PowerScale OneFS Simulator

Installation Guide

July 2024

DELL Technologies

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

Chapter 1: Introduction to the OneFS Simulator Installation Guide....4
About this guide....4
OneFS Simulator overview....4
System requirements....4

Chapter 2: Network Configurations....6
Network settings....6
Record network configuration data....6

Chapter 3: OneFS Simulator Installation....8
Installing OneFS Simulator....8
Installing OneFS Simulator by importing the OVA file....8
Deploy OneFS Simulator on an ESXi server....9

Chapter 4: Updating the network interface....13
Updating the network interface overview....13
Update the network interfaces....13

Chapter 5: Virtual cluster configuration....16
Configure a virtual cluster....16
Virtual cluster configuration settings....16

Chapter 6: OneFS management....19
Manage a virtual cluster....19
Connect to a virtual node through SSH....19
Connect to a virtual node through the web administration interface....20

Chapter 7: Uninstalling OneFS simulator....21
Uninstall OneFS Simulator....21

1

Introduction to the OneFS Simulator Installation Guide

This section contains the following topics:

Topics:

- About this guide
- OneFS Simulator overview
- System requirements

About this guide

This guide describes how you can install and configure OneFS Simulator to monitor and manage virtual clusters. This guide also describes how to run virtual nodes on the virtualization products supported by VMware.

NOTE: OneFS Simulator is for demonstration and noncommercial purposes only and should not be installed in a production environment.

NOTE: OneFS Simulator is an unsupported tool that can be used for nonperformance related testing or evaluation.

OneFS Simulator overview

OneFS Simulator is a virtual version of the physical storage nodes that you can deploy in a physical infrastructure.

On new installations of OneFS 9.x.x.x, all protocols are disabled by default. The customer should enable any protocol that they plan to use. On new installations of OneFS 9.x.x.x, the default /ifs export and ifs share no longer exist.

CAUTION: Customers will receive a notification of unsecured protocols that are disabled for upgrades. If a customer decides to enable these protocols, they will have to agree to being aware of the security risks.

NOTE: An upgrade is affected depending on the OneFS version that you are upgrading to. You should read the release notes for what protocols and features are affected in your upgrade.

Throughout this document, the following conventions are used:

- A *virtual node* refers to a virtual machine.
- A *host* refers to a physical host with a virtual infrastructure, such as VMware ESXi or VMware Workstation.

System requirements

Before you install a virtual node, verify that your system meets the requirements for the virtual version of OneFS. At least three virtual nodes are required to create an PowerScale OneFS virtual cluster.

NOTE: Virtual nodes are for demonstration purposes only and are ineligible for support or repair by Dell Technologies Support.

Table 1. Host System Requirements

Component	Value	Notes
RAM	A minimum of 6 GB RAM for a virtual node is required for a fully populated virtual cluster. This minimum is the	Virtual nodes might not function correctly if they do not meet the recommended memory requirements.

Table 1. Host System Requirements (continued)

Component	Value	Notes
	default requirement. More memory does improve virtual node performance if the amount of RAM is consistent across all nodes.	**NOTE:** Other nodes that are added to your virtual environment to provide services, such as the Active Directory domain controller service or DNS service, have additional memory requirements.
Processor	VT-capable processor	Virtualization technology must be enabled in the BIOS.
Hard drive	100 GB of disk space per virtual node for a fully populated virtual cluster	**NOTE:** Hard drive size is set at 100 GB, no option is available to increase size. Giving a larger size will not change the total space per node of 100 GB.
Operating system	The following operating systems have been tested for and validated for the installation: ● Microsoft Windows 10 (22H2) (recommended) ● Ubuntu 20.04	All the procedures in this guide are based on the Microsoft Windows operating system. Some of the steps in the procedures might differ based on your host operating system.
Virtual infrastructure	Standalone components: ● VMware Server ● VMware Fusion ● VMware Workstation ● VMware Player VMware vSphere components: ● VMware ESXi 6.7, 7.0.3	Install at least one stand-alone component. If you are installing VMware Workstation, VMware Player, or VMware Fusion, ensure that the external network is configured as a bridged network and not as a nat network. This configuration allows the clients to access the virtual nodes. VMware Player is available at: VMware Workstation Player

2

Network Configurations

This section contains the following topics:

Topics:

- Network settings

Network settings

It is critical that you set up the internal and external network of a virtual cluster according to the networking setup on your host system.

