







PowerShell Conference Europe  
Hannover, 2016  
[www.psconf.eu](http://www.psconf.eu)

```
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Sample Code.ps1 X

# about_me

$speaker = @{
    name='Thorsten Butz'
    jobrole = 'Trainer','Consultant','Author'
    certification = 'MC*','LPIC-2'
     = @thorstenbutz
     = gplus.to/thorstenbutz
     = facebook.com/thbutz
     = thorsten-butz.de
     = slidingwindows.de
}


```

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Agenda

- Networking with PoSh
  - Why?
  - Why not?
- Basics
- Testing network connectivity with Cmdlets
  - Depeche mode: classes, multithreading
- Sneak peak:
  - SSH@PoSh
  - Windows Subsystem for Linux



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## Why PoSh?

- No other (or superior) option

```
1 # Example 1
2 Get-NetConnectionProfile |
3   Set-NetConnectionProfile -NetworkCategory Private
4
5 # Example 2
6 Copy-Item -Path c:\demofile.txt -Destination 'c:\' -ToSession $session
```

- (Custom) Objects
- Remoting
- Multithreading

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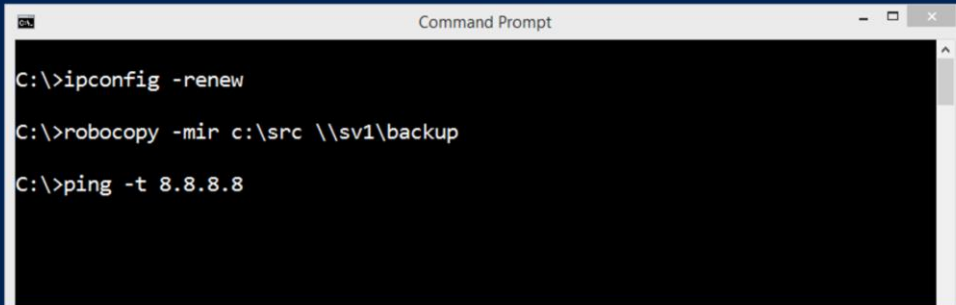
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## Why not?

- Ugly and irritating: lots of CDXML code
- Lack of functionality/performance
- Inconsistency
- Superior "legacy" apps:



```
C:\>ipconfig -renew  
C:\>robocopy -mir c:\src \\sv1\backup  
C:\>ping -t 8.8.8.8
```

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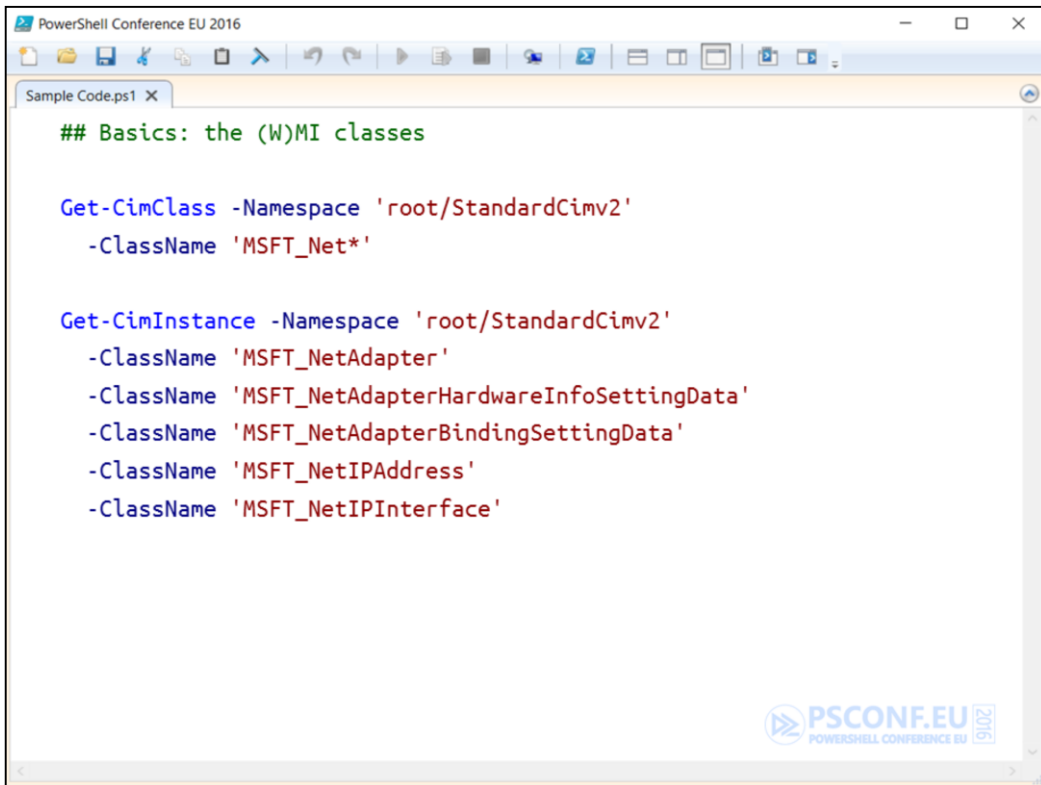
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```
## Basics: the (W)MI classes

Get-CimClass -Namespace 'root/StandardCimv2'
  -ClassName 'MSFT_Net*'

