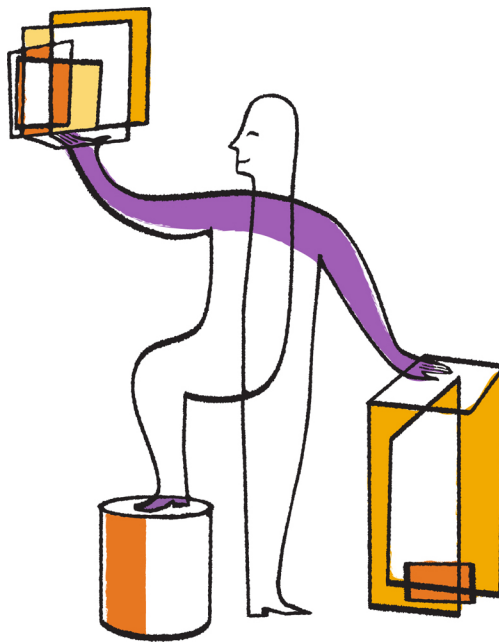




NetApp® OnCommand® Shift 1.0

Conversion and Administration Guide



NetApp, Inc.
495 East Java Drive
Sunnyvale, CA 94089
U.S.

Telephone: +1 (408) 822-6000
Fax: +1 (408) 822-4501
Support telephone: +1 (888) 463-8277
Web: www.netapp.com
Feedback: doccomments@netapp.com

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Product overview

OnCommand Shift is a Windows PowerShell-based interface that enables you to migrate virtual machines from one hypervisor to another.

OnCommand Shift leverages FlexClone technology for the rapid conversion of virtual machine hard drives from one hypervisor format to another. OnCommand Shift 1.0 supports bidirectional conversion as follows:

- VMware ESXi to Microsoft Hyper-V
- Microsoft Hyper-V to VMware ESXi

OnCommand Shift replaces the MAT4Shift tool.

OnCommand Shift components

You can install OnCommand Shift either on a Microsoft Hyper-V server or on a stand-alone server (either physical or virtual). OnCommand Shift consists of multiple components that enable you to migrate virtual machines from one hypervisor to another.

Shift Server

The Shift Server executes OnCommand Shift operations. The Shift Server communicates with VMware ESXi and Microsoft Hyper-V using VMware Power CLI and Hyper-V Server PowerShell module. For supported Shift Server hosts, see the Interoperability Matrix.

The Shift Server can run one hypervisor format conversion at a time. If you need to run multiple concurrent conversions, you can define multiple instances of the Shift Server.

Data ONTAP SVM

A Storage Virtual Machine (SVM) is a logical storage server that provides data access to LUNs and the Network Attached Storage (NAS) namespace from one or more LIFs. You must create an SVM for use during OnCommand Shift operations. All VMs you want to convert must first be moved onto this SVM using either VMware vSphere Storage vMotion or Microsoft Hyper-V Storage Live Migration on your Data ONTAP storage. For more information about SVMs, see the *Clustered Data ONTAP System Administration Guide*.

ShiftClient

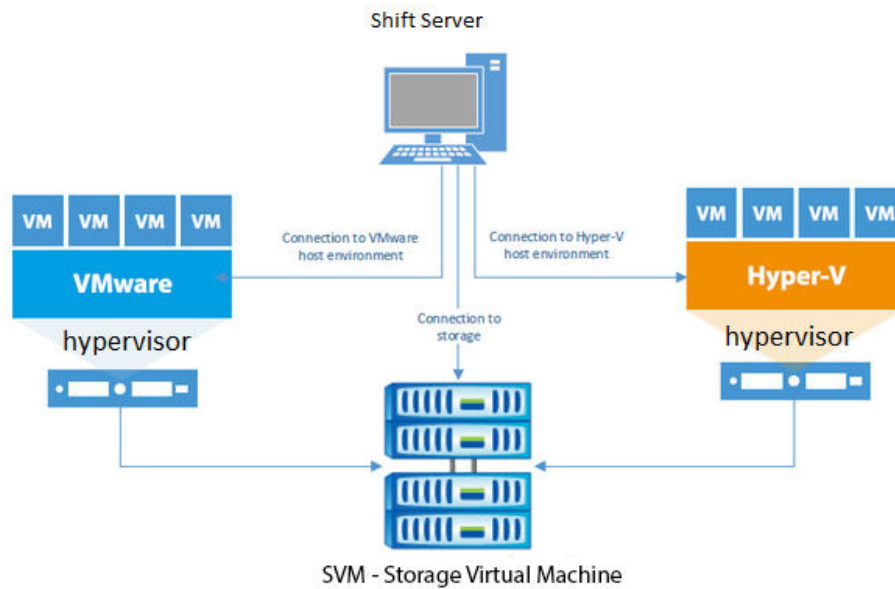
ShiftClient is a PowerShell module installed with OnCommand Shift containing all the PowerShell cmdlets.

