HP Operations Orchestration

for the Windows and Linux operating systems

Software Version: OO 10.x

PowerShell Wizard Guide

Document Release Date: February 2014

Software Release Date: February 2014

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Contents

1 Introduction

With this integration, users can generate OO flows from the selected PowerShell cmdlets found in a list of modules/snapins.

Purpose of the PowerShell Wizard Integration

Its main advantages are:

- Automation. Avoid having to repeat the same time-consuming process of creating flows which execute PowerShell cmdlets. Perform the following steps as an alternative to using the PowerShell Wizard (multiply by the number of cmdlets):
  - Create an empty flow
  - Drag and drop the PowerShell Script operation
  - Search for the cmdlet description
  - Set the required input values
  - Set the description of the flow. The step inherits its description from the PowerShell Script operation, but this is not available for the flow.
- Authoring ease. The description of each flow contains the default description of the corresponding cmdlet which it executes. Therefore, the user is not forced to open the cmdlet description in a browser and switch between OO and the Internet.
- Module and cmdlet discovery. The wizard discovers the available modules and cmdlets from a target host.

Supported Versions

Table 1 Supported Versions

Operations Orchestration Version	PowerShell Wizard Version
OO 10.x with Base Content Pack	10.x

2 Getting Started with the PowerShell Wizard Integration

Download the PowerShell Wizard

The PowerShell Wizard Installer is an executable file that can be downloaded from the HP Live Network page

1. From **https://hpln.hp.com**, click **Operations Orchestration Community** and log in.

   The **Operations Orchestration Community** page contains links to announcements, discussions, downloads, documentation, help, and support.

2. On the left-hand side, click **Operations Orchestration Content Packs**.
3. In the **Operations Orchestration Content Packs** box, click **Content**. The HP Passport and sign-in page appears.
4. Enter your user ID and Password to access to continue.
5. Click **HP Operations Orchestration 10.x**, and then select the items that you want to download.

Install the PowerShell Wizard

The wizard is installed if Studio is selected from the Operation Orchestration installer.

Configure Logging Settings

The configure logging settings are no longer supported in the10x wizard.

Uninstall the PowerShell Wizard

The wizard is uninstalled when Studio is uninstalled.

PowerShell Wizard Requirements

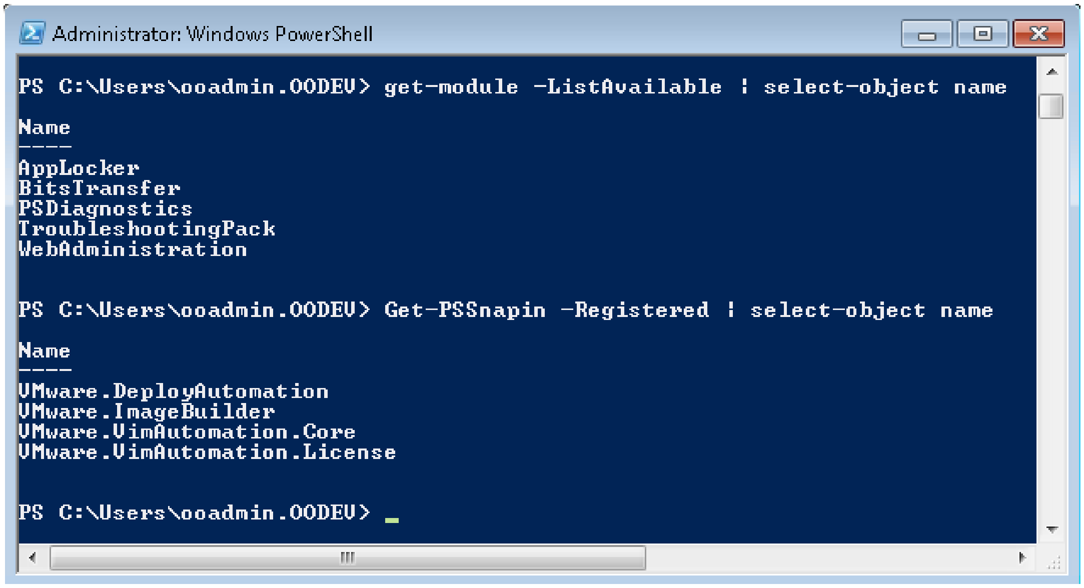
System Requirements

The minimum software requirements for systems running the PowerShell Wizard for HP Operations Orchestration are:

- Java SE Runtime Environment (also known as JRE) 7
- .NET Framework 2 or a later version

Target Host

- PowerShell with remoting enabled.
- For the products providing PowerShell cmdlets, the target host must have the modules and snapins available. Run one of the following cmdlets to list the required modules and snapins. Otherwise, it means that the host does not have the cmdlets provided for that product.



```
PS C:\Users\ooadmin.OODEV> get-module -ListAvailable | select-object name

Name
----
AppLocker
BitsTransfer
PSDiagnostics
TroubleshootingPack
WebAdministration


PS C:\Users\ooadmin.OODEV> Get-PSSnapin -Registered | select-object name

Name
----
VMware.DeployAutomation
VMware.ImageBuilder
VMware.VimAutomation.Core
VMware.VimAutomation.License


PS C:\Users\ooadmin.OODEV> _
```

Figure 1: How to list the modules and snapins in the PowerShell console

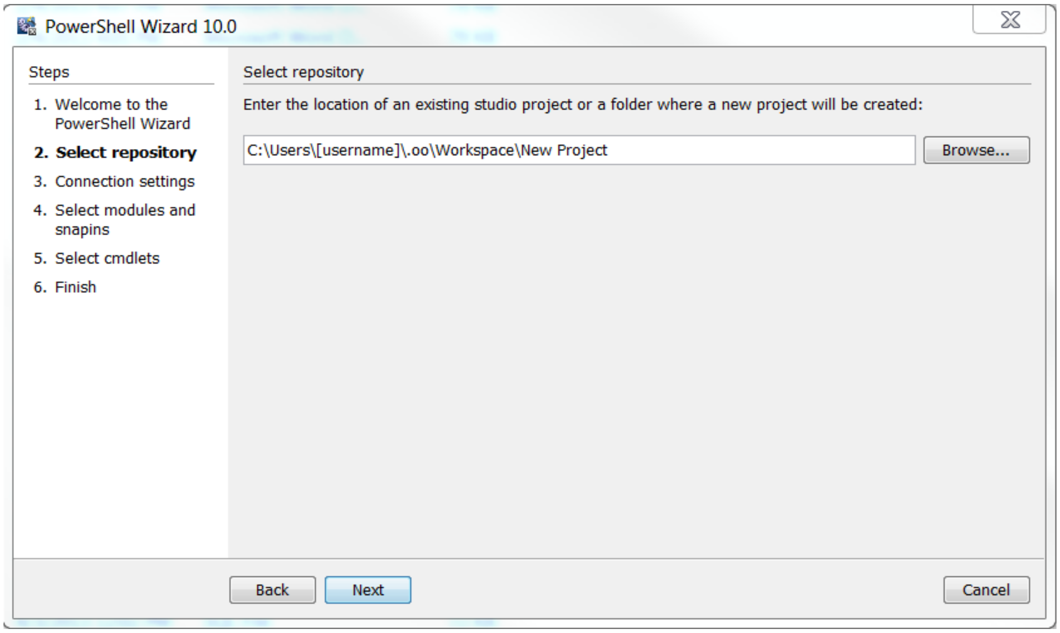
PowerShell Wizard Enhancements from 9.x

- The wizard now has the version (10.x) displayed in the title.
- The wizard now appears in the taskbar and can be closed, minimized or brought to the front.

3 The PowerShell Wizard Steps

The PowerShell Wizard contains only a few steps. The Welcome page contains a short summary of the wizard. This section describes the steps that you have to perform.

Step 1. Select the Repository



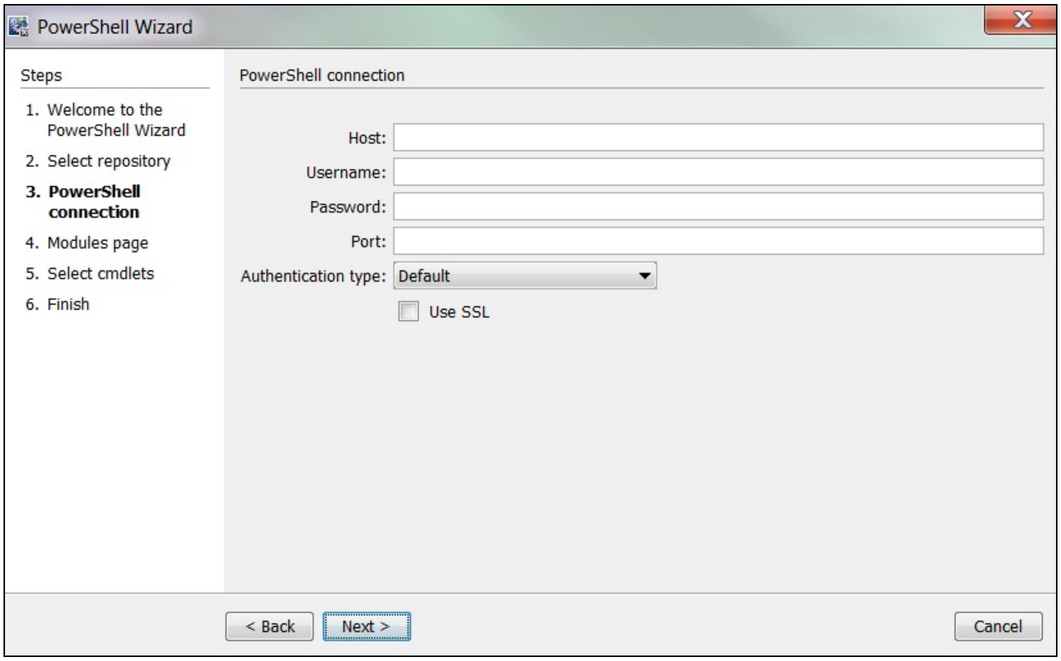
Enter the location of an existing studio project or a folder where a new project will be created:

C:\Users\[username]\.oo\Workspace\New Project

Figure 2: PowerShell Wizard: Select the project location page

- In the **Enter the location**: field, type in the required project path or click **Browse** to locate the project location.
- The wizard generates a 10.x studio project, but not a content pack or a repository. The project has a default location: C:\Users\[username]\.oo\Workspace\New Project.

Step 2. Configure the PowerShell Connection



Steps

1. Welcome to the PowerShell Wizard
2. Select repository
3. **PowerShell connection**
4. Modules page
5. Select cmdlets
6. Finish

PowerShell connection

Host:

Username:

Password:

Port:

Authentication type: Default

□ Use SSL

Figure 3: PowerShell Wizard: Connection page

Host

Type the name of the host that you want to connect to. If you leave the **Host** field empty, the PowerShell Wizard uses localhost as the default.

Note: If Host is empty then the authentication type would be NegotiateWithImplicitCredential. If the host has been defined, the wizard considers the host definition provided by the user.

Username

Enter the user name to connect to the target host..

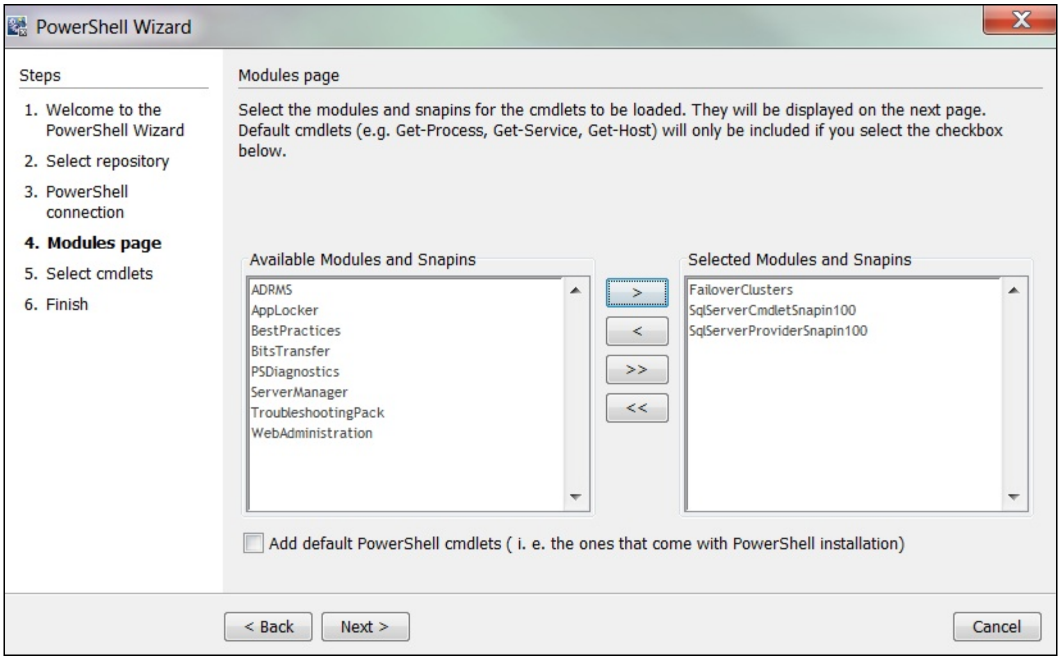
Password

Enter the password.

Port

The port values can be in the range of 1-65535. If you set the port value to 0, the wizard ignores it and uses the default port values. The default port values are: 5985 (HTTP) and 5986 (HTTPS).

Step 3. Select the Modules



Steps

1. Welcome to the PowerShell Wizard
2. Select repository
3. PowerShell connection
4. **Modules page**
5. Select cmdlets
6. Finish

Select the modules and snapins for the cmdlets to be loaded. They will be displayed on the next page. Default cmdlets (e.g. Get-Process, Get-Service, Get-Host) will only be included if you select the checkbox below.

Available Modules and Snapins:

- ADRMS
- AppLocker
- BestPractices
- BitsTransfer
- PSDiagnostics
- ServerManager
- TroubleshootingPack
- WebAdministration

Selected Modules and Snapins:

- FailoverClusters
- SqlServerCmdletSnapin100
- SqlServerProviderSnapin100

□ Add default PowerShell cmdlets (i. e. the ones that come with PowerShell installation)

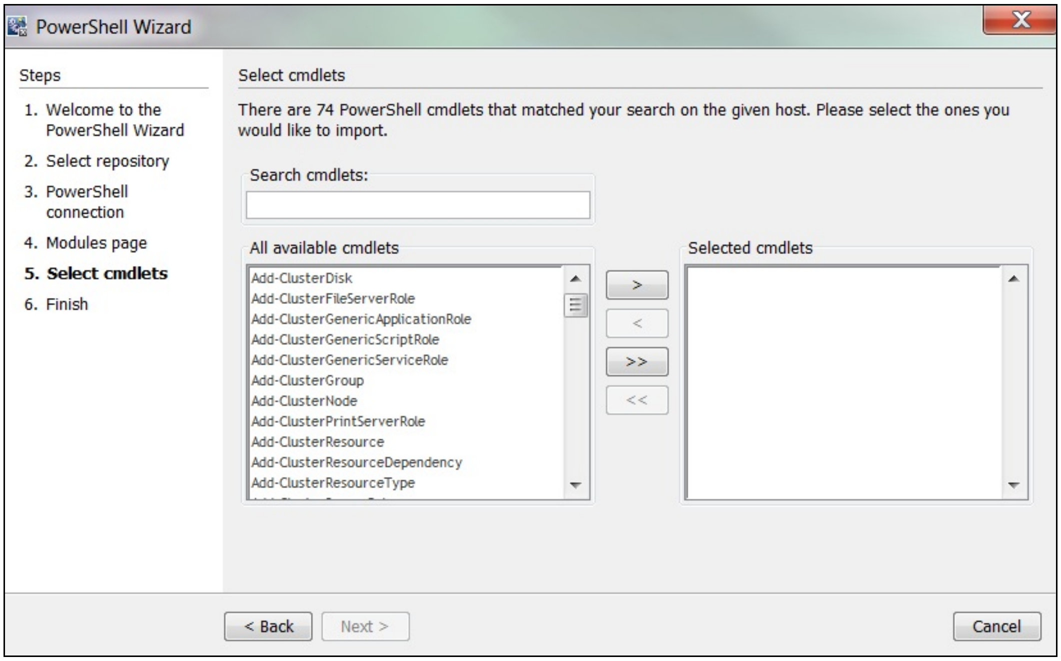
Figure 4: PowerShell Wizard: Modules page

The wizard detects all the available modules/snapins on the target host and displays them in a list as shown above. You can select/unselect any module and the wizard retrieves only those cmdlets contained in the selected modules.

Cmdlets such as Get-Process and Get-Service are not contained in the list of available modules. These are cmdlets which are available by default in PowerShell. To retrieve the list of default cmdlets, select the checkbox **Add default PowerShell cmdlets**.

Note: If you select the **Add default PowerShell cmdlets** checkbox, the lists are disabled.

Step 4. Select Operations (Cmdlets)



There are 74 PowerShell cmdlets that matched your search on the given host. Please select the ones you would like to import.

Search cmdlets:

All available cmdlets

Add-ClusterDisk
Add-ClusterFileServerRole
Add-ClusterGenericApplicationRole
Add-ClusterGenericScriptRole
Add-ClusterGenericServiceRole
Add-ClusterGroup
Add-ClusterNode
Add-ClusterPrintServerRole
Add-ClusterResource
Add-ClusterResourceDependency
Add-ClusterResourceType

Selected cmdlets

Figure 5: PowerShell Wizard: Select cmdlets page

The selected modules are loaded to the PowerShell runspace, and the wizard retrieves the names of the cmdlets from those modules.

You can move the cmdlets from left to right or right to left. Use the search textbox if the list is very large, and you have difficulties finding the required cmdlet. The wizard searches the list for the cmdlets with names containing the search text. In addition, the wizard updates the list while you are typing.

4 Using the PowerShell Wizard – OO Integration

PowerShell Wizard Integration Operations and Flows

This section describes the operations and flows in the PowerShell integration.

