

SQL Server 2012: Evaluating and Sizing Hardware

Module 7: Choosing Components for Redundancy

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Introduction

- **Choosing components for basic hardware redundancy**
- **The importance of redundant components for high availability**
- **Reliability, Availability and Servicing (RAS) features**
- **Architectural considerations for HA/DR**
- **HA/DR architecture and your storage choices**
- **Other HA/DR effects on your hardware configuration**
- **Consider all aspects of reliability**

Choosing Components for Hardware Redundancy

- **Database servers are typically mission-critical assets**
 - You want to avoid failures due to common hardware issues
- **Try to eliminate single points of failure at the server level**
 - You should do this regardless of any HA/DR technology in use
- **There are several components that can fail and cause an outage**
 - Drive failures
 - Storage connectivity failures
 - Power supply failures
 - Network connectivity failures
- **All SQL Server HA technologies take time to react to a problem**
 - Database mirroring
 - Availability groups
 - Failover cluster instances

The Importance of Redundant Components for HA

- **Try to make each server as robust as possible at the hardware level**
 - Having redundant hardware components reduces the chances of hardware failures that can cause your HA technology to be needed
- **Common redundant components and techniques**
 - Dual power supplies, plugged into separate circuits
 - Multiple network ports, plugged into multiple switches
 - Using RAID 1 for the operating system and SQL Server 2012 binaries
 - Logical drives protected by an appropriate RAID level
 - Hot-swappable components such as drives, power supplies and cooling fans
- **Redundant components are cost-effective for database servers**
 - They increase reliability and uptime for a very small incremental cost
 - Database servers are typically much more important than web servers

Reliability, Availability and Servicing Features

- **Processors**

- Machine check architecture (MCA)

- **Memory**

- Error correcting code (ECC) memory
- Memory sparing, memory mirroring
- Memory error recovery in SQL Server 2012

- **Storage**

- Redundant array of inexpensive disks (RAID)
- Battery-backed, hardware RAID controller caches
- Capacitor-backed, flash-based storage
- Single-level cell (SLC) flash-based storage
- High-endurance, multi-level cell (MLC) flash-based storage

Architectural Considerations for HA/DR

- **Will you require shared storage for your HA/DR architecture?**
 - You need to know this before you select your storage type
- **Shared storage types**
 - Storage area network (SAN)
 - Service Message Block (SMB) 3.0 file shares with Windows Server 2012
- **Non-shared storage types**
 - Internal drives
 - PCI-E flash-based storage
 - Direct-attached storage (DAS)

HA/DR Architecture and Your Storage Choices

- **Traditional failover clusters normally use shared storage**
 - Usually this means a SAN
 - You can use SMB 3.0 file shares (Windows Server 2012)
- **Availability groups require the Windows clustering feature**
 - Can use either shared storage or non-shared storage
 - This means that you can use non-shared storage for each replica node
- **Database mirroring can use shared storage or non-shared storage**
 - Database mirroring is deprecated in SQL Server 2012
 - Database mirroring is still a viable choice in many situations

Other HA/DR effects on Hardware Configuration

- **Make sure you have enough reserve capacity for HA/DR effects**
 - Loss of a node with traditional fail-over clustering
 - Extra storage or network load due to HA/DR technologies
- **Make sure that all nodes or replicas can handle the workload**
 - Try to use identical hardware
 - Make sure mirror or replica is not causing performance problems
- **Consider the effects of database maintenance on your HA/DR**
 - Index creation or maintenance generates extra transaction log activity
- **Use identical drive letters and directories for mirrors and replicas**
 - This will prevent problems if extra database files are added later

Consider All Aspects of Reliability

- **Individual server component redundancy and reliability**
- **Proper hardware monitoring and maintenance**
- **Proper operating system and SQL Server maintenance**
- **Regular database consistency checks**
- **Having appropriate SQL Server Agent alerts in place**
- **An appropriate backup and restore strategy**
- **An appropriate HA/DR architecture to meet your RPO/RTO requirements**
- **Policies and procedures that tie all of this together!**
 - No one piece is a complete solution or substitute for other pieces

Course Summary

- **The importance of choosing the correct hardware for SQL Server**
 - **The importance of processor selection for SQL Server 2012**
 - **SQL Server 2012 editions and license limits**
 - **Choosing the correct type of storage subsystem**
 - **The importance of properly sizing your hardware and storage**
 - **Hardware and storage sizing techniques**
 - **Choosing components for redundancy**
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- **Thanks for watching!**