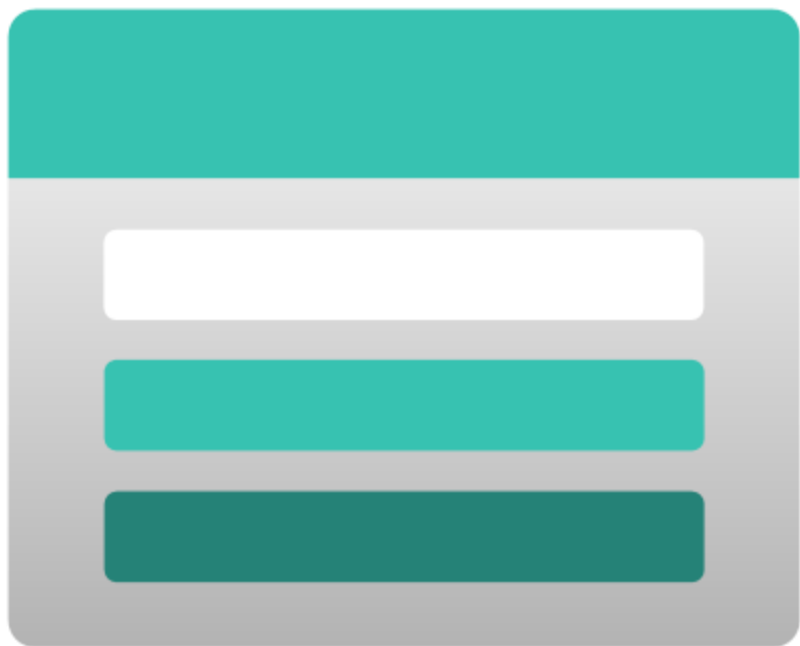


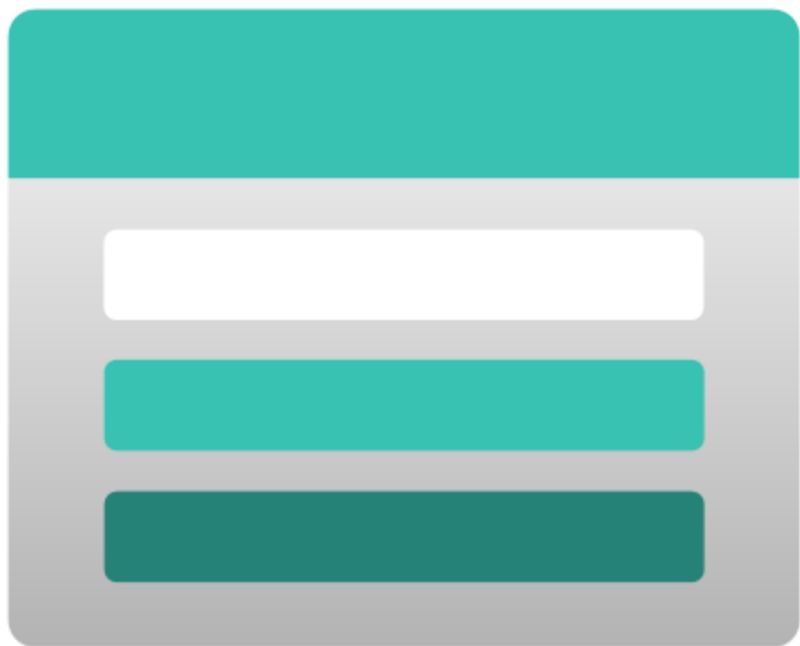
Розподілені системи та хмарні технології

