



Useful Commands

Update-Help	Downloads and installs newest help files
Get-Help	Displays information about commands and concepts
Get-Command	Gets all commands
Get-Member	Gets the properties and methods of objects
Get-Module	Gets the modules that have been imported or that can be imported into the current session

Operators

Assignment Operators

=, +=, -=, *=, /=, %=, ++, -- Assigns one or more values to a variable

Comparison Operators

-eq, -ne Equal, not equal
 -gt, -ge Greater than, greater than or equal to
 -lt, -le Less than, less than or equal to
 -replace changes the specified elements of a value

"abcde" -replace "bc", "TEST"

-match, -notmatch Regular expression match
 -like, -notlike Wildcard matching
 -contains, -notcontains Returns TRUE if the scalar value on its right is contained in the array on its left

1,2,3,4,5 -contains 3

-in, -notin Returns TRUE only when test value exactly matches at least one of the reference values.

"Windows"-in "Windows","PowerShell"

Bitwise Operators

-band Bitwise AND
 -bor Bitwise OR (inclusive)
 -bxor Bitwise OR (exclusive)
 -bnot Bitwise NOT
 -shl, -shr Bitwise shift operators. Bit shift left, bit shift right (arithmetic for signed, logical for unsigned values)

Other Operators

-Split Splits a string
"abcdefghi" -split "de"

-join Joins multiple strings
"abc","de","ghi" -join ","

.. Range operator
1..10 | foreach {\$_* 5}

-is, -isnot Type evaluator (Boolean). Tells whether an object is an instance of a specified .NET Framework type.

42 -is [int]

-as Type convertor. Tries to convert the input object to the specified .NET Framework type.

\$a = 42 -as [String]

-f Formats strings by using the format method of string objects

1..10 | foreach {"{0:N2}" -f \$_ }

[] Cast operator. Converts or limits objects to the specified type

[datetime]\$birthday = "1/10/66"

,

Comma operator (Array constructor)

.

Dot-sourcing operator runs a script in the current scope

. c:\scripts\sample.ps1

\$()

@()

&

Subexpression operator
 Array subexpression operator
 The call operator, also known as the "invocation operator," lets you run commands that are stored in variables and represented by strings.

\$a = "Get-Process"
& \$a
\$sb = { Get-Process | Select -First 2 }
& \$sb

Logical Operators

-and, -or, -xor, -not, ! Connect expressions and statements, allowing you to test for multiple conditions

Redirection Operators

>, >>

The redirection operators enable you to send particular types of output (success, error, warning, verbose, and debug) to files and to the success output stream.

Output streams

- * All output
- 1 Success output
- 2 Errors
- 3 Warning messages
- 4 Verbose output
- 5 Debug messages

Writes warning output to warning.txt
Do-Something 3> warning.txt
 # Appends verbose.txt with the verbose output
Do-Something 4>> verbose.txt
 # Writes debug output to the output stream
Do-Something 5>&1
 # Redirects all streams to out.txt
Do-Something *> out.txt



Arrays

"a", "b", "c"	Array of strings
1,2,3	Array of integers
@()	Empty array
@(2)	Array of one element
1,(2,3),4	Array within array
,"hi"	Array of one element
\$arr[5]	Sixth element of array*
\$arr[2..20]	Returns elements 3 thru 21
\$arr[-1]	Returns the last array element
\$arr[-3..-1]	Displays the last three elements of the array
\$arr[1,4+6..9]	Displays the elements at index positions 1,4, and 6 through 9
@(Get-Process)	Forces the result to an array using the array sub-expression operator
\$arr=1..10	Reverses an array
\$arr[((\$arr.length-1)..0]	Adds to an existing value of the second array item (increases the value of the element)
\$arr[1] += 200	
\$b = \$arr[0,1 + 3..6]	Creates a new array based on selected elements of an existing array
\$z = \$arr + \$b	Combines two arrays into a single array, use the plus operator (+)
*Arrays are zero-based	

Associative Arrays (Hash tables)

\$hash = @{}	Creates empty hash table
@{foo=1; bar='value2'}	Creates and initialize a hash table
[ordered]@{a=1; b=2; c=3}	Creates an ordered dictionary
\$hash.key1 = 1	Assigns 1 to key key1

