

PowerShell

- [Active Directory](#)
- [Basics](#)
- [Errors and Solutions](#)
- [Firewall management](#)
- [Group Policy and PowerShell](#)
- [Querying Event Logs](#)
- [Snippets](#)
- [Useful PowerShell Commands](#)
- [Windows Network Management from the command line](#)
- [Resource Usage](#)
- [64-bit or 32-bit machine / ps host / process](#)
- [Installed software via PowerShell](#)

Active Directory

Get-SMBOpenFile

Basics

Expanding objects

Much of the data we receive from cmdlets are objects that require further manipulation to get to the data we're looking for.

```
# Connect to Microsoft Graph
Connect-MgGraph -Scopes "Mail.Read"

# Define the user and folder details
$userId = "user@domain.com"
$mailFolderId = "folder-id-here"

# Get the messages in the specified folder
$messages = Get-MgUserMailFolderMessage -UserId $userId -MailFolderId $mailFolderId

# Format the output to expand sender, from, and include subject
$messages | Select-Object -Property Id,ReceivedDateTime,From,Sender,Subject | Format-List
```

Below is example output of the above script:

```
# example output without object expansion
# note the un-expanded values for From and Sender
Id                : [REDACTED_GUID]
ReceivedDateTime  : MM/DD/YYYY 2:52:35 AM
Subject           : [REDACTED_SUBJECT]
From              : Microsoft.Graph.PowerShell.Models.MicrosoftGraphRecipient
Sender            : Microsoft.Graph.PowerShell.Models.MicrosoftGraphRecipient
```

The actual data we're looking for related to From and Sender is in the following expansions:

```
From.EmailAddress.Name
From.EmailAddress.Address
Sender.EmailAddress.Name
Sender.EmailAddress.Address
```

Below is an example of how to accomplish that in the Select-Object statement:

```
# Connect to Microsoft Graph
Connect-MgGraph -Scopes "Mail.Read"

# Define the user and folder details
$userId = "user@domain.com"
$mailFolderId = "folder-id-here"

# Get the messages in the specified folder
$messages = Get-MgUserMailFolderMessage -UserId $userId -MailFolderId $mailFolderId

# Format the output to expand sender, from, and include subject
$messages | Select-Object -Property Subject,
    @{Name="SenderName";Expression={$_.Sender.EmailAddress.Name}},
    @{Name="SenderEmail";Expression={$_.Sender.EmailAddress.Address}},
    @{Name="FromName";Expression={$_.From.EmailAddress.Name}},
    @{Name="FromEmail";Expression={$_.From.EmailAddress.Address}} |
    Format-List
```

The output is not actual useful data, rather than the name of the object type that was returned:

```
Id                : [REDACTED_GUID]
ReceivedDateTime  : MM/DD/YYYY 2:52:35 AM
Subject           : Weekly Duo Report
SenderName        : Security Team
SenderEmail       : security@domain.com
FromName          : Security Team
FromEmail         : security@domain.com
```

Using variables in -Filter statements

Example of using a variable in a -Filter statement with the Get-ADGroup cmdlet. Note this cmdlet doesn't properly throw exceptions that can be handled by a try / catch block, so we have to use a Filter statement and check to see if anything was returned.

```
# Assign group name we're looking for to a variable
$GroupName = "Administrators"

# Get-ADGroup doesn't throw exceptions properly, so we have to work around this since we can't
use try / catch
$Group = Get-ADGroup -Filter "Name -eq '$GroupName'" -Properties members

If ($Group -eq $null) {
    "# $($GroupName) - group not found!!!"
} else {
    "# $($GroupName)"
}
```

Errors and Solutions

This page contains a list of common PowerShell errors and their solutions.

Invoke-WebRequest : The request was aborted: Could not create SSL/TLS secure channel.

The cause of the error is that PowerShell, by default, uses TLS 1.0 to make https requests. TLS 1.0 has been broken for a long time now and is no longer supported by most websites. You can change this behavior with running any of the below command to use all protocols. You can also specify single protocol.

```
[Net.ServicePointManager]::SecurityProtocol = "Tls12"
```

```
[Net.ServicePointManager]::SecurityProtocol = [Net.SecurityProtocolType]::Tls,  
[Net.SecurityProtocolType]::Tls11, [Net.SecurityProtocolType]::Tls12,  
[Net.SecurityProtocolType]::Ssl3
```

```
[Net.ServicePointManager]::SecurityProtocol = "Tls, Tls11, Tls12, Ssl3"
```

Restart-Computer : Failed to restart the computer COMPUTERNAME with the following error message: A system shutdown is in progress.

12/23/2024

A server this morning wouldn't respond to CTRL-ALT-DEL requests, remote Event Viewer requests, but we were able to access it via remote a PowerShell session. When we issued the Restart-Computer cmdlet, the error response was that a system shutdown is in progress. Suggestions on the web were to kill any lsass and winlogon processes.

Killing the lsass process did the trick this morning and the server rebooted as expected afterwards.

```
# list all lsass processes  
Get-Process -IncludeUserName | Where-Object {$_.ProcessName -Like 'lsass'}
```

```
# to actually stop all lsass processes
```

```
Get-Process -IncludeUserName | Where-Object {$_.ProcessName -Like 'lsass'} | Stop-Process
```

```
#end
```

Firewall management

List firewall rules with ICMP in the DisplayName

```
Get-NetFirewallRule | Where-Object DisplayName -Like "*ICMP*" | Sort-Object Enabled,Name |  
Format-Table
```

Enable ICMP Echo Request

```
Set-NetFirewallRule -DisplayName "File and Printer Sharing (Echo Request - ICMPv4-In)" -  
enabled True  
Set-NetFirewallRule -DisplayName "File and Printer Sharing (Echo Request - ICMPv6-In)" -  
enabled True
```


