TLS Proxy: Custom domain support for Azure Blob Storage using Application Gateway

Contents

Overview

To use the custom domain feature of Azure Storage one needs to use a public domain since the domain verification process is based on public DNS resolution. This prohibits the use of internal domain name like storage.contoso.corp. Moreover, the Azure Storage supports use of HTTPS for custom domains through Azure CDN only. The Azure CDN is also required when using root domain (e.g. contoso.com) for a custom domain.

With Application Gateway fronting a storage as a backend, we can use internal custom domain, with easier certificate management for TLS termination as well as use of primary domain.

In this document, we will look at setting up an Azure Storage Blob Container and access it using end-to-end TLS through the Application Gateway. The Azure Storage will be with Private Endpoint enabled.

Pre-requisites

1. Storage Account with a Blob Container
2. Application Gateway using L7 capabilities (HTTPS)
3. SSL certificate for the custom domain pointing to Application Gateway
4. MS Azure Storage Explorer client

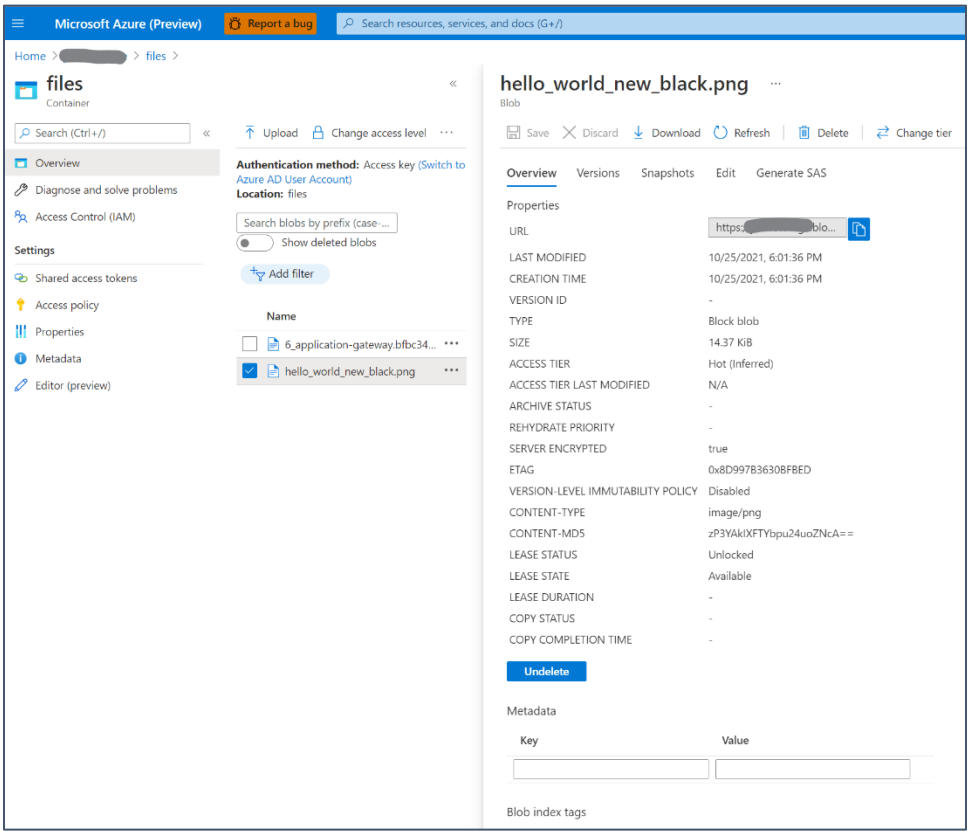
Solution - Overview

1. Create Storage account, create container and uploaded a JPG file. Verify that image's accessibility in a browser using the default domain name and via public internet.
2. Now enable Private Endpoint feature on Storage resource.
3. Assuming an Application Gateway resource already exists, its configuration will need to be updated as described below:
    a. Backend Target – Use the default FQDN of storage
    b. For HTTP settings,
        i. Choose backend protocol as "HTTPS"
        ii. Set "Use well known CA certificate" to Yes
        iii. Set "Override with specific domain name" to specify the default FQDN of Storage or use "Pick host name from backend target", if you are using FQDN for backend.
    c. For Health Probe, use
        i. HTTPS
        ii. Pick hostname from HTTP setting
        iii. Pick port from HTTP setting
        iv. Path - as any file in the Blob container
4. Now configure the custom private domain to point to the Application Gateway's frontend IP using an A record.
5. Verify using a browser client.
6. Verify using MS Azure Storage Explorer client