\$hash.key1	Returns value of key1
\$hash["key1"]	Returns value of key1
\$hash.GetEnumerator sort Key	Sorts a hash table by the Key property
[pscustomobject]@{x=1; y=2}	Creates a custom object

Comments

This is a comment because # is the first character of a token
\$a = "#This is not a comment..." \$a = "something" # ...but this is.
Write-Host Hello#world
Block Comments
<# This is A multi-line comment #>

Object Properties

An object's properties can be referenced directly with the "." operator.
\$a = Get-Date
\$a Get-Member -MemberType Property
\$a.Date
\$a.TimeOfDay.Hours
\$a Get-Member -MemberType Property -Static
Static properties can be referenced with the "::" operator.
[DateTime]::Now

Methods

Methods can be called on objects.
\$a = "This is a string"
\$a Get-Member -MemberType Method
\$a.ToUpper()

\$a.Substring(0,3)

\$a | Get-Member -MemberType Method -Static

Static methods are callable with the "::" operator.

[DateTime]::IsLeapYear(2012)

Strings

"This is a string, this \$variable is expanded as is \$(2+2)" 'This is a string, this \$variable is not expanded'
@ This is a here-string can contain anything including carriage returns and quotes. Expressions are evaluated: \$(2+2*5). Note that the end marker of the here-string must be at the beginning of a line! "@
@' Here-strings with single quotes do not evaluate expressions: \$(2+2*5) '@

Variables

Format: \$[scope:]name or \${anyname} or \${any path}
\$path = "C:\Windows\System32"
Get-ChildItem \${env:ProgramFiles(x86)}
\$processes = Get-Process
\$global:a = 1 # visible everywhere
\$local:a = 1 # defined in this scope and visible to children
\$private:a = 1 # same as local but invisible to child scopes
\$script:a = 1 # visible to everything in this script
Using scope indicates a local variable in remote commands and with Start-Job
\$localVar = Read-Host "Directory, please"
Invoke-Command -ComputerName localhost -ScriptBlock { dir \$using:localVar }
Start-Job { dir \$using:localVar -Recurse}
\$env:Path += ";D:\Scripts"



Get-Command -Noun Variable # the Variable Cmdlets
Get-ChildItem variable: # listing all variables using the variable drive

strongly-typed variable (can contain only integers)
[int]\$number=8

attributes can be used on variables
[ValidateRange(1,10)][int]\$number = 1
\$number = 11 #returns an error

flip variables
\$a=1;\$b=2; \$a,\$b = \$b,\$a

multi assignment
\$a,\$b,\$c = 0
\$a,\$b,\$c = 'a','b','c'
\$a,\$b,\$c = 'a b c'.split()

create read only variable (can be overwritten with -Force)
Set-Variable -Name ReadOnlyVar -Value 3 -Option ReadOnly

create Constant variable (cannot be overwritten)
Set-Variable -Name Pi -Value 3.14 -Option Constant

Windows PowerShell Automatic Variables (not exhaustive)

\$\$	Last token of the previous command line
\$?	Boolean status of last command
\$^	First token of the previous command line
\$_, \$PSItem	Current pipeline object
\$Args	Arguments to a script or function
\$Error	Array of errors from previous commands
\$ForEach	Reference to the enumerator in a foreach loop
\$Home	The user's home directory
\$Host	Reference to the application hosting the PowerShell language

\$Input	Enumerator of objects piped to a script
\$LastExitCode	Exit code of last program or script
\$Matches	Stores a hash table of string values matched by the -match or -notmatch comparison operators.
\$MyInvocation	An object with information about the current command
\$PSHome	The installation location of Windows PowerShell
\$profile	The standard profile (may not be present)
\$Switch	Enumerator in a switch statement
\$True	Boolean value for TRUE
\$False	Boolean value for FALSE
\$PSCulture	Current culture
\$PSUICulture	Current UI culture
\$PsVersionTable	Details about the version of Windows PowerShell
\$Pwd	The full path of the current directory

Windows PowerShell Preference Variables (not exhaustive)

\$ConfirmPreference	Determines whether Windows PowerShell automatically prompts you for confirmation before running a cmdlet or function
\$DebugPreference	Determines how Windows PowerShell responds to debugging
\$ErrorActionPreference	Determines how Windows PowerShell responds to a non-terminating error
\$FormatEnumerationLimit	Determines how many enumerated items are included in a display
\$MaximumHistoryCount	Determines how many commands are saved in the command history for the current session
\$PSEmailServer	Specifies the default e-mail server that is used to send e-mail messages