Follow these guidelines to set up your virtual network:

- Reserve an IP address range for configuring your virtual cluster. You must be able to route the IP range through the hardware host for your virtual cluster. You can perform this step by setting up a virtual interface on your system with an IP address from the same subnet as your virtual cluster. Alternatively, you can configure IP addresses from the same subnet as your hardware host for your virtual cluster.
- Virtual clusters have two network interfaces: NAT and bridged. The NAT interface facilitates internal communication within the virtual cluster and does not need to be public and routable. The bridged interface facilitates client access and must be public and routable. If you are setting up VMware Workstation, VMware Player, or VMware Fusion as a host, ensure that the external network is configured as a bridged interface to enable clients to access the virtual nodes.
- It is recommended that you allocate sufficient internal IP addresses to accommodate any changes that you might want to make to your virtual cluster. If your virtual cluster does not have an available internal IP address, you cannot add new virtual nodes to your virtual cluster.

Record network configuration data

Record the configuration information for your internal and external networks before installing the virtual nodes and configuring your virtual cluster.

1. Type `ipconfig` at the Windows command prompt.
   The network information appears as shown in the following sample output:

```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\student1>ipconfig

Windows IP Configuration


Wireless LAN adapter Wireless Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . : isilon.com
   Link-local IPv6 Address . . . . . : fe80::bceb::99fd:182b:2d7%11
   IPv4 Address. . . . . . . . . . . : 10.8.13.166
   Subnet Mask . . . . . . . . . . . : 255.255.254.0
   Default Gateway . . . . . . . . . : 10.8.12.1

Ethernet adapter VMware Network Adapter VMnet1:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::bc49:183c:fc92:d6f2%19
```

```
   IPv4 Address. . . . . . . . . . . : 192.168.208.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Ethernet adapter VMware Network Adapter VMnet8:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::2cdc::48fc:2927:408a%21
   IPv4 Address. . . . . . . . . . . : 192.168.47.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :
```

2. Record the following internal and external network configuration details:

Table 2. Network Configuration Specifications

Output	Description	Value
IPv4 or IPv6 Address (VMnet1)	Internal range	192.168.208.*
Subnet Mask (VMnet1)	Netmask for the internal network	255.255.255.0
IPv4 or IPv6 Address (VMnet8)	External range	192.168.47.*
Subnet Mask (VMnet8)	Netmask for the external network	255.255.255.0
Default Gateway	Gateway for the external network	None

3

OneFS Simulator Installation

This section contains the following topics:

Topics:

- Installing OneFS Simulator

Installing OneFS Simulator

You can install OneFS Simulator through the OVA file that is in the ZIP file. You can set up VMware Workstation, VMware Fusion, or VMware ESXi to run the OneFS Simulator virtual nodes.

You can configure a virtual cluster for a single virtual node. However, three- to four-node virtual clusters are recommended for testing and experimentation. For configuring a virtual cluster with more than four virtual nodes, ensure that the host system has a minimum of 6 GB of available RAM per virtual node.

Most laptops can only support a three-node virtual cluster. More CPU, RAM, and disk space are consumed for each virtual node you add to the virtual cluster.

Installing OneFS Simulator by importing the OVA file

Follow the steps in this procedure to install OneFS Simulator through the OVA file.

Ensure that you have installed VMware Workstation, VMware Fusion, or VMware ESXi to deploy and configure the OneFS Simulator virtual node. This procedure assumes that you have installed VMware Workstation.

1. Download the ZIP file from the product download page and extract the OVA file from the archive by following the download process specific to your browser and save the file to your local drive.
2. Open VMware Workstation and click **File** > **Open**.
3. Browse to the folder where you have downloaded the OVA file, select the file, and then click **Open**.
   The **Import Virtual Machine** dialog box opens.

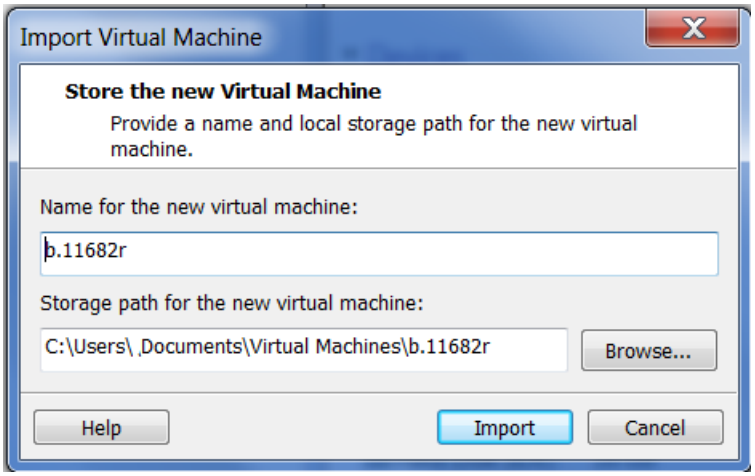

Figure 1. Import Virtual Machine

4. Specify a name for the virtual machine and a path to store it and then click **Import**.
   VMware Workstation imports the OVA virtual machine and the virtual machine appears in the virtual machine library.
5. To import more virtual machines, repeat the previous two steps by selecting the same OVA file but by specifying a different name and path for the imported virtual machines in the **Import Virtual Machine** dialog box.
6. Click **VM** > **Power** > **Power on** from the VMware console to power on the first virtual machine.