Generated Flows

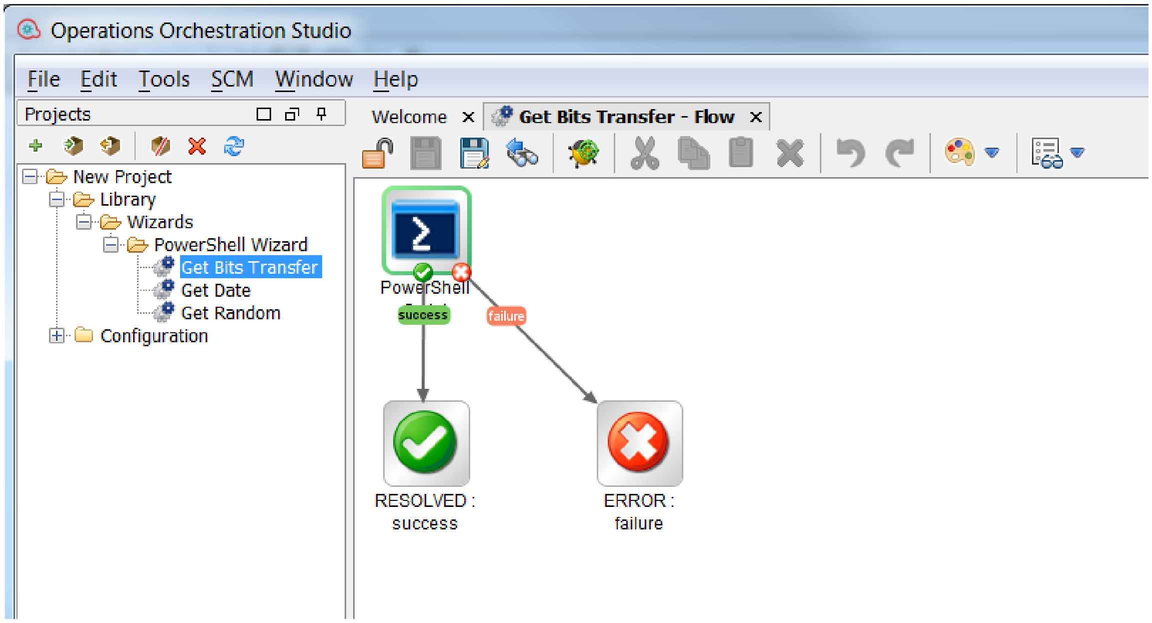


Figure 6: Example of a generated flow

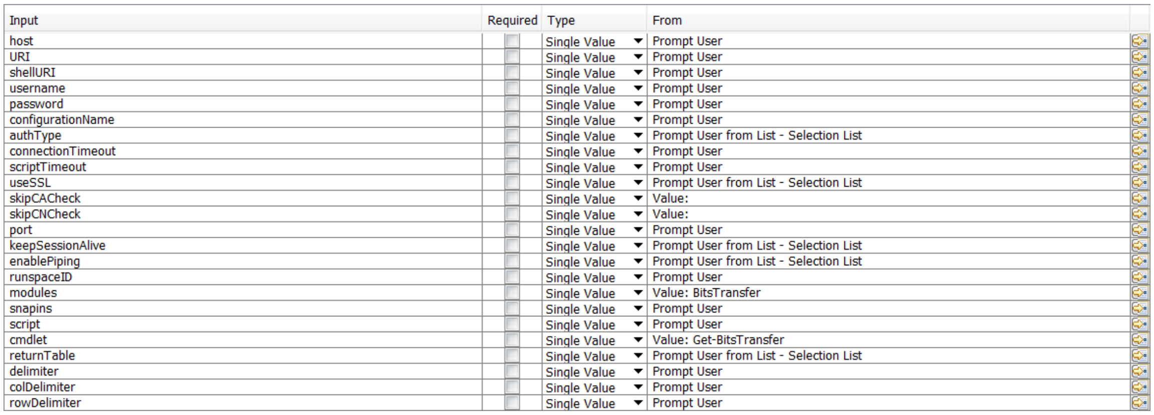
The PowerShell wizard generates one flow for each selected cmdlet unless the project already contains the flow. For example, if the flow was generated in a previous run of the wizard.

The name of the flow is obtained from the name of the cmdlet by applying the following rules:

- Replace "-" with " ".

For example, the name of the flow for the cmdlet *Get-IScsiHbaTarget* is going to be *Get IScsi Hba Target.*

Inputs



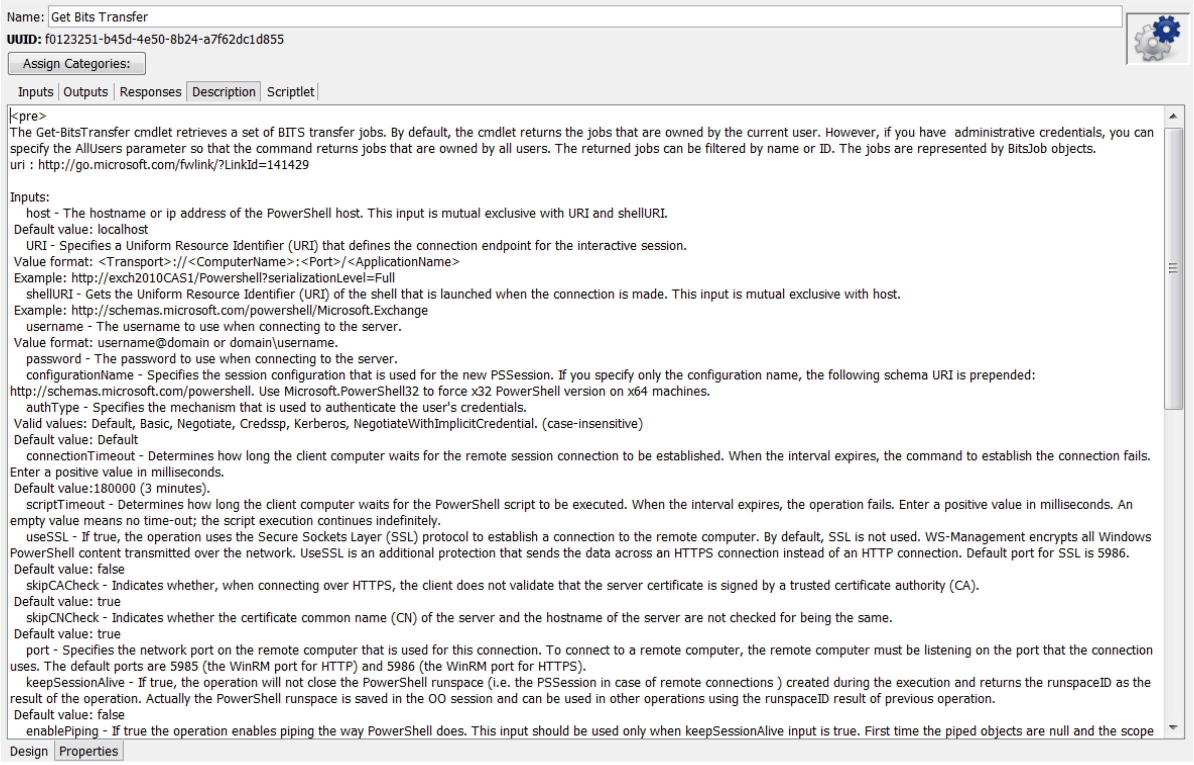
Input	Required	Type	From
host	☐	Single Value ▾	Prompt User
URI	☐	Single Value ▾	Prompt User
shellURI	☐	Single Value ▾	Prompt User
username	☐	Single Value ▾	Prompt User
password	☐	Single Value ▾	Prompt User
configurationName	☐	Single Value ▾	Prompt User
authType	☐	Single Value ▾	Prompt User from List - Selection List
connectionTimeout	☐	Single Value ▾	Prompt User
scriptTimeout	☐	Single Value ▾	Prompt User
useSSL	☐	Single Value ▾	Prompt User from List - Selection List
skipCACheck	☐	Single Value ▾	Value:
skipCNCheck	☐	Single Value ▾	Value:
port	☐	Single Value ▾	Prompt User
keepSessionAlive	☐	Single Value ▾	Prompt User from List - Selection List
enablePiping	☐	Single Value ▾	Prompt User from List - Selection List
runspaceID	☐	Single Value ▾	Prompt User
modules	☐	Single Value ▾	Value: BitsTransfer
snapins	☐	Single Value ▾	Prompt User
script	☐	Single Value ▾	Prompt User
cmdlet	☐	Single Value ▾	Value: Get-BitsTransfer
returnTable	☐	Single Value ▾	Prompt User from List - Selection List
delimiter	☐	Single Value ▾	Prompt User
colDelimiter	☐	Single Value ▾	Prompt User
rowDelimiter	☐	Single Value ▾	Prompt User

Figure 7: Inputs of a generated flow

Each flow has the following inputs:

- Common inputs. All the inputs of the PowerShell Script operation

Descriptions



Name: Get Bits Transfer

UUID: f0123251-b45d-4e50-8b24-a7f62dc1d855

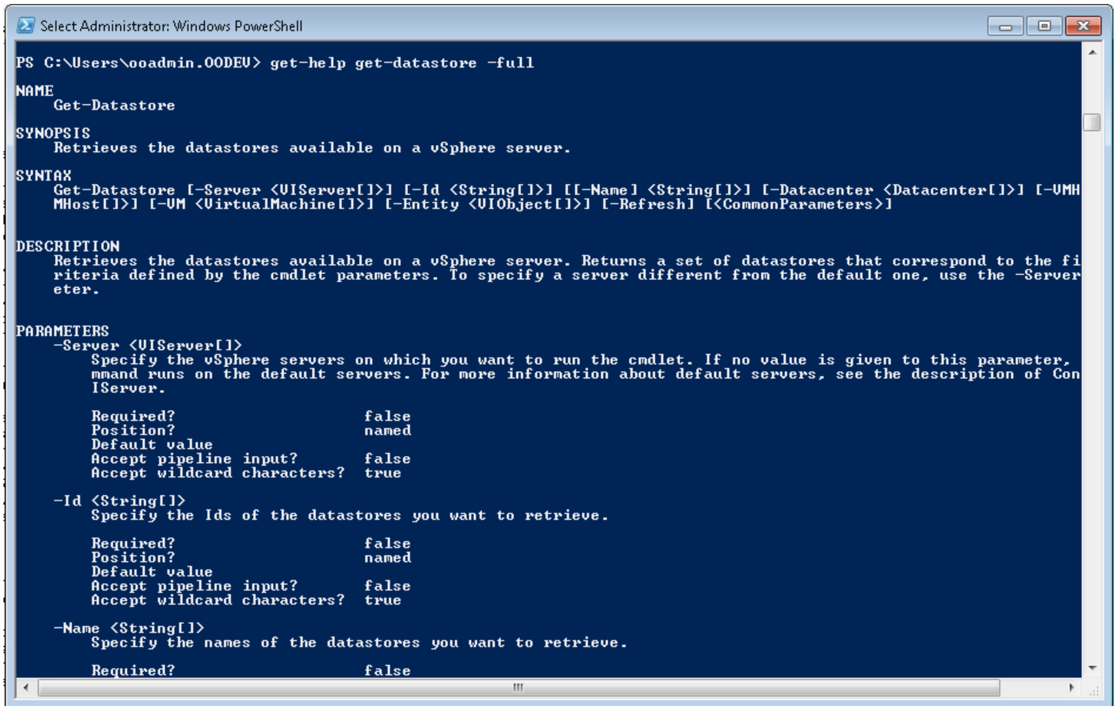
```
<pre>
The Get-BitsTransfer cmdlet retrieves a set of BITS transfer jobs. By default, the cmdlet returns the jobs that are owned by the current user. However, if you have  administrative credentials, you can specify the AllUsers parameter so that the command returns jobs that are owned by all users. The returned jobs can be filtered by name or ID. The jobs are represented by BitsJob objects.
uri : http://go.microsoft.com/fwlink/?LinkId=141429

Inputs:
   host - The hostname or ip address of the PowerShell host. This input is mutual exclusive with URI and shellURI.
 Default value: localhost
   URI - Specifies a Uniform Resource Identifier (URI) that defines the connection endpoint for the interactive session.
 Value format: <Transport>://<ComputerName>:<Port>/<ApplicationName>
 Example: http://exch2010CAS1/Powershell?serializationLevel=Full
   shellURI - Gets the Uniform Resource Identifier (URI) of the shell that is launched when the connection is made. This input is mutual exclusive with host.
 Example: http://schemas.microsoft.com/powershell/Microsoft.Exchange
   username - The username to use when connecting to the server.
 Value format: username@domain or domain\username.
   password - The password to use when connecting to the server.
   configurationName - Specifies the session configuration that is used for the new PSSession. If you specify only the configuration name, the following schema URI is prepended: http://schemas.microsoft.com/powershell. Use Microsoft.PowerShell32 to force x32 PowerShell version on x64 machines.
   authType - Specifies the mechanism that is used to authenticate the user's credentials.
 Valid values: Default, Basic, Negotiate, Credssp, Kerberos, NegotiateWithImplicitCredential. (case-insensitive)
 Default value: Default
   connectionTimeout - Determines how long the client computer waits for the remote session connection to be established. When the interval expires, the command to establish the connection fails. Enter a positive value in milliseconds.
 Default value:180000 (3 minutes).
   scriptTimeout - Determines how long the client computer waits for the PowerShell script to be executed. When the interval expires, the operation fails. Enter a positive value in milliseconds. An empty value means no time-out; the script execution continues indefinitely.
   useSSL - If true, the operation uses the Secure Sockets Layer (SSL) protocol to establish a connection to the remote computer. By default, SSL is not used. WS-Management encrypts all Windows PowerShell content transmitted over the network. UseSSL is an additional protection that sends the data across an HTTPS connection instead of an HTTP connection. Default port for SSL is 5986.
 Default value: false
   skipCACheck - Indicates whether, when connecting over HTTPS, the client does not validate that the server certificate is signed by a trusted certificate authority (CA).
 Default value: true
   skipCNCheck - Indicates whether the certificate common name (CN) of the server and the hostname of the server are not checked for being the same.
 Default value: true
   port - Specifies the network port on the remote computer that is used for this connection. To connect to a remote computer, the remote computer must be listening on the port that the connection uses. The default ports are 5985 (the WinRM port for HTTP) and 5986 (the WinRM port for HTTPS).
   keepSessionAlive - If true, the operation will not close the PowerShell runspace (i.e. the PSSession in case of remote connections ) created during the execution and returns the runspaceID as the result of the operation. Actually the PowerShell runspace is saved in the OO session and can be used in other operations using the runspaceID result of previous operation.
 Default value: false
   enablePiping - If true the operation enables piping the way PowerShell does. This input should be used only when keepSessionAlive input is true. First time the piped objects are null and the scope
```

Figure 8: Description of a generated flow

The description of each generated flow contains the following items:

- A description of the cmdlet as found in its native documentation
- A link where the user can find a detailed description of the cmdlet written by the provider of the module
- The description of the common inputs copied from the PowerShell Script operation's description.
- The description of the common results

Most of the information included in the description can be obtained from the PowerShell console as shown below:



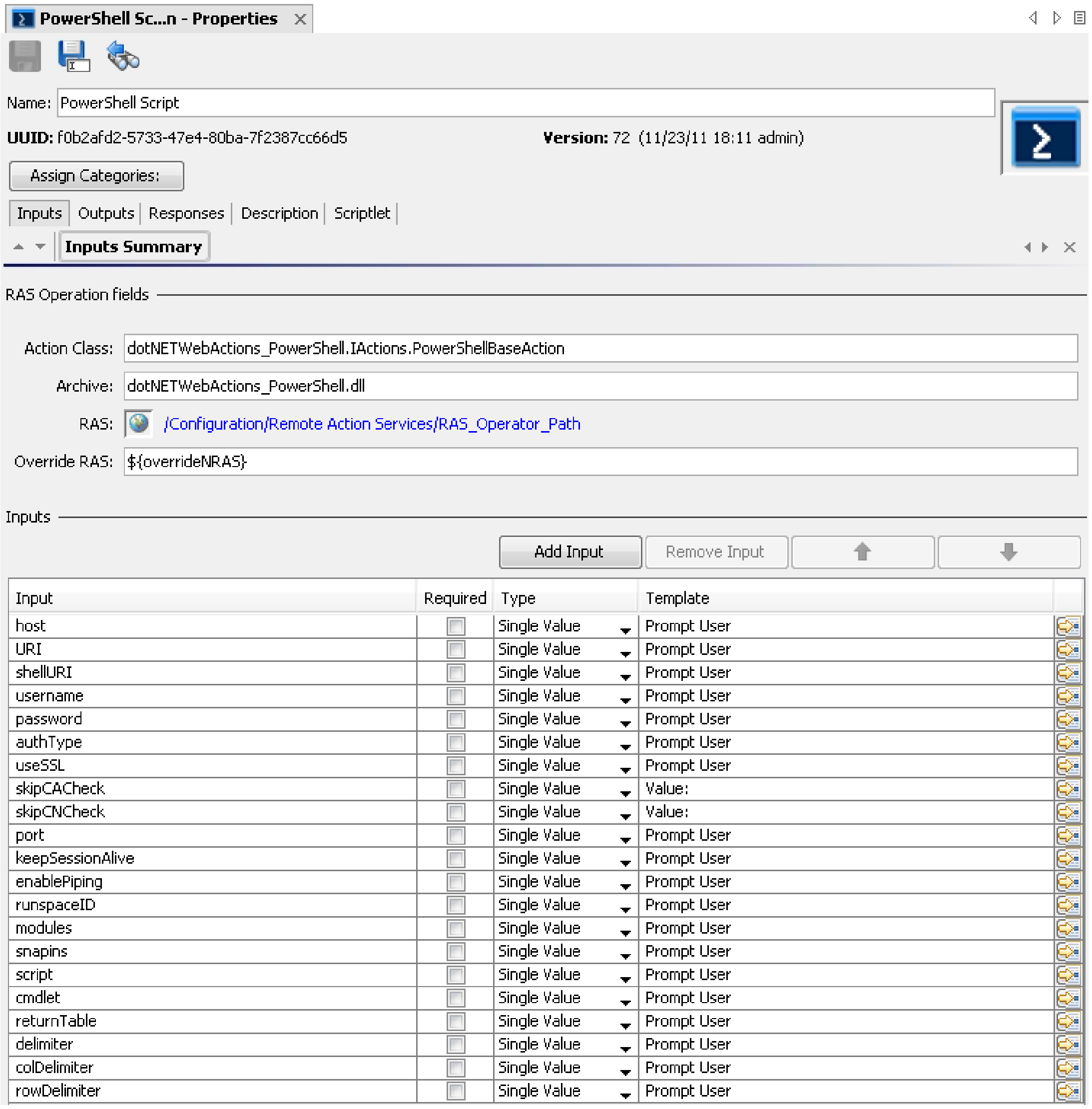
```
PS C:\Users\ooadmin.OODEV> get-help get-datastore -full

NAME
    Get-Datastore

SYNOPSIS
    Retrieves the datastores available on a vSphere server.

SYNTAX
    Get-Datastore [-Server <VIServer[]>] [-Id <String[]>] [[-Name] <String[]>] [-Datacenter <Datacenter[]>] [-VMH
    MHost[]>] [-VM <VirtualMachine[]>] [-Entity <VIObject[]>] [-Refresh] [<CommonParameters>]


DESCRIPTION
    Retrieves the datastores available on a vSphere server. Returns a set of datastores that correspond to the fi
    riteria defined by the cmdlet parameters. To specify a server different from the default one, use the -Server
    eter.


PARAMETERS
    -Server <VIServer[]>
        Specify the vSphere servers on which you want to run the cmdlet. If no value is given to this parameter,
        mmand runs on the default servers. For more information about default servers, see the description of Con
        IServer.

        Required?                    false
        Position?                    named
        Default value
        Accept pipeline input?       false
        Accept wildcard characters?  true

    -Id <String[]>
        Specify the Ids of the datastores you want to retrieve.

        Required?                    false
        Position?                    named
        Default value
        Accept pipeline input?       false
        Accept wildcard characters?  true

    -Name <String[]>
        Specify the names of the datastores you want to retrieve.

        Required?                    false
```

Figure 9: Obtaining the description from the PowerShell console

PowerShell Script Operation

The operation is used to execute a PowerShell script or cmdlet on a target host, either local or remote. If the operation executes a single cmdlet, the parameters of the cmdlet should be passed to the operation inputs.

