MANAGING HADR WITH DBATOOLS

SQL Saturday Orlando

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ABOUT ME

23 years in IT
15 years working with SQL Server
Senior Consultant at Fortified Data
I focus on SQL Server HADR and SQL Server in Azure
I love internals
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WHAT WE WILL COVER

dbatools – What is it?

High Availability and Disaster Recovery Options in SQL Server

Configuring Log Shipping with dbatools

Interrogating Failover Cluster Instance with dbatools

Creating and Configuring Availability Groups with dbatools

DBATOOLS – WHAT IS IT?

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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

THE MOST IMPORTANT THING

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SQL Server HADR can be configured using 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

Parameters make dbatools scripts reusable

DBATOOLS – GETTING THE MODULE

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

Accept the update to NuGet and the install of the module

You are done

For documentation, go to dbatools.io

Additional install options can be found here

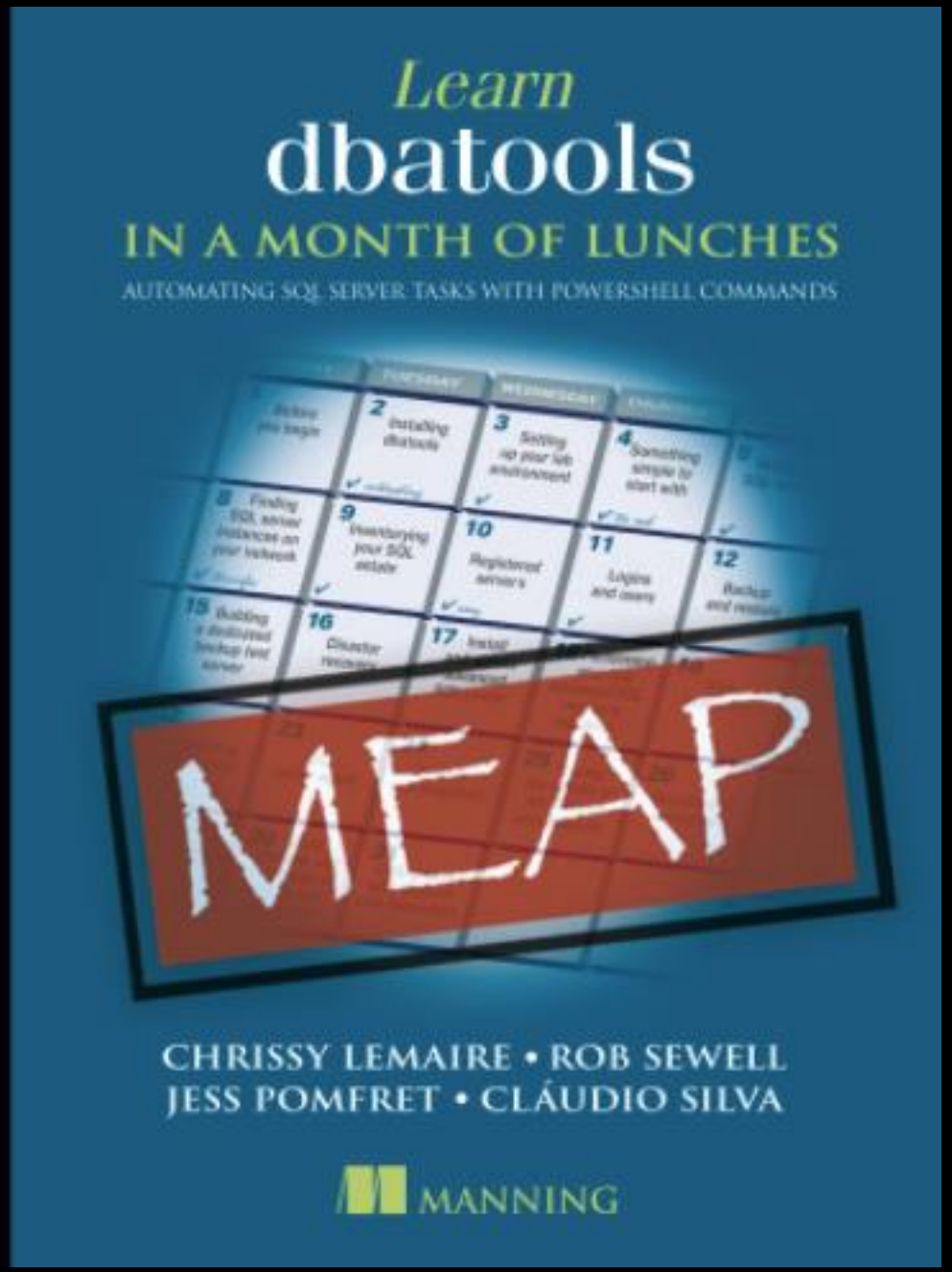
DBATOOLS – WHAT DO YOU GET?

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

LEARN DBATOOLS IN A MONTH OF LUNCHES



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 since SQL Server 2000)

3 phases

- Backup transaction logs on primary
- Copy log backups to secondary
- Restore log backups on secondary

All three phases run by SQL Server Agent jobs

Can be set up using Management Studio

You can roll your own

Limited read-only capability on the secondary

If one phase fails, the others will continue to run

LOG SHIPPING WITH DBATOOLS

SQL SERVER FAILOVER CLUSTER INSTANCE

FAILOVER CLUSTER INSTANCE

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

An FCI contains at least two nodes

One node in the cluster runs as active 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 FCIS

dbatools contains a group of commands for returning 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 associated 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 each node 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 WSFC

No shared storage

Each replica hosts data and log files on local storage

Up to 8 secondary replicas

Databases are contained in AGs

One instance can host multiple AGs

Failover is at the instance level

SQL SERVER AVAILABILITY GROUPS

Log blocks are transferred from primary to secondary replicas

Log traffic can be synchronous or asynchronous

Allows for replicas to be geo-located

Provides both high availability and disaster recovery

Secondary replicas can be read only

AVAILABILITY GROUP FAILOVER

For replicas in synchronous mode, failover will not cause data loss

Failover can be set to automatic

This provides high availability

Set commit to asynchronous for geo-located 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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Configuring Log Shipping with dbatools

Interrogating Failover Cluster Instances with dbatools

Creating and configuring Availability Groups with dbatools

RESOURCES

dbatools – dbatools – the community's sql powershell module

dbatools Commands – command index – dbatools

dbatools Download – download – dbatools

Microsoft Log Shipping Overview – About Log Shipping (SQL Server) - SQL Server | Microsoft Learn

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

Microsoft Availability Groups Overview – Overview of SQL Server Always On availability groups - SQL Server on Azure VMs | Microsoft Learn

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

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

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