



NetApp Element 11.1

Release Notes

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Element 11.1 Release Notes

These release notes describe NetApp Element software version 11.1. This document provides information about enhancements, resolved and known issues, and changes in this release.

Contact NetApp Support if you have questions about the release or to schedule a software upgrade.

Related concepts

[*Contacting NetApp Support*](#) on page 17

What's new in Element 11.1

NetApp Element 11.1 includes new hardware support for H-series and SF-series storage nodes, as well as important changes in management node requirements and features.

Added hardware support

Element 11.1 introduces support for new hardware components and contains the latest firmware updates for existing components:

- The H610S storage node (with 960GB, 1.92TB, and 3.84TB drives) supports the Samsung PM983 SSD, Micron NVDIMMs, and contains the 3A06 BIOS update.
- The H300, H500, and H700 series and SF-series storage nodes support the Samsung PM883 SSD, contain a Samsung PM863a SSD firmware upgrade, and support the Radian RMS-300 NVRAM card.

Management node changes

The following details about the management node in Element 11.0 and newer releases have changed:

- The management node and associated tools support IPv6 addresses as well as IPv4.
- 12GB of memory is required in the management node virtual machine configuration.
- The Realtek virtual NIC is not supported. A newer generation virtual NIC is required (for example, e1000 or vmxnet3).
- A current version of HealthTools is required.
- The location of the collector.json file has changed.

The *Element User Guide* contains more information on new management node features and requirements.

LDAP authentication enhancements

Element 11.1 features LDAP authentication speed and ease of use enhancements:

- LDAP group search speed has been improved for environments using Active Directory. No configuration change is needed to take advantage of this enhancement.
- Enhanced LDAP Direct Bind authentication options can remove the need for a service account in some environments. The *NetApp SolidFire LDAP Configuration Guide* has more information.

SSLoad histograms

SSLoad is a custom measure of a storage node's overall load and this measurement directly affects QoS on the volumes being served from that node. Element 11.1 introduces histograms that enable you to track the SSLoad of a storage node over time. You can use the `GetNodeStats` (for a single node) or `ListNodeStats` (for all nodes) API methods to get this information.

Snapshot replication RPO improvements

The return point objective (RPO) for snapshot replication has been improved in Element 11.1. These improvements lower the time required to detect a new snapshot on the source storage cluster and replicate that snapshot to the target cluster.

Related information

[NetApp Element 11.1 User Guide](#)

[HealthTools information and downloads](#)

Known issues and resolved issues

The NetApp Support Site contains details for the known and resolved issues for this release, as well as product documentation for this and other releases.

The following are some resolved and known issues that might affect daily operation in some environments.

Resolved issues

Issue	Description
Fibre Channel issue with many WWPNS in a volume access group	Element 11.0 was not recommended for the FC0025 and FCN001 Fibre Channel nodes due to a critical issue in environments with more than 32 WWPNS in a volume access group. Element 11.1 resolves this issue.
Incorrect volume name character limit in Element User Guide	The Element 11.1 User Guide resolves an incorrect volume name character limit. The Element 11.x web UI and API limit volume names to a maximum of 64 characters.

Known issues

Issue	Description
Virtual volumes cause protection domains to function at node level	For systems running Element software 11.x, enabling virtual volumes before or after setting protection domain monitoring causes the cluster protection domains feature to function only at node level.
Management node boot loader delay	When you install the management node using the .ISO image, there is a 30-second boot loader delay when booting the .ISO before the SolidFire splash screen and installation menu appear.
Management node does not support Realtek NIC	The Element 11.1 management node does not support the Realtek NIC available in Citrix Xen environments. You must use e1000 or newer NICs.

Related information

[All known issues](#)

[All resolved issues](#)

Storage cluster upgrades

You can upgrade NetApp HCI or SolidFire storage clusters directly to Element 11.1. Contact NetApp Support to schedule an upgrade.

Important upgrade notes

Consider the following when planning an upgrade:

- Before upgrading, ensure you have downloaded and installed the latest version of the HealthTools utilities on the management node. The *Element User Guide* contains instructions for using HealthTools.
- If you have storage clusters with Fibre Channel nodes running Element 10.x, you need to upgrade the clusters directly to version 11.1.
- If you have storage clusters and a management node running Element 9.x or earlier, you need to perform a fresh installation of the Element 11.1 management node before upgrading. You then need to upgrade Element software to version 10.4 before upgrading to Element 11.1.
- If you have storage clusters running Element 11.0, you need to upgrade the management node to version 11.1 first. You can then upgrade Element software to version 11.1 on the storage nodes.

