MANAGING HADR WITH DBATOOLS

LA Data Platform

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ABOUT ME

23 years in IT

15 years working with SQL Server

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I love to learn, and presenting is a great way to do it

All about internals

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WHAT WE WILL COVER

DBATools – What is it?

High Availability and Disaster Recovery (HADR) in SQL Server

Overview of Azure Data Studio Notebooks

Configuring Log Shipping with DBATools

Monitoring Failover Cluster Instance with DBATools

Creating, Configuring, and Monitoring Availability Groups with DBATools

DBATOOLS – WHAT IS IT?

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My take:

DBATOOLS – WHAT IS IT?

The official word:

> The community module that enables SQL Server Pros to automate database development and server administration

My take:

> Along with Ola Hallengren's Maintenance solution and baseball-reference.com, one of the coolest things on the internet

DBATOOLS – WHAT IS IT?

DBATools is a community-developed PowerShell module

Started as a migration tool

Over 500 commands

Additional functionality continues to be added

DBATOOLS – THE MOST IMPORTANT THING

The community module that enables SQL Server Pros to automate database development and server administration

DBATOOLS – THE MOST IMPORTANT THING

The community module that enables SQL Server Pros to **automate** database development and server administration

DBATOOLS – THE MOST IMPORTANT THING FOR HADR

The community module that enables SQL Server Pros to **automate** database development and server administration

SQL Server HADR can be configured using SQL Server Management Studio

Great for a one-time install

T-SQL scripts can be generated but need to be updated for each run

Not great for standardizing and automating

Passing parameters makes DBATools scripts reusable

DBATOOLS – GETTING THE MODULE

In a PowerShell administrator window, type `Install-Module DBATools`

Accept the update of NuGet and the install of the module

You are done

For documentation, go to dbatools.io

Additional options for getting DBATools can be found here.

DBATOOLS – WHAT DO YOU GET?

