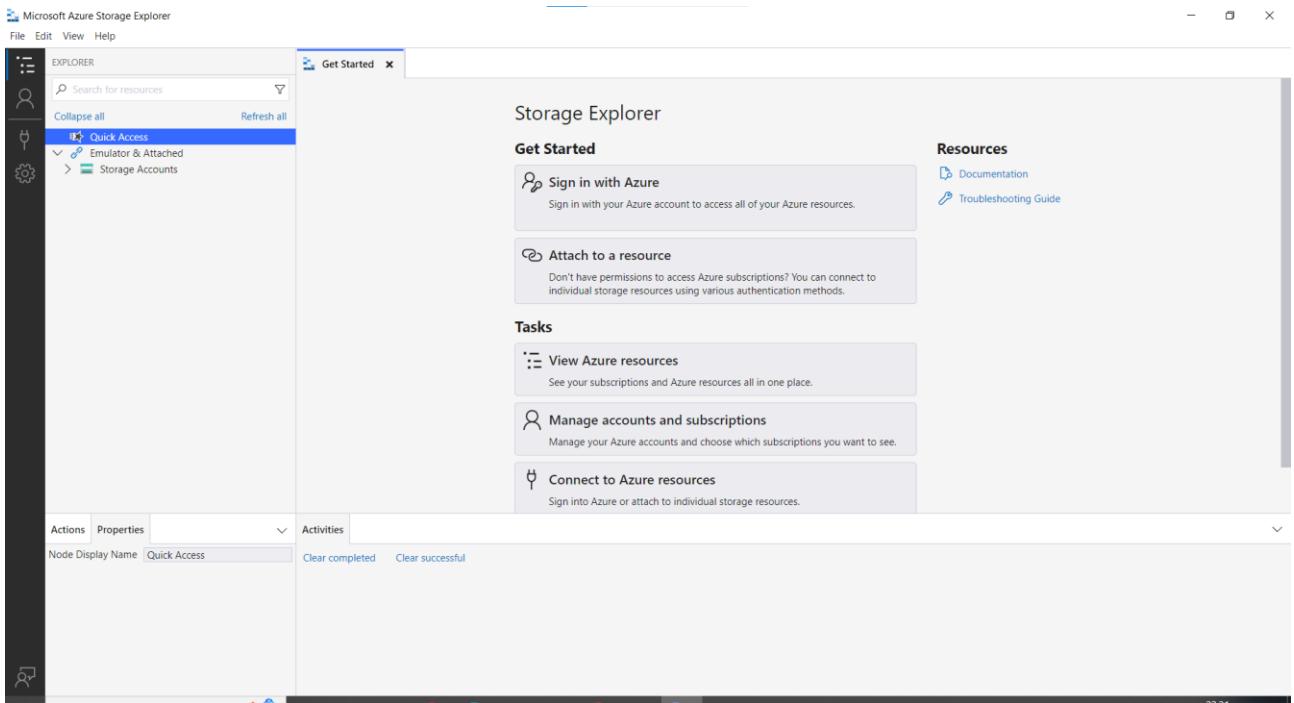
#### 5. Use Azure Storage Explorer to manage and view blobs in your container.

Download

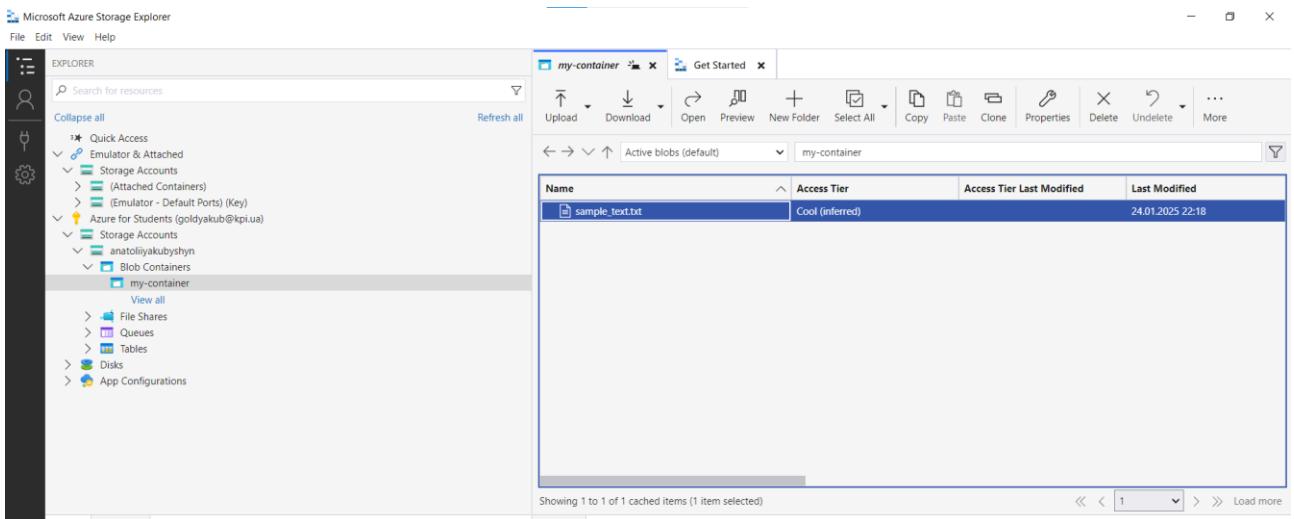
Download Azure Storage Explorer today

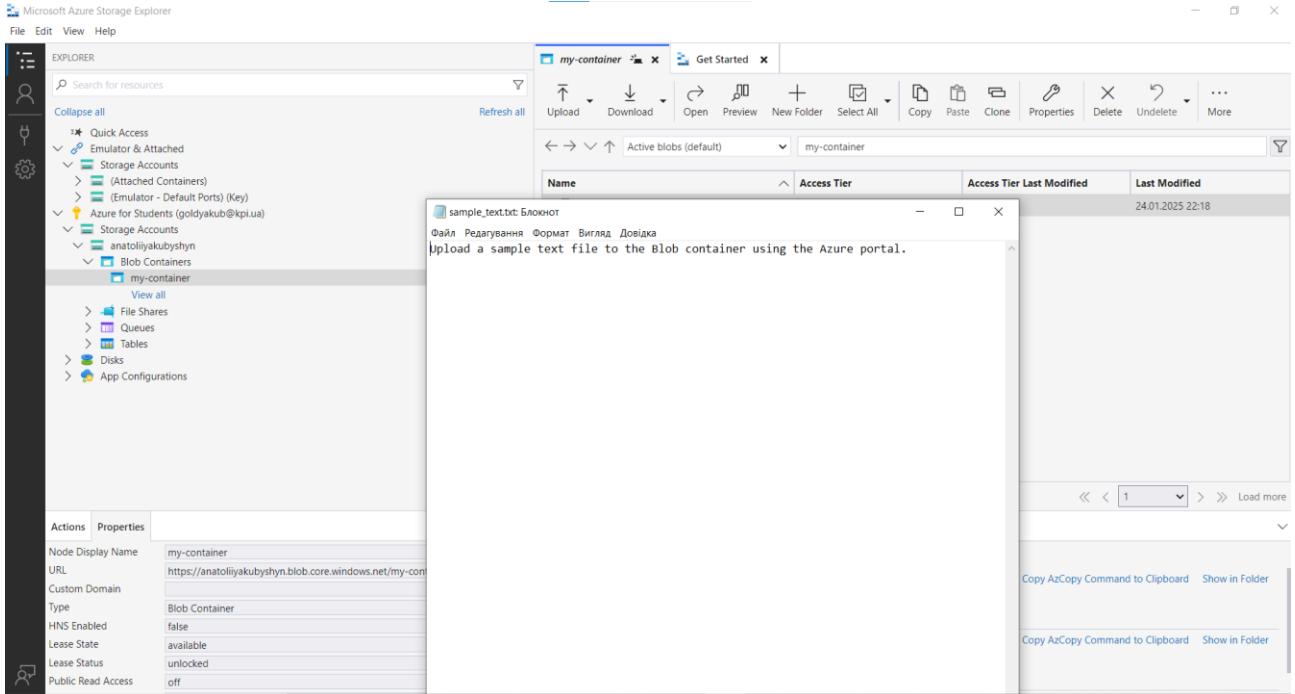
[Download now](#)





## Sign in with Azure





After double click

## Practical Task 2: Lifecycle Management for Blob Storage

Implement lifecycle management policies to optimize storage costs.

### 1. Create a storage account and a Blob container named "lifecycle-container."

**Microsoft Azure**

Home > Sample > Marketplace > Storage account >

Create a storage account ...

**Basics**

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more about Azure storage accounts](#)

**Project details**

Select the subscription in which to create the new storage account. Choose a new or existing resource group to organize and manage your storage account together with other resources.

Subscription \*

Resource group \*  [Create new](#)

**Instance details**

Storage account name \*

Region \*  [Deploy to an Azure Extended Zone](#)

Primary service

Performance \*  Standard: Recommended for most scenarios (general-purpose v2 account)  
 Premium: Recommended for scenarios that require low latency.

Redundancy \*

[Previous](#) [Next](#) [Review + create](#)

Home > Sample > Marketplace > Storage account >

## Create a storage account

...

Basics

Advanced

Networking

Data protection

Encryption

Tags

Review + create

### Security

Configure security settings that impact your storage account.

Require secure transfer for REST API operations

Allow enabling anonymous access on individual containers

Enable storage account key access

Default to Microsoft Entra authorization in the Azure portal

Minimum TLS version

Permitted scope for copy operations (preview)

### Hierarchical Namespace

Hierarchical namespace, complemented by Data Lake Storage Gen2 endpoint, enables file and directory semantics, accelerates big data analytics workloads, and enables access control lists (ACLs) [Learn more](#)

Enable hierarchical namespace

### Access protocols

Blob and Data Lake Gen2 endpoints are provisioned by default [Learn more](#)

Enable SFTP

i SFTP can only be enabled for hierarchical namespace accounts

Enable network file system v3

i To enable NFS v3 'hierarchical namespace' must be enabled. [Learn more about NFS v3](#)

### Blob storage

Allow cross-tenant replication

Access tier

● Hot: Optimized for frequently accessed data and everyday usage scenarios

Cool: Optimized for infrequently accessed data and backup scenarios

[Previous](#)

[Next](#)

[Review + create](#)

Other options are the same in the previous tasks



## New container

Name \*

conta

Anonymous access level

The access level is set to private because anonymous access is disabled on this storage account.

Advanced

Give feedback

## 2. Upload multiple files of varying sizes to the container.

The screenshot shows the Microsoft Azure Storage Explorer interface. A table lists three blobs: 'Бланк 6 листів (X1-12).pdf' (Modified 1/25/2025, 10:45:01 AM, Hot (inferred), Block blob, 172.29 kB, Available), 'photo\_2025-01-21-13-49-06 (3).jpg' (Modified 1/25/2025, 10:44:18 AM, Hot (inferred), Block blob, 92.83 kB, Available), and 'sample\_text.txt' (Modified 1/25/2025, 10:43:59 AM, Hot (inferred), Block blob, 73 B, Available).

## 3. Create a lifecycle management policy to move blobs to the Cool tier after 30 days and delete blobs older than 90 days.

The screenshot shows the Azure Storage account settings for 'ayakstorage'. In the 'Lifecycle management' section, a new rule is being configured. The rule details are as follows:

Condition	Action
Age greater than or equal to 30 days	Move to Cool tier
Age greater than or equal to 90 days	Delete

## Lifecycle management

The screenshot shows the 'Lifecycle management' rules list for the 'ayakstorage' account. There are no rules currently defined.

## Add a rule

Microsoft Azure

Home > ayakstorage | Lifecycle management >

### Add a rule

Details    Base blobs    Filter set

A rule is made up of one or more conditions and actions that apply to the entire storage account. Optionally, specify that rules will apply to particular blobs by limiting with filters.

Rule name \*  
MoveToCoolAndDelete

Rule scope \*

Apply rule to all blobs in your storage account  
 Limit blobs with filters

Blob type \*

Block blobs  
 Append blobs

Blob subtype \*

Base blobs  
 Snapshots  
 Versions

Previous   **Next**

Microsoft Azure

Home > ayakstorage | Lifecycle management >

### Add a rule

Lifecycle management uses your rules to automatically move blobs to cooler tiers or to delete them. If you create multiple rules, the associated actions must be implemented in tier order (from hot to cool storage, then archive, then deletion).

If

Base blobs were \*

Last modified  
 Created

More than (days ago) \*

30

Then

Move to cool storage

If

Base blobs were \*

Last modified  
 Created

More than (days ago) \*

90

Then

Delete the blob

+ Add conditions

Previous   **Next**

[Home](#) > [ayakstorage | Lifecycle management](#) >

## Add a rule ...

 Details     Base blobs     Filter set

### Blob prefix


### Blob index match

If you have indexed items in containers with keys and values, you can filter for them.

Key	Value
<input type="text" value="Enter an index key"/>	<input type="text" value="=="/> <input type="text" value="Enter a value"/>

PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS

```
tolia@m515U:/mnt/d/Azure/task3$ touch -t 202412151200 file1.txt
```

uploading this file



## file1.txt ...

Blob

[Overview](#)    [Versions](#)    [Snapshots](#)    [Edit](#)    [Generate SAS](#)

### Properties

URL	<a href="https://ayakstorage.blob.core.windows.net/lifecycle-container/file1.txt">https://ayakstorage.blob.core.windows.net/lifecycle-container/file1.txt</a>
LAST MODIFIED	1/25/2025, 11:14:21 AM
CREATION TIME	1/25/2025, 11:14:21 AM
VERSION ID	-
TYPE	Block blob
SIZE	-

But in the azure portal I see current date

But when I download a file I see correct creation date of file

4. Simulate policy execution by manually testing with different file creation timestamps.

5. Verify that blobs are moved or deleted according to the policy.

```
1  {
2    "rules": [
3      {
4        "enabled": true,
5        "name": "MoveToCoolAndDelete",
6        "type": "Lifecycle",
7        "definition": {
8          "actions": {
9            "baseblob": {
10              "tierToCool": [
11                "daysAfterCreationGreaterThanOrEqual": 30
12              ],
13              "delete": [
14                "daysAfterCreationGreaterThanOrEqual": 90
15              ]
16            }
17          },
18          "filters": {
19            "blobTypes": [
20              "blockBlob"
21            ],
22            "prefixMatch": [
23              "lifecycle-container"
24            ]
25          }
26        }
27      }
28    ]
29 }
```

Details    Details    Filter set

#### Blob prefix

Filter blobs by name or first letters. To find items in a specific container, enter the name of the container followed by a forward slash, then the blob name or first letters. For example, to show all blobs starting with "a", type: "mycontainer/a".