Inputs



Name: PowerShell Script

UUID: f0b2afd2-5733-47e4-80ba-7f2387cc66d5 **Version:** 72 (11/23/11 18:11 admin)

RAS Operation fields

Action Class: dotNETWebActions_PowerShell.IActions.PowerShellBaseAction

Archive: dotNETWebActions_PowerShell.dll

RAS: /Configuration/Remote Action Services/RAS_Operator_Path

Override RAS: ${overrideNRAS}

Inputs

Input	Required	Type	Template
host	□	Single Value	Prompt User
URI	□	Single Value	Prompt User
shellURI	□	Single Value	Prompt User
username	□	Single Value	Prompt User
password	□	Single Value	Prompt User
authType	□	Single Value	Prompt User
useSSL	□	Single Value	Prompt User
skipCACheck	□	Single Value	Value:
skipCNCheck	□	Single Value	Value:
port	□	Single Value	Prompt User
keepSessionAlive	□	Single Value	Prompt User
enablePiping	□	Single Value	Prompt User
runspaceID	□	Single Value	Prompt User
modules	□	Single Value	Prompt User
snapins	□	Single Value	Prompt User
script	□	Single Value	Prompt User
cmdlet	□	Single Value	Prompt User
returnTable	□	Single Value	Prompt User
delimiter	□	Single Value	Prompt User
colDelimiter	□	Single Value	Prompt User
rowDelimiter	□	Single Value	Prompt User

Figure 10: Inputs of the PowerShell Script operation

Connection Inputs

host

The hostname or ip address of the PowerShell host. This input is mutual exclusive with URI and shellURI

Default value: localhost

URI

Specifies a Uniform Resource Identifier (URI) that defines the connection endpoint for the interactive session.

Value format: <Transport>://<ComputerName>:<Port>/<ApplicationName>

Example: *http://exch2010CAS1/Powershell?serializationLevel=Full*

shellURI

Gets the Uniform Resource Identifier (URI) of the shell that is launched when the connection is made. This input is mutual exclusive with host.

Example: *http://schemas.microsoft.com/powershell/Microsoft.Exchange*

Username

The username to use when connecting to the server.

Value format: username@domain or domain\username

password

The password to use when connecting to the server

authType

Specifies the mechanism that is used to authenticate the user's credentials. Valid values: Default, Basic, Credssp, Digest, Kerberos, Negotiate, NegotiateWithImplicitCredential. (case-insensitive).

Default value: Default

useSSL

If true, the operation uses the Secure Sockets Layer (SSL) protocol to establish a connection to the remote computer. By default, SSL is not used. WS-Management encrypts all Windows PowerShell content transmitted over the network. UseSSL is an additional protection that sends the data across an HTTPS connection instead of an HTTP connection.

Default port for SSL: 5986.

Default value: false

skipCACheck

Indicates when connecting over HTTPS that the client does not validate that the server certificate is signed by a trusted certificate authority (CA).

Default value: true

skipCNCheck

Indicates whether the certificate common name (CN) of the server and the hostname of the server are not checked for being the same.

Default value: true

port

Specifies the network port on the remote computer that is used for this connection. To connect to a remote computer, the remote computer must be listening on the port that the connection uses. The default ports are 5985 (the WinRM port for HTTP) and 5986 (the WinRM port for HTTPS).

Session and Piping Inputs

keepSessionAlive

If true, the operation will not close the PowerShell runspace (i.e. the PSSession in case of remote connections) created during the execution and returns the runspaceID as the result of the operation. Actually the PowerShell runspace is saved in the OO session and can be used in other operations using the runspaceID result of previous operation.

Default value: false

enablePiping

If true, the operation enables piping the way PowerShell does. This input should be used only when keepSessionAlive input is true. First time the piped objects are null and the scope is to save the objects resulted from the PowerShell script execution. Next time the piped objects can be referred in the script as "$_" objects.

Default value: false

Example: First, run "Get-Service" script with enablePiping=true and keepSessionAlive=true, then run the script "Select-Object -property name,displayname,status|where-object {$_.Name -lt "C"}" with enablePiping=true keepSessionAlive=true. Observe the use of "$_".

runspaceID

If this is not empty, the operation searches the OO session for keys which equal the runspaceID. If the operation finds the runspace specified by the runspaceID it tries to use it and does not create another PowerShell runspace with provided inputs. If the runspace exists but is broken or unavailable the operation uses its authentication parameters and tries to reconnect and recreate the PowerShell runspace.

Note: The operation uses the connection parameters of the runspace identified by runspaceID, not the values provided as user inputs. The operation processes the connection inputs, for example, host, username, password, authType, useSSL that is provided by the user only if the runspaceID does not exist in the OO session.

Additional Modules and Snapins

Modules

A list of PowerShell modules that is loaded after the PowerShell connection is established. Each value from the list specifies the name of the module to import. Enter the name of the module or the name of a file in the module, such as a .psd1, .psm1, .dll, or ps1 file. File paths are optional. Wildcards are not permitted. Specify only the module name whenever possible. When you specify a file name, only the members that are implemented in that file are imported. If the module contains other files, they are not imported, and you might be missing important members of the module. The list of modules should be separated by the comma "," delimiter.

Example: FailoverClusters

Snapins

A list of PowerShell snapins loaded after the PowerShell connection is established. Each value from the list specifies the name of a registered snapin, for example, the Name, not the AssemblyName or ModuleName.

Example: Microsoft.Exchange.Management.PowerShell.E2010

PowerShell Script and cmdlet Inputs

script

The script to execute on the PowerShell host. If you want to execute a script from a file just provide the file path.

Example: C:\PowerShellScripts\GetHost.ps1

Cmdlet

The name of the PowerShell cmdlet to invoke. If the cmdlet has additional parameters, please provide them as inputs to the operation. If the parameter has the same name as one of the operation's inputs just prefix it with "_". This input is intended to be used together with the PowerShell wizard so please use the script input whenever possible.

Result Formatting

returnTable

If true, the operation will return a table containing a row for each PSObject that the script emits. The table's columns represent the properties of these PSObjects, in the propertyName<delimiter>propertyValue format. If false the operation returns a string representation of the result similar to the output from the PowerShell console.

Default value: false.

delimiter

The delimiter used to separate each property name from the property value in the output table.

Default value: ":".

colDelimiter

The delimiter used to separate columns in the output table.

Default value: ",".

rowDelimiter

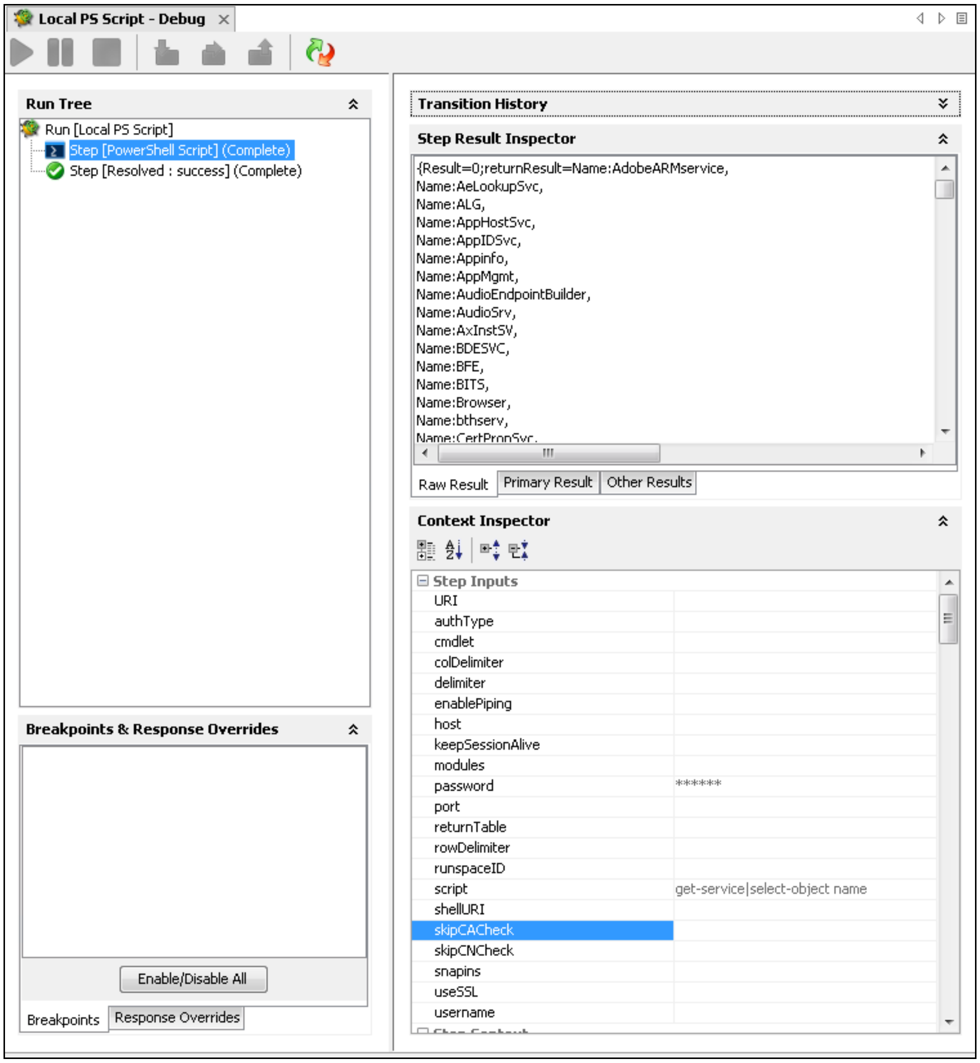
The delimiter used to separate rows in the output table.

Default value: newline.

Run a PowerShell Script on a Localhost

The only setting required to execute the PowerShell scripts on the localhost is that the ExecutionPolicy must be RemoteSigned. Use Get-ExecutionPolicy to display the current execution policy and Set-ExecutionPolicy to set the execution policy.

In addition, the required input is the script input.



```
Run [Local PS Script]
  Step [PowerShell Script] (Complete)
  Step [Resolved : success] (Complete)
```

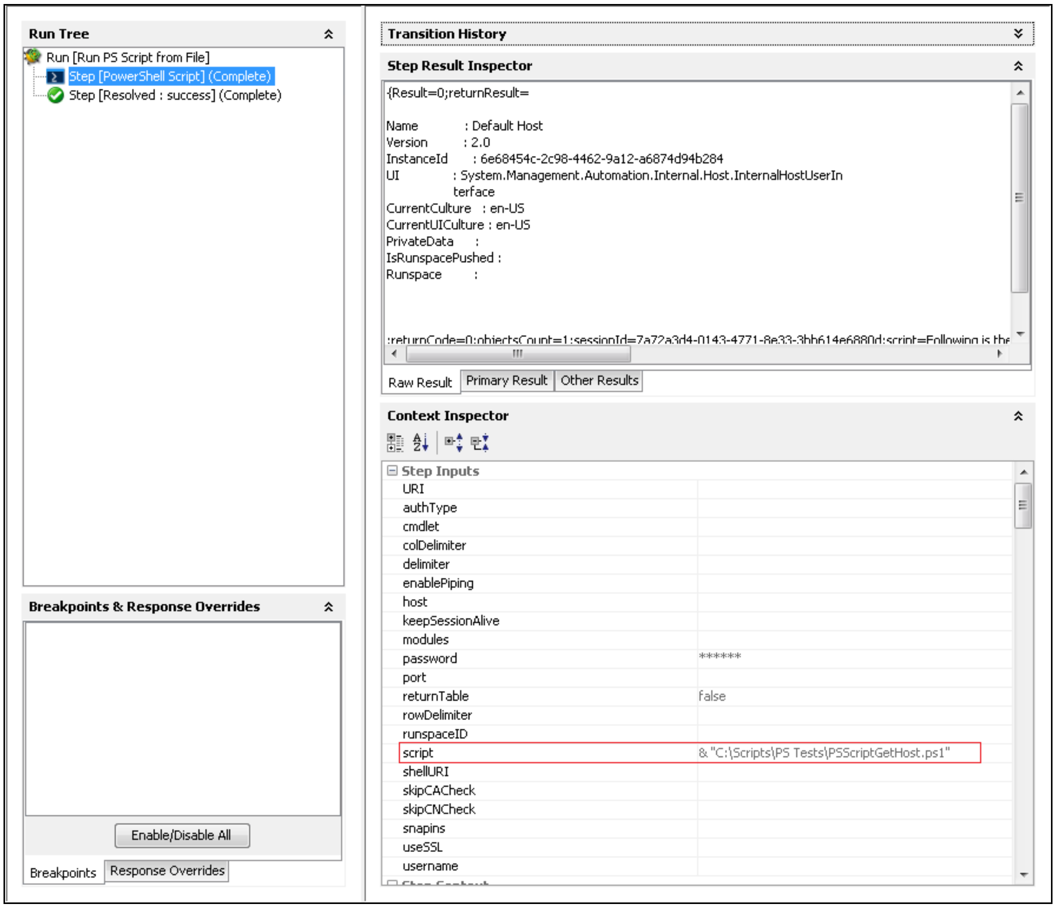
```
{Result=0;returnResult=Name:AdobeARMservice,
Name:AeLookupSvc,
Name:ALG,
Name:AppHostSvc,
Name:AppIDSvc,
Name:Appinfo,
Name:AppMgmt,
Name:AudioEndpointBuilder,
Name:AudioSrv,
Name:AxInstSV,
Name:BDESVC,
Name:BFE,
Name:BITS,
Name:Browser,
Name:bthserv,
Name:CertPropSvc,
```

Step Inputs	
URI	
authType	
cmdlet	
colDelimiter	
delimiter	
enablePiping	
host	
keepSessionAlive	
modules	
password	******
port	
returnTable	
rowDelimiter	
runspaceID	
script	get-service|select-object name
shellURI	
skipCACheck	
skipCNCheck	
snapins	
useSSL	
username	

Figure 11: Running the PowerShell Script operation on localhost

If one script requires elevated rights, enter a username and a password.

Run PowerShell Scripts from a File



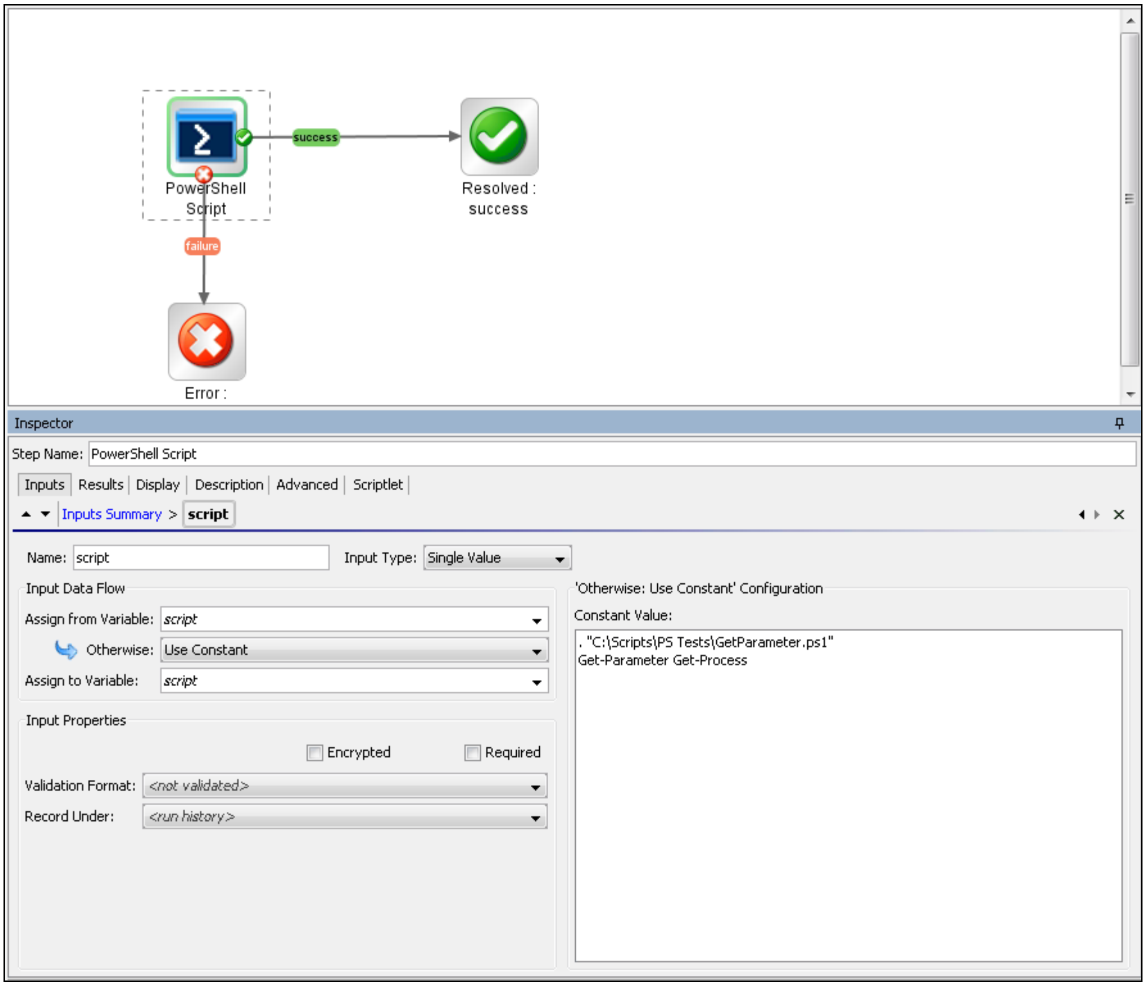
```
{Result=0;returnResult=

Name          : Default Host
Version       : 2.0
InstanceId    : 6e68454c-2c98-4462-9a12-a6874d94b284
UI            : System.Management.Automation.Internal.Host.InternalHostUserIn
                terface
CurrentCulture   : en-US
CurrentUICulture : en-US
PrivateData      :
IsRunspacePushed :
Runspace         :



;returnCode=0;objectsCount=1;sessionId=7a72a3d4-0143-4771-8e33-3bb614e6880d;script=Following is the
```

⊟ Step Inputs	
URI	
authType	
cmdlet	
colDelimiter	
delimiter	
enablePiping	
host	
keepSessionAlive	
modules	
password	******
port	
returnTable	false
rowDelimiter	
runspaceID	
script	& "C:\Scripts\PS Tests\PSScriptGetHost.ps1"
shellURI	
skipCACheck	
skipCNCheck	
snapins	
useSSL	
username	

Figure 12: Running the PowerShell Script operation from a File

To run scripts from a file, just provide the path to that file. This should work in most of the cases, when the path to the file contains whitespaces, the operation fails. To fix this provide the path to that file like in the picture above.

