Practical Scenarios for SQL Server 2022's New Storage Features

Not a vendor session ☺

Anthony E. Nocentino
anocentino@purestorage.com

Anthony E. Nocentino

Principal Field Solution Architect @ Pure Storage

- Specialize in system architecture, performance, SQL Server, Kubernetes, Containers, Microsoft Azure and VMware
- Masters Computer Science

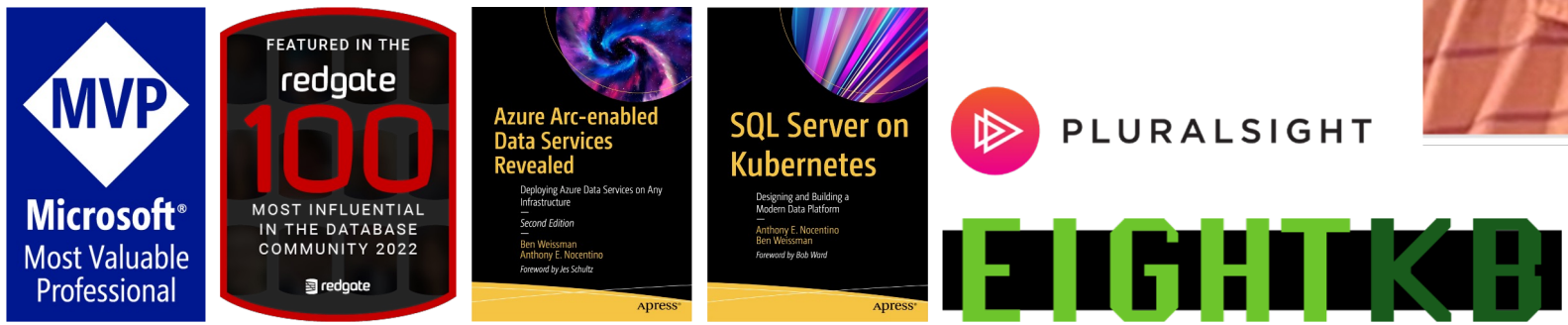
email: anocentino@purestorage.com

Blog: www.nocentino.com

Twitter: @nocentino

GitHub: https://github.com/nocentino/

Pluralsight Author: www.pluralsight.com



Agenda

- Volume Snapshots for Databases
- SQL Server 2022
  - Database Engine Enhancements
  - S3 Object Integration

