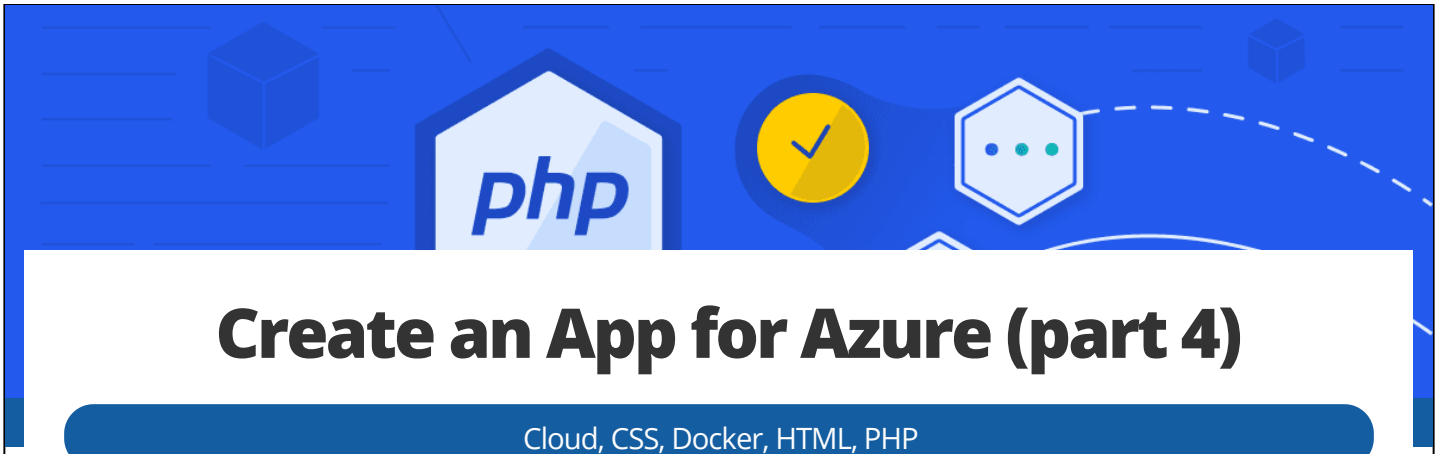


Create an App for Azure (part 4)

Cloud, CSS, Docker, HTML, PHP

Language Skills : 5

The digital transition has pushed software companies and enterprises to migrate their applications to the web. Azure cloud services have provided the ideal platform, the right services, and the tools to go digital while keeping full control over the data. This publication proposes the creation of a simple application by discovering some of these services and tools.

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By Olivier Paudex

Creating Azure infrastructure

Once the container is created, we can start dealing with the Azure infrastructure that will host our application.

> This publication is composed of several parts. This being the 4th part.

The naming of services

Microsoft recommends naming services in a structured manner.

- An acronym or abbreviation for the service.
- The type of resource or information specifying its function.
- The name of the application if the one is dedicated to it.
- The region of the service.
- The instance of the service.

Example:

Sigle	Resource Type	Application	Region	Instance	Description
pe	sqlsrv	imagesgallery	westeu	001	The SQL server endpoint for the Images Gallery application
st		imagesgallery	westeu	001	Storage for the Images Gallery application
snet	backend	imagesgallery	westeu	001	The application's private subnet

Example service naming

Azure Container Registry

The first task is going to be creating an **"ACR"** or **"Azure Container Registry"**.

- Create a resource group for the network elements.
- Create an **"ACR"** in Azure of type basic.
- Copy its name to the clipboard from the **"Overview"** tab.
- Go back to VSCode and enter the command below.

```
az login
```

This will open a login window to connect to your Azure account.

- Close the window
- Enter the command below

```
az acr login --name [ACR name]
```

This will connect you with the ACR.

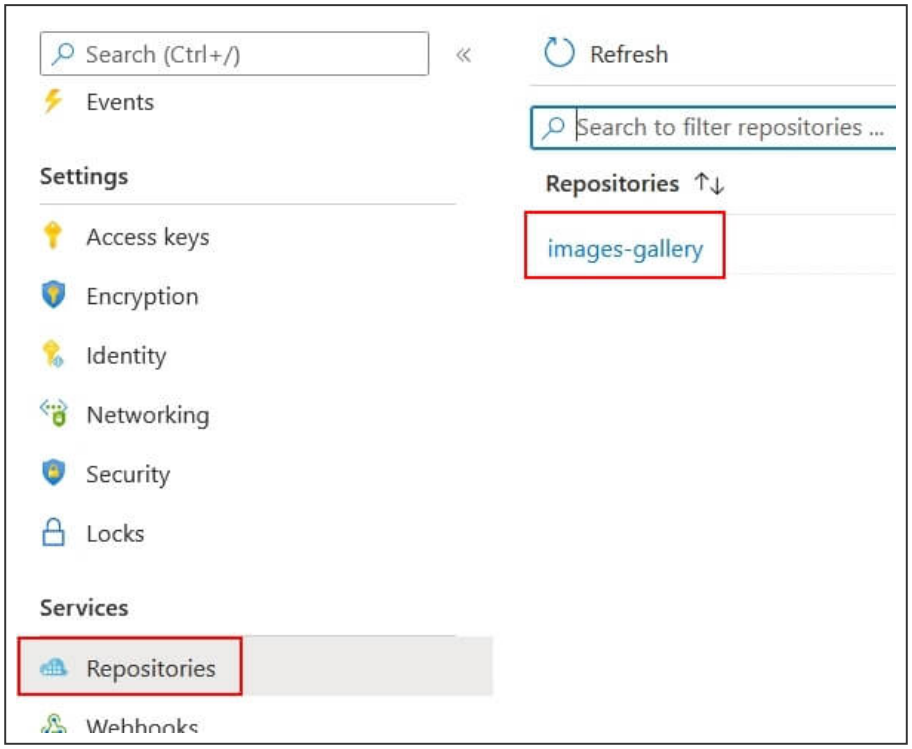
- Create a tag of your docker image. A tag is a version of the image, here 1.0

```
docker tag [docker image name] [ACR name].azurecr.io/images-gallery:1.0
```

- Push image into Azure

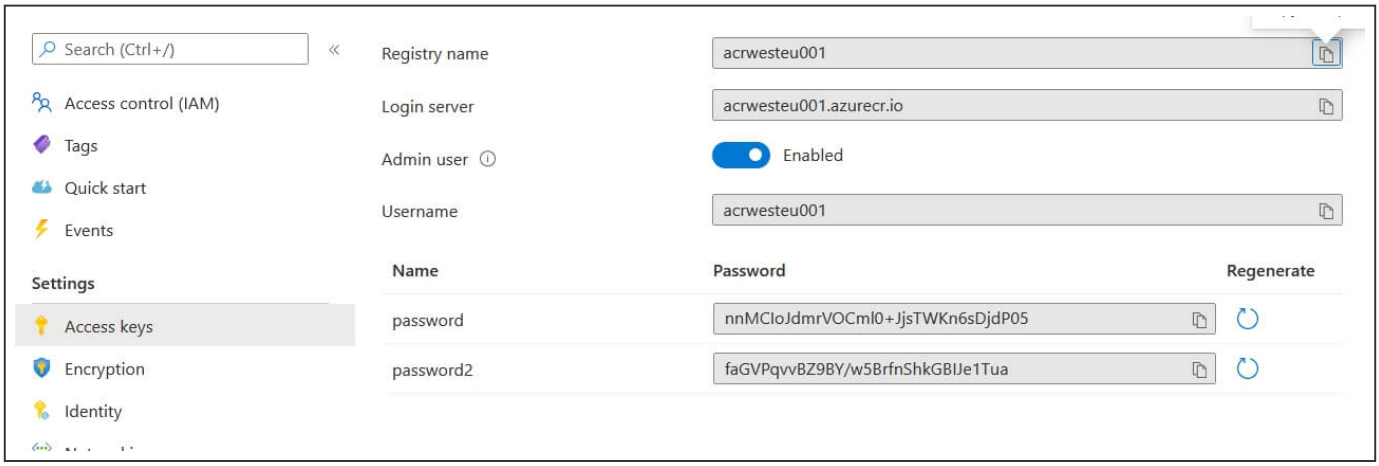
```
docker push [ACR name].azurecr.io/images-gallery:1.0
```

- Click on **"Repositories"** in the ACR and verify that the container is present.