Get-CimInstance -Namespace 'root/StandardCimv2'
  -ClassName 'MSFT_NetAdapter'
  -ClassName 'MSFT_NetAdapterHardwareInfoSettingData'
  -ClassName 'MSFT_NetAdapterBindingSettingData'
  -ClassName 'MSFT_NetIPAddress'
  -ClassName 'MSFT_NetIPInterface'
```

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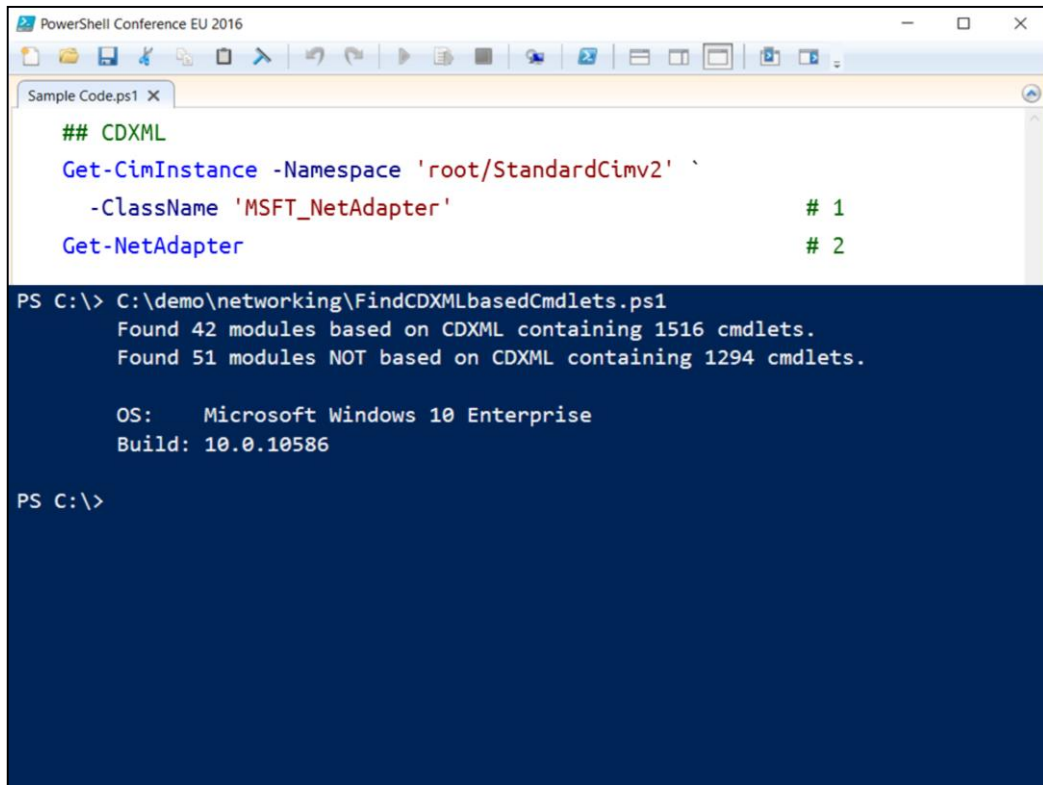
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```
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Sample Code.ps1 X
## CDXML
Get-CimInstance -Namespace 'root/StandardCimv2' `
  -ClassName 'MSFT_NetAdapter' # 1
Get-NetAdapter # 2

PS C:\> C:\demo\networking\FindCDXMLbasedCmdlets.ps1
Found 42 modules based on CDXML containing 1516 cmdlets.
Found 51 modules NOT based on CDXML containing 1294 cmdlets.

OS:    Microsoft Windows 10 Enterprise
Build: 10.0.10586

PS C:\>
```