#### Blob prefix

 \*

Enter a prefix or file path such as "mycontainer/prefix"

#### Blob index match

If you have indexed items in containers with keys and values, you can filter for them.

```
goldyakub [ ~ ]$ az policy state trigger-scan
```

It doesn't move anything, so I will skip those last points.

## Practical Task 3: Implementing an Azure Queue for Message Storage

Create and manage an Azure Queue to store and process messages.

1. Create a storage account and enable the Queue service.

Microsoft Azure

Home > Create a resource > Marketplace > Storage account >

## Create a storage account

Basics Advanced Networking Data protection Encryption Tags Review + create

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more about Azure storage accounts](#)

**Project details**

Select the subscription in which to create the new storage account. Choose a new or existing resource group to organize and manage your storage account together with other resources.

Subscription \* Azure for Students

Resource group \* Sample [Create new](#)

**Instance details**

Storage account name \* ayakubqueue

Region \* (Europe) Poland Central [Deploy to an Azure Extended Zone](#)

Primary service Other (tables and queues)

Performance \*  Standard: Recommended for most scenarios (general-purpose v2 account)  
 Premium: Recommended for scenarios that require low latency.

Redundancy \* Locally-redundant storage (LRS)

Previous Next [Review + create](#)

2. Create a queue named "task-queue."

Queues	
<a href="#">+ Queue</a>	<a href="#">Refresh</a>   <a href="#">Delete</a>   <a href="#">Give feedback</a>
<input type="text"/> Search queues by prefix	
Queue	Url
<input type="checkbox"/> task-queue	<a href="https://ayakubqueue.queue.core.windows.net/task-queue">https://ayakubqueue.queue.core.windows.net/task-queue</a>
<a href="#">...</a>	

3. Use Azure Storage Explorer or the Azure portal to add messages to the queue.

The screenshot shows the Microsoft Azure portal interface. At the top, there's a navigation bar with 'Microsoft Azure' on the left, a search bar in the center containing 'Search resources, services, and docs (0+)', and a 'Copilot' button on the right. The user is signed in as 'gokulyukub@kpi.ua'. Below the navigation bar, the URL is 'Home > ayakubqueue\_1773800894793 | Overview > ayakubqueue | Queues > task-queue'. The main content area has a title 'task-queue' with a 'Queue' icon. Below it is a toolbar with 'Search', 'Refresh', 'Add message', 'Dequeue message', 'Clear queue', and 'Give feedback' buttons. A secondary toolbar below the first one includes 'Overview', 'Diagnose and solve problems', 'Access Control (IAM)', and 'Settings'. The 'Overview' tab is selected. Underneath, there's a section titled 'Authentication method: Access key (Switch to Microsoft Entra user account)' with a 'Search to filter items...' input field. At the bottom, there's a table with columns 'Id', 'Message text', 'Insertion time', 'Expiration time', and 'Dequeue count', showing 'No results'.

Id	Message text	Insertion time	Expiration time	Dequeue count
No results				

« Refresh + Add message Dequeue message Clear queue Give feedback

### Add message to queue

Message text \*

HELLO

Expires in: \*

 Days
 

Message never expires

Encode the message body in Base64 ⓘ

**OK** **Cancel**

#### 4. Retrieve and process messages directly using Azure Storage Explorer or the Azure portal interface.

Azure Storage Explorer

File Help

task-queue Get Started

Search for resources

azureready2 Search all Refresh all

- Quick Access
- Emulator & Attached
- Storage Accounts
  - Azure for Students (goldiyakub@kpi.ua)
- Storage Accounts
- task-queue
  - Blob Containers
  - File Shares
  - Queues
    - task-queue
- Tables
- Disk
- DefaultResourceGroup-NEU
- DefaultResourceGroup-WUK
- NetworkWatcherRG
- Sample
- App Configurations

ID	Message Text	Insertion Time	Expiration Time	Dequeue Count	Size
7dcc689d-c8d2-48a2-8b0f-735ee14dc203	HELLO	25.01.2025 12:36	01.02.2025 12:36	0	8 B

Showing 1 to 1 of 1 messages in queue

#### 5. Verify that processed messages are removed from the queue manually.

Microsoft Azure

Home > ayakubqueue\_1737800894793 | Overview > ayakubqueue | Queues >

task-queue Queue

Search resources, services, and docs (S+)

Copilot

task-queue

Overview Diagnose and solve problems Access Control (IAM) Settings

Authentication method: Access key (Switch to Microsoft Entra user account)

Search to filter items...

ID	Message text	Insertion time	Expiration time	Dequeue count
No results				

Clicked dequeue

there are no messages in portal too

# Practical Task 4: Configuring Azure File Share and Mounting on a Local Machine Set up and access Azure File Storage for shared file access

## 1. Create a storage account and set up an Azure File Share.

I decided to use storage account from a previous task

The screenshot shows the Microsoft Azure portal interface for creating a new file share. At the top, there's a navigation bar with 'Microsoft Azure' and a search bar. Below it, the URL 'ayakubqueue | File shares' is visible, along with a 'Storage account' icon. The main content area has a title 'New file share' and a breadcrumb trail 'Home > ayakubqueue | File shares >'. There are three tabs at the top: 'Basics' (which is selected), 'Backup', and 'Review + create'. The 'Basics' tab contains fields for 'Name \*' (set to 'yakubyshynfileshare') and 'Access tier \*' (set to 'Transaction optimized'). Below these, under 'Performance', are settings for 'Maximum IO/s' (20000) and 'Maximum capacity' (100 TiB). A note in a callout box says: 'To use the SMB protocol with this share, check if you can communicate over port 445. These scripts for [Windows clients](#) and [Linux clients](#) can help. Learn how to [circumvent port 445 issues](#).'. At the bottom, there are buttons for 'Review + create' (in blue), '< Previous', and 'Next : Backup >'.

Microsoft Azure

Search resources, services, and docs (S+I)

Copilot

Home > ayakubqueue | File shares > New file share ...

Basics Backup Review + create

Azure Backup protects your file shares from accidental deletion or modification with granular restore and at-scale management capabilities. [Learn more](#)

Enable backup

Microsoft Azure

Home > ayakubqueue | File shares > New file share ...

Validation passed

Basics Backup Review + create

**Basics**

File share name	yakubyshynfileshare
Access Tier	TransactionOptimized
Protocol	SMB

**Create** < Previous Next > Download a template for automation

## 2. Upload a file to the file share using the Azure portal.

Microsoft Azure

Search resources, services, and docs (S+I)

Copilot

Home > ayakubqueue | File shares > New file share > yakubyshynfileshare ...

Overview

Storage account: ayakubqueue

Resource group: (move) Semipalatinsk

Location: Poland Central

Subscription: (move) Azure for Students

Subscription ID: 3a612e70-8e22-4425-b3ea-29f6acf32428

Share URL: http://ayak...

Redundancy: Locally-redundant

Configuration modified: 25.01.2023

Enable Backup for file share "yakubyshynfileshare" to protect your data. [Learn more](#)

Upload files

Drag and drop files here  
or  
Browse for files

Overwrite if files already exist

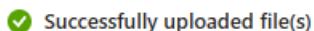
Upload

## Notifications



[More events in the activity log →](#)

[Dismiss all](#) ▾



Successfully uploaded file(s)



Successfully uploaded 1 file(s).

a few seconds ago

3. Generate a connection script for Windows or Linux and use it to mount the file share on your local machine.



### Connect

yakubshymfileshare

'Secure transfer required' is enabled on the storage account. SMB clients connecting to this share must support SMB protocol version 3 or higher in order to handle the encryption requirement. Click here to learn more.

[Windows](#) [Linux](#) [macOS](#)

To connect to this Azure file share from Windows, choose from the following authentication methods and run the PowerShell commands from a normal (not elevated) PowerShell terminal:

Drive letter

T

Authentication method

- Active Directory or Microsoft Entra  
 Storage account key

Connecting to a share using the storage account key is only appropriate for admin access. Mounting the Azure file share with the Active Directory or Microsoft Entra identity of the user is preferred. [Learn more](#)

[Hide Script](#)

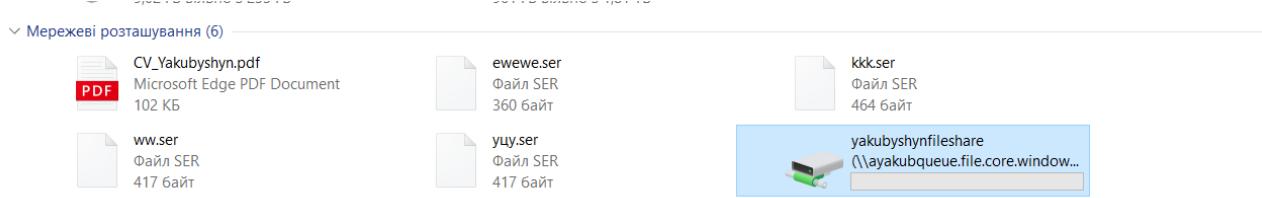
```
SconnectTestResult = Test-NetConnection -ComputerName
ayakubqueue.file.core.windows.net -Port 445
if ($connectTestResult.TcpTestSucceeded) {
    # Save the password so the drive will persist on reboot
    cmd.exe /C "cmdkey /add:"ayakubqueue.file.core.windows.net"
    /user:"localhost\ayakubqueue"
    /pass:"dq0FZFcvfN+SbPLKWBtPqVNSTGcbaRmcCgKe4luTzsJe7ii5di62D5+yESb
    l+VkB9OhylcPSX+AS6gfQ6Q=-"
    # Mount the drive
    New-PSDrive -Name T -PSProvider FileSystem -Root
    "\ayakubqueue.file.core.windows.net\yakubshymfileshare" -Persist
} else {
    Write-Error -Message "Unable to reach the Azure storage account via port
    445. Check to make sure your organization or ISP is not blocking port 445, or
    use Azure P2S VPN, Azure S2S VPN, or Express Route to tunnel SMB traffic over
    a different port."
}
```

This script will check to see if this storage account is accessible via TCP port 445, which is the port SMB uses. If port 445 is available, your Azure file share will be persistently mounted. Your organization or internet service provider (ISP) may block port 445, however you may use Azure Point-to-Site (P2S) VPN, Azure Site-to-Site (S2S) VPN, or ExpressRoute to tunnel SMB traffic to your Azure file share over a different port.

Note: The script will only work on Windows Server 2012 and above.

[Learn how to circumvent the port 445 problem \(VPN\)](#)

Give feedback



#### 4. Verify the mounted file share and ensure it displays the uploaded file.

yakubshynfileshare (\ayakubqueue.file.core.windows.net) (T:)

Ім'я	Дата змінення	Тип	Розмір
Azure Compute Services Practical tasks.pdf	25.01.2025 12:53	Microsoft Edge PD...	79 KB

#### 5. Add another file to the file share from the local machine and confirm it reflects in Azure

Керування yakubshynfileshare (\ayakubqueue.file.core.windows.net) (T:)

Засоби для роботи з дисками

re (\ayakubqueue.file.core.windows.net) (T:)

Ім'я Дата змінення Тип Розмір

Azure Compute Services Practical tasks.pdf 25.01.2025 12:53 Microsoft Edge PD... 79 KB

2% завершено

Копіювання 1 елемента з GO\_підготовка до yakubshynfileshare (\aya...  
2% завершено

Швидкість: 2,94 МБ/с

Ім'я: A Go guide by a beginner - colour version.pdf  
Час, що залишився: обчислення...  
Залишилось елементів: 1 (237 МБ)

Список

Microsoft Azure

Home > ayakubqueue | File shares > yakubshynfileshare

yakubshynfileshare | Browse ...

SMB File share

Search Connect Upload Add directory Refresh Delete share Change tier Edit quota Give feedback

Authentication method: Access key (Switch to Microsoft Entra user account)

Search files by prefix

Name	Type	Size	...
A Go guide by a beginner - colour version.pdf	File	242.27 MiB	...
Azure Compute Services Practical tasks.pdf	File	78.69 KiB	...

This file reflects in azure

## Practical Task 5: Storing and Querying Data with Azure Table Storage

Set up and use Azure Table Storage for structured data.

### 1. Create a storage account and enable the Table service.

The screenshot shows the 'Create a storage account' page in the Microsoft Azure portal. At the top, there's a navigation bar with 'Microsoft Azure' and a search bar. Below it, the breadcrumb navigation shows 'Home > Storage accounts > Create a storage account'. The main content area has a heading 'Create a storage account' with a three-dot ellipsis. A descriptive text explains that Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. It includes Azure Blobs, Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. A link to 'Learn more about Azure storage accounts' is provided.

**Project details**

Select the subscription in which to create the new storage account. Choose a new or existing resource group to organize and manage your storage account together with other resources.

Subscription \*: Azure for Students

Resource group \*: Sample (with a 'Create new' link)

**Instance details**

Storage account name \*: ay5

Region \*: (Europe) Poland Central (with a 'Deploy to an Azure Extended Zone' link)

Primary service: Other (tables and queues)

Performance \*: Standard (Recommended for most scenarios (general-purpose v2 account))  
Premium (Recommended for scenarios that require low latency) is also listed.

Redundancy \*: Locally-redundant storage (LRS)

At the bottom, there are navigation buttons: 'Previous' (disabled), 'Next', and 'Review + create'.

portal.azure.com/#create/MICROSOFT.StorageAccount-AKIVI

## Create a storage account

- Basics Advanced Networking Data protection **Data protection** Encryption Tags Review + create

### Recovery

Protect your data from accidental or erroneous deletion or modification.

- Enable point-in-time restore for containers
 

Use point-in-time restore to restore one or more containers to an earlier state. If point-in-time restore is enabled, then versioning, change feed, and blob soft delete must also be enabled. [Learn more](#)
- Enable soft delete for blobs
 

Soft delete enables you to recover blobs that were previously marked for deletion, including blobs that were overwritten. [Learn more](#)
- Enable soft delete for containers
 

Soft delete enables you to recover containers that were previously marked for deletion. [Learn more](#)
- Enable soft delete for file shares
 

Soft delete enables you to recover file shares that were previously marked for deletion. [Learn more](#)

### Tracking

Manage versions and keep track of changes made to your blob data.