Group Policy and PowerShell

You can manage Group Policy via PowerShell... who knew!? ☐☐

Listing GPOs

```
Get-GPO -All | Sort-Object -Property DisplayName | FT -Property  
DisplayName,Owner,GpoStatus,Description
```

```
Get-GPO -All -Domain domain.loc -Server dcl.domain.loc | Sort-Object -Property DisplayName |  
FT -Property DisplayName,Owner,GpoStatus,Description
```

Generating GPO reports

```
# Generate a GPO Report for a single named GPO  
$gpoName = "PowerShell Logging"  
Get-GPO -All | Where-Object { $_.DisplayName -eq $gpoName } | ForEach-Object {  
    $reportPath = "C:\GPOReports\" + $_.DisplayName + ".html"  
    Get-GPOReport -GUID $_.ID -ReportType HTML -Path "$($reportPath)"  
}
```

```
# Generate GPO reports for all GPOs in the current domain  
$queryDomain = $env:USERDNSDOMAIN  
$queryServer = ($env:LOGONSERVER).replace("\\", ".") + "." + $env:USERDNSDOMAIN  
Get-GPO -All -Domain $queryDomain -Server $queryServer | Sort-Object -Property DisplayName |  
ForEach-Object {  
    $reportPath = "C:\GPOReports\" + $_.DomainName + " - " + $_.DisplayName.replace("/", "_") +  
    ".html"  
    "Generating report for $($_.DisplayName) in $($reportPath)..."  
    Get-GPOReport -Domain $queryDomain -Server $queryServer -GUID $_.ID -ReportType HTML -Path  
    "$($reportPath)"  
}
```

#end

Querying Event Logs

I noticed that there is a huge speed difference between using an XML Query and PowerShell Get-EventLog piped through Where-Object to filter event logs. Thanks to [this article](#), I learned how to use the XML Query via PowerShell, so you get the best of both worlds.

Know your version

Here's different commands that will show you which version PowerShell you're running.

```
$PSVersionTable.PSVersion
```

```
Get-Host
```

```
$host
```

```
$host.version
```

General concepts

There are two different cmdlets for accessing Windows Event Logs. Get-WinEvent is a newer version of Get-EventLog.

Get-WinEvent

- You have access to more information
- Because you have more information, it might take more effort to filter the data

Get-EventLog

- One clear advantage: you can use the **-After** and **-Before** attributes to easily filter results by date

Filtering results

If you want to know how to filter the results, simply pipe the cmdlet to Get-Member:

The output of the command clearly shows you the methods and properties returned:

```
PS C:\> Get-EventLog system -newest 1 | Get-Member
```

```
TypeName: System.Diagnostics.EventLogEntry#system/nhi/1074012975
```

Name	MemberType	Definition
-----	-----	-----
Disposed	Event	System.EventHandler Disposed(System.Object, System.EventArgs)
CreateObjRef	Method	System.Runtime.Remoting.ObjRef CreateObjRef(type requestedType)
Dispose	Method	void Dispose(), void IDisposable.Dispose()
Equals	Method	bool Equals(System.Diagnostics.EventLogEntry otherEntry), bool Equals(System.Object obj)
GetHashCode	Method	int GetHashCode()
GetLifetimeService	Method	System.Object GetLifetimeService()
GetObjectData	Method	void ISerializable.GetObjectData(System.Runtime.Serialization.SerializationInfo info, System.Runtime.Serialization.StreamingContext context)
GetType	Method	type GetType()
InitializeLifetimeService	Method	System.Object InitializeLifetimeService()
ToString	Method	string ToString()
Category	Property	string Category {get;}
CategoryNumber	Property	int16 CategoryNumber {get;}
Container	Property	System.ComponentModel.IContainer Container {get;}
Data	Property	byte[] Data {get;}
EntryType	Property	System.Diagnostics.EventLogEntryType EntryType {get;}
Index	Property	int Index {get;}
InstanceId	Property	long InstanceId {get;}
MachineName	Property	string MachineName {get;}
Message	Property	string Message {get;}
ReplacementStrings	Property	string[] ReplacementStrings {get;}
Site	Property	System.ComponentModel.ISite Site {get;set;}
Source	Property	string Source {get;}
TimeGenerated	Property	datetime TimeGenerated {get;}
TimeWritten	Property	datetime TimeWritten {get;}

```
UserName                Property      string UserName {get;}
EventID                  ScriptProperty System.Object EventID {get=$this.get_EventID() -band
0xFFFF;}
```

Get-EventLog Examples

```
# Show available event logs and stats
Get-EventLog -List
```

```
# get the most recent 10 system log entries
# just change the LogName from System to Application, Security, etc. to access other logs
Get-EventLog -LogName System -Newest 10
```

```
# get all system logs from the last 4 hours
Get-EventLog -LogName System -After (Get-Date).AddHours(-4)
```

```
# get all system logs from the last 24 hours
Get-EventLog -LogName System -After (Get-Date).AddDays(-1)
```

```
# View specific event using the event Index
Get-EventLog -LogName System -Index [Event_Index_Number] | Format-List
```

```
# get the most recent 10 entries from a specific source
Get-EventLog -LogName System -Source Kerberos -Newest 10
Get-EventLog -LogName System -Source Microsoft-Windows-WLAN-AutoConfig -Newest 10
```

```
# Get system logs from the last 24 hours from Source WLAN-AutoConfig
Get-EventLog -LogName system -After (Get-Date).AddDays(-1) -Source Microsoft-Windows-WLAN-
AutoConfig
```

```
# get the most recent 10 Error entries
Get-EventLog -LogName Application -EventType Error -Newest 10
Get-EventLog -LogName Security -EventType Error -Newest 10
Get-EventLog -LogName System -EventType Error -Newest 10
```

```
# Get list of Event Log Sources from the System log from the last 8 hours sorted by log count
Get-EventLog -LogName System -after (Get-Date).AddHours(-8) | Group-Object -Property Source -
NoElement | Select-Object -Property Count, Name | Sort-Object -Descending Count
```

```
# Find logins in the last 24 hours
Get-EventLog system -after (get-date).AddDays(-1) | where {$_.InstanceId -eq 7001}
```

```
# Find last computer start
$today = get-date -Hour 0 -Minute 0;
Get-EventLog system -after $today | sort -Descending | select -First 1
```

```
# Find logins and logoffs in the last 7 days
$log = get-eventlog system -source Microsoft-Windows-Winlogon -After (Get-Date).AddDays(-7);
$res = @(); ForEach ($log in $logs) {if($log.instanceid -eq 7001) {$type = "Logon"} Elseif
($log.instanceid -eq 7002){$type="Logoff"} Else {Continue} $res += New-Object PSObject -
Property @{Time = $log.TimeWritten; "Event" = $type; User = (New-Object
System.Security.Principal.SecurityIdentifier
$Log.ReplacementStrings[1]).Translate([System.Security.Principal.NTAccount])}};
$res
```