The ACR Directory

- Enable the **"Admin"** option.

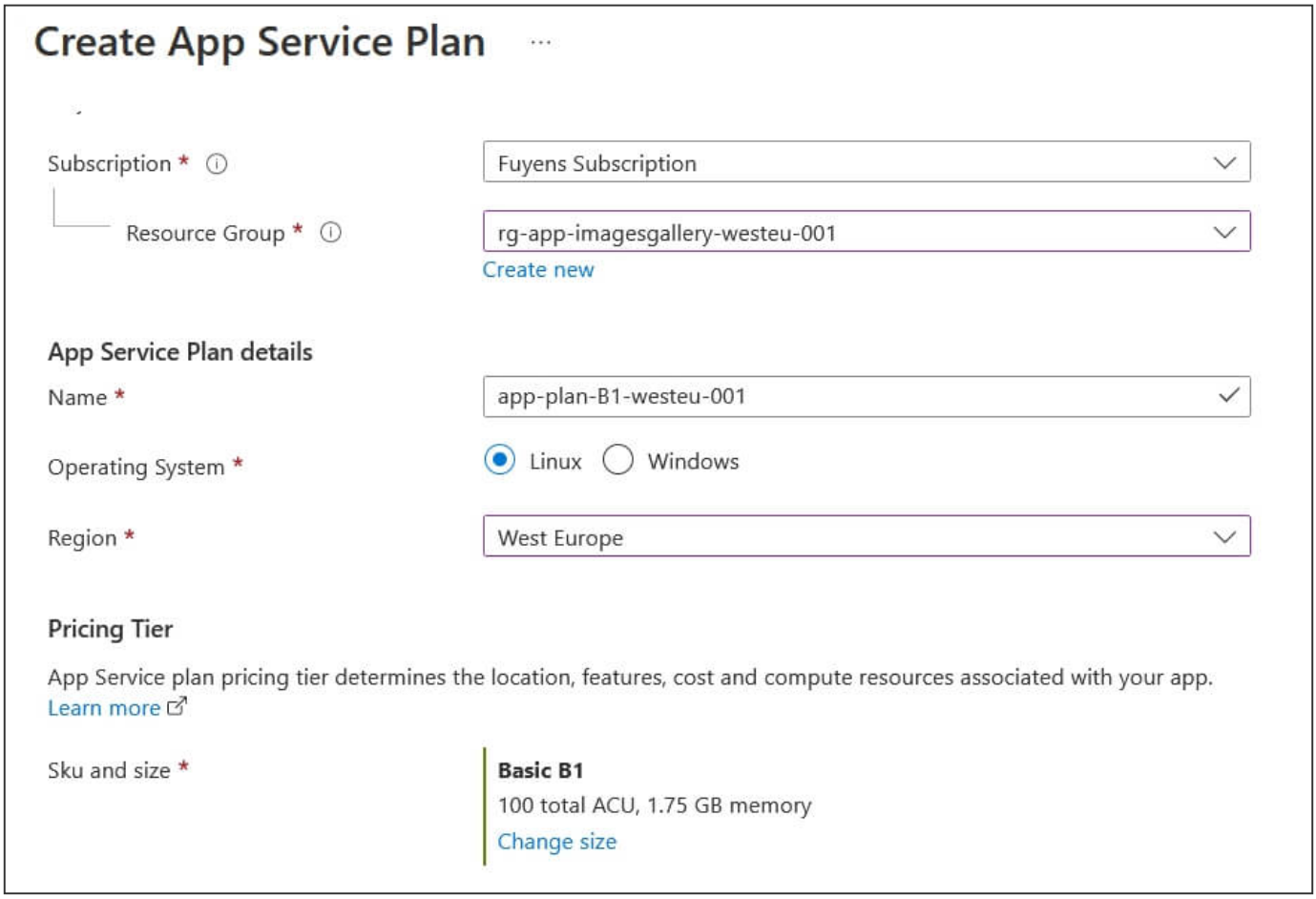


Enable the "Admin user"

App services

Microsoft Azure offers the ability to create applications without worrying about its maintenance. The service can be linked to a GitHub account or a container. One can also program a "**CI/CD**" to create a continuous development environment. The service also has the ability to adapt to demand (auto-scaling).

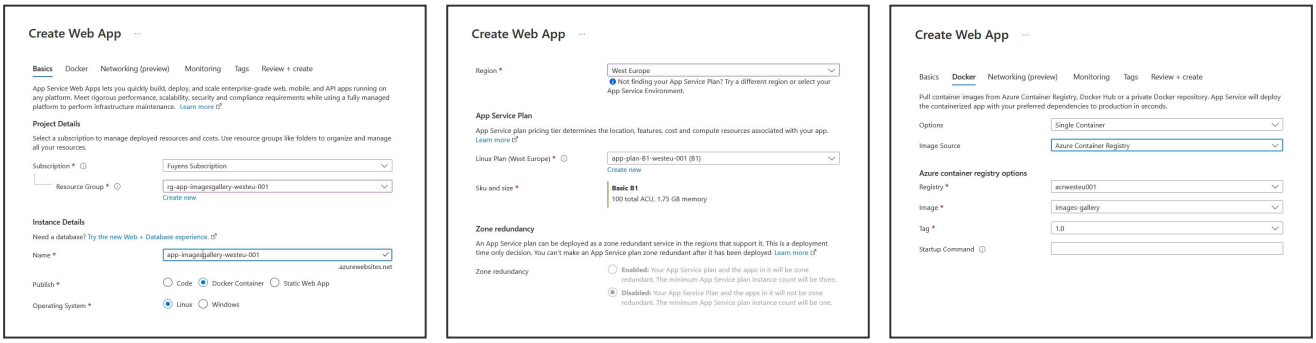
- Create a resource group for the application.
- Create an **"App service plans"** of type B1. The free version does not allow you to create SSL certificates.



The rate plan for the app service

- Create an application
- Enter a name for the application. This one doesn't really matter. It is the SSL certificate and DNS that will give the real name of the application to be used in the URL.
- Select **"Docker Container"**.
- Select **"Linux"**.

- Select the rate plan created above.
- Select the container from the **ACR**.



Creating the app

- Leave the **"Enable Network injection" option set to Off'**. Application security will be addressed later.
- Leave the other options.

Here we go, the app is created and should already respond to the URL**"https://[app name].azurewebsites.net/"**. It may take a good minute for the app to start up for the first time, so be patient!

At this point, the app should return an error of type**"Failed to connect"**. This is normal. We need to take care of creating the database and storage.



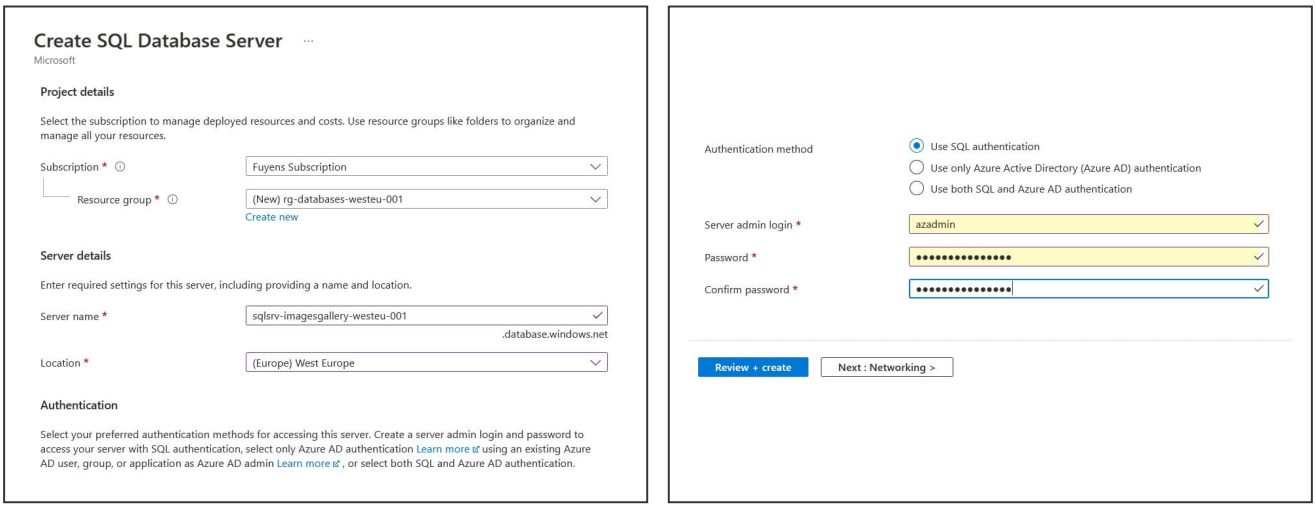
The error screen and a message

The SQL server

Microsoft Azure offers its own database engine called **"Azure SQL Server"**. It's a lightweight version of **"Microsoft SQL Server"**. It is a **"PaaS"**, namely a **"Platform as a Service"**. In the same way as **"The App Services"**, the advantage of "PaaS" comes that it is administered by Microsoft. We do not take care of the update, nor the maintenance of the server. It is quite possible to make the server redundant through **"replicas"** and elastic mode.