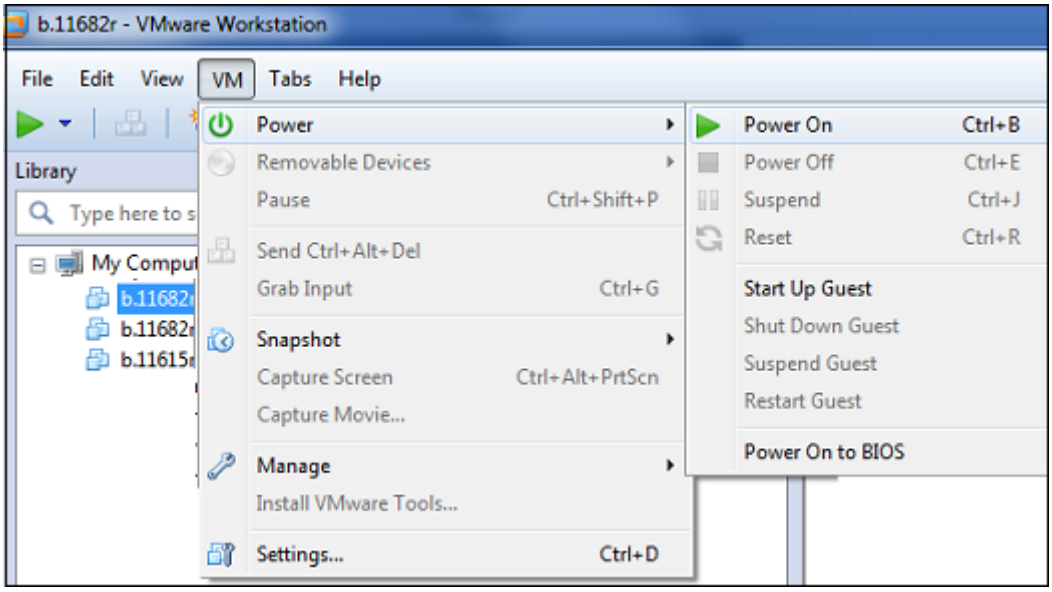

Figure 2. VMware Workstation

A series of checks are performed as the virtual machine powers on.

7. Click anywhere inside the virtual machine console to obtain the control of the mouse and keyboard on the host system.
8. Configure the settings for the virtual cluster through the configuration wizard that appears in the virtual machine command console.
9. Power on the other virtual machines that you have imported and repeat the previous two steps individually for each of the virtual machines by selecting the **Join an existing cluster** option in the configuration wizard.
   The virtual machines are added as virtual nodes to the virtual cluster.

Deploy OneFS Simulator on an ESXi server

You can run virtual nodes on an ESXi server by deploying the `OVA` file on a selected ESXi host.

1. Log in to the VMware vSphere Web Client through the following URL:

```
https://<your-vcenter-dnsname or
ip_address_of_vcenter>:9443/vsphere-client/
```

2. On the vCenter home page, click **Hosts and Clusters**.
3. Select a local host from a virtual cluster and click **Actions** > **Deploy OVF Template** to open the **Deploy OVF Template** wizard.
4. On the **Select source** page, browse to the folder where you have downloaded the `OVA` file and select the file. Alternatively, provide the URL to the `OVA` file and then click **Next**.