Сервіси зберігання даних в Azure

Azure Storage



Azure Account Storage



Azure Account Storage



Azure Blob storage



Azure Files



Azure Queue Storage

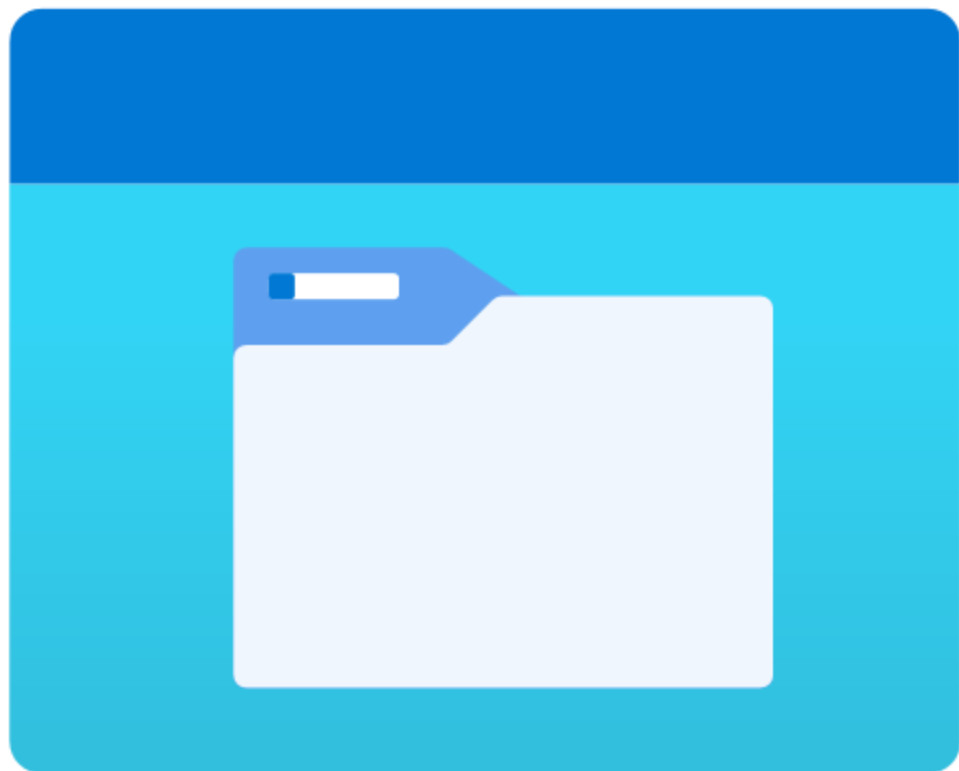


Azure Table Storage

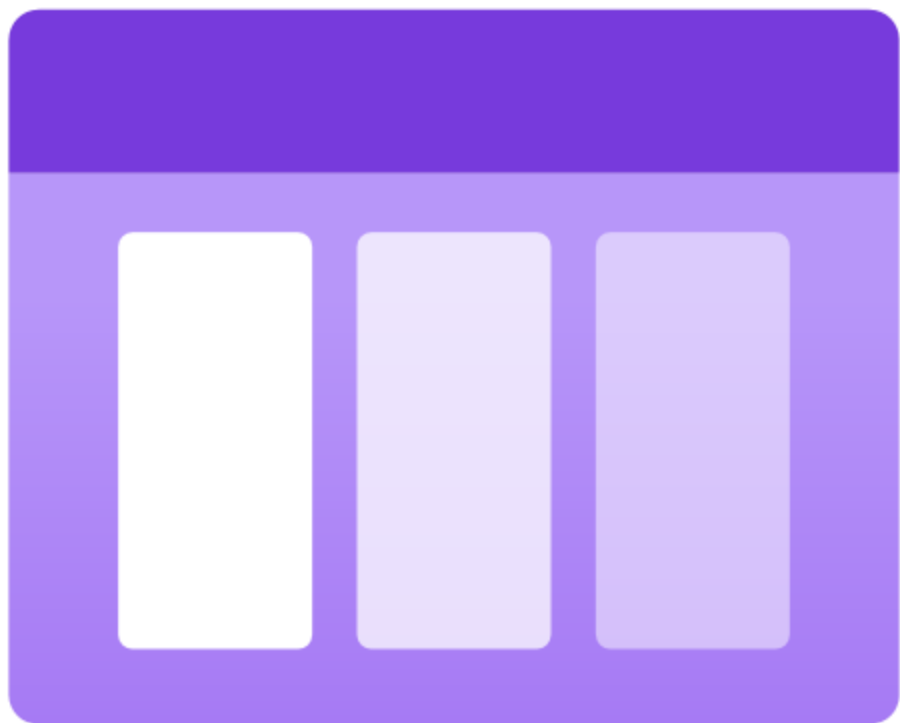
Azure Blob Storage



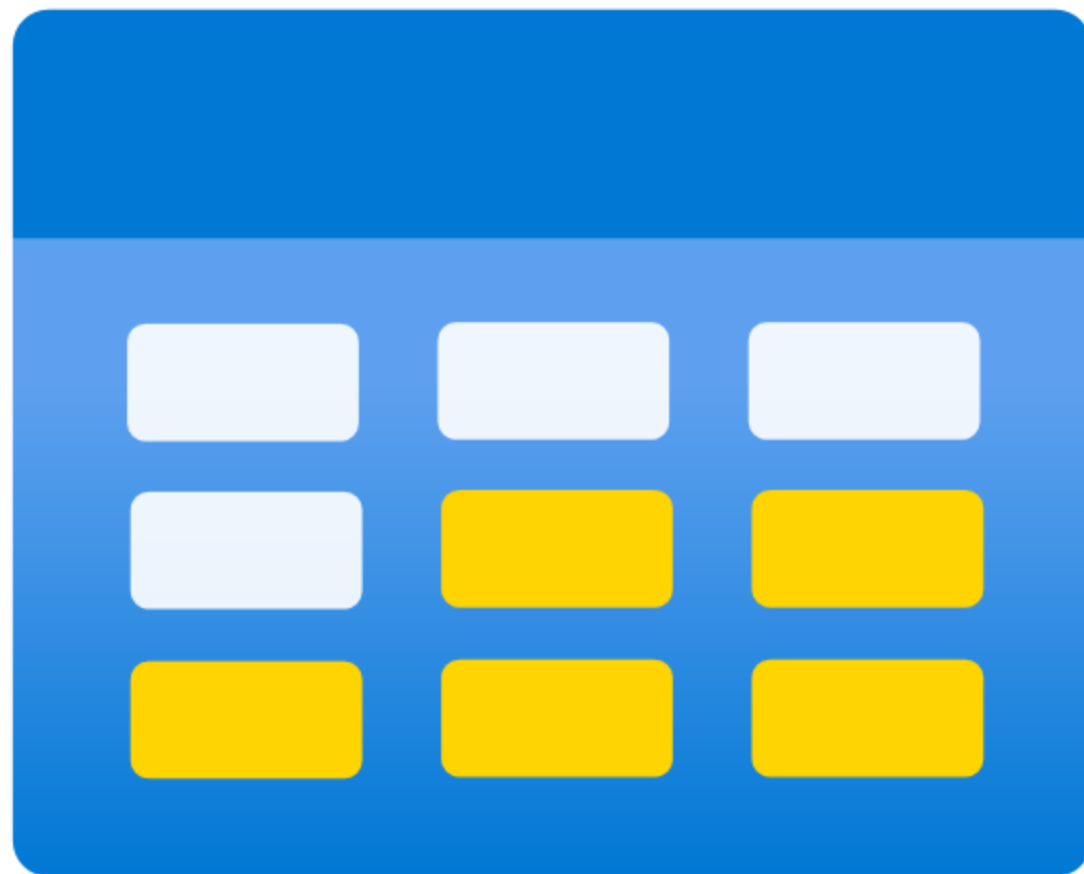
Azure Files

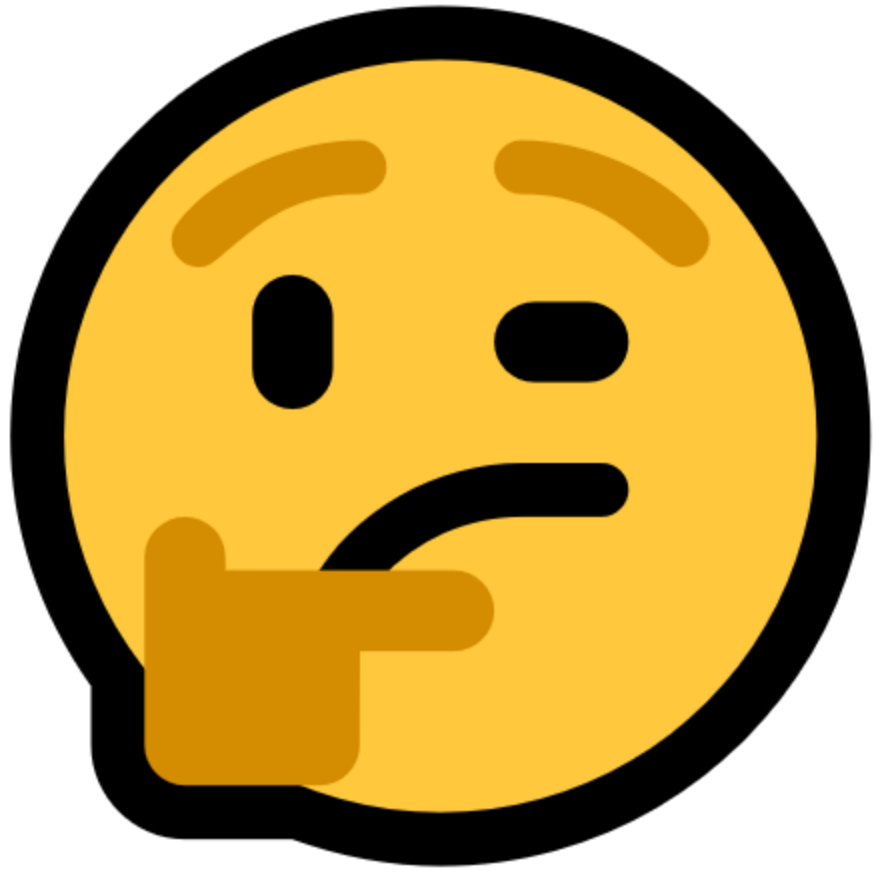


Azure Queue Storage



Azure Table storage







mystorageaccount

Service	Default endpoint
Container service	mystorageaccount.blob.core.windows.net
Table service	mystorageaccount.table.core.windows.net
Queue service	mystorageaccount.queue.core.windows.net
File service	mystorageaccount.file.core.windows.net

Latest version

Download and install the latest release of the Azure CLI. When the installer asks if it can make changes to your computer, select the "Yes" box.

Latest MSI of the Azure CLI (32-bit)

Latest MSI of the Azure CLI (64-bit)

If you have previously installed the Azure CLI, running either the 32-bit or 64-bit MSI will overwrite an existing installation.

Specific version

If you prefer, you can download a specific version of the Azure CLI by using a URL.

To download the MSI installer for a specific version, change the version segment in URL

<https://azcliprod.blob.core.windows.net/msi/azure-cli-<version>.msi> (32-bit) or

<https://azcliprod.blob.core.windows.net/msi/azure-cli-<version>-x64.ms1> (64-bit).