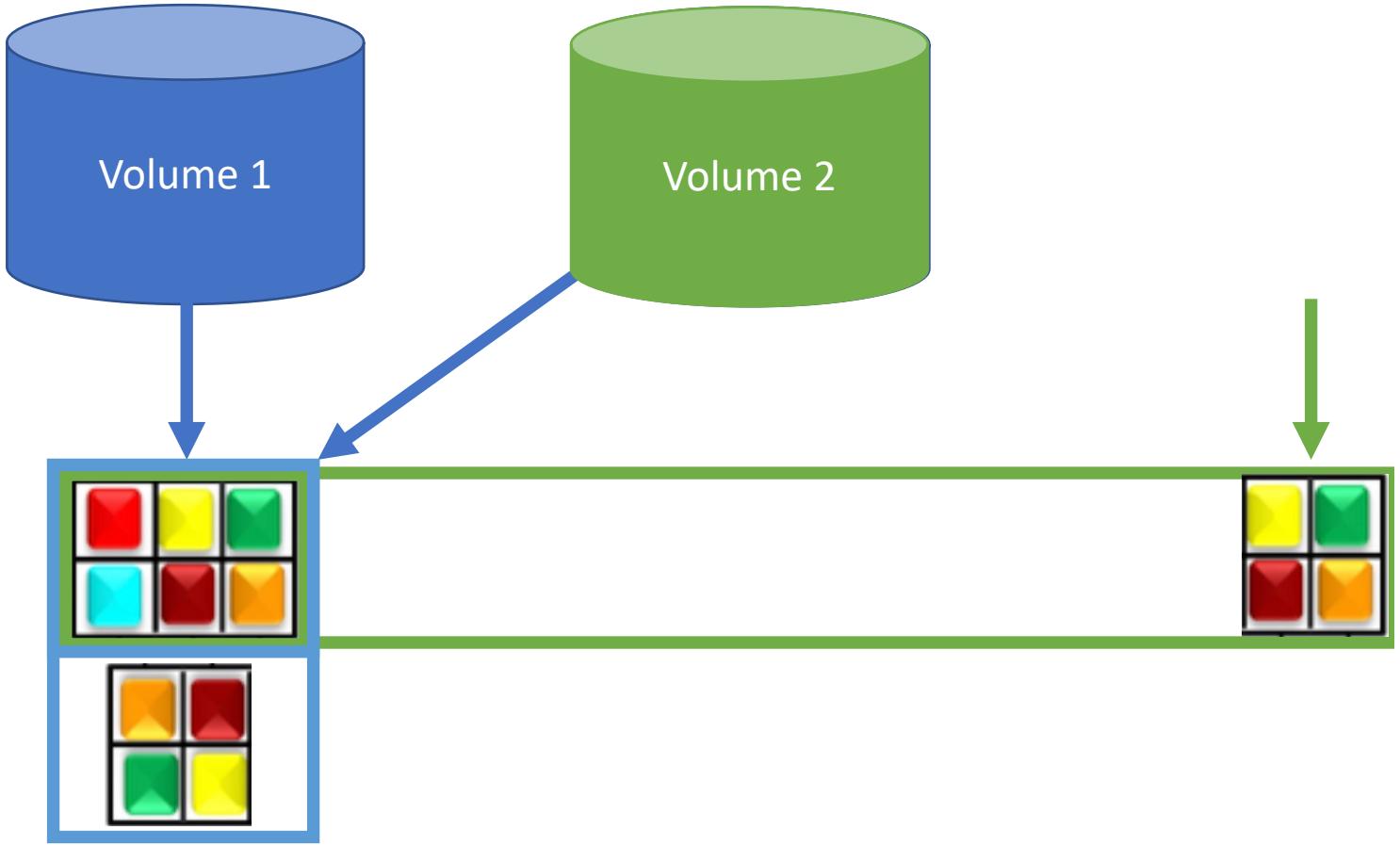
- This isn’t a vendor session…
  but I’ll be using gear in my lab at work

Volume Snapshots for Databases!

We can literally bend space/time when it comes to working with large DBs

What’s a storage based snapshot?

A snapshot is a point in time representation of data on a Volume



SQL Server 2022 – Database Engine Features

Protecting Large Databases

Crash consistent vs. application consistent snapshots

- Enables point in time recovery of a database using snapshots

TSQL Based Snapshot (Cross Platform Snapshot)

- Enables point in time recovery without VSS
- Availability Group Replica Seeding from snapshot
  - Build Availability Groups faster
  - Get back into a high availability posture faster after a failure or failover