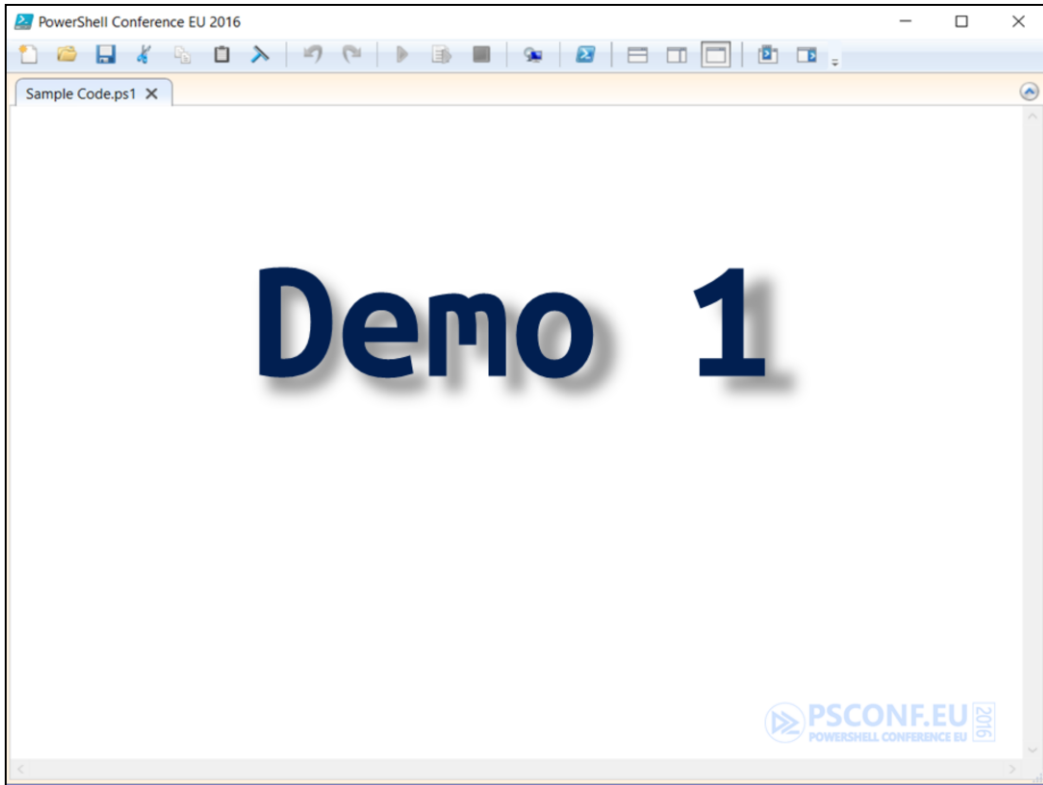
```
$modulesFolders = Get-ChildItem "$pshome\Modules" -Directory
$modulesCDXML = @()
$modulesNonCDXML = @()

foreach ($modulesFolder in $modulesFolders) {
    $cdxml = Get-ChildItem -Path $($modulesFolder.fullname) -File -Filter *.cdxml -
Recurse
    if ($cdxml) {$modulesCDXML += $modulesFolder.name } else { $modulesNonCDXML +=
$modulesFolder.name }
}

# Counting commands ..
$a = $modulesCDXML.count
$b = (Get-Command -Module $modulesCDXML).count
$c = $modulesNonCDXML.count
$d = (Get-Command -Module $modulesNonCDXML).count

$os = (Get-CimInstance -ClassName Win32_OperatingSystem).caption
$version = (Get-CimInstance -ClassName Win32_OperatingSystem).version

"Found $a modules based on CDXML containing $b cmdlets."
"Found $c modules NOT based on CDXML containing $d cmdlets.`n"
"OS:    $os"
"Build: $version"
```



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## gip -detailed: Lack of information

```
c:\ipconfig.exe -all
```

### Windows IP Configuration

```
Host Name . . . . . : sea-cl1
Primary Dns Suffix . . . . . : contoso.com
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : contoso.com
```

### Ethernet adapter Ethernet:

```
Connection-specific DNS Suffix . . :
Description . . . . . : Hyper-V Virtual Ethernet Adapter #3
Physical Address. . . . . : 00-15-5D-00-08-52
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::b515:731b:633:3fba%46(Preferred)
Autoconfiguration IPv4 Address. . . : 192.168.0.169 (Preferred)
Subnet Mask . . . . . : 255.255.255.0
DHCPv6 IAID . . . . . : 771757405
DHCPv6 Client DUID. . . . . : 00-01-00-01-1C-19-00-48-C8-60-00-E3-70-DE
```

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Sample Code.ps1 X



```
## Review: Configuring NICs with PoSh

# .. only 1 IP address at a time!
New-NetIPAddress -InterfaceAlias $ifAlias -IPAddress '172.17.17.1'
  -PrefixLength 24 -AddressFamily IPv4 -DefaultGateway '172.17.17.254'

Set-NetIPAddress -InterfaceAlias $ifAlias -IPAddress '172.17.17.1'
  -PrefixLength 16 -AddressFamily IPv4

# "Remove-NetIPAddress" does not remove DefaultGateway:
Remove-NetIPAddress -InterfaceAlias $ifAlias -Confirm:$false
Remove-NetRoute -InterfaceAlias $ifAlias -Confirm:$false

# Set Array of DNSServers:
Set-DnsClientServerAddress -InterfaceAlias $ifAlias
  -ServerAddresses '8.8.8.8','2001:4860:4860::8888'
```