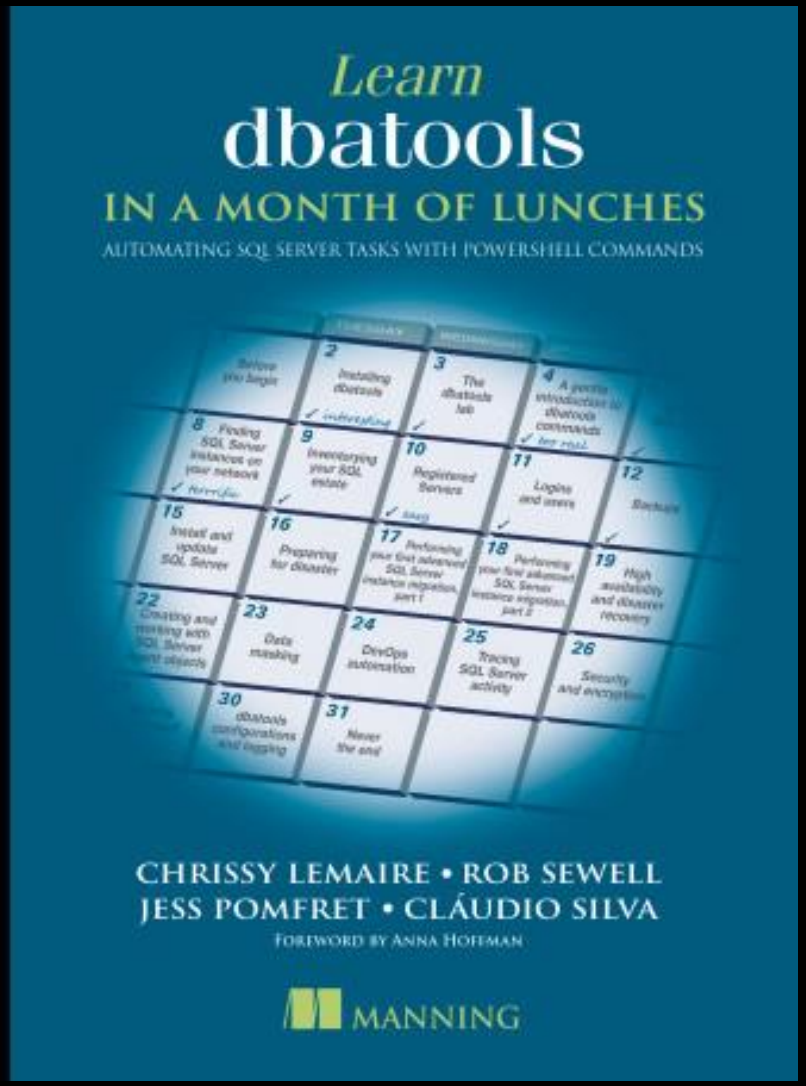
Categories

- Availability Groups
- Backup and Restore
- Certificates and Encryption
- Community Tools
- Connections
- Connection Strings
- Databases
- Data Masking
- dbatools Computer Management
- dbatools Configuration
- dbatools Support tools
- dbatools update watcher
- DBCC
- Diagnostics and Performance
- Detach and Attach
- Endpoints
- Export
- File System and Storage
- FileStream
- Lookup (Find)
- General
- Linked Servers
- Log Shipping
- Login and User Management
- Mail and Logging
- Max Memory
- Migration
- Mirroring
- Network and Firewall
- Policy-Based Management
- Registered Servers
- Replication
- Resource Governor
- Security and Encryption
- Server Management
- Service Principal Names (SPNs)
- Services
- Data Generation
- Snapshots
- sp_configure
- SQL Agent
- SQL Client Configuration
- SQL Management Objects
- System startup
- tempdb
- Traces, Profiler and Extended Events
- Utilities
- Windows Server Failover Cluster
- Table Data

Image Source: command index – dbatools

DBATOOLS IN A MONTH OF LUNCHES

Learn dbatools in a Month of Lunches (manning.com)



HIGH AVAILABILITY AND DISASTER RECOVERY IN SQL SERVER

HADR OPTIONS IN SQL SERVER

- Log Shipping
- Failover Cluster Instance (FCI)
- Availability Groups (AG)

LOG SHIPPING

Log shipping has been around forever (or SQL Server 2000)

3 phases

- Backup transaction logs on primary
- Copy log backup files to secondary
- Restore log backup files on secondary

All three phases run by SQL Server Agent jobs

Can be set up using SQL Server Management Studio

You can roll your own

Limited read-only capability on the secondary instance

If one phase fails, the other phases will continue to run

OVERVIEW OF AZURE DATA STUDIO NOTEBOOKS

AZURE DATA STUDIO

Cross-platform database tools

Connects to on-prem and Azure resources

Contains an integrated terminal

Allows creation and execution of Jupyter Notebooks

NOTEBOOKS

Single file that contains formatted text and runnable code

Each notebook runs a kernel

Available kernels

- SQL Server
- PowerShell
- Spark
- Python

USES

Demo code – As you will see in a minute

Standardize configuration – The log shipping demo is a good example

Runbooks – Store notebooks to define standard operating procedures withI inline executable code

LOG SHIPPING WITH DBATOOLS

Demo

SQL SERVER FAILOVER CLUSTER INSTANCES

FAILOVER CLUSTER INSTANCES

A Failover Cluster Instance (FCI) is an instance of SQL Server running as a clustered resource in a Failover Cluster

An FCI contains at least two nodes

One node in the cluster runs as primary and hosts the clustered resources

Requires shared storage that all nodes in the cluster can access

On failover, the SQL Server instance stops on the active node and starts on a passive node

Failover is at the instance level

DBATOOLS AND FAILOVER CLUSTERS

DBATools contains a group of cmdlets for returning information about FCIs

Extremely useful for gathering information about an FCI when little information is known

