Technical Report

Manage and Automate a Windows File Services Environment with NetApp PowerShell Toolkit

Best Practices Guide

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Abstract

This technical report provides insight into automating the Windows File Services environment by using the NetApp® PowerShell Toolkit. It discusses the provisioning, modifying, monitoring, and cleaning of the CIFS environment, native auditing, the antivirus environment, and the NetApp FPolicy® component. It also discusses how to manage day-to-day CIFS tasks.

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1 Overview

Microsoft is moving toward a more command-line-based interface to manage Windows servers. This trend started with the Server Core option of Windows Server and is accelerating with the Windows Nano Server. The CLI-first approach does not preclude a user from managing an environment through a GUI; however, the GUI often lacks all the options, flexibility, and power that are offered in the CLI environment. With this limitation in mind, NetApp PowerShell Toolkit (PSTK) was created. PSTK exposes all the functions and features of the NetApp controllers by using the NetApp Manageability SDK open interface, including those features that are not available in our GUI management systems. Windows File Services can be automated and managed by using NetApp PSTK.

1.1 Purpose and Scope

This document provides a brief overview of automating a Windows File Services environment by using the NetApp PowerShell Toolkit. It discusses the provisioning, modifying, monitoring, and cleaning of the CIFS environment, native auditing, the antivirus environment, and the FPolicy component. It also discusses how to manage day-to-day CIFS tasks.

1.2 Intended Audience

This document is intended for system and storage administrators who want to manage and automate the Windows File Services environment with Windows PowerShell. Experts in PowerShell will find that all the NetApp PSTK commands are self-documented, cross-referenced, and object-based. Therefore, PowerShell experts will immediately be able to produce powerful and robust scripts. This document, however, is for those administrators who are less familiar with PowerShell and its advantages when used to manage an infrastructure.

It assumes that the reader:

- Has a general knowledge about NetApp hardware and software solutions. For details, review the System Administration Guide for Cluster Administrators.
- Has a general knowledge about the file-access protocols SMB and CIFS. For CIFS- and SMB-related information, review the Best Practices Guide for Windows File Services and the CIFS/SMB Configuration Express Guide.
- Has a general knowledge about Windows PowerShell.

2 PowerShell and NetApp PowerShell Toolkit ONTAP Module

2.1 Windows PowerShell Overview

Windows PowerShell is a task automation and configuration management framework from Microsoft. It consists of a command-line shell and a scripting language that are built on the .NET framework. PowerShell enables administrators to perform administrative tasks and to automate tasks on both local and remote Windows systems. Following are definitions of a few PowerShell components:

- **Cmdlet.** A specialized .NET class that implements a particular operation.
- **Script.** A plain text file with a `.ps1` file extension that contains one or more PowerShell cmdlets.
- **Function.** A named block of code that can be called once or multiple times anywhere from within a script.
- **Advanced function.** A function written in script that performs operations similar to the way that cmdlets do.
- **Module.** A package that contains Windows PowerShell commands such as cmdlets, providers, functions, workflows, variables, and aliases.

- **Object.** A collection of data that represents an item (its type, methods, and properties). All actions in PowerShell occur within the context of objects.

Table 1 summarizes the various PowerShell versions.

Table 1) Versions of PowerShell.

Version	Release Date	Default Windows Version	Available Windows Version	.NET Framework
PowerShell 1.0	2006	Windows Server 2003	N/A	N/A
PowerShell 2.0	2009	Windows 7, Windows Server 2008 R2	Windows XP SP3; Windows Server 2003 SP2; Windows Vista SP1, Vista SP2; Windows Server 2008 SP1, 2008 SP2	3.5+
PowerShell 3.0	2012	Windows 8, Windows Server 2012	Windows 7 SP1; Windows Server 2008 SP2, 2008 R2 SP1	4.0+
PowerShell 4.0	2013	Windows 8.1, Windows Server 2012 R2	Windows 7 SP1, Windows Server 2008 R2 SP1, Windows Server 2012	4.5+
PowerShell 5.0	2014	Windows 10	Windows 7 SP1, Windows 8.1, Windows Server 2012 R2	4.6+
PowerShell 5.1	2016	Windows Server 2016	Windows 7; Windows 8.1; Windows Server 2008 R2, 2012, and 2012 R2	4.6+

2.2 NetApp PowerShell Toolkit Overview

NetApp PowerShell Toolkit (PSTK) is a PowerShell module that provides end-to-end automation and enables storage administration of NetApp storage controllers. PSTK is a unified package that contains the PowerShell modules for NetApp ONTAP® and SANtricity® software. The ONTAP module contains over 2,000 cmdlets and helps administer NetApp FAS, NetApp All Flash FAS, commodity hardware, and the cloud. The SANtricity module contains over 250 cmdlets and helps administer the NetApp E-Series and EF-Series all-flash arrays.

The toolkit also contains several cmdlets that are aimed at storage administration on the Windows host. These operations include creating virtual disks, resizing virtual disks, reclaiming space in virtual disks, copying files, deleting files, reclaiming space on host volumes, and much more.

Further Reading

- For more information about the NetApp PowerShell Toolkit, visit the NetApp Support site and see Getting Started with PSTK and Making the Most of PSTK.
- For the first-steps guide about NetApp PowerShell Toolkit, see the ONTAP PowerShell Toolkit Primer.
- For information about NetApp PowerShell Toolkit best practices, see TR-4475: NetApp PowerShell Toolkit Best Practices Guide.

- For support on NetApp PowerShell Toolkit, visit ONTAP Community Discussions and SANtricity Community Discussions.

System Requirements

Following are requirements for the NetApp PowerShell Toolkit:

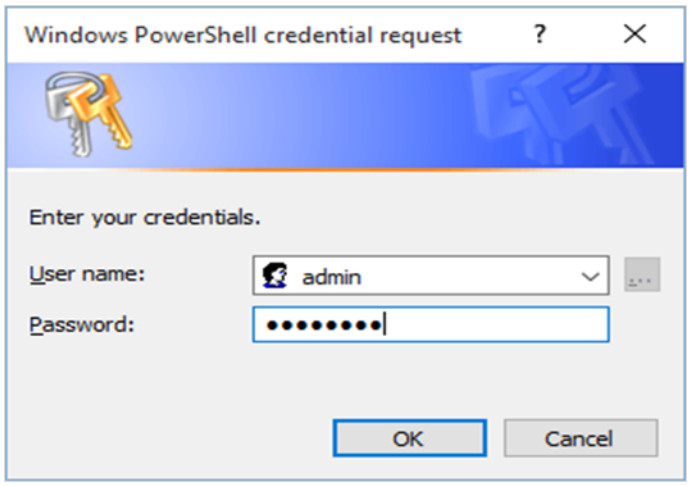
- Microsoft Windows 7 or later
- Windows Server 2008 or later
- Microsoft Windows PowerShell v3.0 or later
- Microsoft .NET Framework v4.5.2 or later
- NetApp ONTAP 7.3.x or later

2.3 Getting Started

1. Download the NetApp PowerShell Toolkit `.msi` installer from the NetApp Support site.
2. Install the NetApp PowerShell Toolkit (make sure that Data ONTAP PowerShell Toolkit is selected for installation under Advanced Setup).
3. Open the PowerShell Console and import the ONTAP module by running the following cmdlet:

```
# Import the ONTAP module
Import-Module -Name DataONTAP

# Change the execution policy to trust the scripts to be run
Set-ExecutionPolicy -ExecutionPolicy RemoteSigned

# Verify the execution policy
Get-ExecutionPolicy

# Connect to a NetApp Controller
Connect-NcController -Name <name or IP address of controller> -Credential (Get-Credential)
```

4. The following window prompts you to enter the credentials for the controller. Enter the credentials to connect the controller.



If you want to avoid the prompt for credentials, use `credential object` as follows:

```
# Controller info
$name = <name or IP address of controller>
$username = <user name of controller>
$password = <password for controller>

# Create controller credential object
$credpassword = ConvertTo-SecureString -AsPlainText -Force $password
$credential = new-object management.automation.pscredential $username, $credpassword

# Connect to a NetApp Controller
Connect-NcController -Name $name -Credential $credential
```

Note: The cmdlet `Connect-NcController` is to connect to an ONTAP controller (previously a NetApp clustered Data ONTAP® controller). To connect to a Data ONTAP operating in 7-Mode controller, use `Connect-NaController`. The prefix `Nc` is for an ONTAP controller, and the prefix `Na` is for a 7-Mode controller. All cmdlets follow this prefix rule.

2.4 Help System

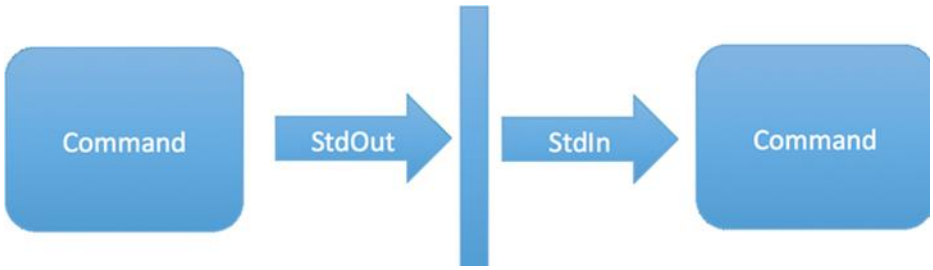
The PowerShell Toolkit ONTAP module includes extensive, console-based help with elaborate descriptions and examples. For help, use the following cmdlets:

```
# View the full HTML Help
Show-NcHelp

# view all the available PSTK cmdlets
Get-NcHelp

# view all the available PSTK cmdlets
Get-NcCommand

# view the available categories in PSTK
Get-NcHelp -CategoryList

# view all the cmdlets of a particular category
Get-NcCommand -Category <category>

# view help for a particular cmdlet
Get-Help <cmdlet_name>

# view full help for a particular cmdlet
Get-Help <cmdlet_name> -full

# view example for a particular cmdlet
Get-Help <cmdlet_name> -examples

# Pops up a window with the help information (PS v3.0+)
Get-Help <cmdlet_name> -ShowWindow

# get the members (properties and methods) of the objects returned by a cmdlet
<cmdlet_name> | Get-Member
```

2.5 PowerShell Pipeline

A *pipeline* is a series of commands that are connected by the pipeline operator `|`. Each pipeline operator sends the results of the preceding command to the next command (Figure 1).

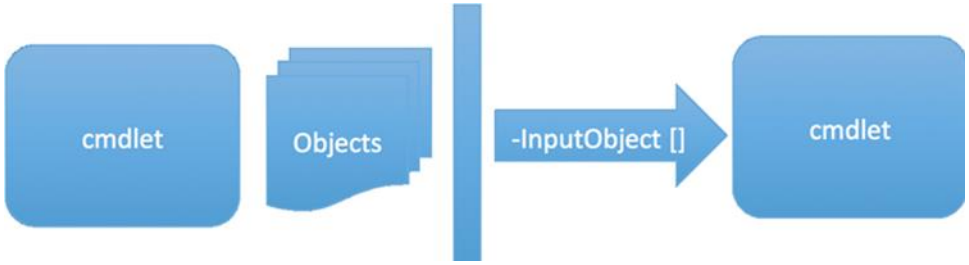
Figure 1) PowerShell pipeline.



In PowerShell, a cmdlet can receive objects from the pipeline in two ways:

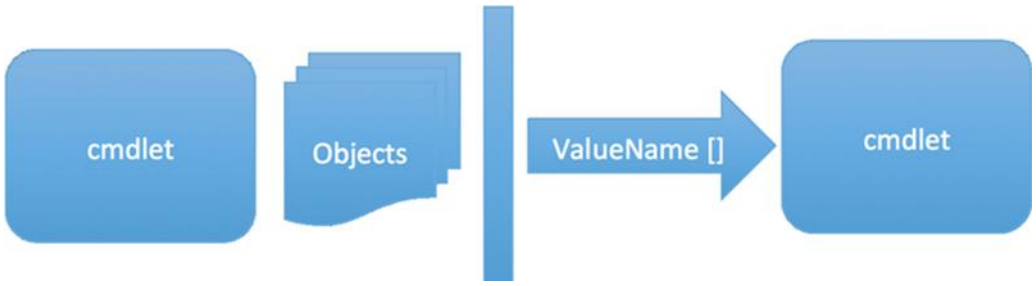
- **By value.** The output of a cmdlet must be the same type as the `-InputObject` parameter of the other cmdlet, as shown in Figure 2.

Figure 2) PowerShell pipeline by value.



- **By property name.** When the object has a property that matches the name of a parameter in the other cmdlet, as shown in Figure 3.

Figure 3) PowerShell pipeline by property name.