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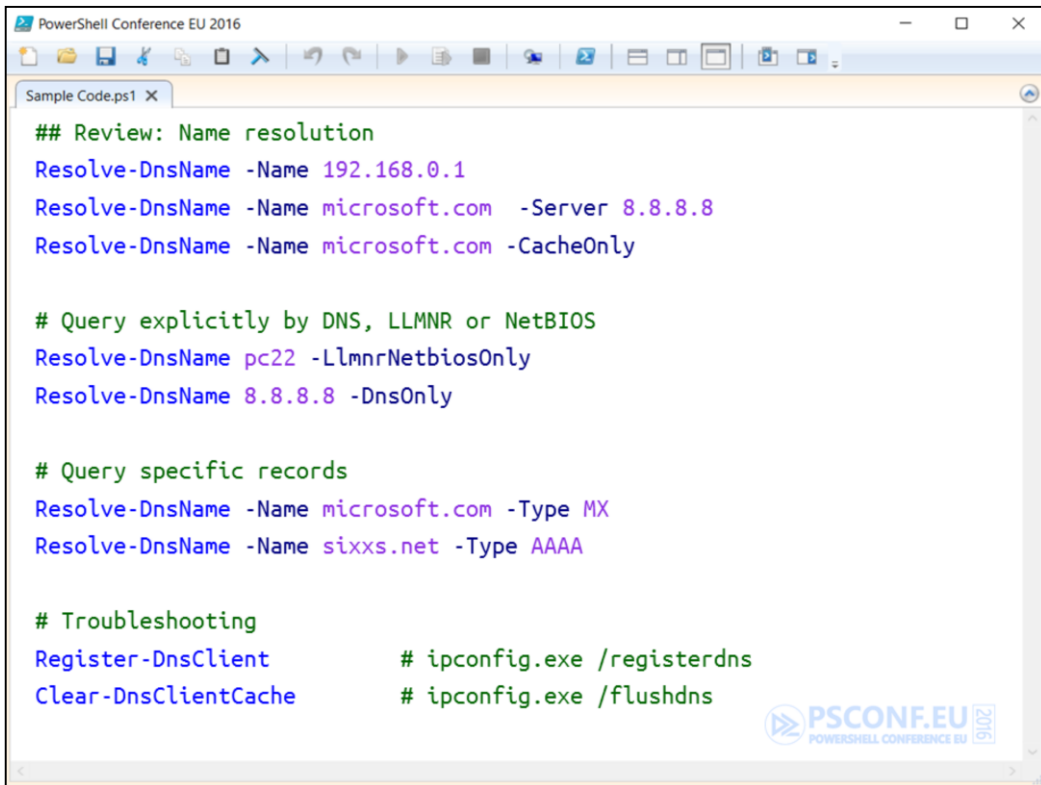
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```
## Review: Name resolution
Resolve-DnsName -Name 192.168.0.1
Resolve-DnsName -Name microsoft.com -Server 8.8.8.8
Resolve-DnsName -Name microsoft.com -CacheOnly

# Query explicitly by DNS, LLMNR or NetBIOS
Resolve-DnsName pc22 -LlmnrNetbiosOnly
Resolve-DnsName 8.8.8.8 -DnsOnly

# Query specific records
Resolve-DnsName -Name microsoft.com -Type MX
Resolve-DnsName -Name sixxs.net -Type AAAA

# Troubleshooting
Register-DnsClient          # ipconfig.exe /registerdns
Clear-DnsClientCache        # ipconfig.exe /flushdns
```

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```
# Module SmbShare vs. net.exe
Get-SmbShare           # net share
New-SmbShare
Set-SmbShare
Remove-SmbShare

Get-SmbOpenFile        # net file ...
Close-SmbOpenFile

Get-SmbSession         # net session ...
Close-SmbSession

Get-SmbMapping         # net use ...
New-SmbMapping
Remove-SmbMapping

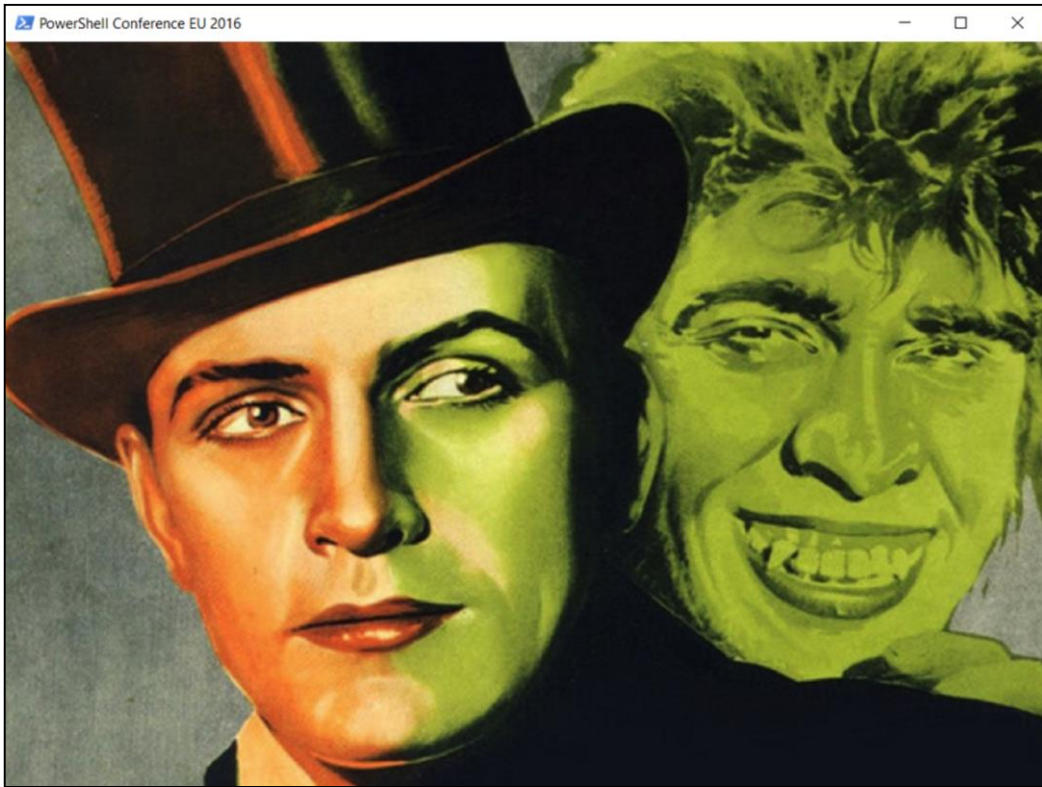
Get-SmbServerConfiguration # net config ...
Set-SmbServerConfiguration
Get-SmbClientConfiguration
Set-SmbClientConfiguration
```