Storage cluster upgrade paths

You can upgrade NetApp HCI or SolidFire storage clusters from the following versions directly to this release:

- 10.0 (SolidFire storage clusters only)
- 10.1
- 10.2 (SolidFire storage clusters only)
- 10.3
- 10.4
- 11.0

Note: Only firmware updates provided during the Element software upgrade process are supported on SF-series and H-series storage nodes. Other methods to update node firmware are not supported.

Related information

[HealthTools information and downloads](#)

[Management node upgrade instructions](#)

Storage cluster capabilities

The following sections detail capabilities for various attributes of NetApp HCI or NetApp SolidFire storage clusters running NetApp Element software.

Number of nodes

Storage clusters running Element software have the following node capabilities:

- Four nodes minimum in a cluster
- 40 nodes maximum

Number of volumes

Storage clusters running Element software have the following volume capabilities:

- 2,000 volumes per account
- 17,500 total volumes per cluster; 10,000 with active I/O
- 700 volumes per node with a maximum of 400 mounted with active I/O

Volume size

The maximum volume size in a cluster is 16TiB.

Replication

Storage clusters running Element software have the following replication capabilities:

Capability	Element-to-Element replication	Element-to-ONTAP replication (SnapMirror)
Storage cluster fan-in (the number of source storage clusters that can be paired with any one target storage cluster)	4	32
Storage cluster fan-out (the number of target storage clusters that can be paired with a single source storage cluster)	4	4
Total number of volumes that can be replicated between a source and target storage cluster	N/A	500
Total number of concurrent transfers supported	10 per node during initial sync; unlimited after initial sync	100
Checkpoint restart supported	Yes	No
Volume fan-in (the number of source volumes that can be paired with any one target volume)	1	1

Capability	Element-to-Element replication	Element-to-ONTAP replication (SnapMirror)
Volume fan-out (number of target volumes that can be paired with a single source volume)	1	1

Note: If a volume is being replicated between two Element software-based storage clusters, this is equivalent to two volumes with active I/O for performance sizing purposes (these totals are counted toward the per-node volume limit).

Virtual volumes

Each node in a storage cluster supports up to 2,000 virtual volumes, and each cluster supports up to 8,000 virtual volumes.

User accounts

Storage clusters running Element software support up to 5,000 user accounts.

Cluster admin accounts

Storage clusters running Element software support up to 5,000 cluster admin accounts.

Volume access groups

Storage clusters running Element software have the following volume access group capabilities:

- 1,000 volume access groups per cluster
- 2,000 volumes per volume access group
- A single volume can belong to a maximum of 64 volume access groups
- A single initiator can belong to a maximum of one volume access group
- A volume access group can contain a maximum of 128 initiators

Volume snapshots

Storage clusters running Element software support up to 32 volume snapshots per volume.

iSCSI sessions

Storage clusters running Element software support up to 700 iSCSI sessions per node.

Data protection

Storage clusters running Element software support up to two copies of each block of data (Double Helix protection).

Node throughput

Storage clusters running Element software have the following throughput capabilities:

- 50,000 (80% read, 4k random) IOPS per node for SF3010, SF2405, SF6010, SF4805, and SF9605 nodes
- 50,000 (80% read, 4k random) IOPS per node for H300S and H500S nodes
- 75,000 (80% read, 4k random) IOPS per node for SF9010 and SF9608 nodes

- 100,000 (80% read, 4k random) IOPS per node for SF19210 and SF38410 nodes
- 100,000 (80% read, 4k random) IOPS per node for H700S and H610S nodes

Volume throughput

Storage clusters running Element software guarantee up to 15,000 minimum IOPS and can sustain up to 40,000 maximum IOPS per volume (80% read, 4k random), and maximum throughput can be attained by setting maximum QoS to 200,000 IOPS.

Sequential read bandwidth

Storage clusters running Element software support up to 400 MBps of read bandwidth per volume.

Sequential write bandwidth

Storage clusters running Element software support up to 400 MBps of write bandwidth per volume.

Cloning

Storage clusters running Element software have the following cloning capabilities:

- Two simultaneous clones in progress per volume
- Eight clone operations per storage node

Integrated backup and restore operations

Storage clusters running Element software have the following backup and restore capabilities:

- Two simultaneous backup or restore operations in progress per volume
- Eight simultaneous backup or restore operations in progress per node

VLANs

Storage clusters running Element software support up to 256 VLANs per cluster.

Web browser support

NetApp provides tiered browser support for this web-based software when used with different browser environments.