Even if we use a service, we're going to have to create two elements, the server and the database.

- Create a resource group for the server and database.
- Name it **"sqlsrv-imagesgallery-westeu-001"**.
- Enter a location.
- Enter the login **"azadmin"** for the admin.
- Enter a password and confirm it. **Don't forget to write it down**.
- Create the server.

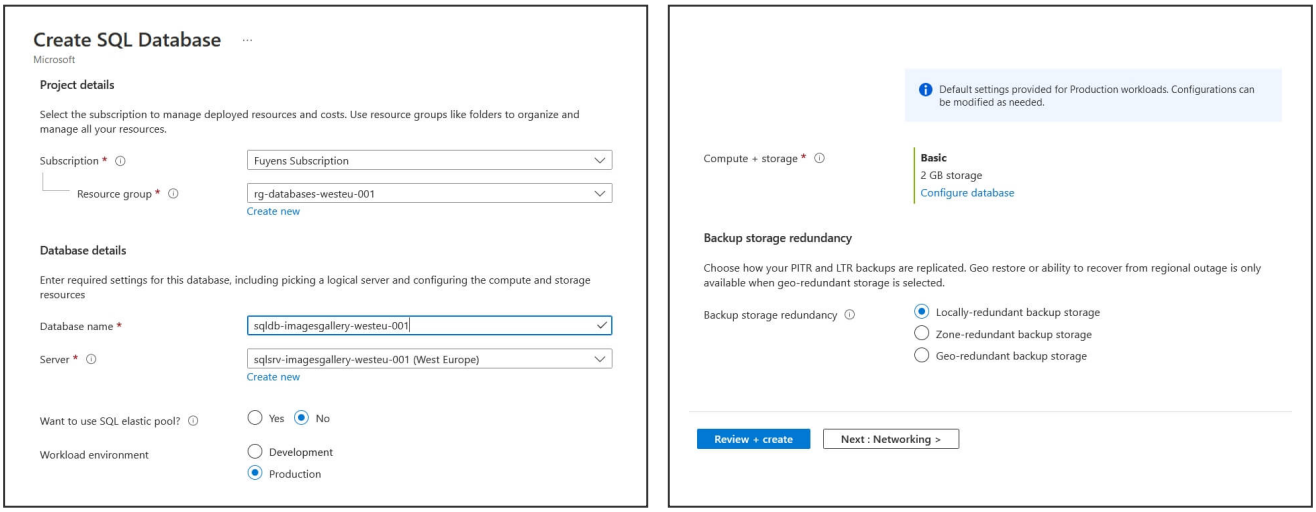


Creating the database server

The database

Step two, creating the database. We will choose the most basic options

- Select the same resource pool as the SQL server.
- Name it **“sqldb-imagesgallery-westeu-001”**.
- Select **“No”** for the **“elastic pool”** option.
- Select **“Production”**.
- Select the cheapest server, i.e. the **“Basic”** option.
- Select **“LRS”** for redundancy.

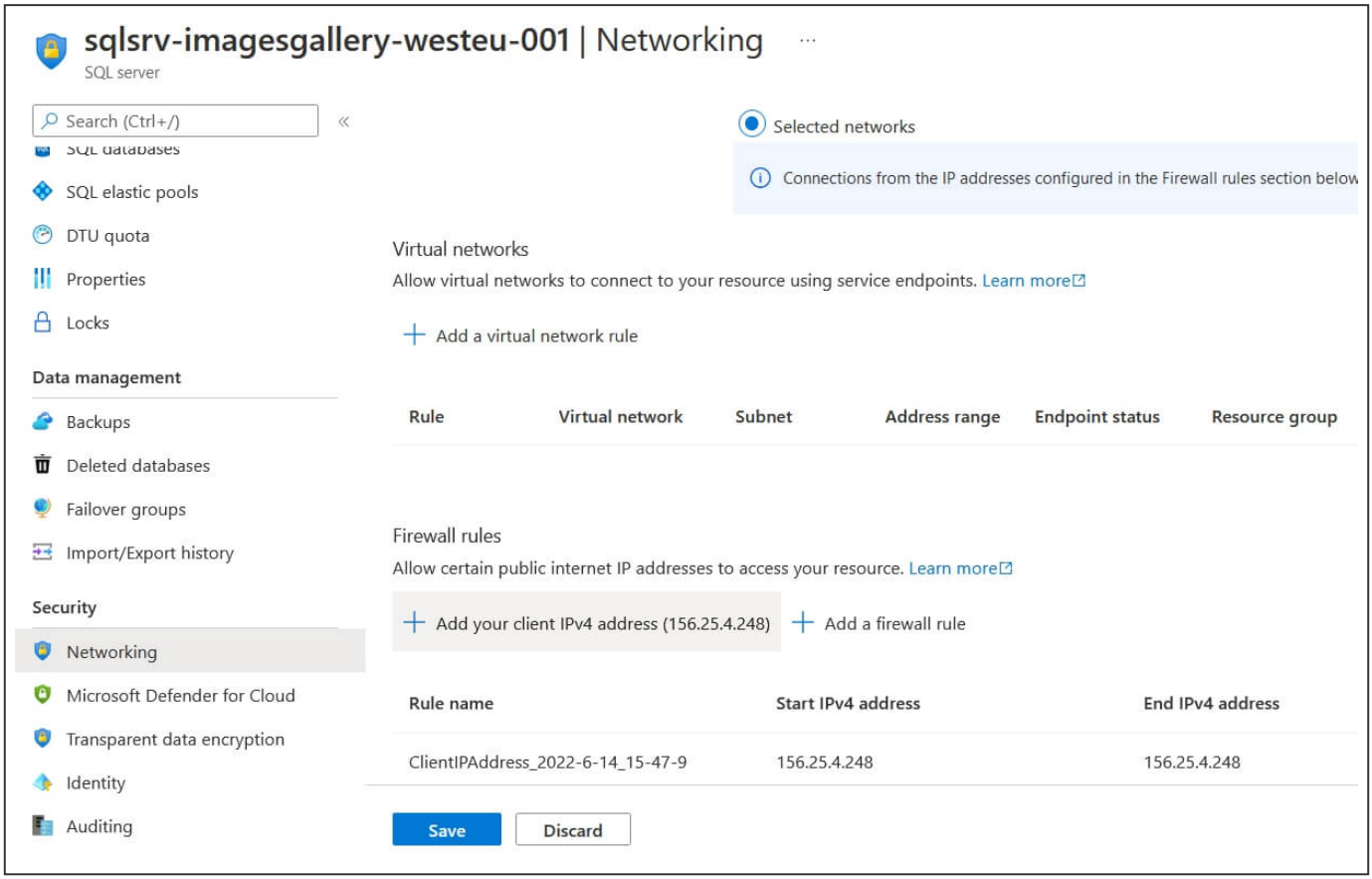


Creating the database

Connecting to the database

We’ll have to set up the server so we can access it.

- Start by clicking on the **“Networking”** tab and make sure the **“Selected networks”** option is enabled.
- Add your public IP address in the section about the firewall.



The "Networking" tab of SQL Server

- Check the option the exception **"Allow Azure services and resources to access this server"**.