Module SmbShare	Net API call
Get-SmbShare	NetShareEnum
	NetShareGetInfo
Set-SmbShare	NetShareSetInfo
New-SmbShare	NetShareAdd
Remove-SmbShare	NetShareDel
	NetShareDelEx
Get-SmbOpenFile	NetFileEnum
	NetFileGetInfo
Close-SmbOpenFile	NetFileClose
Get-SmbSession	NetSessionEnum
	NetSessionGetInfo
Close-SmbSession	NetSessionDel

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The basics of SMB PowerShell, a feature of Windows Server 2012 and SMB 3.0

<https://blogs.technet.microsoft.com/josebda/2012/06/27/the-basics-of-smb-powershell-a-feature-of-windows-server-2012-and-smb-3-0/>



[https://cdn-images-1.medium.com/max/800/1\\*Kf497eBBikYQSwm3o97-VA.png](https://cdn-images-1.medium.com/max/800/1*Kf497eBBikYQSwm3o97-VA.png)

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Sample Code.ps1 X

```
## Credit to Trevor Jones: The "power ping"

# A: Build the class
class Ping
{
    # Magic goes here!
}

# B: Scan the subnet
$ips = @()
1..254 | % {$ips += '192.168.0.' + $_ }
[ping]$test = $ips
$test.online
```

**Highlight**

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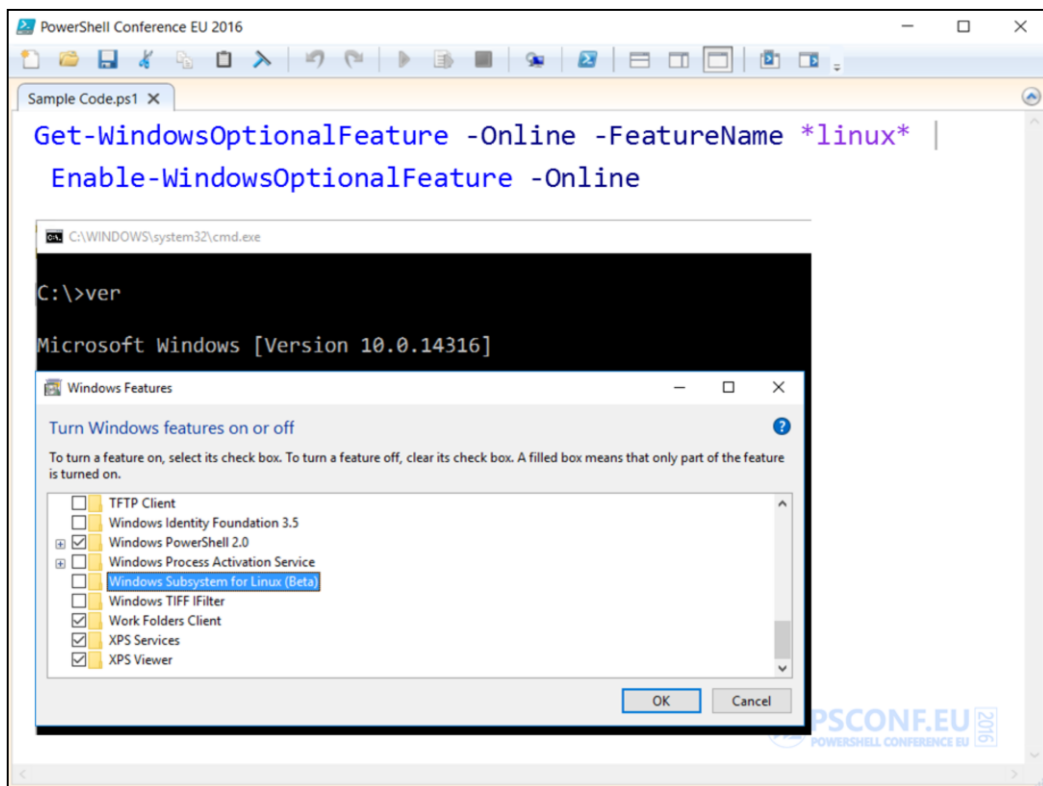
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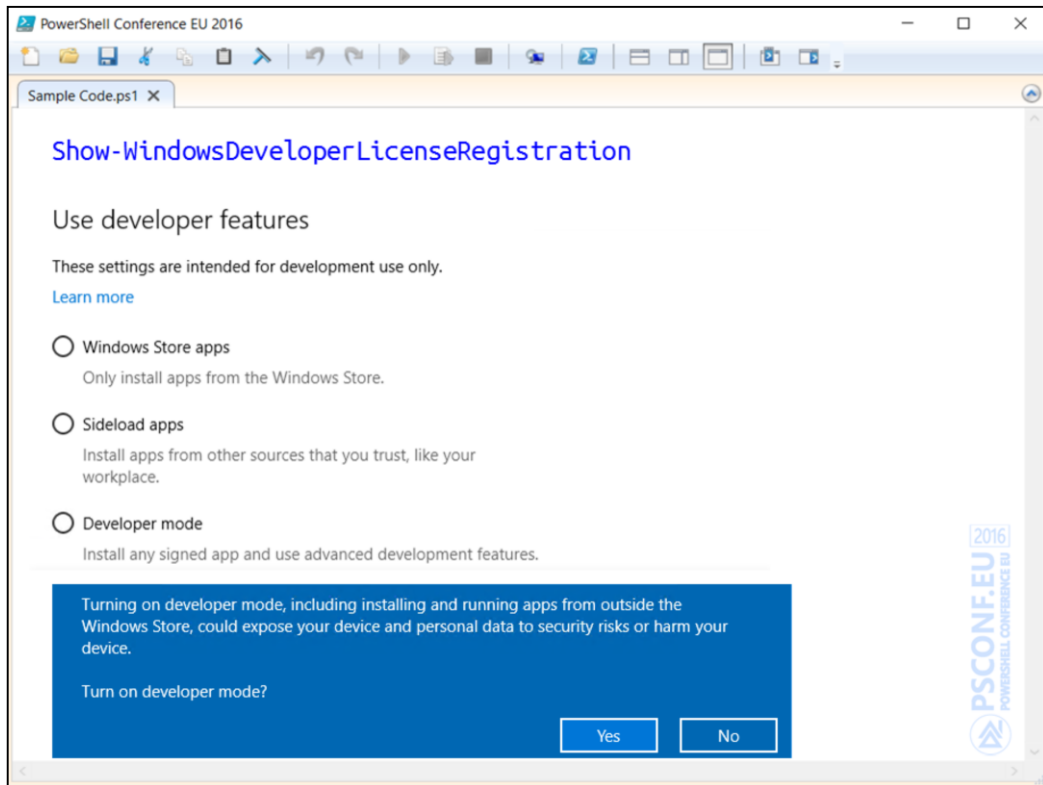
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```
Command Prompt - bash
Microsoft Windows [Version 10.0.14316]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\ba>bash
-- Beta feature --
This will install Ubuntu on Windows, distributed by Canonical
and licensed under its terms available here:
https://aka.ms/uowterms

