Using an Azure Container Instance to Convert a BAK to a BACPAC for Import into Azure SQL Database

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What problem am I trying to solve?

- Multiple source file types are provided to import into an Azure SQL Database – but I have no access to the source database

- One of the source file types is .bak, a database backup file

- The .bak cannot be directly restored to Azure SQL Database

- It must be converted to a .bacpac for import

- Only PaaS is used – no IaaS

Solution

- The .bak lands in an Azure Storage File Share

- An Azure Container Instance is created:
  - Running SQL Server latest on Ubuntu Linux, with sqlcmd and sqlpackage
  - The File Share is mounted as a drive
  - A bash script restores the database, then exports the .bacpac

- The .bacpac is copied to Azure Blob Storage

- The .bacpac can be imported into a new Azure SQL Database

1. Docker image is pushed to Azure Container Registry

Azure Key Vault stores Storage, Container Registry, and SQL server secrets

2. .bak is stored in Azure Storage File Share.

3. Azure Container Instance is created from ACR, bash script converts .bak to .bacpac

4. .bacpac is moved to Azure Storage Container.

5. .bacpac is imported as a new Azure SQL Database.
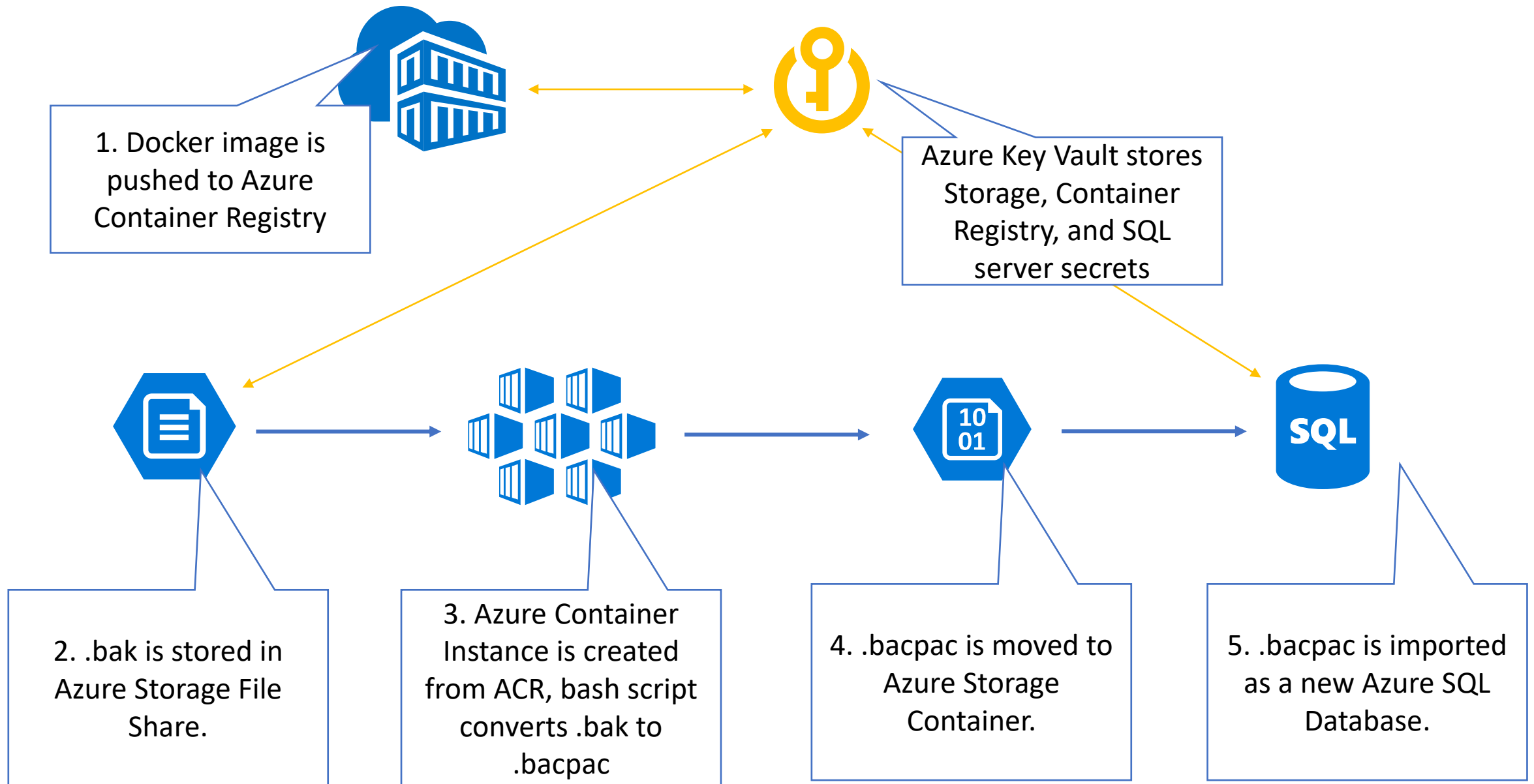
Technologies used