Related information

[NetApp Interoperability Matrix Tool](#)

How OnCommand Shift works

OnCommand Shift works by connecting the Shift Server to your Microsoft Hyper-V and VMware ESXi hosts, as well as to shared storage. OnCommand Shift leverages FlexClone technology to convert the virtual machine hard drives from one hypervisor format to the other.



Protocols and communication methods

You should be familiar with the protocols and communication methods that OnCommand Shift uses during its operations.

HTTPS

Used by the OnCommand Shift client to communicate with the Shift Server; also used to communicate to the NetApp cluster. IPv6 is not supported. IPv4 is supported.

VI Java (VI SDK), VMware PowerCLI

Used when communicating with VMware ESXi.

Windows PowerShell module or PowerShell ISE

Used when communicating with Microsoft Hyper-V.

Converting VMs

You can rapidly convert VMs from one hypervisor format to another. You can perform bidirectional conversion between Microsoft Hyper-V and VMware ESXi. Before you can attempt this operation, you must complete all steps in the [NetApp OnCommand Shift 1.0 Installation and Setup Guide](#) “Installing and setting up OnCommand Shift for the first time”.

Moving source VMs onto the Data ONTAP SVM

Before you can convert your source VMs to another hypervisor format, you must move the source VMs onto the Data ONTAP SVM.

Before you begin

Before you can attempt this operation, you must complete all steps in the [NetApp OnCommand Shift 1.0 Installation and Setup Guide](#) “Installing and setting up OnCommand Shift for the first time”.

Step

1. According to your conversion scenario, perform one of the following actions:

Conversion scenario	Action
VMware ESXi to Microsoft Hyper-V	Perform a vSphere Storage vMotion job onto the appropriate storage.
Microsoft Hyper-V to VMware ESXi	Perform a Hyper-V Storage Live Migration job to the appropriate storage (CIFS share).

Related tasks

[Converting VMs from Microsoft Hyper-V to VMware ESXi](#) on page 6

[Converting VMs from VMware ESXi to Microsoft Hyper-V](#) on page 7

Converting VMs from Microsoft Hyper-V to VMware ESXi

You can convert Microsoft Hyper-V VM hard drives to the VMware ESXi format.

Before you begin

The source VMs must reside on the Data ONTAP SVM.

About this task

If the conversion fails, the VM should automatically roll back.

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Steps

1. Connect to the Shift Server:

```
Connect-ShiftServer -host string -port integer -credential PSCredential -timeoutsec integer
```

If you do not define the `-host`, `-port` and `-timeoutsec` values, the default values are used.

If you do not define your Shift Server credentials, the Shift Server prompts you for them.

2. Convert the VM:

```
Convert-VirtualMachine -source hyperv -destination esx -name string  
-credential PSCredential -ipAddress string -domain string  
-resourcePoolName string -force
```

Example

Converting “TestVM” from Microsoft Hyper-V to VMware ESXi:

```
Convert-VirtualMachine -source hyperv -destination esx -name TestVM
```

3. Optional: Check the job status:

```
Get-ShiftJobStatus -name job_ID -loop
```

To cancel the job status loop, press Ctrl-C.

After you finish

Verify that your VM is online.

Create a post-conversion restore point: using your VM backup management tool, create a backup of your VM. OnCommand Shift does not automatically back up newly converted VMs.