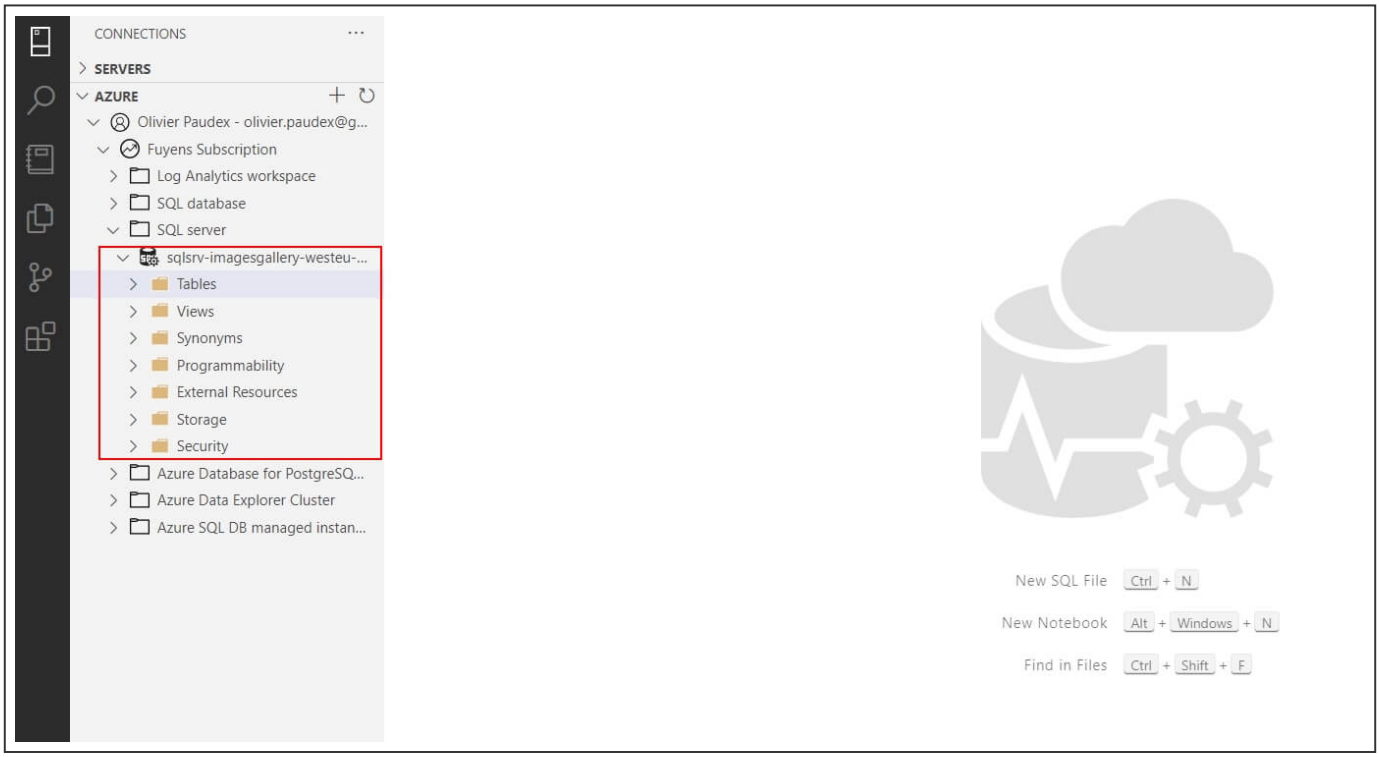
Authorize the application to access the database

- Download **Azure Data Studio** and install it on your PC.
- Click on the **"Overview"** tab of the SQL Server.
- Find its name by clicking on the note.



The "Overview" tab and the server name

- Enter the connection information into **Azure Data Studio** and connect.
- Once the connection is active, we can see the server name and the folders attached to it.



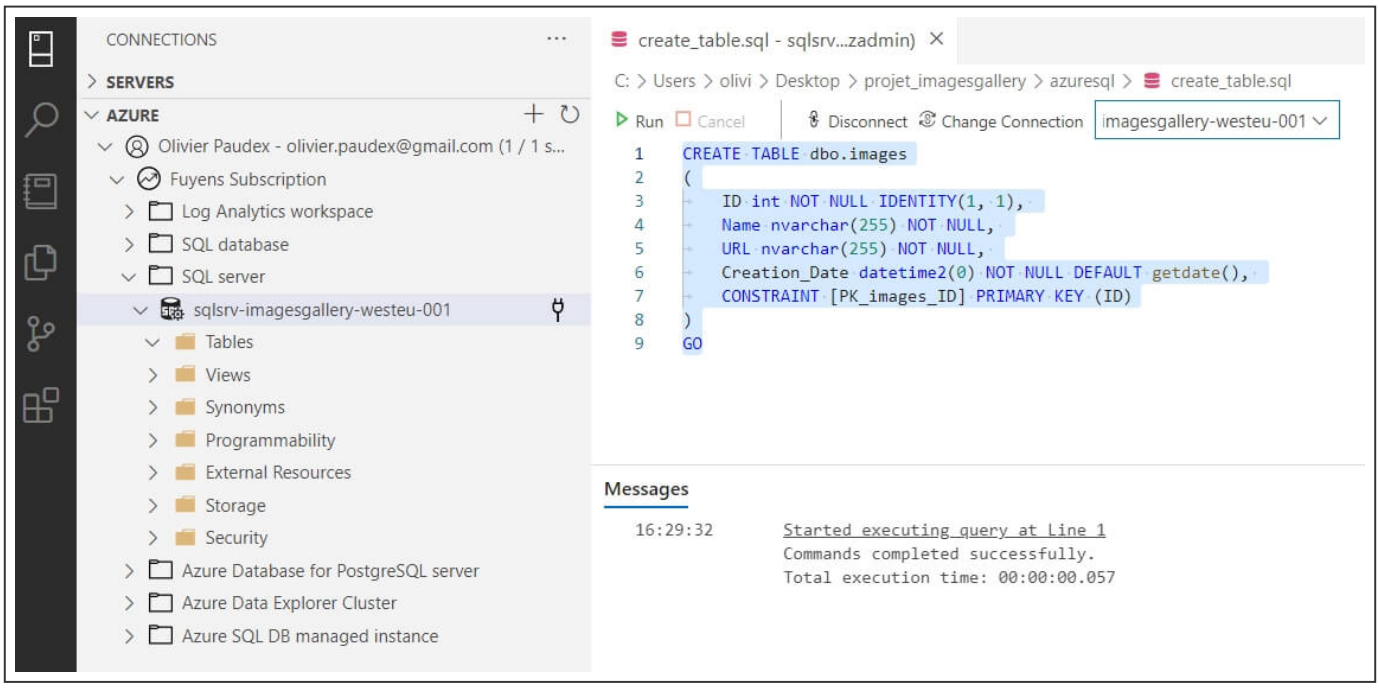
Azure Data Studio

Creating the database

- Copy and paste the small script below.

```
CREATE TABLE dbo.images
(
   ID int NOT NULL IDENTITY(1, 1),
   Name nvarchar(255) NOT NULL,
    URL nvarchar(255) NOT NULL,
   Creation_Date datetime2(0) NOT NULL DEFAULT getdate(),
   CONSTRAINT [PK_images_ID] PRIMARY KEY (ID)
)GO
```

- Save it to a file **"azure.sql"**.
- Return to Azure Data Studio and open the file.
- Accept the security caveats.
- Click **"Run"**.

