Microsoft

PowerShell

DSC in PowerShell 4.0

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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
http://www.microsoft.com/en-us/download/details.aspx?id=40855

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

The good and the bad

Scale	
☺	Business is growing
☹	More servers = More Failures

Rapid changes	
☺	Adjust and respond fast
☹	More changes = More Failures

Scale + Rapid changes = Constant failures?

Desired State Configuration

Microsoft

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 (Managed Object Format) Instance doc
- WMI Service
- Local Configuration Store
- Local Configuration Manager (a WMI Provider)
- Configuration Agent (CA)
- Resource Provider

DSC Resources

Microsoft

Archive Resource	Environment Resource	File Resource
Group Resource	Log Resource	Package Resource
Process Resource	Registry Resource	Role Resource
Script Resource	Service Resource	User Resource

http://technet.microsoft.com/en-us/library/dn249921

DSC Resource Kit Waves (3)

Microsoft

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

And you can build your own custom resources

Requires: http://support.microsoft.com/kb/2883200

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."
}
```

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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"
}
```

Microsoft

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"
}
```

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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
```

Microsoft

Demo

Web Server installation, configuration and continuous deployment

MyWebServerConfiguration

*-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

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Get, Test and Restore Configuration

Demo

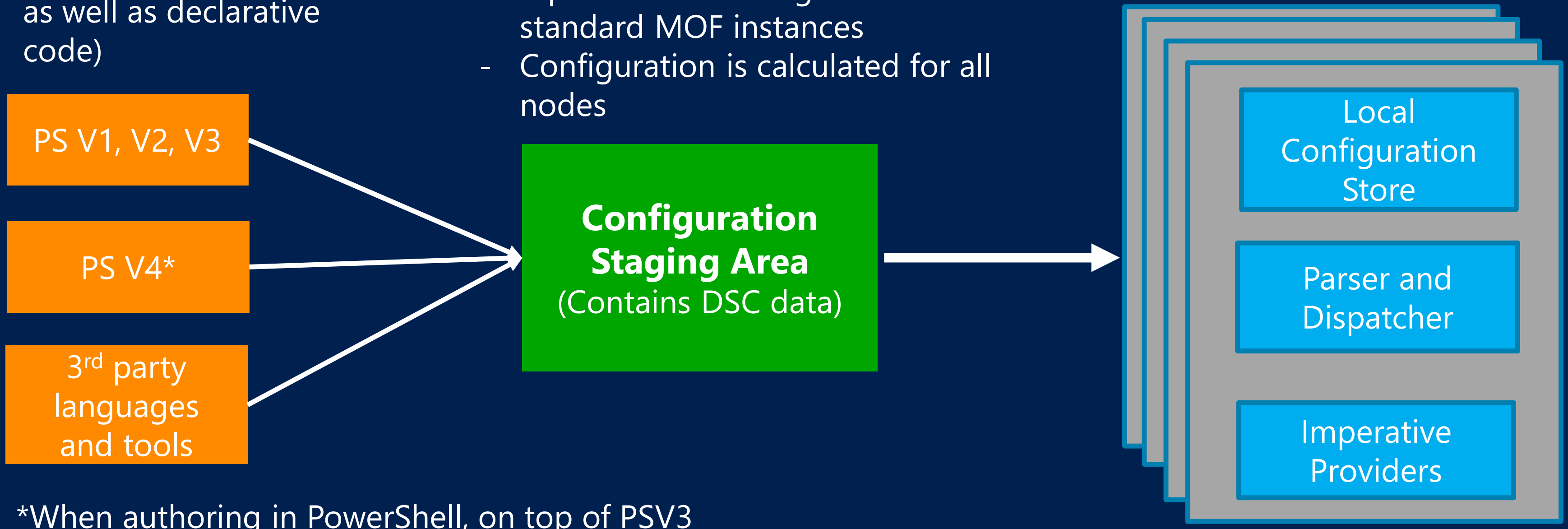
Multi-node configuration and parameters

Push Model

Authoring Phase
(May include imperative as well as declarative code)

Staging Phase
- Fully declarative configuration representation using DMTF standard MOF instances
- Configuration is calculated for all nodes