For example, to install the 32-bit MSI of Azure CLI version 2.51.0, your URL would be

<https://azcliprod.blob.core.windows.net/msi/azure-cli-2.51.0.ms1>. The corresponding 64-bit install would be <https://azcliprod.blob.core.windows.net/msi/azure-cli-2.51.0-x64.ms1>.

Available Azure CLI versions can be found at [Azure CLI release notes](#). The 64-bit MSI is available from version 2.51.0.

```
curl https://azcliprod.blob.core.windows.net/msi/azure-cli-2.64.0-x64.msi -O -v
```

HTTP/1.1 200 OK

Content-Length: 72142848

Content-Type: application/octet-stream

Content-MD5: 8kgmWXTNFTprygnr++u0LA==

Last-Modified: Wed, 28 Aug 2024 07:37:59 GMT

ETag: 0x8DCC7345704E3E7

Server: Windows-Azure-Blob/1.0 Microsoft-HTTPAPI/2.0

x-ms-request-id: 441b99f5-001e-0044-6175-13d666000000

x-ms-version: 2009-09-19

x-ms-lease-status: unlocked

x-ms-blob-type: BlockBlob

< Date: Mon, 30 Sep 2024 20:11:59

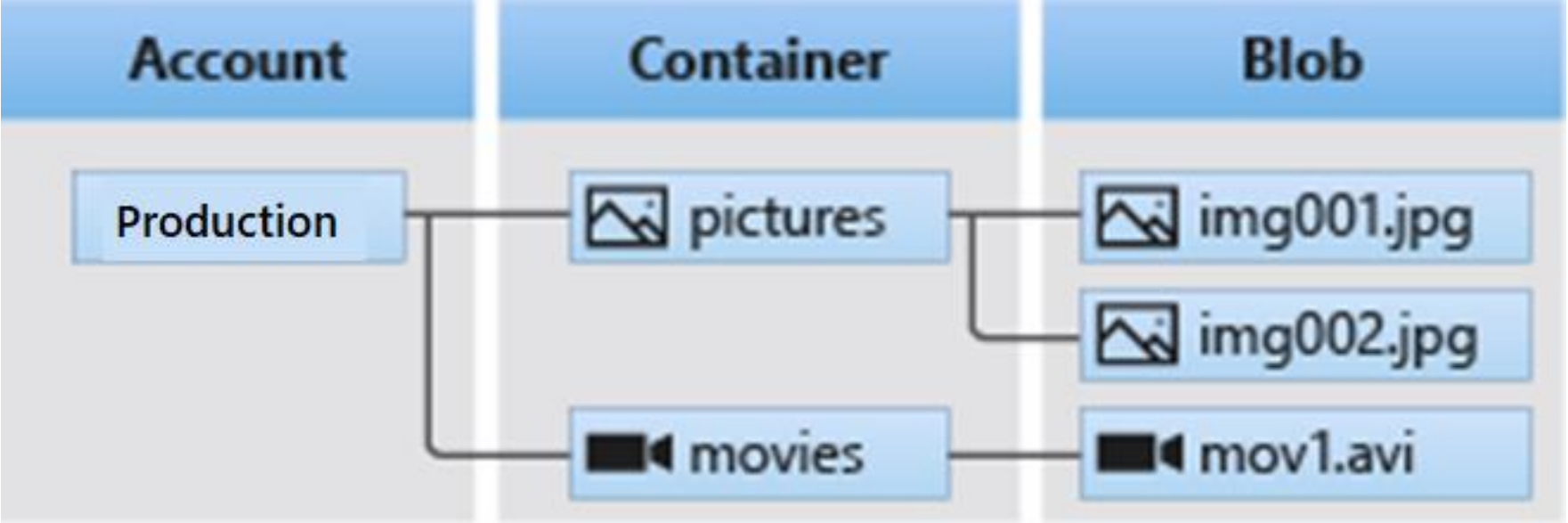
azcliprod – назва Storage Account

blob – піддомен для ідентифікації сервісу, що використовується

msi – назва blob-контейнеру

azure-cli-2.64.0-x64.msi – назва blob-об'єкту

Azure Blob Storage



Azure Blob Storage

The screenshot displays the Azure portal interface for a Storage account named 'mvv01'. The left sidebar contains navigation options such as Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser, Storage Mover, and Data storage (Containers, File shares, Queues, Tables). The main content area shows the account's Essentials, Properties, Capabilities, and Security settings.

mvv01
Storage account

Search

Upload Open in Explorer Delete Move Refresh Open in mobile CLI / PS Feedback

JSON V

^ Essentials

Resource group (move)	:	[blurred]	Performance	:	Standard
Location	:	polandcentral	Replication	:	Locally-redundant storage (LRS)
Subscription (move)	:	[blurred]	Account kind	:	StorageV2 (general purpose v2)
Subscription ID	:	[blurred]	Provisioning state	:	Succeeded
Disk state	:	Available	Created	:	[blurred]
Tags (edit)	:	purpose : easteregg			

Properties Monitoring Capabilities (6) Recommendations (0) Tutorials Tools + SDKs

Blob service		Security	
Hierarchical namespace	Disabled	Require secure transfer for REST API operations	Enabled
Default access tier	Hot	Storage account key access	Enabled
Blob anonymous access	Enabled	Minimum TLS version	Version 1.2
Blob soft delete	Disabled	Infrastructure encryption	Disabled
Container soft delete	Disabled		

Azure Blob Storage

 mvv01 | Containers
Storage account




[+ Container](#) [🔒 Change access level](#) [↶ Restore containers](#) [🔄 Refresh](#) [🗑️ Delete](#) [🗨️ Give feedback](#)

- Overview
- Activity log
- Tags
- Diagnose and solve problems
- Access Control (IAM)
- Data migration
- Events
- Storage browser
- Storage Mover
- Data storage
- Containers**

Show deleted containers

Name	Last modified	Anonymous access level	Lease state	
<input type="checkbox"/> gif	05/10/2024, 00:46:59	Blob	Available	...

Azure Blob Storage

 gif ...
Container ✕

✕ «

[↑ Upload](#) [🔒 Change access level](#) [🔄 Refresh](#) | [🗑 Delete](#) [↔ Change tier](#) [🔗 Acquire lease](#) [🔗 Break lease](#) [👁 View snapshots](#) [📄 Create snapshot](#) [🗣 Give feedback](#)


Overview

- 🔧 Diagnose and solve problems
- 👤 Access Control (IAM)
- ⌵ Settings
 - 🔗 Shared access tokens
 - 🔑 Access policy
 - 📄 Properties
 - 📘 Metadata

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

Show deleted blobs

[+ Add filter](#)

Name	Modified	Access tier	Archive status	Blob type	Size	Lease state	
<input type="checkbox"/>  easter-egg.gif	05/10/2024, 00:47:56	Hot (Inferred)		Block blob	2.85 MiB	Available	⋮

Blob Storage Configuration

- Blob container options
- Blob types and upload options
- Blob Storage access tiers
- Blob lifecycle rules
- Blob object replication options