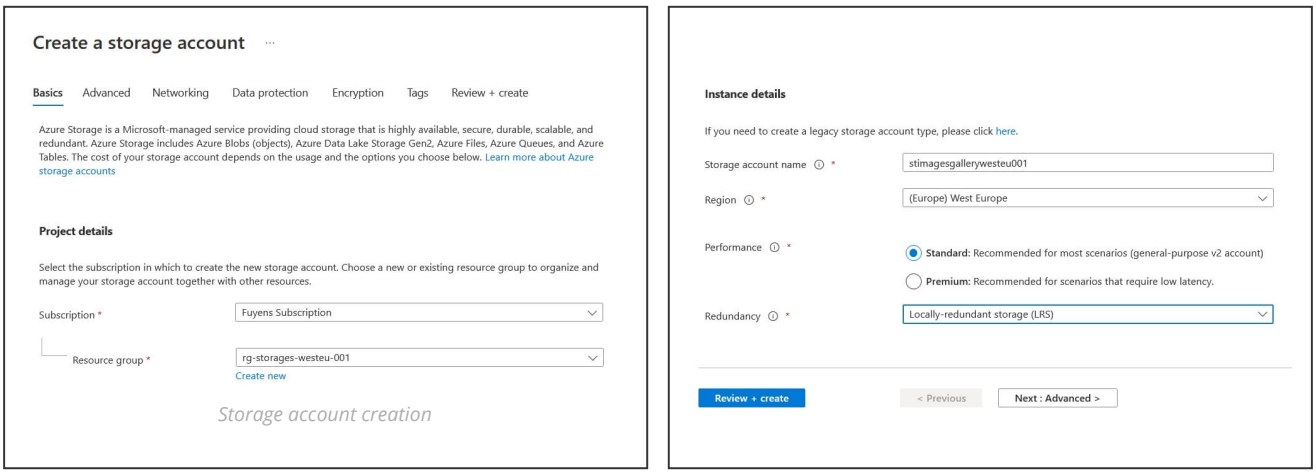


The database creation with Azure Data Studio

Storage

One of the first functions of the cloud is data storage. Again, storage in Azure is a service. No need to install a file server.

- Create a resource group for the storage.
- Create a storage account.
- Enter a name for the storage. The name must be **UNIQUE** to the world, with no capital letters and symbols.
- Select the **"Standard"** option.
- Select the **"LRS (Local Redundancy Storage)"** option.
- Accept all other options.
- Create the storage account.

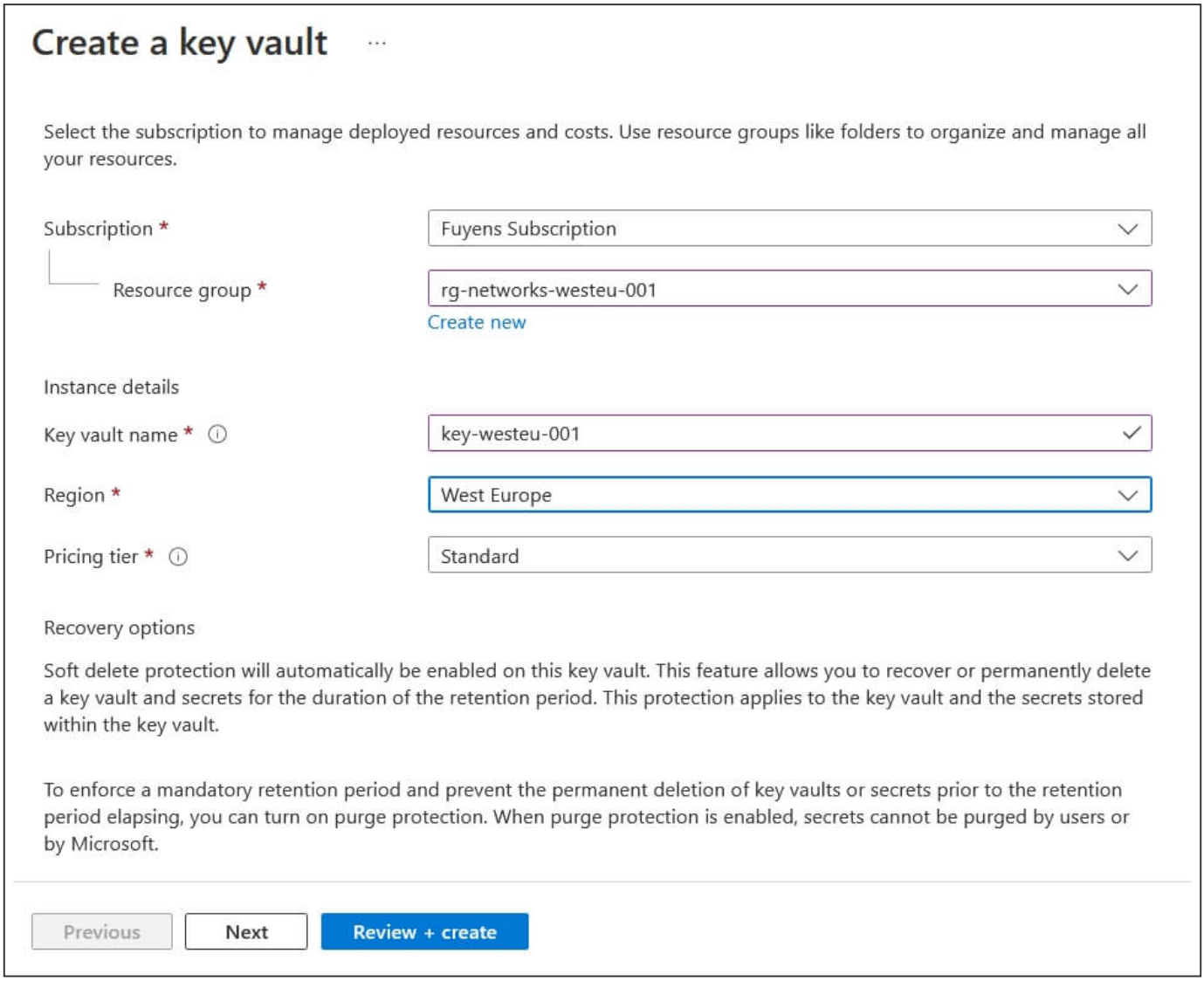


Storage account creation

The vault (keyvault)

The next service is the vault. This is the one that will hold the certificate and login passwords for the database and storage.

- Create a **"Key Vault"**.
- Select the network resource group.
- Name it **"key-westeu-001"**.
- Create the keyvault

