DEPLOYING AND MANAGING SQL SERVER WITH DBATOOLS

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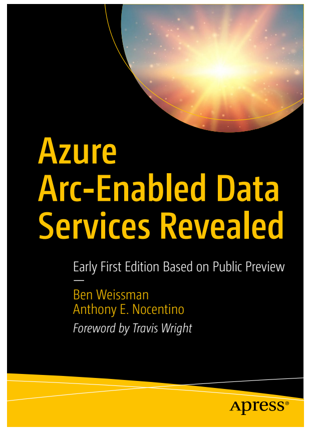

Azure Arc-Enabled Data Services Revealed

Early First Edition Based on Public Preview

Ben Weissman
Anthony E. Nocentino
Foreword by Travis Wright

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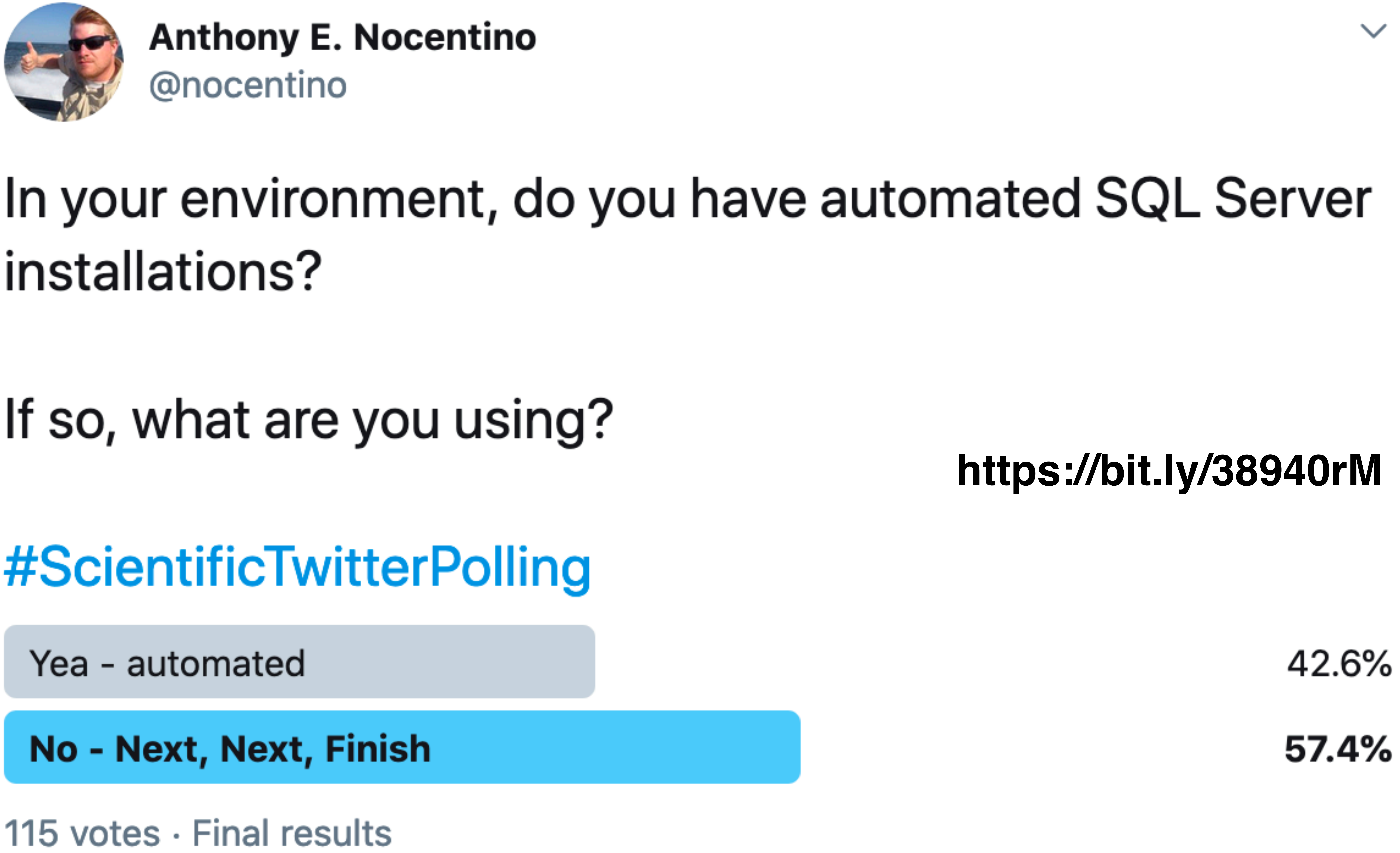
Agenda