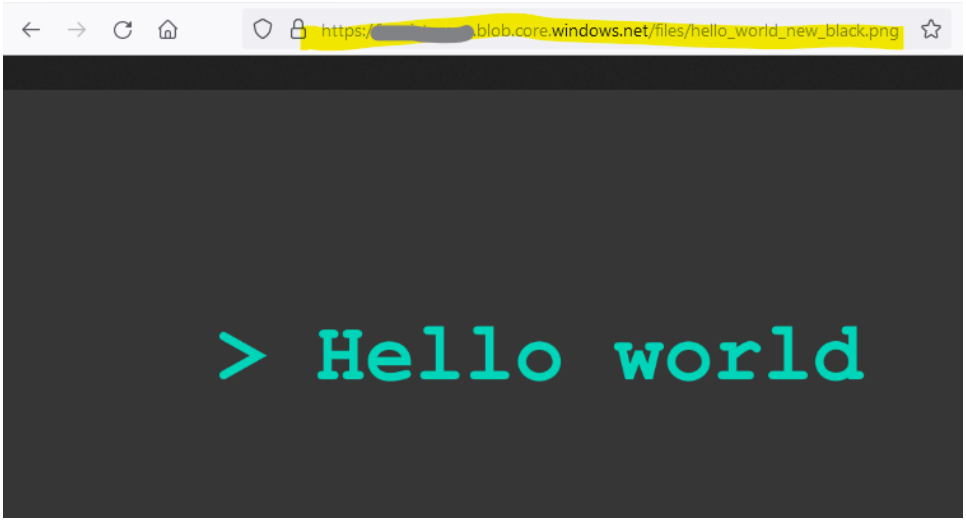
Solution - Detailed Process

Creating a Storage Account and verifying blob's access

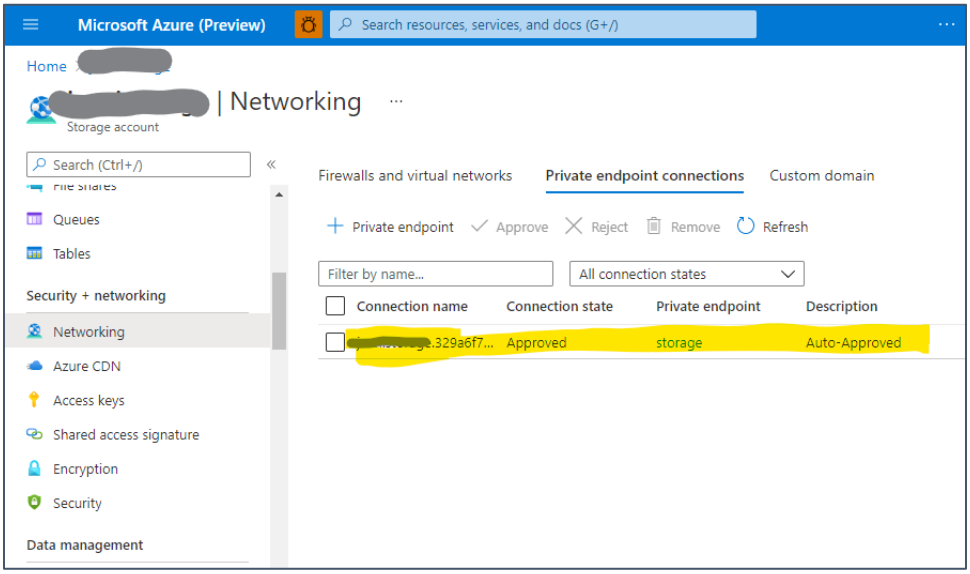
1. Create Storage account, create container and uploaded a JPG file.



