


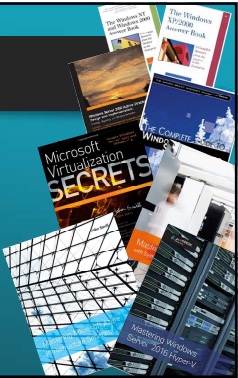
John Savill's  
PowerShell Master Class




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Who am I?




 @NTFAQGuy

- MCSE NT 4 through 2016, Azure, CISSP, ITIL v3
- Author of the Windows FAQ
- Latest book "Mastering Server 2016 Hyper-V"
- Speaker at Tech Ed, Windows Connections and Ignite
- Large number of Pluralsight courses
- <https://savilltech.com/>
- <http://www.youtube.com/NTFAQGuy>

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Agenda




- Because this is online I will be updating it as required
- Key module themes:
  - PowerShell Fundamentals
  - Remote Management with PowerShell
  - Connecting commands together and mastering objects
  - Creating a PowerShell script
  - Advanced scripting techniques
  - Parsing data and working with objects
  - Desired State Configuration
  - PowerShell Workflows, Azure Automation and Azure Functions
  - The best of the rest

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PowerShell Fundamentals




Before PowerShell  
PowerShell Interfaces  
Structure of PowerShell Cmdlets and Modules

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The World Without PowerShell




- Many administrators used to the command prompt
- The command prompt has some built-in commands such as dir and can call separate executables such as ipconfig
- Batch files can be created to perform a fixed set of tasks
- Some pipelining (|) is possible but the output from commands is a text string

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WMI, VBScript, JScript



- There are many scripting languages available which provide a richer language than available in batch files
- Each has its own format and different levels of capability
- Different syntax needed between scripting languages and command line so requires learning multiple systems and environments
- Not highly extensible

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## Enter PowerShell

- Formally codename Monad a loooong time ago
- Provides an environment for both executing live commands and creating powerful scripts
- Built on the .NET framework (and now .NET Core) and is focused around objects enabling rich sequences to be created which can perform complex tasks
- Uses a common syntax and common verb-noun pair command naming for cmdlets

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## Simpler Language and Standards Based

- Thousands of cmdlets so simplicity is important
- PowerShell is focused on “least cognitive distance” between what you want to do and the actual command
- `<verb>-<noun>`
- New core cmdlets related to new functionality and also changes to existing cmdlets to match simpler syntax and more features (e.g. Get-ChildItem)
- PowerShell can manage non-Windows such as Linux as WSMAN and CIM (WMI2) are the default protocols for management
- PowerShell Core utilizes SSH in addition to WSMAN
- Remote Management enabled by default

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## PowerShell Availability

- PowerShell v2 is available for
  - Windows Server 2008 SP1 +
  - Windows Vista SP 2+
  - Windows XP SP 2 +
- Pre-installed in Windows Server 2008 R2 and Windows 7
- .NET Framework 2.0 SP1 required
- .NET Framework 3.5 SP1 required for ISE

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## PowerShell v3

- Standard in Windows Server 2012 and Windows 8
- Also available as part of Windows Management Framework (WMF) 3.0
  - <http://www.microsoft.com/en-us/download/details.aspx?id=34595>
- Available for Windows Server 2008 SP2, 2008 R2 SP1 and Windows 7 SP1
- Can be installed side-by-side with PowerShell v2
- Consider this the absolute minimum version

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## PowerShell v4

- Standard in Windows Server 2012 R2 and Windows 8.1
- Also available as part of Windows Management Framework (WMF) 4.0
  - <http://www.microsoft.com/en-us/download/details.aspx?id=40855>
- Available for Windows Server 2008 R2 SP1, Windows Server 2012 and Windows 7 SP1
- Still have version 2 available

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## PowerShell v5

- New cmdlets such as Get-ItemPropertyValue (to look at property values directly).
- Windows PowerShell Integrated Scripting Environment (ISE) updates
- Windows PowerShell Desired State Configuration (DSC) performance and optimizations (and bug fixes)
- Network Switch cmdlets (in the NetworkSwitch module), which allow management of switches that are Windows Server 2012 R2 certified to have management related to global configuration, VLAN configuration, and Layer 2 port configurations performed.
- OneGet, which allows the discovery and installation of packages from around the web, including services such as Chocolatey
- Part of WMF 5.0