Load PowerShell Functions from Files



Step Name: PowerShell Script

Name: script

Input Type: Single Value

Input Data Flow

Assign from Variable: script

Otherwise: Use Constant

Assign to Variable: script

Input Properties

□ Encrypted □ Required

Validation Format: <not validated>

Record Under: <run history>

'Otherwise: Use Constant' Configuration

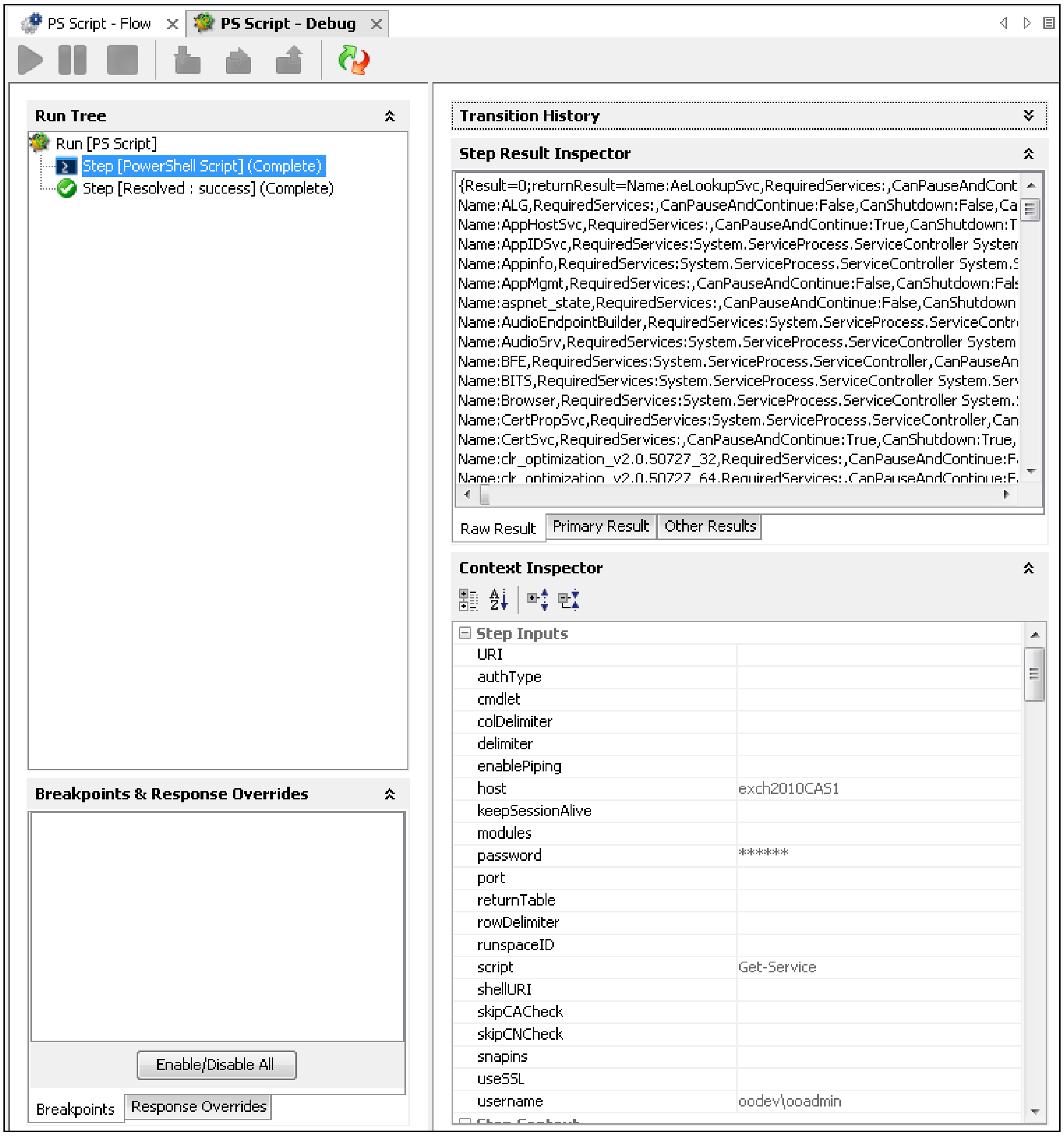
Constant Value:

```
. "C:\Scripts\PS Tests\GetParameter.ps1"
Get-Parameter Get-Process
```

Figure 13: Using a script to enable all functions from a local file

In certain cases, a PowerShell script depends on functions from other file from the disk. The script from the picture above might help to load this file and enable all functions and cmdlets from it. Get-Parameter cmdlet is defined in the file named Get-Parameter.ps1.

Run a PowerShell Script on a Remote Host



```
{Result=0;returnResult=Name:AeLookupSvc,RequiredServices:,CanPauseAndCont
Name:ALG,RequiredServices:,CanPauseAndContinue:False,CanShutdown:False,Ca
Name:AppHostSvc,RequiredServices:,CanPauseAndContinue:True,CanShutdown:T
Name:AppIDSvc,RequiredServices:System.ServiceProcess.ServiceController Syster
Name:Appinfo,RequiredServices:System.ServiceProcess.ServiceController System.
Name:AppMgmt,RequiredServices:,CanPauseAndContinue:False,CanShutdown:Fal
Name:aspnet_state,RequiredServices:,CanPauseAndContinue:False,CanShutdown
Name:AudioEndpointBuilder,RequiredServices:System.ServiceProcess.ServiceContr
Name:AudioSrv,RequiredServices:System.ServiceProcess.ServiceController System
Name:BFE,RequiredServices:System.ServiceProcess.ServiceController,CanPauseAn
Name:BITS,RequiredServices:System.ServiceProcess.ServiceController System.Ser
Name:Browser,RequiredServices:System.ServiceProcess.ServiceController System.
Name:CertPropSvc,RequiredServices:System.ServiceProcess.ServiceController,Can
Name:CertSvc,RequiredServices:,CanPauseAndContinue:True,CanShutdown:True,
Name:clr_optimization_v2.0.50727_32,RequiredServices:,CanPauseAndContinue:F
Name:clr_optimization_v2.0.50727_64,RequiredServices:,CanPauseAndContinue:F
```

Step Inputs	
URI	
authType	
cmdlet	
colDelimiter	
delimiter	
enablePiping	
host	exch2010CAS1
keepSessionAlive	
modules	
password	******
port	
returnTable	
rowDelimiter	
runspaceID	
script	Get-Service
shellURI	
skipCACheck	
skipCNCheck	
snapins	
useSSL	
username	oodev\ooadmin

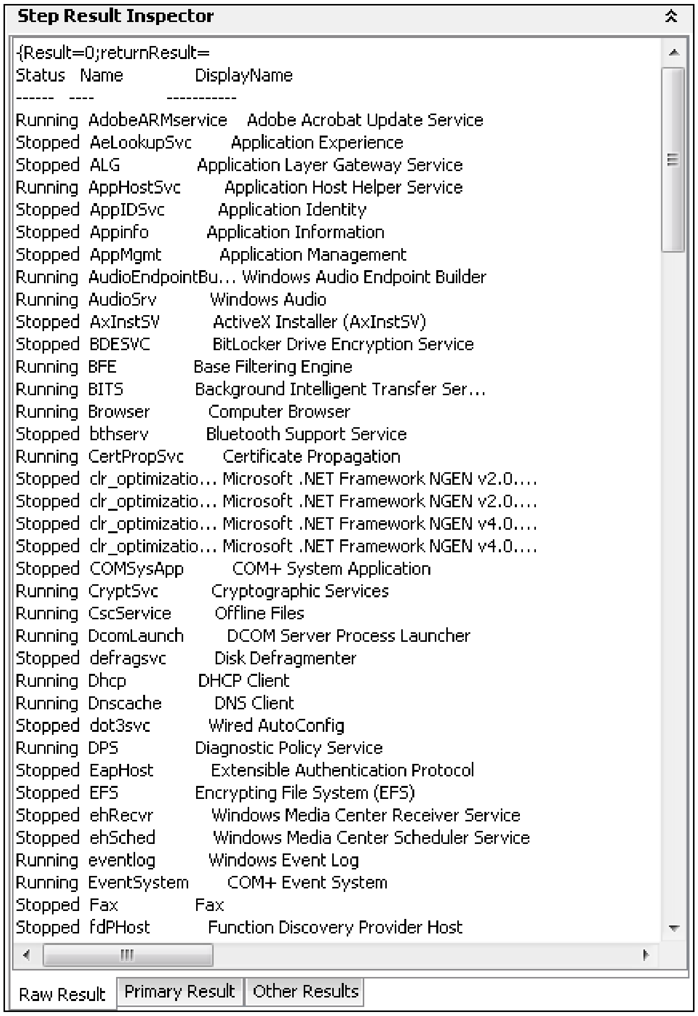
Figure 14: Running the PowerShell Script operation on a remote host

First, execute the script providing only the required inputs: host, username, password and the script.

Negotiate is the default authentication type if the host is provided as an IP address and Kerberos for host names. Please refer to PowerShell Remoting and Authentication Types if the connection fails.

Format the Result

The result can be formatted as a table or the same way it will be displayed in the PowerShell console. The format is decided by the returnTable input described above. If returnTable is set to false the operation will return the result as in the PowerShell console and like the old operation.



```
{Result=0;returnResult=
Status   Name               DisplayName
------   ----               -----------
Running  AdobeARMservice    Adobe Acrobat Update Service
Stopped  AeLookupSvc        Application Experience
Stopped  ALG                Application Layer Gateway Service
Running  AppHostSvc         Application Host Helper Service
Stopped  AppIDSvc           Application Identity
Stopped  Appinfo            Application Information
Stopped  AppMgmt            Application Management
Running  AudioEndpointBu... Windows Audio Endpoint Builder
Running  AudioSrv           Windows Audio
Stopped  AxInstSV           ActiveX Installer (AxInstSV)
Stopped  BDESVC             BitLocker Drive Encryption Service
Running  BFE                Base Filtering Engine
Running  BITS               Background Intelligent Transfer Ser...
Running  Browser            Computer Browser
Stopped  bthserv            Bluetooth Support Service
Running  CertPropSvc        Certificate Propagation
Stopped  clr_optimizatio... Microsoft .NET Framework NGEN v2.0....
Stopped  clr_optimizatio... Microsoft .NET Framework NGEN v2.0....
Stopped  clr_optimizatio... Microsoft .NET Framework NGEN v4.0....
Stopped  clr_optimizatio... Microsoft .NET Framework NGEN v4.0....
Stopped  COMSysApp          COM+ System Application
Running  CryptSvc           Cryptographic Services
Running  CscService         Offline Files
Running  DcomLaunch         DCOM Server Process Launcher
Stopped  defragsvc          Disk Defragmenter
Running  Dhcp               DHCP Client
Running  Dnscache           DNS Client
Stopped  dot3svc            Wired AutoConfig
Running  DPS                Diagnostic Policy Service
Stopped  EapHost            Extensible Authentication Protocol
Stopped  EFS                Encrypting File System (EFS)
Stopped  ehRecvr            Windows Media Center Receiver Service
Stopped  ehSched            Windows Media Center Scheduler Service
Running  eventlog           Windows Event Log
Running  EventSystem        COM+ Event System
Stopped  Fax                Fax
Stopped  fdPHost            Function Discovery Provider Host
```

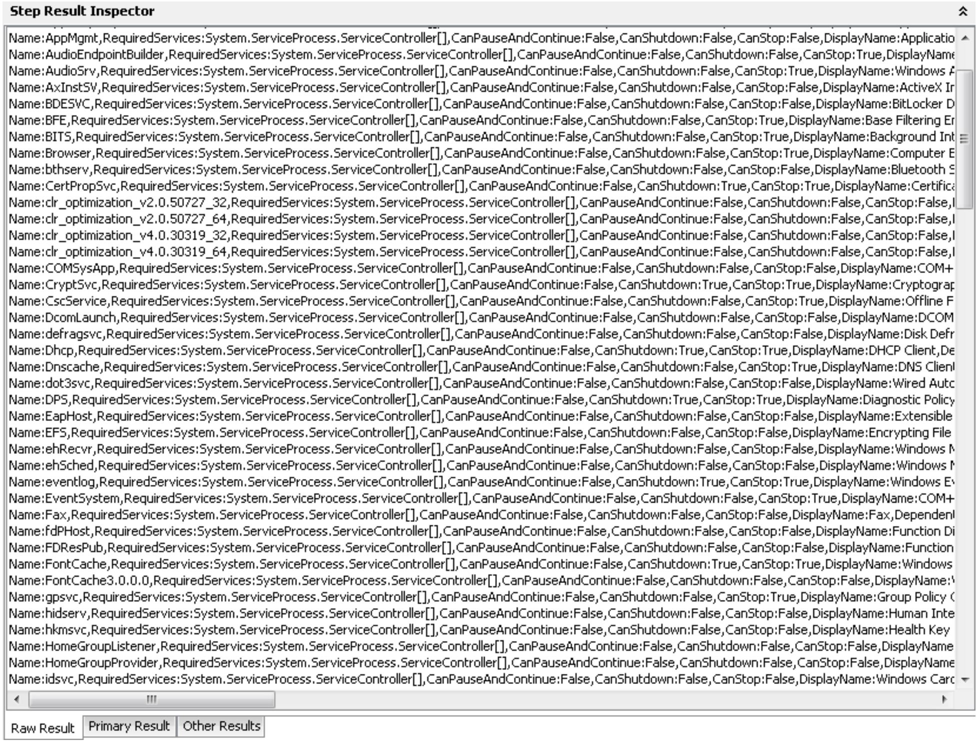
Figure 15: The result if returnTable=false

The result is human readable, but the problem is that it is very difficult to parse, and does not contain properties which could not be displayed on the screen.

The result can be displayed as a table.

PowerShell session considerations results are displayed as a table. Each PowerShell object (in this case each service) is displayed by default on a line. Each line contains different properties of the service (default delimiter is “,”) and the key-value pairs are delimited by “:”. All these delimiters can be changed, refer to the Inputs section for more information.

For example Get-Service returns the following result:

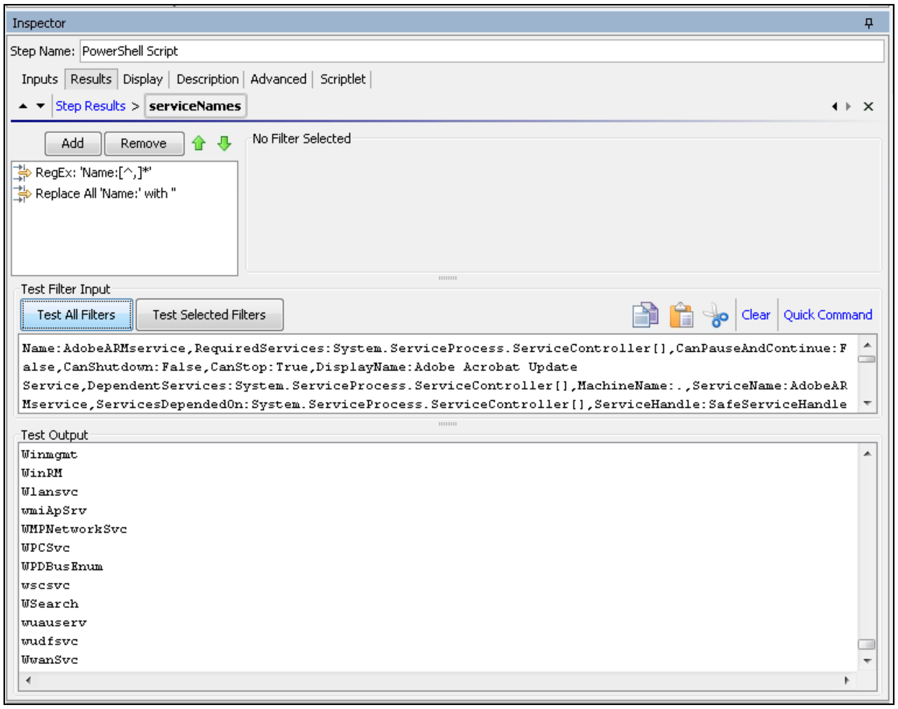


Step Result Inspector

```
Name:AppMgmt,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Applicatio
Name:AudioEndpointBuilder,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:True,DisplayName
Name:AudioSrv,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:True,DisplayName:Windows A
Name:AxInstSV,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:ActiveX Ir
Name:BDESVC,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:BitLocker D
Name:BFE,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:True,DisplayName:Base Filtering Er
Name:BITS,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:True,DisplayName:Background Int
Name:Browser,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:True,DisplayName:Computer E
Name:bthserv,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Bluetooth S
Name:CertPropSvc,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:True,CanStop:True,DisplayName:Certifica
Name:clr_optimization_v2.0.50727_32,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,I
Name:clr_optimization_v2.0.50727_64,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,I
Name:clr_optimization_v4.0.30319_32,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,I
Name:clr_optimization_v4.0.30319_64,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,I
Name:COMSysApp,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:COM+
Name:CryptSvc,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:True,CanStop:True,DisplayName:Cryptograp
Name:CscService,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:True,DisplayName:Offline F
Name:DcomLaunch,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:DCOM
Name:defragsvc,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Disk Defr
Name:Dhcp,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:True,CanStop:True,DisplayName:DHCP Client,De
Name:Dnscache,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:True,DisplayName:DNS Client
Name:dot3svc,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Wired Autc
Name:DPS,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:True,CanStop:True,DisplayName:Diagnostic Policy
Name:EapHost,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Extensible
Name:EFS,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Encrypting File
Name:ehRecvr,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Windows M
Name:ehSched,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Windows M
Name:eventlog,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:True,CanStop:True,DisplayName:Windows Ev
Name:EventSystem,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:True,DisplayName:COM+
Name:Fax,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Fax,Dependent
Name:fdPHost,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Function Di
Name:FDResPub,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Function
Name:FontCache,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:True,CanStop:True,DisplayName:Windows
Name:FontCache3.0.0.0,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:\
Name:gpsvc,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:True,DisplayName:Group Policy C
Name:hidserv,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Human Inte
Name:hkmsvc,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Health Key
Name:HomeGroupListener,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName
Name:HomeGroupProvider,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName
Name:idsvc,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:False,CanShutdown:False,CanStop:False,DisplayName:Windows Carc
```

Figure 16: Raw result of the Get-Service flow

The result contains a full list of properties without any additional PowerShell script, for example, Get-Service|fl, Get-Service|Select-Object Status). Therefore, the status of the services appears and can be parsed by writing two types filters on the result.



Step Name: PowerShell Script

RegEx: 'Name:[^,]*'
Replace All 'Name:' with ''

No Filter Selected

Test Filter Input

```
Name:AdobeARMservice,RequiredServices:System.ServiceProcess.ServiceController[],CanPauseAndContinue:F
alse,CanShutdown:False,CanStop:True,DisplayName:Adobe Acrobat Update
Service,DependentServices:System.ServiceProcess.ServiceController[],MachineName:.,ServiceName:AdobeAR
Mservice,ServicesDependedOn:System.ServiceProcess.ServiceController[],ServiceHandle:SafeServiceHandle
```

Test Output

```
Winmgmt
WinRM
Wlansvc
wmiApSrv
WMPNetworkSvc
WPCSvc
WPDBusEnum
wscsvc
WSearch
wuauserv
wudfsvc
WwanSvc
```

Figure 17: Filtering the results

Run Multiple PowerShell Cmdlets Scripts in the Same PowerShell Session

This section explains how to run multiple PowerShell Script steps in the same PowerShell session. When the PowerShell Script has to execute a single script on a remote server keeping the sessions alive is not necessary. The PowerShell Script connects to the remote host, creates a new PowerShell Runspace, for example, a new PowerShell session, runs the full script on the target and closes the runspace and the connection.

If you want to use the PowerShell Wizard and run the generated flows in a different sequence, you need to consider how much effort is required from the user and whether additional PowerShell Scripts need to be created in order to general flows. However, there are situations when you want to keep the PowerShell session alive.

For example, one uses the PowerShell Wizard, connects to a host which has PowerCLI installed on it and follows the wizard steps to generate OO flows for the PowerShell cmdlets to execute VMWare tasks. Suppose that after the wizard finishes, the user wants to execute one simple cmdlet like Get VM.

