SQLintersection

Session: Wednesday, 10:00AM – 11:00AM

Introduction to High Availability and Disaster Recovery with SQL Server

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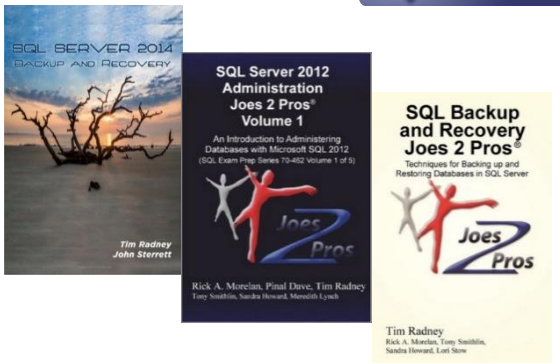

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- **Outstanding PASS Volunteer**
- **Regular presenter at worldwide conferences on administration, disaster recovery and performance tuning.**
- **Friend of Red Gate**
- **(I also like electronics, aquaponics, farming chickens, veggies, and tilapia)**

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Reminder: Intersect with Speakers and Attendees

- **Tweet tips and tricks that you learn and follow tweets posted by your peers!**
  - Follow: #SQLintersection and/or #DEVintersection
- **Join us – WEDNESDAY Evening – for SQLafterDark**
  - Doors open at 7:00 pm
  - Trivia game starts at 7:30 pm

    Winning team receives something fun!
  - Raffle at the end of the night

    Lots of great items to win including a seat in a SQLskills Immersion Event!
  - The first round of drinks is sponsored by SentryOne and SQLskills

SQLafter Dark

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SQLskills immerse yourself in sql server & SentryOne™

Overview

- Definitions
- SQL Server HA/DR solutions
- HA/DR considerations
- Backup fundamentals

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High Availability

- A system design approach and associated service implementation that ensures a prearranged level of operational performance will be met during a contractual measurement period. Wikipedia
- A system design that allows for minimal downtime
- Protection from OS or hardware failure

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Disaster Recovery

- Risk management
- Recovery Point Objective – RPO
- Recovery Time Objective – RTO
- Disaster Recovery Plan – DRP

- Backups are not enough

SQL Server HA/DR Solutions

- Database Mirroring
- Log Shipping
- Replication
- Failover Cluster instances
- Always On Availability Groups

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Database Mirroring

- Deprecated in SQL Server 2012
- Database transactions are compressed and shipped to a secondary (2008+)
- Transfer may be synchronous or asynchronous (Enterprise)
- Optional witness server can facilitate failover

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Database Mirroring Pros/Cons

- **Pros**
  - Automatic failover (witness)
  - Setup is quick and easy
  - Failover is quick in most cases
- **Cons**
  - Deprecated in SQL Server 2012
  - Database level
  - Async is Enterprise only
  - Secondary is inaccessible (except for snapshots)
  - Human error is carried over

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Log Shipping

- Transaction Log backups occur on the primary
- SQL Agent jobs ship logs to secondary server(s)
- SQL Agent job restores logs (with load delay)
- Data can be read on the secondary except during transaction log restores
- Can have a log ship monitor server

Log Shipping Pros/Cons

- **Pros**
  - Standard edition
  - Multiple target support
  - Readable secondary copies (standby)
  - Can load delay *
- **Cons**
  - Dependent on backup of primary
  - Manual failover process
  - Reasonable high complexity

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Replication

- Multiple replication types, transactional, merge, and snapshot
- Typically starts with an initial sync between Publisher and Subscribers
- Transactional replication data changes tracked through the SQL Server transaction log
- Merge replication tracks changes through triggers and metadata tables
- Snapshot replication completely overwrites existing data

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Replication Pros/Cons

- **Pros**
  - Standard edition for transactional
  - Multiple target support
  - Replicated subset of data
- **Cons**
  - Manual failover process
  - Unknown RPO
  - Can be fragile and re-sync cumbersome
  - High complexity
  - Transactional replication requires primary keys

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Failover Cluster Instances

- A group of servers working together to increase availability
- Pre Windows 2012 – Shared Storage
- Two node limit on SQL Server Standard
- Cluster network
- Requires quorum
- Windows 2012 and below requires same domain

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Failover Cluster Instances Pros/Cons

- **Pros**
  - Multiple servers for HA
  - Provides entire instance protection
  - Automatic failover
- **Cons**
  - Complex setup
  - Idle hardware
  - Small downtime during failover
  - In some cases, storage single point of failure

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Always On Availability Groups

- Built on Windows Server Failover Cluster
- SQL Server 2012+
- Readable secondary with Enterprise
- Synchronous and asynchronous modes
- SQL Server 2012 Ent – 4 secondary replicas, 2 can be synchronous
- SQL Server 2014 Ent – 8 secondary replicas, 2 can be synchronous
- SQL Server 2016 Ent – 8 secondary replicas, 3 can be synchronous
- SQL Server 2016 Standard – basic availability group (mirroring)