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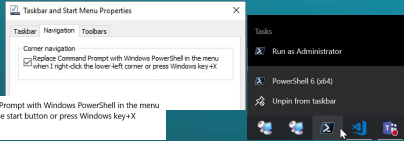
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## Easy Access to PowerShell

- Right click on Start and by default shows Command Prompt and Command Prompt (Admin)
- This can be changed to PowerShell through Taskbar properties
- When using PowerShell sometimes you want to run as Admin
- Should say "Administrator" at top
- Can customize layout, font, opacity (Win 10)
- Can also pin to taskbar



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## Using ISE

- The standard PowerShell interface has basic autocomplete
- Integrated Scripting Interface features intellisense, scripting and debugging and help windows
- While learning (and even using) the ISE may be your way to go
- ISE does require WPF so not available on Server Core instances and takes a little longer to start
- Snippets are your friend!
- Only supports Windows PowerShell

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## Visual Studio Code

- A free, lightweight, cross-platform editor for many languages
- This is the development environment that is the future and has a great deal of investment
- Add-in available to add full syntax and debug support for PowerShell from <https://marketplace.visualstudio.com/items?itemName=ms-vscode.PowerShell>
- Many extensions available including support multiple for terminals
- Native integration with GIT change control
- Supports Windows PowerShell and PowerShell Core (and a lot more)

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## Start with Interactive Shell

- Best way to get started is using PowerShell as an interactive shell
- The shell environment can be customized just like a command prompt window
- Start with navigating round the file system
- Dir works!
- But the switches don't, e.g. `dir /s`, why?
- Intrinsic vs external cmd.exe commands

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## Using non-PowerShell in PowerShell

- Difference between commands built into the shell (cmd.exe) and executables
- Search for dir.exe or dir.com, you won't find it. This is part of cmd.exe
- It works in PowerShell but only because PowerShell has an alias that resolves to Get-ChildItem
- Therefore the switches used must be those for Get-ChildItem and NOT dir
- If you call an executable, e.g. IPCONFIG.exe then the existing switches work

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## Aliases are your friend

- At least initially
- For most cmd.exe intrinsic commands PowerShell has an alias to the PowerShell cmdlet
- However start to learn the proper PowerShell methods rather than relying on aliases long term
- In scripts use the full commands rather than aliases

`Get-Alias`

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## Navigating with PowerShell

- Regular commands will work but file system is not the only hierarchical storage system
  - Registry
  - Certificate Store
  - Active Directory
  - RDS
  - IIS
- These can also be navigated and configured like a file system

```
Get-PSDrive
```

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## Tab Support

- Can use tab character for:
  - Cmdlet completion
  - Cycling through parameters
  - Cycling through valid values for parameters (where the parameter has a set of valid values)
  - Cycling through files and folders

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## PowerShell Modules

- Modules are loaded which contain PowerShell functionalities such as cmdlets
- `Get-module` to see those loaded
- `Get-module -listavailable` to see all available
- `Import-module <module>` to add into PowerShell instance
- `Get-Command -Module <module>` to list commands in a module

```
Get-Command -Module Hyper-V | Select  
-Unique Noun | Sort Noun
```

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## Module Versions and Updating

- Modules go through updates
- Check version with
  - `(Get-Module <module name>).Version`
- Closer integration with repositories like GitHub
  - This enables initial installation and update
  - `Install-Module Az`
  - `Update-Module Az`

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## Getting Help

- PowerShell has great help
- `Get-Help <cmdlet>`
- Also available
  - `-full`
  - `-detailed`
  - `-examples`
  - `-online` (to display in web)
  - `-showwindow`
- `Get-Command -Module <module>`
- `Get-Command -Noun <noun>`

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## Updatable Help

- Help for cmdlets is pulled from the Internet and installed into correct location for module (language specific)
  - `Update-Help` (run elevated)
  - `Save-Help` (save to a folder and use this with above Update-Help cmdlet)
- `Get-Help` will automatically pull down latest help
- `Get-Help <cmdlet> -Online` for web based help information
  - `Get-Help New-VHD -Online`
  - `(Get-Command New-VHD).HelpUri`

Updating help for module Microsoft PowerShell Management  
Downloading help content...

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