- Enable versioning for blobs
 

Use versioning to automatically maintain previous versions of your blobs. [Learn more](#)
- Enable blob change feed
 

Keep track of create, modification, and delete changes to blobs in your account. [Learn more](#)

### Access control

- Enable version-level immutability support
 

Allows you to set time-based retention policy on the account-level that will apply to all blob versions. Enable this feature to set a

**2. Create a table named "employee-data".**

ay5 | Tables

Add table

Table name \*

employee-data

✖ Table names must be alphanumeric, cannot begin with a number, and must be between 3 and 63 characters long.

OK Cancel

Add table

Table name \*

✓

**OK**   **Cancel**

Table ...  
employeedata

Url  
https://ay5.table.core.windows.net/employeedata

3. Add sample data (e.g., employee IDs, names, and roles) to the table using Azure Storage Explorer or Azure CLI.

**Add Entity**

Property Name	Type	Value
PartitionKey	String	QA
RowKey	String	1
Name	String	Random Guy
Role	String	SDET

**Add Property**

**Insert**   **Cancel**

to

ole

nished dequeuing message

Query Import Export Add Edit Select All Customize Columns Delete Table Statistics Refresh

PartitionKey	RowKey	Timestamp	Name	Role
QA	1	2025-01-25T12:27:12.1056167Z	Random Guy	SDET

The screenshot shows the Azure Storage Explorer interface with a table named 'employeedata'. The table has columns: PartitionKey, RowKey, Timestamp, Name, and Role. The data is as follows:

PartitionKey	RowKey	Timestamp	Name	Role
DEV	1	2025-01-25T12:28:21.8318398Z	SD	Fronted dev
QA	1	2025-01-25T12:27:12.1056167Z	Random Guy	SDET
QA	2	2025-01-25T12:27:49.9464723Z	RG	Manual QA

#### 4. Query the table for specific data using filters (e.g., "Role = Developer").

The screenshot shows the Azure Storage Explorer interface with a query builder. A filter is applied to the 'Role' column with the value 'SDET'. The resulting table data is:

PartitionKey	RowKey	Timestamp	Name	Role
QA	1	2025-01-25T12:27:12.1056167Z	Random Guy	SDET

#### 5. Delete specific entries from the table and verify the changes.

The screenshot shows the Azure Storage Explorer interface with a confirmation dialog box titled 'Microsoft Azure Storage Explorer' asking 'Are you sure you want to delete the selected entity?'. Below the dialog, the table data is shown:

PartitionKey	RowKey	Timestamp	Name	Role
DEV	1	2025-01-25T12:28:21.8318398Z	SD	Fronted dev
QA	1	2025-01-25T12:27:12.1056167Z	Random Guy	SDET
QA	2	2025-01-25T12:27:49.9464723Z	RG	Manual QA

At the bottom, there is a message: 'Showing 1 to 3 of 3 cached items (1 item selected)' and a page navigation bar.

## Practical Task 6: Configuring Shared Access Signatures (SAS) for Secure Access Secure Azure Storage services using SAS tokens.

### 1. Create a storage account with Blob, File, Queue, and Table services enabled.

The screenshot shows the 'Create a storage account' wizard in the Microsoft Azure portal. The 'Review + create' tab is selected. The configuration is set up as follows:

Category	Setting	Value
<b>Basics</b>	Subscription	Azure for Students
	Resource group	Sample
	Location	Poland Central
	Storage account name	taskdyakub
	Primary service	Standard
Performance	Locally-redundant storage (LRS)	
Replication	Enabled	
<b>Advanced</b>		
Enable hierarchical namespace	Disabled	
Enable SFTP	Disabled	
Enable network file system v3	Disabled	
Allow cross-tenant replication	Disabled	
Access tier	Hot	
Enable large file shares	Enabled	
<b>Security</b>		
Secure transfer	Enabled	
Blob anonymous access	Disabled	
Allow storage account key access	Enabled	
Default to Microsoft Entra authorization in the Azure portal	Disabled	
Minimum TLS version: Version 1.2		
Permitted scope for copy operations (preview)	From any storage account	
<b>Networking</b>		
Network connectivity	Public endpoint (all networks)	
Default routing tier	Microsoft network routing	
<b>Data protection</b>		
Point-in-time restore	Disabled	
Blob soft delete	Disabled	
Container soft delete	Disabled	
File share soft delete	Disabled	
Versioning	Disabled	
Blob change feed	Disabled	
Version-level immutability support	Disabled	
<b>Encryption</b>		
Encryption type	Microsoft-managed keys (MMK)	
Enable support for customer-managed keys	Blobs and files only	
Enable infrastructure encryption	Disabled	

At the bottom, there are 'Previous', 'Next', and 'Create' buttons. The 'Create' button is highlighted in blue.

## 2. Generate a Shared Access Signature (SAS) token for Blob storage with limited permissions (e.g., read-only access)

The screenshot shows the Azure portal interface for generating a SAS token. The URL in the address bar is `task6yakub_1737823848002 | Overview > task6yakub | Containers > tmp`. The left sidebar shows 'tmp' selected under 'Shared access tokens'. The main form has the following settings:

- Signing method:** Account key (selected)
- Signing key:** Key 1
- Access policy:** None
- Permissions:** Read
- Start:** 01/25/2025 at 6:54:37 PM (UTC +02:00) Helsinki, Kyiv, Riga, Sofia, Tallinn, Vilnius
- Expiry:** 01/25/2025 at 7:54:37 PM (UTC +02:00) Helsinki, Kyiv, Riga, Sofia, Tallinn, Vilnius
- Allowed IP addresses:** example, 168.1.5.65 or 168.1.5.65-168.1...
- Allowed protocols:** HTTPS only (selected)

A blue button at the bottom right says 'Generate SAS token and URL'.

## 3. Share the SAS token URL and verify access to the Blob container with the token.

The screenshot shows a browser window with the URL `task6yakub.blob.core.windows.net/tmp/Azure%20Storage%20and%20Databases%20Practical%20tasks.pdf`. The page displays an XML error message:

```
<Error>
<Code>PublicAccessNotPermitted</Code>
<Message>Public access is not permitted on this storage account. RequestId:87b9fd51-501e-0040-514f-6fc3ee000000 Time:2025-01-25T17:36:27.6254552Z</Message>
</Error>
```

And then I will add parameter - token

The screenshot shows a browser window with the URL `task6yakub.blob.core.windows.net/tmp/Azure%20Storage%20and%20Databases%20Practical%20tasks.pdf?sp=r&st=2025-01-25T17:37:22Z&se=2025-01-26T01:37:22Z&spr=https&sv=2022-1...`. The page content is a PDF titled 'Azure Storage and Databases Practical tasks.pdf' containing two pages of text. The right side of the page has some specific instructions for practical tasks:

**Practical Task 1: Upload and Retrieve Files with Azure Blob Storage**  
Use Azure Blob Storage for storing and retrieving files.  
**Requirements:**

1. Create a new storage account in Azure.
2. Set up a Blob container named "my-container" with public access.
3. Upload a sample text file to the Blob container using the Azure portal.
4. Download the uploaded file to verify successful retrieval.
5. Use Azure Storage Explorer to manage and view blobs in your container.

**Practical Task 2: Lifecycle Management for Blob Storage**  
Implement lifecycle management policies to optimize storage costs.  
**Requirements:**

## 4. Repeat the process for File, Queue, and Table services with different permissions.

# Queue

The screenshot shows the 'Create shared access signature' dialog for a queue. It includes sections for Allowed services (Blob, File, Queue, Table), Allowed resource types (Service, Container, Object), Allowed permissions (Read, Write, Delete, List, Add, Create, Update, Process, Immutable storage, Permanent delete), Blob versioning permissions (Enables deletion of versions), Allowed blob index permissions (Read/Write, Filter), Start and expiry date/time (Start: 01/25/2025, End: 01/26/2025, Timezone: UTC+02:00 Helsinki, Kyiv, Riga, Sofia, Tallinn, Vilnius), Allowed IP addresses (e.g., 168.1.5.65 or 168.1.5.65-168.1.5.70), Allowed protocols (HTTPS only), Preferred routing tier (Basic (default)), Signing key (key1), and a 'Generate SAS and connection string' button.

task6yakub.queue.core.windows.net/sample/messages

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<Error>
<Code>ResourceNotFound</Code>
<Message>The specified resource does not exist. RequestId:c93cbe2-0003-004d-7053-6f0b3a000000 Time:2025-01-25T18:05:50.0020170Z</Message>
</Error>
```

task6yakub.queue.core.windows.net/sample/messages?sv=2022-11-02&ss=q&srt=sco&sp=rlp&

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<QueueMessagesList>
  <QueueMessage>
    <MessageId>97dd919a-54d9-4452-97fd-dce320ede5bf</MessageId>
    <InsertionTime>Sat, 25 Jan 2025 18:06:54 GMT</InsertionTime>
    <ExpirationTime>Sat, 01 Feb 2025 18:06:54 GMT</ExpirationTime>
    <PopReceipt>AgAAAAAMAAAAAAAeheF/lNv2wE=</PopReceipt>
    <TimeNextVisible>Sat, 25 Jan 2025 18:07:28 GMT</TimeNextVisible>
    <DequeueCount>1</DequeueCount>
    <MessageText>Tolia</MessageText>
  </QueueMessage>
</QueueMessagesList>
```

task6yakub.queue.core.windows.net/sample/messages?sv=2022-11-02&ss=q&srt=sco&sp=rlp&se=2025-01-26T01:58:45Z&st=2025-01-25T17:58:45Z&spr=https&sig=H6mtscnW3FCwDOlRy...

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<QueueMessagesList>
```

## After some refreshes message list became empty

The screenshot shows the Azure Queue service overview page for a queue named 'sample'. It includes a search bar, a 'Search' button, a 'Refresh' button, an 'Add message' button, a 'Dequeue message' button, a 'Clear queue' button, and a 'Give feedback' link. The authentication method is listed as 'Access key (Switch to Microsoft Entra user account)'. The 'Overview' section displays a table with columns for Id, Message text, Insertion time, Expiration time, and Dequeue count. A note indicates 'No results'.

PartitionKey	RowKey	Timestamp	name
1	1	2025-01-25T18:11:19.9150275Z	Tolia

task6yakub.table.core.windows.net/TMP?sv=2022-11-02&ss=t&srt=sco&sp=r&se=2025-01-26T02:09:13Z&st=2025-01-25T18:09:13Z&spr=https&sig=3k4bfaSHjNK%2F%2B2iDjkL%2FUbgi%2B...

```
<xml version="1.0" encoding="utf-8"><feed xmlns="https://task6yakub.table.core.windows.net/" xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservices" xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata" xmlns:georss="http://www.w3.org/2005/Atom" xmlns:gml="http://www.opengis.net/gml"><id>https://task6yakub.table.core.windows.net/TMP</id><title type="text">TMP</title><updated>2025-01-25T18:11:50Z</updated><link rel="self" title="TMP" href="TMP" /><entry m:etag="W/&quot;2025-01-25T18:3A1X3A19.9150275Z&quot;"><id>https://task6yakub.table.core.windows.net/TMP("PartitionKey='1',RowKey='1')</id><category term="task6yakub,TMP" scheme="http://schemas.microsoft.com/ado/2007/08/dataservices/scheme" /><link rel="edit" title="TMP" href="TMP('PartitionKey='1',RowKey='1')"/><title /><updated>2025-01-25T18:11:50Z</updated><author><name /></author><content type="application/xml"><m:properties><d:PartitionKey>1</d:PartitionKey><d:RowKey>1</d:RowKey><d:Timestamp m:type="Edm.DateTime">2025-01-25T18:11:19.9150275Z</d:Timestamp><d:name>Tolia</d:name></m:properties></content></entry></feed>
```

task6yakub.file.core.windows.net/tmp?sv=2022-11-02&ss=t&srt=sco&sp=r&se=2025-01-26T02:09:13Z&st=2025-01-25T18:09:13Z&spr=https&sig=3k4bfaSHjNK%2F%2B2iDjkL%2FUbgi%2B...

```
<Error>
<Code>AuthorizationServiceMismatch</Code>
<Message>This request is not authorized to perform this operation using this service. RequestId:d6d7ba58-201a-0028-7854-6fa57e000000 Time:2025-01-25T18:13:23.3804291Z</Message>
</Error>
```

## → Example if type of resource is off

### 5. Analyze the security implications of SAS tokens and expiry times.

Start and expiry date/time ○  
 Start | 01/25/2025 | 10:08:32 PM  
 End | 01/25/2025 | 10:10:32 PM  
 (UTC+02:00) Helsinki, Kyiv, Riga, Sofia, Tallinn, Vilnius

Allowed IP addresses ○

task6yakub.blob.core.windows.net/container/Azure%20Storage%20and%20Databases%20Practical%20tasks.pdf?sv=2022-11-02&ss=bfqt&srt=sco&sp=rw&lac=uplytfx&se=2025-01-25T20:10:32...

Azure Storage and Databases Practical tasks.pdf

1 / 5 | 100% + | 🔍

**Practical Task 1: Upload and Retrieve Files with Azure Blob Storage**  
 Use Azure Blob Storage for storing and retrieving files.  
**Requirements:**

1. Create a new storage account in Azure.
2. Set up a Blob container named "my-container" with public access.
3. Upload a sample text file to the Blob container using the Azure portal.
4. Download the uploaded file to verify successful retrieval.
5. Use Azure Storage Explorer to manage and view blobs in your container.

**Practical Task 2: Lifecycle Management for Blob Storage**  
 Implement lifecycle management policies to optimize storage costs.  
**Requirements:**

1. Create a storage account and a Blob container named "lifecycle-container."
2. Upload multiple files of varying sizes to the container.
3. Create a lifecycle management policy to move blobs to the Cool tier after 30 days and delete blobs older than 90 days.
4. Simulate policy execution by manually testing with different file creation timestamps.
5. Verify that blobs are moved or deleted according to the policy.

**Practical Task 3: Implementing an Azure Queue for Message Storage**

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<Error>
  <Code>AuthenticationFailed</Code>
  <Message>Server failed to authenticate the request. Make sure the value of Authorization header is formed correctly including the signature. RequestId:f8dc4954-701e-0013-2f65-6f2b79000000 Time:2025-01-25T20:10:32...</Message>
  <AuthenticationErrorDetail>Signature not valid in the specified time frame: Start [Sat, 25 Jan 2025 20:08:32 GMT] - Expiry [Sat, 25 Jan 2025 20:10:32 GMT] - Current [Sat, 25 Jan 2025 20:10:59 GMT]</AuthenticationErrorDetail>
</Error>
```



## Practical Task 7: Implementing Security Best Practices with Azure RBAC and Managed Identities

Securely manage access to Azure resources and integrate services using Managed Identities.