- Deployment challenges
- Benefits of automation
- Automation solutions
- Using dbatools for automated deployment
- Installing SQL Server
- Configuring SQL Server
- Pester for managing configuration

Survey

- How many of you…
  - Have a SQL Installation checklist?
  - How many of you have logged into a server and found deviations from that ‘standard’?



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In your environment, do you have automated SQL Server installations?

If so, what are you using?

#ScientificTwitterPolling

Yea - automated	42.6%
No - Next, Next, Finish	**57.4%**

115 votes · Final results

https://bit.ly/38940rM

Deployment Challenges…

- Consistency
- Speed of deployment
- Configuration skew

Benefits of Automation

- Repeatable and consistent processes
- Speed
- Infrastructure as code
- Reduces human error (or increases it :)
- Scale out installations

Lesser known benefits of automation

- Measure configuration skew
- High availability
  - Restores can be simpler and automated
- Troubleshooting
  - If all the systems are the same…

Possible Solutions

- `Configuration.ini`
- PowerShell Desired State Configuration (DSC)
- Chef/Puppet/Ansible/Chocolatey
- Containers and Kubernetes
- **dbatools** - PowerShell Module

Using dbatools for Automation

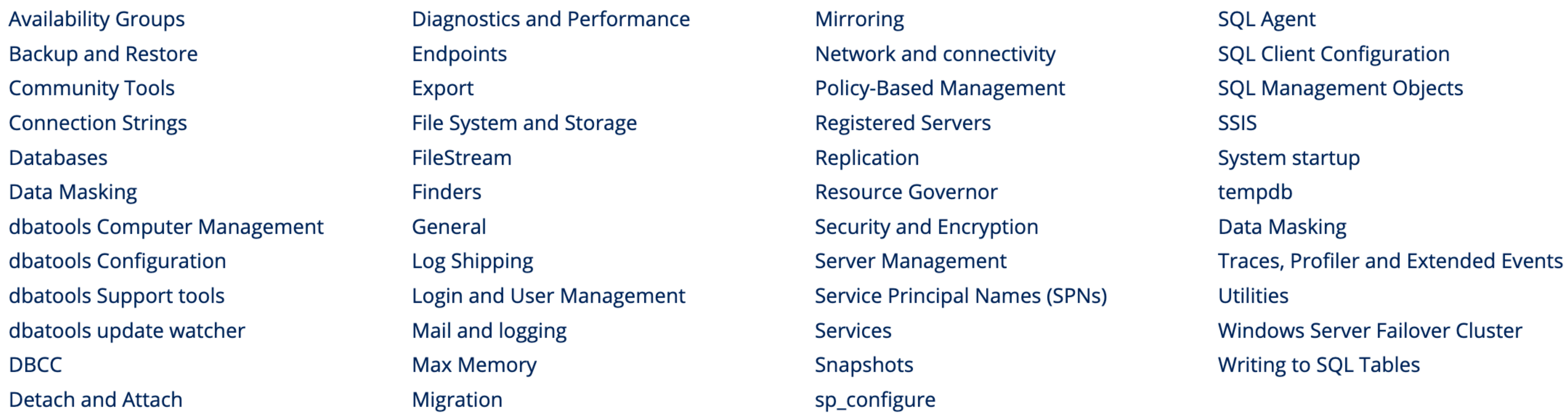
What is dbatools?