Copy the file URL from Properties section and resolve it in a browser to confirm if this basic configuration is working fine. The URL will be of the form https://<account-name>.blob.core.windows.net/files/<file-name>



2. Now, enable Private Endpoint feature for the Storage resource.

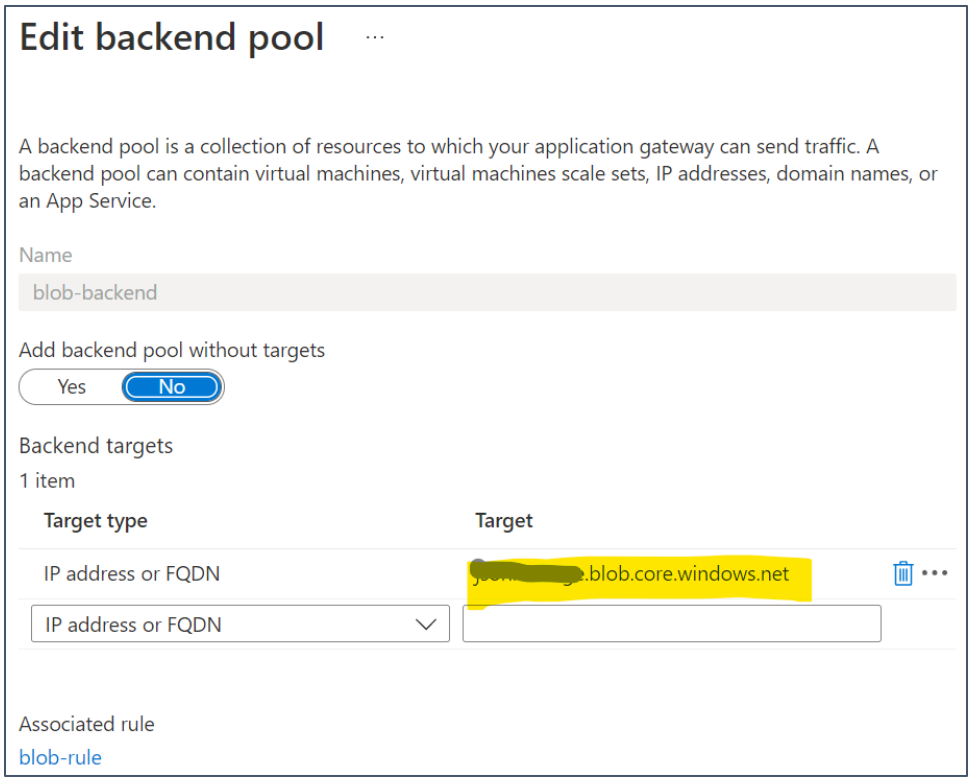


This [documentation] describes the process to enable a Private Endpoint while creating Storage resource itself. You can also perform these steps after its creation via its Networking Blade.