Blob Storage Configuration

+ Container Change access level

New container

Name *

container01 ✓

Public access level ⓘ

Private (no anonymous access) ✓

OK Cancel



Public access level ⓘ

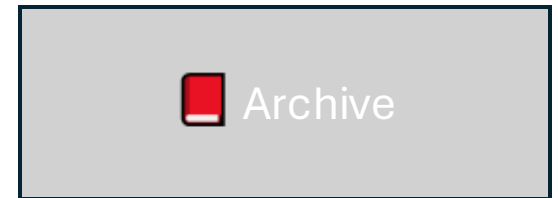
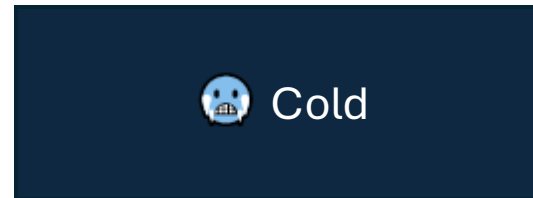
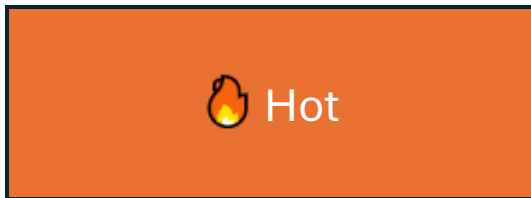
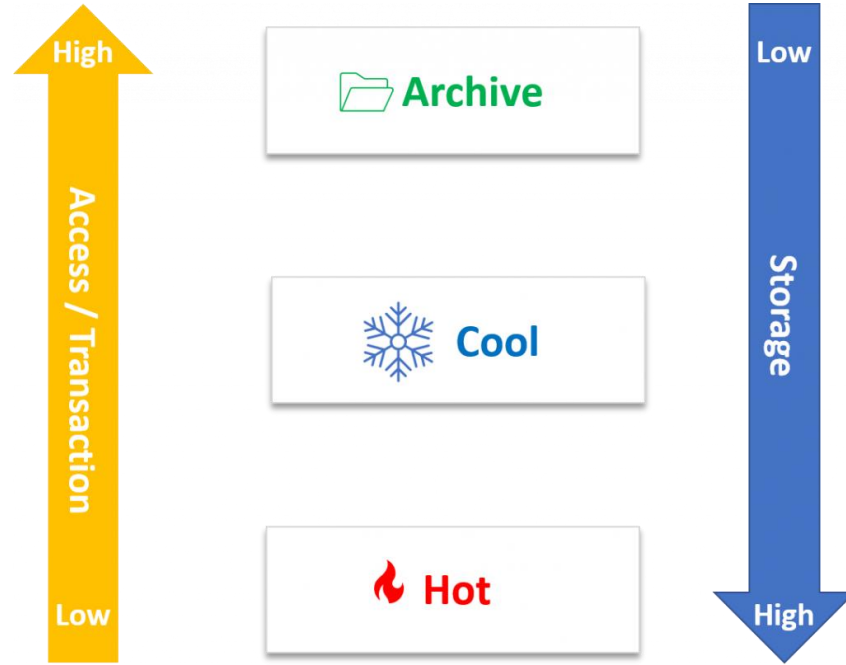
Private (no anonymous access) ^

Private (no anonymous access)

Blob (anonymous read access for blobs only)

Container (anonymous read access for containers and blobs)

Blob Access Tiers



Blob Lifecycle management rules

Add a rule ...

✓ Details **2** Base blobs

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) *

Enter a value

↓

Then

Delete the blob

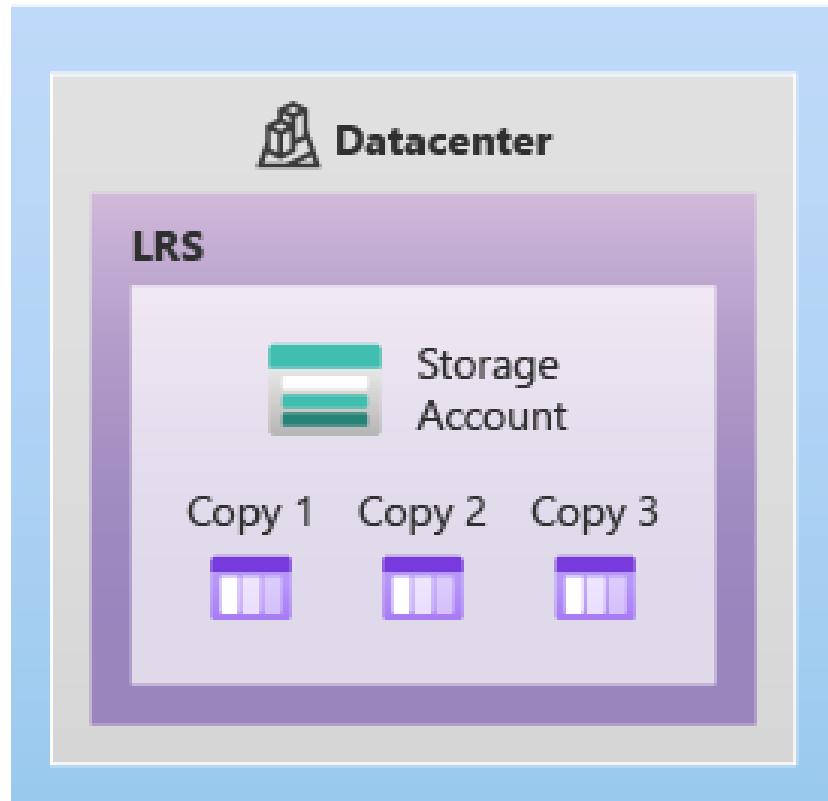
Move to cool storage
For infrequently accessed data that you want to keep on cool storage for at least 30 days.

Move to archive storage
Use if you don't need online access and want to keep the object for 180 days or longer.

Delete the blob
Deletes the object per the specified conditions.

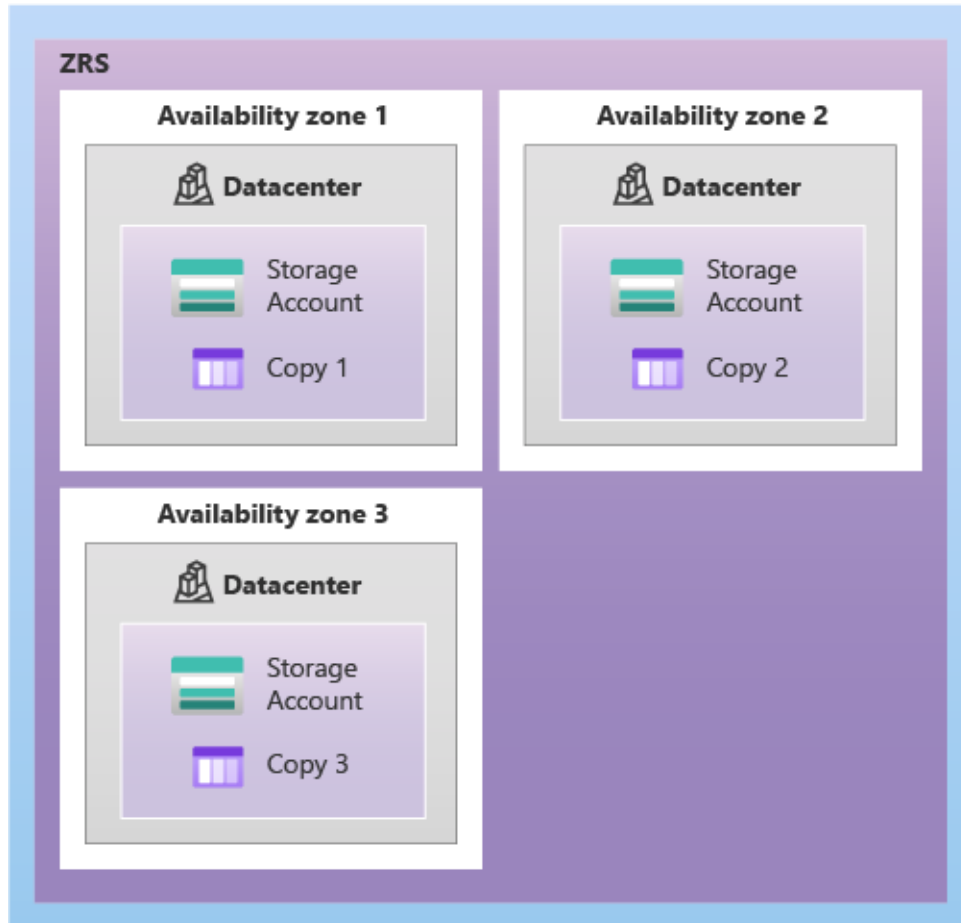
Data redundancy - Locally Redundant Storage