Get-WinEvent Examples

```
# Get user Logon / Logoff events
Get-WinEvent -FilterHashtable @{
    LogName='System'
    ProviderName='Microsoft-Windows-Winlogon'
    ID=7001,7002
}
```

```
Get-WinEvent -FilterHashtable @{
    LogName='Application'
    ProviderName='.NET Runtime'
    Keywords=36028797018963968
    ID=1023
    Level=2
}
```

```
}
```

Formatting output

[Source](#)

You can see what formatters are available on any system using the following command

```
Get-Command -Verb Format -Module Microsoft.PowerShell.Utility
```

Below is the output on Windows 11 as of 10/31/2023

```
PS C:\> Get-Command -Verb Format -Module Microsoft.PowerShell.Utility
```

CommandType	Name	Version	Source
-----	----	-----	-----
Function	Format-Hex	3.1.0.0	
	Microsoft.PowerShell.Utility		
Cmdlet	Format-Custom	3.1.0.0	
	Microsoft.PowerShell.Utility		
Cmdlet	Format-List	3.1.0.0	
	Microsoft.PowerShell.Utility		
Cmdlet	Format-Table	3.1.0.0	
	Microsoft.PowerShell.Utility		
Cmdlet	Format-Wide	3.1.0.0	
	Microsoft.PowerShell.Utility		

You also have access to the following cmdlets for other output formats

[Export-CliXml](#)

```
# Export-Clixml exports an XML representation of an object or objects and stores it in a file
Get-Acl C:\Windows | Export-CliXml -Path .\c-windows-acl.xml
```

```
# You can use Import-CliXml to save the stored object or objects back to a variable
$WindowsFolderACL = Import-CliXml -Path .\c-windows-acl.xml
```

[Export-Csv](#)

```
# Export-Csv - Add an example later
```

Redirecting data with Out-* cmdlets

[Source](#)

```
Out-Host -Paging
```

```
Get-Process | Out-Host -Paging | Format-List
```

```
Get-Process | Format-List | Out-Host -Paging
```

```
Get-Command | Out-Null
```

```
Get-Command Get-Command | Out-Printer -Name 'Microsoft Office Document Image Writer'
```

```
Get-Process | Out-File -FilePath C:\temp\processlist.txt
```

```
Get-Command | Out-File -FilePath c:\temp\output.txt -Width 2147483647
```

```
Get-EventLog -LogName System -After (Get-Date).AddDays(-1) -EntryType Error | Out-GridView
```

Grouping output

Remember to use the Get-Member cmdlet to see what properties you can use with Sort-Object and -GroupBy

```
Get-Service -Name win* | Sort-Object StartType | Format-Table -GroupBy StartType -AutoSize
```

```
PS C:\> Get-Service -Name win* | Sort-Object StartType | Format-Table -GroupBy StartType -
AutoSize
```


StartType: Automatic

Status	Name	DisplayName
Running	Winmgmt	Windows Management Instrumentation
Running	WinDefend	Microsoft Defender Antivirus Service

StartType: Manual

Status	Name	DisplayName
Stopped	WinRM	Windows Remote Management (WS-Management)
Running	WinHttpAutoProxySvc	WinHTTP Web Proxy Auto-Discovery Service

Querying for specific logs

System uptime related logs

For the actual current system uptime via PowerShell, [look here](#). The code below will show actual related event log entries.

Use this XML Filter in the Windows Event Viewer to create a custom filtered view of Kernel-General "The operating system started at system time..." events.

Event ID	Description
12	
13	
41	The system has rebooted without cleanly shutting down first. This error could be caused if the system stopped responding, crashed, or lost power unexpectedly.
1074	Logged when an app (ex: Windows Update) causes the system to restart, or when a user initiates a restart or shutdown.
6006	Logged as a clean shutdown. It gives the message "The Event log service was stopped".

6008

Logged as a dirty shutdown. It gives the message "The previous system shutdown at time on date was unexpected".

```
$query = @"
<QueryList>
  <Query Id="0" Path="System">
    <Select Path="System">*[System[(EventID='12')]]</Select>
    <Select Path="System">*[System[(EventID='13')]]</Select>
    <Select Path="System">*[System[(EventID='41')]]</Select>
    <Select Path="System">*[System[(EventID='1074')]]</Select>
    <Select Path="System">*[System[(EventID='6006')]]</Select>
    <Select Path="System">*[System[(EventID='6008')]]</Select>
  </Query>
</QueryList>
"@
```

```
Get-WinEvent -FilterXml $query | Format-List
```

Finding account lockouts.