To run cmdlets and keep the sessions alive:

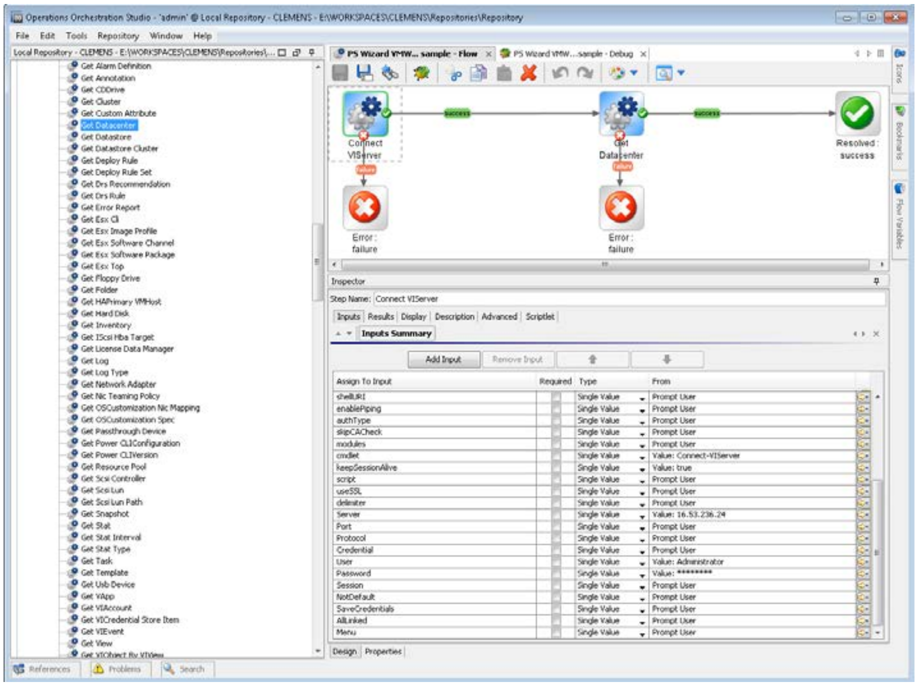
1 Run the OOTB **Get Datacenter** flow generated with the PowerShell Wizard.

Note: This cmdlet does not have any required inputs, however the flow fails to run as you need to run the **Connect VIServer** cmdlet. The PowerShell Wizard generates this flow to solve this problem.

2 Create a flow sequence as shown below.

- Do not modify the generated flow.
- The flow tries to execute Connect VIServer before Get VM.

In the flow below, the parameters specific to the cmdlet were added as flow inputs. The names appear in capital letters.



Step Name: Connect VIServer

Assign To Input	Required	Type	From
shellURI	□	Single Value	Prompt User
enablePiping	□	Single Value	Prompt User
authType	□	Single Value	Prompt User
skipCACheck	□	Single Value	Prompt User
modules	□	Single Value	Prompt User
cmdlet	□	Single Value	Value: Connect-VIServer
keepSessionAlive	□	Single Value	Value: true
script	□	Single Value	Prompt User
useSSL	□	Single Value	Prompt User
delimiter	□	Single Value	Prompt User
Server	□	Single Value	Value: 16.53.236.24
Port	□	Single Value	Prompt User
Protocol	□	Single Value	Prompt User
Credential	□	Single Value	Prompt User
User	□	Single Value	Value: Administrator
Password	□	Single Value	Value: ********
Session	□	Single Value	Prompt User
NotDefault	□	Single Value	Prompt User
SaveCredentials	□	Single Value	Prompt User
AllLinked	□	Single Value	Prompt User
Menu	□	Single Value	Prompt User

Figure 18: Adding values to specific parameters of the cmdlet

The user runs the flow and provides inputs for the server, user name and password (Connect VIServer). No inputs are required for the Get Datacenter. The Connect VIServer succeeds, however, the Get Datacenter fails.

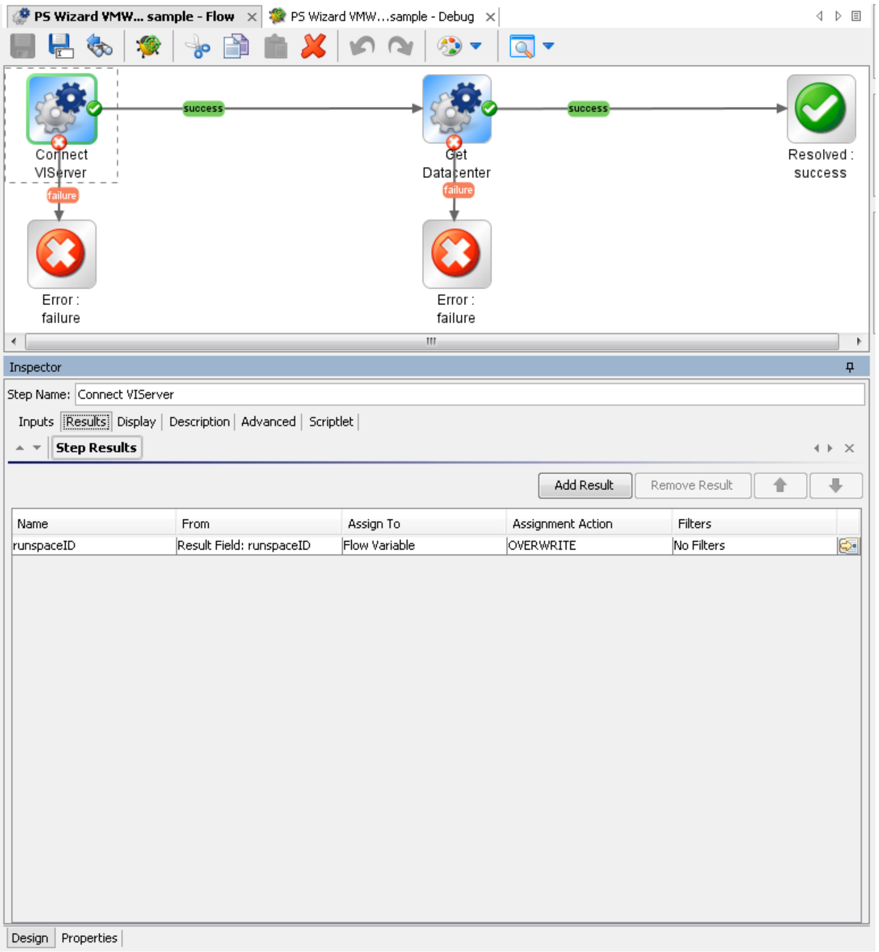
The Get Datacenter fails for the following reasons:

- Connect VIServer passes successfully and the connection to the VMWare server was established.
- Connect VIServer created a new PowerShell runspace, for example, PowerShell session and executed the cmdlet which established a valid connection to the server, however the runspace is closed after the flow runs and the connection is lost.
- Get Datacenter flow creates another PowerShell runspace which is different from the one created by Connect VIServer flow. Therefore, Get-Datacenter cmdlet fails.

3 The solution to the previous step is to keep the session alive during the execution of the 2 cmdlets.

To do this:

keepSessionAlive=true for the first flow which is Connect VIServer; the runspaceID must be added to the results of the Connect VIServer flow;



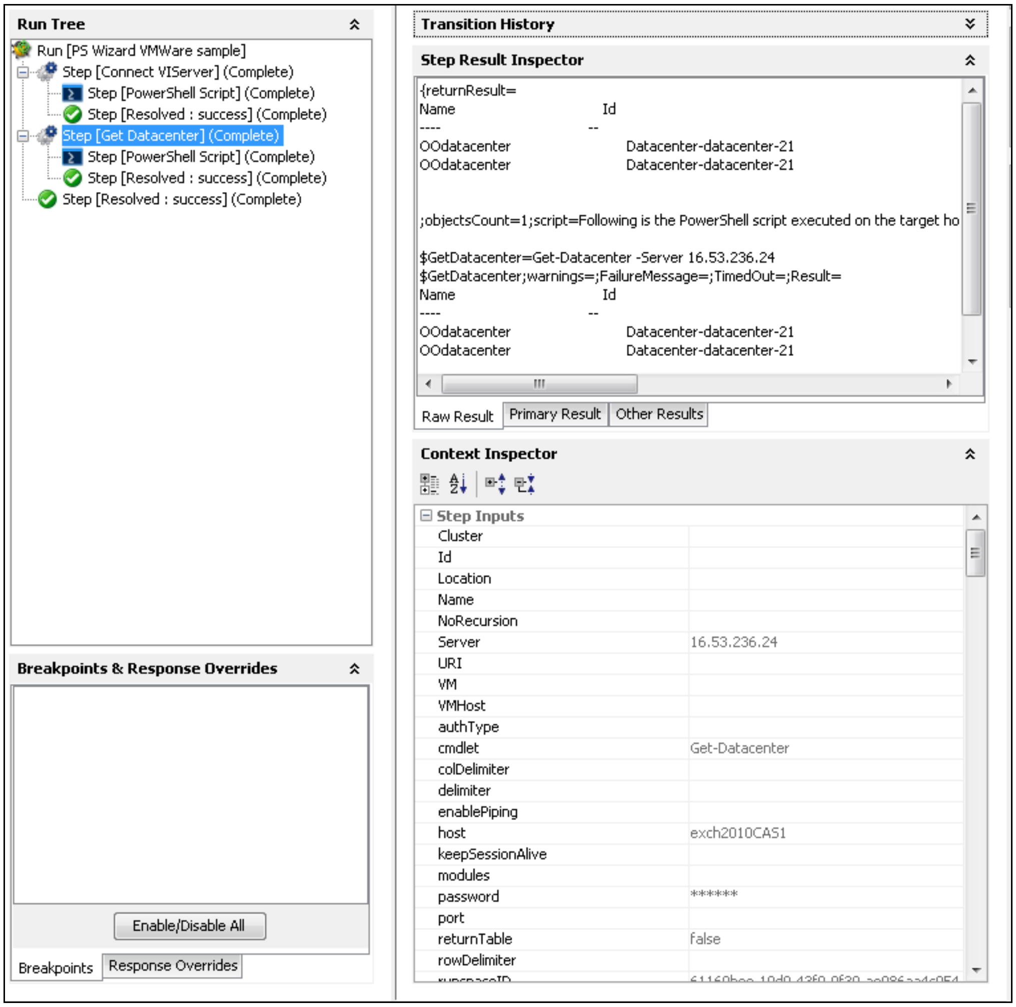
Step Name: Connect VIServer

Name	From	Assign To	Assignment Action	Filters
runspaceID	Result Field: runspaceID	Flow Variable	OVERWRITE	No Filters

Figure 19: Adding a result to the Connect VIServer flow

4 **runspaceID** of the **Get Datacenter** flow must get its value from the result of the **Connect VIServer**. This happens automatically because runspaceID input assigns its value from the flow variable.

At this point the flow completes successfully.



Run [PS Wizard VMWare sample]
Step [Connect VIServer] (Complete)
Step [PowerShell Script] (Complete)
Step [Resolved : success] (Complete)
Step [Get Datacenter] (Complete)
Step [PowerShell Script] (Complete)
Step [Resolved : success] (Complete)
Step [Resolved : success] (Complete)

```
{returnResult=
Name                      Id
----                      --
OOdatacenter              Datacenter-datacenter-21
OOdatacenter              Datacenter-datacenter-21


;objectsCount=1;script=Following is the PowerShell script executed on the target ho

$GetDatacenter=Get-Datacenter -Server 16.53.236.24
$GetDatacenter;warnings=;FailureMessage=;TimedOut=;Result=
Name                      Id
----                      --
OOdatacenter              Datacenter-datacenter-21
OOdatacenter              Datacenter-datacenter-21
```

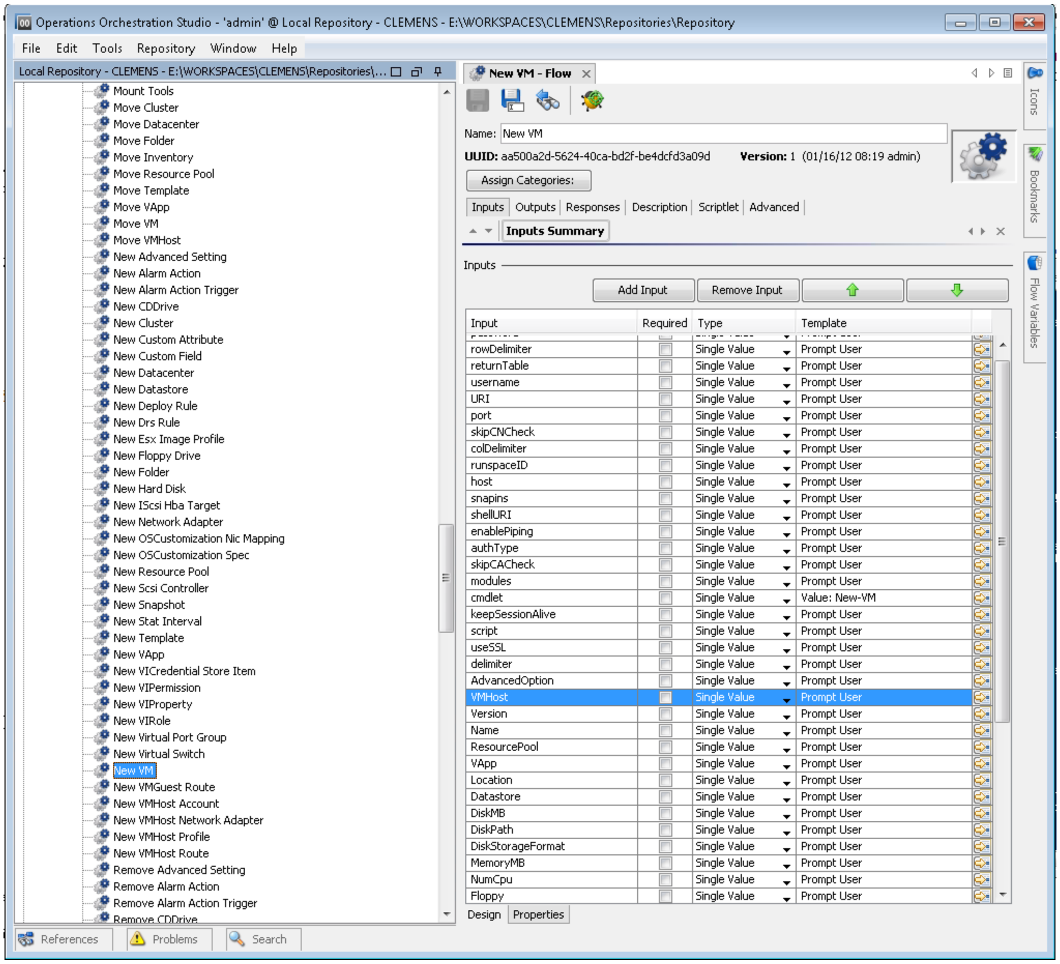
Step Inputs	
Cluster	
Id	
Location	
Name	
NoRecursion	
Server	16.53.236.24
URI	
VM	
VMHost	
authType	
cmdlet	Get-Datacenter
colDelimiter	
delimiter	
enablePiping	
host	exch2010CAS1
keepSessionAlive	
modules	
password	******
port	
returnTable	false
rowDelimiter	
runspaceID	61160bee-19d0-43f0-9f30-ae086aa4c054

Figure 20: The execution of the PSWizard VMWare sample flow

Assign the Result of One Cmdlet as a Parameter to Another Cmdlet

Most of the “get” flows generated through the PowerShell Wizard should work OOTB with minimum effort from the user. But there are some cmdlets, probably the “new” cmdlets, which require as parameters the result of another cmdlet. For example, one would like to create a new virtual machine using the generated flow New VM.

Even if the user follows all the steps described in the previous section, the flow can not be executed. The PowerShell Wizard generates the flow, but the user can run OOTB flows only if their parameters have a built-in type (e.g. strings or integers). In case of cmdlets like Get-Help the parameters can be passed as strings (e.g. the name of the cmdlet to search for help information). The New VM flow parameters are below:



Name: New VM

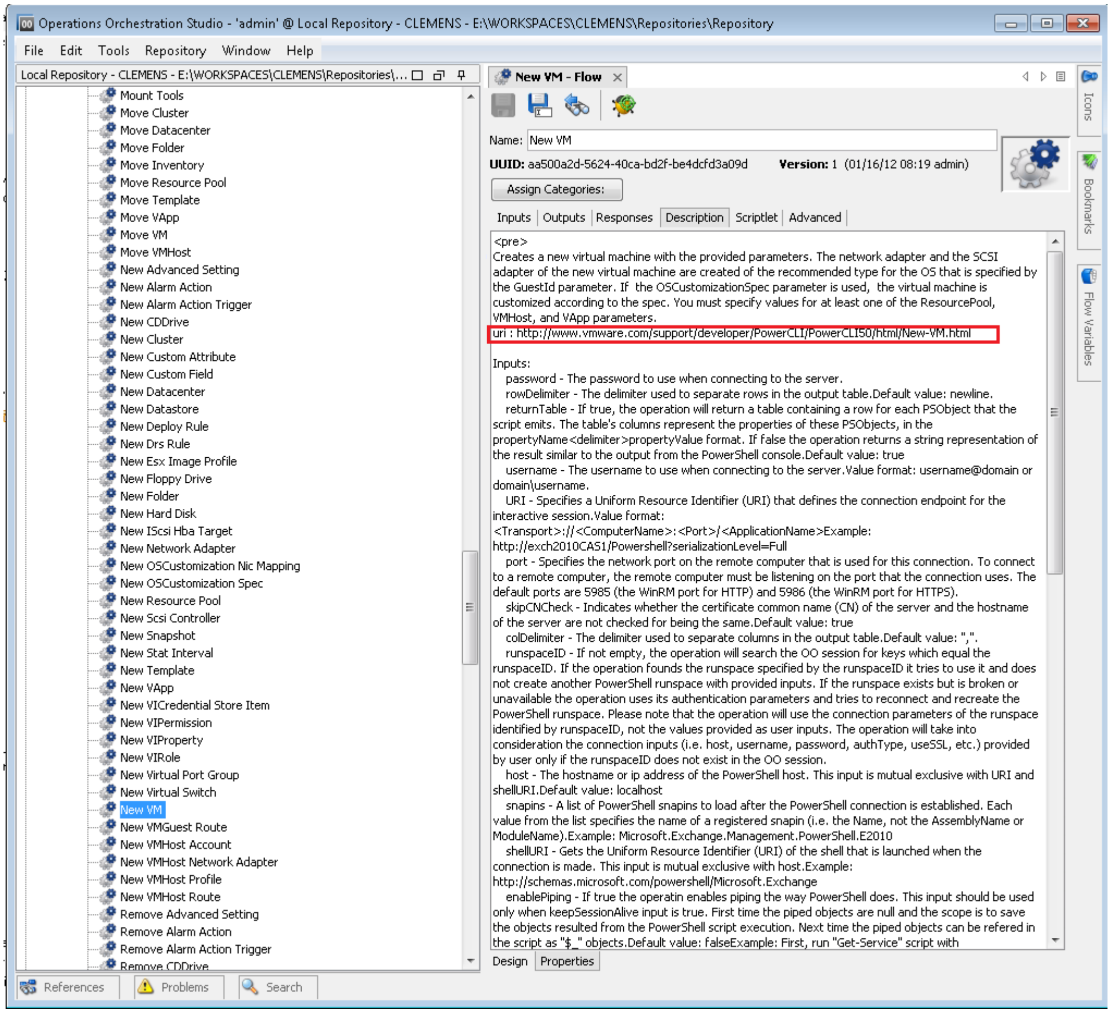
UUID: aa500a2d-5624-40ca-bd2f-be4dcfd3a09d **Version:** 1 (01/16/12 08:19 admin)

Input	Required	Type	Template
rowDelimiter	□	Single Value	Prompt User
returnTable	□	Single Value	Prompt User
username	□	Single Value	Prompt User
URI	□	Single Value	Prompt User
port	□	Single Value	Prompt User
skipCNCheck	□	Single Value	Prompt User
colDelimiter	□	Single Value	Prompt User
runspaceID	□	Single Value	Prompt User
host	□	Single Value	Prompt User
snapins	□	Single Value	Prompt User
shellURI	□	Single Value	Prompt User
enablePiping	□	Single Value	Prompt User
authType	□	Single Value	Prompt User
skipCACheck	□	Single Value	Prompt User
modules	□	Single Value	Prompt User
cmdlet	□	Single Value	Value: New-VM
keepSessionAlive	□	Single Value	Prompt User
script	□	Single Value	Prompt User
useSSL	□	Single Value	Prompt User
delimiter	□	Single Value	Prompt User
AdvancedOption	□	Single Value	Prompt User
VMHost	□	Single Value	Prompt User
Version	□	Single Value	Prompt User
Name	□	Single Value	Prompt User
ResourcePool	□	Single Value	Prompt User
VApp	□	Single Value	Prompt User
Location	□	Single Value	Prompt User
Datastore	□	Single Value	Prompt User
DiskMB	□	Single Value	Prompt User
DiskPath	□	Single Value	Prompt User
DiskStorageFormat	□	Single Value	Prompt User
MemoryMB	□	Single Value	Prompt User
NumCpu	□	Single Value	Prompt User
Floppy	□	Single Value	Prompt User

Figure 21: The inputs of the New VM flow

New VM has an input named VMHost. What is the type of this parameter?

