



# DSC in PowerShell 4.0

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#### Microsoft

#### WMF 4.0

- PowerShell 4.0
- PowerShell Integrated Scripting Environment (ISE)
- PowerShell Web Services (OData IIS Extension)
- Remote Management (WinRM)
- Management Infrastructure (WMI)
- PowerShell Desired State Configuration (DSC)

Windows Management Framework 4.0 <a href="http://www.microsoft.com/en-us/download/details.aspx?id=40855">http://www.microsoft.com/en-us/download/details.aspx?id=40855</a>

Requires .NET Framework 4.5 <a href="http://www.microsoft.com/en-us/download/details.aspx?id=30653">http://www.microsoft.com/en-us/download/details.aspx?id=30653</a>



#### The good and the bad

#### Scale

 $\odot$ 

Business is growing

 $\odot$ 

More servers = More Failures

#### Rapid changes

 $\odot$ 

Adjust and respond fast

More changes = More Failures

Scale + Rapid changes = Constant failures?



### Desired State Configuration

Enables you to **ensure** that the components of your data center have the **correct configuration** 

Allows "continuous deployment" and prevents "configuration drift"

Uses language extensions and providers to enable declarative, autonomous and idempotent (repeatable) Deployment, Configuration and Conformance of standards-based managed elements

#### Imperative vs. Declarative

- Imperative How a task should be performed
- **Declarative** What needs to be done

Meaning, you'll write "configuration documents", not scripts



#### DSC Practical Applications

- Install or remove server roles and features
- Manage registry settings
- Manage files and directories
- Start, stop, and manage processes and services
- Manage local groups and user accounts
- Install and manage packages such as .msi and .exe
- Manage environment variables
- Run Windows PowerShell scripts
- and many more...



#### DSC Components

- PowerShell Language Extensions
- MOF (<u>Managed Object Format</u>) Instance doc
- WMI Service
- Local Configuration Store
- Local Configuration Manager (a WMI Provider)
- Configuration Agent (CA)
- Resource Provider



#### DSC Resources

Archive Resource

**Environment** Resource

**File Resource** 

**Group Resource** 

**Log Resource** 

Package Resource

Process Resource Registry Resource Role Resource

Script Resource Service Resource User Resource



#### DSC Resource Kit Waves (3)

Active **Computer Database Directory Management Failover Hyper-V Networking** Cluster Remote SQL **SmbShare Desktop** Web Admin-**System Security** istration

And you can build your own custom resources

#### Archive Resource

 Provides a mechanism to unpack archive (.zip) files at a specific path on a target node

```
Archive myArchiveExample
{
    Ensure = "Present" # You can also set Ensure to "Absent"
    Path = "\\RepositoryServer01\Share\SysinternalsSuite.zip"
    Destination = "C:\Tools\SysinternalsSuite"
}
```



### Demo

Archive Resource

#### **Environment Resource**

 Provides a mechanism to manage system environment variables on a target node

```
Environment myEnvironmentExample
{
    Ensure = "Present" # You can also set Ensure to "Absent"
    Name = "_NT_SYMBOL_PATH"
    Value = "SRV*C:\symbols*http://msdl.microsoft.com/download/symbols"
}
```

#### File Resource

 Provides a mechanism to manage files and folders on a target node

```
File myDirectoryCopy
{
    Ensure = "Present" # You can also set Ensure to "Absent"
    Type = "Directory" # Default is "File".
    Recurse = $true # Ensure presence of subdirectories, too
    SourcePath = "\\DC01\DSC\FourthCoffeeWebSite"
    DestinationPath = "C:\inetpub\wwwroot"
}
```

#### Group Resource

Provides a mechanism to manage local groups on a target node

```
Group myGroupExample
{
    # This will remove the myTestGroup ,if present
    # To create a new group, set Ensure to "Present"
    Ensure = "Absent"
    GroupName = "myTestGroup"
}
```

#### Log Resource

 Provides a mechanism to write messages to the Microsoft-Windows-Desired State Configuration/Analytic event log

```
Log myLogExample
{
   Message = "This is a test message."
}
```