XML Query

Use this XML Filter in the Windows Event Viewer to create a custom filtered view displaying account lockouts.

```
<QueryList>
  <Query Id="0" Path="Security">
    <Select Path="Security">
      *
      System[(EventID='4740')]
    </Select>
  </Query>
</QueryList>
```

PowerShell Script - Slow method

```
Get-EventLog -LogName Security | Where-Object {$_.EventID -eq 4740} |
  Select-Object -Property TimeGenerated, Source, EventID, InstanceId, Message
```

PowerShell Script - Fast method

```
$query = @"
<QueryList>
  <Query Id="0" Path="Security">
    <Select Path="Security">
      *
      [
        System[ (EventID= '4740' ) ]
      ]
    </Select>
  </Query>
</QueryList>
"@

Get-WinEvent -FilterXml $query | Format-List
```

Finding account lockouts for a particular user.

XML Query

Use this XML Filter in the Windows Event Viewer to create a custom filtered view displaying account lockouts for the administrator user.

```
<QueryList>
  <Query Id="0" Path="Security">
    <Select Path="Security">
      *
      [
        EventData[Data[@Name='TargetUserName']='administrator']
        and
        System[ (EventID= '4740' ) ]
      ]
    </Select>
  </Query>
</QueryList>
```

PowerShell Script - Fast method

```
$query = @"
<QueryList>
  <Query Id="0" Path="Security">
```

```

<Select Path="Security">
  *
  EventData[Data[@Name='TargetUserName']='administrator']
  and
  System[(EventID='4740')]
]
</Select>
</Query>
</QueryList>
"@

```

```
Get-WinEvent -FilterXml $query | Format-List
```

NPS + Azure MFA Logs - XML Query

XML Filter for custom filtered view that suppresses accounting event logs.

```

<QueryXML>
<QueryList>
  <Query Id="0" Path="System">
    <Select Path="System">*[System[Provider[@Name='NPS']]]</Select>
    <Select Path="Security">*[System[Provider[@Name='Microsoft-Windows-Security-Auditing'] and
Task = 12552]]</Select>
    <Suppress Path="Security">*[System[Provider[@Name='Microsoft-Windows-Security-Auditing'] and
Task = 12552 and (Data='Network Policy Server discarded the accounting request for a
user.')]</Suppress>
    <Select Path="Security">*[System[Provider[@Name='Microsoft-Windows-Security-Auditing']] and
*[EventData[Data[@Name='LogonProcessName'] and (Data='IAS')]]</Select>
    <Select Path="AuthN0ptCh">*</Select>
    <Select Path="AuthZAdminCh">*</Select>
    <Select Path="AuthZ0ptCh">*</Select>
  </Query>
</QueryList>
</QueryXML>

```

NPS Logs - XML Query

XML Filter for custom filtered view that suppresses accounting event logs.

```

<QueryXML>
  <QueryList>
    <Query Id="0" Path="System">
      <Select Path="System">*[System[Provider[@Name='NPS']]]</Select>
      <Select Path="Security">*[System[Provider[@Name='Microsoft-Windows-Security-Auditing'] and Task = 12552]]</Select>
      <Suppress Path="Security">*[System[Provider[@Name='Microsoft-Windows-Security-Auditing'] and Task = 12552 and (Data='Network Policy Server discarded the accounting request for a user.')]]</Suppress>
      <Select Path="Security">*[System[Provider[@Name='Microsoft-Windows-Security-Auditing']]] and *[EventData[Data[@Name='LogonProcessName'] and (Data='IAS')]]</Select>
    </Query>
  </QueryList>
</QueryXML>

```

Disk logs

XML Query

XML Filter for custom filtered view for disk events.

```

<QueryList>
  <Query Id="0" Path="System">
    <Select Path="System">*[System[Provider[@Name='disk']]]</Select>
  </Query>
</QueryList>

```

VPN Client Logs

PowerShell Query

```

$query = @"
<QueryList>
  <Query Id="0" Path="Application">
    <Select Path="Application">*[System[Provider[@Name='RasAuto' or @Name='RasCfg' or @Name='RasClient' or @Name='Rasman' or @Name='Microsoft-Windows-RasServer' or @Name='Microsoft-Windows-RasSstp' or @Name='Microsoft-Windows-EapMethods-RasChap' or @Name='Microsoft-Windows-NcdAutoSetup' or @Name='Microsoft-Windows-NCSI' or @Name='Microsoft-Windows-NetworkProfile']]]</Select>
  </Query>
</QueryList>

```

```

    <Select Path="System">*[System[Provider[@Name='RasAuto' or @Name='RasCfg' or
@Name='RasClient' or @Name='Rasman' or @Name='Microsoft-Windows-RasServer' or
@Name='Microsoft-Windows-RasSstp' or @Name='Microsoft-Windows-EapMethods-RasChap' or
@Name='Microsoft-Windows-NcdAutoSetup' or @Name='Microsoft-Windows-NCSI' or @Name='Microsoft-
Windows-NetworkProfile']]]</Select>
  </Query>
</QueryList>
"@

$vpnEvents = Get-WinEvent -FilterXml $query -Oldest

# Displays events from the last 24 hours grouped by ProviderName
# This is the best view for easily browsing
$vpnEvents | ?{$_.TimeCreated -ge (Get-Date).Addhours(-24)}

```

```

# Displays events from the last 24 hours as a time sorted list
$vpnEvents | ?{$_.TimeCreated -ge (Get-Date).Addhours(-24)} | Format-List