- Community driven PowerShell module
- Manage, configure and deploy SQL Server
- Command line SQL Server Management Studio

Getting dbatools

- PowerShell Gallery
- GitHub - https://github.com/sqlcollaborative/dbatools
- Chocolatey
- Offline install - https://dbatools.io/getting-started/

Core dbatools Functionality

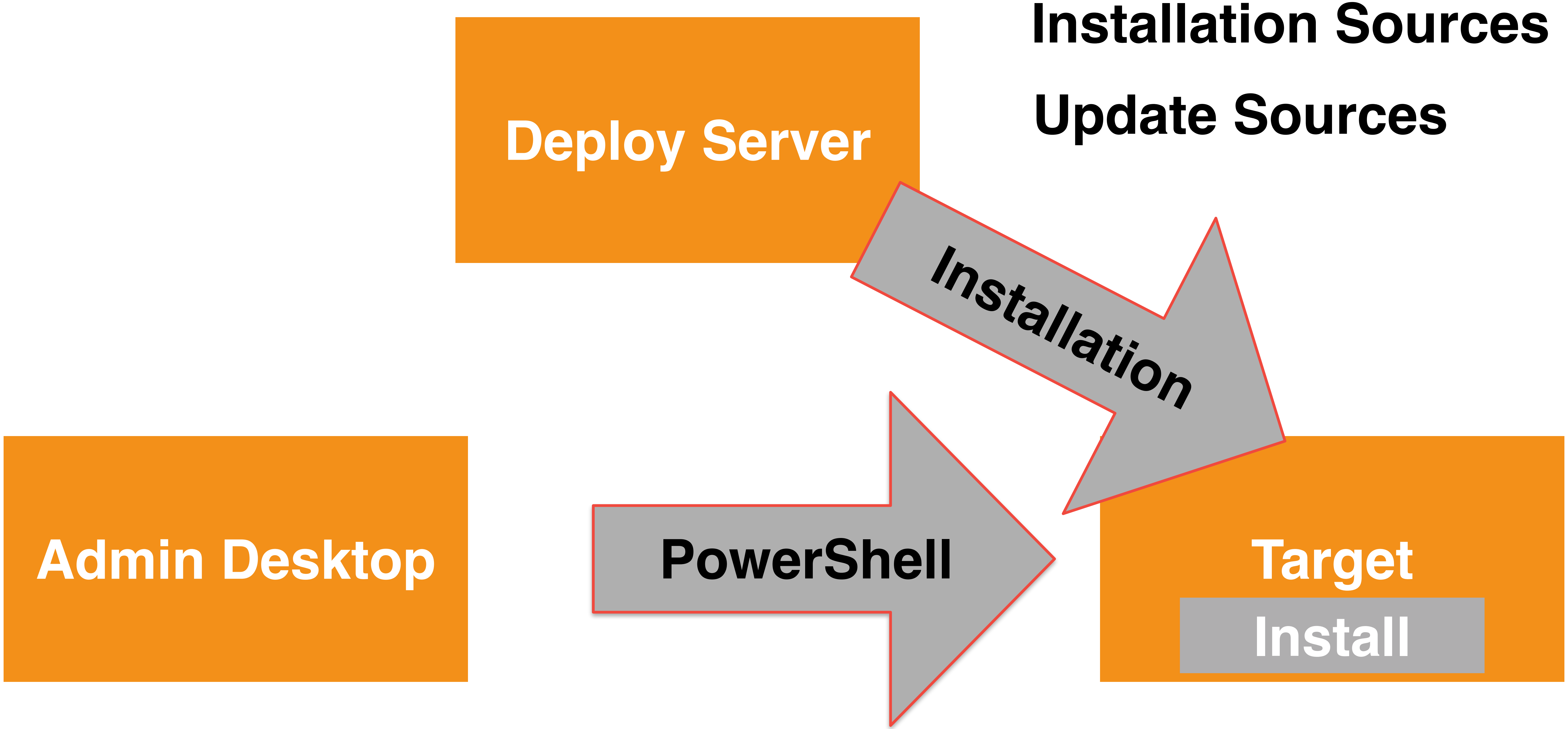


- Availability Groups
- Backup and Restore
- Community Tools
- Connection Strings
- Databases
- Data Masking
- dbatools Computer Management
- dbatools Configuration
- dbatools Support tools
- dbatools update watcher
- DBCC
- Detach and Attach
- Diagnostics and Performance
- Endpoints
- Export
- File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