### 1. Configure Azure RBAC for a Storage Account:

#### 1.1 Create a storage account named "secure-storage".

The screenshot shows the 'Create a storage account' wizard in the Microsoft Azure portal. The page title is 'Create a storage account'. The top navigation bar includes 'Home', 'Sample', 'Marketplace', 'Storage account', and a search bar. Below the title, there are tabs for 'Basics', 'Advanced', 'Networking', 'Data protection', 'Encryption', 'Tags', and 'Review + create'. The 'Basics' tab is selected. A descriptive text explains that Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. It includes Azure Blobs, Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost depends on usage and options chosen. A link to 'Learn more about Azure storage accounts' is provided. The 'Project details' section asks for a subscription ('Azure for Students') and a resource group ('Sample'). The 'Instance details' section includes fields for 'Storage account name' (set to 'securestorageyak'), 'Region' (set to '(Europe) Poland Central'), 'Primary service' (set to 'Azure Blob Storage or Azure Data Lake Storage Gen 2'), 'Performance' (radio button selected for 'Standard: Recommended for most scenarios (general-purpose v2 account)'), and 'Redundancy' (set to 'Locally-redundant storage (LRS)'). At the bottom, there are 'Previous' and 'Next' buttons, and a prominent blue 'Review + create' button.

secure-storage is not allowed and securestorage has been already taken

## 1.2 Add a user or service principal with Storage Blob Data Contributor role.

The screenshot shows the Microsoft Entra ID Overview page. It displays basic information about the tenant, including the name 'Yakubshyn.org', tenant ID 'be098e76-f2f0-41f0-8282-f151f67b6729', primary domain 'yakubshyn.onmicrosoft.com', and license 'Microsoft Entra ID Free'. There are 3 users, 2 groups, 1 application, and 0 devices.

Navigate to Microsoft Entra ID

The screenshot shows the 'Create new user' page in Microsoft Azure. The 'Basics' tab is selected. The user principal name is 'DataContributor', and the display name is 'Data Contributor'. A password is set, and the account is enabled. The 'Review + create' button is visible at the bottom.

Copied password

The screenshot shows the 'Access Control (IAM)' page for the 'securestorageyak' storage account. The 'Check access' tab is selected. It shows 'My access' and 'Check access' sections. Below are four cards: 'Grant access to this resource', 'View access to this resource', 'View deny assignments', and 'New! Permissions Management'.

Add role assignment

Microsoft Azure

Home > securestorageyak | Access Control (IAM) >

## Add role assignment

Role Members Conditions Review + assign

A role definition is a collection of permissions. You can use the built-in roles or you can create your own custom roles. [Learn more](#)

Job function roles Privileged administrator roles

Grant access to Azure resources based on job function, such as the ability to create virtual machines.

Storage Blob Data Contributor Type : All Category : All

Name ↑↓	Description ↑↓	Type ↑↓	Category ↑↓	Details
Storage Blob Data Contributor	Allows for read, write and delete access to Azure Storage blob containers and data	BuiltinRole	Storage	<a href="#">View</a>

Showing 1 - 1 of 1 results.

Microsoft Azure

Home > securestorageyak | Access Control (IAM) >

## Add role assignment

Role Members Conditions Review + assign

Selected role Storage Blob Data Contributor

Assign access to  User, group, or service principal  Managed identity

Members [+ Select members](#)

Name	Object ID	Type
Data Contributor	c50704ba-ab50-403b-b652-f6ea1763af02	User

Description

[Review + assign](#) [Previous](#) [Next](#) [Feedback](#)

<https://portal.azure.com/#>

## Review and assign

Microsoft Azure

Home > Yakubshyn.org | Users >

## Per-user multifactor authentication

Bulk update Got feedback?

Users Service settings

Use multifactor authentication (MFA) to protect your users and data. Our recommended approach to enforce MFA is to use adaptive Conditional Access policies. [Learn more](#)

Before you begin, take a look at the [multifactor authentication deployment guide](#).

Enable MFA  Disable MFA  Enforce MFA  User MFA settings

Status : All View : Sign-in allowed users  Reset filters

Name	UPN	Status
Billie Jean	Billie.Jean@yakubshyn.onmicrosoft.com	enforced
Data Contributor	DataContributor@yakubshyn.onmicrosoft.com	disabled
Андрей Якубшин	goldyakub_kpi.ua#EXT#@yakubshyn.onmicrosoft.com	enforced
Joe Dao	Joe.Dao@yakubshyn.onmicrosoft.com	enforced

## Opened Per-user multifactor authentication

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

goldyakub@kpi.ua YAKUBYSHYN.ORG

Home > Yakubышин.org | Users > Users

Per-user multifactor authentication ...

Bulk update Got feedback?

Users Service settings

Use multifactor authentication (MFA) to protect your users and data. Our recommended approach to enforce MFA is to use adaptive Conditional Access policies. Learn more

Before you begin, take a look at the [multifactor authentication deployment guide](#).

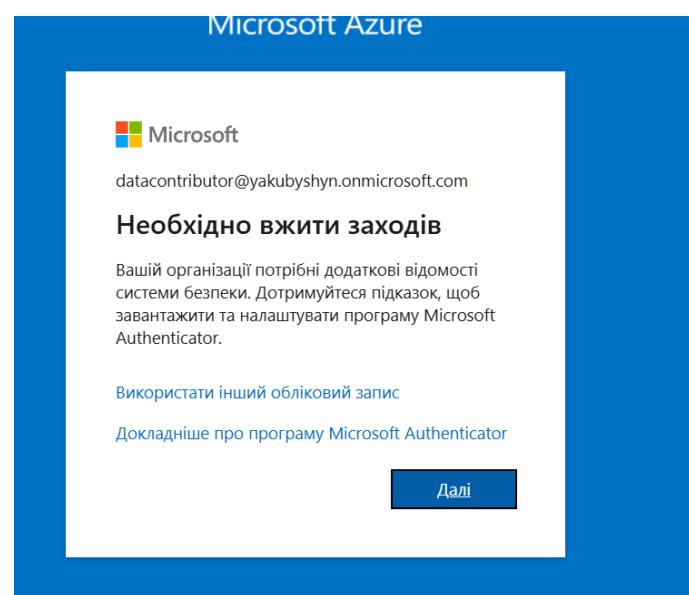
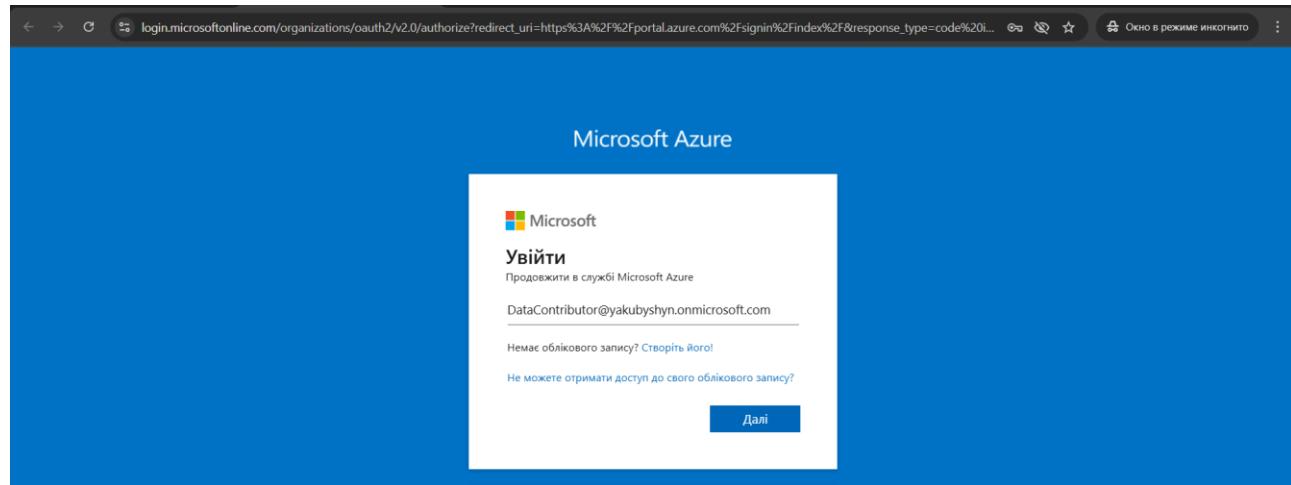
Enable MFA Disable MFA Enforce MFA User MFA settings

Search Status : All View : Sign-in allowed users Reset filters

Name	UPN	Status
Billie Jean	BillieJean@yakubышин.onmicrosoft.com	enforced
Data Contributor	DataContributor@yakubышин.onmicrosoft.com	enabled
Анатолій Якубішин	goldyakub_kpi.ua#EXT#@yakubышин.onmicrosoft.com	enforced
Joe Dao	JoeDao@yakubышин.onmicrosoft.com	enforced

## enabled MFA for Data Contributor

### 1.3 Verify that the user or service principal can upload and download blobs to the account.



# Enforced MFA

I don't see resources. So, I need to add also rights to list resources

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes 'Microsoft Azure', a search bar, and user information 'goldyyakub@kpi.ua YAKUBYSHYN Oleg'. Below the navigation is a breadcrumb trail 'Home > Azure for Students'. The main content area is titled 'Azure for Students | Access control (IAM)' with a subtitle 'Subscription'. A navigation bar within the content area includes 'IAM' (selected), 'Add', 'Download role assignments', 'Edit columns', 'Refresh', 'Delete', and 'Feedback'. A prominent orange warning message at the top right states: 'Action required: As of August 31, 2024, Azure classic administrator roles (along with Azure classic resources, Azure Service Manager) are retired and are no longer supported. If you still have active Co-Administrator or Service Administrator role assignments, convert these roles to Azure RBAC immediately. Learn more'.

The screenshot shows the 'Add role assignment' page for the 'Reader' role. The top navigation bar is identical to the previous screenshot. The main content area has a title 'Add role assignment' with a subtitle '...'. Below this, there are tabs for 'Role' (selected), 'Members' (with a red asterisk), 'Conditions', and 'Review + assign'. A note says: 'A role definition is a collection of permissions. You can use the built-in roles or you can create your own custom roles. Learn more'. Under the 'Job function roles' section, it says 'Privileged administrator roles'. A note below says: 'Grant access to Azure resources based on job function, such as the ability to create virtual machines.' A table lists the 'Reader' role details: Name: Reader, Description: View all resources, but does not allow you to make any changes., Type: BuiltInRole, Category: General, Details: View. At the bottom, there are buttons for 'Review + assign', 'Previous', and 'Next'.

The screenshot shows the 'Review + assign' step of the role assignment process. The top navigation bar is identical. The main content area has a title 'Add role assignment' with a subtitle '...'. Below this, there are tabs for 'Role' (selected), 'Members' (with a red asterisk), 'Conditions', and 'Review + assign'. A note says: 'A role definition is a collection of permissions. You can use the built-in roles or you can create your own custom roles. Learn more'. Under the 'Selected role' section, it shows 'Reader'. Under 'Assign access to', it shows 'User, group, or service principal' (radio button selected). Under 'Members', it shows '+ Select members'. A table lists a member: Name: Data Contributor, Object ID: c50704ba-ab50-403b-b652-f6ea1763af02, Type: User. Under 'Description', there is a text input field with 'Optional' placeholder text. At the bottom, there are buttons for 'Review + assign' (highlighted in blue), 'Previous', and 'Next'.

Review + assign

Microsoft Azure

Home > All resources > securestoragewayak

All resources

Yakubshyn.org (yakubshyn.onmicrosoft.com)

+ Create Manage view ...

Filter for any field... Name ↑

- DefaultWorkspace-3a612e70-8e22-4425-b3ea-29f6acf32428
- DefaultWorkspace-3a612e70-8e22-4425-b3ea-29f6acf32428
- NetworkWatcher\_northeurope
- NetworkWatcher\_polandcentral
- securestoragewayak

securestoragewayak | Storage browser

Storage account

Search

Overview Favorites Recently viewed

Add container Upload Refresh Delete

Blob containers

Search containers by prefix

Showing all 0 items

No items found

Last modified

View all

File shares

Queues

Tables

Storage browser

Storage Mover Partner solutions

Data storage Security + networking Data management Settings Monitoring Monitoring (classic) Automation Help

Create Give feedback

Page of 0

Name \* tmp

Anonymous access level Private (no anonymous access)

The access level is set to private because anonymous access is disabled on this storage account.

Advanced

DataContributor@yaku... YAKUBSHYN.ORG (YAKUBSHY...)

## Notifications

[More events in the activity log →](#)

Dismiss all

✓ Successfully created storage container

Successfully created storage container 'tmp'.

a few seconds ago

❗ Failed to create storage queue

Failed to create storage queue 'tmp'. Error: The client 'DataContributor@yakubshyn.onmicrosoft.com' with object id 'c50704ba-ab50-403b-b652-f6ea1763af02' does not have authorization to perform action 'Microsoft.Storage/storageAccounts/listKeys/action' over scope '/subscriptions/3a612e70-8e22-4425-b3ea-29f6acf32428/resourceGroups/Sample/providers/Microsoft.Storage/stor...' or the scope is invalid. If access was recently granted, please refresh your credentials.

[Help me troubleshoot](#)

a few seconds ago

securestorageyak | Storage browser

Storage account

securestorageyak

Overview Favorites

Activity log Recently viewed

Tags Blob containers

Diagnose and solve problems Blob containers > tmp

Access Control (IAM)

Data migration

Events

File shares

Storage browser Queues

Storage Mover View all

Partner solutions Tables

Data storage

Security + networking

Data management

Settings

Add Directory Upload Change access level Refresh

Delete Copy Paste Rename

Authentication method: Microsoft Entra user account (Switch to Access key)

Search blobs by prefix (case-sensitive)

Only show active blobs

Name	Last modified	Access tier	Blob type	Size
Yakubshyn...	26.01.2025, 10:52:09	Hot (Inferred)	Block blob	7.13 MiB

## Uploaded

Збереження файлу

Цей ПК > Seagate Basic (D:) > Azure > task3

Упорядкувати Створити папку

Ім'я	Дата змінення	Тип	Розмір
Помаранчевий	26.01.2025, 10:52:09	PDF-файл (*.pdf)	7.13 MiB

Пошук не дав результатів.