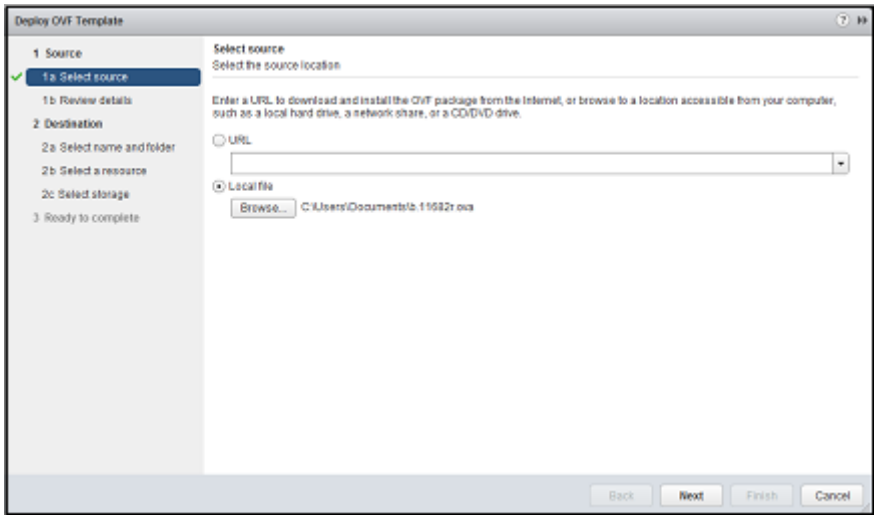

Figure 3. Select Source

5. On the **Review details** page, review the details, and then click **Next**.

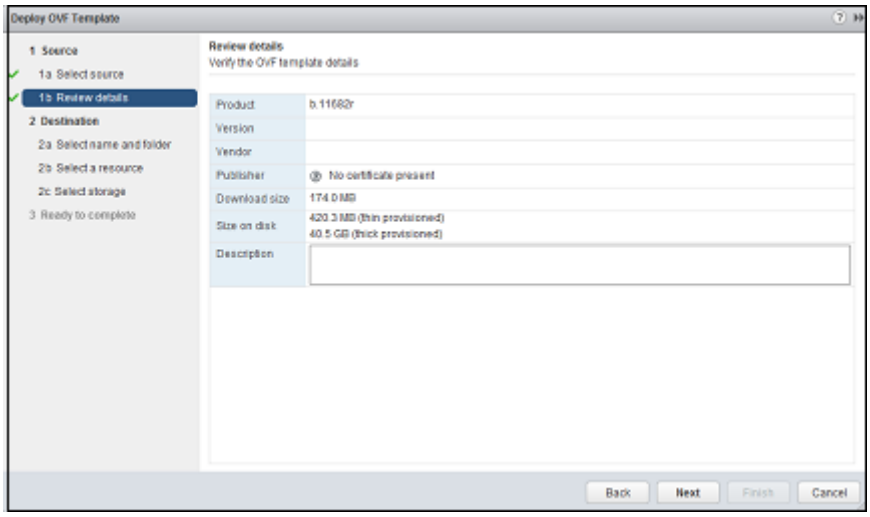

Figure 4. Review Details

6. On the **Select name and folder** page, perform the following actions:

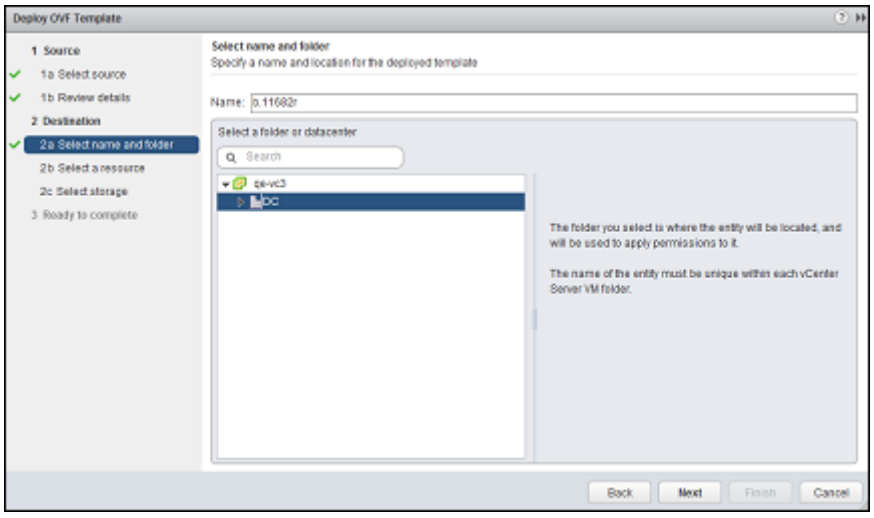

Figure 5. Select Name and Folder

a. Type a name for the deployed template.
b. Select a folder or data center within the inventory where OneFS Simulator will reside.
c. Click **Next**.