The description of the generated flows contains information about the PowerShell cmdlet, but from size reasons and other considerations we could not include the full description of the cmdlet as it is displayed when someone executes Get-Help New-VM –full. The description of the operation contains the original link where the user can find detailed information about the cmdlet.



Operations Orchestration Studio - 'admin' @ Local Repository - CLEMENS - E:\WORKSPACES\CLEMENS\Repositories\Repository

Local Repository - CLEMENS - E:\WORKSPACES\CLEMENS\Repositories\...

- Mount Tools
- Move Cluster
- Move Datacenter
- Move Folder
- Move Inventory
- Move Resource Pool
- Move Template
- Move VApp
- Move VM
- Move VMHost
- New Advanced Setting
- New Alarm Action
- New Alarm Action Trigger
- New CDDrive
- New Cluster
- New Custom Attribute
- New Custom Field
- New Datacenter
- New Datastore
- New Deploy Rule
- New Drs Rule
- New Esx Image Profile
- New Floppy Drive
- New Folder
- New Hard Disk
- New IScsi Hba Target
- New Network Adapter
- New OSCustomization Nic Mapping
- New OSCustomization Spec
- New Resource Pool
- New Scsi Controller
- New Snapshot
- New Stat Interval
- New Template
- New VApp
- New VICredential Store Item
- New VIPermission
- New VIProperty
- New VIRole
- New Virtual Port Group
- New Virtual Switch
- New VM
- New VMGuest Route
- New VMHost Account
- New VMHost Network Adapter
- New VMHost Profile
- New VMHost Route
- Remove Advanced Setting
- Remove Alarm Action
- Remove Alarm Action Trigger
- Remove CDDrive

New VM - Flow

Name: New VM

UUID: aa500a2d-5624-40ca-bd2f-be4dcfd3a09d **Version:** 1 (01/16/12 08:19 admin)

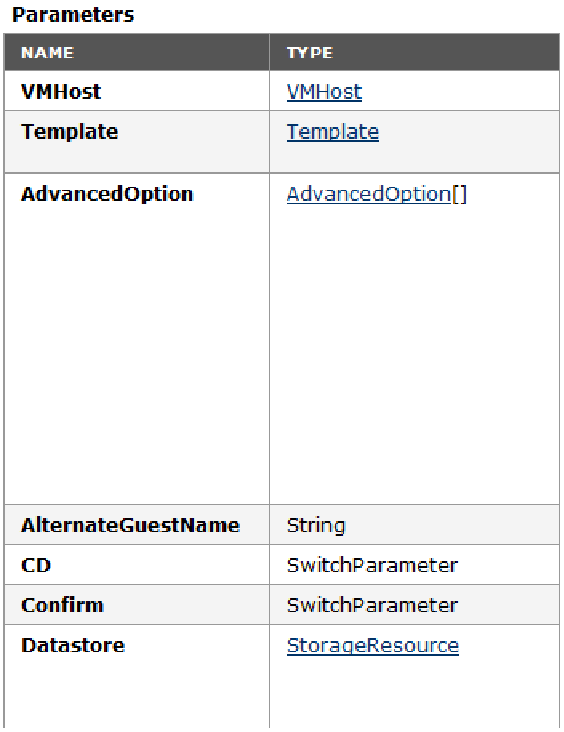
Assign Categories:

Inputs | Outputs | Responses | Description | Scriptlet | Advanced

```
<pre>
Creates a new virtual machine with the provided parameters. The network adapter and the SCSI
adapter of the new virtual machine are created of the recommended type for the OS that is specified by
the GuestId parameter. If  the OSCustomizationSpec parameter is used,  the virtual machine is
customized according to the spec. You must specify values for at least one of the ResourcePool,
VMHost, and VApp parameters.
uri : http://www.vmware.com/support/developer/PowerCLI/PowerCLI50/html/New-VM.html

Inputs:
   password - The password to use when connecting to the server.
   rowDelimiter - The delimiter used to separate rows in the output table.Default value: newline.
   returnTable - If true, the operation will return a table containing a row for each PSObject that the
script emits. The table's columns represent the properties of these PSObjects, in the
propertyName<delimiter>propertyValue format. If false the operation returns a string representation of
the result similar to the output from the PowerShell console.Default value: true
   username - The username to use when connecting to the server.Value format: username@domain or
domain\username.
   URI - Specifies a Uniform Resource Identifier (URI) that defines the connection endpoint for the
interactive session.Value format:
<Transport>://<ComputerName>:<Port>/<ApplicationName>Example:
http://exch2010CAS1/Powershell?serializationLevel=Full
   port - Specifies the network port on the remote computer that is used for this connection. To connect
to a remote computer, the remote computer must be listening on the port that the connection uses. The
default ports are 5985 (the WinRM port for HTTP) and 5986 (the WinRM port for HTTPS).
   skipCNCheck - Indicates whether the certificate common name (CN) of the server and the hostname
of the server are not checked for being the same.Default value: true
   colDelimiter - The delimiter used to separate columns in the output table.Default value: ",".
   runspaceID - If not empty, the operation will search the OO session for keys which equal the
runspaceID. If the operation founds the runspace specified by the runspaceID it tries to use it and does
not create another PowerShell runspace with provided inputs. If the runspace exists but is broken or
unavailable the operation uses its authentication parameters and tries to reconnect and recreate the
PowerShell runspace. Please note that the operation will use the connection parameters of the runspace
identified by runspaceID, not the values provided as user inputs. The operation will take into
consideration the connection inputs (i.e. host, username, password, authType, useSSL, etc.) provided
by user only if the runspaceID does not exist in the OO session.
   host - The hostname or ip address of the PowerShell host. This input is mutual exclusive with URI and
shellURI.Default value: localhost
   snapins - A list of PowerShell snapins to load after the PowerShell connection is established. Each
value from the list specifies the name of a registered snapin (i.e. the Name, not the AssemblyName or
ModuleName).Example: Microsoft.Exchange.Management.PowerShell.E2010
   shellURI - Gets the Uniform Resource Identifier (URI) of the shell that is launched when the
connection is made. This input is mutual exclusive with host.Example:
http://schemas.microsoft.com/powershell/Microsoft.Exchange
   enablePiping - If true the operatin enables piping the way PowerShell does. This input should be used
only when keepSessionAlive input is true. First time the piped objects are null and the scope is to save
the objects resulted from the PowerShell script execution. Next time the piped objects can be refered in
the script as "$_" objects.Default value: falseExample: First, run "Get-Service" script with
```

Figure 22: The description of the New VM flow

If the user opens the link in a browser he can observe the types of the cmdlet parameters. In our case, VMHost is of the same type as the name suggests.

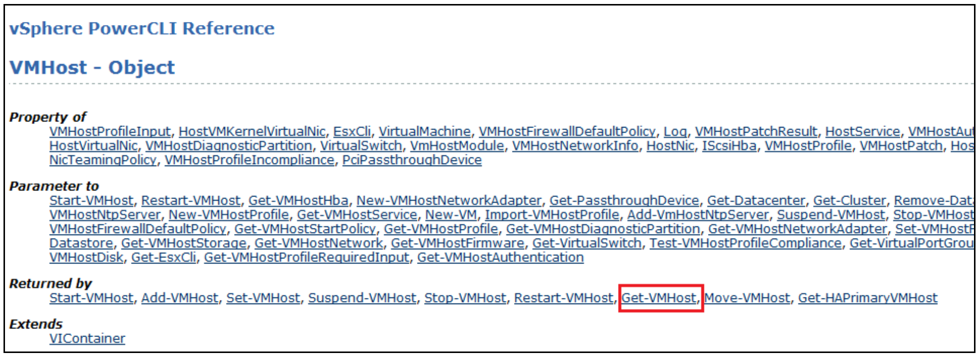


Parameters

NAME	TYPE
VMHost	VMHost
Template	Template
AdvancedOption	AdvancedOption[]
AlternateGuestName	String
CD	SwitchParameter
Confirm	SwitchParameter
Datastore	StorageResource

Figure 23: The VMHost object: parameters

The problem is that VMHost is an object, not a built-in type which can be resolved as a string. Following the link provided for the VMHost type the user can find which cmdlets return VMHost objects as it can be observed below. In our case the type suggests that a cmdlet like Get-VMHost would return this kind of objects.



vSphere PowerCLI Reference

VMHost - Object

Property of
VMHostProfileInput, HostVMKernelVirtualNic, EsxCli, VirtualMachine, VMHostFirewallDefaultPolicy, Log, VMHostPatchResult, HostService, VMHostAu
HostVirtualNic, VMHostDiagnosticPartition, VirtualSwitch, VmHostModule, VMHostNetworkInfo, HostNic, IScsiHba, VMHostProfile, VMHostPatch, Hos
NicTeamingPolicy, VMHostProfileIncompliance, PciPassthroughDevice

Parameter to
Start-VMHost, Restart-VMHost, Get-VMHostHba, New-VMHostNetworkAdapter, Get-PassthroughDevice, Get-Datacenter, Get-Cluster, Remove-Dat
VMHostNtpServer, New-VMHostProfile, Get-VMHostService, New-VM, Import-VMHostProfile, Add-VmHostNtpServer, Suspend-VMHost, Stop-VMHost
VMHostFirewallDefaultPolicy, Get-VMHostStartPolicy, Get-VMHostProfile, Get-VMHostDiagnosticPartition, Get-VMHostNetworkAdapter, Set-VMHostF
Datastore, Get-VMHostStorage, Get-VMHostNetwork, Get-VMHostFirmware, Get-VirtualSwitch, Test-VMHostProfileCompliance, Get-VirtualPortGrou
VMHostDisk, Get-EsxCli, Get-VMHostProfileRequiredInput, Get-VMHostAuthentication

Returned by
Start-VMHost, Add-VMHost, Set-VMHost, Suspend-VMHost, Stop-VMHost, Restart-VMHost, Get-VMHost, Move-VMHost, Get-HAPrimaryVMHost

Extends
VIContainer

Figure 24: The VMHost object : additional information

In the previous section, we explained how to execute in the same PowerShell session multiple OO flows generated with the PowerShell wizard. At this point we can imagine the following chain of cmdlets which need to be executed to create a new vm:

Connect-VIServer – this must be executed before any VMWare cmdlet;

Get-VMHost – we need the result of this cmdlet as parameter for the next cmdlet;

New-VM – this cmdlet actually creates a new virtual machine.

New VM has other parameters beside VMHost which are not built-in, but we are going to explain how to solve the VMHost parameter, because the process is the same for the other parameters, too.

You need to execute 3 cmdlets in the same PowerShell session. You have generated flows for each of the cmdlets and executed them in the same session. The next step is to take the result of the Get-VMHost cmdlet and pass it to the New-VM cmdlet? Select from one of the following solutions:

Solution 1: Create a New PowerShell Script Step

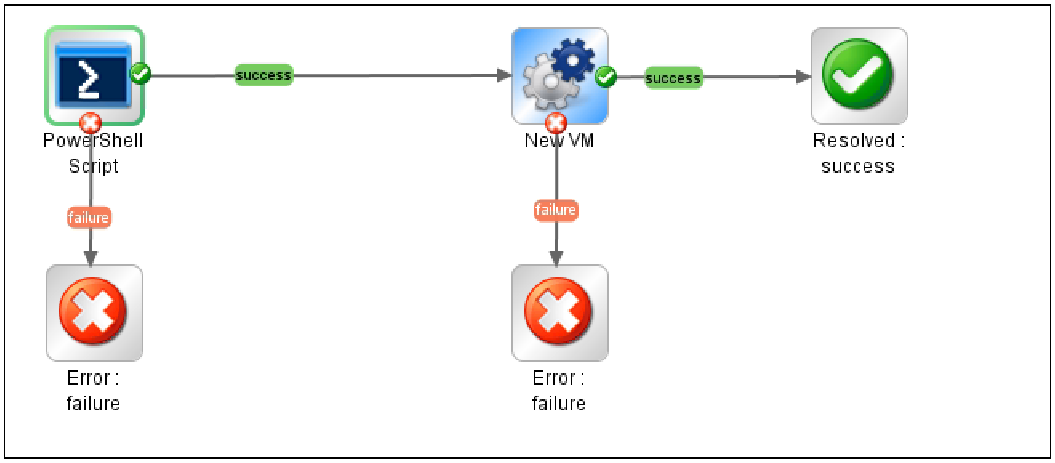
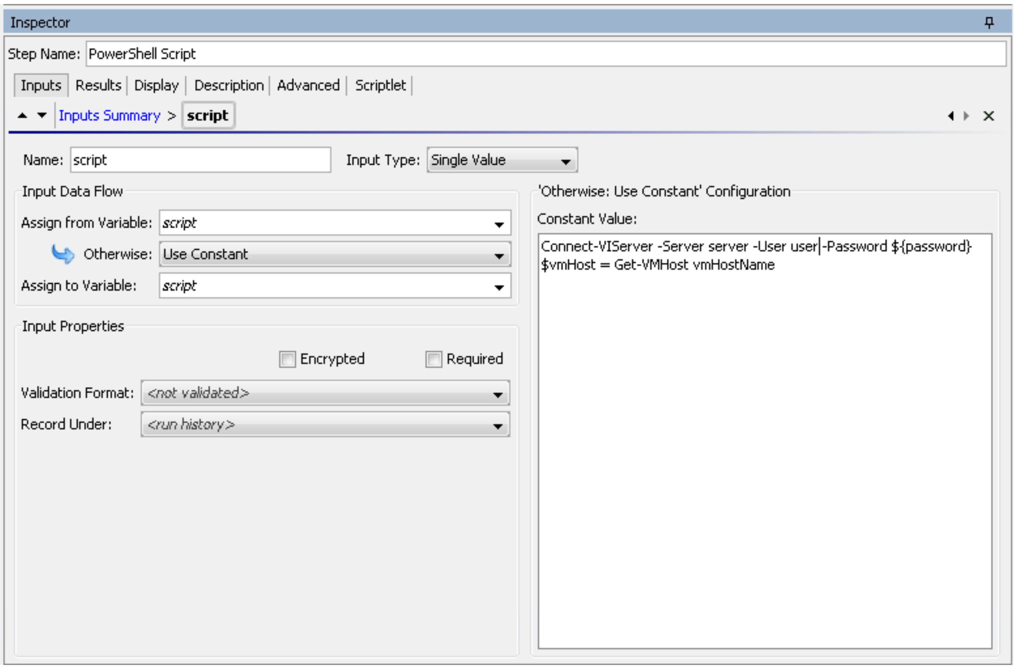


Figure 25: Add a PowerShell script step to the flow

Create a new PowerShell script in addition to the generated flow that you want to run. If you keep the session alive during the execution of the 2 PowerShell script steps, you can use the PowerShell script variables defined in the first step to pass them in the script of the second step or as parameters for the generated flow. In this case, you are not using the generated flows for Connect-VIServer and Get-VMHost, however you need to write the script.