Ім'я файлу: Yakubshyn Anatolii Azure Identity and Access Management Practical tasks.pdf

Тип файлу: PDF-файл (\*.pdf)

Also, I am able to download

## 1.4 Attempt access with an unauthorized user and verify access is denied.

The screenshot shows the Microsoft Azure Storage browser interface for the 'securestorageyak' account. On the left, a sidebar lists various storage-related services like Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser (which is selected), Storage Mover, Partner solutions, and Data storage. The main pane displays a 'Blob containers' view with a single container named 'tmp'. A prominent message at the top states: 'You do not have permissions to use the access key to list data. Click to learn more about authenticating with Azure Storage. The client 'JoeDao@yakubyshyn.onmicrosoft.com' with object id '2bbfeb2a-5df3-4197-aa0a-47129c9cc88e' does not have authorization to perform action 'Microsoft.Storage/storageAccounts/listKeys/action' over scope '/subscriptions/3a612e70-8e22-4425-b3ea-29f6acf32428/resourceGroups/Sample/providers/Microsoft.Storage/storageAccounts/securestorageyak' or the scope is invalid. If access was recently granted, please refresh your credentials.' Below this message, there are buttons for Add Directory, Upload, Change access level, Refresh, Delete, Copy, Paste, Rename, Acquire lease, Break lease, and Edit columns. A search bar and a filter dropdown are also present. The right side of the interface shows a list of blobs with columns for Name, Last modified, Access tier, Blob type, Size, and Lease state. The list is currently empty, showing 'No items found'.

No items found

The screenshot shows the 'Upload blob' dialog box. At the top, it says 'Upload blob' and has a close button 'X'. Below this is a large dashed rectangular area with a cloud icon containing an upward arrow. Inside the area, the text '1 file(s) selected: ПР4\_5 Сил Портрета.docx' is displayed, followed by the instruction 'Drag and drop files here or [Browse for files](#)'. At the bottom of the dialog, there is a checkbox labeled 'Overwrite if files already exist' and a red error message: 'The client 'JoeDao@yakubyshyn.onmicrosoft.com' with object id '2bbfeb2a-5df3-4197-aa0a-47129c9cc88e' does not have authorization to perform action 'Microsoft.Storage/storageAccounts/listKeys/action' over scope '/subscriptions/3a612e70-8e22-4425-b3ea-29f6acf32428/resourceGroups/Sample/providers/Microsoft.Storage/storageAccounts/securestorageyak' or the scope is invalid. If access was recently granted, please refresh your credentials.' There is also a 'Advanced' section with a downward arrow.

## 2. Set Up a Managed Identity for an Azure Virtual Machine:

### 2.1 Create an Azure Virtual Machine (VM) with a system-assigned Managed Identity enabled.

The screenshot shows the Microsoft Azure portal interface for creating a new virtual machine. At the top, there's a navigation bar with 'Microsoft Azure' and a search bar. Below it, the breadcrumb trail shows 'Home > Create a resource > Marketplace > Virtual machine'. The main area is titled 'Create a virtual machine' with tabs for 'Management' (which is selected), 'Basics', 'Disks', 'Networking', 'Monitoring', 'Advanced', 'Tags', and 'Review + create'. Under 'Management', there's a section for 'Configure management options for your VM' which includes 'Microsoft Defender for Cloud' and a note about Foundational Cloud Security Posture Management Free Plan. The 'Identity' section is expanded, showing the option 'Enable system assigned managed identity' with a checked checkbox. The main content area is titled 'Add inbound security rule' for the network security group 'task7-nsg'. It contains fields for 'Source' (set to 'My IP address'), 'Source IP addresses/CIDR ranges' (set to '178.94.106.142'), 'Source port ranges' (set to '\*'), 'Destination' (set to 'Any'), 'Service' (set to 'RDP'), 'Destination port ranges' (set to '3389'), and 'Protocol' (set to 'TCP'). At the bottom, there are 'Add' and 'Cancel' buttons, and a 'Give feedback' link.

## 2.2 Assign the Storage Blob Data Reader role to the Managed Identity for "secure-storage".

The screenshot shows the Azure portal interface. On the left, a sidebar lists 'System assigned' and 'User assigned'. The main area shows a 'Status' switch set to 'On', an 'Object (principal) ID' input field containing 'ed7bb754-1c1c-400d-8752-d349acbd2cbe', and a 'Permissions' section with a 'Azure role assignments' button. A note at the bottom states: 'This resource is registered with Microsoft Entra ID. The managed identity can be configured to allow access to other resources. Be careful when making changes to the access settings for the managed identity because it can result in failures.' Below this, the 'Azure role assignments' blade is open, showing a table with columns 'Role', 'Resource Name', and 'Resource Type'. The table is empty, indicating 'No role assignments found for the selected subscription.' To the right, a modal window titled 'Add role assignment (Preview)' is displayed, with fields for 'Scope' (set to 'Storage'), 'Subscription' (set to 'Azure for Students'), 'Resource' (set to 'securestorageyak'), and 'Role' (set to 'Storage Blob Data Reader'). At the bottom of the modal are 'Save' and 'Discard' buttons.

## 2.3 Connect to the VM and verify that the Managed Identity can access blob data using Azure CLI or a pre-installed script

Installing azure cli on vm from internet explorer

```
PS C:\Users\anatolii> az login --identity
[
  {
    "environmentName": "AzureCloud",
    "homeTenantId": "be098e76-f2f0-41f0-8292-f151f67b6729",
    "id": "3a612e70-8e22-4425-b3ea-29f6acf32428",
    "isDefault": true,
    "managedByTenants": [],
    "name": "Azure for Students",
    "state": "Enabled",
    "tenantId": "be098e76-f2f0-41f0-8292-f151f67b6729",
    "user": {
      "assignedIdentityInfo": "MSI",
      "name": "systemAssignedIdentity",
      "type": "servicePrincipal"
    }
  }
]
```

```
PS C:\Users\anatolii> az storage container list --account-name securestorageyak --auth-mode login
[
  {
    "deleted": null,
    "encryptionScope": {
      "defaultEncryptionScope": "$account-encryption-key",
      "preventEncryptionScopeOverride": false
    },
    "immutableStorageWithVersioningEnabled": false,
    "metadata": null,
    "name": "tmp",
    "properties": {
      "etag": "\"0x8DD3DE696598F91\"",
      "hasImmutabilityPolicy": false,
      "hasLegalHold": false,
      "lastModified": "2025-01-26T08:51:13+00:00",
      "lease": {
        "duration": null,
        "state": "available",
        "status": "unlocked"
      },
      "publicAccess": null
    },
    "version": null
  }
]
```

```
PS C:\Users\anatolii> az storage blob list --account-name securestorageyak --container-name tmp --auth-mode login
[
  {
    "container": "tmp",
    "content": "",
    "deleted": null,
    "encryptedMetadata": null,
    "encryptionKeySha256": null,
    "encryptionScope": null,
    "hasLegalHold": null,
    "hasVersionsOnly": null,
    "immutabilityPolicy": {
      "expiryTime": null,
      "policyMode": null
    },
    "isAppendBlobSealed": null,
    "isCurrentVersion": null,
    "lastAccessedOn": null,
    "metadata": {},
    "name": "Yakubyshyn Anatolii Azure Identity and Access Management Practical tasks.pdf",
    "objectReplicationDestinationPolicy": null,
    "objectReplicationSourceProperties": [],
    "properties": {
      "appendBlobCommittedBlockCount": null,
      "blobType": "Append"
    }
  }
]
```

```
PS C:\Users\anatolii> az storage blob download --account-name securestorageyak --container-name tmp --auth-mode login --name "Yakubsyn Anatolii Azure Identity and Access Management Practical tasks.pdf" --file ~/Downloads/myfile.txt
Finished[########################################] 100.0000%
```

```
{
  "container": "tmp",
  "content": "...",
  "contentMd5": null,
  "deleted": false,
  "encryptedMetadata": null,
  "encryptionKeySha256": null,
  "encryptionScope": null,
  "hasLegalHold": null,
  "hasMutabilityPolicy": null,
  "immutabilityPolicy": {
    "expiryTime": null,
    "policyMode": null
  },
  "isAppendBlobSealed": null,
  "isCurrentVersion": null,
  "lastAccessedOn": null,
  "metageneration": 1
}
{
  "name": "Yakubsyn Anatolii Azure Identity and Access Management Practical tasks.pdf",
  "objectReplicationDestinationPolicy": null,
  "objectReplicationSourceProperties": [],
  "properties": {
    "appendBlobCommittedBlockCount": null,
    "blobType": "BlockBlob",
    "blobTierChangeTime": null,
    "blobTierInferred": null,
    "blobType": "BlockBlob",
    "contentLength": 7473017,
    "contentRange": "bytes None-None/7473017",
    "contentSettings": {
      "cacheControl": null,
      "contentTypeDisposition": null,
      "contentEncoding": null,
      "contentLanguage": null,
      "contentMd5": "egahVhJkPtgnmlV3khJEQ==",
      "contentType": "application/pdf"
    },
    "copy": {
      "completionTime": null,
      "destinationSnapshot": null,
      "id": null,
      "incrementalCopy": null,
      "progress": null,
      "source": null,
      "status": null,
      "statusDescription": null
    }
  }
}
```

```
PS C:\Users\anatolii> az storage blob download --account-name securestorageyak --container-name tmp --auth-mode login --name "Yakubsyn Anatolii Azure Identity and Access Management Practical tasks.pdf" --file ~/Downloads/res.pdf
Finished[########################################] 100.0000%
```

are View			
This PC > Downloads			
Name	Date modified	Type	Size
azure-cli-2.68.0-x64	1/26/2025 9:29 AM	Windows Installer ...	70,176 KB
myfile	1/26/2025 9:42 AM	Text Document	7,298 KB
res	1/26/2025 9:43 AM	Microsoft Edge PD...	7,298 KB

## Practical Task 8: Creating and Querying an Azure SQL Database

Learn to create and query an Azure SQL Database using the Azure portal.

1. Create an Azure SQL Database named "test-db" in a new logical SQL server.

2. Set the pricing tier to the free tier for cost optimization.

See next task (I have done later)

Microsoft Azure

Home > Create a resource > Marketplace > SQL Database > Create SQL Database >

## Create SQL Database Server

Microsoft

**Server details**

Enter required settings for this server, including providing a name and location. This server will be created in the same subscription and resource group as your database.

Server name \*  .database.windows.net

Location \*

**Authentication**

Azure Active Directory (Azure AD) is now Microsoft Entra ID. [Learn more](#)

Select your preferred authentication methods for accessing this server. Create a server admin login and password to access your server with SQL authentication, select only Microsoft Entra authentication [Learn more](#) or using an existing Microsoft Entra user, group, or application as Microsoft Entra admin [Learn more](#), or select both SQL and Microsoft Entra authentication.

Authentication method  Use Microsoft Entra-only authentication  
 Use both SQL and Microsoft Entra authentication  
 Use SQL authentication

Set Microsoft Entra admin   
Admin Object/App ID: 4e615916-b648-4451-a57a-77a0d0cc3a6  
[Set admin](#)

**OK**

Microsoft Azure

Home > Create a resource > Marketplace > SQL Database > Create SQL Database

## Create SQL Database

Basis Networking Security Additional settings Tag Review + create

Create a SQL database with your preferred configurations. Complete the Basics tab then go to Review + Create to preview with smart defaults, or edit each tab to customize. [Learn more](#)

Want to try an Azure SQL Database for free? Create a free premium database with the free 10 GB Core grants, 32GB of data, and 32GB of backup storage free per month for the lifetime of the subscription! [Learn more](#)

**Apply offer (Preview)**

**Project details**

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription \*  Resource group \*  Create new

**Database details**

Enter required settings for this database, including picking a logical server and configuring the compute and storage amounts.

Database name \*  Server \*  Create new

Want to use SQL elastic pool?  Yes  No

Workload environment  Development  Production

Default settings provided for Development workloads. Configurations can be modified as-needed.

Compute + storage \*  General Purpose - Standard  General Purpose - Services  Standard series (Gen1), 1 vCore, 32 GB storage, zone redundant disabled Configure database

Backup storage redundancy  Locally redundant backup storage  Zone redundant backup storage

**Review + create** **Next: Networking**

Microsoft Azure

Home > Create a resource > Marketplace > SQL Database >

### Create SQL Database

Networking

Basics Networking Security Additional settings Tags Review + create

Configure network access and connectivity for your server. The configuration selected below will apply to the selected server 'test-serveryalibulyshyn' and all databases it manages. [Learn more](#)

Network connectivity

Choose an option for configuring connectivity to your server via public endpoint or private endpoint. Choosing no access creates with defaults and you can configure connection method after server creation. [Learn more](#)

Connectivity method:  No access  Public endpoint  Private endpoint

Connection policy

Configure how clients communicate with your SQL database server. [Learn more](#)

Connection policy:  Default - Uses Redirect policy for all client connections originating inside of Azure (except Private Endpoint connections) and Proxy for all client connections originating outside Azure  Proxy - All connections are proxied via the Azure SQL Database gateway  Redirect - Clients establish connections directly to the node hosting the database

Encrypted connections

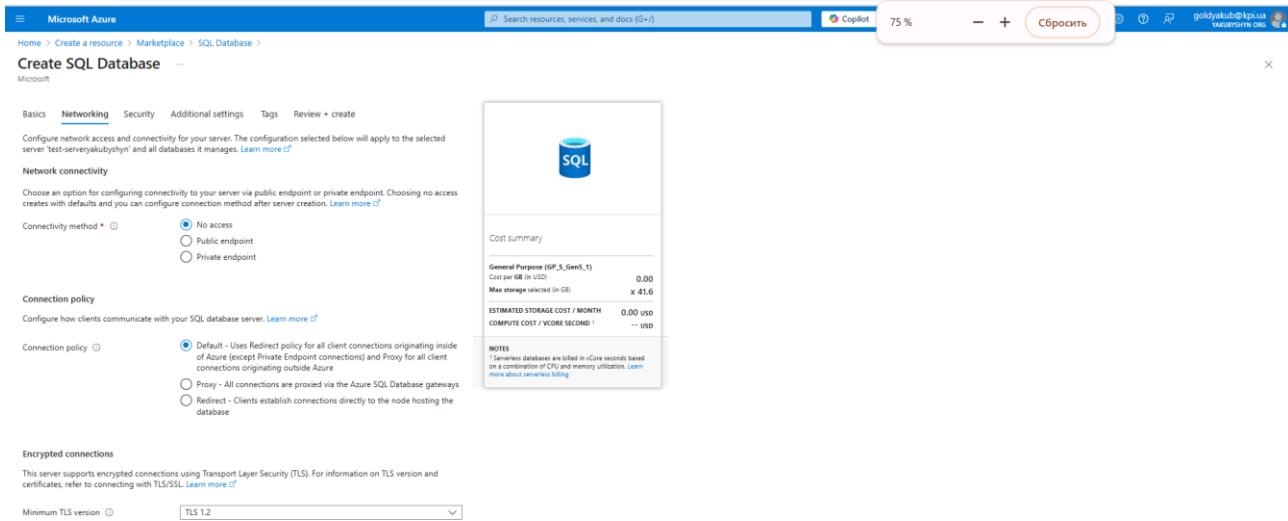
This server supports encrypted connections using Transport Layer Security (TLS). For information on TLS version and certificates, refer to connecting with TLS/SSL. [Learn more](#)

Minimum TLS version:  TLS 1.2

Cost summary

General Purpose (GP_S_Gen5_1)	Cost per GB (in USD)	0.00
Max storage selected (in GB)	x 41.6	
ESTIMATED STORAGE COST / MONTH	0.00 USD	-- USD
COMPUTE COST / VCore SECOND	-- USD	

NOTES  
1. Serverless databases are billed in-core seconds based on computation of CPU and memory utilization. [Learn more](#)  
2. More about serverless billing



## Review and create

3. Use the Query Editor in the Azure portal to create a table named "Products" with columns for ID, Name, and Price.

yalibulyshyn | Networking

Public network access

Public Endpoints allow access to this resource through the internet using a public IP address. An application or resource that is granted access with the following network rules still requires proper authorization to access this resource. [Learn more](#)

Public network access:  Selected networks  Disable

Connections from the IP addresses configured in the Firewall rules section below will have access to this database. By default, no public IP addresses are allowed. [Learn more](#)

Please save public network access value before adding new virtual networks.