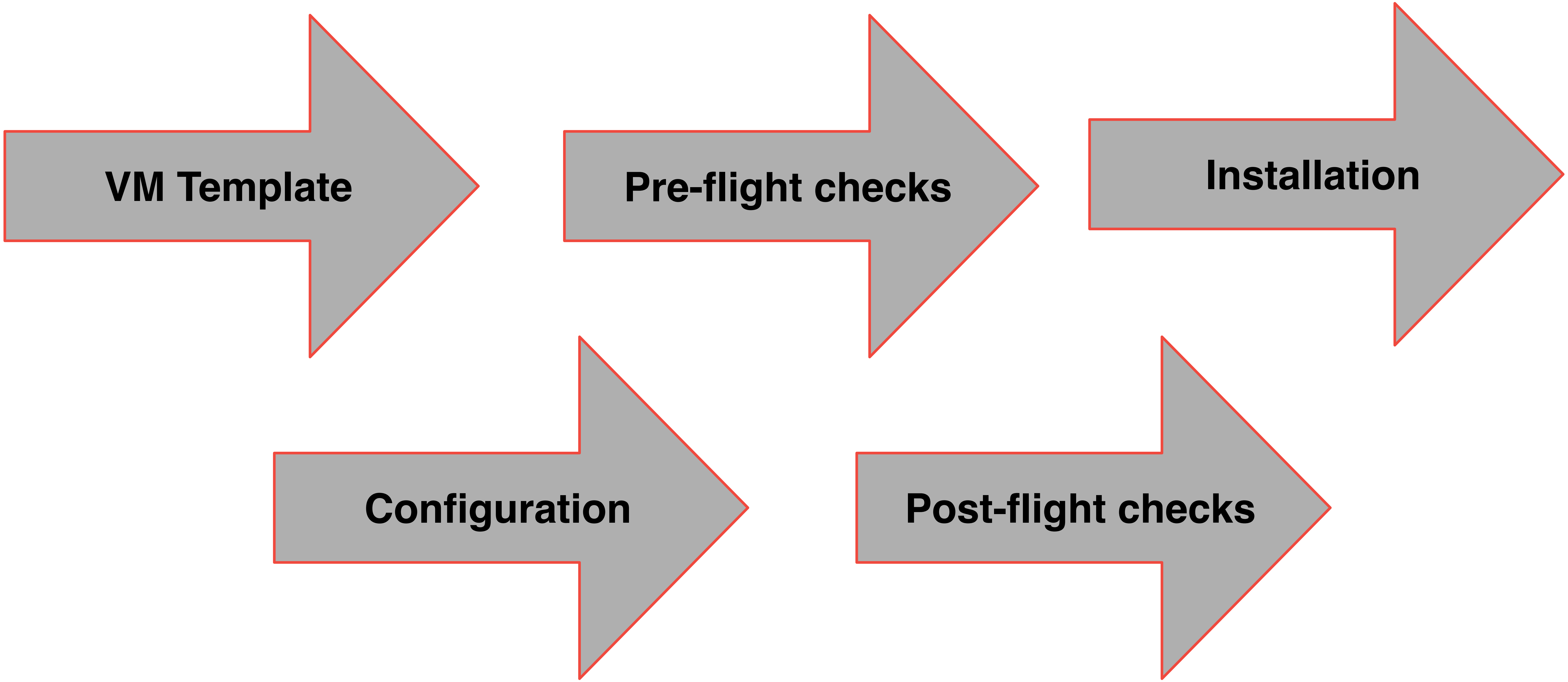
Installation cmdlet

- `Install-DbaInstance`
- Install SQL Server
  - Need an installation source files