Primary region



Data redundancy - Zone Redundant Storage

Primary region



Data redundancy - Zone Redundant Storage

Americas

Brazil South

Canada Central

Central US

East US

East US 2

South Central US

US Gov Virginia

West US 2

West US 3

Mexico Central

Europe

France Central

Italy North

Germany West
Central

Norway East

North Europe

UK South

West Europe

Sweden Central

Switzerland North

Poland Central

Spain Central

Middle East

Qatar Central

UAE North

Israel Central

Africa

South Africa North

Asia Pacific

Australia East

Central India

Japan East

*Japan West

Southeast Asia

East Asia

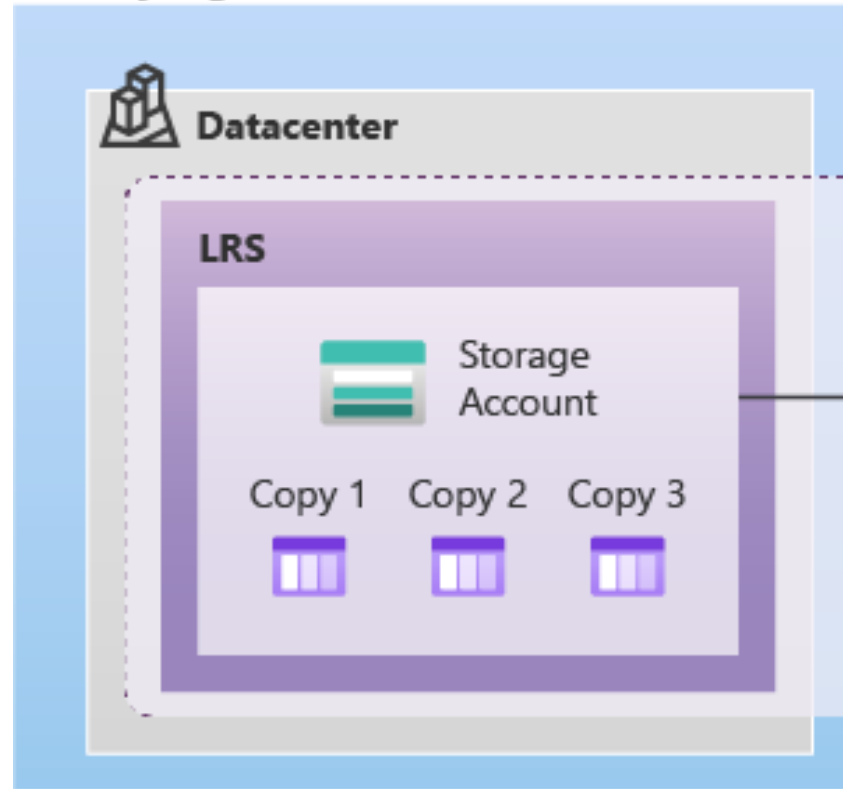
China North 3

Korea Central

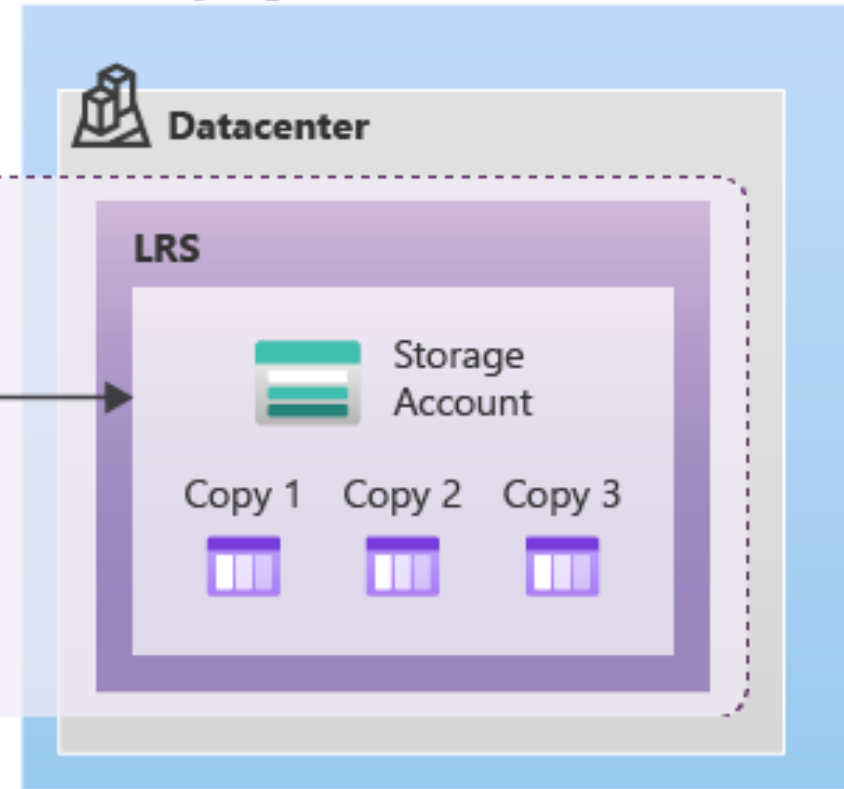
*New Zealand
North

Data redundancy - Geo Redundant Storage

Primary region



Secondary region



(RA-)GRS

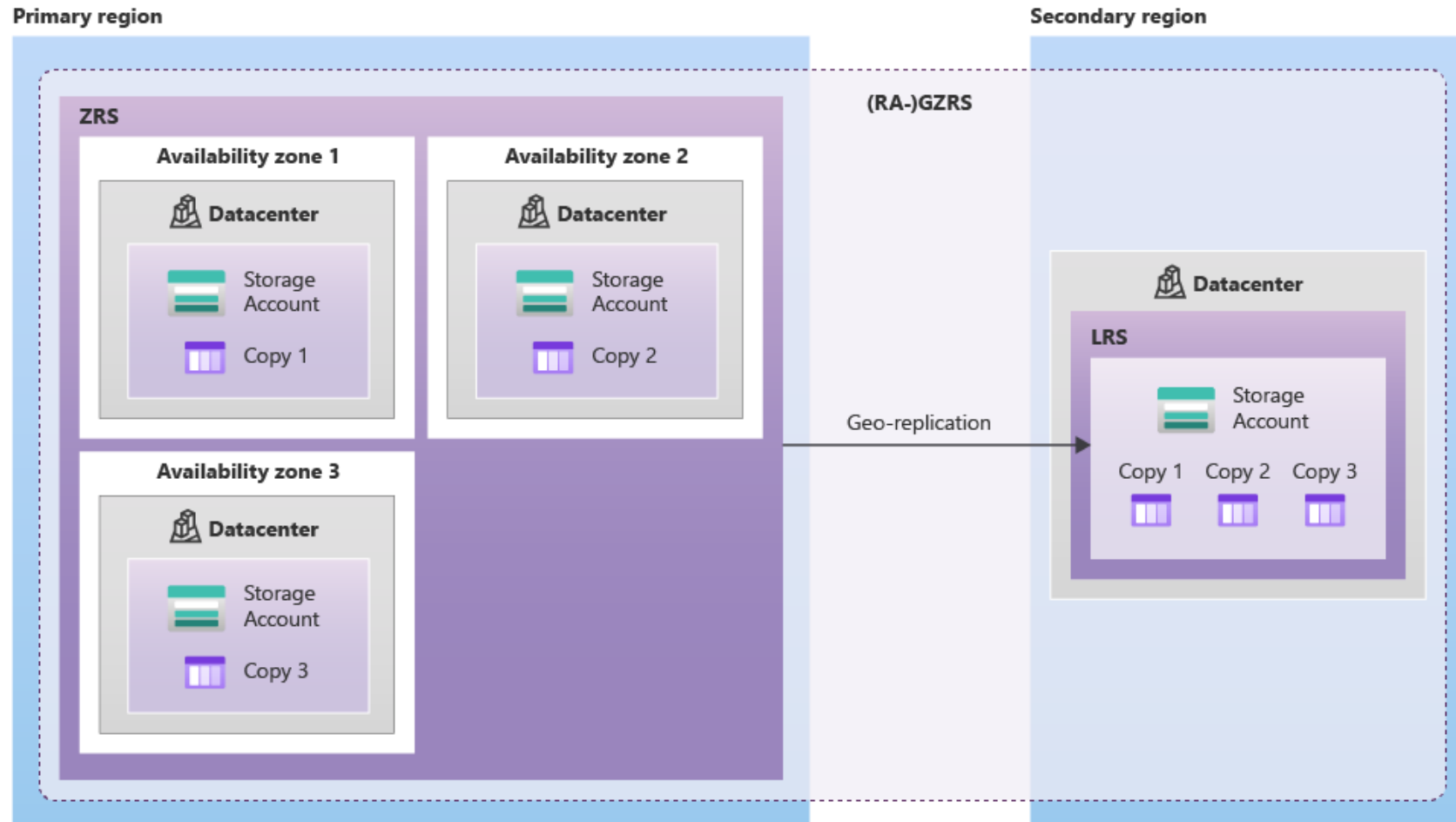
Geo-replication



Data redundancy - Geo Redundant Storage

Geography	Regional pair A	Regional pair B
Asia-Pacific	East Asia (Hong Kong Special Administrative Region)	Southeast Asia (Singapore)
Australia	Australia East	Australia Southeast
	Australia Central	Australia Central 2*
Brazil	Brazil South	South Central US
	Brazil Southeast*	Brazil South
Canada	Canada Central	Canada East
China	China North	China East
	China North 2	China East 2
	China North 3	China East 3*
Europe	North Europe (Ireland)	West Europe (Netherlands)
France	France Central	France South*
Germany	Germany West Central	Germany North*
India	Central India	South India
	Central India	West India
	West India	South India
Japan	Japan East	Japan West
Korea	Korea Central	Korea South*
Norway	Norway East	Norway West*
South Africa	South Africa North	South Africa West*
Sweden	Sweden Central	Sweden South*
Switzerland	Switzerland North	Switzerland West*
United Kingdom	UK West	UK South
United States	East US	West US
	East US 2	Central US
	North Central US	South Central US
	West US 2	West Central US
	West US 3	East US
United Arab Emirates	UAE North	UAE Central*
US Department of Defense	US DoD East*	US DoD Central*
US Government	US Gov Arizona*	US Gov Texas*
	US Gov Virginia*	US Gov Texas*
	US Gov Texas*	US Gov Virginia*

Data redundancy - Geo Z Zone Redundant Storage



Data redundancy - Geo Zone Redundant Storage

(Africa) South Africa North