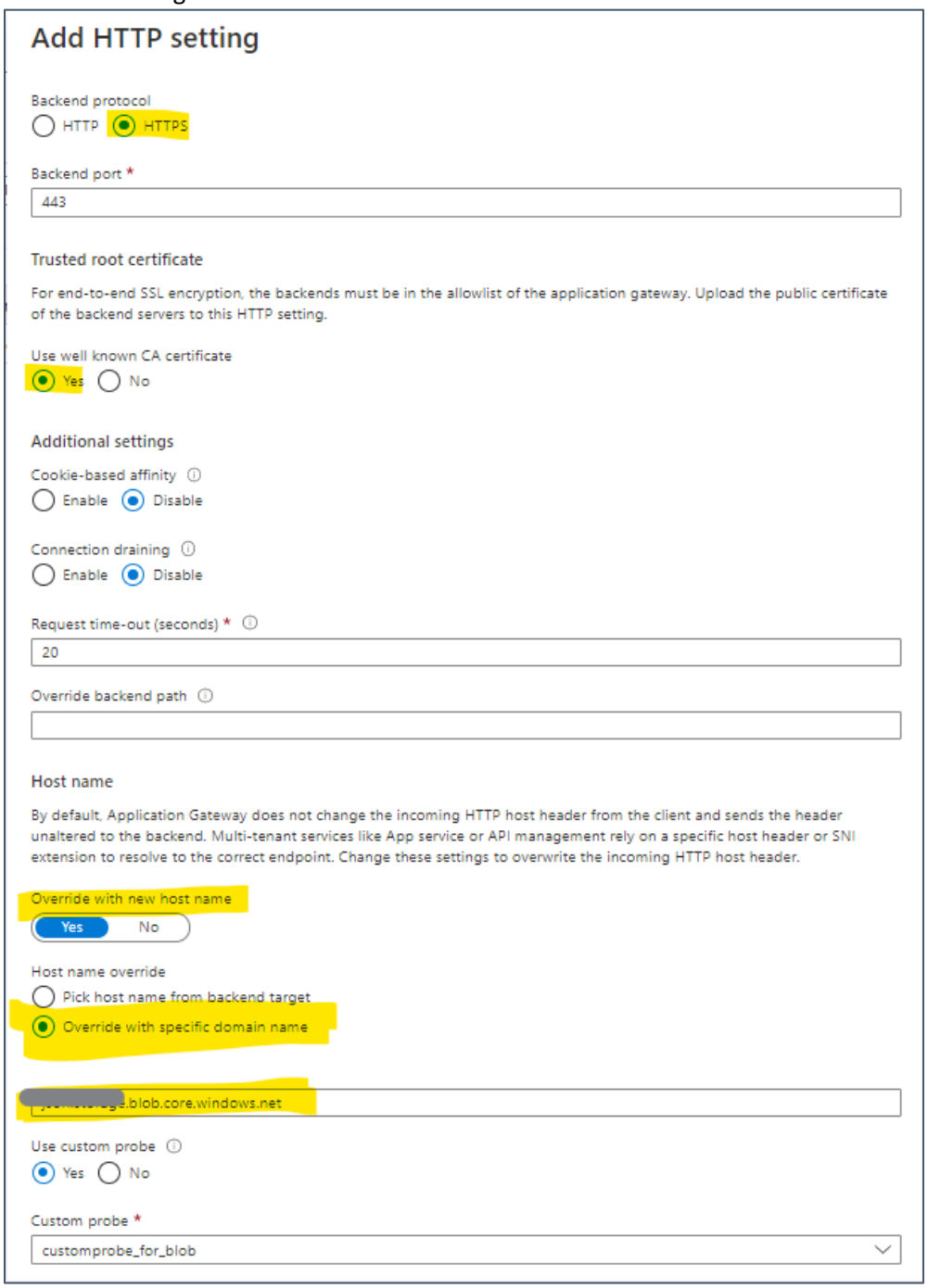
Configurations of Application Gateway

3. Configure the Application Gateway in the described manner.

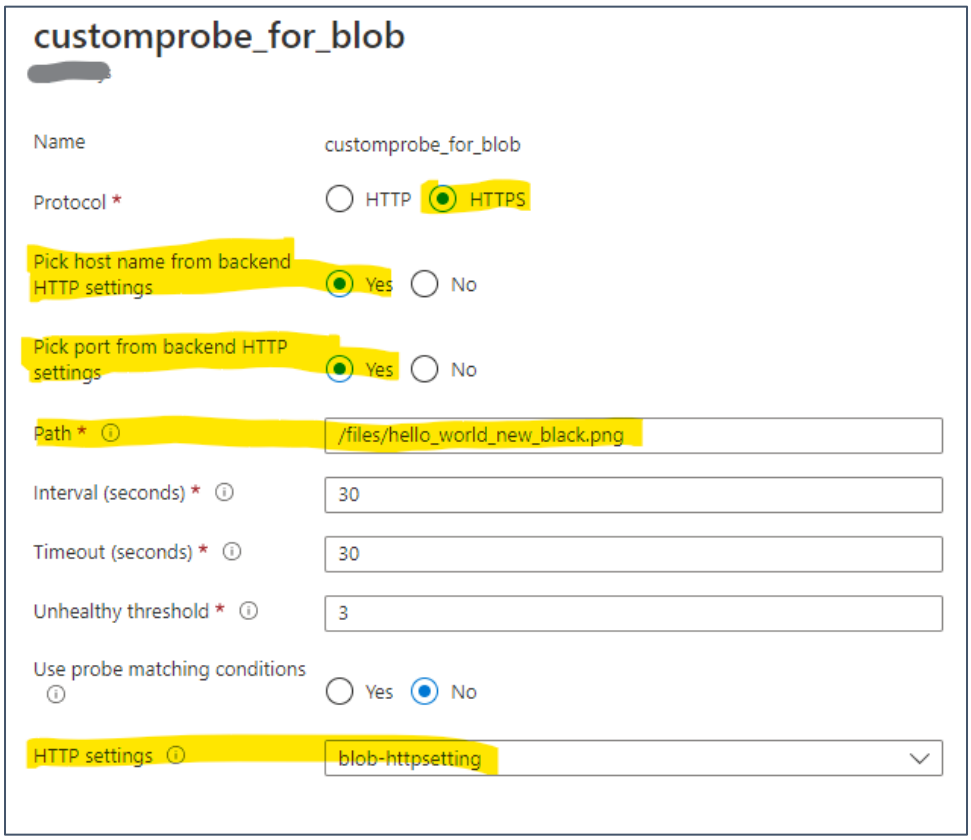
    a. Backend Target – Use the default FQDN of the Storage.