### Package Resource

 Provides a mechanism to install or uninstall packages (setup.exe or \*.msi), on a target node

```
Package myPackageExample
{
    Ensure = "Present" # You can also set Ensure to "Absent"
    Path = "\\DC01\DSC\WPTx64-x86_en-us.msi"
    Name = "WPTx64"
    ProductId = "{986EABFC-92F6-CECD-9E5A-B13CAC40BB1D}"
    Arguments = "/qn"
    LogPath = "C:\myMsiInstall.log"
}
```



### Demo

Package Resource and Configuration Parameters

#### Process Resource

Provides a mechanism to configure processes on a target node

```
WindowsProcess myProcess
{
   Arguments = "/a /b /c"
   Path = "C:\myPath\myApp.exe"
   Ensure = "Absent"
   WorkingDirectory = "C:\Windows"
}
```

#### Registry Resource

 Provides a mechanism to manage registry keys and values on a target node

```
Registry myRegistryExample
{
    Ensure = "Present" # You can also set Ensure to "Absent"
    Key = "HKEY_LOCAL_MACHINE\SOFTWARE\myApplication"
    ValueName = "DatabaseServerName"
    ValueData = "SQLServer01.contoso.com"
}
```

#### Role Resource

 Provides a mechanism to ensure that roles and features are added or removed on a target node

```
WindowsFeature myIIS
{
    Ensure = "Present"
    Name = "Web-Server"
}
```

#### Script Resource

- Provides a mechanism to run Windows PowerShell script blocks on target nodes
- The TestScript block runs first
- If it returns False, the SetScript block will run

```
Script myScriptExample
{
    SetScript = { Set-Content -Path "C:\Temp\TestFile.txt" -Value "Test" }
    TestScript = { Test-Path "C:\Temp\TestFile.txt" -PathType Leaf}
    GetScript = { <# This must return a hash table #> }
}
```

#### Service Resource

Provides a mechanism to manage services on the target node

```
Service myServiceExample
{
   Name = "TermService"
   StartupType = "Manual"
   State = "Running"
}
```

#### User Resource

Enables local user accounts management on a target node

```
User myUserExample
{
    Ensure ="Present" # To delete a user account, set Ensure to "Absent"
    UserName = "Martin"
    Password = $passwordCred # This needs to be a credential object
    DependsOn = "[Group]myGroupExample" # Configures the group first
}
```



### Deploying Configuration

```
Configuration MyConfig
   # A Configuration block can have zero or more Node blocks
   Node "Server01"
      # Next, specify one or more resource blocks
      # Ensure the Web Server (IIS) role is installed
      WindowsFeature MyRoleIIS
          Ensure = "Present" # To uninstall the role, set to "Absent"
          Name = "Web-Server"
PS C:\> MyConfig
PS C:\> Start-DscConfiguration -Wait -Verbose -Path .\MyConfig
```



### Demo

Web Server installation, configuration and continuous deployment



### \*-DscConfiguration

- Start-DscConfiguration
  - Applies configuration to nodes
- Get-DscConfiguration
  - Gets the node's current configuration
- Test-DscConfiguration
  - Tests whether the actual configuration on the nodes matches the desired configuration
- Restore-DscConfiguration
  - Restores the previous configuration for the node



### Demo

Get, Test and Restore Configuration

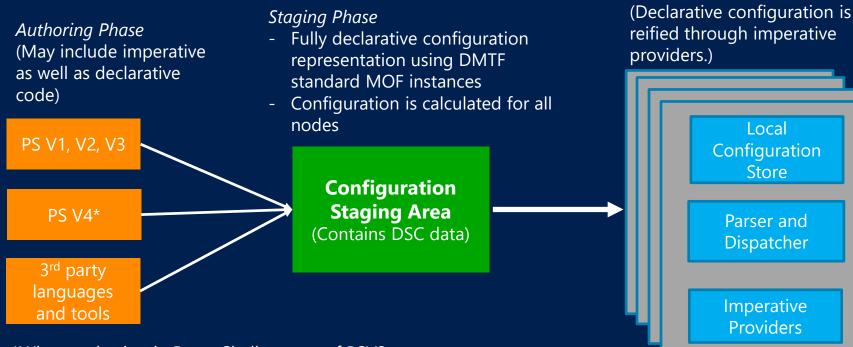


### Demo

Multi-node configuration and parameters



#### Push Model



\*When authoring in PowerShell, on top of PSV3 imperative features, PSV4 adds:

- Declarative syntax extensions
- Schema-driven Intellisense
- Schema validation (early-binding)

**Providers** implement changes:

Local

Store

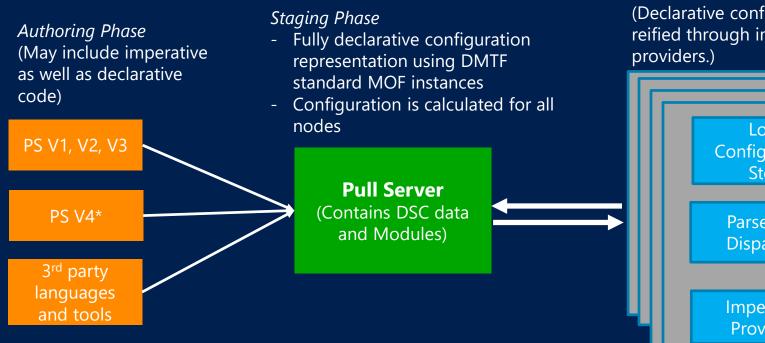
Monotonic

Set Phase

- **Imperative**
- Idempotent



#### Pull Model



\*When authoring in PowerShell, on top of PSV3 imperative features, PSV4 adds:

- Declarative syntax extensions
- Schema-driven Intellisense
- Schema validation (early-binding)

Set Phase (Declarative configuration is

reified through imperative

Local Configuration Store Parser and Dispatcher **Imperative Providers** 

**Providers** implement changes:

- Monotonic
- **Imperative**
- Idempotent

#### Push vs. Pull

- Push
  - Simple
  - Control
  - Immediately applies the configuration
- Pull
  - Complete Automation
  - Scalability
  - Dedicated Pull Server



### Local Configuration Manager

- Runs on all nodes (as a WMI provider)
- Responsible for calling the DSC resources
- LCM Properties can be set using DSC

PS> Get-DscLocalConfigurationManager

AllowModuleOverwrite : False

CertificateID :
ConfigurationID :

ConfigurationMode : ApplyAndMonitor

ConfigurationModeFrequencyMins : 30

Credential :
DownloadManagerCustomData :
DownloadManagerName :

RebootNodeIfNeeded : False
RefreshFrequencyMins : 15
RefreshMode : PUSH

PSComputerName :

### ConfigurationMode

#### Apply

Will apply the configuration once and after a successful run is logged, it will stop attempting to apply configuration or checking the configuration

#### ApplyAndMonitor

Will apply a configuration as in Apply, but will continue to validate that a node is configured as described. No corrective action will take place if there is configuration drift

#### ApplyAndAutoCorrect

Applies a configuration and checks it regularly. If configuration drift is detected, the configuration manager will attempt to return the machine to the *desired state* 



### \*FrequencyMins

#### ConfigurationModeFrequencyMins

Determines how frequently the configured method (RefreshMode) is run. In the case of a pull server, this is how frequently the pull server will be checked for updated configurations. The minimum value for this is 30.

#### RefreshFrequencyMins

Determines how often DSC runs an integrity check against the cached configuration value. The minimum value for this setting is 15 minutes



### Configuring LCM

```
Configuration mySetLcmConfiguration
       Node "localhost"
              LocalConfigurationManager
                     ConfigurationMode = "ApplyAndAutoCorrect"
                     RefreshFrequencyMins = 30
                     ConfigurationModeFrequencyMins = 60
                     RefreshMode = "PUSH"
                     RebootNodeIfNeeded = $true
PS> mySetLcmConfiguration
PS> Set-DscLocalConfigurationManager -Path .\mySetLcmConfiguration -Verbose
```



## Demo LCM Configuration



### Desired State Configuration...

- Declarative syntax
- Simplify configuration
- Prevent configuration drift
- Enable continuous deployment

"Hey, you're a Web server Here's what you should look like. Get to it, and stay that way!"







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