



# Manage nodes

## Element Software

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# Manage nodes

You can manage SolidFire storage and Fibre Channel nodes from the Nodes page of the Cluster tab.

If a newly added node accounts for more than 50 percent of the total cluster capacity, some of the capacity of this node is made unusable ("stranded"), so that it complies with the capacity rule. This remains the case until more storage is added. If a very large node is added that also disobeys the capacity rule, the previously stranded node will no longer be stranded, while the newly added node becomes stranded. Capacity should always be added in pairs to avoid this happening. When a node becomes stranded, an appropriate cluster fault is thrown.

## Find more information

[Add a node to a cluster](#)

## Add a node to a cluster

You can add nodes to a cluster when more storage is needed or after cluster creation. 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.

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

You can add nodes of smaller or larger capacities to an existing cluster. You can add larger node capacities to a cluster to allow for capacity growth. Larger nodes added to a cluster with smaller nodes must be added in pairs. This allows for sufficient space for Double Helix to move the data should one of the larger nodes fail. You can add smaller node capacities to a larger node cluster to improve performance.



If a newly added node accounts for more than 50 percent of the total cluster capacity, some of the capacity of this node is made unusable ("stranded"), so that it complies with the capacity rule. This remains the case until more storage is added. If a very large node is added that also disobeys the capacity rule, the previously stranded node will no longer be stranded, while the newly added node becomes stranded. Capacity should always be added in pairs to avoid this happening. When a node becomes stranded, the strandedCapacity cluster fault is thrown.

[NetApp video: Scale on Your Terms: Expanding a SolidFire Cluster](#)

You can add nodes to SolidFire Enterprise SDS (SolidFire eSDS) clusters or to NetApp HCI appliances.

SolidFire eSDS nodes are denoted with a Node type prefix of "SFc", for example, "SFc100."

### Steps

1. Select **Cluster > Nodes**.
2. Click **Pending** to view the list of pending nodes.

When the process for adding nodes (both SolidFire eSDS or non SolidFire eSDS nodes) is complete, they appear in the Active nodes list. Until then, pending nodes appear in the Pending Active list.

For nodes that are not SolidFire eSDS nodes, SolidFire installs the Element software version of the cluster on the pending nodes when you add them to a cluster. This might take a few minutes.

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 software than the version running on the cluster, the cluster asynchronously updates the node to the version of Element software 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.

## Find more information

[Node versioning and compatibility](#)

# Node versioning and compatibility

Node compatibility is based on the Element software version installed on a node. Element software-based storage clusters automatically image a node to the Element software version on the cluster if the node and cluster are not at compatible versions.

The following list describes the software release significance levels that make up the Element software version number:

- **Major**

The first number designates a software release. A node with one major component number cannot be added to a cluster containing nodes of a different major-patch number, nor can a cluster be created with nodes of mixed major versions.

- **Minor**

The second number designates smaller software features or enhancements to existing software features that have been added to a major release. This component is incremented within a major version component to indicate that this incremental release is not compatible with any other Element software incremental releases with a different minor component. For example, 11.0 is not compatible with 11.1, and 11.1 is not compatible with 11.2.

- **Micro**

The third number designates a compatible patch (incremental release) to the Element software version represented by the major.minor components. For example, 11.0.1 is compatible with 11.0.2, and 11.0.2 is compatible with 11.0.3.

Major and minor version numbers must match for compatibility. Micro numbers do not have to match for compatibility.

# Cluster capacity in a mixed node environment

You can mix different types of nodes in a cluster. The SF-Series 2405, 3010, 4805, 6010, 9605, 9010, 19210, 38410 and the H-Series can coexist in a cluster.

The H-Series consists of H610S-1, H610S-2, H610S-4, and H410S nodes. These nodes are both 10GbE and 25GbE capable.

It is best to not intermix non-encrypted and encrypted nodes. In a mixed node cluster, no node can be larger than 33 percent of the total cluster capacity. For instance, in a cluster with four SF-Series 4805 nodes, the largest node that can be added alone is an SF-Series 9605. The cluster capacity threshold is calculated based on the potential loss of the largest node in this situation.

Beginning with Element 12.0, the following SF-series storage nodes are not supported:

- SF3010
- SF6010
- SF9010

If you upgrade one of these storage nodes to Element 12.0, you will see an error stating that this node is not supported by Element 12.0.

## View node details

You can view details for individual nodes such as service tags, drive details, and graphics for utilization and drive statistics. The Nodes page of the Cluster tab provides the Version column where you can view the software version of each node.

### Steps

1. Click **Cluster > Nodes**.
2. To view the details for a specific node, click the **Actions** icon for a node.
3. Click **View Details**.
4. Review the node details:
  - **Node ID:** The system-generated ID for the node.
  - **Node Name:** The host name for the node.
  - **Available 4k IOPS:** The IOPS configured for the node.
  - **Node Role:** The role that the node has in the cluster. Possible values:
    - **Cluster Master:** The node that performs cluster-wide administrative tasks and contains the MVIP and SVIP.
    - **Ensemble Node:** A node that participates in the cluster. There are either 3 or 5 ensemble nodes depending on cluster size.
    - **Fibre Channel:** A node in the cluster.
  - **Node Type:** The model type of the node.
  - **Active Drives:** The number of active drives in the node.
  - **Management IP:** The management IP (MIP) address assigned to node for 1GbE or 10GbE network

admin tasks.

- **Cluster IP:** The cluster IP (CIP) address assigned to the node used for the communication between nodes in the same cluster.
- **Storage IP:** The storage IP (SIP) address assigned to the node used for iSCSI network discovery and all data network traffic.
- **Management VLAN ID:** The virtual ID for the management local area network.
- **Storage VLAN ID:** The virtual ID for the storage local area network.
- **Version:** The version of software running on each node.
- **Replication Port:** The port used on nodes for remote replication.
- **Service Tag:** The unique service tag number assigned to the node.

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