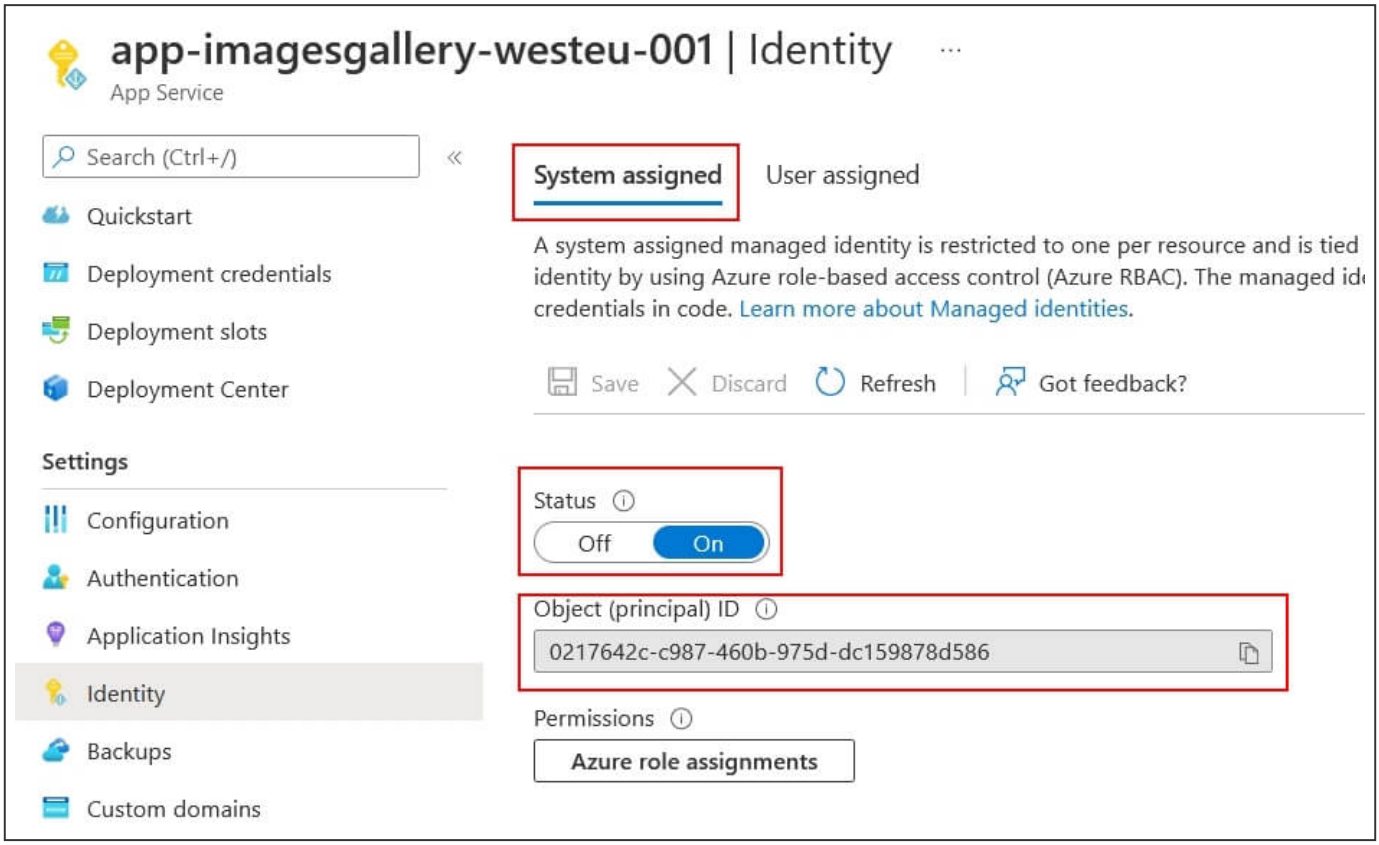


Vault creation

Configuring the keyvault

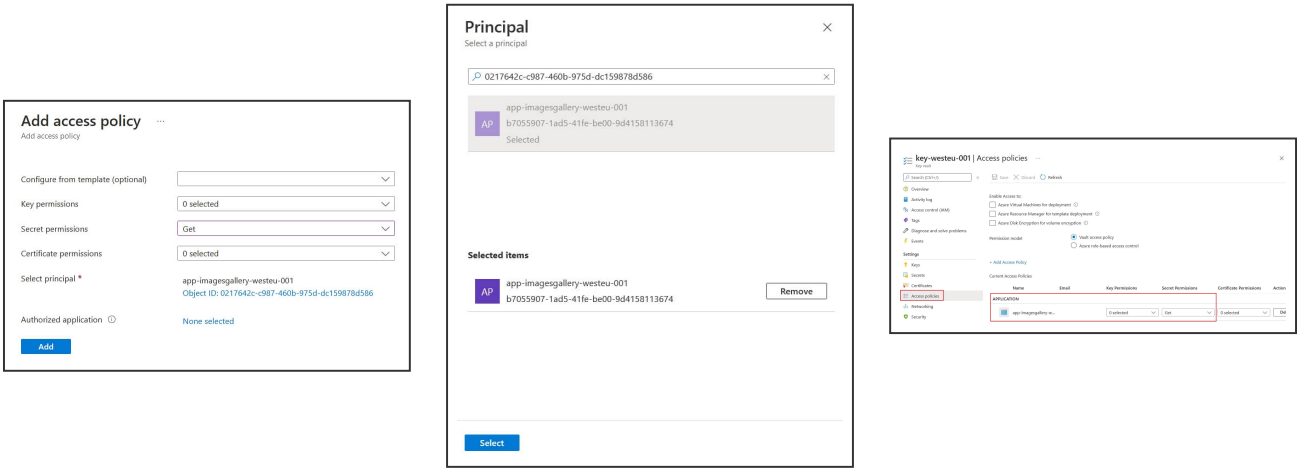
To access the keyvault, the various services must be registered in Azure AD.

- Return to the application (App Services).
- Click on the **"Identity"** tab.
- Create a **"managed identity"** of type **"system assigned"** for the application.
- Enable the service by dragging the button to **"On"**.
- Copy the object ID.



Application registration

- Go back to the keyvault.
- Click on the **"Access Policies"** tab.
- Click on **"Add Access policy"**.
- Select **"Get"** for the **"Secret permissions"**.
- Select **"Select Principal"**.
- Paste the application ID.
- Save.