To determine the parameters that accept pipeline input, use `Get-Help`.

```
-InputObject <ServiceController[]>
     Specifies ServiceController objects representing the services to be retrieved.
Enter a variable that contains the objects, or type a command or expression that gets
the objects. You can also pipe a service object to Get-Service.

     Required?                    false
     Position?                    named
     Default value
     Accept pipeline input?       true (ByValue)
     Accept wildcard characters?  False

 -Name <String[]>
     Specifies the service names of services to be retrieved. Wildcards are permitted.
By default, Get-Service gets all of the services on the computer.

     Required?                    false
     Position?                    1
     Default value                All services
     Accept pipeline input?       true (ByPropertyName, ByValue)
     Accept wildcard characters?  true
```

Examples

```
# Basic Pipeline example
Get-NcVol -Name <volume name> | Set-NcVol -Offline

# The objects returned from the Get-NcVol cmdlet include a 'Name' property
# The Set-NcVol cmdlet accepts pipeline input via the 'Name' property (ByPropertyName)
```

```
# Basic Filtering example (Filtering based on search criteria)
Get-NcVol | Where-Object { $_.State -eq 'Offline' } | Set-NcVol -Online

# Where-Object filters objects passed down the pipeline based on the search criteria you specify

# Basic Filtering example (Filtering based on property)
Get-NcVol | Select-Object -Property Name, TotalSize

# Select-Object allows you to filter the results based on property names, number of objects, or
other criteria
```

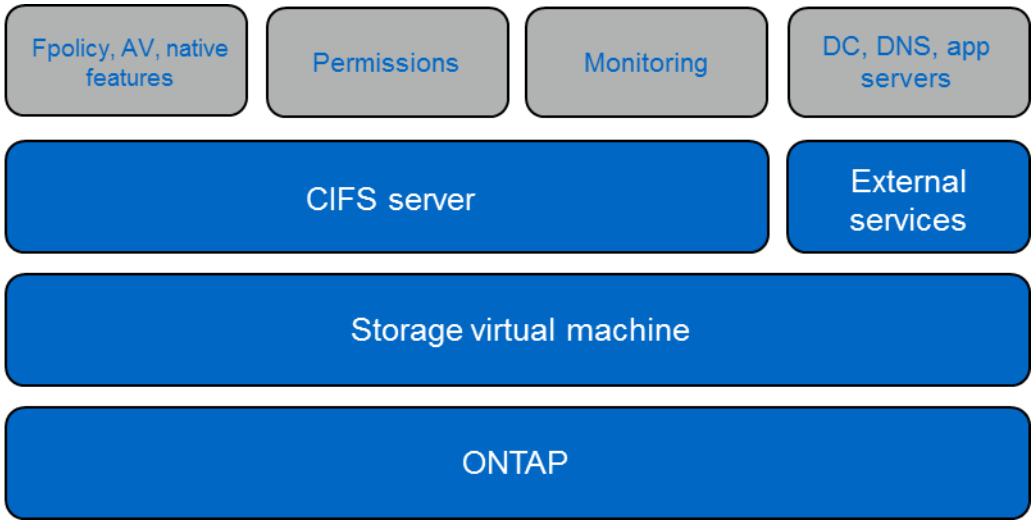
3 Components of Windows File Services

Figure 4 shows the components of Windows File Services. A CIFS server must be configured over a NetApp ONTAP storage virtual machine (SVM) over which SMB shares are configured so that SMB clients can access files. After the CIFS server has been set up, several management tasks can be performed, such as:

- Configuring CIFS options
- Managing CIFS server security settings
- Configuring SMB protocol and SMB signing
- Managing CIFS oplocks
- Configuring IPv6 CIFS access
- Applying Group Policy Objects (GPOs) to CIFS servers
- Managing domain controller connections
- Managing CIFS server service

- Managing the `Home` directory
- Managing NetApp FPolicy policies
- Managing antivirus (AV)
- Managing native auditing

Figure 4) Components of Windows File Services.



4 Managing the CIFS Environment

This section provides information about CIFS server prerequisites and the cmdlets that are used for those prerequisites, and it gives examples of the cmdlets.

4.1 CIFS Server Prerequisites

Figure 5 shows the prerequisites for deploying a CIFS server.

Table 2 shows the cmdlets that are used to meet the prerequisites. CIFS licensing, time services, and networking prerequisites must be met before configuring the CIFS server.

Figure 5) CIFS server prerequisites.

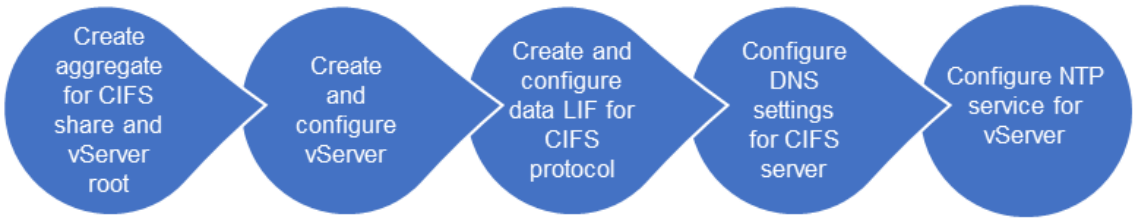


Table 2) Cmdlets for CIFS server prerequisites.

Description	Cmdlet
Create a new aggregate	`New-NcAggr`
Create a new SVM (called `Vserver` in the CLI)	`New-NcVserver`
Configure network settings: Create a new subnet	`New-NcNetSubnet`
Configure network settings: Create a new LIF	`New-NcNetInterface`
Configure DNS settings: Configure a DNS	`New-NcNetDns`
Configure DNS settings: Enable DDNS	`Set-NcNetDdns`
Configure the NTP service	`New-NcNtpServer`

```
#-------------------------------------------------------------------------------
# User Inputs
# The below script uses example inputs. Please change it according to your needs

# Aggregate info
$aggr_name = "aggr_cifs"
$aggr_diskcount = 5

# VServer info
$vserver_name = "vserver_cifs"
$rootvolume_name = $vservername+"_root"

# Network info
$subnet_name = "cifs_subnet_231"
$lif1_name = "cifs_lif1"

# Domain info
$domain = "netapp.local"

# NTP info
$ntp_server_ip = "10.195.49.25"
#-------------------------------------------------------------------------------

# Get the nodes in the cluster
$cluster_nodes = (Get-NcNode).Node

# Get the data ports in cluster
$data_ports = Get-NcNetPort | where {$_.Role -eq 'data' -and $_.LinkStatus -eq 'up'}

#-------------------------------------------------------------------------------
# Create a new Aggregate
New-NcAggr -Name $aggr_name -Node $cluster_nodes[1] -DiskCount $aggr_diskcount

#-------------------------------------------------------------------------------
# Create a new VServer
New-NcVserver -Name $vserver_name -RootVolumeAggregate $aggr_name -RootVolume $rootvolume_name -
RootVolumeSecurityStyle NTFS
# Possible values for RootVolumeSecurityStyle: 'unix', 'ntfs', 'mixed'

#-------------------------------------------------------------------------------
# Network Configuration
        # Create new subnet
New-NcNetSubnet -Name $subnet_name -BroadcastDomain Default -Subnet 10.238.231.0/22 -Ipspace
Default -Gateway 10.238.231.1 -IpRange 10.238.231.20-10.238.231.100 -ForceUpdateLifAssociations
# Above cmdlet uses example subnet, ip address, gateway and ip range
# Please change it according to your needs

        # Create a new LIF
```

```
        New-NcNetInterface -Name $lif1_name -Vserver $vserver_name -Role data -Node
$cluster_nodes[0] -Port $data_ports[0].Port -DataProtocols cifs -FirewallPolicy data -Subnet
$subnet_name
# Providing subnet will take IP address automatically
# To manually specify the IP, use -Address and -NetMask argument
# Possible values for FirewallPolicy: 'mgmt', 'data', cluster', 'intercluster'

#-------------------------------------------------------------------------------------
# DNS Configuration
        # Configure DNS settings for VServer
    New-NcNetDns -Domains $domain -NameServers 10.238.231.199 -VserverContext $vserver_name
        # Above cmdlet uses example NameServer IP Address
# Please change it according to your needs

        # Enable DDNS for VServer
Set-NcNetDdns -VserverContext $vserver_name -DomainName $domain -Enable $true

#-------------------------------------------------------------------------------------
# NTP Server Configuration
New-NcNtpServer -ServerName $ntp_server_ip -IsPreferred

#-------------------------------------------------------------------------------------
```

4.2 Provisioning the CIFS Environment

This section provides detailed information about the cmdlets that are used to provision the CIFS environment. Figure 6 outlines the process, and Table 3 presents the provisioning cmdlets.

Figure 6) Provisioning the CIFS environment.

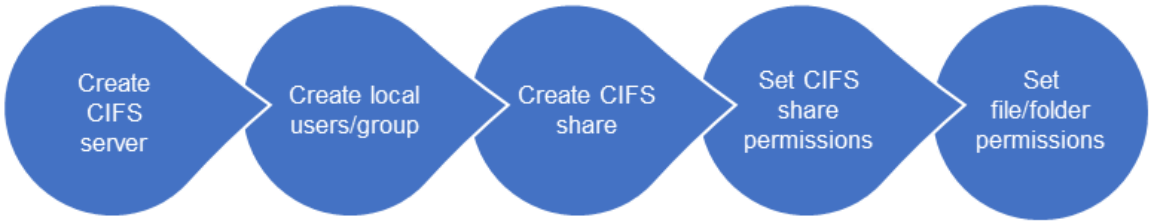


Table 3) Cmdlets for CIFS server provisioning.

Type	Description	Cmdlet
CIFS server	Create a new CIFS server	`Add NcCifsServer`
CIFS local users and groups	Create a new CIFS local user	`New-NcCifsLocalUser`
CIFS local users and groups	Create a new CIFS local group	`New-NcCifsLocalGroup`
CIFS local users and groups	Add a CIFS local user to a CIFS local group	`Add-NcCifsLocalGroupMember`
CIFS share and permissions	Create a new CIFS share	`Add-NcCifsShare`
CIFS share and permissions	Set CIFS share permissions	`Add-NcCifsShareAcl`
File/folder permissions	Create a new NTSF security descriptor	`New-NcFileDirectorySecurityNtfs`
File/folder permissions	Add a discretionary access control list (ACL) to an NTFS security descriptor	`Add-NcFileDirectorySecurityNtfsDacl`