Solution Architecture



Solution Workflow



VM Template

Pre-flight checks

Installation

Configuration

Post-flight checks

Virtual Machine Template

- Configuration best practices
  - Disable vCPU Hot Plug, PV storage and network adapters…
- Standardize drive topology
  - Volumes and folders
    - D:\DATA, T:\LOGS, S:\SYSTEM
    - NTFS Allocation Units - 64KB
- Base OS settings best practices
- Swap configuration

VMware on SQL Best Practices
https://bit.ly/31u0ntr

Pre-flight Checks

WinRM

Service Accounts

Installation Account

Test Disk Topology

Access to Installation share

Access to Updates share

What’s Pester?

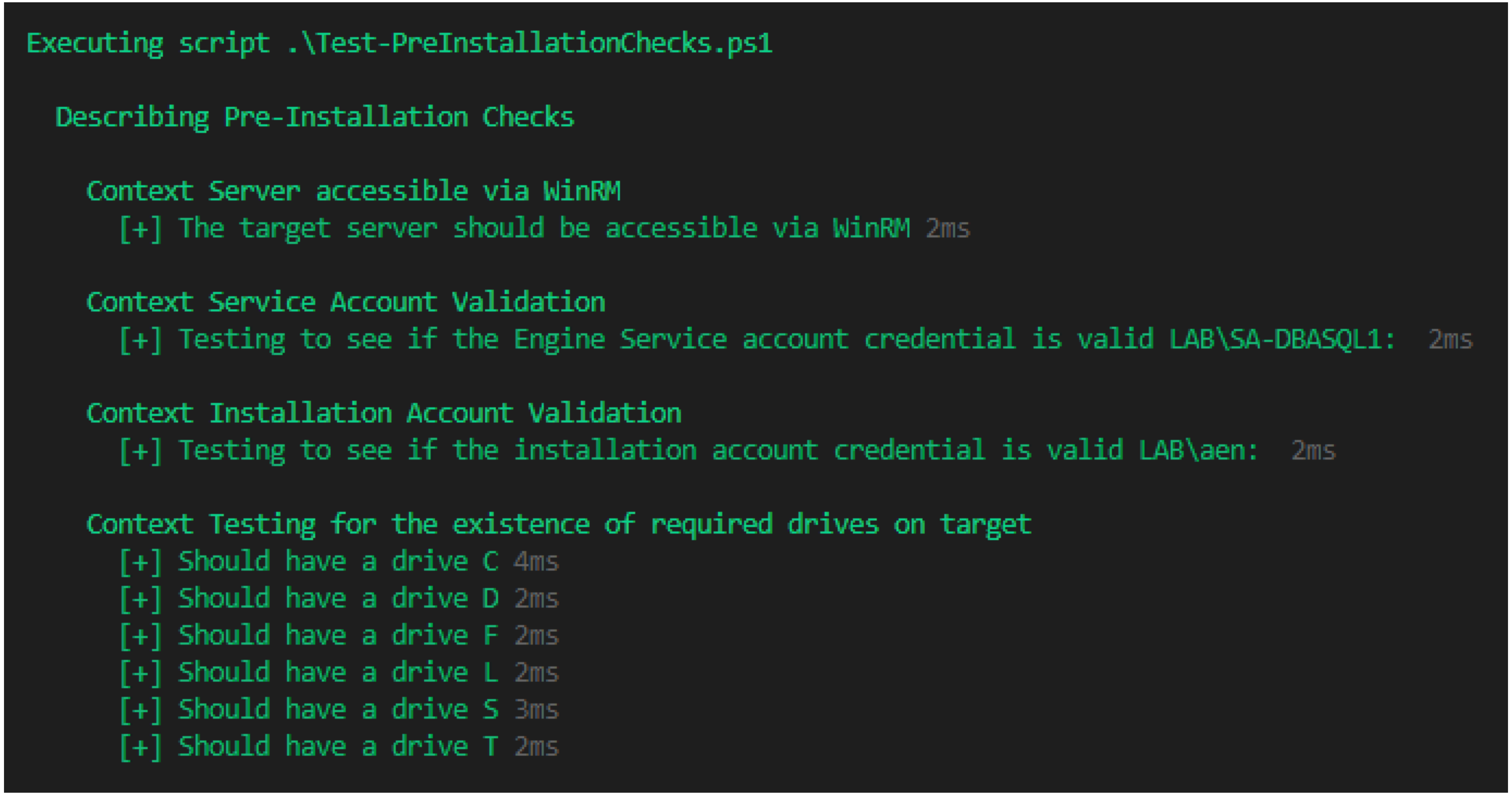
- Testing framework
- We’ll use it to validate pre and post configuration
- Measure configuration skew
- Assert desired state
- What about dbachecks?
    - https://dbachecks.readthedocs.io/en/latest/