Docker Desktop

- Run Docker containers on Windows or Mac
  - https://www.docker.com/products/docker-desktop
- On Windows, requires Windows Subsystem for Linux (WSL)
  - https://docs.microsoft.com/en-us/windows/wsl/install-win10
- This solution:
  - Pulls the latest mssql/server image
  - Installs mssql-tools for sqlcmd.exe
  - Install sqlpackage for sqlpackage.exe

Azure Storage

- File Share
  - Files shares accessible via SMB
  - https://docs.microsoft.com/en-us/azure/storage/files/storage-files-introduction
  - The container will need a file share to attach as a mounted volume
- Blob
  - Designed to store large volumes of files, images, photos, and more
  - https://docs.microsoft.com/en-us/azure/storage/blobs/storage-blobs-introduction
  - The PowerShell cmdlet to import the .bacpac can only read from blob storage

Azure Key Vault

- Use Key Vault to securely store secrets
  - Storage SAS and Access Keys
  - SQL server admin username and password
  - Container Registry admin username and password
- https://docs.microsoft.com/en-us/azure/key-vault/general/overview

Azure Container Registry

- Store Docker images in a private repository
- https://docs.microsoft.com/en-us/azure/container-registry/

Azure Container Instances

- Create containers based on images in the Container Registry
- https://docs.microsoft.com/en-us/azure/container-instances/container-instances-overview
- Fewer features and less orchestration (and less complex!) than Azure Kubernetes Services (AKS)