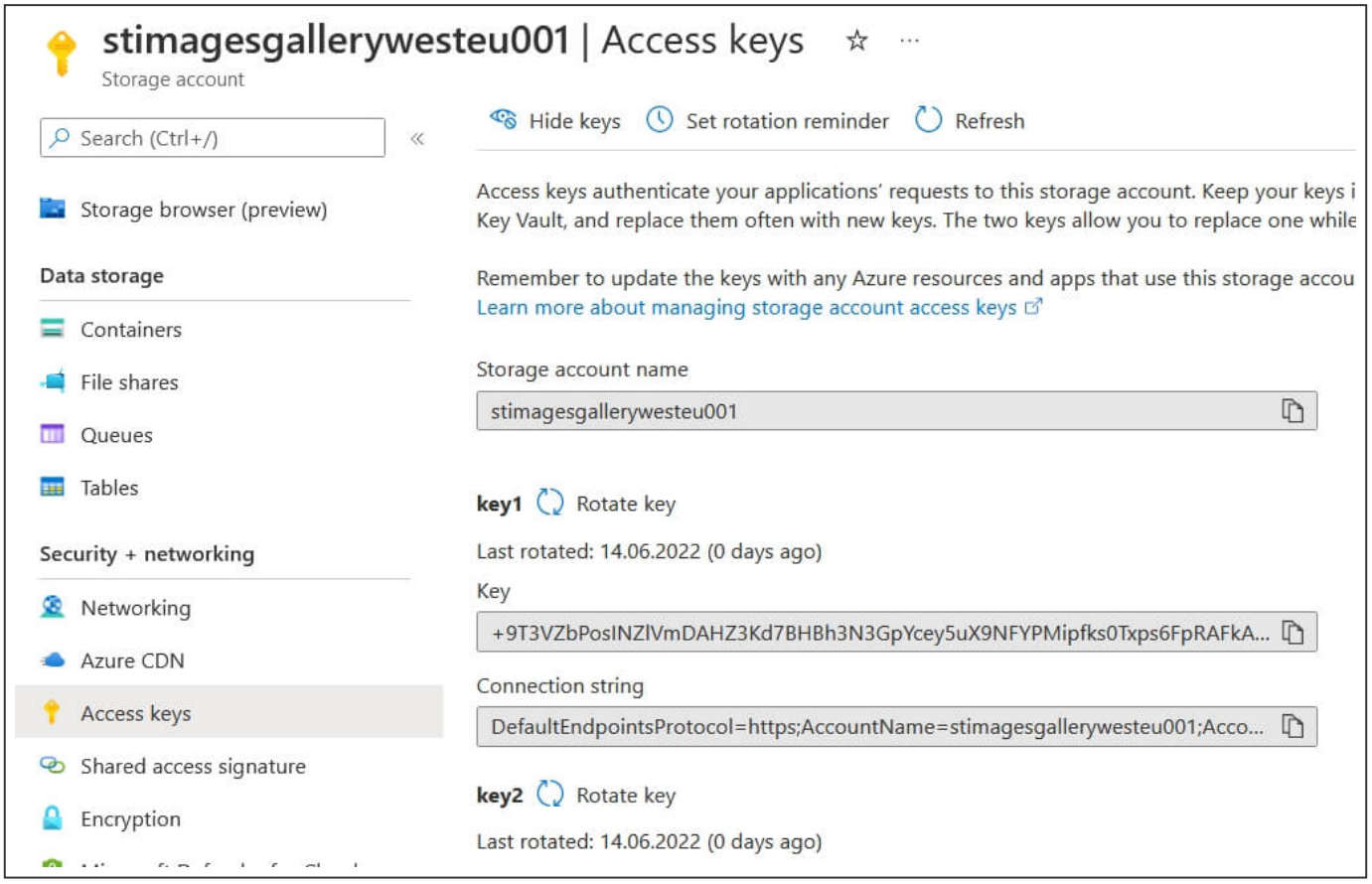


Adding an access font for the application

The Secrets

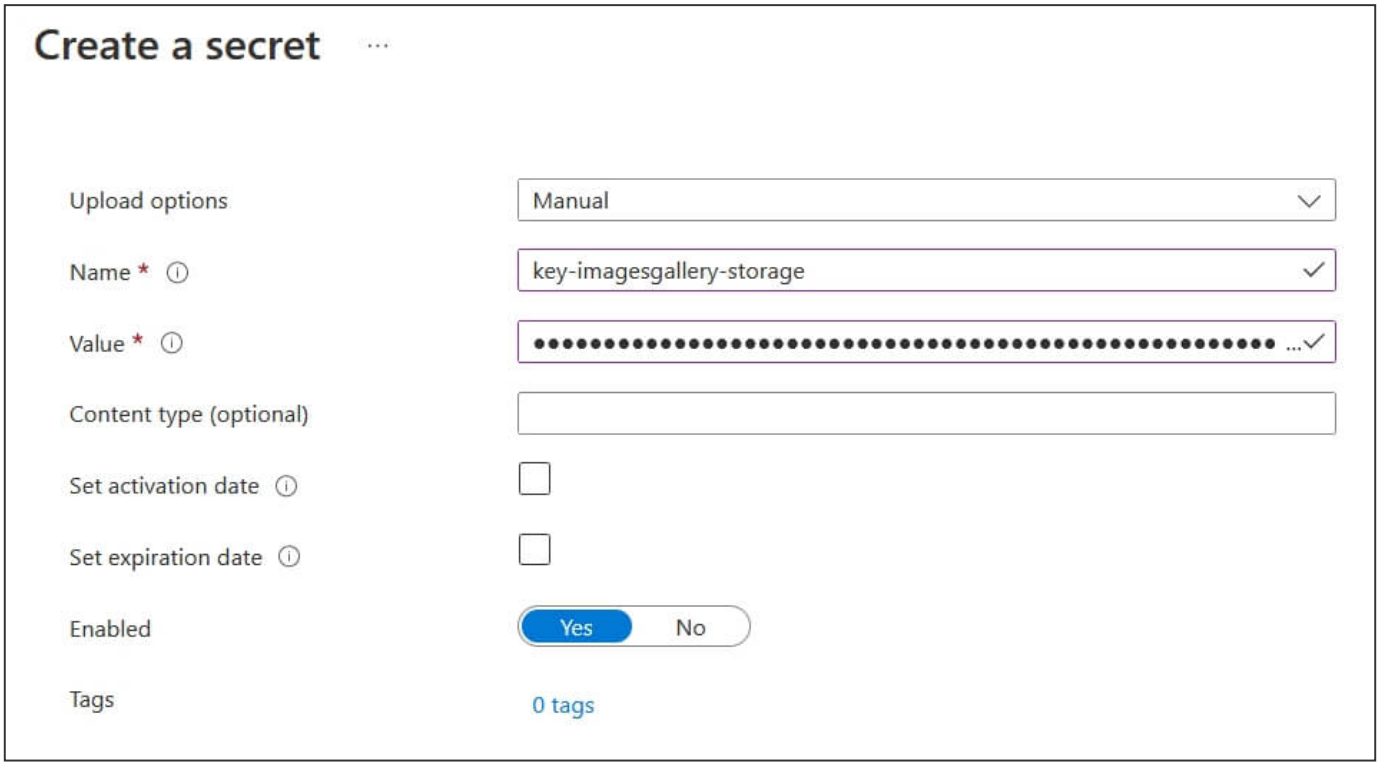
We call **"secrets"**, a string of characters less than 10kb in length used as a password or other confidential items.

- Go back to the storage account.
- Click on the **"Access keys"** tab.
- View the keys by clicking on **"Show keys"** at the very top of the screen.
- Copy key number 1.



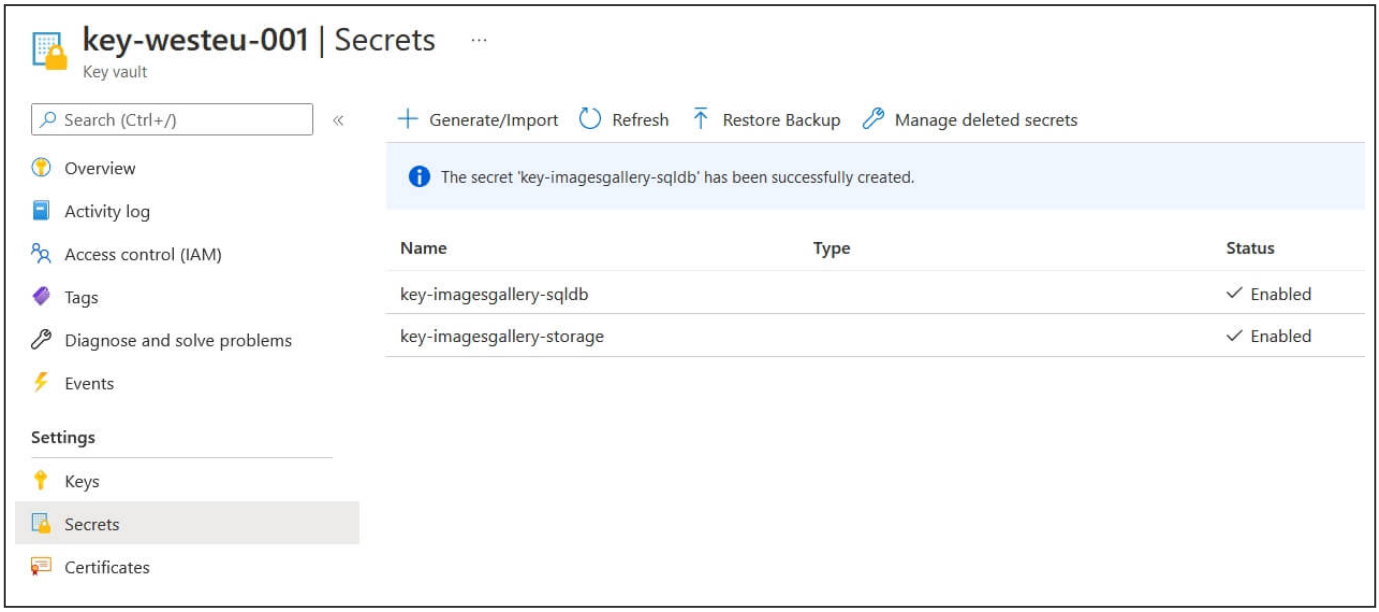
Storage account access keys

- Return to Keyvault.
- Create a secret for the storage account password.
- Name it **"key-imagesgallery-storage"**.
- Paste in key number 1.



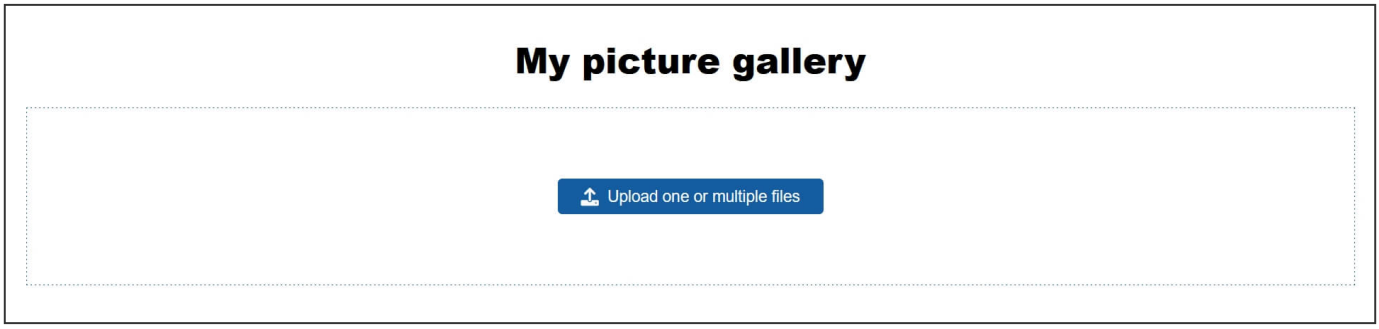
The secret of storage

- Start over for the database.
- Name it this time **"key-imagesgallery-sqldb"**.
- Paste in the SQL server password. If you forgot to write it down, you have the option of doing a password reset.



The Two Secrets of Infrastructure

At this point, the application should work with the URL: **"https://[app name].azurewebsites.net/"**.