Related tasks

[Moving source VMs onto the Data ONTAP SVM](#) on page 6

Converting VMs from VMware ESXi to Microsoft Hyper-V

You can convert VMware ESXi VM hard drives to the Microsoft Hyper-V format.

Before you begin

The source VMs must reside on the Data ONTAP SVM.

About this task

If the conversion fails, the VM should automatically roll back.

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Steps

1. Connect to the Shift Server:

```
Connect-ShiftServer -host string -port integer -credential PSCredential  
-timeoutsec integer
```

If you do not define the -host, -port and -timeoutsec values, the default values are used.

If you do not define your Shift Server credentials, the Shift Server prompts you for them.

2. Convert the VM:

```
Convert-VirtualMachine -source esx -destination hyperv -name string  
-credential PSCredential -ipAddress string -domain string -force
```

Example

Converting “TestVM” from VMware ESXi to Microsoft Hyper-V:

```
Convert-VirtualMachine -source esx -destination hyperv -name TestVM
```

- Optional: Check the job status:

```
Get-ShiftJobStatus -name job_ID -loop
```

To cancel the job status loop, press Ctrl-C.

After you finish

Verify that your VM is online.

Create a post-conversion restore point: using your VM backup management tool, create a backup of your VM. OnCommand Shift does not automatically back up newly converted VMs.

Related tasks

[Moving source VMs onto the Data ONTAP SVM](#) on page 6

PowerShell cmdlet for VM conversions

The cmdlet used for converting VMs is `Convert-VirtualMachine`. This cmdlet has various parameters.

The full syntax of `Convert-VirtualMachine` includes the following structure and parameters:
`Convert-VirtualMachine -source SourceHypervisor -destination DestinationHypervisor -name string -credential PSCredntial -ipAddress string -domain string -resourcePoolName string -force`

Parameter	Definition
Source	The hypervisor where the VM currently resides. Options are either <code>esx</code> or <code>hyperv</code> .
Destination	The hypervisor where the VM to be migrated resides. Options are either <code>esx</code> or <code>hyperv</code> .
Name	The name of the VM to be migrated
Credential	This is an optional parameter. If it is not included, the credential specified with the <code>Set-ShiftGuestOSConfig</code> cmdlet is used.
ipAddress	The IP address of the VM to be migrated. This is not needed if the name can be resolved.
Domain	The domain to which the VM to be migrated is currently connected. This is only required if the <code>-credential</code> parameter is specified.
resourcePoolName	This parameter is only valid for migrations to ESXi. It Assigns newly converted VMs to a preexisting VMware resource pool. If it is not specified, the default is used.

Migrating a VM from ESXi to Hyper-V

```
Convert-VirtualMachine -source esx -destination hyperv -name TestVM
```

Migrating a VM from Yper-V to ESXi

```
Convert-VirtualMachine -source hyperv -destination esx -name TestVM
```

Checking the status of a conversion job

A VM conversion job is started when you use the `Convert-VirtualMachine` cmdlet; you can check the status of one or all such jobs currently running.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Step

1. To check the status of all jobs or a specific job, do one of the following:
 - To check the status of all jobs currently running, enter:
Get-ShiftJobStatus -loop
 The `-loop` parameter causes the Job status to refresh automatically every 30 seconds. You can cancel the job status loop by pressing **Ctrl-C**.
 - To check the status of a specific job, enter:
Get-ShiftJobStatus -name *job_ID* -loop
 The job ID was displayed when you ran `Convert-VirtualMachine`. You can cancel the job status loop by pressing **Ctrl-C**.

Verifying that the converted VMs are online

You can choose to verify that your VMs are online after conversion has finished.

Step

1. To check that the newly converted VMs are online, connect to the VM using its hypervisor manager:
 - VMware vSphere Client
 - Microsoft Hyper-V Manager

Restoring a VM after a failed conversion

If a VM fails to convert to a new format, the default behavior is for the VM to automatically roll back using the last FlexClone copy. In some cases, the automatic rollback process fails; when this happens, you can manually restore the VM to its original state.