7. On the **Select a resource page**, select a virtual cluster or host to run the virtual machine after it is deployed.

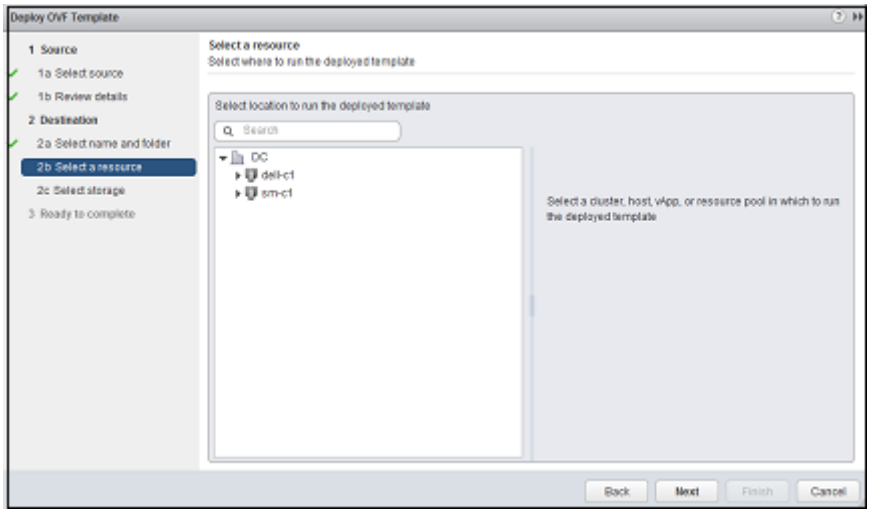

Figure 6. Select a Resource Page

8. On the **Select storage** page, select the following parameters:

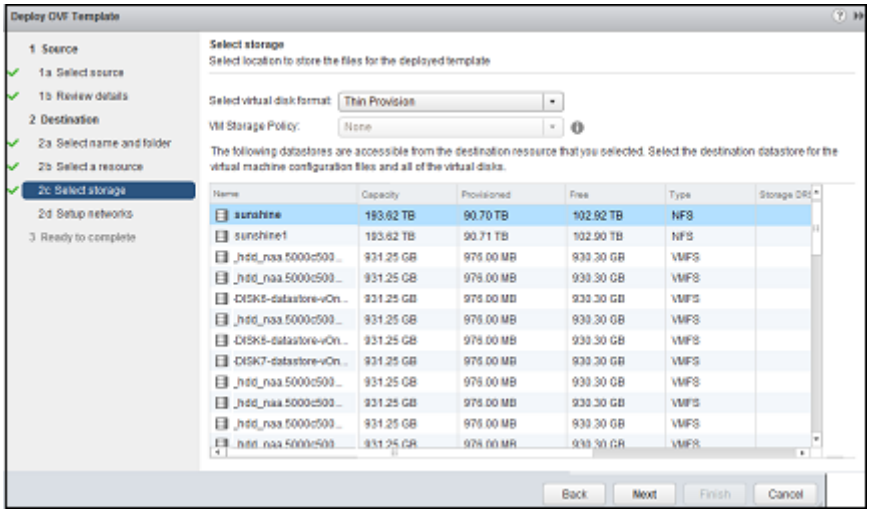

Figure 7. Select Storage

a. A virtual disk format from the list.
b. A virtual machine storage policy, if applicable.
c. A datastore for storing the virtual machine configuration files on the destination resource that you selected in the previous step.
d. Click **Next**.