b. For HTTP settings

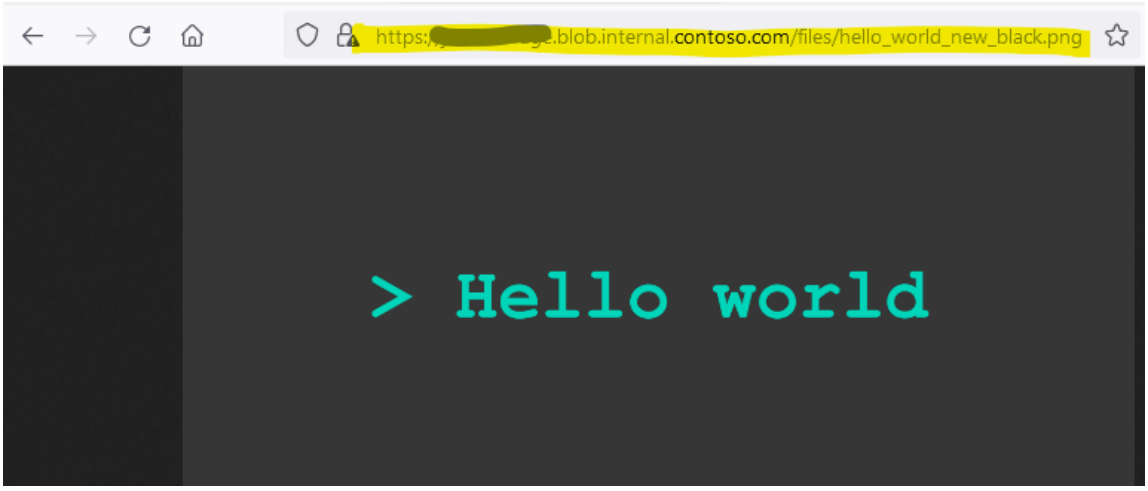


c. For Health Probe, use



Before we proceed, ensure the custom domain's DNS resolves to Application Gateway IP.

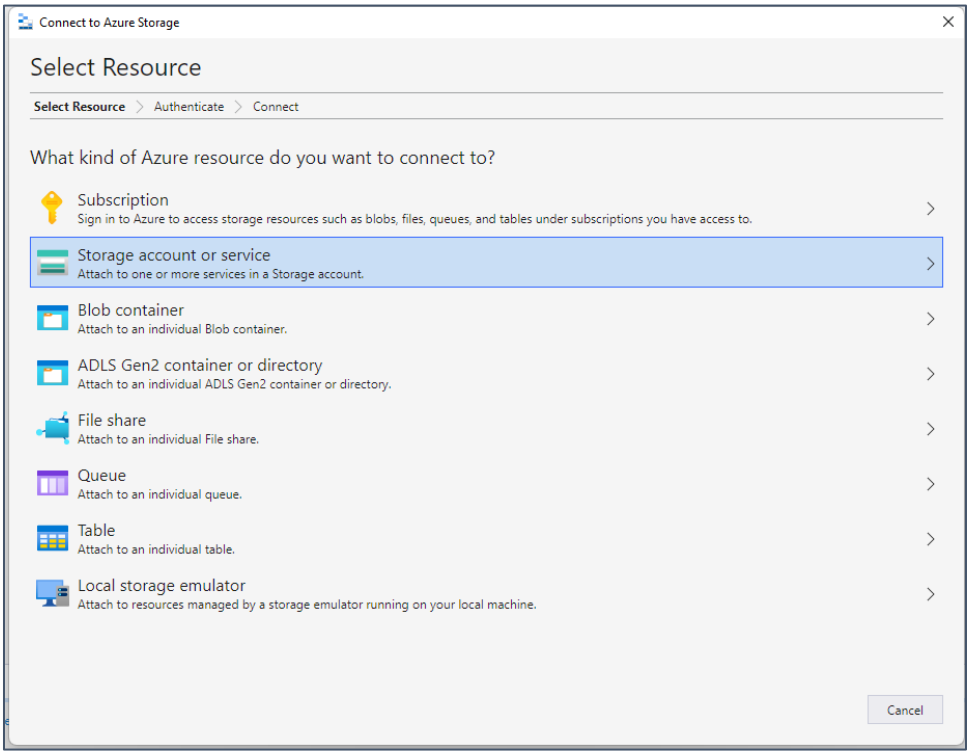
4. Verify using a browser client, this time using custom domain in the URL.