NetApp extensively tests the Google Chrome and Mozilla Firefox web browsers on the Apple OS X and Microsoft Windows (64-bit) operating systems. These environments are considered tier-1 support, meaning that NetApp has done extensive testing and generally addresses any browser-related bugs that are reported with the software. In addition to tier-1 environments, NetApp does basic functional testing with a number of tier-2 environments including Mozilla Firefox on Linux, Apple Safari, and Microsoft Internet Explorer. NetApp makes efforts to address functional issues in tier-2 environments but cannot guarantee results with these browsers. Additional browser environments are considered tier-3, meaning that NetApp has done no specific testing in these environments and addresses any reported functional issues on a case-by-case basis.

Tier 1 browser	Operating system	Support
Google Chrome (latest version)	Apple OS X, Microsoft Windows 64-bit	Fully supported
Mozilla Firefox (latest version)	Apple OS X, Microsoft Windows 64-bit, Ubuntu Linux LTS	Fully supported

Tier 2 browser	Operating system	Support
Google Chrome (latest version)	Ubuntu Linux LTS	Best effort support
Apple Safari (latest version)	Apple OS X	Best effort support
Microsoft Edge (latest version)	Microsoft Windows 64-bit	Best effort support

Tier 3 browser	Operating system	Support
Mozilla Firefox (latest version)	Linux OS other than Ubuntu Linux	Case by case
Chromium (latest version)	Linux OS	Case by case
Microsoft Internet Explorer 11	Microsoft Windows 64-bit or 32-bit	Case by case

Interoperability information

You can use the Interoperability Matrix Tool (IMT) to see qualified ecosystem information for NetApp Element software, such as supported hypervisors, operating systems, and boot from SAN support.

NetApp H-series node interoperability

When deploying NetApp HCI or expanding an existing deployment, you can mix different hardware platforms in the same deployment.

- You can deploy NetApp HCI with H300, H500, H700 and H400C series nodes in the same chassis and the same cluster.
- You can expand your existing deployment with both H400C and H600S series nodes.

Note: The NetApp Deployment Engine does not support initial deployment or expansion of NetApp HCI installations with H610S storage nodes. Use the Element web interface to add NetApp H610S storage nodes to an existing NetApp HCI installation. For information about adding nodes, see the *Element Software User Guide*.

Related information

[Interoperability Matrix Tool \(IMT\)](#)

[NetApp Support Site](#)

Capabilities of clusters with Fibre Channel nodes

Storage clusters with Fibre Channel nodes have slightly different capabilities and interoperability than clusters with only iSCSI connectivity. The following table notes some differences. For Fibre Channel interoperability information with this software version, see the Interoperability Matrix Tool (IMT).

System attribute	Capability
Maximum number of storage nodes in a storage cluster with Fibre Channel connectivity	40
Recommended number of Fibre Channel nodes in a storage cluster	One FCN001 node for every 10 storage nodes
	One FC0025 node for every 5 storage nodes
Maximum number of Fibre Channel nodes in a storage cluster	2 or 4 (must be installed in pairs)
Maximum volumes per storage cluster	16,384
Maximum number of Fibre Channel client initiators per Fibre Channel storage cluster	256
Maximum IOPS per Fibre Channel node	625,000 at 4k block size (model FCN001)
	450,000 at 4k block size (model FC0025)

Note: There are configuration limitations for how many volumes can be accessed by Fibre Channel initiators. See the *NetApp SolidFire Fibre Channel Configuration Guide* for more information.

Related information

[Interoperability Matrix Tool \(IMT\)](#)

[NetApp SolidFire Fibre Channel Configuration Guide](#)

Management integrations

The following applications are supported by products running NetApp Element software when using iSCSI. Fibre Channel is currently not supported for these integrations.

Some of the following software is driven by community members, and community acceptance indicates official support for a product or integration. Where applicable, community acceptance is noted in the following table.

Management integration	Support status
OpenStack Cinder Driver - Essex, Folsom, Grizzly, Havana, Icehouse, Juno, Kilo, Liberty, Mitaka, Newton, Ocata, Pike, Queens, Rocky	Natively supported and community-accepted
Apache CloudStack, versions 4.2 through 4.11	Natively supported and community-accepted
VMware vSphere Web Client Plugin, versions 5.1, 5.5, 6.0, 6.5	Natively supported with SIOC functionality
Citrix XenDesktop, version 7.0	Natively supported
OnApp	Natively supported

Note: All necessary software and packages are integrated into the base distribution.

Where to find additional information

You can use the resources in this section for additional information about NetApp HCI and SolidFire storage systems.

- For more information about deploying, configuring, and using your storage cluster, see the *NetApp Element Software User Guide*.
- For information about the NetApp Element API, see the *NetApp Element Software API Reference Guide*.

Related information

[Element Software documentation](#)

Contacting NetApp Support

If you need help with or have questions or comments about NetApp products, contact NetApp Support.

- Web: mysupport.netapp.com
- Phone:
 - 888.4.NETAPP (888.463.8277) (US and Canada)
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