



**NetApp SolidFire Element OS**

# **Setup Guide**

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 **NetApp**<sup>®</sup>



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## **SolidFire system overview**

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The SolidFire storage system contains hardware and software designed for complete system automation and management. A cluster serves as the storage hub and comprises four or more nodes. Double Helix data protection ensures that there are two copies of data on a cluster.

Using the SolidFire Element OS web UI, you can set up and monitor SolidFire cluster storage capacity and performance, and manage storage activity across a multi-tenant infrastructure. The Element OS web UI is built on the SolidFire API which enables you to see system adjustments almost immediately.

## Configuring a storage node

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You must configure individual nodes before you can add them to a cluster. When you install and cable a node in a rack unit and power it on, the terminal user interface (TUI) displays the fields necessary to configure the node. Ensure that you have the necessary configuration information for the node before proceeding.

Alternatively, you can configure these settings by accessing the node via the Element OS web UI using the Dynamic Host Configuration Protocol (DHCP) 1G management IP address displayed in the TUI. The DHCP address is located in the menu bar at the top of the TUI.

You cannot add a node with DHCP assigned IP addresses to a cluster. You can use the DHCP IP address to initially configure the node in the web UI, TUI, or API. During this initial configuration, you can add the static IP address information so that you can add the node to a cluster.

After initial configuration, you can access the node using the node's management IP address. You can then change the node settings, add it to a cluster, or use the node to create a cluster. You can also configure a new node using SolidFire API methods.

### Related concepts

[Configuring iDRAC on each new node](#) on page 6

### Related tasks

[Configuring the node using the TUI](#) on page 5

[Configuring the node using the node UI](#) on page 6

[Creating a new cluster](#) on page 13

### Related references

[Node states](#) on page 7

## Configuring the node using the TUI

You can use the terminal user interface (TUI) to perform initial configuration for new nodes.

### About this task

**Attention:** You should configure the Bond1G and Bond10G interfaces for separate subnets. Bond1G and Bond10G interfaces configured for the same subnet causes routing problems when storage traffic is sent via the Bond1G interface. If you must use the same subnet for management and storage traffic, manually configure management traffic to use the Bond10G interface. You can do this for each node using the Cluster Settings page of the Element OS web UI.

### Steps

1. Attach a keyboard and monitor to the node and then power on the node.

The TUI appears on the tty1 terminal with the Network Settings tab. If a DHCP server is running on the network with available IP addresses, the 1GbE address appears in the Address field.

**Note:** If the node cannot reach your configuration server, the TUI displays an error message. Check your configuration server connection or the networking connection to resolve the error.

2. Use the on-screen navigation to configure the 1G and 10G network settings for the node.

**Tip:** To enter text, press **Enter** on the keyboard to open edit mode. After you enter text, press **Enter** again to close the edit mode. To navigate between fields, use the arrow keys.

3. Enter **s** to save the settings, and then enter **y** to accept the changes.
4. Enter **c** to navigate to the **Cluster** tab.
5. Use the on-screen navigation to configure the cluster settings for the node.  
All the nodes in a cluster must have identical cluster names. Cluster names are case-sensitive.
6. Enter **s** to save the settings, and then enter **y** to accept the changes.  
The node is put in a pending state and can be added to an existing cluster or a new cluster.

#### Related tasks

[Creating a new cluster](#) on page 13

## Configuring iDRAC on each new node

NetApp installs Dell iDRAC Enterprise on each node. iDRAC enables you to remotely manage and monitor the underlying hardware of each node in the cluster.

#### Related information

[How to configure iDRAC on a SolidFire storage node](#)

## Configuring the node using the node UI

You can configure nodes using the Node Configuration user interface.

#### About this task

You need the DHCP address displayed in the TUI to access a node. You cannot use DHCP addresses to add a node to a cluster.

**Attention:** You should configure the Bond1G and Bond10G interfaces for separate subnets. Bond1G and Bond10G interfaces configured for the same subnet causes routing problems when storage traffic is sent via the Bond1G interface. If you must use the same subnet for management and storage traffic, manually configure management traffic to use the Bond10G interface. You can do this for each node using the Cluster Settings page of the Element OS web UI.

#### Steps

1. In a browser window, enter the DHCP IP address of a node.  
You must add the extension :442 to access the node; for example, 172.25.103.6:442.  
The Network Settings tab opens with the Network Settings – Bond1G section.
2. Enter the 1G network settings.
3. Click **Save Changes**.
4. Click **Bond10G** to display the settings for the 10G network settings.
5. Enter the 10G network settings.
6. Click **Save Changes**.

7. Click **Cluster Settings**.
8. Enter the hostname for the 10G network.
9. Click **Save Changes**.

**Related tasks**

*Configuring the node using the TUI* on page 5

## Node states

A node can be in one of several states depending on the level of configuration.

- Available: The node has no associated cluster name and is not yet part of a cluster.
- Pending: The node is configured and can be added to a designated cluster. Authentication is not required to access the node.
- PendingActive: The system is in the process of installing compatible Element OS software on the node.  
When complete, the node will move to the Active state.
- Active: The node is participating in a cluster. Authentication is required to modify the node.