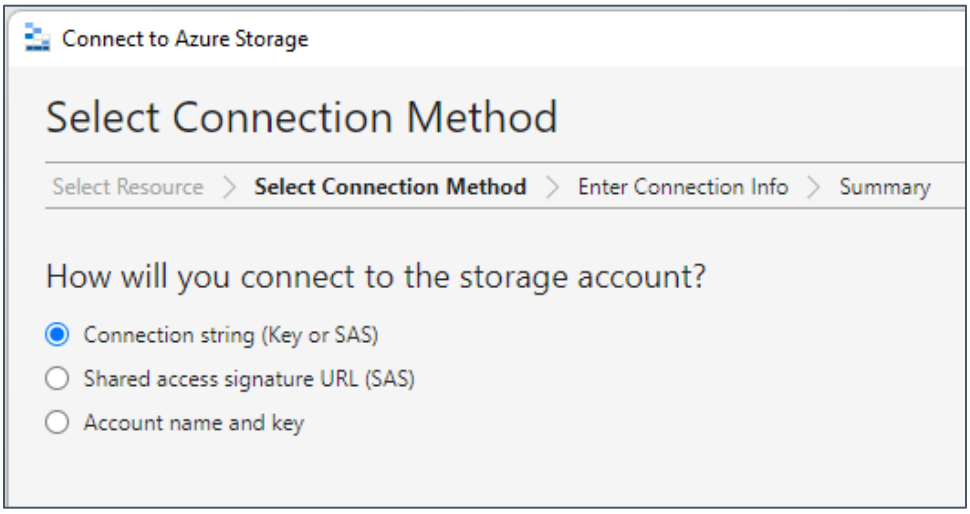
Configuration of Storage client and file access

