SQL Server: Myths and Misconceptions

Module 10: High Availability

Paul S. Randal
Paul@SQLskills.com

pluralsight
hardcore developer training

Introduction

- **Successfully achieving high availability depends on:**
  - Picking the right technologies
  - Understanding how to configure those technologies correctly
  - Understanding the side effects and behaviors of those technologies

- **In this module:**
  - Eight myths around high-availability features in SQL Server

High-Availability Myth #1

UNTRUE!!

- **Myth: When a database snapshot is created, it makes a copy of the entire database**

- **A database snapshot starts out very small and grows as needed**
- **Database snapshots use NTFS sparse files for storage**
- **Although the sparse files present themselves as the same size as the matching database data files, they start very small and grow as required**
  - As data file pages in the source database change, they are pushed, pre-change, into the database snapshot
- **This is why database snapshot creation is usually very fast**
- **Database snapshots do not reserve disk space, so can run out of space and become unusable**

High-Availability Myth #2

YES AND NO!!

- **Myth: Database snapshots are very efficient**

- **They are efficient in terms of disk space…**
- **But they can be really inefficient in terms of memory**
  - A page that hasn't changed in the source database and is accessed through the snapshot takes up 8KB of extra memory
  - Each page image in memory is owned by a database so can't be shared
  - This can contribute to buffer pool memory pressure
- **And if you interrupt the creation of one, it won't stop until it's finished creating it**
  - A new database snapshot has to be transactionally consistent
  - Crash recovery of the database snapshot cannot be interrupted

High-Availability Myth #3

UNTRUE!!

- **Myth: Failure detection is instantaneous in database mirroring**

- **Speed of failure detection depends on what the failure is**
- **Some examples:**
  - Fast: SQL Server instance crashes
  - Slow: Windows crashes
  - Slower: log drive failure
  - Maybe: corrupt page

High-Availability Myth #4

UNTRUE!!

- **Myth: Failover is instantaneous in database mirroring**

- **Failover speed depends on how database mirroring is configured and the state of the mirror database**
- **Automatic failover only happens if:**
  - Synchronous database mirroring is being used
  - A witness server is configured
  - The mirror is in the SYNCHRONIZED state
- **Even then, the mirror database will not come online until all its REDO queue of transaction log has been recovered**
  - This could mean seconds, minutes, or hours of delay!
- **Monitor the REDO queue size on the mirror!**

High-Availability Myth #5

IT DEPENDS!!

- **Myth: Failover clustering is the best HA technology to use**

- **What are the requirements?**
- **Failover clustering protects against a failed server but has a big problem: no redundancy at the I/O subsystem level**
- **You must provide some additional protection for the data, for example:**
  - SAN replication
  - Database mirroring
  - AlwaysOn Availability Groups

- **Failover clustering is often not the most appropriate HA technology, based on requirements, unless paired with another technology**

High-Availability Myth #6

UNTRUE!!

- **Myth: It is possible to have multiple mirrors of a database with database mirroring**

- **Only one mirror database can exist per principal database**
- **Other technologies allow multiple copies, for example:**
  - Log shipping
  - Replication
  - AlwaysOn Availability Groups

- **Also database mirroring does not allow 'chaining'**
  - I.e. a database cannot be a mirror and a principal for another mirror

High-Availability Myth #7

UNTRUE!!

- Myth: In-flight transactions are preserved after a failover

- SQL Server does not provide any technology that allows transactions to continue after a failover
- In-flight transaction are *never* preserved when a connection is terminated
- Crash recovery is always involved when a failover occurs, which rolls back uncommitted transactions
- The application must gracefully cope with being disconnected, reconnecting, and trying the transaction again

High-Availability Myth #8

TRUE!!

- **Myth: Replication is a valid high-availability technology**

- **Replication creates a redundant copy of data and so allows that data to be highly available**
- **It does have a lot of drawbacks though:**
  - Hard to troubleshoot and work with
  - Limited scope for what is protected
  - No automatic failure detection or failover
- **But if the requirements are such that replication will work, that's perfectly valid**

- **And peer-to-peer replication is the only technology that allows the redundant data copy to be written to**