\$OFS	Output Field Separator. Specifies the character that separates the elements of an array when the array is converted to a string. The default value is Space.
\$PSDefaultParameterValues	Specifies default values for the parameters of cmdlets and advanced functions
\$PSModuleAutoLoadingPreference	Enables and disables automatic importing of modules in the session. "All" is the default.
\$PSSessionApplicationName	Specifies the default application name for a remote command that uses WS-Management technology
\$PSSessionConfigurationName	Specifies the default session configuration that is used for PSSessions created in the current session
\$PSSessionOption	Establishes the default values for advanced user options in a remote session
\$VerbosePreference	Determines how Windows PowerShell responds to verbose messages generated by a script, cmdlet or provider
\$WarningPreference	Determines how Windows PowerShell responds to warning messages generated by a script, cmdlet or provider
\$WhatIfPreference	Determines whether WhatIf is automatically enabled for every command that supports it

Collection Filtering

Collection filtering by using a method syntax is supported.

```
.Where({ expression } [, mode [, numberToReturn]])
.ForEach({ expression } [, arguments...])
```

```
$Services = Get-Service
$Services.Where({ $_.Status -eq 'Stopped'}, 'First', 3)
$Services.ForEach({ $_.Name.ToUpper()
(1..5).ForEach({ $args[0] + $_, 'Server'}
```



WINDOWS POWERSHELL LEARNING RESOURCES

Microsoft Resources

Scripting with Windows PowerShell

<http://technet.microsoft.com/library/bb978526.aspx>

Windows PowerShell Team Blog

<http://blogs.msdn.com/PowerShell>

Microsoft Script Center

<http://technet.microsoft.com/scriptcenter/default>

Windows PowerShell Forum

<http://social.technet.microsoft.com/Forums/en-US/winserverpowershell/>

Hey, Scripting Guy! Blog

<http://blogs.technet.com/b/heyscriptingguy/>

Windows PowerShell Survival Guide

<http://social.technet.microsoft.com/wiki/contents/articles/183.windows-powershell-survival-guide-en-us.aspx>

Windows PowerShell ISE Add-on Tools

<http://social.technet.microsoft.com/wiki/contents/articles/2969.windows-powershell-ise-add-on-tools.aspx>

Windows PowerShell Customer Connection: Submit bugs and feature requests

<https://connect.microsoft.com/powershell>

Report Windows PowerShell documentation bugs by email

write-help@microsoft.com

Community Resources

PowerShell Code Repository: <http://poshcode.org>

PowerShell.com Community: <http://powershell.com>

PowerShell.org Community: <http://powershell.org>

PowerGUI Community: <http://en.community.dell.com/techcenter/powergui/>

The PowerShell Community Toolbar: <http://powershell.ourtoolbar.com/>

PowerScripting Podcast: <http://powerscripting.net>

PowerShell Magazine: <http://powershellmagazine.com>

[#PowerShell](http://irc.freenode.net)

Free eBooks and Guides

Mastering PowerShell, Second Edition - Dr. Tobias Weltner

<http://powershell.com/cs/blogs/ebookv2/default.aspx>

PowerShell.org Free eBooks

<http://powershell.org/wp/ebooks/>

Effective Windows PowerShell - Keith Hill

<http://rkeithhill.wordpress.com/2009/03/08/effective-windows-powershell-the-free-ebook/>

Popular Community Projects

PowerShell Community Extensions (PSCX)

<http://pscx.codeplex.com/>

PSReadLine - A bash inspired readline implementation for PowerShell

<https://github.com/lzybkr/PSReadLine>

TabExpansionPlusPlus - PowerShell module to improve tab expansion and Intellisense

<https://github.com/lzybkr/TabExpansionPlusPlus>

PowerSploit - A PowerShell Post-Exploitation Framework

<https://github.com/mattifestation/PowerSploit>

PoshSec - PowerShell module focused on security in the Windows environment

<https://github.com/PoshSec/PoshSec>

Posh-SecMod - PowerShell module with security-related cmdlets

<https://github.com/darkoperator/Posh-SecMod>

Pester - PowerShell BDD-style testing framework

<https://github.com/pester/pester>