1 Execute the following script, then save the result of the Get-VMHost cmdlet in the PowerShell variable named $vmHost.


Inspector
Inputs | Results | Display | Description | Advanced | Scriptlet
Inputs Summary > script
Input Data Flow
Input Properties
'Otherwise: Use Constant' Configuration

Step Name: PowerShell Script

Name: script
Input Type: Single Value

Assign from Variable: script
Otherwise: Use Constant
Assign to Variable: script

□ Encrypted □ Required

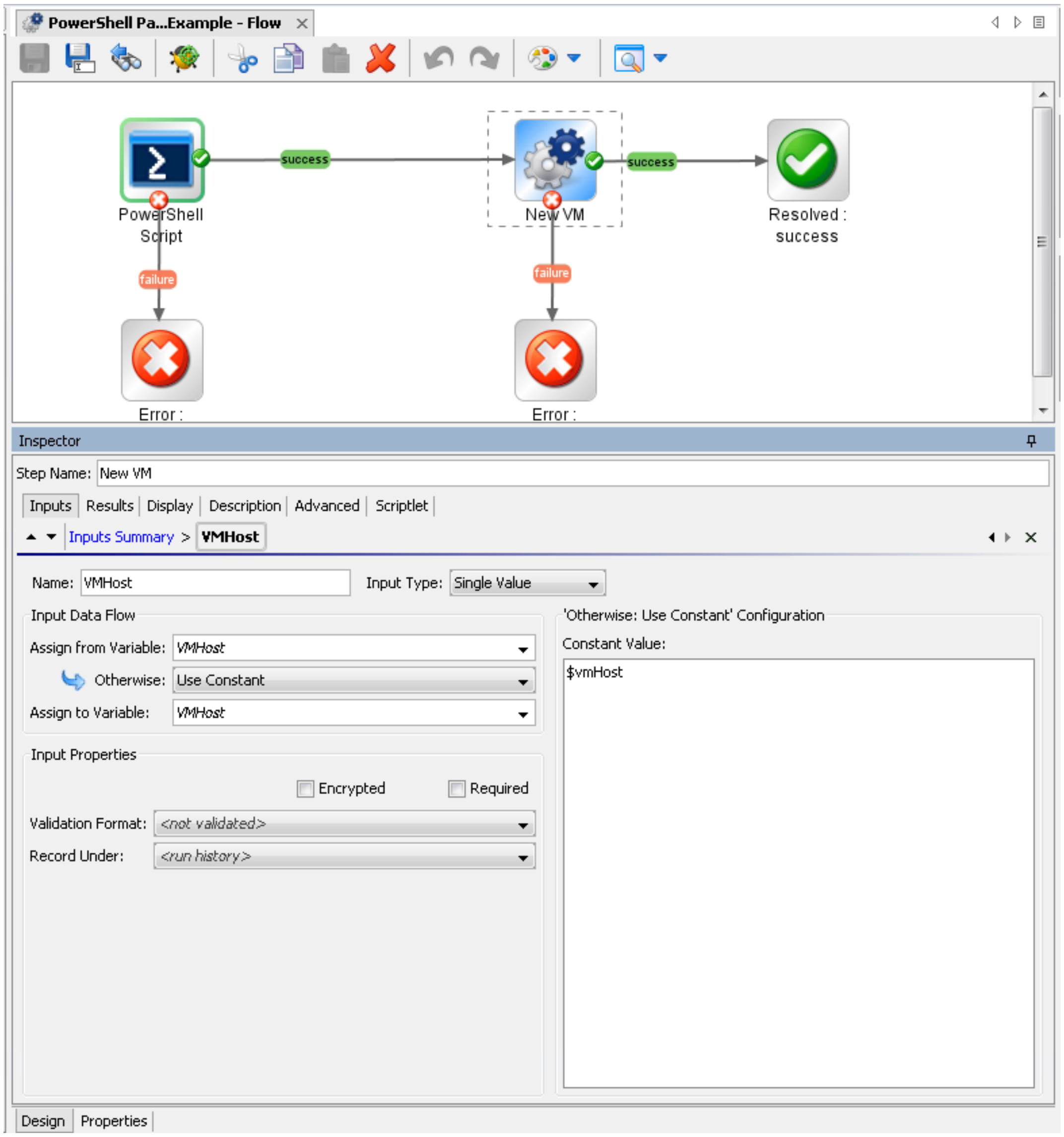
Validation Format: <not validated>
Record Under: <run history>

Constant Value:

```
Connect-VIServer -Server server -User user -Password ${password}
$vmHost = Get-VMHost vmHostName
```

Figure 26: Use a variable to save the result of the step

2 The next step is to assign the value of the VMHost input from the $vmHost variable.



Step Name: New VM

Name: VMHost

Input Type: Single Value

Assign from Variable: VMHost

Otherwise: Use Constant

Assign to Variable: VMHost

☐ Encrypted ☐ Required

Validation Format: <not validated>

Record Under: <run history>

'Otherwise: Use Constant' Configuration

Constant Value:

$vmHost

Figure 27: Assign the variable to the VMHost input of the flow

This way we managed to pass PowerShell cmdlets results between OO flows generated with the PowerShell wizard.

Note: The $var refers to PowerShell variables and ${var} refers to OO flow variables.

Solution 2: Run a PowerShell Script in the Generated Flow Context

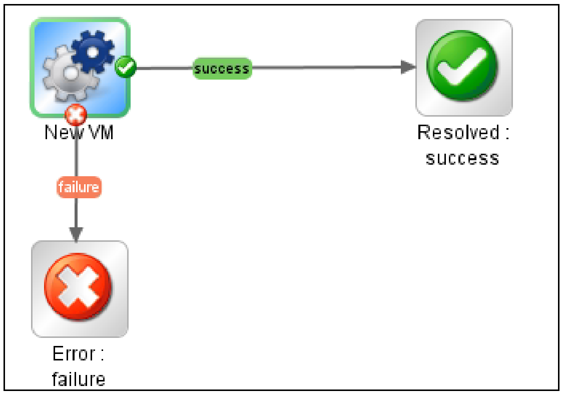


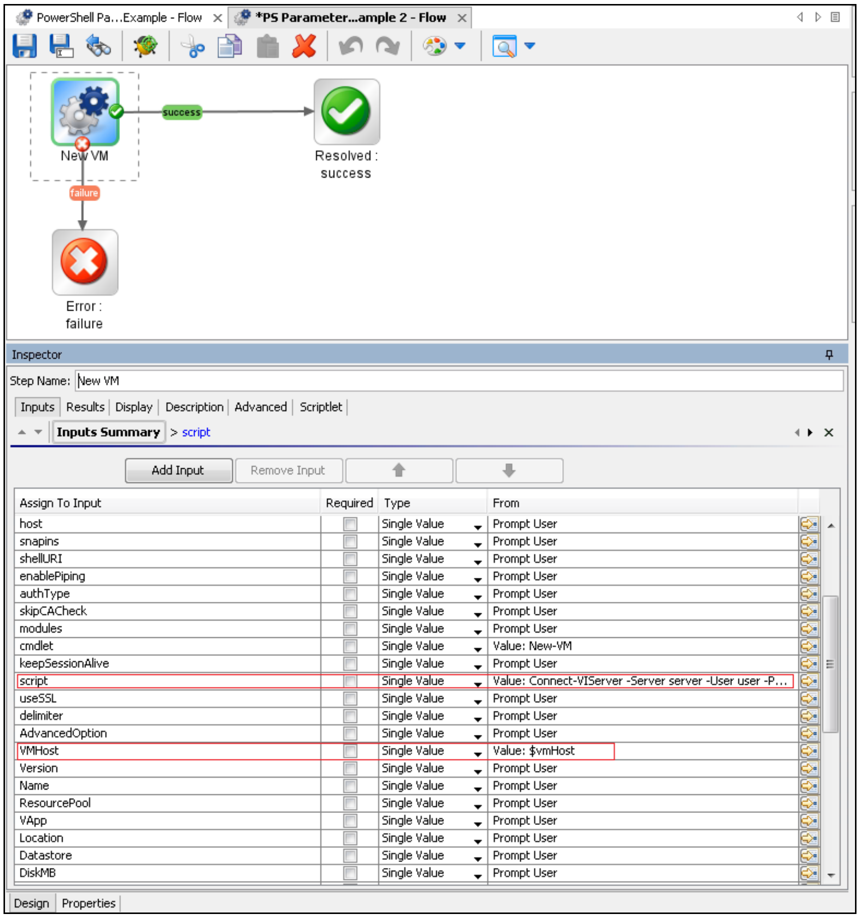
Figure 28: The NewVM Flow

The second solution is to execute the previous defined script in the context of the generated flow. The PowerShell script operation has two inputs which build the script that is going to be executed:

Script – a PowerShell script to execute on target host;

Cmdlet – the PowerShell cmdlet name. If the script input is not empty, than the PowerShell script defined by this input is going to be executed before the cmdlet. Although the script is executed in the same PowerShell runspace with no extra settings.

The solution is shown in the following flow:



Step Name: New VM

Assign To Input	Required	Type	From
host	□	Single Value	Prompt User
snapins	□	Single Value	Prompt User
shellURI	□	Single Value	Prompt User
enablePiping	□	Single Value	Prompt User
authType	□	Single Value	Prompt User
skipCACheck	□	Single Value	Prompt User
modules	□	Single Value	Prompt User
cmdlet	□	Single Value	Value: New-VM
keepSessionAlive	□	Single Value	Prompt User
script	□	Single Value	Value: Connect-VIServer -Server server -User user -P...
useSSL	□	Single Value	Prompt User
delimiter	□	Single Value	Prompt User
AdvancedOption	□	Single Value	Prompt User
VMHost	□	Single Value	Value: $vmHost
Version	□	Single Value	Prompt User
Name	□	Single Value	Prompt User
ResourcePool	□	Single Value	Prompt User
VApp	□	Single Value	Prompt User
Location	□	Single Value	Prompt User
Datastore	□	Single Value	Prompt User
DiskMB	□	Single Value	Prompt User

Figure 29: Add a script to the input of the flow

Solution 3: Use Generated Flows Only and Minimize the User Effort

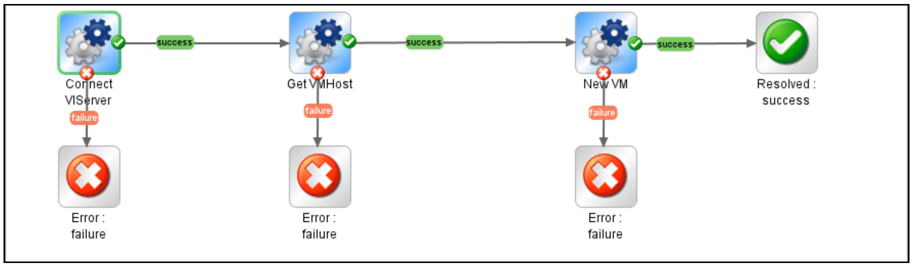


Figure 30: Using only generated flows

The result of each PowerShell cmdlet executed from a generated flow is saved in a PowerShell variable with the same name as the cmdlet, for example, for Get-VMHost the variable is $GetVMHost.

Without writing any PowerShell script, the user can execute Get VMHost generated flow and know that the result of this cmdlet is saved in the $GetVMHost variable. Pass the variable to the VMHost input of the New VM flow.

5 PowerShell Remoting

Overview

Enable PowerShell remoting, by running the following cmdlet: *Enable-PSRemoting*.

In workgroup environments, enable classic mode authentication for network logons. This can be performed by opening the "*Local Security Policy*" from Control Panel and selecting "*Administrative Tools*". Navigate to "*Local Policies*" → "*Security Options*", double-click "*Network Access: Sharing and Security Model for local accounts*" and set it to classic.

Modify the WSMan trusted hosts setting, by adding the IP addresses of all remote clients to the list of trusted hosts. This can be done using one of the following commands:

Set-item wsman:localhost\client\trustedhosts -value * (adds all computers as trusted hosts)

Set-item wsman:localhost\client\trustedhosts -value Computer (only adds Computer to the trusted hosts)

*Set-item wsman:localhost\client\trustedhosts -value *.domain.com* (adds all computers in the specified domain)

Set-item wsman:localhost\client\trustedhosts -value 10.10.10.1 (adds the remote computer with the IP address 10.10.10.1 to the trusted hosts list).

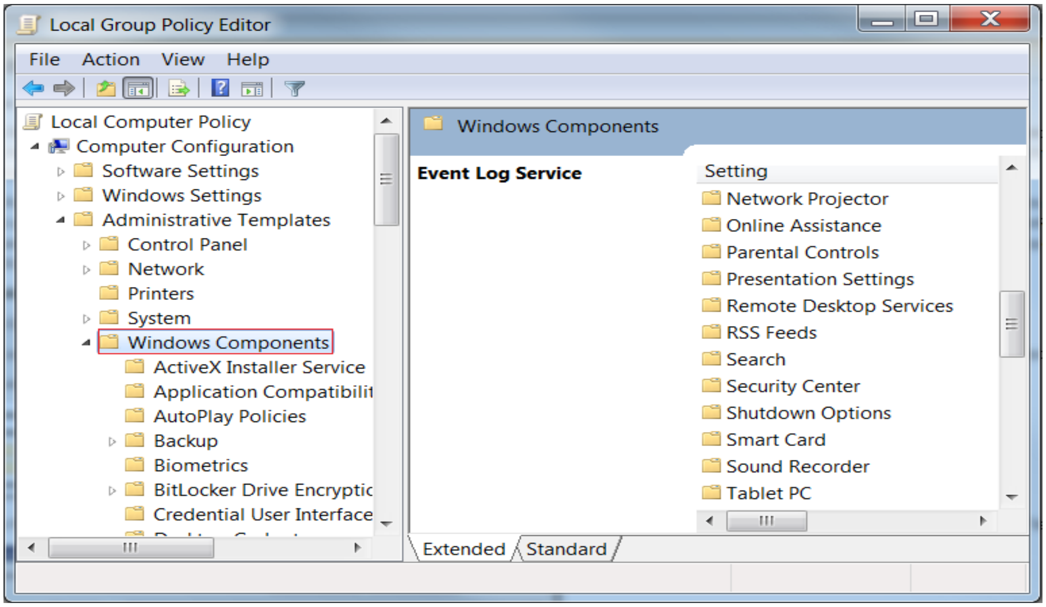
Enable Remoting Using GPO (Group Policy Objects)

While remoting can be enabled manually using Enable-PSRemoting, it is recommended to use GPO management tools whenever it is possible. Use GPO to apply policies on a single host (i.e. the target PowerShell host) or a group of servers.

Group Policy Configuration for a Single Host

To enable PowerShell remoting for a single host execute the following steps:

1. Open Group Policy Management console, for example, gpedit.msc.
2. Go to Local Computer Policy – Computer Configuration – Administrative Templates – Windows Components.



- Local Computer Policy
  - Computer Configuration
    - Software Settings
    - Windows Settings
    - Administrative Templates
      - Control Panel
      - Network
      - Printers
      - System
      - Windows Components
        - ActiveX Installer Service
        - Application Compatibilit
        - AutoPlay Policies
        - Backup
        - Biometrics
        - BitLocker Drive Encryptic
        - Credential User Interface

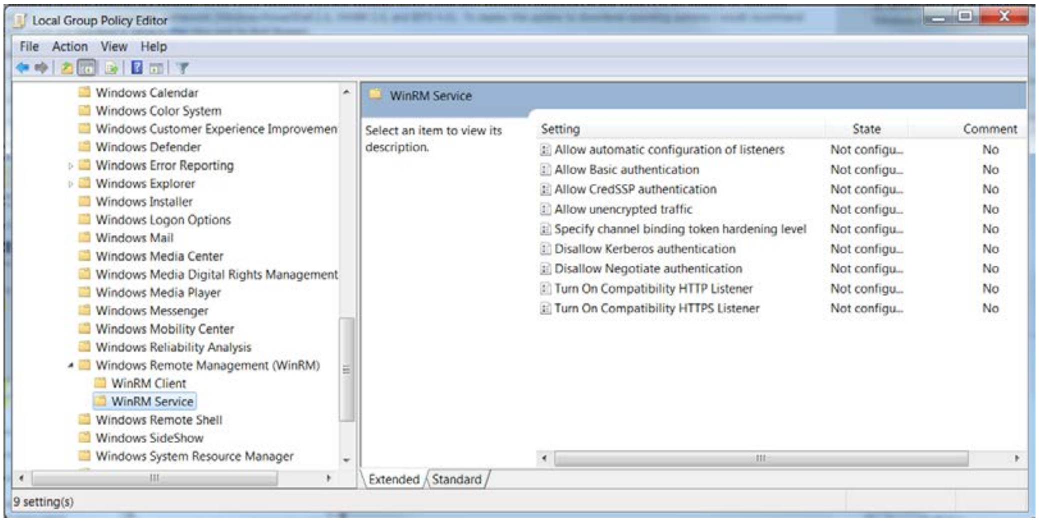
Windows Components

Event Log Service

Setting
Network Projector
Online Assistance
Parental Controls
Presentation Settings
Remote Desktop Services
RSS Feeds
Search
Security Center
Shutdown Options
Smart Card
Sound Recorder
Tablet PC

Figure 31: Group Policy Configuration : Windows components section

3. From the Windows Components listed in the right pane, we are interested in two of them. The first one is Windows Remote Management (WinRM) and the second one is Windows Remote Shell. The next step will refer to the first one, therefore browse the components and open Windows Remote Management (WinRM).



- Windows Calendar
- Windows Color System
- Windows Customer Experience Improvemen
- Windows Defender
- Windows Error Reporting
- Windows Explorer
- Windows Installer
- Windows Logon Options
- Windows Mail
- Windows Media Center
- Windows Media Digital Rights Management
- Windows Media Player
- Windows Messenger
- Windows Mobility Center
- Windows Reliability Analysis
- Windows Remote Management (WinRM)
  - WinRM Client
  - WinRM Service
- Windows Remote Shell
- Windows SideShow
- Windows System Resource Manager

WinRM Service

Select an item to view its description.

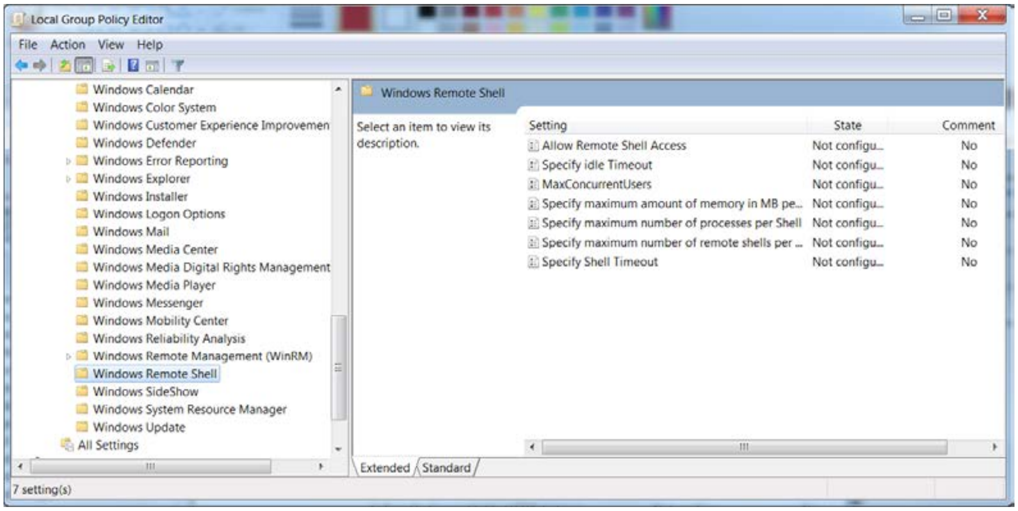
Setting	State	Comment
Allow automatic configuration of listeners	Not configu...	No
Allow Basic authentication	Not configu...	No
Allow CredSSP authentication	Not configu...	No
Allow unencrypted traffic	Not configu...	No
Specify channel binding token hardening level	Not configu...	No
Disallow Kerberos authentication	Not configu...	No
Disallow Negotiate authentication	Not configu...	No
Turn On Compatibility HTTP Listener	Not configu...	No
Turn On Compatibility HTTPS Listener	Not configu...	No

9 setting(s)

Figure 32: Group Policy Configuration : WinRM Service section

4 WinRM is the service which PowerShell uses for remote sessions. WinRM can be configured as client or service, depending on the role the host is going to have in a PowerShell connection (i.e. request access to execute scripts on other hosts or allow other hosts to execute scripts on the current host). At this point the user can enable different authentication types, specify the trusted hosts, enable HTTP or HTTPS listeners, etc.

5 There are some other default settings the user might want to change in a production environment. These settings can be found in Windows Remote Shell as shown below:



Windows Calendar
Windows Color System
Windows Customer Experience Improvemen
Windows Defender
Windows Error Reporting
Windows Explorer
Windows Installer
Windows Logon Options
Windows Mail
Windows Media Center
Windows Media Digital Rights Management
Windows Media Player
Windows Messenger
Windows Mobility Center
Windows Reliability Analysis
Windows Remote Management (WinRM)
Windows Remote Shell
Windows SideShow
Windows System Resource Manager
Windows Update
All Settings

Windows Remote Shell

Select an item to view its description.

Setting	State	Comment
Allow Remote Shell Access	Not configu...	No
Specify idle Timeout	Not configu...	No
MaxConcurrentUsers	Not configu...	No
Specify maximum amount of memory in MB pe...	Not configu...	No
Specify maximum number of processes per Shell	Not configu...	No
Specify maximum number of remote shells per ...	Not configu...	No
Specify Shell Timeout	Not configu...	No

Figure 33: Group Policy Configuration : Windows Remote Shell section

6 You can specify the maximum number of remote shells per user (default is 2) or the maximum amount of memory in MB for shell (default is 150).