5. Verify using MS Storage Explorer client.

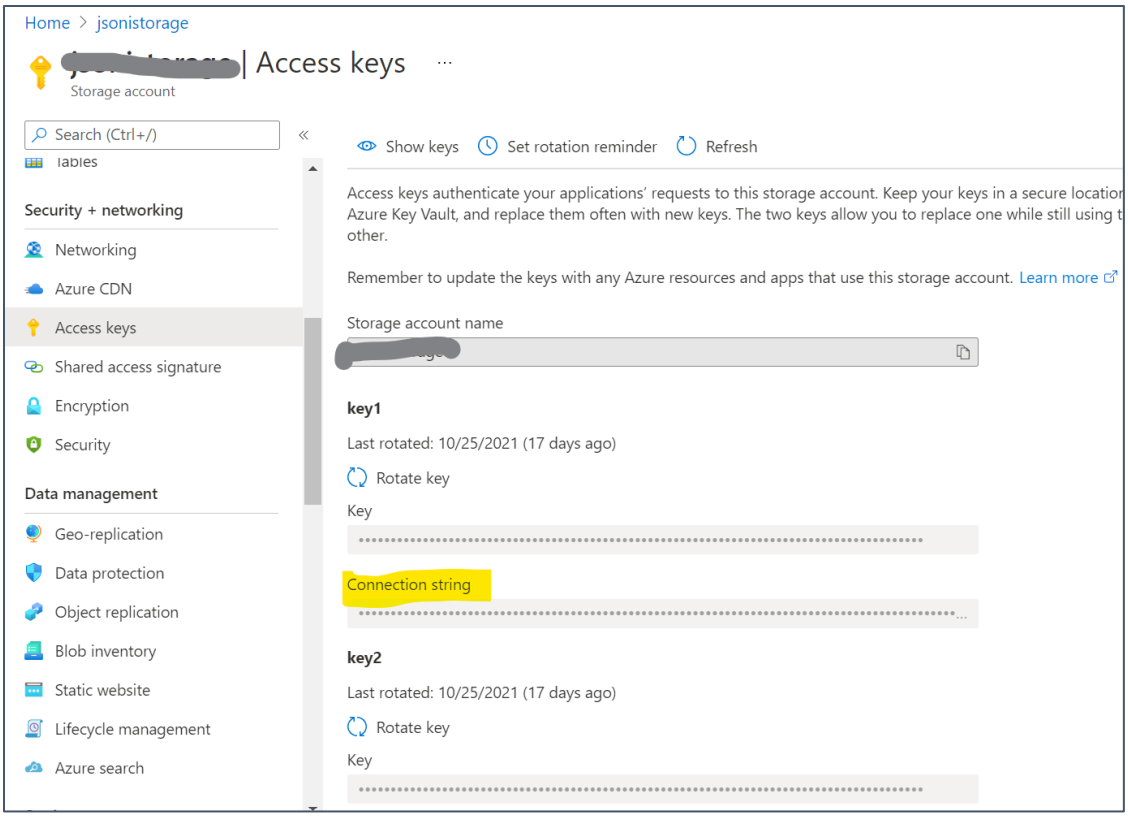
Click the add connection button to open the below screen. Select “Storage account or service”.



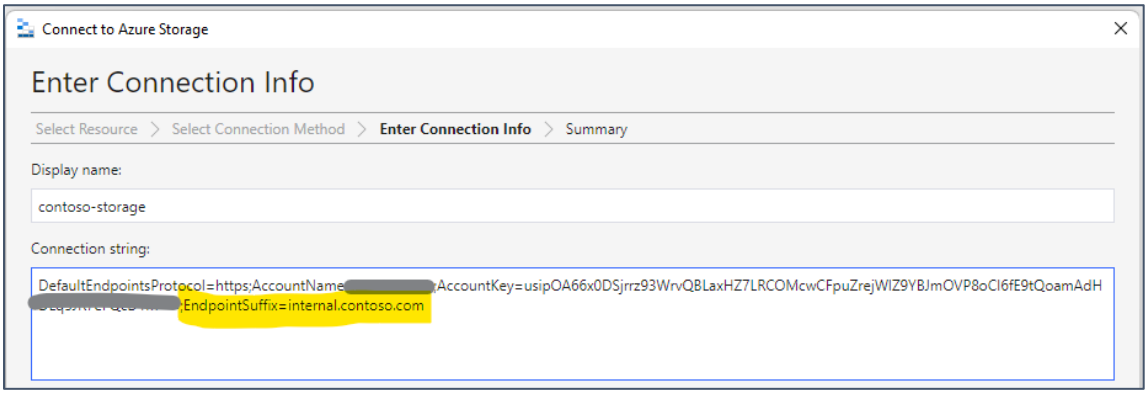
Choose ”Connection string”.