Before you begin

The source VMs must reside on the Data ONTAP SVM.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Step

1. Enter:

```
Restore-VirtualMachine -name string -source esx|hyperv -force
```

Example

The following syntax shows restoring the VMware ESXi VM “TestVM” from its backup:

```
Restore-VirtualMachine -source esx -name TestVM
```

Interacting with the Shift Server

You must run `Connect-ShiftServer` before issuing any other PowerShell cmdlets, except `Get-ShiftServerState`.

Connecting to the Shift Server

To perform most operations on the Shift Server, you must first connect to the Shift Server using `Connect-ShiftServer`.

About this task

You must run `Connect-ShiftServer` before issuing any other PowerShell cmdlets, except `Get-ShiftServerState`.

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Steps

1. Enter your server information:

`Connect-ShiftServer -host string -port integer -credential PSCredential -timeoutsec integer`

If you do not specify the `-credential` parameter, you are prompted for your user name and password.

Example

The following example connects to the Shift Server with the default host “localhost” and default port number 8443:

`Connect-ShiftServer`

Example

The next example connects to the Shift Server with a specified host name and port number:

`Connect-ShiftServer -host ShiftServer3 -port 8181`

2. Optional: Check the Shift Server status:

`Get-ShiftServerState -host string -port integer -timeoutsec integer`

Checking the Shift Server state

If you are encountering problems or the PowerShell cmdlets are not working, you should first verify your Shift Server state.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Step

1. To retrieve the state of your Shift Server, enter:

`Get-ShiftServerState -host string -port integer -timeoutsec integer`

Example

Retrieving the Shift Server state at the default host and port:

Get-ShiftServerState

Disconnecting from the Shift Server

You can disconnect from the Shift Server when you are finished with OnCommand Shift operations, or if you need to restart the Shift Server connection.

Before you begin

The Shift Server must already be connected for you to disconnect.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Step

1. Disconnect from the Shift Server:

Disconnect-ShiftServer

Modifying your OnCommand Shift configuration

When you install OnCommand Shift, there are some default Shift Server configurations. If you need to add, update, view, or remove a configuration, you can use the configuration cmdlets.

Adding network mappings

Network settings within VMs are automatically detected, but the external networks configured within ESXi (also known as *vmPortGroups*) and Hyper-V (also known as *Hyper-V switches*) are not. Before you can migrate a VM, you must define the network mappings so that the VM can continue to communicate on the network.

Before you begin

The Shift Server must already be connected.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Steps

1. Find all the networks that exist in your environment:

- For ESXi, run
Get-VirtualPortGroup.
- For Hyper-V, run
Get-VMSwitch.

A table is returned with all the network adapters associated with the Hyper-V server. These network adapters are listed in the Name column.

2. Find all the networks connected to a specific VM:

- For ESXi, run the following:
Get-VM -Name *VMName* | Get-NetworkAdapter
- For Hyper-V, run the following:
Get-VMNetworkAdapter -VMName "*VirtualMachineName*"

If the VM exists, a table is returned with all the network adapters associated with the VM. For ESXi, the adapters are listed in the NetworkName column. For Hyper-V, the network adapters are listed in the SwitchName column.

After you finish

If you change your credentials or settings, you are prompted to reenter your credentials.

Removing the existing network configuration

You can remove the existing network configuration from OnCommand Shift.

Before you begin

The Shift Server must already be connected for you to interact with this configuration.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Step

1. Remove the existing network configuration:

```
Remove-ShiftNetworkConfig -name string -force
```

Example

```
Remove-ShiftNetworkConfig -name Network-A
```

Viewing the existing network configuration

If you are encountering problems, you can view your existing network configuration to verify that it is as expected.

Before you begin

The Shift Server must already be connected.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Step

1. View the existing network configuration:

```
Get-ShiftNetworkConfig -name string
```

Example

```
Get-ShiftNetworkConfig -name Network-A
```

Configuring the default guest OS settings

When converting virtual machines, you can enter guest OS credentials for each VM to be converted. If the credentials are always the same, you can set default guest OS credentials to be used.