7 After configuring the GPO, you might need to restart the computer in order to apply the policies or try to run the command gpupdate.

Group Policy Configuration for a Group of Servers

Sometimes the GPO policies must be applied on multiple server hosts and repeating the above steps on every server might not be the best solution. Therefore, the user can create a new GPO policy, configure it and apply it on a list of servers.

1 Go to the domain controller or on a server where gpmc.msc is available and open it.

2 Right click the Group Policy Object item as in the following picture and choose New. Fill in the name for the new GPO and select the policy to inherit from, then go to the next step.

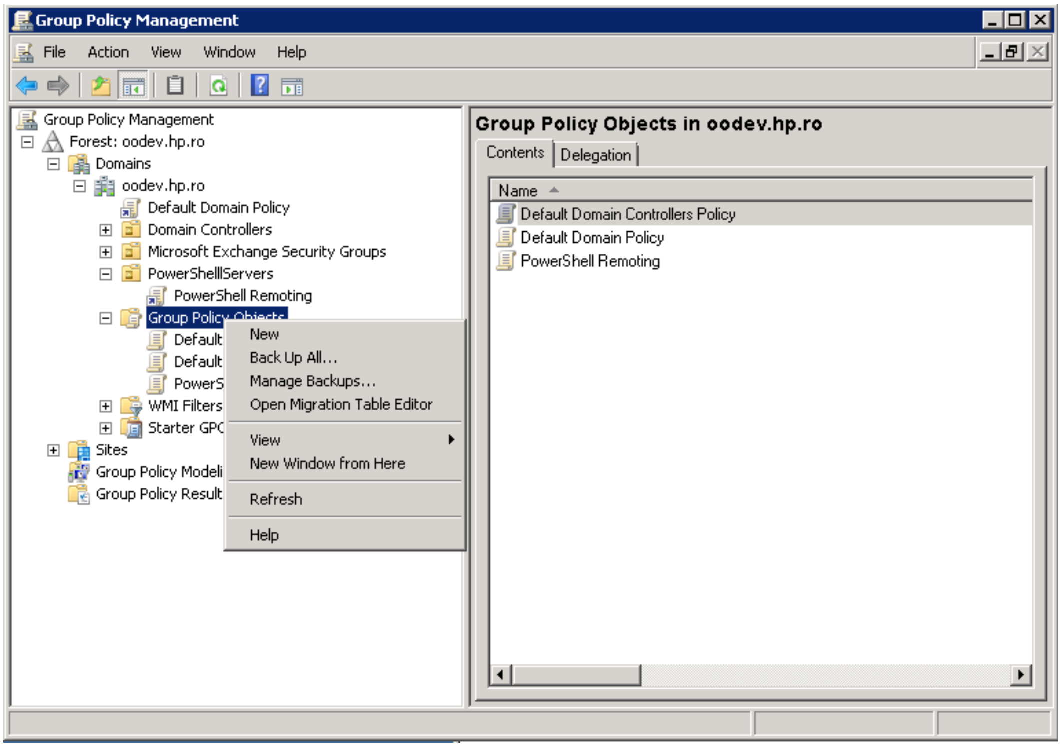
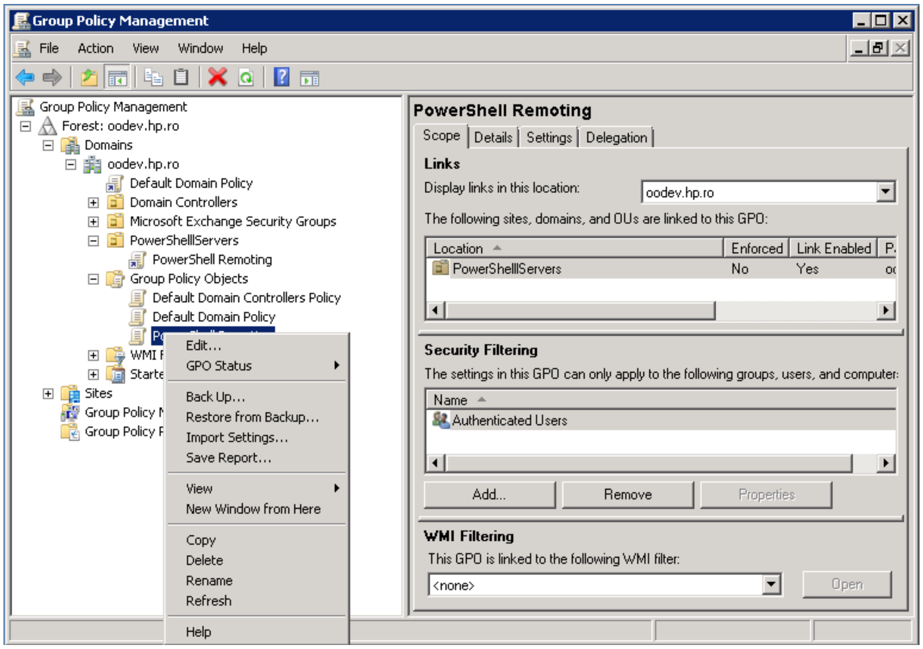


Figure 34: Using Group Policy Objects - step 1

3 Right-click the new GPO and select **Edit**.



Links

Display links in this location: oodev.hp.ro

The following sites, domains, and OUs are linked to this GPO:

Location	Enforced	Link Enabled	P.
PowerShellServers	No	Yes	o(

Security Filtering

The settings in this GPO can only apply to the following groups, users, and computer:

Name
Authenticated Users

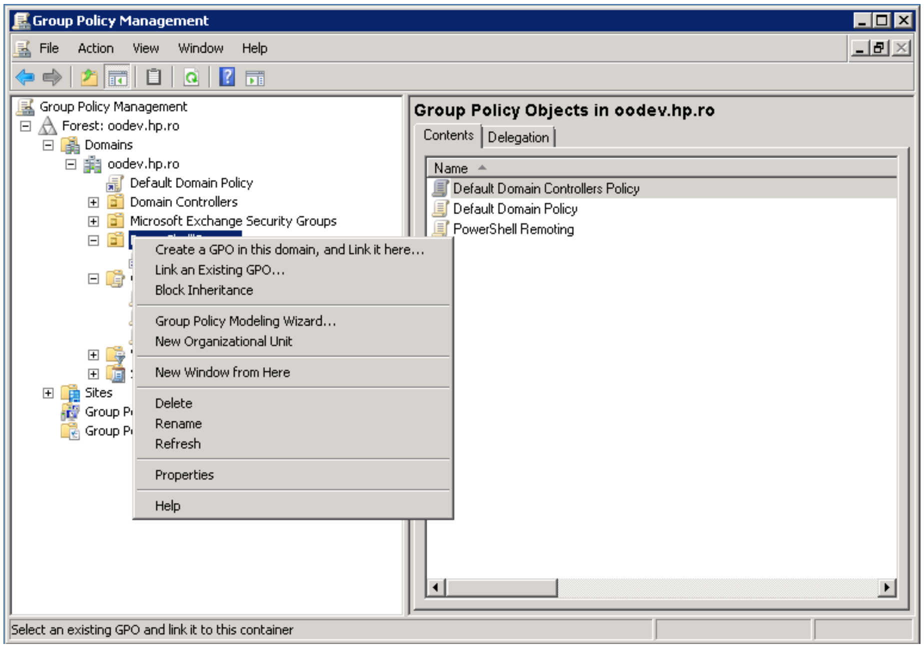
WMI Filtering

This GPO is linked to the following WMI filter: <none>

Figure 35: Using Group Policy Objects - step 2

4 Configure the GPO same way as for single hosts.

5 Now that there is a new GPO, you can apply it to a group of servers. The following example shows you how to link it on an existing OU from AD, however this can be applied to other groups either. The GPO interface displays the existing OU's from the domain controller AD. To link a GPO to an OU, go to that, right click it and select Link an Existing GPO.



Group Policy Objects in oodev.hp.ro

Name
Default Domain Controllers Policy
Default Domain Policy
PowerShell Remoting

Select an existing GPO and link it to this container

Figure 36: Using Group Policy Objects - step 3

6 The GPO settings will be applied to all servers contained in the selected OU. Although a GPO update might be required and also a reboot for the servers before the policies are actually applied.

Note: Local policies overwrite domain policies.

Enable Remoting for Non-Administrative Users

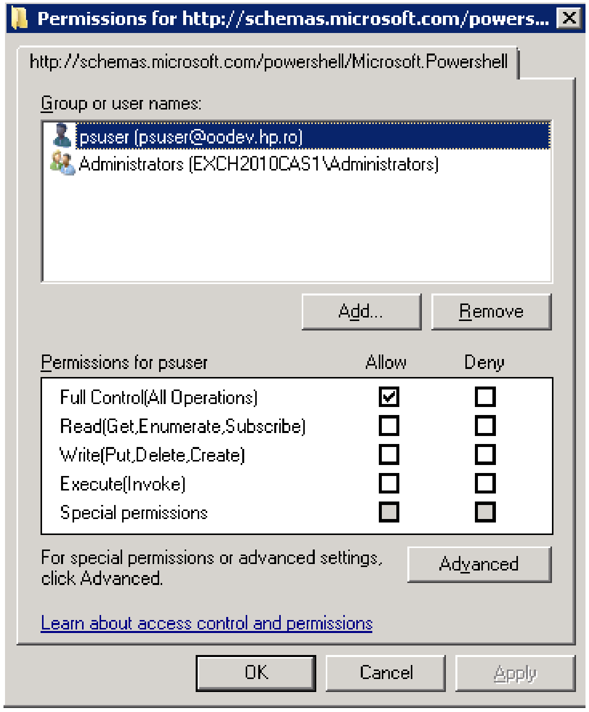
To establish a PSSession or run a command on a remote computer, the user must have permission to use the session configurations on the remote computer.

By default, only members of the Administrators group on a computer have permission to use the default session configurations. Therefore, only members of the Administrators group can connect to the computer remotely.

To allow other users to connect to the local computer, give the user Execute permissions to the default session configurations on the local computer.

The following command opens a property sheet that lets you change the security descriptor of the default Microsoft.PowerShell session configuration on the local computer.

Set-PSSessionConfiguration Microsoft.Powershell –ShowSecurityDescriptorUI



Permissions for http://schemas.microsoft.com/powers...

http://schemas.microsoft.com/powershell/Microsoft.Powershell

Group or user names:

- psuser (psuser@oodev.hp.ro)
- Administrators (EXCH2010CAS1\Administrators)

Permissions for psuser	Allow	Deny
Full Control(All Operations)	☑	□
Read(Get,Enumerate,Subscribe)	□	□
Write(Put,Delete,Create)	□	□
Execute(Invoke)	□	□
Special permissions	□	□

For special permissions or advanced settings, click Advanced.

Figure 37: Adding a user to the PowerShell session configuration

Authentication Types

Basic

Client side steps

- Allow unencrypted communication for the client, by running the following PowerShell command: set-item wsman:\localhost\client\AllowUnencrypted -value true
- Enable Basic authentication for the client, by running the following PowerShell command: set-item wsman:\localhost\client\auth\Basic -value true

Server side steps

- Turn off encryption for the WinRM service, by running the following PowerShell command: set-item wsman:\localhost\service\AllowUnencrypted -value true
- Enable Basic authentication for the service, by running the following PowerShell command: set-item wsman:\localhost\service\auth\Basic -value true

Notes

- The client and server can be in different domains.
- When using Basic authentication, a local user account must be provided for authentication on the remote host.
- Basic can be used when the destination is an IP address.
- Basic can be used when the destination is one of the following: localhost, 127.0.0.1, [::1].
- The cluster name, as well as the hostnames of the cluster nodes can be used for the destination host.

CredSSP

Client side steps

- Enable CredSSP authentication for the client, by running the command: Enable-WSManCredSSP -Role Client -DelegateComputer WSMAN/*.
- Allow delegating fresh credentials by performing the following steps. Open gpedit.msc and go to Computer Configuration → Administrative Templates → System → Credentials Delegation. Enable "Allow Delegating Fresh Credentials" and add the wsman hosts to the server list. Run gpupdate /force from command line to force policy update.

Server side steps

- Enable CredSSP authentication, by running the following PowerShell command: Enable-WSManCredSSP -Role Server
- Create a new https listener by using the following commad: winrm create winrm/config_/Listener?Address=*+Transport=HTTPS_.

Domain Controller side steps

- If the NETWORK SERVICE doesn't have "Validated write to service principal name", either try running the following command: dsacls "CN=AdminSDHolder,CN=System,DC=domain,DC=com" /G "Sn-1-5-20:WS;Validated write to service principal name" or open ADUC, go to Computers → DC object → Security, select Network Service and give it "Validated write to SPN".

Default

When Default authentication is used, the following situations can occur:

- Kerberos is the method of authentication used if the client is in the same domain as the destination host, and the value specified for that host is not one of the following: localhost, 127.0.0.1, [::1].
- Negotiate is the method of authentication used if the client is not in the same domain as the destination host, or the value specified for that host is one of the following: localhost, 127.0.0.1, [::1].

Digest

- Digest authentication is not supported for remote connections. It cannot be configured for the WinRM server component.

Kerberos

Client side steps

- Enable Kerberos authentication for the client, by running the following PowerShell command: set-item wsman:\localhost\client\auth\Kerberos -value true

Server side steps

- Enable Kerberos authentication for the service, by running the following PowerShell command: set-item wsman:\localhost\service\auth\Kerberos -value true

Notes:

- The client and server must be in the same domain.
- Either a local or a domain user account can be provided for authentication on the server host.
- Kerberos cannot be used when the destination is an IP address.
- Kerberos cannot be used when the destination is one of the following: localhost, 127.0.0.1, [::1].
- The cluster name cannot be used to specify the host. Only the hostnames of the cluster nodes can be used for the destination host.

Negotiate

Client side steps

- Enable Negotiate authentication for the client, by running the following PowerShell command: set-item wsman:\localhost\client\auth\Negotiate -value true

Server side steps

- Enable Negotiate authentication for the service, by running the following PowerShell command: set-item wsman:\localhost\service\auth\Negotiate -value true

Notes

- The client and server can be in different domains.
- Either a local or a domain user account can be provided for authentication on the server host. Local accounts can only be provided when connecting to the localhost.
- Negotiate can be used when the destination is an IP address.
- Negotiate can be used when the destination is one of the following: localhost, 127.0.0.1, [::1].
- The cluster name, as well as the hostnames of the cluster nodes can be used for the destination host.

NegotiateWithImplicitCredential

Notes

- When using NegotiateWithImplicitCredentials, no credentials should be provided. The current logged-on user account will be used for authentication. This can either be a local or a domain user account.
- NegotiateWithImplicitCredential can only be used when the destination is one of the following: localhost, 127.0.0.1, [::1].

6 Troubleshooting

This section provides troubleshooting procedures that you can use to solve problems you may encounter while using the wizard. It also includes an error message you may receive while using the integration and offers descriptions and possible fixes for the error.

Could not connect to the host

The possible reasons are:

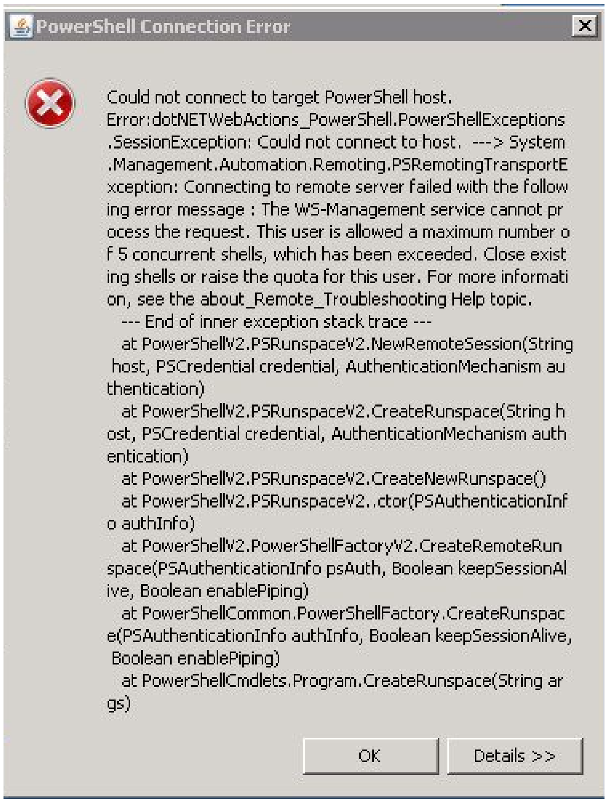
- The user credentials are not correct.
- The user does not have permission to execute PowerShell scripts on the target host. Make sure the user has admin rights or refer to the section *Enable Remoting for Non-Administrative Users*.
- Authentication problems (most common). Refer to *Running a PowerShell Script on a Remote Host.*
- The WinRM service is stopped on the target host.
- WinRM default ports (5985 and 5986) were changed. You need to provide the correct port in the connection page of the wizard.

The wizard fails to load modules on a x64 localhost.

Some modules cannot be loaded using the wizard, but they are loaded from the PowerShell console. By default, the wizard runs in a x32 process (depends on the OO jre) which ends up calling x32 PowerShell. The x32 version of PowerShell cannot load some modules (e.g. FailoverClusters) therefore the wizard fails. In order to fix this, do not leave the host input empty. Instead, you need to provide the "localhost". This way, the wizard will try to authenticate the localhost like any other remote host. Note that remoting rules should be satisfied for localhost in this case. If user is left empty, the wizard will connect using the NegotiateWithImplicitCredential. Otherwise, you need to provide user credentials and authentication type as for any other remote host.

The user has exceeded the maximum allowed number of remote shells

The user has exceeded the maximum allowed number of remote shells. This error would probably occur if the user stresses the wizard with too many “back and next” actions without running the wizard from start to end. Refer to Group Policy Configuration sections in order to increase the allowed number of remote shells per user.



```
Could not connect to target PowerShell host.
Error:dotNETWebActions_PowerShell.PowerShellExceptions
.SessionException: Could not connect to host.  ---> System
.Management.Automation.Remoting.PSRemotingTransportE
xception: Connecting to remote server failed with the follow
ing error message : The WS-Management service cannot pr
ocess the request. This user is allowed a maximum number o
f 5 concurrent shells, which has been exceeded. Close exist
ing shells or raise the quota for this user. For more informati
on, see the about_Remote_Troubleshooting Help topic.
   --- End of inner exception stack trace ---
   at PowerShellV2.PSRunspaceV2.NewRemoteSession(String
 host, PSCredential credential, AuthenticationMechanism au
thentication)
   at PowerShellV2.PSRunspaceV2.CreateRunspace(String h
ost, PSCredential credential, AuthenticationMechanism auth
entication)
   at PowerShellV2.PSRunspaceV2.CreateNewRunspace()
   at PowerShellV2.PSRunspaceV2..ctor(PSAuthenticationInf
o authInfo)
   at PowerShellV2.PowerShellFactoryV2.CreateRemoteRun
space(PSAuthenticationInfo psAuth, Boolean keepSessionAl
ive, Boolean enablePiping)
   at PowerShellCommon.PowerShellFactory.CreateRunspac
e(PSAuthenticationInfo authInfo, Boolean keepSessionAlive,
 Boolean enablePiping)
   at PowerShellCmdlets.Program.CreateRunspace(String ar
gs)
```

Figure 38: Connection Error - number of remote shells has been exceeded