```

XML Query

```

<QueryList>
  <Query Id="0" Path="Application">
    <Select Path="Application">*[System[Provider[@Name='RasAuto' or @Name='RasCfg' or
@Name='RasClient' or @Name='Rasman' or @Name='Microsoft-Windows-RasServer' or
@Name='Microsoft-Windows-RasSstp' or @Name='Microsoft-Windows-EapMethods-RasChap' or
@Name='Microsoft-Windows-NcdAutoSetup' or @Name='Microsoft-Windows-NCSI' or @Name='Microsoft-
Windows-NetworkProfile']]]</Select>
    <Select Path="System">*[System[Provider[@Name='RasAuto' or @Name='RasCfg' or
@Name='RasClient' or @Name='Rasman' or @Name='Microsoft-Windows-RasServer' or
@Name='Microsoft-Windows-RasSstp' or @Name='Microsoft-Windows-EapMethods-RasChap' or
@Name='Microsoft-Windows-NcdAutoSetup' or @Name='Microsoft-Windows-NCSI' or @Name='Microsoft-
Windows-NetworkProfile']]]</Select>
  </Query>
</QueryList>

```

Searching for Wired/WLAN-AutoConfig related errors

Wired-AutoConfig

```
#Powershell

$addhours = 12;

# Setup filter for error only logs
$filter = @{ LogName = "Microsoft-Windows-Wired-AutoConfig/Operational"
StartTime = [DateTime]::Now.AddHours($addhours*-1)
EndTime = [DateTime]::Now
Level = 2
}

Write-Host ([DateTime]::Now.AddHours($addhours*-1))

Write-Host ([DateTime]::Now)

$Events = Get-Winevent -FilterHashtable $filter

# Parse out the event message data
ForEach ($Event in $Events) {
    # Convert the event to XML
    $eventXML = [xml]$Event.ToXml()
    # Iterate through each one of the XML message properties
    For ($i=0; $i -lt $eventXML.Event.EventData.Data.Count; $i++) {
        # Append these as object properties
        Add-Member -InputObject $Event -MemberType NoteProperty -Force -Name
        $eventXML.Event.EventData.Data[$i].name -Value
        $eventXML.Event.EventData.Data[$i].'#text'
    }
}
```

```
# Show results stored in variable
$Events | Format-List
```

WLAN-AutoConfig

```
#Powershell

$addhours = 12;

# Setup filter for error only logs
$filter = @{ LogName = "Microsoft-Windows-WLAN-AutoConfig/Operational"
StartTime = [DateTime]::Now.AddHours($addhours*-1)
EndTime = [DateTime]::Now
Level = 2
}

Write-Host ([DateTime]::Now.AddHours($addhours*-1))

Write-Host ([DateTime]::Now)

$Events = Get-Winevent -FilterHashtable $filter


# Parse out the event message data
ForEach ($Event in $Events) {
    # Convert the event to XML
    $eventXML = [xml]$Event.ToXml()
    # Iterate through each one of the XML message properties
    For ($i=0; $i -lt $eventXML.Event.EventData.Data.Count; $i++) {
        # Append these as object properties
        Add-Member -InputObject $Event -MemberType NoteProperty -Force -Name
        $eventXML.Event.EventData.Data[$i].name -Value
        $eventXML.Event.EventData.Data[$i].'#text'
    }
}

$Events | Select-Object id, MachineName, ProcessId,TimeCreated, Adapter, LocalMac, SSID,
Cipher, Auth, PeerMac | Format-List
```



```
# Show results stored in variable
$Events | Select-Object id, MachineName, ProcessId,TimeCreated, Adapter, LocalMac, SSID,
Cipher, Auth, PeerMac | Format-List
```

Show available wireless profiles and available wireless networks

```
# show profiles
netsh wlan show profiles

# show available networks
netsh wlan show networks
```

Duo Security Events

```
# Get Duo Security related events
Get-WinEvent -FilterHashtable @{
    LogName='Application'
    ProviderName='Duo Security'
}
```

Internet availability via Universal Telemetry Client

```
$query = @"
<QueryList>
  <Query Id="0" Path="Microsoft-Windows-UniversalTelemetryClient/Operational">
    <Select Path="Microsoft-Windows-UniversalTelemetryClient/Operational">
      *[System[(EventID=55)]] and *[EventData[Data[@Name='State'] and (Data='false')]]
    </Select>
  </Query>
</QueryList>
"@

$Events = Get-WinEvent -FilterXml $query -Oldest

$Events
```

Show network disconnects

```
$query = @"
<QueryList>
  <Query Id="0" Path="Microsoft-Windows-NetworkProfile/Operational">
    <Select Path="Microsoft-Windows-NetworkProfile/Operational">
      *[System[(EventID=10001)]]
    </Select>
  </Query>
</QueryList>
"@

$Events = Get-WinEvent -FilterXml $query -Oldest

$Events
```

netsh wlanreport

netsh will generate an HTML report containing logs of the last 3 days regarding the wireless network interfaces of a device.

```
# The results will be stored here: C:\ProgramData\Microsoft\Windows\WlanReport\wlan-report-
latest.html
netsh wlan show wlanreport
```

Sources: [1](#)

Snippets

While a file exists or not

```
# while a file exists
While (Test-Path C:\Temp\File_I_Want_Gone.txt -ErrorAction SilentlyContinue) {
    # Do something here while the file exists
}
```

```
# while a file doesn't exists
While (!(Test-Path C:\Temp\File_I_Want_Gone.txt -ErrorAction SilentlyContinue)) {
    # Do something here while the file doesn't exists
}
```

```
# while a file exists
While (Test-Path C:\Temp\File_I_Want_Gone.txt -ErrorAction SilentlyContinue) {
    # try to delete the file, continue silently if we can't
    Remove-Item "C:\Temp\File_I_Want_Gone.txt" -ErrorAction SilentlyContinue
    # print date each time just to give some sort of feedback on the console
    Get-Date
}
```