Before you begin

The Shift Server must already be connected.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Steps

1. Update the existing guest OS configuration from the command prompt:

```
Set-ShiftGuestOSConfig -credential PSCredential -domain string -force
```

The `-domain` parameter is the domain to which the VM to be migrated is currently connected. It is only required if the `-credential` parameter is specified. If you do not specify the `-credential` parameter, you will be prompted for your guest OS username and password.

Example

Updating the default guest OS configuration:

```
Set-ShiftGuestOSConfig -domain eng
```

Example

Updating the default guest OS configuration with credentials provided in the `$cred` parameter:

```
$password = ConvertTo-SecureString -AsPlainText -Force "GuestOSpassword"  
$cred = new-object -typename System.Management.Automation.PSCredential  
-argumentlist "GuestOSusername", $password  
Set-ShiftGuestOSConfig -domain eng -cred $cred
```

2. To script this command, you can add the `-credential` parameter and a saved credential object.

For more information about creating saved credential objects, see Microsoft documentation about Get-Credential: [Microsoft TechNet Script Center: Get-Credential](#).

Viewing the existing guest OS configuration

You can view the existing guest OS configuration. If you are encountering problems, it is important to verify that your configuration is as expected.

Before you begin

The Shift Server must already be connected for you.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Step

1. View the existing guest OS configuration:

```
Get-ShiftGuestOSConfig
```

Configuring the hypervisor settings

You must enter your hypervisor configuration settings for VMware ESXi and Microsoft Hyper-V.

Before you begin

The Shift Server must already be connected.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Steps

1. Configure the VMware ESXi hypervisor:

```
Set-ShiftHypervisorConfig -name VMWARE -IPAddress hypervisor_IPaddress -hostname hypervisor_host_name -datacenter data_center -force
```

- The `-name` parameter is not case sensitive, so both VMWARE and vmware can be used. The `(-)` in Hyper-V is required.
- The `-datacenter` parameter is the name of the data center you are connecting to.
- If you do not specify the `-credential` parameter, you are prompted for your ESXi host user name and password.

Example

Updating the VMware ESXi hypervisor configuration:

```
Set-ShiftHypervisorConfig -name vmware -IPAddress 10.0.0.1
```

2. Configure the Microsoft Hyper-V hypervisor:

```
Set-ShiftHypervisorConfig -name HYPER-V -IPAddress string -hostname string -datacenter string -force
```

If you do not specify the `-credential` parameter, you are prompted for your Hyper-V administrator host user name and password.

Example

Updating the Hyper-V hypervisor configuration using a saved credential object:

```
$password = ConvertTo-SecureString -AsPlainText -Force  
"HypervisorPassword"
```

```
$cred = new-object -typename System.Management.Automation.PSCredential -argumentlist "HypervisorUsername", $password
```

```
Set-ShiftHypervisorConfig -name vmware -IPAddress 10.0.0.1 -cred $cred
```

3. To script this command, you can add the `-credential` parameter and a saved credential object.

For more information about creating saved credential objects, see Microsoft documentation about Get-Credential: [Microsoft TechNet Script Center: Get-Credential](#).

Viewing the existing hypervisor configuration

If you are encountering problems, you can view your existing hypervisor configuration to verify that it is as expected.

Before you begin

The Shift Server must already be connected.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Step

1. To view an existing hypervisor configuration, enter:

```
Get-ShiftHypervisorConfig -name string
```

Example

```
Get-ShiftHypervisorConfig -name VMWARE
```

Configuring the Data ONTAP settings

Before you can convert virtual machines, you must first configure several Shift settings. These settings are necessary to connect to your storage system, your VMware ESXi host, and your Microsoft Hyper-V host.

Before you begin

The Shift Server must already be connected.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Steps

1. Configure the Data ONTAP settings:

```
Set-ShiftOntapConfig -clusterIp string -destinationPath string -force
```

-clusterIp is the cluster management LIF.

If you do not specify the -credential parameter, you are prompted for your cluster management administrator user name and password:

Example

```
Set-ShiftOntapConfig -clusterIp 10.0.0.1 -destinationPath /dest/vm
```

2. To script this command, you can add the -credential parameter and a saved credential object.

For more information about creating saved credential objects, see Microsoft documentation about Get-Credential: [Microsoft TechNet Script Center: Get-Credential](#).