Can be used remotely to build an inventory of FCIs and their resources

GET-DBAWSFCNODE

Returns information about each node running under the FCI

```
Get-DbaWsfcNode -ComputerName MyServer1
```

```
Get-DbaWsfcNode


ClusterName          : MyCluster
ClusterFqdn          : MyCluster.local.com
Name                 : MyServer2
PrimaryOwnerName     :
PrimaryOwnerContact  :
Dedicated            :
NodeHighestVersion   : 655363
NodeLowestVersion    : 655363

ClusterName          : MyCluster
ClusterFqdn          : MyCluster.local.com
Name                 : MyServer1
PrimaryOwnerName     :
PrimaryOwnerContact  :
Dedicated            :
NodeHighestVersion   : 655363
NodeLowestVersion    : 655363
```

GET-DBAWSFCROLE

Returns information about roles running under the FCI

```
Get-DbaWsfcRole -ComputerName MyServer1
```

```
Get-DbaWsfcRole


ClusterName : MyCluster
ClusterFqdn : MyCluster.local.com
Name        : Available Storage
OwnerNode   : MyServer1
State       :

ClusterName : MyCluster
ClusterFqdn : MyCluster.local.com
Name        : Cluster Group
OwnerNode   : MyServer1
State       :

ClusterName : MyCluster
ClusterFqdn : MyCluster.local.com
Name        : SQLServerCluster
OwnerNode   : MyServer1
State       :
```

GET-DBAWSFCRESOURCE

Returns information about resources running under the FCI

```
Get-DbaWsfcResource -ComputerName MyServer1
```

GET-DBAWSFCRESOURCE

```
ClusterName                    : MyCluster
ClusterFqdn                    : MyCluster.local.com
Name                           : Cluster Disk 1
State                          : Online
Type                           : Physical Disk
OwnerGroup                     : SQLServerCluster
OwnerNode                      : MyServer1

ClusterName                    : MyCluster
ClusterFqdn                    : MyCluster.local.com
Name                           : Cluster Disk 2
State                          : Online
Type                           : Physical Disk
OwnerGroup                     : Cluster Group
OwnerNode                      : MyServer1
```

```
ClusterName                    : MyCluster
ClusterFqdn                    : MyCluster.local.com
Name                           : SQL Server
State                          : Online
Type                           : SQL Server
OwnerGroup                     : SQLServerCluster
OwnerNode                      : MyServer1

ClusterName                    : MyCluster
ClusterFqdn                    : MyCluster.local.com
Name                           : SQL Server Agent
State                          : Online
Type                           : SQL Server Agent
OwnerGroup                     : SQLServerCluster
OwnerNode                      : MyServer1
```

SQL SERVER AVAILABILITY GROUPS

SQL SERVER AVAILABILITY GROUPS

Run on top of a Windows Server Failover Cluster

No shared storage

Up to 8 secondary replicas

Each replica has its own data and log files on local storage

Databases are contained in AGs

One instance can host multiple AGs

Failover is at the AG level

SQL SERVER AVAILABILITY GROUPS

Log blocks are transferred from primary to secondary replicas

Log traffic can be synchronous or asynchronous

Allows for nodes to be geo-located

Provides both high availability and disaster recovery

Secondary replicas can be read-only

AVAILABILITY GROUP FAILOVER

For AGs in synchronous commit mode, a failover will not cause data loss

Failover can be set to automatic

This provides high availability

Set commit to asynchronous for geo-replicated replicas

For a planned failover, switch to synchronous and confirm data is synchronized

Perform failover

DBATOOLS AG DEMO

WHAT WE HAVE COVERED

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RESOURCES

DBATools - dbatools – the community's sql powershell module

DBATools Commands - command index – dbatools

DBATools Download Options - download – dbatools

Microsoft Log Shipping Overview - About Log Shipping (SQL Server) - SQL Server | Microsoft Docs

Microsoft Failover Cluster Instance Overview - Always On failover cluster instances - SQL Server Always On | Microsoft Docs

Microsoft Availability Group Overview - Availability groups: a high-availability and disaster-recovery solution - SQL Server Always On | Microsoft Docs

DBATools in a Month of Lunches - https://www.manning.com/books/learn-dbatools-in-a-month-of-lunches

Basic Availability Groups - Basic availability groups for a single database - SQL Server Always On | Microsoft Docs

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