In each of these states, some fields are read only.

## Using the Element OS web UI

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You can use the Element OS web user interface (UI) to monitor and perform common tasks on your SolidFire system. You can access the UI by using the management virtual IP (MVIP) address of the primary cluster node.

Before you access the UI, you must ensure that popup blockers and NoScript settings are disabled in your browser.

You can access the UI by entering the following URL in your browser window:

**`https://<MVIP formatted as 1-2-3-4>.ip.solidfire.net`**

If your browser cannot connect to the Internet, you can enter the MVIP address as a URL in your browser window:

**`http://<MVIP address>`**

You should click through any authentication certificate messages.

## Configuring a Fibre Channel node

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Fibre Channel nodes enable you to connect the cluster to a Fibre Channel network fabric. Fibre Channel nodes are added in pairs, and operate in active-active mode (all nodes actively process traffic for the cluster). Clusters running Element OS version 9.0 and later support up to four nodes; clusters running previous versions support a maximum of two nodes.

You must ensure that the following conditions are met before you configure a Fibre Channel node:

- At least two Fibre Channel nodes are connected to Fibre Channel switches.
- All SolidFire Fibre Channel ports should be connected to your Fibre Channel fabric. The four SolidFire Bond10G network connections should be connected in one LACP bond group at the switch level. This will allow for the best overall performance from the Fibre Channel systems.

Network and cluster configuration steps are the same for Fibre Channel nodes and storage nodes.

When you create a new cluster with Fibre Channel nodes and SolidFire storage nodes, the worldwide port name (WWPN) addresses for the nodes are available in the web UI. You can use the WWPN addresses to zone the Fibre Channel switch.

WWPNs are registered in the system when you create a new cluster with nodes. In the Element OS web UI, you can find the WWPN addresses from the WWPN column of the FC Ports tab, which you access from the Cluster tab.

### Related tasks

[Adding Fibre Channel nodes to a cluster](#) on page 9

[Creating a new cluster with Fibre Channel nodes](#) on page 10

## Adding Fibre Channel nodes to a cluster

You can add Fibre Channel nodes to a cluster when more storage is needed or during cluster creation. Fibre Channel nodes require initial configuration when they are first powered on. After the node is configured, it appears in the list of pending nodes and you can add it to a cluster.

### About this task

The software version on each Fibre Channel node in a cluster must be compatible. When you add a Fibre Channel node to a cluster, the cluster installs the cluster version of Element OS on the new node as needed.

### Steps

1. Select **Cluster > Nodes**.
2. Click **Pending** to view the list of pending nodes.
3. Do one of the following:
  - To add individual nodes, click the **Actions** icon for the node you want to add.
  - To add multiple nodes, select the check box of the nodes to add, and then **Bulk Actions**.

### Note:

If the node you are adding has a different version of Element OS than the version running on the cluster, the cluster asynchronously updates the node to the version of Element OS running

on the cluster master. After the node is updated, it automatically adds itself to the cluster. During this asynchronous process, the node will be in a pendingActive state.

**4. Click **Add**.**

The node appears in the list of active nodes.

## Creating a new cluster with Fibre Channel nodes

You can create a new cluster after you have configured the individual Fibre Channel nodes. When you create a cluster, a cluster administrator user account is automatically created for you. The cluster administrator has permission to manage all cluster attributes and can create other cluster administrator accounts.

### Before you begin

You have configured the individual Fibre Channel nodes.

### About this task

During new node configuration, 1G or 10G Management IP (MIP) addresses are assigned to each node. You must use one of the node IP addresses created during configuration to open the Create a New Cluster page. The IP address you use depends on the network you have chosen for cluster management.

### Steps

1. In a browser window, enter a node MIP address.
2. In **Create a New Cluster**, enter the following information:
  - Management VIP: Routable virtual IP on the 1GbE or 10GbE network for network management tasks.
  - iSCSI (storage) VIP: Virtual IP on the 10GbE network for storage and iSCSI discovery.
    - Note:** You cannot change the SVIP after you create the cluster.
  - User name: The primary Cluster Admin user name for authenticated access to the cluster. You must save the user name for future reference.
    - Note:** You can use uppercase and lowercase letters, special characters, and numbers for the user name.
  - Password: Password for authenticated access to the cluster. You must save the user name for future reference.

Two-way data protection is enabled by default. You cannot change this setting.

3. Read the End User License Agreement, and click **I Agree**, if you approve.
4. Optional: In the Nodes list, ensure that the check boxes for nodes that should not be included in the cluster are not selected.
5. Click **Create Cluster**.

The system might take several minutes to create the cluster depending on the number of nodes in the cluster. On a properly configured network, a small cluster of five nodes should take less than one minute. After the cluster is created, the Create a New Cluster window is redirected to the MVIP URL address for the cluster and displays the web UI.