Type "y"
Download: Microsoft Windows [Version 10.0.14316]
Extracti: (c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\ba>bash
-- Beta feature --
This will install Ubuntu on Windows, distributed by Canonical
and licensed under its terms available here:
https://aka.ms/uowterms

Type "y" to continue: y
Downloading from the Windows Store... 100%
Extracting filesystem, this will take a few minutes...
Installation successful! The environment will start momentarily...
root@localhost:/mnt/c/Users/ba#
```

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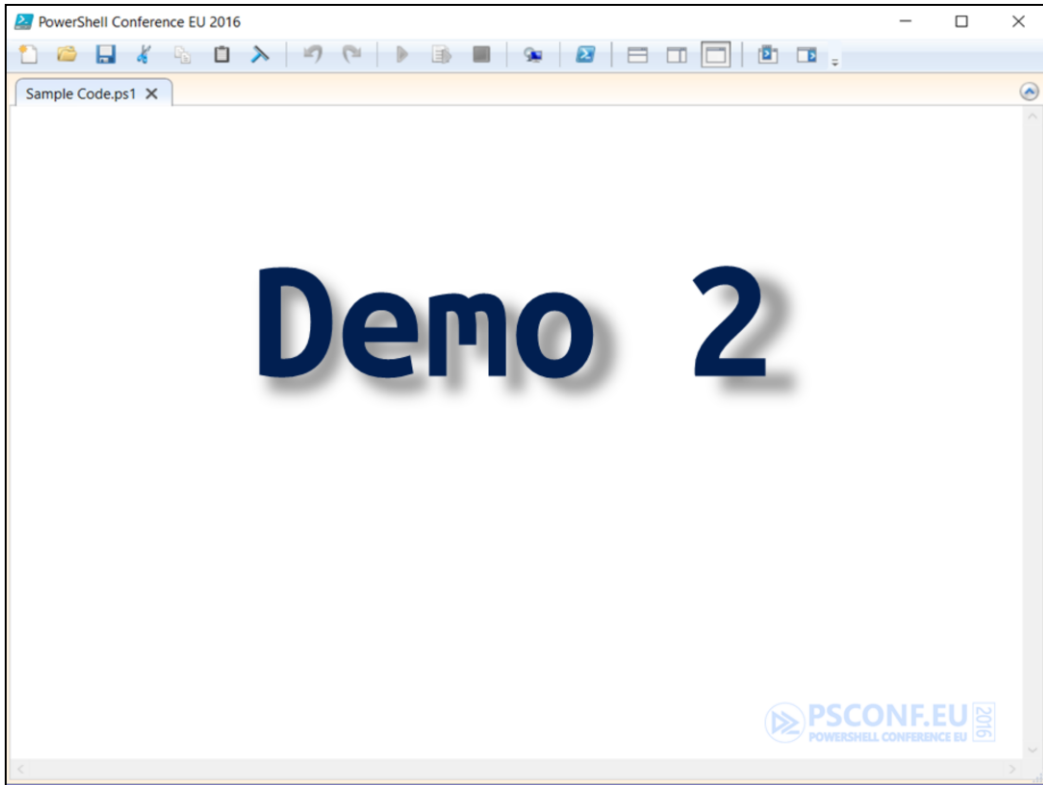
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Introduction

This project was inspired by Sharp.SSH library which was ported from java and it seems like was not supported for quite some time. This library is a complete rewrite using .NET 4.0, without any third party dependencies, using parallelism to achieve the best performance possible.

Features

- » Execution of SSH command using both synchronous and asynchronous methods
- » Return command execution exit status and other information
- » Provide SFTP functionality for both synchronous and asynchronous operations.
- » Provides SCP functionality.
- » Provide status report for upload and download sftp operations to allow accurate progress bar implementation

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download

CURRENT	2014.4.6-beta2
DATE	Sat Nov 22, 2014 at 8:00 AM
STATUS	Beta
DOWNLOADS	24,017
RATING	★★★★★ 8 ratings

Review this release

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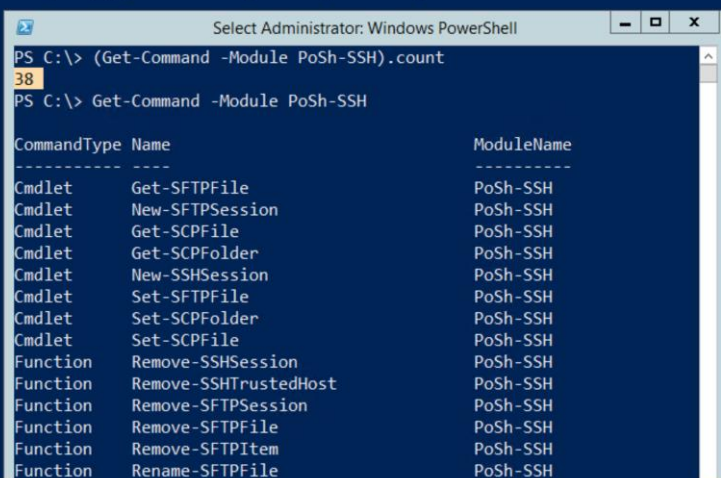
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- "PoSh-SSH" by Carlos Perez

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