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Always On Availability Groups Pros/Cons

- **Pros**
  - Not dependent on shared storage
  - Readable secondaries
  - Configuration is easy
  - Grouping of databases into AGs
- **Cons**
  - Large setups can be expensive
  - Enterprise only – except for BAG

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Considerations

- **What are you trying to protect against?**
  - Hardware failure
  - OS failure
  - SQL Server application failure
  - Human error/sabotage
  - Datacenter failure/natural disaster

Considerations

- **Different solutions have different benefits**

HA/DR Option	OS Redundant	Hardware Redundant	Load Delay	Multiple datasets	Multiple Secondaries	Readable Secondary
Log Shipping	Yes	Yes	Yes	Yes	Yes	Yes
Mirror	Yes	Yes	No	Yes	No	No
Replication	Yes	Yes	No	Yes	Yes	Yes
Failover Cluster	Yes	Yes	No	No	No	No
Availability Groups	Yes	Yes	No	Yes	Yes	Yes
Virtualization	No	Yes	No	No	No	No

Backup Fundamentals

- Backups are worthless, restores are priceless
- Have the correct recovery models
- Know your Recovery Point Objective and Recovery Time Objective
- Have a restore validation process
- Have a recovery strategy and DR plan
- Practice restores regularly, know how to recover

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Review

- Definitions
- SQL Server HA/DR solutions
- HA/DR considerations
- Backup fundamentals

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Questions?

Don’t forget to complete an online evaluation!

Introduction to High Availability and Disaster Recovery with SQL Server

Your evaluation helps organizers build better conferences and helps speakers improve their sessions.

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Thank you!

Save the Date!

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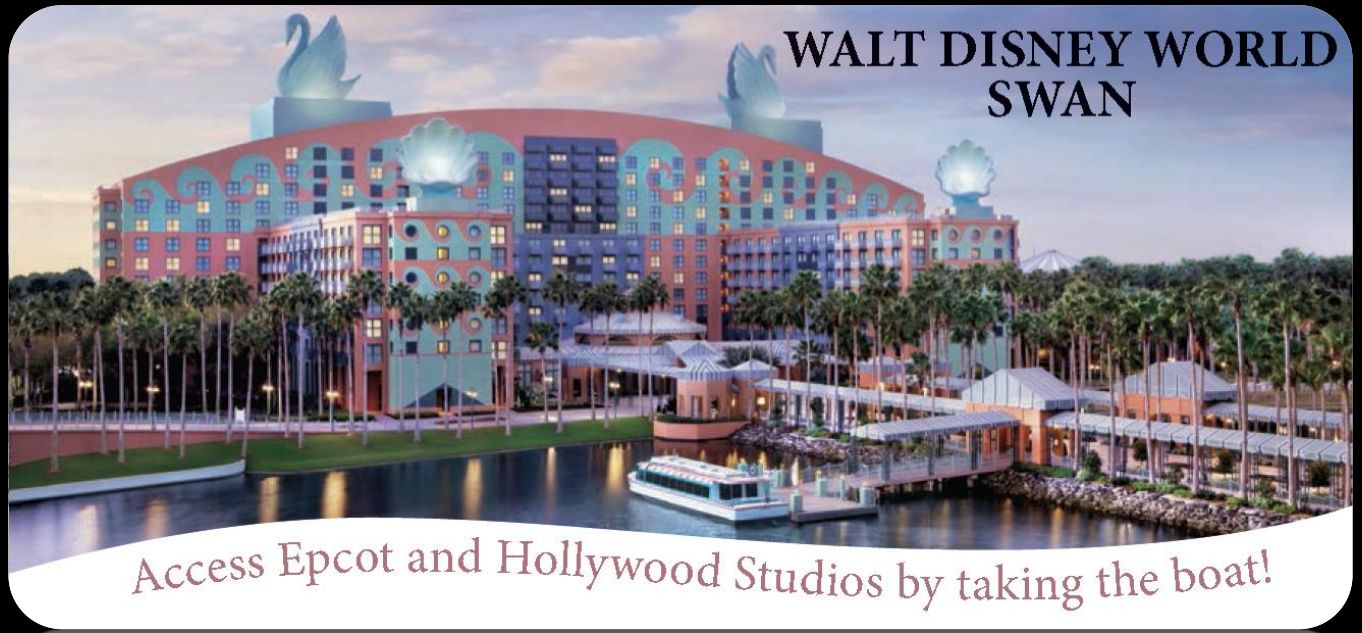

2018

Mar 25-28

We're back in Orlando!

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Leave the every day behind and enter a world of wonder and enchantment at the Walt Disney World® Resort. Located in the heart of the most magical place on earth, the Walt Disney World Swan and Dolphin Resort provides a truly extraordinary backdrop for our event! Beautiful tropical landscaping, tranquil waterways, and classic art and architecture work together to create a stunning landmark!