Type	Description	Cmdlet
File/folder permissions	Add a system/audit ACL to an NTFS security descriptor	Add-NcFileDirectorySecurityNtfsSacl
File/folder permissions	Create a new file-directory security policy	New-NcFileDirectorySecurityPolicy
File/folder permissions	Attach a file-directory security policy task to a path	Add-NcFileDirectorySecurityPolicyTask
Domain activities	Add a trusted domain	Add-NcCifsTrustedDomain
Domain activities	Configure the preferred domain controllers	Add-NcCifsPreferredDomainController
Home directory	Add a CIFS home directory search path	Add-NcCifsHomeDirectorySearchPath
Shadow copy	Add files to a shadow copy in a share	Add-NcCifsShadowCopyFile

```
#-------------------------------------------------------------------------------
# User Inputs
# The below script uses example inputs. Please change it according to your needs

# CIFS info
$cifsserver_name = "cifs_server"
$vol_name = "cifs_vol"
$qtree_name = "cifs_qtree"
$vol_share_name = "cifs_share_vol"
$qtree_share_name = "cifs_share_qtree"

# Domain info
$domain = "netapp.local"
$domain_username = "Administrator"
$domain_password = "password"

# VServer info
$vserver_name = "vserver_cifs"

# CIFS Local Users and Group info
$localgroup_name = "cifs_localgroup"
$localuser_name = "cifs_localuser"
$localuser_password = "password"

# File/Folder Permissions
$ntfs_sec_desc_id = "ntfssd"
$policy_name = "policy1"

# Home Directory info
$homedir_volume_name = "home_vol"
$homeshare_name = "home"

#-------------------------------------------------------------------------------
# Create a Secure String password for local user
$secure_localuser_password = ConvertTo-SecureString -AsPlainText -Force $localuser_password

#-------------------------------------------------------------------------------
# List all cmdlets available for CIFS
Get-NcHelp | where {$_.Category -eq 'cifs'}

#-------------------------------------------------------------------------------
# Create a new CIFS server
Add-NcCifsServer -Name $cifsserver_name -Domain $domain -OrganizationalUnit CN=Computers -
AdminUsername $domain_username -AdminPassword $domain_password -VserverContext $vserver_name
```

```
#-------------------------------------------------------------------------------
# CIFS Local Users and Groups
        # Create a CIFS new Local User
New-NcCifsLocalUser -UserName $localuser_name -Password $secure_localuser_password -FullName
"$localuser_name $localuser_name" -Description "new cifs local user" -VserverContext
$vserver_name
# Above cmdlet uses example Name, FullName and Description
# Please change it according to your needs

# Create a new CIFS Local Group
New-NcCifsLocalGroup -Name $localgroup_name -Description "local group for cifs" -VserverContext
$vserver_name
# Above cmdlet uses example GroupName and Description
# Please change it according to your needs

# Add a CIFS Local user to CIFS local group
Add-NcCifsLocalGroupMember -Name $localgroup_name -Member $localuser_name -VserverContext
$vserver_name

#-------------------------------------------------------------------------------
# CIFS Share Configuration
        # Create a new Volume to share
New-NcVol -Name $vol_name -Aggregate $aggr_name -size 10g -JunctionPath "/$vol_name" -
SecurityStyle "ntfs" -VserverContext $vserver_name

        # Create a new Qtree to share
New-NcQtree -Volume $vol_name -Qtree $qtree_name -VserverContext $vserver_name -SecurityStyle
"ntfs"

# Share the volume
        Add-NcCifsShare -Name $vol_share_name -Path "/$vol_name" -VserverContext $vserver_name -
ShareProperties "browsable"

# Share the qtree
        Add-NcCifsShare -Name $qtree_share_name -Path "/$vol_name/$qtree_name" -VserverContext
$vserver_name -ShareProperties "browsable"

#-------------------------------------------------------------------------------
# CIFS Share Permissions
        # Add permission for user or group for a CIFS Share
# Give full control access to the local group on volume share
Add-NcCifsShareAcl -Share $vol_share_name -UserOrGroup $localgroup_name -Permission
"full_control" -UserGroupType "windows" -VserverContext $vserver_name

# Give read access to the local user on qtree share
Add-NcCifsShareAcl -Share $qtree_share_name -UserOrGroup $localuser_name -Permission "read" -
UserGroupType "windows" -VserverContext $vserver_name
        # Possible values for Permission: 'no_access', 'read', 'change', 'full_control'
# Possible values for UserGroupType: 'windows', 'unix_user', 'unix_group'

#-------------------------------------------------------------------------------
# File/Folder Permissions
        # Create a new NTFS security descriptor
New-NcFileDirectorySecurityNtfs -SecurityDescriptor $ntfs_sec_desc_id -Owner $localuser_name -
Group $localgroup_name -VserverContext $vserver_name

# Add a discretionary access control entry to NTFS security descriptor
Add-NcFileDirectorySecurityNtfsDacl -SecurityDescriptor $ntfs_sec_desc_id -Account
$localuser_name -AccessType "allow" -Rights "full_control" -ApplyTo "files" -VserverContext
$vserver_name

# Add a system/audit access control entry to NTFS security descriptor
Add-NcFileDirectorySecurityNtfsSacl -SecurityDescriptor $ntfs_sec_desc_id -Account
$localuser_name -AccessType "success" -Rights "read_and_execute" -AdvancedRights "full_control" -
ApplyTo "sub_folders" -VserverContext $vserver_name
# Possible values for -AccessType: "deny", "allow"
# Possible values for -Rights: "no_access", "full_control", "modify", "read_and_execute", "read",
"write"
# Possible values for -AdvancedRights : "read_data", "write_data", "append_data", "read_ea",
"write_ea", "execute_file", "delete_child", "read_attr", "write_attr", "delete", "read_perm",
"write_perm", "write_owner", "full_control"
```

```
# Possible values for -ApplyTo: "this_folder", "sub_folders", "files"

# Create a new file directory security policy
New-NcFileDirectorySecurityPolicy -Name $policy_name -VserverContext $vserver_name

        # Get the junction path of the file/folder
$query = Get-NcVol -Template
$query.Name = $vol_name
$query.JunctionPath

$volume_junctionpath = (Get-NcVol -Query $query | select JunctionPath).JunctionPath
$qtree_junctionpath = "$volume_junctionpath/$qtree_name"

# Add a file security policy task
Add-NcFileDirectorySecurityPolicyTask -Name $policy_name -Path $qtree_junctionpath -SecurityType
"ntfs" -NtfsSecurityDescriptor $ntfs_sec_desc_id -VserverContext $vserver_name

#-------------------------------------------------------------------------------------
# Domain Activities
# Add to the list of trusted domains for name-mapping search
Add-NcCifsTrustedDomain -TrustedDomain $domain -VserverContext $vserver_name

# Add to a list of preferred domain controllers
Add-NcCifsPreferredDomainController -Domain $domain -DomainControllers 10.10.10.10 -
VserverContext $vserver_name
# Above cmdlet uses example DomainControllers IP Address
# Please change it according to your needs

#-------------------------------------------------------------------------------------
# Home Directory
# Create a new volume for Home Directory
New-NcVol -Name $homedir_volume_name -Aggregate $aggr_name -size 10g -JunctionPath
"/$homedir_volume_name" -SecurityStyle "ntfs" -VserverContext $vserver_name

# Create a share for the volume
Add-NcCifsShare -Name $homeshare_name -Path "/$homedir_volume_name" -VserverContext $vserver_name

# Add that share as CIFS Home directory search path
Add-NcCifsHomeDirectorySearchPath -Path "/$homedir_volume_name" -VserverContext $vserver_name

# Add Home directory share
Add-NcCifsShare -Name %w -Path %w -VserverContext $vserver_name -ShareProperties "homedirectory"

# Get the VServer LIF
$vserver_lif = (Get-NcNetInterface -Name $lif1_name -VserverContext $vserver_name).Address
# Get all the AD Users by running a remote powershell command on the AD machine
$ad_userlist = Invoke-Command -ComputerName "ad.netapp.local" -ScriptBlock {(Get-ADGroupMember -
Identity CifsADgroup).name }
        # Above cmdlet uses example ComputerName and example Identity
# Please change it according to your needs
# Please use FQDN of the AD machine for ComputerName
# Please provide a valid AD group for Identity

# Create folders for each user in the AD group
for($i=0; $i -lt $ad_userlist.Count; $i++)
{
        $ad_user_dir = $ad_userlist[$i]
        New-Item -Path "\\$vserver_lif\$homeshare_name\$ad_user_dir" -ItemType directory
}

#-------------------------------------------------------------------------------------
# Shadow Copy
        # Add files in a share
New-Item -Path "\\$vserver_lif\$qtree_share_name\file1.txt" -ItemType file
New-Item -Path "\\$vserver_lif\$qtree_share_name\file2.txt" -ItemType file

# Add a list of files to shadow copy in a particular share
Add-NcCifsShadowCopyFile -Id 101 -File "/$qtree_share_name/file1.txt" -VserverContext
$vserver_name

#-------------------------------------------------------------------------------------
```

4.3 Modifying the CIFS Environment

Table 4 and the following example code provide detailed information about the cmdlets that are used to modify and manage the CIFS server.

Table 4) Cmdlets for managing the CIFS server.

Type	Description	Cmdlet
CIFS server	Start the CIFS server	`Start-NcCifsServer`
CIFS server	Stop the CIFS server	`Stop-NcCifsServer`
CIFS server	Modify the CIFS server	`Set-NcCifsServer`
CIFS server	Set CIFS security tunable parameters	`Set-NcCifsSecurity`
CIFS server	Modify the CIFS specific tunable parameters	`Set-NcCifsOption`
CIFS local users and groups	Modify a CIFS local user	`Set-NcCifsLocalUser`
CIFS local users and groups	Rename a CIFS local user	`Rename-NcCifsLocalUser`
CIFS local users and groups	Modify a CIFS local group	`Set-NcCifsLocalGroup`
CIFS local users and groups	Rename a CIFS local group	`Rename-NcCifsLocalGroup`
CIFS share and permissions	Modify a CIFS share	`Set-NcCifsShare`
CIFS share and permissions	Modify CIFS share permissions	`Set-NcCifsShareAcl`
CIFS sessions and files	Retrieve the list of the established CIFS sessions	`Get-NcCifsSession`
CIFS sessions and files	Retrieve the list of the opened CIFS files	`Get-NcCifsSessionFile`
CIFS sessions and files	Close an open CIFS session	`Close-NcCifsSession`
CIFS sessions and files	Close an open CIFS file	`Close-NcCifsSessionFile`
File/folder permissions	Modify the NTFS security descriptor	`Set-NcFileDirectorySecurityNtfs`
File/folder permissions	Modify a discretionary ACL of the NTFS security descriptor	`Set-NcFileDirectorySecurityNtfsDacl`
File/folder permissions	Modify a system/audit ACL of the NTFS security descriptor	`Set-NcFileDirectorySecurityNtfsSacl`
File/folder permissions	Modify a file security policy task	`Set-NcFileDirectorySecurityPolicyTask`
File/folder permissions	Apply the security settings of a policy	`Set-NcFileDirectorySecurity`