9. On the **Setup networks** page, configure the networking parameters and click **Next**.

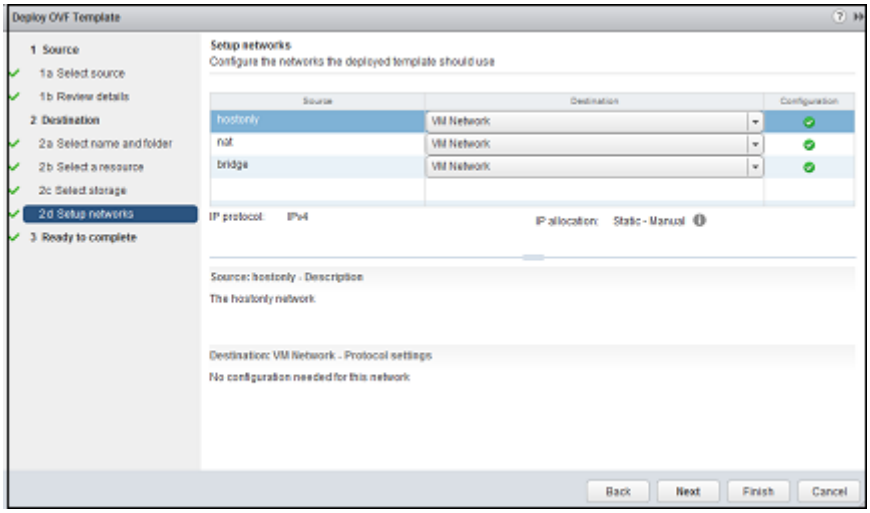

Figure 8. Setup Networks

10. Review the summary on the **Ready to complete** page.

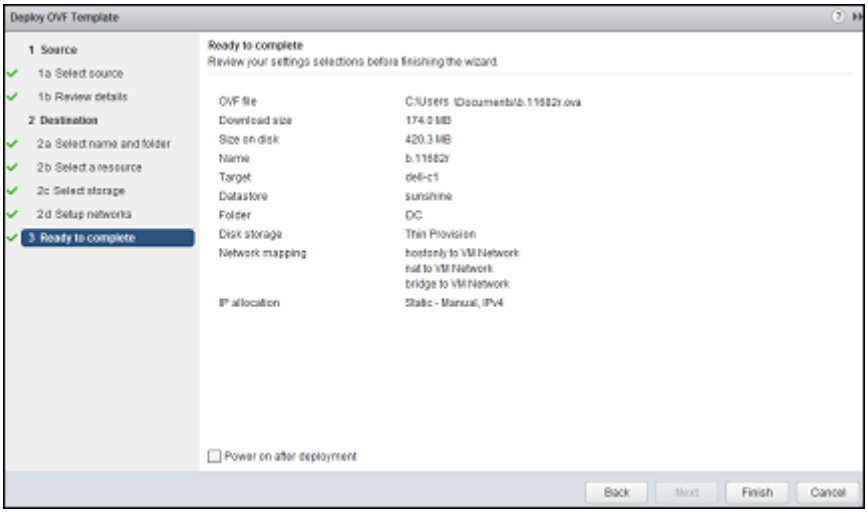

Figure 9. Ready to Complete

11. Click **Power on after deployment** and then click **Finish** to deploy the virtual node as a virtual machine.
12. Configure the cluster. See Network Settings and Record network configuration data for cluster configuration settings.
13. **NOTE:** This step activates advanced features that are activated through the license option in the UI or CLI. The baseline configuration does not require this step, and advanced features can be activated at any time.

    (Optional) Open an SSH client and at the command prompt, type the following command to activate the advanced features:

```
isi license add –evaluation
ONEFS,SMARTQUOTAS,SNAPSHOTIQ,SMARTCONNECT_ADVANCED,SYNCIQ,SMARTPOOLS,SMARTLOCK,HDFS,SM
ARTDEDUPE,CLOUDPOOLS,SWIFT,HARDENING
```

If the amount of RAM in the deployed virtual node has increased, you can convert the virtual machine to a template and create additional virtual nodes from the template. You do not need to create a template if the configuration of the virtual machine has not been changed.

NOTE: Do not create templates from a virtual machine that has ever been booted.

4

Updating the network interface

This section contains the following topics:

Topics:

- Updating the network interface overview

Updating the network interface overview

This section explains the process of upgrading the E1000 network interfaces used with the OneFS simulator to the newer vmxnet3 network interfaces.

Update the network interfaces

This section explains how to update the network interfaces from E1000 to VMXNET3 drivers.

The following steps explain how to add the additional interface to the OneFS level.

1. Deploy the virtual machine and name it node1.
2. Add the three networking interfaces in the VMware settings and set them to vmxnet3.
3. Start the virtual machine and go through the install.
4. When installation finishes, edit the `/etc/rc.conf` file.
   a. Add `if_vmx` to `kld_list="aio cpuctl if_bxe if_vmx if_cxgb if_cxgbe if_em if_igb mthca mlx4ib mlxen ipoib"`.
   b. Add the following lines to `rc.conf` after `ldconfig_paths=`.
   - `ifconfig_vmx0_name=em0`
   - `ifconfig_vmx1_name=em1`
   - `ifconfig_vmx2_name=em2`
5. Shut the virtual machine off and remove the E1000 network interfaces in the VMware settings.
6. Clone 2 more virtual machines, calling them node2 and node3.
7. Start the virtual machine for node3 and let it boot while watching in a VMRC console.
   a. Log in and run `isi_reformat_node -nolkg`.
   b. Wait for it to go back to the menu screen to create or join a cluster.
8. Start the virtual machine for node2 and let it boot watching in a VMRC console.
   a. Log in and run `isi_reformat_node -nolkg`.
   b. Wait for it to go back to the menu screen to create or join a cluster.
9. Start node1 and let it boot all the way up.
10. Log in to it and ensure it is ok.
11. Launch a VMRC console and ensure it boots all the way to the login screen.
12. When node1 is up, log in to the GUI to watch the other nodes join.
13. Go back to the node2 VMRC screen to select join and select the cluster. Wait until it completes.
14. Go back to node 3 vmrc screen and select join and select the cluster.
    Wait until it completes.
15. Log in and run `ifconfig`.
16. Verify 10G interfaces.

Below is an example of an unedited `/etc/rc.conf` file.

```
background_fsck="NO"
```

```
blanktime="NO"
dumpdev="NO"
dumppid="NO"
ipv6_ipv4mapping="YES"
kld_list="aio cpuctl if_bxe if_cxgb if_cxgbe if_em if_igb mthca mlx4ib mlxen ipoib"
ldconfig_paths="/usr/lib/compat /usr/local/lib /usr/likewise/lib /usr/local/apache2/lib
/usr/local/apache2/bin /usr/local/lib/compat/pkg"
netfs_types="efs:IFS ${netfs_types}"
rcshutdown_timeout="570"
# Daemon options.
isi_clear_webui_enable="YES"
isi_drive_d_enable="YES"
isi_eth_mixer_enable="YES"
isi_flexnet_enable="YES"
isi_ipmi_d_enable="YES"
isi_initial_enable="YES"
isi_km_d_enable="YES"
isi_lcd_enable="YES"
isi_mcp_enable="YES"
isi_watchdog_enable="YES"
local_startup=""
netwait_enable="NO"
netwait_timeout="60" # Total number of seconds to perform pings.
netwait_if_timeout="30" # Total number of seconds to monitor link state.
newsyslog_flags="-N -CC"
nfs_async="NO"
portmap_enable="YES"
rpcbind_enable="YES"
sendmail_enable="NONE"
snmptrapd_enable="NO"
syslogd_flags="-c"
update_motd="YES"
xinetd_enable="YES"
xntpd_enable="NO"
```