(Asia Pacific) Australia East
(Asia Pacific) East Asia
(Asia Pacific) Japan East
(Asia Pacific) Korea Central
(Asia Pacific) Southeast Asia
(Asia Pacific) Central India
(Europe) France Central
(Europe) Germany West Central
(Europe) North Europe
(Europe) Norway East
(Europe) Sweden Central
(Europe) Switzerland North

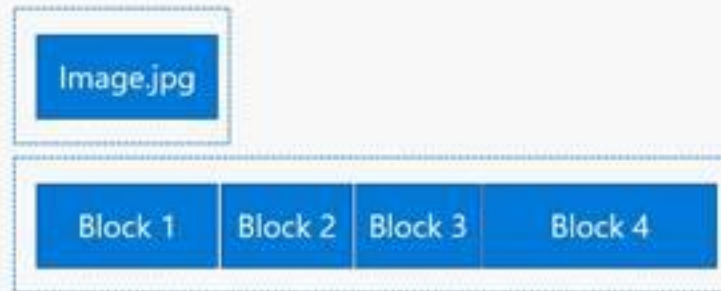
(Europe) UK South
(Europe) West Europe
(Middle East) UAE North
(North America) Canada Central
(North America) Central US
(North America) East US
(North America) East US 2
(North America) South Central US
(North America) West US 2
(North America) West US 3
(North America) US Gov Virginia
(South America) Brazil South

Типи Blob

Types of Blobs

Block Blobs

Most object storage scenarios
Documents, images, video, etc.



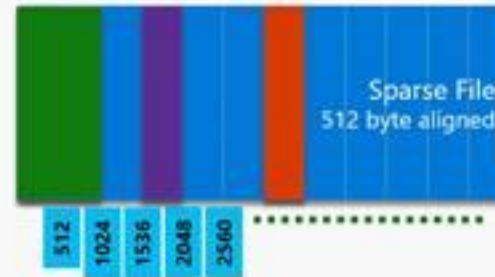
Append Blobs

Multi-writer append only scenarios
Logging, Big Data Analytics output



Page Blobs

Page aligned random reads and writes
IaaS Disks, Event Hub, Block level backup



Block blob


Service version	Maximum block size (via Put Block)	Maximum blob size (via Put Block List)	Maximum blob size via single write operation (via Put Blob)
Version 2019-12-12 and later	4000 MiB	Approximately 190.7 TiB (4000 MiB X 50,000 blocks)	5000 MiB
Version 2016-05-31 through version 2019-07-07	100 MiB	Approximately 4.75 TiB (100 MiB X 50,000 blocks)	256 MiB
Versions prior to 2016-05-31	4 MiB	Approximately 195 GiB (4 MiB X 50,000 blocks)	64 MiB

Page blob

Append blob

Конфігурація Storage Account


Secure Access

 **adsstorageaccount** | Networking ...
Storage account

Security + networking

 Networking

 Azure CDN

 Access keys



Firewalls and virtual networks

Custom domain

 Save  Discard  Refresh

Public network access

- Enabled from all networks
- Enabled from selected virtual networks and IP addresses
- Disabled

 All networks, including the internet, can access this storage account. [Learn more](#) 

Storage Account Access Keys

Home > [Storage account] | Access keys ☆ ...

Search

Set rotation reminder Refresh Give feedback

Access keys authenticate your applications' requests to this storage account. Keep your keys in a secure location like Azure Key Vault, and replace them often with new keys. The two keys allow you to replace one while still using the other.