Type	Description	Cmdlet
Domain activities	Enable the CIFS domain password schedule	`Enable-NcCifsDomainPasswordSchedule`
Domain activities	Modify the attributes of the CIFS domain password schedule object	`Set-NcCifsDomainPasswordSchedule`
Domain activities	Modify the list of trusted domains	`Set-NcCifsTrustedDomain`
Domain activities	Disable the CIFS domain password schedule	`Disable-NcCifsDomainPasswordSchedule`
Home directory	Modify the CIFS home directory search path	`Set-NcCifsHomeDirectorySearchPath`
Home directory	Modify the CIFS home directory configurations	`Set-NcCifsHomeDirectoryConfig`
Shadow copy	Save the NetApp Snapshot® copies of the shadow copy set	`Save-NcCifsShadowCopySnapshot`
Shadow copy	Restore a shadow copy directory	`Restore-NcCifsShadowCopyDirectory`

```
#-------------------------------------------------------------------------------
# Start a CIFS server on the specified Vserver
Start-NcCifsServer -VserverContext $vserver_name

# Stop a CIFS server on the specified Vserver
Stop-NcCifsServer -VserverContext $vserver_name

# Set the configurations of a CIFS server
Set-NcCifsServer -CifsServer $cifsserver_name -Domain $domain -Ou CN=Computers -AdminUsername
$domain_username -AdminPassword $domain_password -VserverContext $vserver_name -
AdministrativeStatus "up" -ForceAccountOverwrite
# Possible values for AdministrativeStatus: 'up', 'down'
# ForceAccountOverwrite : if the domain is being modified,and a machine account with the same
name as the current Vserver's CIFS server name exists in the Active Directory, it will be
overwritten and reused

# Set CIFS security tunable parameters
Set-NcCifsSecurity -ClockSkew 5 -TicketAge 10 -RenewAge 7 -IsSigningRequired $true -
IsPasswordComplexityRequired $true -UseStartTlsForAdLdap $true -IsAesEncryptionEnabled $true -
LmCompatibilityLevel 'krb' -IsSmbEncryptionRequired $true -KerberosKdcTimeout 30s -VserverContext
$vserver_name
# -ClockSkew : The clock skew in minutes is the tolerance for accepting tickets with time stamps
that do not exactly match the host's system clock
# -TicketAge : This option determines the maximum amount of time in hours that a user's ticket
may be used for the purpose of Kerberos authentication
# -RenewAge  : This option determines the maximum amount of time in days for which a ticket can
be renewed
# -IsSigningRequired : If true, signing is required for incoming CIFS traffic
# -IsPasswordComplexityRequired : If true, password complexity is required for local users
# -UseStartTlsForAdLdap : If true, use start-tls for AD LDAP connections. Default value : false
# -IsAesEncryptionEnabled : Determines whether AES-128 and AES-256 encryption mechanisms are
enabled for Kerberos-related CIFS communication.
#                           Default value : true
# -LmCompatibilityLevel : This option determines the LM compatibility level. Default value : 'LM,
NTLM, NTLMv2 and Kerberos'
#                         Possible Values :
```

```
#                          'lm_ntlm_ntlmv2_krb'  - Accepts LM, NTLM, NTLMv2 and Kerberos,
#                          'ntlm_ntlmv2_krb'     - Accepts NTLM, NTLMv2 and Kerberos,
#                          'ntlmv2_krb'          - Accepts NTLMv2 and Kerberos,
#                          'krb'                 - Accepts Kerberos only
# -IsSmbEncryptionRequired : Determines whether SMB encryption is required for incoming CIFS
traffic. Default value : false
# -KerberosKdcTimeout : Timeout value for KDC connections. Example: 5m (5 minutes), 20s (20
seconds), 1h (1 hour) (Data ONTAP 8.4 and above)

# Create a new Unix group and user and add user to group
$unix_group = "unix_group"
$unix_user = "unix_user"

New-NcNameMappingUnixGroup -Name $unix_group -GroupId 21 -VserverContext $vserver_name

New-NcNameMappingUnixUser -Name $unix_user -UserId 1 -GroupId 21 -VserverContext $vserver_name

Add-NcNameMappingUnixGroupUser -Name $unix_group -UserName $unix_user -VserverContext
$vserver_name

# Modify the CIFS specific tunables that can be set on a Vserver
Set-NcCifsOption -DefaultUnixUser "root" -ReadGrantsExecute \"enabled\" -WinsServers $domain -
EnableSmb2 -MaxMpx 255 -ShadowcopyDirDepth 5 -IsSmb3Enabled $true -IsCopyOffloadEnabled $true -
DefaultUnixGroup $unix_group -IsShadowCopyEnabled $true -IsReferralEnabled $true -
IsLocalAuthEnabled $true -IsLocalUsersAndGroupsEnabled $true -
IsUseJunctionsAsReparsePointsEnabled $true -IsExportPolicyEnabled $true -
IsTrustedDomainEnumSearchEnabled $true -IsCopyOffloadDirectCopyEnabled $true -
FileSystemSectorSize '512' -IsUnixNtAclEnabled $true -ClientSessionTimeout 30s -IsDacEnabled
$true -AnonymousRestrictionLevel 'no_restriction' -IsReadOnlyDeleteEnabled $true -
IsFakeOpenEnabled $false -IsUnixExtensionsEnabled $true -IsSearchShortNamesEnabled $true -
IsAdvertiseDfsEnabled $false -IsAdvancedSparseFileSupportEnabled $true -MaxFileWriteZeroLength
512K -GuestUnixUser $unix_user -Smb1MaxBufferSize 256KB -MaxSameUserSessionsPerConnection 10 -
MaxSameTreeConnectPerSession 5 -MaxOpensSameFilePerTree 10 -MaxWatchesSetPerTree 5 -
IsAdminUsersMappedToRootEnabled $true -GrantUnixGroupPermsToOthers $true -
IsClientDupDetectionEnabled $true -IsClientVersionReportingEnabled $true -IsHideDotfilesEnabled
$true -IsLargeMtuEnabled $true -IsMultichannelEnabled $true -IsPathComponentCacheEnabled $true -
IsPathComponentCacheSymlinkEnabled $true -IsSmb31Enabled $true -MaxConnectionsPerSession 10 -
MaxLifsPerSession 10 -NbnsEnabledLifs $lif1_name -PathComponentCacheEntryExpTime 30 -
PathComponentCacheMaxEntries 3 -PathComponentCacheMaxSessionTokenSize 10 -
PathComponentCacheSymlinkExpTime 30 -WinNameForNullUser $localuser_name -IsNetbiosOverTcpEnabled
$true -VserverContext $vserver_name
# -DefaultUnixUser   : This is the default UNIX user mapping that will be used if the identity of
a CIFS user connot be mapped using normal name mapping rules.
# -ReadGrantsExecute : On a file with UNIX Style security effective on it, if the file has read
permission on it, a CIFS user would be allowed to execute permissions if this option is enabled.
Possible values: \"enabled\", \"disabled\".
# -WinsServers : List of Windows Internet Name Service (WINS) IP addresses. The Vserver will send
NetBIOS name resolution requests to these addresses.
# -EnableSmb2 : Specify to enable Smb2 on this CIFS sserver.
# -DisableSmb2 : Specify to disable Smb2 on this CIFS sserver.
# -MaxMpx : This option controls maximum simultaneous operations the CIFS server reports it can
process per TCP connection. The default value for this option is 255.
# -ShadowcopyDirDepth : The maximum depth of directories to shadow copy.
# -IsSmb3Enabled : If true, the CIFS server negotiates the SMB3 version of the CIFS protocol.
# -IsCopyOffloadEnabled : If true, the CIFS server is capable of performing copy offload
operation.
# -DefaultUnixGroup : The default UNIX group used if the identity of a CIFS group cannot be
mapped using normal group mapping rules.
# -IsShadowCopyEnabled : If true, the CIFS server is capable of performing shadow copy
operations.
# -IsReferralEnabled : If true, the CIFS server refers clients to more optimal data access paths
(LIFs).
# -IsLocalAuthEnabled : If true, CIFS local users can authenticate.
# -IsLocalUsersAndGroupsEnabled : If true, the CIFS local users and groups feature is enabled on
the cluster.
# -IsUseJunctionsAsReparsePointsEnabled : If true, the CIFS server exposes junction points as
reparse points to Windows clients.
# -IsExportPolicyEnabled : If true, the CIFS server uses export policies to control client
access.
# -IsTrustedDomainEnumSearchEnabled : If true, the CIFS server is capable of performing
enumeration of trusted domains and search to map a UNIX user to a Windows user.
```

```
# -FileSystemSectorSize : Specifies the size of file system sector in bytes reported to SMB
Clients.
#     Possible values:
#        '512'  - Reported file system sector size to SMB clients is 512 bytes,
#        '4096' - Reported file system sector size to SMB clients is 4096 bytes
# -IsCopyOffloadDirectCopyEnabled : If true, the direct-copy copy offload mechanism is enabled.
The default value is true.
# -IsUnixNtAclEnabled : If true, NT ACLs can be set on a volume with UNIX security-style.
# -ClientSessionTimeout : The amount of idle time (in seconds) before a CIFS session is
disconnected.
# -IsDacEnabled : If true, the CIFS server supports Dynamic Access Control. The default value for
this parameter is false.
# -AnonymousRestrictionLevel : The level of access a non authenticated user get
#     Possible values:
#        'no_restriction' - No access restriction for anonymous user
#        'no_enumeration' - Only enumeration is restricted
#        'no_access'      - Access restricted for anonymous user.
# -IsReadOnlyDeleteEnabled : If true, a file can be deleted using UNIX delete semantics when the
DOS read-only bit is enabled.
# -IsFakeOpenEnabled : If true, the CIFS server supports fake open requests. The default value
for this parameter is true.
# -IsUnixExtensionsEnabled : If true, the CIFS server is capable of supporting UNIX Extensions.
The default value for this parameter is false.
# -IsSearchShortNamesEnabled : If true, the CIFS server supports searching short names. The
default value for this parameter is false.
# -IsAdvertiseDfsEnabled : If true, DFS referral of the CIFS protocol is advertised.
# -IsAdvancedSparseFileSupportEnabled : Specifies whether advanced sparse file capabilities, such
as Query Allocated Ranges and Set Zero Data, are enabled on the CIFS server.
# -MaxFileWriteZeroLength : Maximum length of data that the CIFS server can write zero with one
CIFS request. Value must be between 4K and 1G
# -GuestUnixUser : The specific unix user to which a guest user coming from any untrusted domain
can be mapped.
# -Smb1MaxBufferSize : Maximum buffer size used for SMB1 message that the server can receive
# -MaxSameUserSessionsPerConnection : Maximum simultaneous sessions by the same user per TCP
connection
# -MaxSameTreeConnectPerSession : Maximum simultaneous CIFS connections to the same share per
CIFS session.
# -MaxOpensSameFilePerTree : Maximum existing opens on the same file per CIFS Tree.
# -MaxWatchesSetPerTree : Maximum watches that can be set per CIFS Tree.
# -IsAdminUsersMappedToRootEnabled : Specifies that if name-mapping is not present for members of
BUILTIN\Administrators group then whether they can be mapped to Unix User 'root'.
# -GrantUnixGroupPermsToOthers : Specifies whether UNIX group permissions should be granted to
others when Windows clients access files on a UNIX security-style Volume/Qtree as well as mixed
security style Volume/Qtree, as long as the effective security style on the file is UNIX.
# -IsClientDupDetectionEnabled : Specifies whether the CIFS server should detect duplicate
sessions coming from the same SMB 1.0 client with VcNumber of zero (0).
# -IsClientVersionReportingEnabled : Specifies whether to report the client version through ASUP.
# -IsHideDotfilesEnabled : Specifies whether the CIFS server should hide files and directories
beginning with a dot '.' during directory enumeration.
# -IsLargeMtuEnabled : Specifies that the SMB 2.1 Large MTU feature is supported.
# -IsMultichannelEnabled : Specifies whether the CIFS server supports Multichannel or not.
# -IsPathComponentCacheEnabled : Specifies whether the CIFS path component cache is enabled for
SMB2 or not.
# -IsPathComponentCacheSymlinkEnabled : Specifies whether the CIFS symlink resolution for path
component cache is enabled for SMB2 or not.
# -IsSmb31Enabled : Specifies whether the CIFS server negotiates the SMB3.1 version of the CIFS
protocol.
# -MaxConnectionsPerSession : Maximum number of connections allowed per Multichannel session.
# -MaxLifsPerSession : Maximum number of network interfaces advertised per Multichannel session.
# -NbnsEnabledLifs : Specifies the list of LIFs on which NBNS broadcast can be sent.
# -PathComponentCacheEntryExpTime : This parameter controls the time in milliseconds when the
path component cache entry would be considered fresh.
# -PathComponentCacheMaxEntries : This parameter control the maximum number of cache entries in
one instance of path component cache.
# -PathComponentCacheMaxSessionTokenSize : This parameter specifies maximum session token size
for path component cache for SMB2.
# -PathComponentCacheSymlinkExpTime : This parameter controls the time in milliseconds when the
path component cache entry that is symlink would be considered fresh.
# -WinNameForNullUser : This parameter specifies a valid Windows user or group name that will be
added to the CIFS credentials for a NULL user Session.
```

```
# -IsNetbiosOverTcpEnabled : This optional parameter specifies whether the use of NetBIOS over
Tcp is enabled or not.

#-------------------------------------------------------------------------------
# CIFS Local Users and Groups
# Modify a CIFS local user
Set-NcCifsLocalUser -UserName $localuser_name -FullName $localuser_name -Description "new cifs
local user" -VserverContext $vserver_name
# Use -Disable to disable this local user

# Modify the CIFS Local user password
Set-NcCifsLocalUser -UserName $localuser_name -Password $localuser_password -VserverContext
$vserver_name

# Rename a CIFS local user
Rename-NcCifsLocalUser -UserName $localuser_name -NewUserName "new name" -VserverContext
$vserver_name

# Modify a CIFS local group
Set-NcCifsLocalGroup -Name $localgroup_name -Description "local cifs users' group" -
VserverContext $vserver_name

# Rename a CIFS local group
Rename-NcCifsLocalGroup -Name $localgroup_name -NewName $localgroup_name -VserverContext
$vserver_name

#-------------------------------------------------------------------------------
# CIFS Shares and Permissions
# Modify CIFS Shares
Set-NcCifsShare -Name $qtree_share_name -ShareProperties "browsable" -VserverContext
$vserver_name

# Modify CIFS Share Permissions
Set-NcCifsShareAcl -Share $qtree_share_name -UserOrGroup $localuser_name -Permission "write" -
VserverContext $vserver_name

#-------------------------------------------------------------------------------
# CIFS Sessions and Files
# Retrieve the list of the established CIFS sessions
Get-NcCifsSession

# Retrieve the list of the opened CIFS files
Get-NcCifsSessionFile

# Close an open CIFS session
Close-NcCifsSession -Node $cluster_nodes[0] -VserverContext $vserver_name -Confirm:$false

# Close an open CIFS file
Close-NcCifsSessionFile -Node $cluster_nodes[0] -VserverContext $vserver_name -Confirm:$false

#-------------------------------------------------------------------------------
# File/Folder Permissions
#  Modify the NTFS security descriptor
Set-NcFileDirectorySecurityNtfs -SecurityDescriptor $ntfs_sec_desc_id -Owner $localuser_name -
Group $localgroup_name -ControlFlags 1
# Where -ControlFlags : The security descriptor control flags integer value
# The following are the bit fields of control flags
# 1... .... .... .... = Self Relative
# .0.. .... .... .... = RM Control Valid
# ..0. .... .... .... = SACL Protected
# ...0 .... .... .... = DACL Protected
# .... 0... .... .... = SACL Inherited
# .... .0.. .... .... = DACL Inherited
# .... ..0. .... .... = SACL Inherit Required
# .... ...0 .... .... = DACL Inherit Required
# .... .... ..0. .... = SACL Defaulted
# .... .... ...0 .... = SACL Present
# .... .... .... 0... = DACL Defaulted
# .... .... .... .1.. = DACL Present
# .... .... .... ..0. = Group Defaulted
# .... .... .... ...0 = Owner Defaulted
```

```
# At present only the following flags are honored. Others are ignored.
# ..0. .... .... .... = SACL Protected
# ...0 .... .... .... = DACL Protected
# .... .... ..0. .... = SACL Defaulted
# .... .... .... 0... = DACL Defaulted
# .... .... .... ..0. = Group Defaulted
# .... .... .... ...0 = Owner Defaulted


# Modify an discretionary access control entry of a file security descriptor
Set-NcFileDirectorySecurityNtfsDacl -SecurityDescriptor $ntfs_sec_desc_id -Account
$localuser_name -AccessType "allow" -Rights "full_control" -AdvancedRights "full_control" -
ApplyTo "this_folder" -VserverContext $vserver_name

# Modify an system/audit access control entry of a file security descriptor
Set-NcFileDirectorySecurityNtfsSacl -SecurityDescriptor $ntfs_sec_desc_id -Account
$localuser_name -AccessType "success" -Rights "read_and_execute" -AdvancedRights "full_control" -
ApplyTo "this_folder" -VserverContext $vserver_name
# Possible values for -AccessType     : "deny", "allow"
# Possible values for -Rights         : "no_access", "full_control", "modify",
"read_and_execute", "read", "write"
# Possible values for -AdvancedRights : "read_data", "write_data", "append_data", "read_ea",
"write_ea", "execute_file", "delete_child", "read_attr", "write_attr", "delete", "read_perm",
"write_perm", "write_owner", "full_control"
# Possible values for -ApplyTo        : "this_folder", "sub_folders", "files"

        # Get the junction path of the file/folder
$query = Get-NcVol -Template
$query.Name = $vol_name
$query.JunctionPath

$volume_junctionpath = (Get-NcVol -Query $query | select JunctionPath).JunctionPath
$qtree_junctionpath = "$volume_junctionpath/$qtree_name"

# Modify a file security policy task
Set-NcFileDirectorySecurityPolicyTask -Name $policy_name -Path $qtree_junctionpath -SecurityType
"ntfs" -NtfsMode "replace" -NtfsSecurityDescriptor $ntfs_sec_desc_id -Index 2 -VserverContext
$vserver_name
# Possible values for -SecurityType : "ntfs", "nfsv4"
# Possible values for -NtfsMode     : "propagate", "ignore", "replace"
# -Index : the target index/position of this task in the policy.  If a policy has already 5 tasks
and this is the 6th task you are adding and you want to add this task as 2nd task, you can
specifiy the index 2. By default the task gets added as last task. If the index number exceeds
the number of positions, it will go at the end

# Apply security settings of a policy
Set-NcFileDirectorySecurity -Name $policy_name -VserverContext $vserver_name

#-------------------------------------------------------------------------------
# Domain Activitites
# Enable the CIFS domain password schedule
Enable-NcCifsDomainPasswordSchedule -VserverContext $vserver_name

# Modify the attributes of CIFS domain password schedule object
Set-NcCifsDomainPasswordSchedule -WeeklyInterval 8 -RandomizedMinute 150 -DayOfWeek 1 -TimeOfDay
06:30:00 -VserverContext $vserver_name
# Where
# -WeeklyInterval   : The number of weeks after which the scheduled domain account password
change must occur
# -RandomizedMinute : The minutes within which the scheduled domain account password start time
can be randomized beginning at TimeOfDay
# -DayOfWeek        : The day of week when the scheduled domain account password change occurs
# -TimeOfDay        : The time in HH:MM:SS format at which the scheduled domain account password
change starts

# Modify the list of trusted domains for name-mapping search
Set-NcCifsTrustedDomain -TrustedDomain $trusted_domain -VserverContext $vserver_name

# Disable the CIFS domain password schedule
```

```
Disable-NcCifsDomainPasswordSchedule -VserverContext $vserver_name

#-------------------------------------------------------------------------------
# Home Directory
# Set the position of a path in the list of paths that will be searched to find a CIFS user's
home directory
Set-NcCifsHomeDirectorySearchPath -Path "/$homedir_volume_name" -Position 1 -VserverContext
$vserver_name
# -Position : The target position this entry should be moved to, in the list of CIFS home
directory search paths
# Above cmdlet moves the CIFS home directory search path /$homedir_volume_name into the first
position

# Modify cifs home directory configurations
Set-NcCifsHomeDirectoryConfig -IsAdminAccessEnabled $true -IsPublicAccessEnabled $false -
VserverContext $vserver_name
# Possible values for -IsAdminAccessEnabled  : "true", "false". If true, home directory access is
enabled to admin
# Possible values for -IsPublicAccessEnabled : "true", "false". If true, home directory access is
enabled to public

#-------------------------------------------------------------------------------
# Shadow Copy
# Request the storage system to keep the snapshots taken as part of the shadow copy set creation
Save-NcCifsShadowCopySnapshot -Id 101 -VserverContext $vserver_name

# Create source and destination directory
New-Item -Path "\\$vserver_lif\$qtree_share_name\src_dir" -ItemType directory
New-Item -Path "\\$vserver_lif\$qtree_share_name\dest_dir" -ItemType directory

# Request the storage system to restore a directory
Restore-NcCifsShadowCopyDirectory -Volume $vol_name -SourceDirectory '/$qtree_share_name/src_dir'
-DestinationDirectory '/$qtree_share_name/dest_dir' -DirectoryOnly
# -DirectoryOnly : When specified, only the directory and no content will be restored, otherwise
all content will be restored

#-------------------------------------------------------------------------------
```