Testing Microsoft SQL database connectivity

```
function Test-SQLConnection
{
    [OutputType([bool])]
    Param
    (
        [Parameter(Mandatory=$true,
                    ValueFromPipelineByPropertyName=$true,
                    Position=0)]
        $ConnectionString
    )
}
```

```
)  
try  
{  
    $sqlConnection = New-Object System.Data.SqlClient.SqlConnection $ConnectionString;  
    $sqlConnection.Open();  
    $sqlConnection.Close();  
  
    return $true;  
}  
catch  
{  
    return $false;  
}  
}
```

```
Test-SQLConnection "Data Source=localhost;database=someDatabase;User  
ID=bogusTestUser;Password=bogusTestPassword;"
```

[[Source](#)]

Useful PowerShell Commands

Placeholder

Select-String is the Grep equivalent

Examples:

```
# Searching for multiple patterns at the same time
Select-String -Path "*.txt" -Pattern "Pattern1","Pattern2","Pattern3"

# Only return the first 10 results
Select-String -Path "*.txt" -Pattern "Pattern1","Pattern2","Pattern3" | Select-Object -First 10

# Searching for IP addresses
Select-String -Path "*.log" -Pattern '\b\d{1,3}\.\d{1,3}\.\d{1,3}\.\d{1,3}\b' | Select-Object -First 10
```

Uptime

The script below will give you the uptime in any version of PowerShell.

```
Get-CimInstance -ClassName Win32_OperatingSystem | Select LastBootUpTime
```

The [Get-Uptime](#) cmdlet was introduced in PowerShell 6.0.

```
Get-Uptime
```

Format processes by start date

This command will show a lot of errors if you're not running PowerShell as Administrator.

```
Get-Process | Sort-Object StartTime | Format-Table -View StartTime
```

Active Directory Account Information

This command will show you the date of the last password set for a user.

```
Get-ADUser -Identity [USERNAME] -properties * | select accountexpirationdate, accountexpires,
accountlockouttime, badlogoncount, padpwdcount, lastbadpasswordattempt, lastlogondate,
lockedout, passwordexpired, passwordlastset, pwdlastset | format-list
```

Sources:

[PowerShell Format-Table](#)

Active Directory Account Password Expiration

The old way:

```
net use userName /domain
```

The PowerShell way:

```
Get-ADUser -identity userName -Properties "DisplayName", "msDS-UserPasswordExpiryTimeComputed"
|
Select-Object -Property
"Displayname",@{Name="ExpiryDate";Expression={[datetime]::FromFileTime($_."msDS-
UserPasswordExpiryTimeComputed")}}
```

Active Directory OU Account Password Expiration

```
Get-ADUser -filter * -SearchBase "OU=Management,OU=ADPRO
Users,DC=ad,DC=activedirectorypro,DC=com" -Properties "DisplayName", "msDS-
UserPasswordExpiryTimeComputed" | Select-Object -Property
"Displayname",@{Name="ExpiryDate";Expression={[datetime]::FromFileTime($_."msDS-
UserPasswordExpiryTimeComputed")}}
```

View physical network interfaces

```
# Show all physical devices
Get-NetAdapter -Physical | Sort-Object -Property MediaType,Name | Format-Table
ifIndex,MediaType,InterfaceMetric,Name,InterfaceDescription,Status,MacAddress,LinkSpeed
```

Get interface metrics

```
# IPv4 - Display interfaces sorted by metric and alias
Get-NetIPInterface -AddressFamily IPv4 | Sort InterfaceMetric,InterfaceAlias

# IPv6 - Display interfaces sorted by metric and alias
Get-NetIPInterface -AddressFamily IPv6 | Sort InterfaceMetric,InterfaceAlias

# All - Display interfaces sorted by metric and alias
Get-NetIPInterface | Sort InterfaceMetric,InterfaceAlias
```

Set interface metrics

The following commands will set Ethernet interfaces to be preferred over wireless interfaces by manipulating the InterfaceMetric of each device. If there are more than one Ethernet and/or Wireless interface on the machine, you may want to adjust these metrics further to provide a more detailed use order.

Ethernet first, then wireless:

```
# Set Ethernet devices interface metric to 11
Get-NetAdapter -Physical | Where {$_.MediaType -eq "802.3"} | Set-NetIPInterface -
InterfaceMetric 11

# Set Wireless devices interface metric to 12
Get-NetAdapter -Physical | Where {$_.MediaType -eq "Native 802.11"} | Set-NetIPInterface -
InterfaceMetric 12
```

Wireless first, then Ethernet:

```
# Set Wireless devices interface metric to 12
Get-NetAdapter -Physical | Where {$_.MediaType -eq "Native 802.11"} | Set-NetIPInterface -
InterfaceMetric 12

# Set Ethernet devices interface metric to 13
Get-NetAdapter -Physical | Where {$_.MediaType -eq "802.3"} | Set-NetIPInterface -
InterfaceMetric 13
```

Is your Office installation 32 or 64 bit?

```
# .platform value will be either x86 for 32-bit or x64 for 64-bit
$officeCheck = (Get-ItemProperty -Path
"HKLM:\SOFTWARE\Microsoft\Office\ClickToRun\Configuration").platform

if ($officeCheck -eq 'x64'){
    Write-Output "Office is 64 bit."
}
else {
    Write-Output "Office is 32 bit."
}
```

Exporting Event Logs using Out-HTMLView

You can use the Out-HTMLView module to view or save and view later.

```
$executionPolicy = Get-ExecutionPolicy
#Set-ExecutionPolicy -Scope Process -ExecutionPolicy Bypass -Force
Set-ExecutionPolicy -Scope Process -ExecutionPolicy Unrestricted -Force

try { Import-Module -Name PSWriteHTML }
catch {
    Install-Module -Name PSWriteHTML
    Import-Module -Name PSWriteHTML
}
```



```

$lastHours = -4
$timestamp = (Get-Date).ToString('yyyyMMdd_HH:mm:ss')
$systemEventLogFile = ("$(env:TEMP)\$(timestamp)_eventlogs_system_Out-HTMLView.html")
$applicationEventLogFile = ("$(env:TEMP)\$(timestamp)_eventlogs_system_Out-HTMLView.html")

Get-EventLog -LogName System -After (Get-Date).AddHours($lastHours) | Out-HTMLView -FilePath
$systemEventLogFile
Get-EventLog -LogName Application -After (Get-Date).AddHours($lastHours) | Out-HTMLView -
FilePath $applicationEventLogFile

Write-Host ("Event Logs for the last $($lastHours) hours saved to the following files:")
Write-Host ("$(systemEventLogFile)")
Write-Host ("$(applicationEventLogFile)")

#end