QAT Offload - QuickAssist Technology

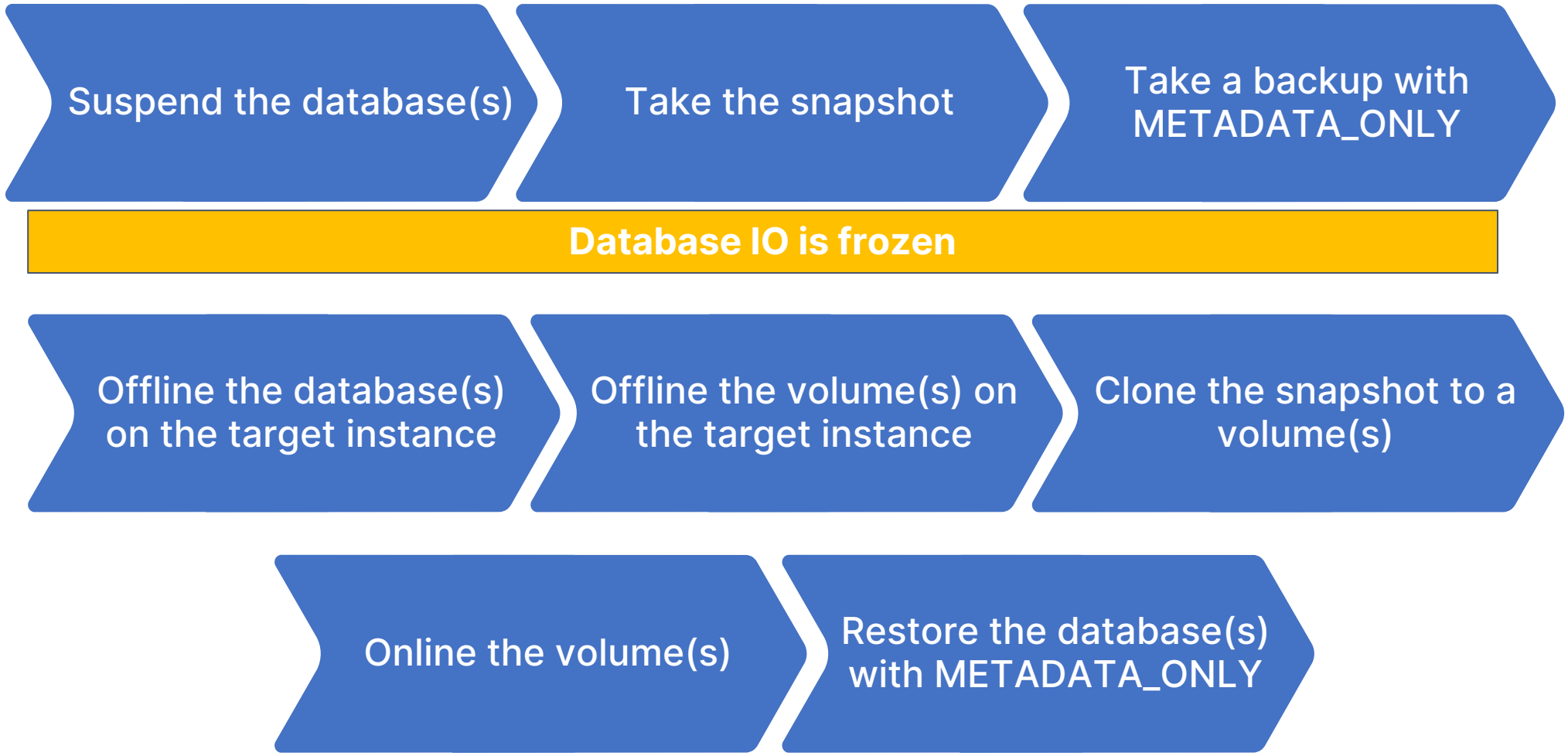
- Hardware accelerated encryption and compression
- Helps accelerate large database backups
- Faster backups and restores

https://www.nocentino.com/posts/2022-05-26-seed-ag-replica-from-snapshot/

https://github.com/microsoft/sql-server-samples/blob/master/samples/features/t-sql-snapshot-backup/snapshot-backup-restore-azurevm-single-db.ps1

Using Volume Snapshots for Databases

Bending space and time…



Demo:
SQL Server 2022
Using TSQL Snapshots

S3 101

Modern Object Storage

- AWS Simple Storage Service (S3)
  - Storage service in the cloud
- API is open and available
- Has become the “standard” for object storage
- Companies have built their own s3 compatible object storage platforms
- Means you can get access to s3 anywhere
  - Pure Storage FlashBlade
  - MinIO
  - Many others