4.4 Monitoring the CIFS Environment

Table 5 provides detailed information about the cmdlets that are used to monitor the CIFS server.

Table 5) Cmdlets for monitoring the CIFS server.

Type	Description	Cmdlet
CIFS server	List all the CIFS servers	`Get-NcCifsServer`
CIFS server	List all the CIFS security tunable parameters	`Get-NcCifsSecurity`
CIFS server	List the CIFS specific tunable parameters	`Get-NcCifsOption`
CIFS local users and groups	List all the local users	`Get-NcCifsLocalUser`
CIFS local users and groups	List all the local groups	`Get-NcCifsLocalGroup`
CIFS local users and groups	List all the local users in a local group	`Get-NcCifsLocalGroupMember`
CIFS share and permissions	List all the CIFS shares	`Get-NcCifsShare`
File/folder permissions	Get information about the NTFS security descriptor	`Get-NcFileDirectorySecurityNtfs`

Type	Description	Cmdlet
File/folder permissions	Get information about discretionary access control entries	`Get-NcFileDirectorySecurityNtfsDacl`
File/folder permissions	Get information about system/audit access control entries	`Get-NcFileDirectorySecurityNtfsSacl`
File/folder permissions	Get security information about a file/folder	`Get-NcFileDirectorySecurity`
File/folder permissions	Get information about policy tasks	`Get-NcFileDirectorySecurityPolicyTask`
Domain activities	Trigger the discovery of domain servers	`Find-NcCifsDomainServer`
Domain activities	Retrieve the list of discovered trusted domains	`Get-NcCifsDomainTrust`
Domain activities	List the CIFS domain password schedule objects	`Get-NcCifsDomainPasswordSchedule`
Domain activities	List the preferred domain controllers that are associated with an active directory	`Get-NcCifsPreferredDomainController`
Domain activities	Trigger rediscovery of trusted domains	`Invoke-NcCifsDomainTrustsDiscovery`
Domain activities	List the trusted domains	`Get-NcCifsTrustedDomain`
Home directory	List the CIFS home directory search path	`Get-NcCifsHomeDirectorySearchPath`
Shadow copy	List shadow copy EMS messages	`Get-NcCifsShadowCopyEmsMessage`

4.5 Cleaning the CIFS Environment

Table 6 and the following example code provide detailed information about the cmdlets that are used to clean the CIFS server.

Table 6) Cmdlets for cleaning the CIFS server.

Type	Description	Cmdlet
Home directory	Delete the home directory share	`Remove-NcCifsShare`
Home directory	Delete the CIFS home directory search path	`Remove-NcCifsHomeDirectorySearchPath`
Domain activities	Remove a trusted domain	`Remove-NcCifsTrustedDomain`
Domain activities	Remove a preferred domain controller	`Remove-NcCifsPreferredDomainController`

Type	Description	Cmdlet
File/folder permissions	Delete an NTFS security descriptor	`Remove-NcFileDirectorySecurityNtfs`
File/folder permissions	Remove a discretionary access control entry from an NTFS security descriptor	`Remove-NcFileDirectorySecurityNtfsDacl`
File/folder permissions	Remove a system/audit access control entry from an NTFS security descriptor	`Remove-NcFileDirectorySecurityNtfsSacl`
File/folder permissions	Remove the security policy	`Remove-NcFileDirectorySecurityPolicy`
File/folder permissions	Remove a task from the policy	`Remove-NcFileDirectorySecurityPolicyTask`
File/folder permissions	Remove the Storage Level Access Guard (SLAG) from the specified volume junction path	`Remove-NcFileDirectorySecuritySlag`
CIFS share and permissions	Remove permissions for the local user on a share	`Remove-NcCifsShareAcl`
CIFS share and permissions	Remove permissions for the local group on a share	`Remove-NcCifsShareAcl`
CIFS share and permissions	Delete a CIFS share	`Remove-NcCifsShare`
CIFS local users and groups	Remove a CIFS local user from a CIFS local group	`Remove-NcCifsLocalGroupMember`
CIFS local users and groups	Remove a CIFS local user	`Remove-NcCifsLocalUser`
CIFS local users and groups	Remove a CIFS local group	`Remove-NcCifsLocalGroup`
CIFS server	Delete a CIFS server	`Remove-NcCifsServer`

```
# Destroy Home Directory
# Get the VServer LIF
    $vserver_lif = (Get-NcNetInterface -Name $lif1_name -VserverContext $vserver_name).Address

    # Destroy all the folders created for each user in the AD Group
    for($i=0; $i -lt $ad_userlist.Count; $i++)
    {
        $ad_user_dir = $ad_userlist[$i]
        Remove-Item -Path "\\$vserver_lif\$homeshare_name\$ad_user_dir" -Force
    }

    # Destroy the Home directory share
    Remove-NcCifsShare -Name %w -VserverContext $vserver_name -Confirm:$false

    # Destroy the CIFS Home directory search path
    Remove-NcCifsHomeDirectorySearchPath -Path "/$homedir_volume_name" -VserverContext
$vserver_name -Confirm:$false

    # Destroy the CIFS share
    Remove-NcCifsShare -Name $homeshare_name -VserverContext $vserver_name -Confirm:$false
```

```
    # Destroy the Volume
        # Unmount the volume
        Dismount-NcVol -Name $homedir_volume_name -VserverContext $vserver_name -Force -
Confirm:$false
        # Bring the Volume offline
        Set-NcVol -Name $homedir_volume_name -Offline -VserverContext $vserver_name
        # Destroy the Volume
        Remove-NcVol -Name $homedir_volume_name -VserverContext $vserver_name -Confirm:$false

#-------------------------------------------------------------------------------
# Destroy domain related
    # Remove domain related
$trusted_domain = "wfs.local"

# Remove from the list of trusted domains for name-mapping search
Remove-NcCifsTrustedDomain -TrustedDomain $trusted_domain -VserverContext $vserver_name

# Remove from a list of preferred domain controllers
Remove-NcCifsPreferredDomainController -Domain $trusted_domain -VserverContext $vserver_name

#-------------------------------------------------------------------------------
# Remove File/Folder permissions
$ntfs_sec_desc_id = "ntfssd"
$policy_name = "policy1"
$account = (Get-NcCifsLocalUser -UserName $localuser_name).UserName

# Delete a NTFS security descriptor
Remove-NcFileDirectorySecurityNtfs -SecurityDescriptor $ntfs_sec_desc_id -VserverContext
$vserver_name

# Remove a discretionary access control entry from NTFS security descriptor
Remove-NcFileDirectorySecurityNtfsDacl -SecurityDescriptor $ntfs_sec_desc_id -Account $account -
AccessType "allow" -VserverContext $vserver_name

# Remove a system/audit access control entry from NTFS security descriptor
Remove-NcFileDirectorySecurityNtfsSacl -SecurityDescriptor $ntfs_sec_desc_id -Account $account -
AccessType "success" -VserverContext $vserver_name

# Remove the security policy
Remove-NcFileDirectorySecurityPolicy -Name $policy_name -VserverContext $vserver_name

# Get the junction path of the file/folder
$query = Get-NcVol -Template
$query.Name = $vol_name
$query.JunctionPath

$volume_junctionpath = (Get-NcVol -Query $query | select JunctionPath).JunctionPath
$qtree_junctionpath = "$volume_junctionpath/$qtree_name"

# Remove a task from the policy of a vserver
Remove-NcFileDirectorySecurityPolicyTask -Name $policy_name -Path $qtree_junctionpath -
VserverContext $vserver_name

# Removes SLAG from the specified volume junction path
Remove-NcFileDirectorySecuritySlag -Path $qtree_junctionpath -VserverContext $vserver_name

#-------------------------------------------------------------------------------
# Remove CIFS Share permissions
# Remove permissions for the local user on qtree share
Remove-NcCifsShareAcl -Share $qtree_share_name -UserOrGroup $localuser_name -VserverContext
$vserver_name -Confirm:$false

# Remove permissions for the local group on volume share
Remove-NcCifsShareAcl -Share $vol_share_name -UserOrGroup $localgroup_name -VserverContext
$vserver_name -Confirm:$false

# Destroy CIFS Share
# Destroy the volume share
Remove-NcCifsShare -Name $qtree_share_name -VserverContext $vserver_name

# Destroy the qtree share
```

```
Remove-NcCifsShare -Name $vol_share_name -VserverContext $vserver_name

# Destroy Qtree and Volume
# Destroy Qtree
Remove-NcQtree -Volume $vol_name -Qtree qtree_name -VserverContext $vserver_name -Force -
Confirm:$false

# Destroy Volume
# Unmount the volume
Dismount-NcVol -Name $vol_name -VserverContext $vserver_name -Force -Confirm:$false
# Bring the Volume offline
Set-NcVol -Name $vol_name -Offline -VserverContext $vserver_name
# Destroy the Volume
Remove-NcVol -Name $vol_name -VserverContext $vserver_name -Confirm:$false

#-------------------------------------------------------------------------------
 # Destroy CIFS Local Users and Groups
# Remove a CIFS Local user from CIFS local group
Remove-NcCifsLocalGroupMember -Name $localgroup_name -Member $localuser_name -VserverContext
$vserver_name

# Destroy CIFS Local User
Remove-NcCifsLocalUser -UserName $localuser_name -VserverContext $vserver_name

# Destroy CIFS Local Group
Remove-NcCifsLocalGroup -Name $localgroup_name -VserverContext $vserver_name

#-------------------------------------------------------------------------------
# Destroy CIFS Server
Remove-NcCifsServer -VserverContext $vserver_name -AdminUsername $domain_username -AdminPassword
$domain_password

#-------------------------------------------------------------------------------
# Destroy VServer
# Destroy LIF
Remove-NcNetInterface -Name $lif1_name -Vserver $vserver_name -Confirm:$false

# Destroy Subnet
Remove-NcNetSubnet -Name $subnet_name
# Bring the root volume offline
Set-NcVol -Name $rootvolume_name -Offline -VserverContext $vserver_name

# Destroy the root volume
Remove-NcVol -Name $rootvolume_name -VserverContext $vserver_name

# Destroy the VServer
Remove-NcVserver -Name $vserver_name

# Destroy aggregate
# Remove-NcAggr -Name $aggr_name -Confirm:$false

#-------------------------------------------------------------------------------
```