```
PS C:\> (Get-Command -Module PoSh-SSH).count
38
PS C:\> Get-Command -Module PoSh-SSH

CommandType Name                               ModuleName
-----
Cmdlet      Get-SFTPFile                         PoSh-SSH
Cmdlet      New-SFTPSession                     PoSh-SSH
Cmdlet      Get-SCPFile                         PoSh-SSH
Cmdlet      Get-SCPFolder                       PoSh-SSH
Cmdlet      New-SSHSession                      PoSh-SSH
Cmdlet      Set-SFTPFile                        PoSh-SSH
Cmdlet      Set-SCPFolder                       PoSh-SSH
Cmdlet      Set-SCPFile                         PoSh-SSH
Function     Remove-SSHSession                   PoSh-SSH
Function     Remove-SSHTrustedHost               PoSh-SSH
Function     Remove-SFTPSession                  PoSh-SSH
Function     Remove-SFTPFile                     PoSh-SSH
Function     Remove-SFTPItem                     PoSh-SSH
Function     Rename-SFTPFile                     PoSh-SSH
```

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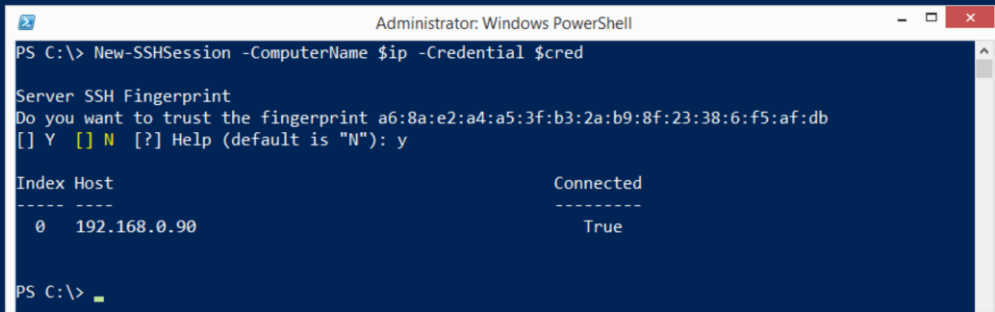
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## PoSh-SSH (by Carloz Perez)

- Requires -Version 3.0
- PoSh module written in C#
- Open source



```
Administrator: Windows PowerShell
PS C:\> New-SSHSession -ComputerName $ip -Credential $cred

Server SSH Fingerprint
Do you want to trust the fingerprint a6:8a:e2:a4:a5:3f:b3:2a:b9:8f:23:38:6:f5:af:db
[] Y [] N [?] Help (default is "N"): y

Index Host                                Connected
-----
0      192.168.0.90                        True

PS C:\>
```

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# Demo 2: PoSh-SSH

## # Installation

Administrator: Windows PowerShell ISE