Pre-flight Checks with Pester

```
Context "Server accessible via WinRM" {
    $result = Test-NetConnection -ComputerName $SqlInstance -InformationLevel Quiet -CommonTCPPort WINRM
    It "The target server should be accessible via WinRM" {
       $result | Should -BeTrue -Because "We need to do stuff with WinRM during the installation."
    }
}


Context "Service Account Validation" {
    $CredentialTestResult = Test-AdCredential -Credential $EngineCredential
    It "Testing to see if the Engine Service account credential is valid $($EngineCredential.Username): " {
        $CredentialTestResult | Should -BeTrue -Because "SQL Server requires a valid service account."
    }
}
```

Pre-flight Checks with Pester



```
Executing script .\Test-PreInstallationChecks.ps1

  Describing Pre-Installation Checks

    Context Server accessible via WinRM
      [+] The target server should be accessible via WinRM 2ms

    Context Service Account Validation
      [+] Testing to see if the Engine Service account credential is valid LAB\SA-DBASQL1:  2ms

    Context Installation Account Validation
      [+] Testing to see if the installation account credential is valid LAB\aen:  2ms

    Context Testing for the existence of required drives on target
      [+] Should have a drive C 4ms
      [+] Should have a drive D 2ms
      [+] Should have a drive F 2ms
      [+] Should have a drive L 2ms
      [+] Should have a drive S 3ms
      [+] Should have a drive T 2ms
```

Install-DbaInstance

```
$InstallationParameters = @{
    SqlInstance = $SqlInstance
    Path = $InstallationSources[$Version]
    Version = $Version
    Feature = $Features
    InstancePath = $InstancePath
    DataPath = $DataPath
    LogPath = $LogPath
    TempPath = $TempPath
    BackupPath = $BackupPath
    AdminAccount = $AdminAccount
    EngineCredential = $EngineCredential
    AgentCredential = $AgentCredential
    Credential = $InstallationCredential
    Configuration = $Configuration
    PerformVolumeMaintenanceTasks = $true
    Restart = $true
    Confirm = $false
    Verbose = $true
}
```

```
Install-DbaInstance @InstallationParameters
```

Demo!

- Pre-flight Checks
- Installing SQL Server with `Install-DbaInstance`

Invoke-SqlConfigure

- Custom function
- Post installation configuration tasks
- Idempotent

Invoke-SqlConfigure

```
# Configure SQL instance
Invoke-SqlConfigure -SqlInstance $SqlInstance

function DisableSaLogin {
    Param(
        [Parameter(Mandatory = $True)]  [String] $SqlInstance,
        [String] $InstanceName = "MSSQLSERVER"
    )

    #Disable the sa login.
    Get-DbaLogin -SqlInstance "$SqlInstance\$InstanceName" |
     Where-Object { $_.Name -eq 'sa' } |
     Set-DbaLogin -Disable
}
```

Demo!