5 Managing Native Auditing

This section provides detailed information about the cmdlets that are used to manage native auditing. Figure 7 summarizes the process, and Table 7 lists the cmdlets.

Figure 7) Managing native auditing.

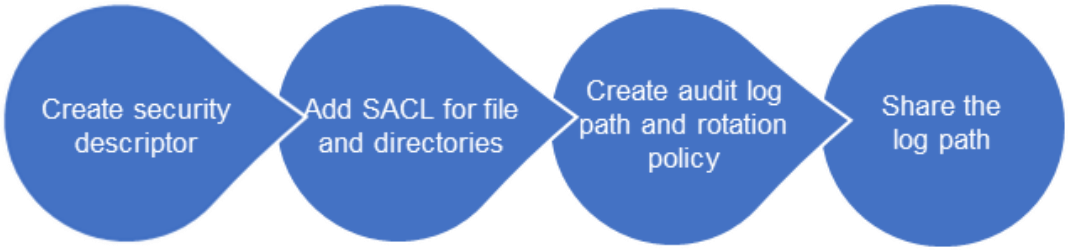


Table 7) Cmdlets for managing native auditing.

Type	Description	Cmdlet
Provisioning native auditing	Create an audit configuration	`New-NcFileserviceAudit`
Modifying native auditing	Enable auditing	`Enable-NcFileserviceAudit`
Modifying native auditing	Rotate the file service audit log	`Invoke-NcFileserviceAuditLogRotate`
Modifying native auditing	Repair the audit infrastructure	`Repair-NcFileserviceAudit`
Modifying native auditing	Modify the audit configuration	`Set-NcFileserviceAudit`
Modifying native auditing	Disable auditing	`Disable-NcFileserviceAudit`
Monitoring native auditing	List audit configuration details	`Get-NcFileserviceAudit`
Cleaning native auditing	Remove the file service audit configuration	`Remove-NcFileserviceAudit`

```
# Provision Native Auditing
# Create a new Qtree to store Audit Log file
    New-NcQtree -Volume $vol_name -Qtree "auditlog" -VserverContext $vserver_name -SecurityStyle
"ntfs"

    # Get the junction path the Qtree created to store Audit Log file
    $query = Get-NcVol -Template
    $query.Name = $vol_name
    $query.JunctionPath

    $volume_junctionpath = (Get-NcVol -Query $query | select JunctionPath).JunctionPath
    $auditlog_path = "$volume_junctionpath/auditlog"

    # Create audit configuration for a Vserver
    New-NcFileserviceAudit -Destination $auditlog_path -RotateLimit 20 -RotateSize 50MB -
VserverContext $vserver_name

#-------------------------------------------------------------------------------
# Modify Native Auditing
# Enable Auditing for Vserver
    Enable-NcFileserviceAudit -VserverContext $vserver_name

    # Rotate fileservice audit log
    Invoke-NcFileserviceAuditLogRotate -VserverContext $vserver_name

    # Repair the audit infrastructure
    Repair-NcFileserviceAudit -VserverContext $vserver_name

    # Get the junction path the Qtree created to store Audit Log file
    $query = Get-NcVol -Template
```

```
    $query.Name = $vol_name
    $query.JunctionPath

    $volume_junctionpath = (Get-NcVol -Query $query | select JunctionPath).JunctionPath
    $auditlog_path = "$volume_junctionpath/auditlog"

# Modify audit configuration
    Set-NcFileserviceAudit -Destination $auditlog_path -AuditEvents "cifs_logon_logoff" -
RotateLimit 20 -AuditGuarantee $true -RotateSize 50MB -Format "evtx" -VserverContext
$vserver_name
# Possible values for -AuditEvents:
#       'file_ops'            - File Operation Events,
#       'cifs_logon_logoff'   - CIFS Logon and Logoff Events,
#       'cap_staging'         - Central Access Policy Staging Events
#       If not specified, then default is 'file_ops,cifs_logon_logoff,cap_staging'
# Possible values for -AuditGuarantee : "true", "false". Default value is true
# Possible values for -Format:
#       'xml'  - Data ONTAP-Specific XML Log Format,
#       'evtx' - Microsoft Windows EVTX Log Format
#       If not specified, then default is 'evtx'
# -RotateSize : Default value is 100MB

    # Disable Auditing for Vserver
    Disable-NcFileserviceAudit -VserverContext $vserver_name

#-------------------------------------------------------------------------------------
# Clean Native Auditing
# Remove the fileservice audit configuration
Remove-NcFileserviceAudit -VserverContext $vserver_name

# Remove the Qtree used to store Audit Log file
Remove-NcQtree -Volume $vol_name -Qtree "auditlog" -VserverContext $vserver_name -Force -
Confirm:$false

#-------------------------------------------------------------------------------------
```

6 Managing the Antivirus Environment

This section provides detailed information about the cmdlets that are used to manage the antivirus environment. Figure 8 summarizes the process, and

Table 8 lists the cmdlets.

Figure 8) Managing the antivirus environment.

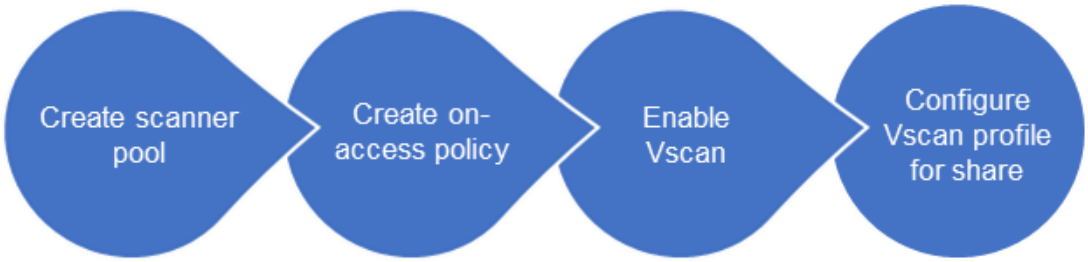


Table 8) Cmdlets for manging the antivirus environment.

Type	Description	Cmdlet
Provisioning the antivirus environment	Create a virus scanner pool	`New-NcVscanScannerPool`
Provisioning the antivirus environment	Create a Vscan on-access policy	`New-NcVscanOnAccessPolicy`
Provisioning the antivirus environment	Create a new antivirus log entry	`New-NcAntivirusLogEntry`
Provisioning the antivirus environment	Create an on-demand task	`New-NcVscanOnDemandTask`
Modifying the antivirus environment	Enable the Vscan scanner	`Enable-NcVscan`
Modifying the antivirus environment	Discard cached information about scanned files	`Reset-NcVscan`
Modifying the antivirus environment	Resolve the host names that are configured in the scanner pool	`Resolve-NcVscanHostnames`
Modifying the antivirus environment	Disable the Vscan scanner	`Disable-NcVscan`
Modifying the antivirus environment	Enable a Vscan on-access policy	`Enable-NcVscanOnAccessPolicy`
Modifying the antivirus environment	Disable a Vscan on-access policy	`Disable-NcVscanOnAccessPolicy`
Modifying the antivirus environment	Modify a Vscan scanner pool	`Set-NcVscanScannerPool`
Modifying the antivirus environment	Modify a Vscan on-access policy	`Set-NcVscanOnAccessPolicy`
Modifying the antivirus environment	Set the attributes of the antivirus engine	`Set-NcAntivirusEngine`
Modifying the antivirus environment	Modify the attributes of antivirus engine options	`Set-NcAntivirusEngineOption`
Modifying the antivirus environment	Set quarantine information for the antivirus engine	`Set-NcAntivirusRemedy`
Modifying the antivirus environment	Set version information for the antivirus engine	`Set-NcAntivirusVersion`
Modifying the antivirus environment	Start an antivirus update job	`Start-NcAntivirusUpdate`
Modifying the antivirus environment	Run an on-demand task	`Invoke-NcVscanOnDemandTask`
Modifying the antivirus environment	Modify an on-demand task	`Set-NcVscanOnDemandTask`