```
Get-PoShSSH.ps1 X
1 # Get PoSh-SSH
2 $uri = 'https://gist.github.com/darkoperator/6152630/raw/c67de4f7cd780ba367ccbc2593f38d18ce6df89/instposhsshdev'
3 $ex (New-Object Net.WebClient).DownloadString($uri)
4
```

Downloading latest version of Posh-SSH from https://github.com/darkoperator/Posh-SSH/archive/master.zip  
File saved to C:\Users\ADMINI-1\AppData\Local\Temp\2\Posh-SSH.zip  
Uncompressing the zip file to C:\Users\Administrator\Documents\WindowsPowerShell\Modules  
Renaming folder  
Module has been installed

Assembly

File Home Share View

Documents > WindowsPowerShell > Modules > Posh-SSH > Assembly


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Name	Date modified	Type	Size
Ionic.Zlib.dll	3/28/2015 4:16 AM	Application extension	100 KB
Renci.SshNet.dll	3/28/2015 4:16 AM	Application extension	429 KB

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```
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# Define variables
$vm = 'linux-vm.contoso.com'
$user = 'root'
$password = ConvertTo-SecureString -String 'Pa$$w0rd' -AsPlainText -Force
$cred = New-Object System.Management.Automation.PSCredential($user,
$password)

# Test SSH port
Test-NetConnection -ComputerName $vm -Port 22 -InformationLevel Quiet

# Initiate session
$sshSession = New-SSHSession -ComputerName $vm -Credential $cred

# Remote command
Get-SSHSession # Mind the SessionID, pipelining not supported
Invoke-SSHCommand -Index 0 -Command 'uname -a'
```



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```
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# Remote command, reloaded
(Invoke-SSHCommand -SessionId $sshSession.SessionId `
-Command 'uname -a').output

$linuxCommand = `
'uname -a; lsb_release -a; cat /proc/cpuinfo | grep "model name" | uniq'

(Invoke-SSHCommand -SessionId $sshSession.SessionId `
-Command $linuxCommand).output

PS C:\demo> $linuxCommand = 'uname -a; lsb_release -a; cat /proc/cpuinfo | grep "model name" | uniq'
(Invoke-SSHCommand -SessionId $sshSession.SessionId -Command $linuxCommand).output
Linux sea-www4 3.2.0-4-amd64 #1 SMP Debian 3.2.65-1 x86_64 GNU/Linux
Distributor ID: Debian
Description:    Debian GNU/Linux 7.8 (wheezy)
Release:        7.8
Codename:       wheezy
model name      : Intel(R) Core(TM) i7-4750HQ CPU @ 2.00GHZ

# Close session
Get-SSHSession | Remove-SSHSession
```



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```
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# Download single file
$configFullName = '/etc/network/interfaces'
$configFileName =
    $configFullName.split("/"][$configFullName.split("/").count-1]

Get-SCPFile -ComputerName $vm -Credential $cred `
    -LocalFile $configFileName -RemoteFile $configFullName
Get-Content $configFileName

# Download directory (recursive)
Get-SCPFolder -ComputerName $vm -Credential $cred `
    -RemoteFolder '/etc/ssh' -LocalFolder 'c:\download'
```



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# Questions?

@thorstenbutz

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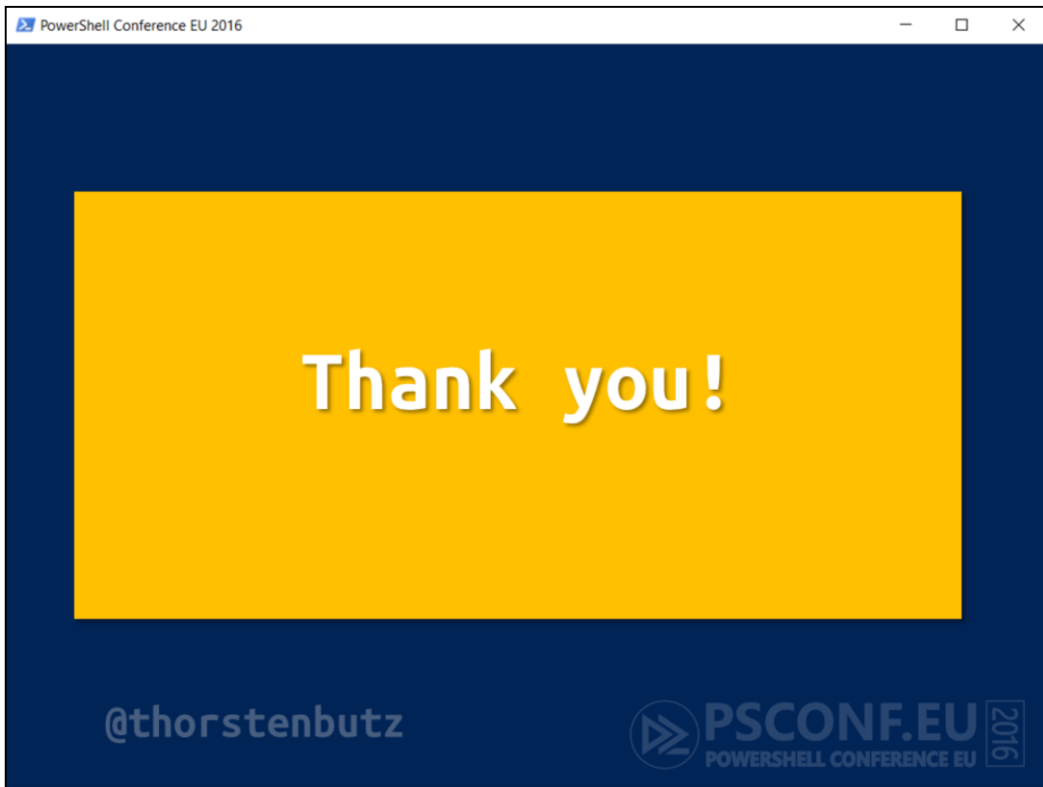
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