```

List installed Windows Features

```
Get-WindowsFeature | Where-Object {$_. installstate -eq "installed"}
```

CPU utilization

[Source](#)

```

Get-Counter -ComputerName localhost '\Process(*)\% Processor Time' `
| Select-Object -ExpandProperty countersamples `
| Select-Object -Property instancename, cookedvalue `
| Sort-Object -Property cookedvalue -Descending | Select-Object -First 20 `
| ft InstanceName,@{L='CPU';E={(($_.Cookedvalue/100).toString('P'))}} -AutoSize

```

Get external IP address

The OpenDNS way via PowerShell

```
$(Resolve-DnsName -Name myip.opendns.com -Server 208.67.222.220).IPAddress
```

The OpenDNS way via cmd

```
nslookup myip.opendns.com 208.67.222.220
```

The OpenDNS way using dig (Linux)

```
dig a myip.opendns.com @208.67.222.220
```

-end

Windows Network Management from the command line

Get interface metrics

```
# IPv4 - Display interfaces sorted by metric and alias
Get-NetIPInterface -AddressFamily IPv4 | Sort InterfaceMetric,InterfaceAlias

# IPv6 - Display interfaces sorted by metric and alias
Get-NetIPInterface -AddressFamily IPv6 | Sort InterfaceMetric,InterfaceAlias

# All - Display interfaces sorted by metric and alias
Get-NetIPInterface | Sort InterfaceMetric,InterfaceAlias
```

Set interface metrics

The following commands will set Ethernet interfaces to be preferred over wireless interfaces by manipulating the InterfaceMetric of each device. If there are more than one Ethernet and/or Wireless interface on the machine, you may want to adjust these metrics further to provide a more detailed use order.

```
# Set Ethernet devices interface metric to 11
Get-NetAdapter -Physical | Where {$_.MediaType -eq "802.3"} | Set-NetIPInterface -
InterfaceMetric 11

# Set Wireless devices interface metric to 12
Get-NetAdapter -Physical | Where {$_.MediaType -eq "Native 802.11"} | Set-NetIPInterface -
```

netsh and firewall

```
# turn off Windows firewall for all profiles
netsh advfirewall set allprofiles state off
```

netsh wireless

```
# show wireless LAN interfaces on the system
netsh wlan show interfaces

# show properties of the wireless LAN drivers on the system
netsh wlan show drivers

# show list of networks visible on the system
netsh wlan show networks

# show more detailed information on visible networks
netsh wlan show networks mode=bssid

# show a list of profiles configured on the system
netsh wlan show profiles
```

```
# connect to an SSID using a Profile
netsh wlan connect ssid=[ssid] name=[profile]
```

```
# disconnect all wireless interfaces
netsh wlan disconnect
```

```
# PowerShell script to run all of the commands and save the output to a txt file
```

```
$outputFile = "$($env:TEMP)\$(Get-Date).ToString('yyyyMMdd_HH:mm:ss'))_netsh_wlan_info_$(($env:COMPUTERNAME).output.txt"

$scriptBlock1 = {
    # basic information
    dir env: | Where-Object {$_.Name -Like 'USER*' -Or $_.Name -Like 'COMPUTERNAME' -Or $_.Name -Like 'LOGONSERVER'}
    ipconfig /all
    nslookup google.com

    # show wireless LAN interfaces on the system
    netsh wlan show interfaces

    # show properties of the wireless LAN drivers on the system
    netsh wlan show drivers

    # show list of networks visible on the system
    netsh wlan show networks

    # show more detailed information on visible networks
    netsh wlan show networks mode=bssid

    # show a list of profiles configured on the system
    netsh wlan show profiles

    # show the rest of the env:
    dir env:
}

Invoke-Command -ScriptBlock $scriptBlock1 | Out-File -FilePath $outputFile
Write-Output "netsh wlan output saved the following file: $($outputFile)"
```

Setting IPv4 address using netsh

```
netsh interface ipv4 show config

# set IPv4 address and dns on an interface using dhcp
```

```
netsh interface ipv4 set address name="Ethernet" source=dhcp
```

```
netsh interface ipv4 set dns name="Ethernet" source=dhcp
```

```
# set IPv4 address on an interface
```

```
netsh interface ipv4 set address name="Ethernet" static 10.1.1.84 255.255.255.0 10.1.1.1
```

```
# set DNS servers on an interface
```

```
netsh interface ipv4 set dns name="Ethernet" static 8.8.8.8 1.1.1.1
```

```
#end
```

Resource Usage

SYSTEMINFO

You can cheat and use good old SYSTEMINFO from any command line. This will give you fairly comprehensive system information.

```
systeminfo
```

Memory Usage

Again you can cheat, use SYSTEMINFO and filter the output:

```
systeminfo | Select-String 'Memory:'
```

The code snippet below will work with PowerShell 3.0 and newer

```
if ([Environment]::Is64BitOperatingSystem) {  
    #64 bit logic here  
    get-process | Group-Object -Property ProcessName |  
    % {  
        [PSCustomObject]@{  
            ProcessName = $_.Name  
            Mem_MB = [math]::Round((($_.Group|Measure-Object WorkingSet64 -Sum).Sum / 1MB, 0)  
            ProcessCount = $_.Count  
        }  
    } | sort -desc Mem_MB | Select-Object -First 25  
} else {  
    #32 bit logic here  
    get-process | Group-Object -Property ProcessName |
```

```
% {
    [PSCustomObject]@{
        ProcessName = $_.Name
        Mem_MB = [math]::Round(($_.Group|Measure-Object WorkingSet -Sum).Sum / 1MB, 0)
        ProcessCount = $_.Count
    }
} | sort -desc Mem_MB | Select-Object -First 25
}
```