Virtual networks

Allow virtual networks to connect to your resource using service endpoints. [Learn more](#)

+ Add a virtual network rule

Rule	Virtual network	Subnet	Address range	Endpoint status	Resource group	Subscription	State
------	-----------------	--------	---------------	-----------------	----------------	--------------	-------

Firewall rules

Allow certain public internet IP addresses to access your resource. [Learn more](#)

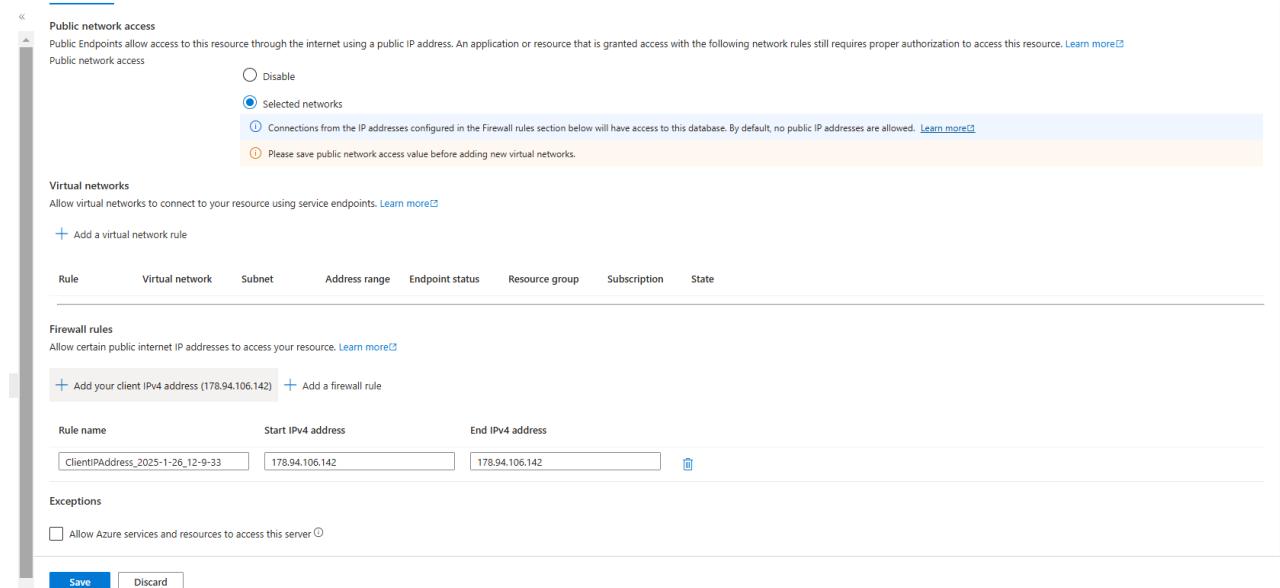
+ Add your client IPv4 address (178.94.106.142) + Add a firewall rule

Rule name	Start IPv4 address	End IPv4 address
ClientIPAddress_2025-1-26_12-9-33	178.94.106.142	178.94.106.142

Exceptions

Allow Azure services and resources to access this server

**Save** **Discard**



The screenshot shows the Microsoft Azure portal interface for a database named 'test-db'. The top navigation bar includes 'Microsoft Azure', a search bar, and a Copilot button. The main header reads 'test-db (test-serveryakubushyn/test-db) | Query editor (preview)'.

The left sidebar contains links for Overview, Activity log, Tags, Diagnose and solve problems, Query editor (preview), Mirror database in Fabric (preview), Settings, Data management, Integrations, Power Platform, Security, Intelligent performance, and Monitoring. The 'Query editor (preview)' link is currently selected.

The central area displays the 'Welcome to SQL Database Query Editor' screen. It offers two authentication methods: 'SQL server authentication' (Login: CloudSA5ba316f5, Password: [redacted], OK button) and 'Microsoft Entra authentication' (Logged in as godlyakub@kpi.ua, Continue as godlyakub@kpi.ua button).

The bottom section shows the 'Query 1' editor window. It contains a code snippet for creating a 'Products' table:

```
1 CREATE TABLE Products (
2     ID INT IDENTITY(1,1) PRIMARY KEY,
3     Name NVARCHAR(255) NOT NULL,
4     Price DECIMAL(10, 2) NOT NULL
5 );
```

Below the editor, the 'Messages' tab is selected, showing the message: 'Query succeeded: Affected rows: 0'.

4. Insert a few sample records into the "Products" table using a SQL query.

5. Query the table to display all records and verify the data.

## Query editor (preview) ⭐ ...

X

[Feedback](#) [Getting started](#)

### Query 1 ×

Run Cancel query Save query Export data as Show only Editor Open Copilot

```
1 Insert INTO Products(Name,price) VALUES('Bread',25.50),('Milk',30),('Coca-cola',40)
```

Results Messages

Query succeeded: Affected rows: 3

## Query editor (preview) ⭐ ...

X

[Feedback](#) [Getting started](#)

### Query 1 ×

Run Cancel query Save query Export data as Show only Editor Open Copilot

```
1 SELECT * FROM [dbo].[Products]
```

Results Messages

Search to filter items...

ID	Name	Price
1	Bread	25.50
2	Milk	30.00
3	Coca-cola	40.00

# Practical Task 9: Deploying an Azure SQL Database with Automated Backup Configuration

Set up an Azure SQL Database and configure automated backups.

1. Create an Azure SQL Database in a new or existing resource group.

2. Choose the desired service tier (e.g., Basic or General Purpose).

The screenshot shows the 'Create SQL Database Server' page in the Microsoft Azure portal. Under 'Server details', the 'Server name' is set to 'test-yakubshyn' and the 'Location' is '(Europe) Poland Central'. Under 'Authentication', 'Use Microsoft Entra-only authentication' is selected. A note indicates that Azure Active Directory (Azure AD) is now Microsoft Entra ID. A 'Set Microsoft Entra admin' section shows the email 'goldyakub\_kpl.ua#EXT#@yakubshyn.onmicrosoft.com' and an Admin Object/App ID: 4e615916-b648-4451-a57a-77a0d0cc3a6. An 'OK' button is at the bottom.

The screenshot shows the 'Configure' page for the Azure SQL Database. Under 'Service tier', 'Basic (For less demanding workloads)' is selected. A 'Cost summary' table provides the following information:

Basic (Basic)	Cost per DTU (in USD)	DTUs selected	ESTIMATED COST / MONTH
	0.98	x 5	4.90 USD

An 'Apply' button is at the bottom left.

 Free database offer applied! You got first 100,000 vCore seconds and 32GB of data & 32GB of backup storage free per month for lifetime of the subscription. [Learn more](#)

[Remove offer](#)

Applied free offer from previous task (forgot to do)

Microsoft Azure

Home | Services | Marketplace | SQL Database

Create SQL Database

Microsoft

Basics Networking Security Additional settings Tags Review + create

Create a SQL database with your preferred configurations. Complete the Basics tab then go to Review + Create to provision with current defaults, or visit each tab to customize. Learn more?

**Want to try Azure SQL Database for free? Create a free developer database with the first 100,000 v-core seconds, 10GB storage, and 1GB memory storage per month for the duration of the selected offer.**

[Apply offer \(Preview\)](#)

**SQL Database Hyperscale** Low price, high availability, and best feature set [Learn more?](#)

**Project details**

Edit the subscription to manage deployed resources and costs. Use resource groups to organize and manage all your resources.

Subscription \*  Resource group \*  [Create new](#)

**Database details**

Enter required settings for this database, including picking a logical server and configuring the compute and storage resources.

Database name \*  [Create new](#)

Server \*  [Create new](#)

Want to use SQL elastic pool?  No  Yes

Workload environment  Development  Production

**Default settings provided for Development workloads. Configurations can be modified on request.**

Compute + storage \*  Basic  Standard [Configure database](#)

**Backup storage redundancy**

Choose how your HTR and LTR backups are replicated. Geo restore or ability to recover from regional outage is only available when geo redundant storage is selected.

Backup storage redundancy  Locality redundant backup storage  None redundant backup storage

[Review + create](#) [Next: Networking](#)

Search resources, services, and data in this portal

Feedback

50 %

Сбросить



Home > Sample > Marketplace > SQL Database >

## Create SQL Database

Microsoft

Basics Networking Security Additional settings Tags Review + create

Configure network access and connectivity for your server. The configuration selected below will apply to the selected server 'test-yakubshyn' and all databases it manages. [Learn more](#)

### Network connectivity

Choose an option for configuring connectivity to your server via public endpoint or private endpoint. Choosing no access creates with defaults and you can configure connection method after server creation. [Learn more](#)

Connectivity method \* ⓘ

- No access
- Public endpoint
- Private endpoint

### Firewall rules

Setting 'Allow Azure services and resources to access this server' to Yes allows communications from all resources inside the Azure boundary, that may or may not be part of your subscription. [Learn more](#)

Setting 'Add current client IP address' to Yes will add an entry for your client IP address to the server firewall.

Allow Azure services and resources to access this server \*

- No
- Yes

Add current client IP address \*

- No
- Yes

**Cost summary**

**General Purpose (GP\_S\_Gen5\_2)**

Cost per GB (in USD)	0.00
<b>Max storage selected (in GB)</b>	x 41.6
First 32 GB storage free	
First 100,000 vCore seconds free	
<b>Overage billing</b>	Disabled
<b>ESTIMATED STORAGE COST / MONTH</b>	0.00 usd
<b>COMPUTE COST / VCORE SECOND</b>	-- USD

1 There will be no charges for usage within the free limits. The database will be paused automatically when the free limits are reached.  
2 Serverless databases are billed in vCore seconds based on a combination of CPU and memory utilization. [Learn more about serverless billing](#)

### Connection policy

Configure how clients communicate with your SQL database server. [Learn more](#)

Connection policy ⓘ

- Default - Uses Redirect policy for all client connections originating inside of Azure (except Private Endpoint connections) and Proxy for all client connections originating outside Azure
- Proxy - All connections are proxied via the Azure SQL Database gateways
- Redirect - Clients establish connections directly to the node hosting the database

### Encrypted connections

This server supports encrypted connections using Transport Layer Security (TLS). For information on TLS version and certificates, refer to connecting with TLS/SSL. [Learn more](#)

Minimum TLS version ⓘ

[Review + create](#) [< Previous](#) [Next : Security >](#)

### 3. Enable and configure long-term backup retention for the database

### 4. Use the Azure portal to verify backup settings and review available restore points.

Microsoft Azure

Home > Sample > test-yakubshyn

test-yakubshyn | Backups ⋮

SQL server

Available backups Retention policies

Azure SQL databases are backed up automatically. Backup availability is listed below for each database on this server. Manage your available long-term retention (LTR) backups or restore a database here. [Learn more](#)

Database	Earliest PTR restore point (UTC)	Available LTR backups	Last LTR backup time (UTC)	Action
yakubshyn	2023-01-26 1040 UTC	None	None	<a href="#">Restore</a>

Search Refresh Feedback

Overview Activity log Access control (IAM) Tags Quick start Diagnose and solve problems Settings Microsoft Entra ID SQL databases SQL elastic pools Properties Locks Data management Backups Delete databases Failover groups Import/Export history Security



## Configure policies

SQL server

### Point-in-time-restore

Specify how long you want to keep your point-in-time backups. [Learn more](#)

How many days would you like PITR backups to be kept? [?](#)

X

### Differential backup frequency

Specify how often you want differential backups to be taken. [Learn more](#)

Take a differential backup every:

12 Hours [▼](#)

i Long term retention is not supported for free database with auto-pause configured.

## 5. Test the restore process by creating a new database from a backup.

Microsoft Azure

Home > Sample > test-yakubshyn > yakubshyn (test-yakubshyn/yakubshyn) [Copy](#) [Restore](#) [Export](#) [Set server firewall](#) [Delete](#) [Connect with...](#) [Feedback](#)

Search

Copy Restore Export Set server firewall Delete Connect with... Feedback

Mirror databases in Microsoft Fabric. Early replicate your existing databases in Fabric, and help your team achieve streamlined ETL, and operational analytics goals. [Learn more](#)

Overview Activity log Tags Diagnose and solve problems Query editor (preview)

Essentials

Resource group ([more](#)) Sample

Status Online

Server name [test-yakubshyn.database.windows.net](#)

Connection strings [Show database connection strings](#)

Click restore

Microsoft Azure

Home > Sample > test-yakubshyn > yakubshyn (test-yakubshyn/yakubshyn) >

## Create SQL Database - Restore database

... Microsoft

Basics Tags Review + create

**Product details**

SQL database by Microsoft **Estimated cost** Storage cost 0.00 USD / month + Compute cost -- USD / vCore second  
[Terms of use](#) | [Privacy policy](#)

**Terms**  
By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. For additional details see [Azure Marketplace Terms](#).