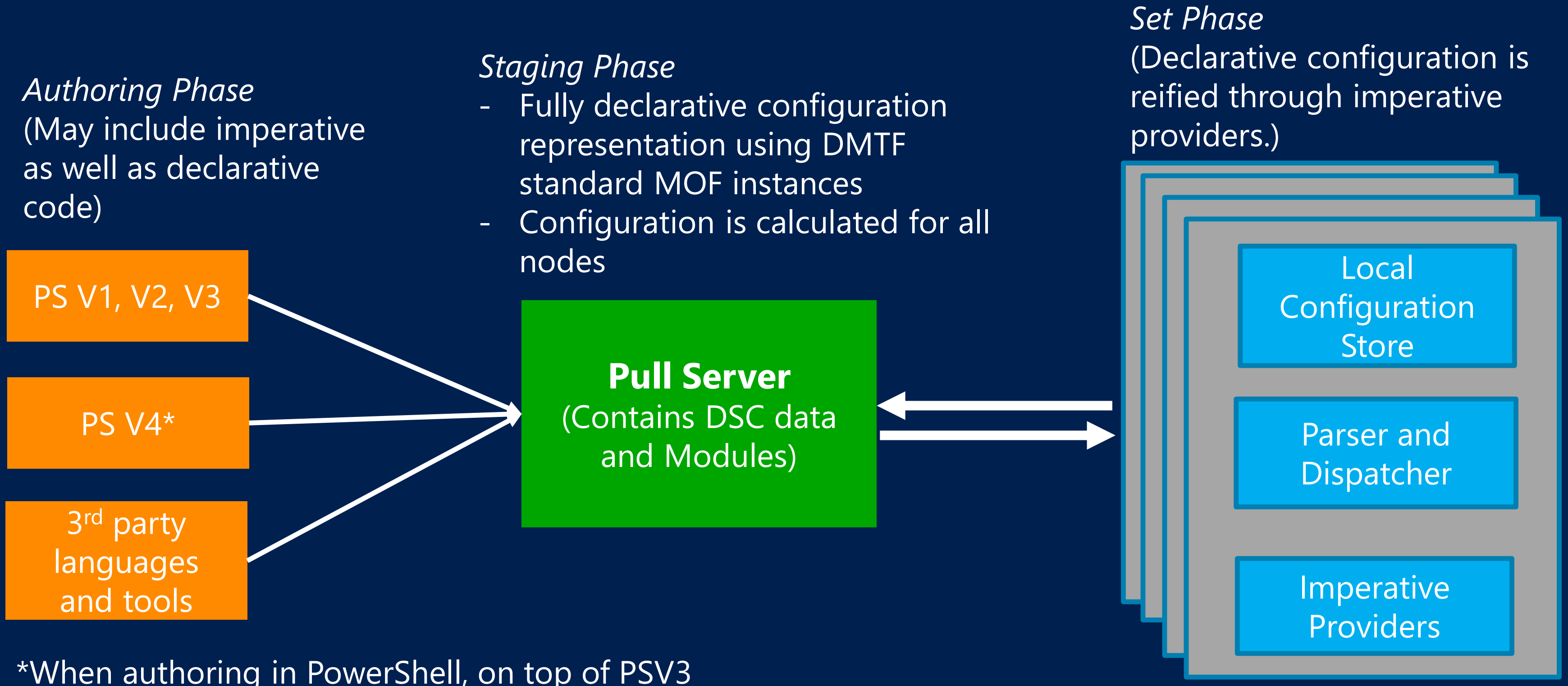
Set Phase
(Declarative configuration is reified through imperative providers.)


PS V1, V2, V3
PS V4*
3rd party languages and tools
Configuration Staging Area
(Contains DSC data)
Local Configuration Store
Parser and Dispatcher
Imperative Providers

*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:
- Monotonic
- Imperative
- Idempotent

Pull Model



Authoring Phase
(May include imperative as well as declarative code)
Staging Phase
- Fully declarative configuration representation using DMTF standard MOF instances
- Configuration is calculated for all nodes
Set Phase
(Declarative configuration is reified through imperative providers.)
PS V1, V2, V3
PS V4*
3rd party languages and tools
Pull Server
(Contains DSC data and Modules)
Local Configuration Store
Parser and Dispatcher
Imperative Providers

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

- Declarative syntax extensions
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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                 :
```

http://technet.microsoft.com/en-us/library/dn249922

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
```

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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!”

Q & A