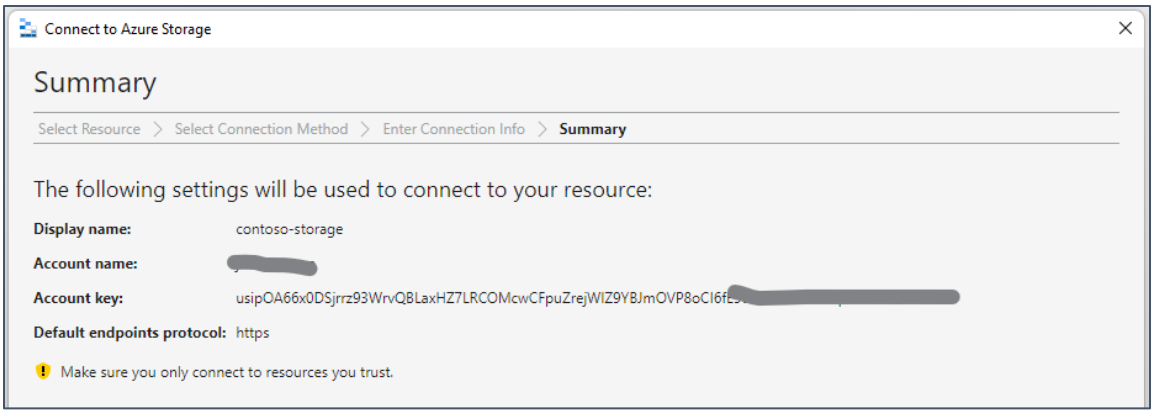


Go back to Azure Storage resource in the portal and open ”Access keys” blade to copy the given connection string.

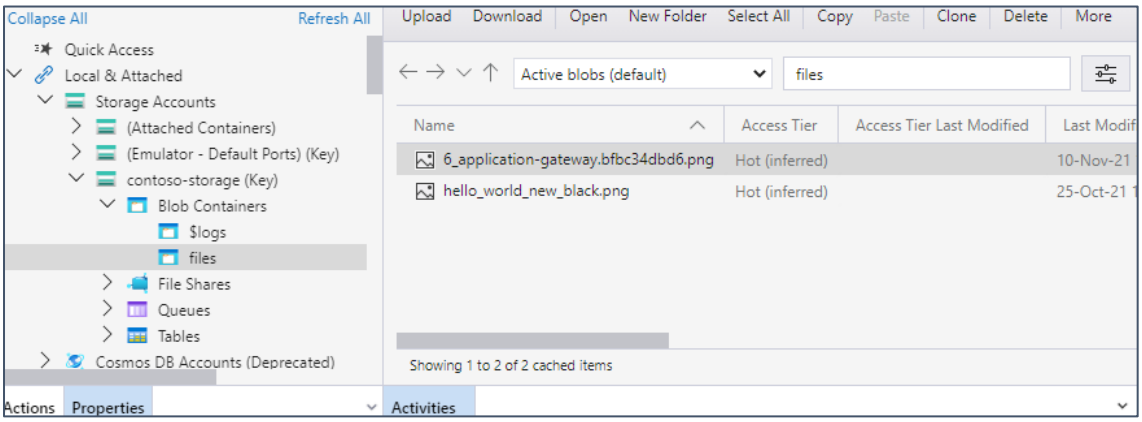


In the next step of Storage connection configuration, add the copied connection string. Please use only the custom domain part without ”blob” or storage account name in it.





That's about it!



Callouts/Caveats

1. The Custom Domain for Azure Storage need NOT be configured in Azure Storage Account. The desired custom domain can simply point to Application Gateway's IP via an A record.

2. The "EndpointSuffix" in the Connection String for Storage Explorer must include only custom domain part. Taking example of Blob containers, the Storage Explorer will form a connection URL as https://<storage-account>.blob.<custom-domain>. Since "<account name>" and "blob" are auto added, you must include only the precise custom domain in the connection string endpoint suffix.

   If the Account Name = mystorage and Custom Domain = shop.contoso.com, the string will look as DefaultEndpointsProtocol=https;AccountName=mystorage;AccountKey=<key>==;EndpointSuffix=shop.contoso.com;

3. This document assumes that the Private DNS is configured in the Application Gateway virtual network. This Private DNS contains the required A record for <accountname>.privatelink.blob.core.windows.net

4. While configuring Private Link from clients other than portal, the subnet in which the endpoint would reside must have “privateLinkServiceNetworkPolicies” property disabled. More on this here.

5. Due to current limitation with Application Gateway, any PaaS service’s default FQDN should be added to the backend pool **after** configuring the private link, otherwise the default FQDN continues to point to its public IP. [ETA for this fix: Early 2022. As a workaround, you can even perform any PUT operation on gateway which will refresh its DNS.]

6. This document assumes that the Listener is created with HTTPS protocol and an appropriate certificate.

ETA

Private Preview: 15 Feb, 2022

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