Azure SQL Database
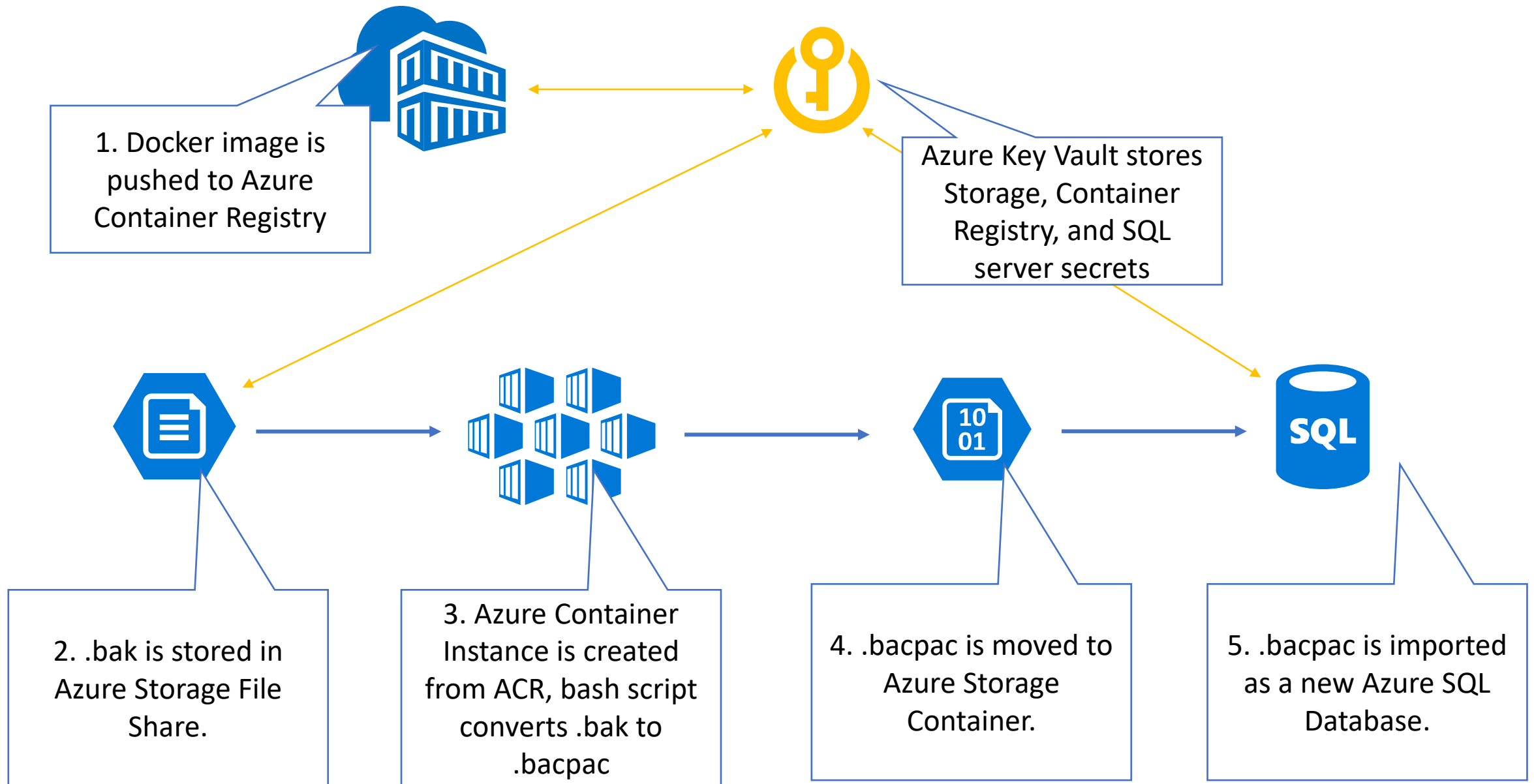

- SQL Server in Azure
  - This solution uses a single database
- https://docs.microsoft.com/en-us/azure/azure-sql/database/sql-database-paas-overview
- No option to attach a data file or restore a backup
- Can populate from existing database through .bacpac, Data Migration Service, or replication

BACPAC

- A file that captures schema and data

- On EXPORT, a schema file is created and data is exported out to bcp

- On IMPORT, the schema file is run first to create the objects, then the data is imported through bcp

- [Data-tier Applications - SQL Server | Microsoft Docs](#)

- [Migrating from SQL Server to Azure SQL Database using Bacpac Files - Microsoft Tech Community](#)
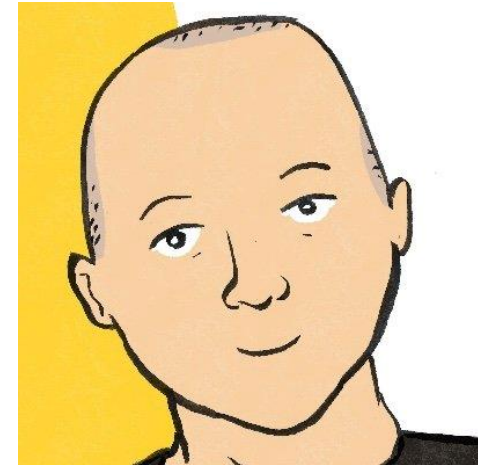
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4. .bacpac is moved to Azure Storage Container.

5. .bacpac is imported as a new Azure SQL Database.

Demo

Thank you Drew Furgiuele!
@Pittfurg

Thank you Rob Sewell!
@sqldbawithbeard

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