S3 Object Integration – Backup and Restore

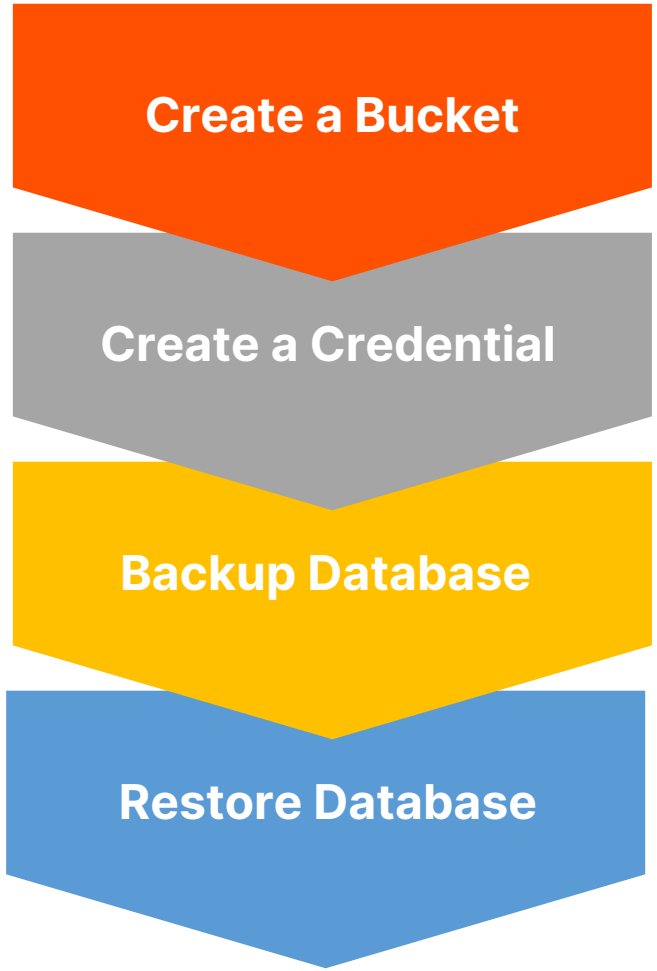
Modern Object Storage and Data

- Scale out rather than scale up
  - Single database high throughput
  - Concurrent backups
- Large environments
- Single Namespace
- Easy and native replication
- DBAs have one job
  - Get backups off the primary storage
  - Get them out of the data center as fast as possible…

https://www.nocentino.com/posts/2022-06-06-backing-up-to-s3-storage-with-sqlserver/

S3 Object Integration – Backup and Restore

Modern Object Storage and Data




```
CREATE CREDENTIAL [s3://s3.example.com/sqlbackups]
WITH IDENTITY = 'S3 Access Key', SECRET = ACCESSKEYID:SECRETKEY';
```

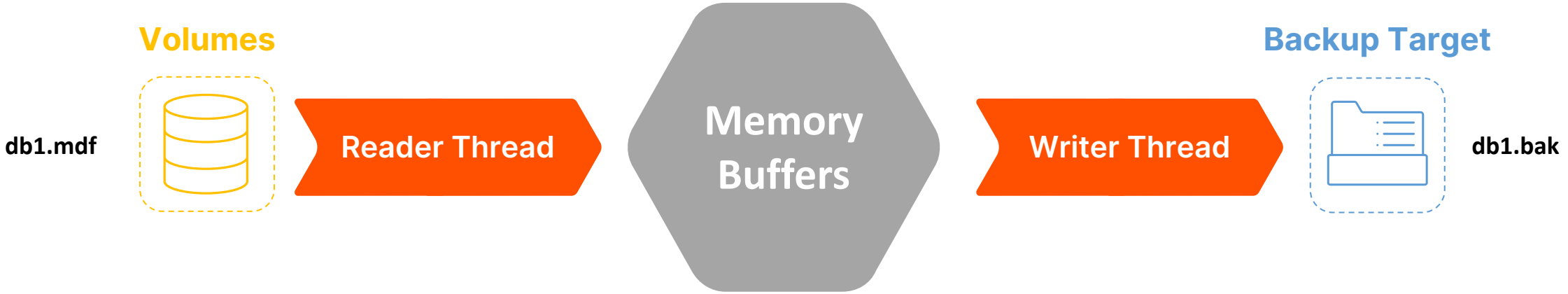
```
BACKUP DATABASE TestDB1
TO URL = 's3://s3.example.com/sqlbackups/TestDB1.bak'
WITH COMPRESSION, STATS = 10, FORMAT, INIT
```

```
RESTORE DATABASE TestDB1
FROM URL = 's3://s3.example.com/sqlbackups/TestDB1.bak'
WITH STATS = 10
```