Viewing the existing Data ONTAP configuration

You can view the existing Data ONTAP configuration. If you are encountering problems, it is important to verify that your configuration is as expected.

Before you begin

The Shift Server must already be connected.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Step

1. View the existing Data ONTAP configuration:

```
Get-ShiftOntapConfig
```

Troubleshooting OnCommand Shift

If you encounter a problem with OnCommand Shift, you should use any error messages that you receive to help with troubleshooting.

Log location

You can access logs to troubleshoot problems with OnCommand Shift.

Logs are located at `C:\Program Files (x86)\NetApp\OnCommand Shift\log\shift-server.log`.

Generating reports

You can generate and analyze OnCommand Shift reports to help identify and diagnose problems.

About this task

Issue these commands from the Shift Server using a PowerShell or PowerShell ISE prompt.

Step

1. To generate the OnCommand Shift report, enter:

```
Get-ShiftReport -file string
```

Example

Downloading the OnCommand Shift report file as “shiftreport.csv”:

```
Get-ShiftReport -file shiftreport.csv
```

The OnCommand Shift report downloads to the folder from which you run the command.

The RPC server is unavailable.

Message

The RPC server is unavailable.

Description

This message occurs when the guest system does not have the necessary firewall exception for OnCommand Shift.

Corrective action

Guest OS on Hyper-V	Corrective action
Windows Server 2008	1. Open Start > Control Panel > Windows Firewall. 2. Select Allow a program through Windows Firewall. 3. Click the Exceptions tab. 4. Select the File and Printer Sharing check box. 5. Select the Windows Instrumentation (WMI) check box. 6. Click OK.
Windows Server 2008 R2 Windows Server 2012 Windows Server 2012 R2	1. Open Start > Control Panel > System and Security > Windows Firewall. 2. Select Allow a program or feature through Windows Firewall. 3. Select the Windows Management Instrumentation (WMI) check box, which automatically selects the check box in the Domain column. 4. Click OK.
Windows 7 Windows 8 Windows 8.1	1. Open Start > Control Panel > Windows Firewall. 2. Select Allow a program through Windows Firewall. 3. Click the Exceptions tab. 4. Select the File and Printer Sharing check box. 5. Select the Windows Instrumentation (WMI) check box. 6. Click OK.

Execution policy is not changed for external scripts**Messages**

You receive the following errors during installation:

```
PS C:\Users\Administrator.SHIFTQA> Get-ShiftServerState
Get-ShiftServerState : The 'Get-ShiftServerState' command was found in
the module 'ShiftClient', but the module could
not be loaded. For more information, run 'Import-Module ShiftClient'.
```

```

At line:1 char:1
+ Get-ShiftServerState
+ ~~~~~
    + CategoryInfo          : ObjectNotFound: (Get-ShiftServerState:String) [], CommandNotFoundException
    + FullyQualifiedErrorId : CouldNotAutoloadMatchingModule

```

Description

During installation, Set-ExecutionPolicy Unrestricted does not change the execution policy for external scripts. You must go to the group policy editor by using gpedit.msc to change it.

Corrective action

1. Run **gpedit.msc**.
2. Navigate to **Computer Configuration > Administrative Templates > Windows Components > Windows PowerShell**.
3. Turn On Script Execution.
4. Set Policy to **Enabled**.
5. Change the execution policy to **Allow all scripts**.
6. Uninstall and reinstall Shift.

VMWARE_DEST_DATASTORE_NOT_FOUND

Message

VMWARE_DEST_DATASTORE_NOT_FOUND

Description

Your NFS server is using a hostname instead of the IP address on the NFS device.

Corrective action

Fix your DNS setup; make sure reverse lookup is working for the NFS server IP address.

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- NetApp, Inc., 495 East Java Drive, Sunnyvale, CA 94089 U.S.
- Telephone: +1 (408) 822-6000
- Fax: +1 (408) 822-4501
- Support telephone: +1 (888) 463-8277

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