Below is an example of a modified `/etc/rc.conf` file. Changes are italicized.

```
background_fsck="NO"
blanktime="NO"
dumpdev="NO"
dumppid="NO"
ipv6_ipv4mapping="YES"
kld_list="aio cpuctl if_bxe if_vmx if_cxgb if_cxgbe if_em if_igb mthca mlx4ib mlxen
ipoib"
ifconfig_vmx0_name=em0
ifconfig_vmx1_name=em1
ifconfig_vmx2_name=em2
ldconfig_paths="/usr/lib/compat /usr/local/lib /usr/likewise/lib /usr/local/apache2/lib
/usr/local/apache2/bin /usr/local/lib/compat/pkg"
netfs_types="efs:IFS ${netfs_types}"
rcshutdown_timeout="570"

# Daemon options.
isi_clear_webui_enable="YES"
isi_drive_d_enable="YES"
isi_eth_mixer_enable="YES"
isi_flexnet_enable="YES"
isi_ipmi_d_enable="YES"
isi_initial_enable="YES"
isi_km_d_enable="YES"
isi_lcd_enable="YES"
isi_mcp_enable="YES"
isi_watchdog_enable="YES"
local_startup=""
netwait_enable="NO"
netwait_timeout="60" # Total number of seconds to perform pings.
netwait_if_timeout="30" # Total number of seconds to monitor link state.
newsyslog_flags="-N -CC"
nfs_async="NO"
portmap_enable="YES"
rpcbind_enable="YES"
sendmail_enable="NONE"
snmptrapd_enable="NO"
```

```
syslogd_flags="-c"
update_motd="YES"
xinetd_enable="YES"
xntpd_enable="NO"
```

5

Virtual cluster configuration

This section contains the following topics:

Topics:

- Configure a virtual cluster

Configure a virtual cluster

After installing one or more virtual nodes, you can configure a virtual cluster through the configuration wizard. The wizard provides step-by-step guidance for configuring a new virtual cluster or for adding a new virtual node to an existing virtual cluster.

After a virtual node has been booted, the PowerScale IQ configuration wizard options appear in the same command window.

1. In the configuration wizard, select one of the following options:
   - To create a new virtual cluster, type **1**.
   - To join the virtual node to an existing virtual cluster, type **2**.
   - To exit the wizard and configure the virtual node manually, type **3**.
   - To reboot into SmartLock Compliance mode, type **4**.

   NOTE: You cannot mix enterprise nodes with compliance nodes. If you choose to configure as SmartLock Compliance mode nodes, all nodes must have option 4 selected, and rebooted to configure up the cluster.
2. Follow the prompts to configure the virtual cluster. See the *Virtual cluster configuration settings* section for details.
3. Open an SSH client and type the lowest IP address from the external range.
4. Log in with the root username and password.
5. **NOTE:** This step activates advanced features that are activated through the license option in the UI or CLI.

   (Optional) At the command prompt, run the following command to activate the permanent evaluation license:

```
isi license add —evaluation
ONEFS,SMARTQUOTAS,SNAPSHOTIQ,SMARTCONNECT_ADVANCED,SYNCIQ,SMARTPOOLS,SMARTLOCK,HDFS,SM
ARTDEDUPE,CLOUDPOOLS,SWIFT,HARDENING
```

Virtual cluster configuration settings

Cluster configuration review and acceptance of stated configuration.

The configuration wizard prompts you a complete overview of the initial configuration of the cluster. You can customize your virtual cluster in a series of steps by typing yes to approve and move forward or no to go back and make changes.

Note: Upon completing of the cluster configuration, you will move to the management section on how to manage your virtual cluster using SSH or UI.

The following table provides information about each step in the configuration wizard. Enter values that are appropriate for your virtual cluster.

Table 3. Cluster Configuration Settings

Setting	Description
Root password	Type a password for the root user.
UI admin password	Type a password for the UI administrator user.

Table 3. Cluster Configuration Settings (continued)