- Configuring SQL Server with dbatools

Post-flight checks

Services Started

Accounts added or disabled

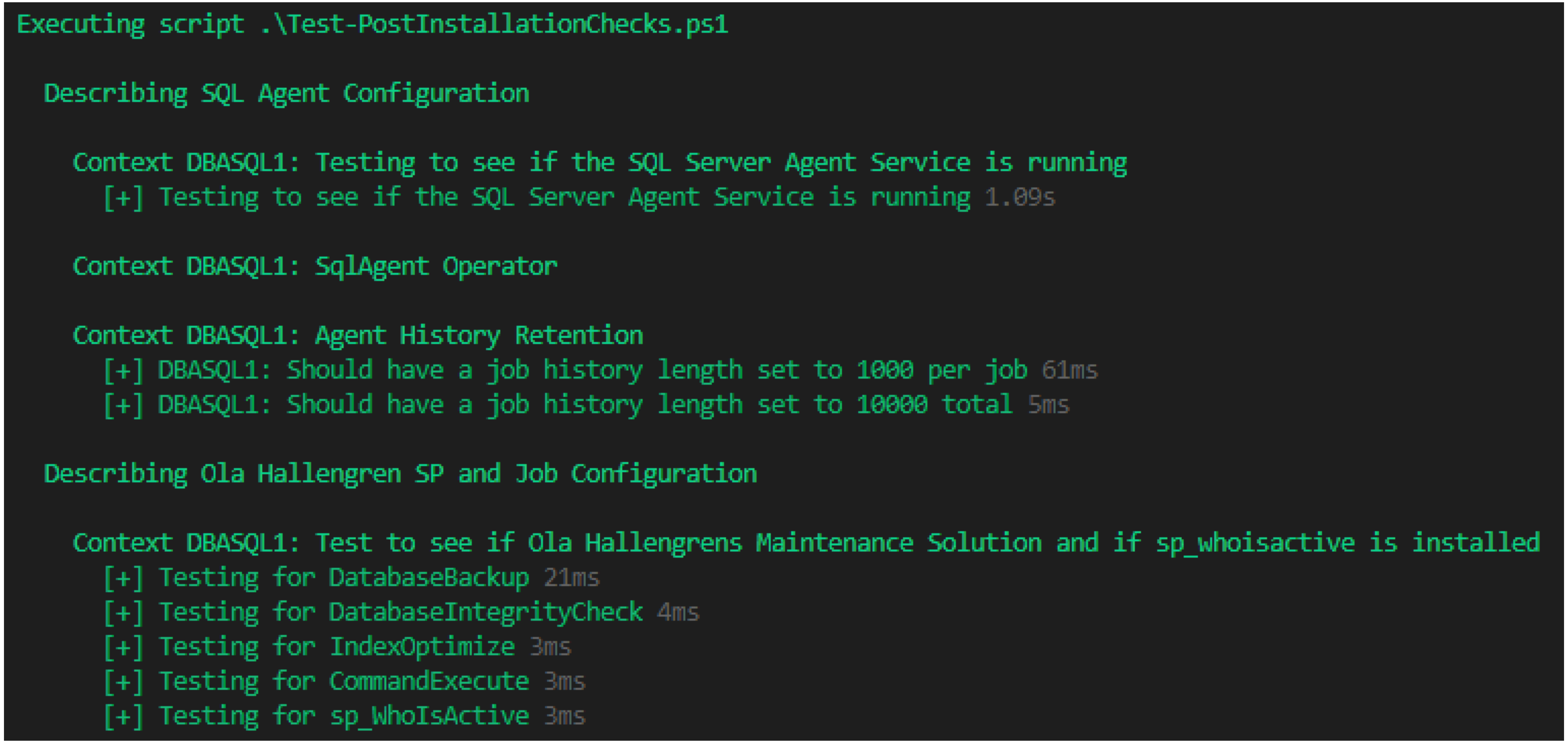
SPNs Configured

Instance Settings

Agent Settings and Jobs

Database Settings and Stored Procs

Post-flight checks



```
Executing script .\Test-PostInstallationChecks.ps1

  Describing SQL Agent Configuration

    Context DBASQL1: Testing to see if the SQL Server Agent Service is running
      [+] Testing to see if the SQL Server Agent Service is running 1.09s

    Context DBASQL1: SqlAgent Operator

    Context DBASQL1: Agent History Retention
      [+] DBASQL1: Should have a job history length set to 1000 per job 61ms
      [+] DBASQL1: Should have a job history length set to 10000 total 5ms

  Describing Ola Hallengren SP and Job Configuration

    Context DBASQL1: Test to see if Ola Hallengrens Maintenance Solution and if sp_whoisactive is installed
      [+] Testing for DatabaseBackup 21ms
      [+] Testing for DatabaseIntegrityCheck 4ms
      [+] Testing for IndexOptimize 3ms
      [+] Testing for CommandExecute 3ms
      [+] Testing for sp_WhoIsActive 3ms
```

Demo!