The code below will execute on Windows 7 and newer.

```
if ((Get-WmiObject win32_operatingsystem | select osarchitecture).osarchitecture -eq "64-bit")
{
    #64 bit logic here
    get-process | Group-Object -Property ProcessName |
    % {
        [PSCustomObject]@{
            ProcessName = $_.Name
            Mem_MB = [math]::Round(($_.Group|Measure-Object WorkingSet64 -Sum).Sum / 1MB, 0)
            ProcessCount = $_.Count
        }
    } | sort -desc Mem_MB | Select-Object -First 25
} else {
    #32 bit logic here
    get-process | Group-Object -Property ProcessName |
    % {
        [PSCustomObject]@{
            ProcessName = $_.Name
            Mem_MB = [math]::Round(($_.Group|Measure-Object WorkingSet -Sum).Sum / 1MB, 0)
            ProcessCount = $_.Count
        }
    } | sort -desc Mem_MB | Select-Object -First 25
}
```


64-bit or 32-bit machine / ps host / process

Various ways of determining if the system is 64-bit or 32-bit

[\[Source\]](#)

```
# Get the path where powershell resides.  If the caller passes -use32 then
# make sure we are returning back a 32 bit version of powershell regardless
# of the current machine architecture
function Get-PowerShellPath() {
    param ( [switch]$use32=$false,
            [string]$version="1.0" )

    if ( $use32 -and (test-win64machine) ) {
        return (join-path $env:windir "syswow64\WindowsPowerShell\v$version\powershell.exe")
    }

    return (join-path $env:windir "System32\WindowsPowerShell\v$version\powershell.exe")
}

# Is this a Win64 machine regardless of whether or not we are currently
# running in a 64 bit mode
function Test-Win64Machine() {
    return test-path (join-path $env:WinDir "SysWow64")
}

# Is this a Wow64 powershell host
function Test-Wow64() {
    return (Test-Win32) -and (test-path env:\PROCESSOR_ARCHITEW6432)
}

# Is this a 64 bit process
```

```

function Test-Win64() {
    return [IntPtr]::size -eq 8
}

# Is this a 32 bit process
function Test-Win32() {
    return [IntPtr]::size -eq 4
}

function Get-ProgramFiles32() {
    if (Test-Win64 ) {
        return ${env:ProgramFiles(x86)}
    }

    return $env:ProgramFiles
}

function Invoke-Admin() {
    param ( [string]$program = $(throw "Please specify a program" ),
            [string]$argumentString = "",
            [switch]$waitForExit )

    $psi = new-object "Diagnostics.ProcessStartInfo"
    $psi.FileName = $program
    $psi.Arguments = $argumentString
    $psi.Verb = "runas"
    $proc = [Diagnostics.Process]::Start($psi)
    if ( $waitForExit ) {
        $proc.WaitForExit();
    }
}

# Run the specified script as an administrator
function Invoke-ScriptAdmin() {
    param ( [string]$scriptPath = $(throw "Please specify a script"),
            [switch]$waitForExit,
            [switch]$use32=$false )

    $argString = ""
    for ( $i = 0; $i -lt $args.Length; $i++ ) {

```

```
    $argString += $args[$i]
    if ( ($i + 1) -lt $args.Length ) {
        $argString += " "
    }
}
```

```
$p = "-Command & "
$p += resolve-path($scriptPath)
$p += " $argString"
```

```
$psPath = Get-PowershellPath -use32:$use32
write-debug ("Running: $psPath $p")
Invoke-Admin $psPath $p -waitForExit:$waitForExit
}
```

Installed software via PowerShell

Query registry for installed software

There's more data in each registry than is being displayed in the PowerShell Custom Objects output be the script below. You can inspect `$InstalledSoftware` for further details.

```
# HKEY_Local_Machine
$HKLM_InstalledSoftware = Get-ChildItem
"HKLM:\Software\Microsoft\Windows\CurrentVersion\Uninstall"
$HKLM_PrettyList = foreach ($obj in $HKLM_InstalledSoftware) {
    [PSCustomObject]@{
        Name = ($obj.Name).Split('\')[-1]
        DisplayName = $obj.GetValue('DisplayName')
        DisplayVersion = $obj.GetValue('DisplayVersion')
        Publisher = $obj.GetValue('Publisher')
        InstallLocation = $obj.GetValue('InstallLocation')
    }
}
$HKLM_PrettyList | Sort-Object -Property Publisher,Name | Select-Object -Property
DisplayName,Publisher,InstallLocation,Name
```

The above information does not include software installed to the current logged in user. Just change the hive that's being queried as shown below:

```
# HKEY_Current_User
$HKCU_InstalledSoftware = Get-ChildItem
"HKCU:\Software\Microsoft\Windows\CurrentVersion\Uninstall"
$HKCU_PrettyList = foreach ($obj in $HKCU_InstalledSoftware) {
    [PSCustomObject]@{
        Name = ($obj.Name).Split('\')[-1]
        DisplayName = $obj.GetValue('DisplayName')
    }
}
```

```
        DisplayVersion = $obj.GetValue('DisplayVersion')
        Publisher = $obj.GetValue('Publisher')
        InstallLocation = $obj.GetValue('InstallLocation')
    }
}
$HKCU_PrettyList | Sort-Object -Property Publisher,Name | Select-Object -Property
DisplayName,Publisher,InstallLocation,Name
```