Remember to update the keys with any Azure resources and apps that use this storage account. [Learn more about managing storage account access keys](#)

Storage account name

key1 Rotate key
Last rotated: 08/10/2024 (6 days ago)
Key: H+ctF+xsU/ICmXqlulpZZam9+0p+b0FTIYmyBgF8MY3GpxR+rA9cv2ybkSQ/90... Hide
Connection string: Show

key2 Rotate key
Last rotated: 08/10/2024 (6 days ago)
Key: ItXPXpB63W0MWyH6vMLX/abxn4kxdnL4VxN+IF2NED++IWELJqVxEbE0ReAx... Hide
Connection string: Show

Overview
Activity log
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
Networking
Front Door and CDN
Access keys
Shared access signature

Managed Identities

📘 Important

For optimal security, Microsoft recommends using Microsoft Entra ID with managed identities to authorize requests against blob, queue, and table data, whenever possible. Authorization with Microsoft Entra ID and managed identities provides superior security and ease of use over Shared Key authorization. To learn more about managed identities, see [What are managed identities for Azure resources](#). For an example of how to enable and use a managed identity for a .NET application, see [Authenticating Azure-hosted apps to Azure resources with .NET](#).

For resources hosted outside of Azure, such as on-premises applications, you can use managed identities through Azure Arc. For example, apps running on Azure Arc-enabled servers can use managed identities to connect to Azure services. To learn more, see [Authenticate against Azure resources with Azure Arc-enabled servers](#).

For scenarios where shared access signatures (SAS) are used, Microsoft recommends using a user delegation SAS. A user delegation SAS is secured with Microsoft Entra credentials instead of the account key. To learn about shared access signatures, see [Grant limited access to data with shared access signatures](#). For an example of how to create and use a user delegation SAS with .NET, see [Create a user delegation SAS for a blob with .NET](#).

Managed Identities

1. Увімкніть managed identity на вашому ресурсі в Azure

Managed Identities

The screenshot shows the Azure portal search interface. At the top, a search bar contains the text 'msdocs-dotnet-sdk'. Below the search bar, there are several filter buttons: 'All', 'Resources (1)', 'Resource Groups (1)', 'Documentation (28)', 'Services (0)', and 'Marketplace (0)'. Under the 'Resources' section, a single result is displayed: 'msdocs-dotnet-sdk-auth-example-web-app' with the service type 'App Service'. This result is highlighted with a red box. Below the 'Resource Groups' section, a single result is also displayed: 'msdocs-dotnet-sdk-auth-example-web-app'.

msdocs-dotnet-sdk

All Resources (1) Resource Groups (1) Documentation (28) Services (0) Marketplace (0)

Azure Active Directory (0)

Resources

msdocs-dotnet-sdk-auth-example-web-app App Service


Resource Groups

msdocs-dotnet-sdk-auth-example-web-app

Managed Identities

The screenshot shows the Azure portal interface for an App Service resource. The title bar at the top reads "msdocs-dotnet-sdk-auth-example" and "App Service". Below the title bar is a search box and "Browse" and "Stop" buttons. The left-hand navigation pane contains several categories: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Security, Events (preview), Deployment (Quickstart, Deployment slots, Deployment Center), Settings (Configuration, Authentication, Application Insights, Identity, Backups, Custom domains, TLS/SSL settings). The "Identity" item is highlighted with a red rectangular box. The main content area on the right shows a "Click here to access" button, an "Essentials" section with links for Resource group, Status, Location, Subscription, and Subscription ID, a "Tags" section with an "edit" link, a "Diagnose and solve problems" section with a description, and an "Http 5xx" section with a vertical scale from 50 to 100.

Managed Identities

 msdocs-dotnet-sdk-auth-example-web-app | Identity ...
App Service

Search (Ctrl+/) <<

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Security
- Events (preview)

Deployment

- Quickstart
- Deployment slots
- Deployment Center

Settings

System assigned User assigned

A system assigned managed identity is restricted to one per resource and i
[Managed identities](#).

Save Discard Refresh | Got feedback?

Status ⓘ
Off On

Object (principal) ID ⓘ
[Redacted]

Permissions ⓘ
Azure role assignments

i This resource is registered with Azure Active Directory. The managed ider

Managed Identities

2. Назначте необхідну роль цій identity для вашого Storage Account

Managed Identities

The screenshot shows the Azure portal search interface. At the top, a search bar contains the text 'msdocs-dotnet-sdk'. Below the search bar, there are several filter buttons: 'All', 'Resources (1)', 'Resource Groups (1)', 'Documentation (28)', 'Services (0)', and 'Marketplace (0)'. Under the 'Resources' section, a single result is shown: 'msdocs-dotnet-sdk-auth-example-web-app' with the service type 'App Service'. Under the 'Resource Groups' section, a single result is shown: 'msdocs-dotnet-sdk-auth-example-web-app', which is highlighted with a red rectangular box.

msdocs-dotnet-sdk

All Resources (1) Resource Groups (1) Documentation (28) Services (0) Marketplace (0)

Azure Active Directory (0)

Resources




msdocs-dotnet-sdk-auth-example-web-app App Service

Resource Groups

msdocs-dotnet-sdk-auth-example-web-app


Managed Identities


[Home](#) >


 **msdocs-dotnet-sdk-auth-example-web-app**   ...
Resource group


<<


 Create  Manage view   Delete resource group  Refresh


 Overview

 Activity log

 Access control (IAM)

 Tags

 Resource visualizer

 Events

^ Essentials

Subscription ([move](#))

Subscription ID


Tags ([edit](#)) : [Click here to add tags](#)

Resources

Recommendations

Managed Identities

Home > msdocs-dotnet-sdk-auth-example-web-app

 msdocs-dotnet-sdk-auth-example-web-app | Access control (IAM) ...
Resource group

«

+ Add



Download role assignments




Edit columns




Refresh





Remove


 Overview




 Activity log

 Access control (IAM)

 Tags

 Resource visualizer

 Events

Check access

Role assignments

Roles

Deny assignments

Classic administrators

Number of role assignments for this subscription ⓘ

21

2000

Type : All


Role : All

Scope : All sc


Managed Identities

[Home](#) > [msdocs-dotnet-sdk-auth-example-web-app](#) >

Add role assignment ...

 Got feedback?



[Role](#) [Members](#) [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](#) 

Type : All

Category : All


Showing 6 of 349 roles

Name 	Description 
Avere Cluster Runtime Operator	Avere cluster runtime role user
GenevaWarmPathStorageBlobContributor	Geneva Warm Path Storage Bl
Storage Blob Data Contributor	Allows for read, write and dele
Storage Blob Data Owner	Allows for full access to Azure
Storage Blob Data Reader	Allows for read access to Azun
Storage Blob Delegator	Allows for generation of a use

Managed Identities

[Home](#) > [msdocs-dotnet-sdk-auth-example-web-app](#) >

Add role assignment ...

 Got feedback?

[Role](#) [Members](#) [Conditions \(optional\)](#) [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
------	-----------	------

No members selected

Description

Managed Identities

Select managed identities ×

 Got feedback?

Subscription *

C&L Cross Service Content Team Testing ∨

Managed identity

App Service (8) ∨

Select ⓘ

Search by name




[Redacted identity name]

Managed Identities

[Home](#) > [msdocs-dotnet-sdk-auth-example-web-app](#) >

Add role assignment ...

 Got feedback?