- **Managing Configuration with Pester**

Review

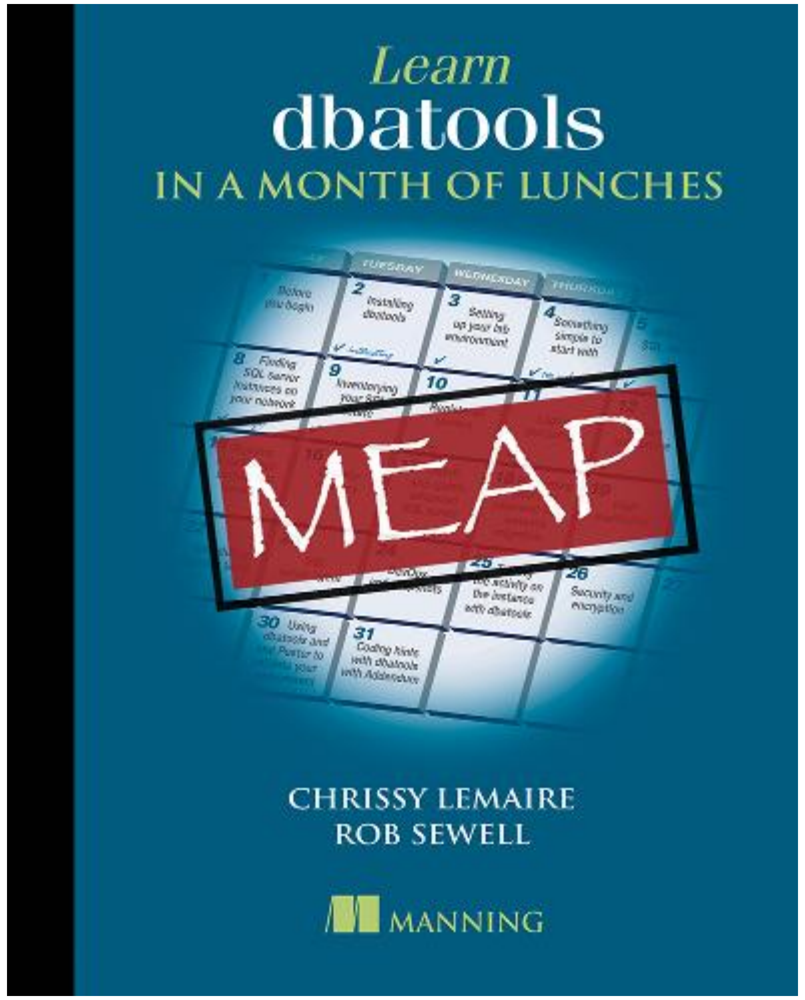
- **Deploying and Managing SQL Server with dbatools**
  - Deployment challenges
  - Benefits of automation
  - Automation solutions
  - Using dbatools for automated deployment
  - Installing SQL Server
  - Configuring SQL Server
  - Pester for managing configuration

Resources and References

- dbatools.io

- dbatools.io/slack/

Books



The dbatools Team and my Friends!

- **Chrissy** @cl
- **Kirill** @nvarscar
- **Rob** @sqldbawithbeard
- **Jess** @jpomfret
- **Claudio** @ClaudioESSilva
- **Sander** @SQLStad
- **Stuart** @napalmgram
- …and so many more

Need more data or help?

http://www.github.com/nocentino/presentations

Links to resources
Demos
Presentation
Pluralsight

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