## Zoning for Fibre Channel nodes

When you create a new cluster with Fibre Channel nodes and SolidFire storage nodes, the worldwide port name (WWPN) addresses for the nodes are available in the web UI. You can use the WWPN addresses to zone the Fibre Channel switch.

WWPNs are registered in the system when you create a new cluster with nodes. In the Element OS web UI, you can find the WWPN addresses from the WWPN column of the FC Ports tab, which you access from the Cluster tab.

## Creating a volume access group for Fibre Channel clients

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Volume access groups enable communication between Fibre Channel clients and volumes on a SolidFire storage system. Mapping Fibre Channel client initiators (WWPN) to the volumes in a volume access group enables secure data I/O between a Fibre Channel network and a SolidFire volume.

### About this task

You can also add iSCSI initiators to a volume access group; this gives the initiators access to the same volumes in the volume access group.

### Steps

1. Click **Management > Access Groups**.
2. Click **Create Access Group**.
3. Enter a name for the volume access group in the **Name** field.
4. Select and add the Fibre Channel initiators from the **Unbound Fibre Channel Initiators** list.  
**Note:** You can add or delete initiators at a later time.
5. Optional: Select and add an iSCSI initiator from the **Initiators** list.
6. To attach volumes to the access group, perform the following steps:
  - a. Select a volume from the **Volumes** list.
  - b. Click **Attach Volume**.
7. Click **Create Access Group**.

## Creating a new cluster

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You can create a new cluster after you have configured individual nodes. When you create a cluster, a cluster administrator user account is automatically created for you. The cluster administrator has permission to manage all cluster attributes and can create other cluster administrator accounts.

### Before you begin

- You have installed the management node.
- You have configured individual nodes.

### About this task

During new node configuration, 1G or 10G Management IP (MIP) addresses are assigned to each node. You must use one of the node IP addresses created during configuration to open the Create a New Cluster page. The IP address you use depends on the network you have chosen for cluster management.

### Steps

1. In a browser window, enter a node MIP address.
2. In **Create a New Cluster**, enter the following information:
  - Management VIP: Routable virtual IP on the 1GbE or 10GbE network for network management tasks.
  - iSCSI (storage) VIP: Virtual IP on the 10GbE network for storage and iSCSI discovery.  
**Note:** You cannot change the SVIP after you create the cluster.
  - User name: The primary Cluster Admin user name for authenticated access to the cluster. You must save the user name for future reference.  
**Note:** You can use uppercase and lowercase letters, special characters, and numbers for the user name.
  - Password: Password for authenticated access to the cluster. You must save the user name for future reference.

Two-way data protection is enabled by default. You cannot change this setting.
3. Read the End User License Agreement, and click **I Agree**, if you approve.
4. Optional: In the Nodes list, ensure that the check boxes for nodes that should not be included in the cluster are not selected.
5. Click **Create Cluster**.

The system might take several minutes to create the cluster depending on the number of nodes in the cluster. On a properly configured network, a small cluster of five nodes should take less than one minute. After the cluster is created, the Create a New Cluster window is redirected to the MVIP URL address for the cluster and displays the web UI.

## Adding drives to a cluster

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You will be directed to the Available Drives list when drives have been detected when you create a cluster. You will be prompted to add all the available drives at that time.

### About this task

When you add a node to the cluster or install new drives in an existing node, the drives automatically register as available. You must add the drives to the cluster using either the web UI or API before it can participate in the cluster.

Drives are not displayed in the Available Drives list when the following conditions exist:

- Drives are in Active, Removing, Erasing, or Failed state.
- The node of which the drive is a part of is in Pending state.

### Steps

1. Select **Cluster > Drives**.
2. Click **Available** to view the list of available drives.
3. Add drives by following one of the following methods:
  - To add individual drives, click the Actions icon for the drive you want to add.
  - To add multiple drives, select the check box of the drives to add, and then click Bulk Actions.
4. Click **Add**.

## Where to find additional information

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You can learn more about tasks related to the SolidFire system in NetApp's extensive documentation library.

### *[How to calculate max provisioned space in a SolidFire cluster](#)*

Describes how to calculate the max provisioned space in a SolidFire cluster. Max provisioned space is the metadata drive capacity in a cluster.

### *[How to calculate SolidFire system error alert percentage](#)*

Describes how to calculate the SolidFire cluster fullness percentage at which the system notifies you.

### *[NetApp SolidFire Element OS Documentation Library](#)*

Includes documentation for various releases of Element OS.

### *[NetApp SolidFire Element OS Known Issues](#)*

Provides a list of known issues in the current and earlier versions of Element OS.

### *[NetApp SolidFire Element OS Resolved Issues](#)*

Provides a list of resolved issues in the current and earlier versions of Element OS.

### *[NetApp SolidFire Resources page](#)*

Provides resources about SolidFire, including links to video content and technical reports.

### *[NetApp Technical Report 4677: NetApp SolidFire Element OS Remote Replication](#)*

Describes different types of remote replication supported by NetApp SolidFire clusters.

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