Setting	Description
ESRS	Type **no** to disable support for (ESRS) on your virtual cluster.
Cluster Join mode	Manual: Allows any node to join the cluster. Secure: Nodes are not allowed to join unless a password is entered, thus securing the access to the cluster.
Name	Type a name to identify the virtual cluster.
Encoding	Specify the character encoding for the virtual cluster. The default character encoding is UTF-8.
Interface int-a	Specify the network settings for the int-a network which facilitates communication between the virtual nodes. **NOTE:** This interface can be configured with either IPv6 or IPv4. 1. Specify an IP address to configure the netmask. Refer to the table in Record network configuration data for the values you recorded for the internal IP range (VMnet1). 2. Retain the existing value for MTU. 3. Specify a low IP address and a high IP address for the internal IP range of your network. Press ENTER to retain the existing configuration.
Interface int-b	To skip configuring the failover backend network press ENTER. If you chose to fully configure the failover interface, you need three matching IP ranges to support this. **NOTE:** This interface can be configured with either IPv6 or IPv4. The Dell Technologies official Infiniband/Ethernet network address ranges are: • 128.221.252.1.-254 • 128.221.253.1.-254 • 128.221.254.1.-254
External subnet	Specify the network settings for the ext-1 network. The ext-1 network provides client access to the virtual cluster. **NOTE:** The external subnet can be configured with either IPv6 or IPv4. 1. Specify an IP address to configure the netmask. Refer to the table in Record network configuration data for the values you recorded for the external IP range (VMnet8). 2. Retain the existing value for MTU. 3. Specify a low IP address and a high IP address for the external IP range of your network.
Default gateway	Specify the gateway IP address of your network to optionally configure the gateway server through which the virtual cluster communicates with clients outside the subnet.
SmartConnect	Specify the SmartConnect zone name and service IP address. Press ENTER to retain the default settings.
DNS	Specify the gateway IP address of your network to configure the DNS server.
External subnet	Specify the network settings for the external network interface. Press ENTER to retain the default settings. **NOTE:** The external subnet can be configured with either IPv6 or IPv4.

Table 3. Cluster Configuration Settings (continued)

Setting	Description
Date and time zone	By default, the virtual node is set to the time and date settings that are based on your host computer. However, you can configure a different date and time zone.

6

OneFS management

This section contains the following topics:

Topics:

- Manage a virtual cluster
- Connect to a virtual node through SSH
- Connect to a virtual node through the web administration interface

Manage a virtual cluster

OneFS nodes can be managed individually or as a minimum three node cluster.

You can access the nodes or cluster using:

Table 4. Protocol Specifications

Protocols	Specification
SSH	CLI access of OneFS using the IP address of each node
UI	Entering in the address field: "https://xxx.xxx.xxx.xxx:8080" where the x's represent the IP address of a node in the cluster or "https://clustername.com:8080."

NOTE: Connection can be made through FQDN rather than IP address when the full IP range of information, including SmartConnect, has been configured in DNS.

After you have joined at least three virtual nodes to a virtual cluster, you can connect to one of the virtual nodes and manage the virtual cluster.

When connecting to a virtual node, provide the information that is configured on the virtual cluster.

Connect to a virtual node through SSH

You can connect to a virtual node through SSH and manage a virtual cluster.

Ensure that the ext-1 interface is set to bridged before you proceed.

1. Open an SSH client and type the lowest IP address from the external range.
2. Log in with the root username and password.
3. At the command prompt, type the required `isi` commands to monitor and manage your virtual cluster.
   For example, type the following command at the command prompt to monitor the health and performance of the virtual cluster:

   ```
   isi status
   ```

   NOTE: OneFS supports tab completion. When typing an `isi` command, you can press the TAB key to identify or complete the command syntax.

   For more information about the OneFS commands, see the *OneFS CLI Administration Guide* at Dell Online Support.

Connect to a virtual node through the web administration interface

You can connect to a virtual node through the web administration interface and manage a virtual cluster.

NOTE: Optionally, a connection can be made through FQDN rather than the IP address if full IP information has been configured in DNS.

1. Open a browser and type the lowest IP address from the external range.
2. Click **Continue to this website (not recommended)**.

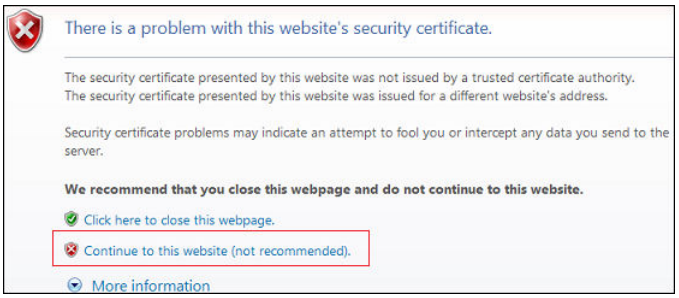

Figure 10. Continue to This Website (not recommended)

3. Log in with the root or admin username and password.
4. Suppress any warning events by going to **Cluster Status** > **Events** > **Summary** and clicking **Quiet** against the event that you want to suppress.
   For example, for each configured virtual node, select **Quiet** to remove the warning that the virtual machine has four hard drives when a physical node has 12.

7

Uninstalling OneFS simulator

This section contains the following topics:

Topics:

- Uninstall OneFS Simulator

Uninstall OneFS Simulator

You can uninstall and remove OneFS Simulator by removing all the virtual nodes and virtual clusters that you configured.

1. Power off the virtual machine nodes.
2. Delete the virtual machines and all the associated files and folders.