Type	Description	Cmdlet
Monitoring the antivirus environment	List Vscan scanner pools	`Get-NcVscanScannerPool`
Monitoring the antivirus environment	List Vscan on-access policies	`Get-NcVscanOnAccessPolicy`
Monitoring the antivirus environment	List the Vscan connection status	`Get-NcVscanConnection`
Monitoring the antivirus environment	List the extended status for Vscan connections	`Get-NcVscanConnectionStats`
Monitoring the antivirus environment	List the contents of the Vscan event log	`Get-NcVscanEvents`
Monitoring the antivirus environment	List the active scanner pool configuration	`Get-NcVscanScannerPoolActive`
Monitoring the antivirus environment	Get information about the Vscan status	`Get-NcVscanStatus`
Monitoring the antivirus environment	List the attributes of the antivirus engine	`Get-NcAntivirus Engine`
Monitoring the antivirus environment	List the antivirus engine options	`Get-NcAntivirusEngineOption`
Monitoring the antivirus environment	List the antivirus objects	`Get-NcAntivirusLog`
Monitoring the antivirus environment	Get remedy information about the antivirus engine	`Get-NcAntivirusRemedy`
Monitoring the antivirus environment	Get version information about the antivirus engine	`Get-NcAntivirusVersion`
Monitoring the antivirus environment	List on-demand tasks	`Get-NcVscanOnDemandTask`
Monitoring the antivirus environment	List on-demand task reports	`Get-NcVscanOnDemandReport`
Cleaning the antivirus environment	Delete a Vscan on-access policy	`Remove-NcVscanOnAccessPolicy`
Cleaning the antivirus environment	Delete an on-demand report	`Remove-NcVscanOnDemandReport`
Cleaning the antivirus environment	Delete an on-demand task	`Remove-NcVscanOnDemandTask`
Cleaning the antivirus environment	Delete a Vscan scanner pool	`Remove-NcVscanScannerPool`

```
# Provision Antivirus
$vscan_pool_name = "vscanpool1"
    $vscan_server = "1.1.1.1"
    $vscan_policy_name = "vscanpolicy1"
```

```
    $task_name
    $priv_user = (Get-NcCifsLocalUser -UserName $localuser_name).UserName

    # Create a virus scanner pool
    New-NcVscanScannerPool -Name $vscan_pool_name -VscanServer $vscan_server -PrivilegedUser
$priv_user -VserverContext $vserver_name

    # Create a Vscan On-Access policy
    New-NcVscanOnAccessPolicy -Name $vscan_policy_name -Protocol cifs -VserverContext
$vserver_name

    # Create a new antivirus log entry
    New-NcAntivirusLogEntry -VendorId 1 -VendorString "Test string”

#-------------------------------------------------------------------------------
# Modify Antivirus
$vscan_pool_name = "vscanpool1"
    $vscan_policy_name = "vscanpolicy1"

    # Enable the vscan scanner for the current Vserver
    Enable-NcVscan -VserverContext $vserver_name

    # Discard cached information of files that have been successfully scanned
    Reset-NcVscan -VserverContext $vserver_name

    # Resolve the hostnames configured in the scanner pool
    Resolve-NcVscanHostnames -ScannerPool $vscan_pool_name -VserverContext $vserver_name

    # Disable the vscan scanner for the current Vserver
    Disable-NcVscan -VserverContext $vserver_name

    # Enable the vscan On-Access policy
    Enable-NcVscanOnAccessPolicy -Name $vscan_policy_name -VserverContext $vserver_name

    # Disable the vscan On-Access policy
    Disable-NcVscanOnAccessPolicy -Name $vscan_policy_name -VserverContext $vserver_name

#  Modify a Vscan scanner pool
    Set-NcVscanScannerPool -Name $vscan_pool_name -VscanServer $vscan_server -PrivilegedUser
$priv_user -RequestTimeout 50 -ScanQueueTimeout 30 -SessionSetupTimeout 20 -
SessionTeardownTimeout 20 -MaxSessionSetupRetries 3 -VserverContext $vserver_name
    # -RequestTimeout         : Total request-service time-limit in seconds. The default value is
30
    # -ScanQueueTimeout       : Scan-queue wait time-limit in seconds. The default is 20
    # -SessionSetupTimeout    : Total session setup time-limit in seconds. The default value is
10
    # -SessionTeardownTimeout : Total session teardown time-limit in seconds. The default value
is 10
    # -MaxSessionSetupRetries : Maximum number of consecutive session-setup attempts. The default
is 5

#  Modify a Vscan On-Access policy
    Set-NcVscanOnAccessPolicy -Name $vscan_policy_name -Filter 'scan_mandatory' -MaxFileSize 512
-ExcludePath '/ -ExcludeExtension 'vhd,vhdx,vmdk' -IncludeExtension 'txt' -
ScanFilesWithNoExtension -IsScanMandatory $true -VserverContext $vserver_name
    # -Filter : Filters to apply. Possible values :
    #            'scan_mandatory'      - Enable mandatory scan,
    #            'scan_ro_volume'      - Enable scans for read-only volume,
    #            'scan_execute_access' - Scan only files opened with execute-access (CIFS only)
    # -MaxFileSize : Max file-size (in bytes) allowed for scanning

# This sets the attributes of the antivirus engine installed
    Set-NcAntivirusEngine -Enable -LicenseKey "xxxx-xxxx-xxxx-xxxx" -Vendor "norton" -ProductInfo
"norton av 360" -LicenseType "full" -LicenseExpiration "09:12:2017" -Seats 2 -UpdateUrl
"https:/norton.com" -DesiredActivationCode "xxxx-xxxx-xxxx-xxxx" -CurrentActivationCode "xxxx-
xxxx-xxxx-xxxx"
    # -Enable  : If specified, the antivirus engine will be enabled
    # -Disable : If specified, the antivirus engine will be disabled
    # -LicenseType : Possible values : "full" - full license
    #                                  "eval" - evaluation license
    #                                  "none" - no license
```

```
    # -Seats : Number of nodes that can run an instance of the antivirus software
    # -UpdateUrl : HTTP/HTTPS url for downloading updates

# Modify the attributes of antivirus engine options
    Set-NcAntivirusEngineOption -GroupArchiveUnpack $true -MaxRecursionDepth 5 -HeuristicAnalysis
$true -MacroAnalysis $true -ScanMime $true -MimeLinesToScan 5 -CacheSize 512k -ProxyHost
"http://proxy_server_name" -ProxyPort 2552 -ProxyLogin "admin" -ProxyPassword "netapp1!" -
DecompressedFileCountLimit 256 -DecompressedFileSizeLimit 512 -DecompressionLayersLimit 10 -
DecompressionSizeFactor 256 -IsSpywareEnabled $true
    # -GroupArchiveUnpack  : If true, scan archive file formats
    # -MaxRecursionDepth   : Max recursion depth into archives
    # -HeuristicAnalysis   : If true, heuristic virus search analysis
    # -MacroAnalysis       : If true, macro virus search analysis
    # -ScanMime            : If true, scan MIME-encoded files
    # -MimeLinesToScan     : Max lines to scan to identify MIME file
    # -CacheSize           : Max cache size for scanning files. Specify the cache size using
format: <number>[k|m|g|t]

# Set the quarantine information of the Anti-Virus engine installed
    Set-NcAntivirusRemedy -Action "repair" -Option "add_extension" -Extension ".vir" -Repair
"quarantine" -Directory "/quarantine"
    # -Action : Possible values: "none"       - no action will be taken;
    #                            "repair"     - file will be reparied;
    #                            "delete"     - file will be deleted;
    #                            "quarantine" - file will be quarantined
    # -Option : Possible values: "move"          - file will be moved
    #                            "add_extension" - an extension will be added to the file
    # -Repair : Possible values: "none"       - no action will be taken
    #                            "delete"     - file will be deleted
    #                            "quarantine" - file will be quarantined

# Set the version information of the antivirus engine installed
    Set-NcAntivirusVersion -ClusterVersion "8.4" -ComponentUpdated "both" -Vsapi32BitVersion
"xxx-x" -Vsapi64BitVersion "xxx-x" -VirusPatternVersion "xxx-x" -SpywarePatternVersion "xxx-x"
    # -ClusterVersion        : The current cluster version of the engine
    # -ComponentUpdated      : The component that was updated
    #        Possible values : "engine" - only antivirus engine was updated
    #                          "vde"    - only virus definition files were updated
    #                          "both"   - both antivirus engine and virus definition files were
updated
    # -Vsapi32BitVersion     : The version of the 32-bit VSAPI engine
    # -Vsapi64BitVersion     : The version of the 64-bit VSAPI engine
    # -VirusPatternVersion   : The version of the virus pattern files
    # -SpywarePatternVersion : The version of the spyware pattern files

# Start an antivirus update job
    Start-NcAntivirusUpdate -Sync
    # -Sync : If specified, an antivirus update job should be started immediately

#-------------------------------------------------------------------------------
# Clean Antivirus
$vscan_pool_name = "vscanpool1"
    $vscan_policy_name = "vscanpolicy1"

    # Delete a Vscan On-Access policy
    Remove-NcVscanOnAccessPolicy -Name $vscan_policy_name -VserverContext $vserver_name

    # Delete an On-Demand report
    Remove-NcVscanOnDemandReport

    # Delete an On-Demand Task
    Remove-NcVscanOnDemandTask

    # Delete a Vscan scanner pool
    Remove-NcVscanScannerPool -Name $vscan_pool_name -VserverContext $vserver_name

#-------------------------------------------------------------------------------
```

7 Managing FPolicy

This section provides detailed information about the cmdlets that are used to manage the NetApp FPolicy feature. Figure 9 shows an overview of the process, and Table 9 lists the cmdlets.

Figure 9) Managing FPolicy.

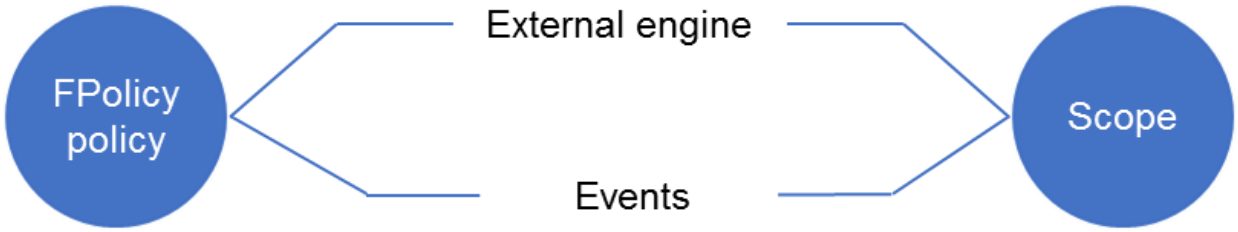


Table 9) Cmdlets for managing FPolicy.

Type	Description	Cmdlet
Provisioning FPolicy	Create a new event for the CIFS protocol	`New-NcFpolicyEvent`
Provisioning FPolicy	Create a new FPolicy policy external engine	`New-NcFpolicyExternalEngine`
Provisioning FPolicy	Create a new FPolicy policy	`New-NcFpolicyPolicy`
Provisioning FPolicy	Create FPolicy scope options	`New-NcFpolicyScope`
Modifying FPolicy	Enable a specific named policy	`Enable-NcFpolicyPolicy`
Modifying FPolicy	Disable a specific named policy	`Disable-NcFpolicyPolicy`
Modifying FPolicy	Make a connection to an FPolicy server	`Connect-NcFpolicyServer`
Modifying FPolicy	Terminate a connection to an FPolicy server	`Disconnect-NcFpolicyServer`
Modifying FPolicy	Set FPolicy event options	`Set-NcFpolicyEvent`
Modifying FPolicy	Modify an FPolicy external engine	`Set-NcFpolicyExternalEngine`
Modifying FPolicy	Modify a policy	`Set-NcFpolicyPolicy`
Modifying FPolicy	Create an export policy	`New-NcExportPolicy`
Modifying FPolicy	Set FPolicy scope options	`Set-NcFpolicyScope`
Monitoring FPolicy	List FPolicy event options	`Get-NcFpolicyEvent`
Monitoring FPolicy	Get information about external engines	`Get_NcFpolicyExternalEngine`
Monitoring FPolicy	Get information about policies	`Get-NcFpolicyPolicy`