**Basics**

Subscription	Azure for Students
Resource group	Sample
Source Database	yakubshyn
Source	Point-in-time
Restore point (UTC)	2025-01-26 10:52:00 UTC
Region	polandcentral
Database name	yakubshyn_2025-01-26T10-52Z
Server	test-yakubshyn
Compute + storage	General Purpose - Serverless: Standard-series (Gen5), 2 vCores, 32 GB storage, zone redundant disabled
Database level customer-managed key	Not configured
Database level user assigned managed identity	Not configured
Backup storage redundancy	Locally-redundant backup storage

**Tags**

Validating... < Previous Download a template for automation

Name	Type	Location	...
test-yakubshyn	SQL server	Poland Central	...
yakubshyn (test-yakubshyn/yakubshyn)	SQL database	Poland Central	...
yakubshyn_2025-01-26T10-52Z (test-yakubshyn/yakubshyn_2025-01-26T10-52Z)	SQL database	Poland Central	...

The db was restored

The screenshot shows the Microsoft Azure Query editor interface. On the left, there's a sidebar with various navigation links: Overview, Activity log, Tags, Diagnose and solve problems, Query editor (preview), Mirror database in Fabric (preview), Settings, Data management, Integrations, Power Platform, Security, Intelligent performance, Monitoring, Automation, and Help. The 'Query editor (preview)' link is currently selected. The main area has tabs for 'Query 1x' and 'Run'. Below the tabs, there's a message: 'Showing limited object explorer here. For full capability please click here to open Azure Data Studio.' A 'Run' button is present. The query editor contains the following SQL code:

```
1  SELECT * FROM [dbo].[Products]
```

Below the code, there are buttons for 'Cancel query', 'Save query', 'Export data as', and 'Open Caplet'. The results tab is selected, showing a table with three rows of data:

ID	Name	Price
1	Bread	25.50
2	Milk	30.00
3	Coca-cola	40.00

data is also present

# Practical Task 10: Getting Started with Cosmos DB

Set up and explore Cosmos DB by creating a database, managing data, querying, and testing key features like consistency and global distribution.

Set up and explore Cosmos DB by creating a database, managing data, querying, and testing key features like consistency and global distribution.

## 1. Create a Cosmos DB Account:

The screenshot shows the Azure Marketplace interface for creating a new service. In the top navigation bar, the user is at 'Home > Sample > Marketplace > Azure Cosmos DB'. The main content area is titled 'Create an Azure Cosmos DB account'. It displays two options: 'Azure Cosmos DB for NoSQL' and 'Azure Cosmos DB for MongoDB'. Both options have a 'Create' button and a 'Learn more' link. Below these, there are links for 'Give Feedback' and 'Help improve this page'.

The second part of the screenshot shows the 'Create Azure Cosmos DB Account - Azure Cosmos DB for NoSQL' configuration page. The top navigation bar is identical. The main content area has tabs for 'Basics', 'Global distribution', 'Networking', 'Backup Policy', 'Encryption', 'Tags', and 'Review + create'. The 'Basics' tab is selected. It contains fields for 'Subscription' (set to 'Azure for Students'), 'Resource Group' (set to 'Sample'), 'Instance Name' (set to 'jakubuzyn'), and 'Location' (set to 'US East US 2 EUAP'). Under 'Capacity mode', the 'Provisioned throughput' option is selected. At the bottom, there are buttons for 'Review + create', 'Previous', 'Next: Global distribution', and 'Feedback'.

Microsoft Azure

Create Azure Cosmos DB Account - Azure Cosmos DB for NoSQL

Basics Global distribution Networking Backup Policy Encryption Tags Review + create

Configure global distribution and regional settings for your account. You can also change these settings after the account is created.

Geo-Redundancy  Enable  Disable

Multi-region Writes  Enable  Disable

Microsoft Azure

Create Azure Cosmos DB Account - Azure Cosmos DB for NoSQL

Basics Global distribution Networking Backup Policy Encryption Tags Review + create

Network connectivity

You can connect to your Azure Cosmos DB account either publicly, via public IP addresses or service endpoints, or privately, using a private endpoint.

Connectivity method \*  All networks  Public endpoint (selected networks)  Private endpoint

All networks will be able to access this CosmosDB account. <https://aka.ms/network-security>

Connection Security Settings

Minimum Transport Layer Security  TLS 1.2

Protocol

Microsoft Azure

Create Azure Cosmos DB Account - Azure Cosmos DB for NoSQL

Basics Global distribution Networking Backup Policy Encryption Tags Review + create

Azure Cosmos DB provides three different backup policies. You will not be able to switch to Periodic mode once you adopt Continuous mode. [Learn more about the differences of the backup policies and pricing details.](#)

Backup policy  Periodic  
Backup is taken at periodic interval based on your configuration.

Continuous (7 days)  
Provides backup window of 7 days / 168 hours and you can restore to any point of time within the window. This mode is available for free.

Continuous (30 days)  
Provides backup window of 30 days / 220 hours and you can restore to any point of time within the window. This mode has cost impact.

Backup interval  240  Minute(s)  80-1440

Backup retention  8  Hour(s)  8-720

Copies of data retained  2

Availability Zones  Enable  Disable

Location \*  Central US EUAP  
Available locations are determined by your subscription's access and availability zone support. If that is enabled, if you don't see or cannot select your desired location, please open a support request for region access. [Click here for more details on how to create a region access request.](#)

Standard provisioned  Capacity

Changed to this. (Was error)

Had an error.

Decided to switch to

<https://portal.azure.com/>AnatoliYakubyshyn@dmytroslovtvinskyy@gmail.onmicrosoft.com

Microsoft Azure

Home > AnatoliYakubsyn > Marketplace > Azure Cosmos DB >

## Create Azure Cosmos DB Account - Azure Cosmos DB for NoSQL

Basics Global distribution Networking Backup Policy Encryption Tags Review + create

Azure Cosmos DB is a fully managed NoSQL and relational database service for building scalable, high performance applications. Go to production starting at \$24/month per database, multiple containers included. [Learn more](#)

**Project Details**

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription: Azure Subscription 1

Resource Group: AnatoliYakubsyn

**Instance Details**

Account Name: yakubsyn

Configure availability zone settings for your account. You cannot change these settings once the account is created.

Availability Zones:  Enable  Disable

Location: (US) West US 3

Available locations are determined by your subscription's access and availability zone support (if that is enabled). If you don't see or cannot select your desired location, please open a support request for region access. [Click here for more details on how to create a region access request.](#)

Capacity mode:  Provisioned throughput  Serverless

[Learn more about capacity mode](#)

With Azure Cosmos DB free tier, you will get the first 1000 RU/s and 25 GB of storage for free in an account. You can enable free tier on up to one account per subscription. Estimated \$64/month discount per account.

The subscription you have selected already has an account with free tier enabled.

Apply Free Tier Discount:  Apply  Do Not Apply

Limit total account throughput:  Limit the total amount of throughput that can be provisioned on this account. This limit will prevent unexpected charges related to provisioned throughput. You can update or remove this limit after your account is created.

Microsoft Azure

Home > AnatoliYakubsyn > Marketplace > Azure Cosmos DB >

## Create Azure Cosmos DB Account - Azure Cosmos DB for NoSQL

Basics Global distribution Networking Backup Policy Encryption Tags Review + create

Configure global distribution and regional settings for your account. You can also change these settings after the account is created.

Geo-Redundancy:  Enable  Disable

Multi-region Writes:  Enable  Disable

Microsoft Azure

Home > AnatoliYakubsyn > Marketplace > Azure Cosmos DB >

## Create Azure Cosmos DB Account - Azure Cosmos DB for NoSQL

Validation Success

Basics Global distribution Networking Backup Policy Encryption Tags Review + create

**Creation Time**

Estimated Account Creation Time (in minutes): 3

The estimated creation time is calculated based on the location you have selected.

**Basics**

Subscription	Azure Subscription 1
Resource Group	AnatoliYakubsyn
Location	West US 3
Account Name	(new) yakubsyn
API	Azure Cosmos DB for NoSQL
Capacity mode	Provisioned throughput
Geo-Redundancy	Disable
Multi-region Writes	Disable
Availability Zones	Disable

**Backup Policy**

Backup policy	Periodic
Backup storage redundancy	Geo-redundant backup storage

**Encryption**

Data Encryption	Service Managed
-----------------	-----------------

**Networking**

Connectivity method	All networks
Minimum TLS Protocol	TLS 1.2

[Create](#) [Previous](#) [Next](#) Download a template for automation [Feedback](#)

## 2. Set Up a Database and Container: o Create a database named "SampleDB" in the Cosmos DB account

New Container

\* Database id ⓘ  
 Create new  Use existing  
Type a new database id  
 Share throughput across containers ⓘ

\* Container id ⓘ  
e.g., Container1

\* Partition key ⓘ  
Required - first partition key e.g., /Tenantid

\* Container throughput (autoscale) ⓘ  
 Autoscale  Manual  
Estimate your required RU/s with [capacity calculator](#).  
Container Max RU/s ⓘ  
4000\*

Your container throughput will automatically scale from **400 RU/s (10% of max RU/s)** - **4000 RU/s** based on usage.  
Estimated monthly cost (USD) ⓘ: \$35.04 - \$350.40 (1 region, 400 - 4000 RU/s, \$0.00012/RU)

Unique keys ⓘ

Analytical store ⓘ  
 On  Off  
Azure Synapse Link is required for creating an analytical store container. Enable Synapse Link for this Cosmos DB account. [Learn more](#)

> Advanced

New Container

Database id ⓘ  
 Create new  Use existing

SampleDB

Share throughput across containers ⓘ

---

Container id ⓘ  
Items

Partition key ⓘ  
/category

Container throughput (400 - unlimited RU/s) ⓘ  
 Autoscale  Manual  
Estimate your required RU/s with [capacity calculator](#).

Container Required RU/s ⓘ  
400 \*

Estimated cost (USD) ⓘ: \$0.032 hourly / \$0.77 daily / \$23.36 monthly (1 region, 400RU/s, \$0.00008/RU)

Unique keys ⓘ

Analytical store ⓘ  
 On  Off  
Azure Synapse Link is required for creating an analytical store container. Enable Synapse Link for this Cosmos DB account. [Learn more](#)

Enable

Advanced  
My application uses an older Cosmos .NET or Java SDK version (.NET V1 or Java V2)  
To ensure compatibility with older SDKs, the created container will use a legacy partitioning scheme that supports partition key values of size only up to 101 bytes. If this is enabled, you will not be able to use hierarchical partition keys. [Learn more](#)

### 3. Insert Data Using Data Explorer:

The screenshot shows the Microsoft Azure portal with the URL <https://portal.azure.com/#@dmytrosiotvinskyy@gmail.onmicrosoft.com/resource/subscriptions/yabae428-d8c5-44fe-bd12-4e0b593901a0/resourcegroups/AnatoliYakubshyn/providers/Microsoft...>. The user is in the 'yakubshyn' Azure Cosmos DB account. On the left sidebar, 'Data Explorer' is selected. In the main area, a search bar contains 'Items.Items'. Below it, a query editor shows 'SELECT \* FROM c'. A dropdown menu under 'SampleDB' is open, showing 'Items' as the selected option. A 'New Item' button is visible at the top.

The screenshot shows the same Microsoft Azure portal setup as the previous one. The user has inserted the following JSON data into the 'Items.Items' table:

```
1 {  
2   "id": "1",  
3   "name": "Smartphone",  
4   "category": "Electronics",  
5   "price": 699  
6 }  
7  
8
```

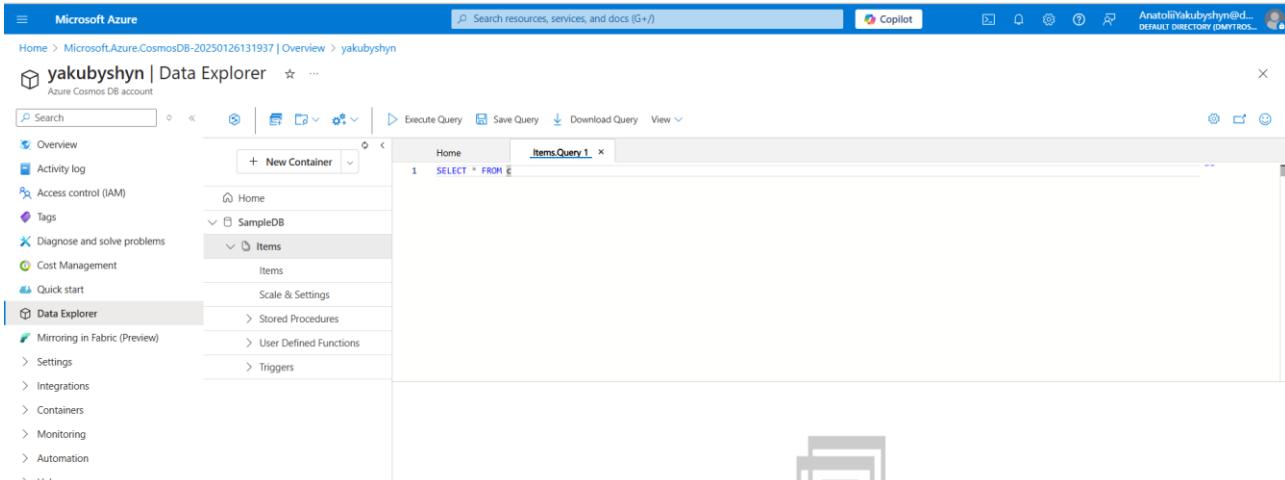
Click save

Verify that the documents are successfully added and visible in the Data Explorer

The screenshot shows the Microsoft Azure portal with the same setup. The user has selected the 'Items' container in the 'SampleDB' dropdown. The JSON document from the previous step is now listed in the results table, with the '\_rid' field showing its unique identifier.