The application (without content)

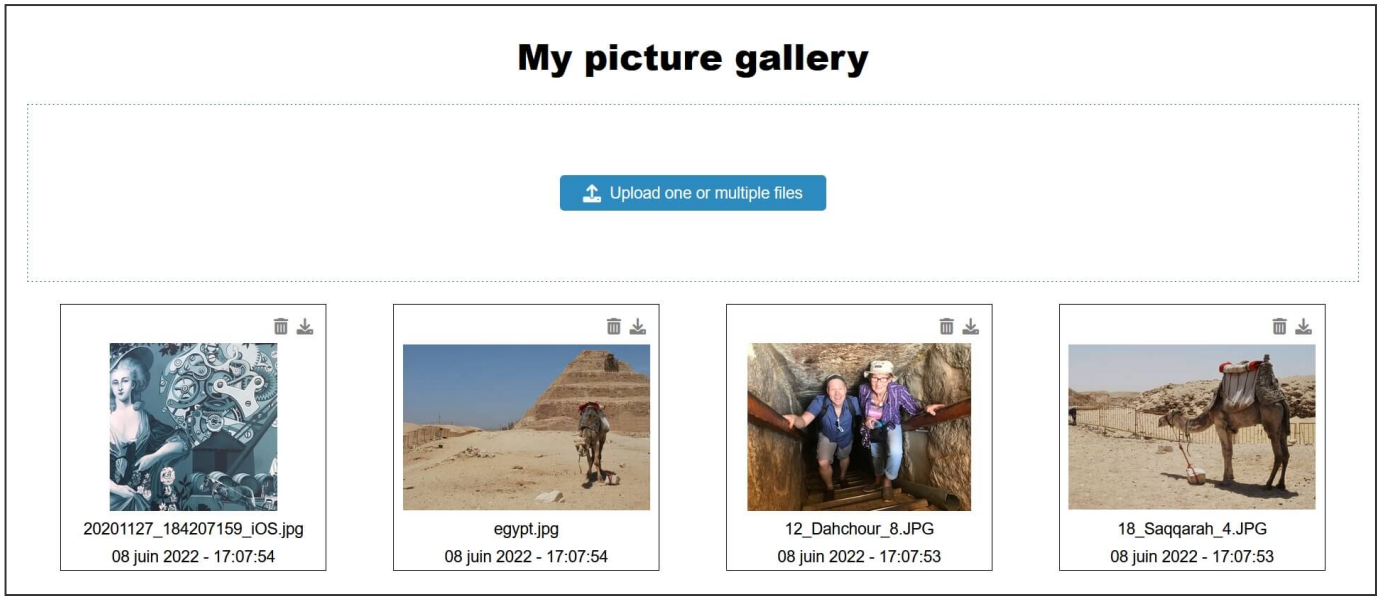
- Try uploading images.

You should see the result of the upload. It shows the number of images uploaded, the total number of images as well as any errors that occurred.



The result of uploading images

- Click on the **"Go Back"** link and you will see the thumbnails of the images displayed.
- Then it is possible to download or delete the thumbnails by clicking on the trash can and/or download icon.

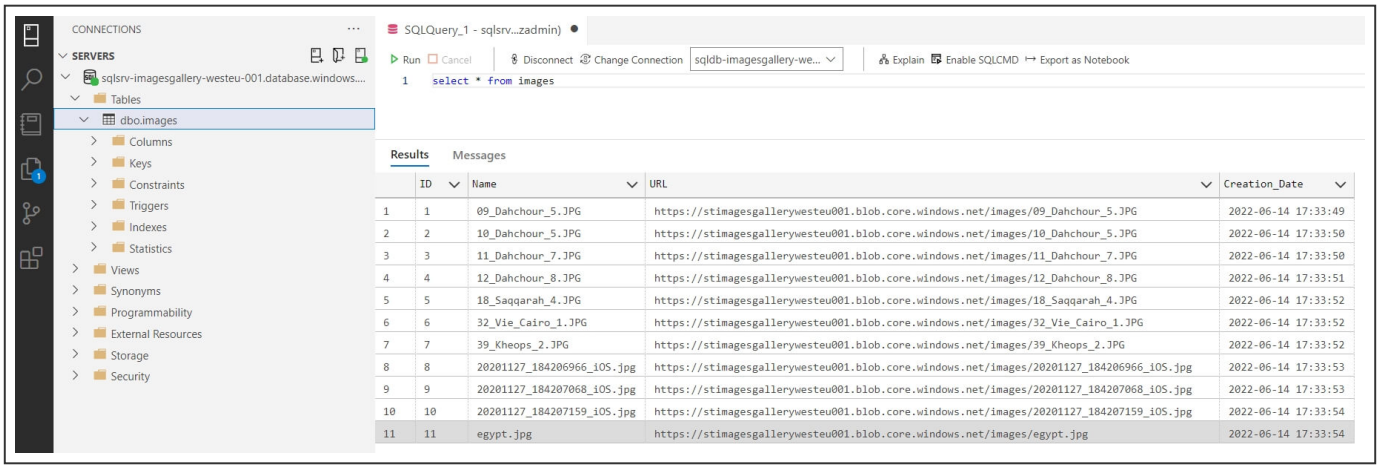


The application (with content)

Content verification

The contents of the database can be viewed with **Azure Data Studio**.

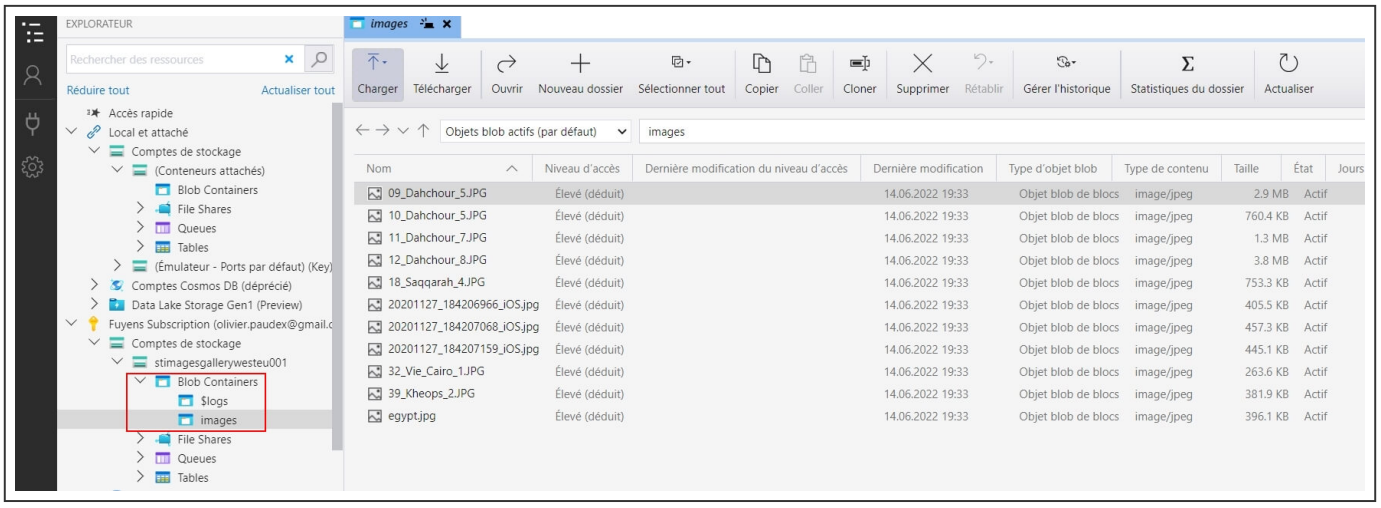
- Connect to the database and run the SQL query **"Select * from images"**.
- Azure Data Studio does display the images contained in the application.



The database contents

Also, it is possible to check the content of the storage.

- Download **Azure Storage Explorer** and install it on your PC.
- Log in.



The contents of the images container

The application will automatically create a **"blob container"** called images. This one contains our images.

Here we go, the application works and that's already not bad. But there is still room for improvement.

Conclusion

This chapter has covered the registry in which the container was dropped, as well as the various services used for this application such as storage, database, and vault.

Finally, it is also about two of the indispensable tools when it comes to using storage and database services.

- Azure Data Studio
- Azure Storage Explorer

The next chapter will focus on the security of the application and on the Azure cloud in general.