Role Members Conditions (optional) 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
msdocs-dotnet-sdk-auth-example-web-...	05d52d07-3efd-430e-8d54-c911515cdcf5	App Service ⓘ

Description

Optional

Review + assign

Previous

Next

Managed Identities

3. Використайте **DefaultAzureCredential** у вашому додатку

Managed Identities

`DefaultAzureCredential` is an opinionated, ordered sequence of mechanisms for authenticating to Microsoft Entra ID. Each authentication mechanism is a class derived from the `TokenCredential` class and is known as a *credential*. At runtime, `DefaultAzureCredential` attempts to authenticate using the first credential. If that credential fails to acquire an access token, the next credential in the sequence is attempted, and so on, until an access token is successfully obtained. In this way, your app can use different credentials in different environments without writing environment-specific code.

Managed Identities



```
1 dotnet add package Azure.Identity  
2 dotnet add package Microsoft.Extensions.Azure
```

Managed Identities

Azure services are accessed using specialized client classes from the various Azure SDK client libraries. These classes and your own custom services should be registered so they can be accessed via dependency injection throughout your app. In `Program.cs`, complete the following steps to register a client class and `DefaultAzureCredential`:

1. Include the `Azure.Identity` and `Microsoft.Extensions.Azure` namespaces via `using` directives.
2. Register the Azure service client using the corresponding `Add`-prefixed extension method.
3. Pass an instance of `DefaultAzureCredential` to the `UseCredential` method.

Managed Identities



```
1 using Microsoft.Extensions.Azure;
2 using Azure.Identity;
3
4 builder.Services.AddAzureClients(clientBuilder =>
5 {
6     clientBuilder.AddBlobServiceClient(
7         new Uri("https://<account-name>.blob.core.windows.net"));
8     clientBuilder.UseCredential(new DefaultAzureCredential());
9 });
```

Managed Identities



```
1 using Azure.Identity;
2
3 builder.Services.AddSingleton<BlobServiceClient>(_ =>
4     new BlobServiceClient(
5         new Uri("https://<account-name>.blob.core.windows.net"),
6         new DefaultAzureCredential()));
```

SAS token

- User delegation SAS
- Service SAS
- Account SAS

SAS token

`https://storagesample.blob.core.windows.net/sample-container/sampleBlob.txt?sv=2022-11-02&sr=b&sig=39Up9jzHkxhUIhFEjEh9594DJxe7w6cIRCg0V6ICGS0%3A377&sp=rcw`

Storage resource URI

Delimiter character

SAS token

User delegation SAS

- User delegation SAS
- Service SAS
- Account SAS

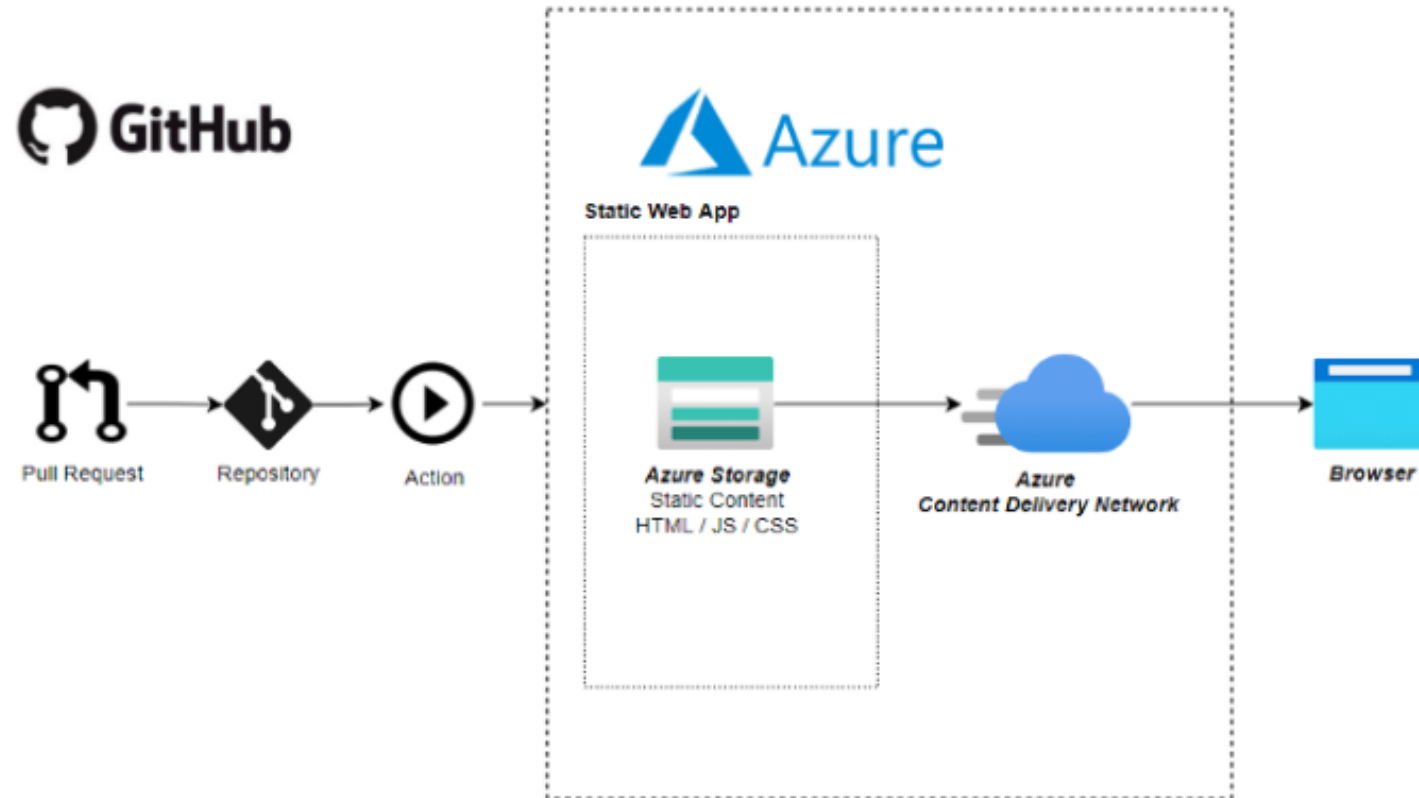
Service SAS

- User delegation SAS
- Service SAS
- Account SAS

Account SAS

- User delegation SAS
- Service SAS
- Account SAS

Static website hosting in Azure Storage



Setting up a static website

The screenshot shows the Azure portal interface for a storage account named 'contosoblobaccount'. The left sidebar contains navigation options: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, and Data transfer. The main area displays the 'Blobs' view for the storage account. At the top, there are action buttons: Container, Refresh, Delete, and Change access level. Below these, the storage account name is shown, followed by a search bar for containers. A table lists the containers with columns for NAME, LAST MODIFIED, PUBLIC ACCESS L..., and LEASE STATE. The container '\$web' is selected, indicated by a red box around its checkbox. The table also shows a container named 'myContainer'.

Search resources, services, and docs

Home > contosoblobaccount - Blobs

contosoblobaccount - Blobs
Storage account

Search (Ctrl+)

Container Refresh Delete Change access level

Storage account: contosoblobaccount

Search containers by prefix

NAME	LAST MODIFIED	PUBLIC ACCESS L...	LEASE STATE
<input checked="" type="checkbox"/> \$web	5/29/2019, 11:55:08 AM	Blob	Available ...
myContainer	5/23/2019, 10:34:46 AM	Private	Available ...

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