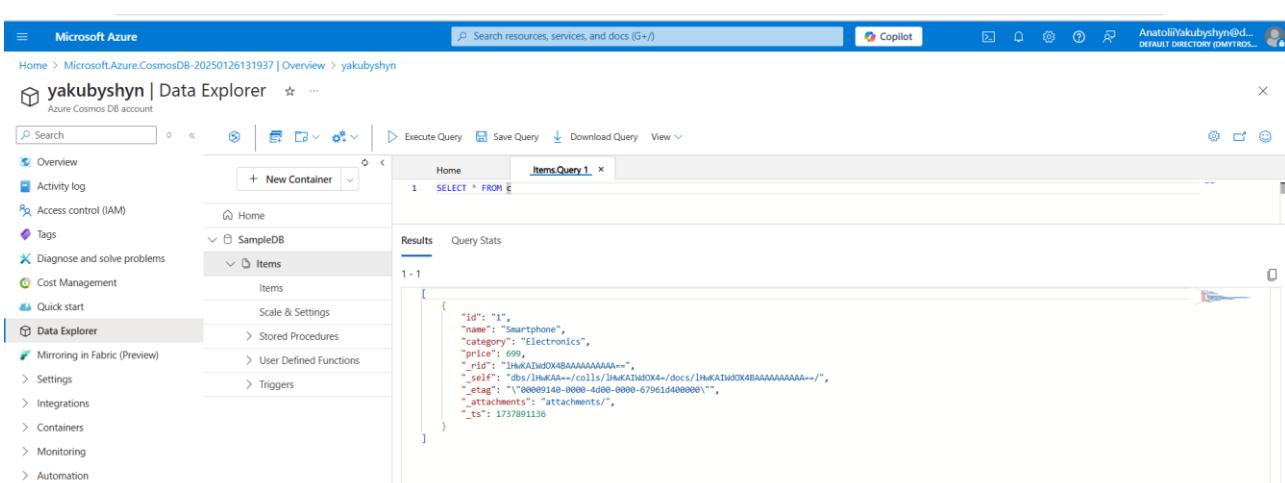
```
1 {  
2   "id": "1",  
3   "name": "Smartphone",  
4   "category": "Electronics",  
5   "price": 699  
6 }  
7  
8  
9  
10  
11 }
```

#### 4. Query Data in Cosmos DB:

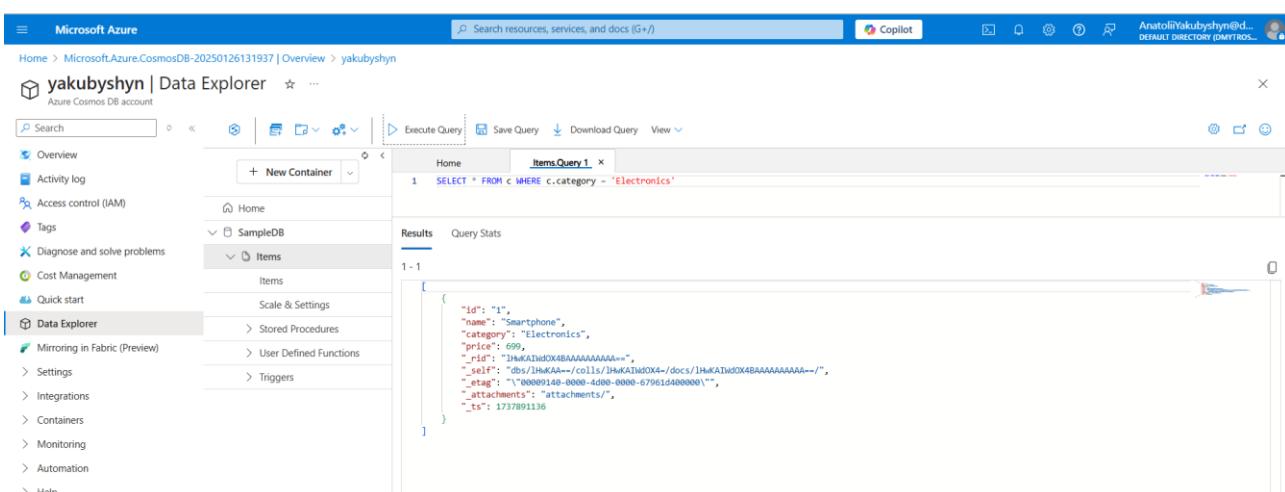


The screenshot shows the Microsoft Azure Data Explorer interface. On the left, the sidebar navigation includes Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Cost Management, Quick start, Data Explorer (which is selected), Mirroring in Fabric (Preview), Settings, Integrations, Containers, Monitoring, Automation, and Help. Under the Data Explorer section, the SampleDB is selected, and the Items node is expanded. In the main pane, a query editor window titled "Items.Query.1" contains the SQL query: "SELECT \* FROM c". The results pane displays a single document with the following JSON structure:

```
{  
    "id": "1",  
    "name": "Smartphone",  
    "category": "Electronics",  
    "price": 699,  
    "_rid": "1HwKAId0X4BAAAAAAA==",  
    "_self": "db:/1HwKAId0X4BAAAAAAA=/colls/1HwKAId0X4-/docs/1HwKAId0X4BAAAAAAA==/",  
    "_etag": "\\"00009140-0000-4d80-0000-67961d400000\\\"",  
    "_attachments": "attachments/",  
    "_ts": 1737891136  
}
```



The screenshot shows the Microsoft Azure Data Explorer interface. The sidebar navigation is identical to the previous screenshot. The main pane now displays the results of the query "SELECT \* FROM c WHERE c.category = 'Electronics'". The results pane shows a single document with the same JSON structure as the first screenshot, indicating that the query has successfully filtered the data.



A yellow box highlights the text "I forgot to insert 3 so I am repeating again:" at the bottom of the page.

Execute Query Save Query Download Query View

Home Items.Query 1 Items.Items Items.Query 2

```
1 SELECT * FROM c
```

Results Query Stats

1 - 3

```
[{"id": "1", "name": "Smartphone", "category": "Electronics", "price": 699, "_rid": "1HwKAIWdOX4BAAAAAAA==", "_self": " dbs/1HwKAA=/colls/1HwKAIWdOX4=/docs/1HwKAIWdOX4BAAAAAAA==/", "_etag": "\\"00009140-0000-4d00-0000-67961d400000\\\"", "_attachments": "attachments/", "_ts": 1737891136}, {"id": "2", "name": "Harry Potter", "category": "Books", "price": 699, "_rid": "1HwKAIWdOX4CAAAAAAAA==", "_self": " dbs/1HwKAA=/colls/1HwKAIWdOX4=/docs/1HwKAIWdOX4CAAAAAAAA==/", "_etag": "\\"00009740-0000-4d00-0000-67961e8f0000\\\"", "_attachments": "attachments/", "_ts": 1737891471}, {"id": "3", "name": "Chocolate bar", "category": "Food", "price": 100, "_rid": "1HwKAIWdOX4DAAAAAAA==", "
```

Execute Query Save Query Download Query View

Home Items.Query 1 Items.Items Items.Query 2

```
1 SELECT * FROM c WHERE c.category =
2 'Electronics'
3 
```

Results Query Stats

1 - 1

```
[{"id": "1", "name": "Smartphone", "category": "Electronics", "price": 699, "_rid": "1HwKAIWdOX4BAAAAAAA==", "_self": " dbs/1HwKAA=/colls/1HwKAIWdOX4=/docs/1HwKAIWdOX4BAAAAAAA==/", "_etag": "\\"00009140-0000-4d00-0000-67961d400000\\\"", "_attachments": "attachments/", "_ts": 1737891136}]
```

## 5. Configure and Test Consistency Levels:

Review the available consistency levels in the Cosmos DB account: Eventual, Session, Consistent Prefix, Bounded Staleness, Strong.

The screenshot shows the Azure Cosmos DB account settings for the 'yakubshyn' account. The 'Default consistency' section is selected. It displays five consistency level options: STRONG, BOUNDED STALENESS, SESSION (which is highlighted in blue), CONSISTENT PREFIX, and EVENTUAL. Below these options, a note states: 'Session consistency is most widely used consistency level both for single region as well as globally distributed applications.' A small diagram illustrates session consistency across multiple regions.

Set the account-level consistency to "Session."

So, it was originally session

Perform a query or data operation and observe the impact on performance and latency.

I will check strong and session

Strong:

The screenshot shows the Azure Cosmos DB Query Editor. A query is being run against the 'Items' container. The results table displays various performance metrics for the query execution.

Metric	Value
Output document size	859 bytes
Index hit document count	3
Index lookup time	0 ms
Document load time	0.02 ms
Query engine execution time	0.01 ms
System function execution time	0 ms
User defined function execution time	0 ms
Document write time	0.01 ms
Round Trips	1

At the bottom, there is a link to 'Per-partition query metrics (CSV)'.

## Session:

Results	Query Stats
Retrieved document count	3
Retrieved document size	483 bytes
Output document count	3
Output document size	859 bytes
Index hit document count	3
Index lookup time	0 ms
Document load time	0.02 ms
Query engine execution time	0 ms
System function execution time	0 ms
User defined function execution time	0 ms
Document write time	0.01 ms
Round Trips	1

Query engine time is less for Session

## 6. Enable Global Distribution and Test Replication:

### 1. Enable multi-region replication by adding at least one additional region to the Cosmos DB account.

The screenshot shows the 'Replicate data globally' blade in the Azure portal. At the top, there's a warning about adding a region: "When you add a region to your account, you will be billed for the additional RUs and storage copied to the region. Click here to learn more." Below this, another warning states: "Add or Remove Region operations execute asynchronously. They perform consistency checks and data transfer which can result in long execution times (possibly many hours depending on the amount of data). During this duration other operations which need to update the account will not be allowed. You can view the status of this operation using PowerShell or Azure CLI. Learn More - PowerShell | Learn More - Azure CLI". A note below says: "Click on a location to add or remove regions from your Azure Cosmos DB account. Each region is billable based on the throughput and storage for the account. Learn more". The main area features a world map with various regions marked. Below the map is a table titled "Configure regions" with "Multi-region writes" set to "Enable". The table lists regions and their configuration status:

Regions	Reads Enabled	Writes Enabled	Availability zone	Action
West US 3	✓	✓		
East US 2	✓	✓	□	

### 2. Insert new data into the primary region and verify that it replicates to the secondary region.

The screenshot shows the "Data Explorer" blade in the Azure portal. On the left, there's a sidebar with options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Cost Management, Quick start, and Data Explorer. The Data Explorer section is selected. In the main area, there's a table titled "Items" with columns: Id, category, and value. The table contains four rows of data:

Id	category	value
1	Electronics	{ "id": "1", "category": "Electronics", "price": 700, "url": "https://microsoftcosmosdb1.documents.azure.com:443/dbs/19a4d400-e44e-4590-8000-679c25280000/colls/19a4d400-e44e-4590-8000-679c25280000/docs/1717993298?partitionKey=1&st=2024-06-24T12%3A00Z&se=2024-06-24T12%3A30Z&t=1&api-version=2024-01-01" }
2	Books	{ "id": "2", "category": "Books", "price": 100, "url": "https://microsoftcosmosdb1.documents.azure.com:443/dbs/19a4d400-e44e-4590-8000-679c25280000/colls/19a4d400-e44e-4590-8000-679c25280000/docs/1717993299?partitionKey=2&st=2024-06-24T12%3A00Z&se=2024-06-24T12%3A30Z&t=1&api-version=2024-01-01" }
3	food	{ "id": "3", "category": "food", "price": 50, "url": "https://microsoftcosmosdb1.documents.azure.com:443/dbs/19a4d400-e44e-4590-8000-679c25280000/colls/19a4d400-e44e-4590-8000-679c25280000/docs/1717993300?partitionKey=3&st=2024-06-24T12%3A00Z&se=2024-06-24T12%3A30Z&t=1&api-version=2024-01-01" }
4	Electronics	{ "id": "4", "category": "Electronics", "price": 700, "url": "https://microsoftcosmosdb1.documents.azure.com:443/dbs/19a4d400-e44e-4590-8000-679c25280000/colls/19a4d400-e44e-4590-8000-679c25280000/docs/1717993301?partitionKey=4&st=2024-06-24T12%3A00Z&se=2024-06-24T12%3A30Z&t=1&api-version=2024-01-01" }

Microsoft Azure

Home > yakubshyn | Replicate data globally

Add or Remove Region operations execute asynchronously. They perform consistency checks and data transfer which can result in long execution times (possibly many hours depending on the amount of data). During this duration other operations which need to update the account will not be allowed. You can view the status of this operation using PowerShell or Azure CLI. [Learn More - PowerShell](#) [Learn More - Azure CLI](#)

Click on a location to add or remove regions from your Azure Cosmos DB account. Each region is billable based on the throughput and storage for the account. [Learn more](#)

Configure regions  
Multi-region writes:  Disable  Enable

Regions	Reads Enabled	Writes Enabled	Availability zone	Action
East US 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		

Removed first region

Microsoft Azure

Home > yakubshyn | Data Explorer

New Container  Update

Items
Home
SampleDB
Items
1 Books
2 food
3 Electronics
4 Electronics

```

1  {
2   "id": "4",
3   "name": "PC",
4   "category": "Electronics",
5   "price": 1000,
6   "rid": "1neKADM0kAEAAAAAAA=+",
7   "self": "https://1nekadm0kae-cosmos1nekadm0kae.documents.azure.com:40408-0000-0000-079e23b200001",
8   "attachments": "attachments/",
9   "etag": "00000000-0000-0000-0000-1717893298"
10  }
11

```

It was replicated

3. Perform a manual failover and verify that the secondary region becomes the primary.

4. Test data consistency and latency after failover

Replicate data globally

Add or Remove Region operations execute asynchronously. They perform consistency checks and data transfer which can result in long execution times (possibly many hours depending on the amount of data). During this duration other operations which need to update the account will not be allowed. You can view the status of this operation using PowerShell or Azure CLI. [Learn More - PowerShell](#) [Learn More - Azure CLI](#)

Click on a location to add or remove regions from your Azure Cosmos DB account. Each region is billable based on the throughput and storage for the account. [Learn more](#)

Configure regions  
Multi-region writes:  Disable  Enable

Configure the regions for reads, writes and availability zone (supported in selected regions and can only be configured when a new region is added).

Write region	Availability zone
East US 2	<input type="checkbox"/>

Read regions

Availability zone	Action
The account has no read regions.	

Disabled multi-region write

## To do manual failover

The screenshot shows two consecutive steps in the Microsoft Azure portal for performing a manual failover:

**Step 1: Selecting a new Write region.** The "Write region" dropdown is set to "East US 2". The "Read regions" dropdown is set to "West Central US". A tip at the bottom says: "Select a new Write region. The existing Write region will become a Read region. Tip: Identify all dependent services leveraging this account and ensure that triggering a failover will not jeopardize your production application."

**Step 2: Triggering the failover.** The "Read regions" dropdown is now set to "East US 2". A checkbox labeled "I understand and agree to trigger a failover on my current Write Region." is checked. An "OK" button is visible at the bottom left.

## Test data consistency and latency after failover

The screenshot shows the "Query Stats" tab of a document's properties page. The table displays various performance metrics:

Metric	Value
Retrieved document size	639 bytes
Output document count	4
Output document size	1124 bytes
Index hit document count	4
Index lookup time	0 ms
Document load time	0.030000000000000002 ms
Query engine execution time	0.01 ms
System function execution time	0 ms
User defined function execution time	0 ms
Document write time	0.01 ms
Round Trips	1

At the bottom, there is a link: "↓ Per-partition query metrics (CSV)".