Type	Description	Cmdlet
Monitoring FPolicy	List FPolicy scope options	`Get-NcFpolicyScope`
Monitoring FPolicy	Get information about the passthrough read connection status	`Get-NcFpolicyPassthroughReadConnection`
Monitoring FPolicy	Get information about the FPolicy server status	`Get-NcFpolicyServerStatus`
Monitoring FPolicy	Get information about the FPolicy policy status	`Get-NcFpolicyStatus`
Cleaning FPolicy	Delete an FPolicy event	`Remove-NcFpolicyEvent`
Cleaning FPolicy	Delete an FPolicy external engine	`Remove-NcFpolicyExternalEngine`
Cleaning FPolicy	Delete an FPolicy policy scope	`Remove-NcFpolicyScope`
Cleaning FPolicy	Delete a policy	`Remove-NcFpolicyPolicy`

```
# Provision Fpolicy
# Create a new event for the CIFS protocol
    New-NcFpolicyEvent -Name $event_name -Protocol cifs -FileOperation create,delete,read,write -
VserverContext $vserver_name

    # Create a new FPolicy policy external engine
    New-NcFpolicyExternalEngine -Name $external_engine_name -PrimaryServer 1.1.1.1 -Port 2357 -
SslOption no_auth -VserverContext $vserver_name

    # Create a new Fpolicy policy
    New-NcFpolicyPolicy -Name $fpolicy_name -Event $event_name -EngineName $external_engine_name
-NonMandatory -VserverContext $vserver_name

    # Create FPolicy scope options
    New-NcFpolicyScope -PolicyName $fpolicy_name -VserverContext $vserver_name

#-------------------------------------------------------------------------------
# Modify Fpolicy
# Enable a specific named policy
    Enable-NcFpolicyPolicy -Name $fpolicy_name -SequenceNumber 1 -VserverContext $vserver_name

    # Disables a specific named policy
    Disable-NcFpolicyPolicy -Name $fpolicy_name -VserverContext $vserver_name

    # Make a connection to FPolicy server
    Connect-NcFpolicyServer -PolicyName $fpolicy_name -FpolicyServer $fpolicy_server -Node
$cluster_nodes[0] -VserverContext $vserver_name

    # Terminate connection to FPolicy server
    Disconnect-NcFpolicyServer -PolicyName $fpolicy_name -FpolicyServer $fpolicy_server -Node
$cluster_nodes[0] -VserverContext $vserver_name

    # Set FPolicy event options
    Set-NcFpolicyEvent -Name $event_name -Protocol cifs -FileOperation create,delete,read,write -
Filter "first_read,first_write" -VolumeOperation $true -VserverContext $vserver_name
# Possible values for -Protocol     : "cifs", "nfsv3", "nfsv4"
# Possible values for -FileOperation:
#       "close"          - File close operation
#       "create"         - File create operation
#       "create_dir"     - File create directory operation
#       "delete"         - File delete operation
```

```
#       "delete_dir"     - Directory delete operation
#       "getattr"        - Get attribute operation
#       "link"           - Link operation
#       "lookup"         - Lookup operation
#       "open"           - File open operation
#       "read"           - File read operation
#       "write"          - File write operation
#       "rename"         - File rename operation
#       "rename_dir"     - Directory rename operation
#       "setattr"        - Set attribute operation
#       "symlink"        - Symbolic link operation
# Possible values for -Filter:
#       "monitor_ads"                  - Monitor alternate data stream
#       "close_with_modification"       - Filter close with modification
#       "close_without_modification"    - Filter close without modification
#       "first_read"                    - Filter first read
#       "first_write"                   - Filter first write
#       "offline_bit"                   - Filter offline bit set
#       "open_with_delete_intent"       - Filter open with delete intent
#       "open_with_write_intent"        - Filter open with write intent
#       "write_with_size_change"        - Filter write with size change
# Possible values for -VolumeOperation : "true", "false". If true, the volume operation required
for the event

# Modify an FPolicy external engine
Set-NcFpolicyExternalEngine -Name $external_engine_name -PrimaryServer 1.1.1.1 -Port 2357 -
SecondaryServer 2.2.2.2 -SslOption "mutual_auth" -RequestCancelTimeout 30 -RequestAbortTimeout 30
-StatusRequestInterval 5 -MaxConnectionRetries 8 -MaxServerRequests 25 -ServerProgressTimeout 30
-KeepAliveInterval 20 -CertificateCommonName $domain -CertificateSerial
"B1:B8:88:48:64:B7:45:52:21:CC:35:37:9E:24:50:EE:AD:58:02:B5" -CertificateCa
"certs/www.example.com.cert.pem" -RecvBufferSize 512KB -SendBufferSize 512KB -SessionTimeout 20 -
EnableResiliency -ResiliencyMaxRetentionDuration 360 -ResiliencyDirectoryPath '/path' -
Synchronous -VserverContext $vserver_name
# -RequestCancelTimeout  : Timeout in seconds for a screen request to be processed by an FPolicy
server. Default value : 20 seconds
# -RequestAbortTimeout   : Timeout in seconds for a screen request to be aborted by storage
appliance. Default value : 40 seconds
# -StatusRequestInterval : Interval time in seconds for storage appliance to query status request
from FPolicy server. Default value : 10 seconds
# -MaxConnectionRetries  : Number of times storage appliance will attempt to establish a broken
connection to FPolicy server. Default value : 5
# -MaxServerRequests     : Maximum number of outstanding screen requests that will be queued for
an FPolicy Server. Default value : 50
# -ServerProgressTimeout : Timeout in seconds in which a throttled FPolicy server must complete
at least one screen request. If no request is processed within the timeout, connection to FPolicy
server is terminated. Default value : 60 seconds
# -KeepAliveInterval     : Interval time in seconds for storage appliance to send keep-alive
message to FPolicy server. Default value : 10 seconds
# -RecvBufferSize        : Receive buffer size of connected socket for FPolicy Server. Default
value : 256KB
# -SendBufferSize        : Send buffer size of connected socket for FPolicy Server. Default value
: 256KB
# -SessionTimeout        : Session Id purge timeout during FPolicy server reconnection. Default
value : 10 seconds
# -EnableResiliency      : Specify to enable resiliency (Only Data ONTAP 8.4 and above)
# -ResiliencyMaxRetentionDuration : Maximum retention duration for which the notifications will
be stored. Default value : 180 seconds
# -Synchronous  : If specified, the external engine type is synchronous.  If the engine is
synchronous, reply is sent from FPolicy servers
# -Asynchronous : If specified, the external engine type is asynchronous.  If the engine is
asynchronous, no reply is sent from FPolicy servers

# Modify a policy
    Set-NcFpolicyPolicy -Name $fpolicy_name -Event $event_name -EngineName $external_engine_name
-Mandatory -AllowPrivilegedAccess true -PrivilegedUserName $localuser_name -
IsPassthroughReadEnabled $true -VserverContext $vserver_name

# Create export policies
$export_policy1 = "export_policy1"
$export_policy2 = "export_policy2"
```

```
New-NcExportPolicy -Name $export_policy1 -VserverContext $vserver_name
New-NcExportPolicy -Name $export_policy2 -VserverContext $vserver_name

# Set FPolicy scope options
Set-NcFpolicyScope -PolicyName $fpolicy_name -SharesToInclude $qtree_share_name -SharesToExclude
$vol_share_name -VolumesToInclude "vol*" -VolumesToExclude $vol_name -ExportPoliciesToInclude
$export_policy1 -ExportPoliciesToExclude $export_policy2 -FileExtensionsToInclude "vhd, vhdx,
vmdk" -FileExtensionsToExclude "txt" -CheckExtensionsOnDirectories $true -
IsMonitoringOfObjectsWithNoExtensionEnabled $true -VserverContext $vserver_name
    # -CheckExtensionsOnDirectories : If true, directory names are subjected to extensions check,
similar to file names
    # -IsMonitoringOfObjectsWithNoExtensionEnabled : Indicates whether monitoring of Objects with
no extension is enabled or not

#-------------------------------------------------------------------------------
# Clean Fpolicy
$event_name = "cifs_event"
$external_engine_name = "engine1"
$fpolicy_name = "fpolicy1"

# Delete FPolicy event
Remove-NcFpolicyEvent -Name $event_name -VserverContext $vserver_name

# Delete an FPolicy external engine
Remove-NcFpolicyExternalEngine -Name $external_engine_name -VserverContext $vserver_name

# Delete an FPolicy policy scope
Remove-NcFpolicyScope -PolicyName $fpolicy_name -VserverContext $vserver_name

# Delete a policy
Remove-NcFpolicyPolicy -Name $fpolicy_name -VserverContext $vserver_name

#-------------------------------------------------------------------------------
```

8 Managing Day-to-Day Tasks

This section provides detailed information about managing day-to-day tasks. Regular tasks include:

- Reviewing critical share permissions
- Displaying share NTFS ACLs (`Get-NcFileDirectorySecurity`)

```
PS C:\> Get-NcFileDirectorySecurity -Path /smb3vm2 -VserverContext infra


NcController          : 10.195.49.190
SecurityStyle         : ntfs
EffectiveStyle        : ntfs
DosAttributes         : 16
DosAttributesText     : ----D---
DosAttributesExpanded :
UnixUserId            : 0
UnixGroupId           : 0
UnixModeBits          : 777
Acls                  : {NTFS Security Descriptor, Control:0x8004,
                        Owner:BUILTIN\Administrators, Group:BUILTIN\Administrators...}
Inode                 : 64
Path                  : /smb3vm2
```

- Listing current CIFS sessions and details (`Get-NcCifsSession`)

```
PS C:\> Get-NcCifsSession -ConnectionId 1109371042

LifAddress          SessionId   ConnectionId    ConnectedTime ProtocolVersion    Address          Vserver
----------          ---------   ------------    ------------- ---------------    -------          -------
10.238.189.112   ...582703621     1109371042     2d 3h 2m 27s smb3_1             10.238.189.39    infra


PS C:\> Get-NcCifsSession -ConnectionId 1109371042 | Format-List


Address                  : 10.238.189.39
AuthMechanism            : ntlmv2
ConnectedTime            : 2d 3h 2m 40s
ConnectionCount          : 1
ConnectionId             : 1109371042
ContinuouslyAvailable    : yes
Files                    : 1
IdleTime                 : 2m 34s
IsSessionSigned          : False
LifAddress               : 10.238.189.112
NcController             : 10.195.49.190
NetbiosName              :
Node                     : f8040-187-34-35-01
Other                    : 0
ProtocolVersion          : smb3_1
SessionId                : 144357256555827036 21
Shares                   : 1
SmbEncryptionStatus      : unencrypted
```

- Determining which client opened the file (`Get-NcCifsSession`, `Get-NcCifsSessionFile`)

```
PS C:\> Foreach ($c in Get-NcCifsSessionFile) `
    { Get-NccifsSession -ConnectionId $c.ConnectionId;$c.Share + "\" + $c.Path;" "}

LifAddress          SessionId   ConnectionId    ConnectedTime ProtocolVersion    Address          Vserver
----------          ---------   ------------    ------------- ---------------    -------          -------
10.238.189.113   ...521486346     2553524503          26m 14s smb3_1             10.238.189.39    infra
sharevol\share11\sessionfile.txt

10.238.189.113   ...521486346     2553524503          26m 14s smb3_1             10.238.189.39    infra
smb3vm2\test.rtf
```

- Displaying locks (`Get-NcLock`)

```
PS C:\> Get-NcLock `
| Format-table -Property ClientAddress,IsSharelockSoft,Volume,Vserver,lif,Lockid,LockType

ClientAddress IsSharelockSoft Volume   Vserver Lif             Lockid                                 LockType
------------- --------------- ------   ------- ---             ------                                 --------
10.238.189.39           False sharevol infra   infra_smb3_lif2 7a19bb2e-4e16-44d6-afec-70eccec51607 share_level
10.238.189.39           False sharevol infra   infra_smb3_lif2 a7882b71-d331-4f40-87ea-fafad78c9ee2 share_level
10.238.189.39           False sharevol infra   infra_smb3_lif2 97cbbfbb-23ac-4121-8aa9-2e1c6fc5af54 share_level
10.238.189.39           False smb3vm2  infra   infra_smb3_lif1 1837d581-97cf-4813-b482-c2c0c29034fb share_level
10.238.189.39           False smb3vm2  infra   infra_smb3_lif2 85750bcb-cea7-4a9f-8233-357e48b05889 share_level
```

- Invoking the CLI commands from NetApp PowerShell Toolkit (PSTK)

```
# CLI commands can be invoked from PSTK using cmdlet 'Invoke-NcSSh'
# Basic example to invoke a CLI command for secd

$cmd_set_diag = "set diag -confirmations off"

for($i=0; $i -lt $cluster_nodes.Count; $i++)
{
    $node = $cluster_nodes[$i]
    $cmd_secd = "statistics secd show -node $node -vserver $vserver_name"

    Invoke-NcSsh -Command $cmd_set_diag
    Invoke-NcSsh -Command "$cmd_set_diag; $cmd_secd"
}
```

- Retrieving the CIFS performance counters

```
# Retrieve CIFS performance objects
$perf_object = Get-NcPerfObject | where {$_.Name -cmatch 'cifs'}
# This will return the following perf objects : cifs, cifs:node, cifs:vserver, cifs_cap,
cifs_cap:constituent, cifs_shadowcopy, cifs_watch and nblade_cifs

# For each of the retrieved performance objects, get the perf counters
foreach($object in $perf_object)
{
        # Get list of performance counters
    $perf_counters = Get-NcPerfCounter -Name $object.Name
        # Get list of performance object instances
    $instance = Get-NcPerfInstance -Name $object.Name

    $mod_perf_counters = @()
    foreach($counter in $perf_counters)
    {
        $mod_counter = [pscustomobject]@{Name=$counter.Name;Unit=$counter.Unit}
        $mod_perf_counters += $mod_counter
    }

    $arr = @()

    for ($i=0; $i -lt $mod_perf_counters.Count; $i++)
    {
        $name = $mod_perf_counters[$i].Name
        $unit = $mod_perf_counters[$i].Unit

            # Get list of current counter values of instances of an object
        $perf_data = Get-NcPerfData -Name $object.Name -Instance $instance.Name -Counter
$mod_perf_counters[$i].Name

        $arritem = [pscustomobject]@{Name=$name;Unit=$unit;Value=$perf_data.Counters.Value}
        $arr += $arritem
    }
    Write-Host "------------------------------------------------------------------------"
    Write-Host " Perf Object : " $object.Name
    Write-Host "------------------------------------------------------------------------"
    $arr
    Write-Host "------------------------------------------------------------------------"
}
```

References

The following references were used in this document.

- System Administration Guide for Cluster Administrators
  https://library.netapp.com/ecmdocs/ECMP1636037/html/frameset.html
- Best Practices Guide for Windows File Services
  http://www.netapp.com/us/media/tr-4191.pdf
- CIFS/SMB Configuration Express Guide
  https://library.netapp.com/ecm/ecm_get_file/ECMP1547457
- ONTAP File Access and Protocols Management Guide
  https://fieldportal.netapp.com/content/200567
- Getting Started with PSTK
  http://community.netapp.com/t5/Virtualization-and-Cloud-Articles-and-Resources/Getting-Started-With-Data-ONTAP-PowerShell-Toolkit-pptx/ta-p/87123
- Making the Most of PSTK
  http://community.netapp.com/t5/Virtualization-and-Cloud-Articles-and-Resources/Making-The-Most-Of-Data-ONTAP-PowerShell-Toolkit/ta-p/87234
- ONTAP PowerShell Toolkit Primer
  http://www.netapp.com/us/media/tr-4161.pdf

- TR-4475: NetApp PowerShell Toolkit Best Practices Guide
  https://fieldportal.netapp.com/content/316607

Refer to the Interoperability Matrix Tool (IMT) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.