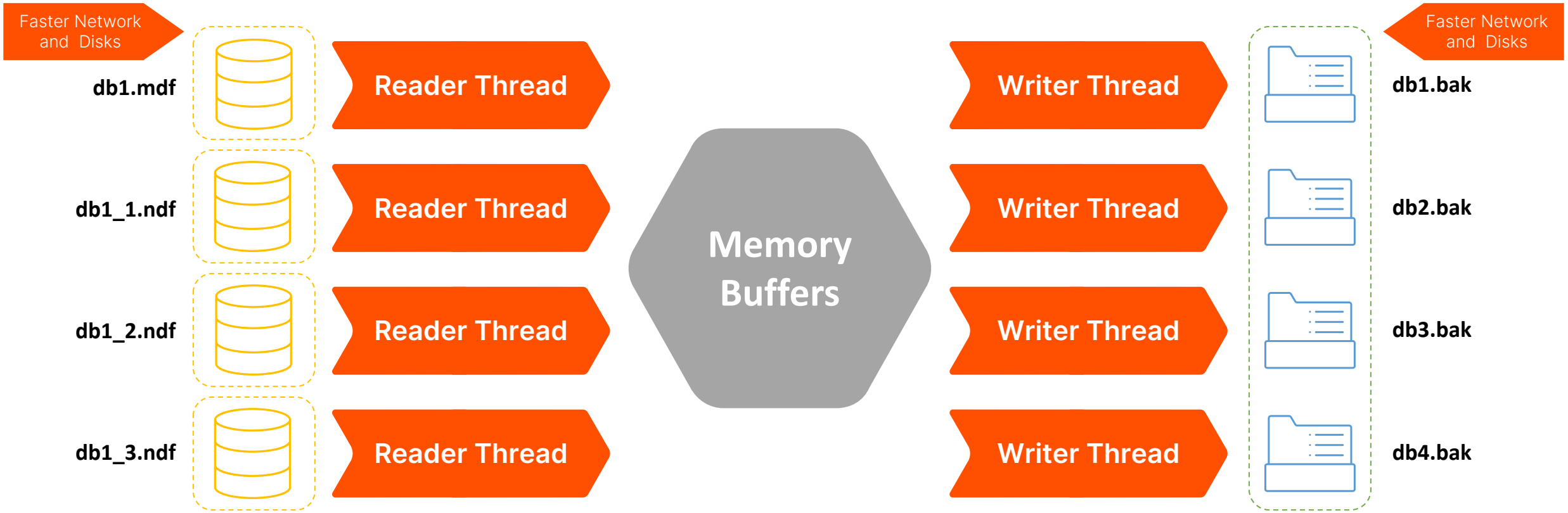
SQL Server Backup Architecture

Database Files are read by the **Reader Thread** into **Memory Backups Buffers**.

The **Writer Thread** reads from backup buffers and is written to the **Backup File.**



Performance Tuning Backups



SQL Server

How many database files and shares/buckets should you use?

S3 Bucket (or SMB)

S3 Object Integration – Data Virtualization

Accessing modern object storage natively in SQL Server

Why Data Virtualization?

- Access object storage directly from SQL Server engine
- Minimize overhead to get access to data
- Access data where it lives
- Backup restore / partitioning / index tuning not needed

Supported external file types

- Parquet/CSV/Delta

How to access external object data

- OPENROWSET
- EXTERNAL TABLE
- CREATE EXTERNAL TABLE AS SELECT

https://www.nocentino.com/posts/2022-08-13-setting-up-minio-for-sqlserver-object-storage-docker-compose/

Demo:
SQL Server 2022
Using S3 Object Integration

Review

- Volume Snapshots for Databases
- SQL Server 2022
  - Database Engine Enhancements
  - S3 Object Integration