Supported NFS versions and clients

ONTAP 9

NetApp
May 18, 2023

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Overview of supported NFS versions and clients

Before you can use NFS in your network, you need to know which NFS versions and clients ONTAP supports.

This table notes when major and minor NFS protocol versions are supported by default in ONTAP. Support by default does not indicate that this is the earliest version of ONTAP supporting that NFS protocol.

Version	Enabled by default
NFSv3	Yes
NFSv4.0	Yes, beginning with ONTAP 9.9.1
NFSv4.1	Yes, beginning with ONTAP 9.9.1
NFSv4.2	Yes, beginning with ONTAP 9.9.1
pNFS	No

For the latest information about which NFS clients ONTAP supports, see the Interoperability Matrix.

NetApp Interoperability Matrix Tool

NFSv4.0 functionality supported by ONTAP

ONTAP supports all the mandatory functionality in NFSv4.0 except the SPKM3 and LIPKEY security mechanisms.

The following NFSV4 functionality is supported:

- **COMPOUND**

  Allows a client to request multiple file operations in a single remote procedure call (RPC) request.

- **File delegation**

  Allows the server to delegate file control to some types of clients for read and write access.

- **Pseudo-fs**

  Used by NFSv4 servers to determine mount points on the storage system. There is no mount protocol in NFSv4.

- **Locking**

  Lease-based. There are no separate Network Lock Manager (NLM) or Network Status Monitor (NSM) protocols in NFSv4.

For more information about the NFSv4.0 protocol, see RFC 3530.

Limitations of ONTAP support for NFSv4

You should be aware of several limitations of ONTAP support for NFSv4.

- The delegation feature is not supported by every client type.
- In ONTAP 9.4 and earlier releases, names with non-ASCII characters on volumes other than UTF8 volumes are rejected by the storage system.

  In ONTAP 9.5 and later releases, volumes created with the utf8mb4 language setting and mounted using NFS v4 are no longer subject to this restriction.

- All file handles are persistent; the server does not give volatile file handles.
- Migration and replication are not supported.
- NFSv4 clients are not supported with read-only load-sharing mirrors.

  ONTAP routes NFSv4 clients to the source of the load-sharing mirror for direct read and write access.

- Named attributes are not supported.
- All recommended attributes are supported, except for the following:
  - `archive`
  - `hidden`
  - `homogeneous`
  - `mimetype`
  - `quota_avail_hard`
  - `quota_avail_soft`
  - `quota_used`
  - `system`
  - `time_backup`

  Although it does not support the `quota*` attributes, ONTAP does support user and group quotas through the RQUOTA side band protocol.

ONTAP support for NFSv4.1

Beginning with ONTAP 9.8, nconnect functionality is available by default when NFSv4.1 is enabled.

Earlier NFS client implementations use only a single TCP connection with a mount. In ONTAP, a single TCP connection can become a bottleneck with increasing IOPS. However, an nconnect-enabled client can have multiple TCP connections (up to 16) associated with a single NFS mount. Such an NFS client multiplexes file operations onto multiple TCP connections in a round-robin fashion and thus obtains higher throughput from the available network bandwidth. Nconnect is recommended for NFSv3 and NFSv4.1 mounts only.

See your NFS client documentation to confirm whether nconnect is supported in your client version.

NFSv4.1 is enabled by default in ONTAP 9.9.1 and later. In earlier releases, you can enable it by specifying the `-v4.1` option and setting it to `enabled` when creating an NFS server on the storage virtual machine (SVM).

ONTAP does not support NFSv4.1 directory and file level delegations.

ONTAP support for NFSv4.2

Beginning with ONTAP 9.8, the NFSv4.2 protocol is supported to allow access for NFSv4.2-enabled clients.

NFSv4.2 is enabled by default in ONTAP 9.9.1 and later. In ONTAP 9.8, you can enable v4.2 by specifying the `-v4.1` option and setting it to `enabled` when creating an NFS server on the storage virtual machine (SVM). Enabling NFSv4.1 also enables clients to use the NFSv4.1 features while mounted as v4.2.

The following NFSv4.2 optional features are supported:

Feature	Supported beginning with …
Mandatory Access Control (MAC) labelled NFS	ONTAP 9.9.1
NFS extended attributes	ONTAP 9.12.1

Additional NFSv4.2 optional features will be added in a later ONTAP release.

Enable NFS v4.2 security labels

Beginning with ONTAP 9.9.1, NFS security labels can be enabled. They are disabled by default.

With NFS v4.2 security labels, ONTAP NFS servers are Mandatory Access Control (MAC) aware, storing and retrieving sec_label attributes sent by clients.

For more information, see RFC 7240

Beginning with ONTAP 9.12.1, NFS v4.2 security labels are supported for NDMP dump operations. If security labels are encountered on files or directories in earlier releases, the dump fails.

Steps

1. Change the privilege setting to advanced:

   ```
   set -privilege advanced
   ```

2. Enable security labels:

   ```
   vserver nfs modify -vserver svm_name -v4.2-seclabel enabled
   ```

Enable NFS extended attributes

Beginning with ONTAP 9.12.1, NFS extended attributes (xattrs) are enabled by default.

Extended attributes are standard NFS attributes defined by RFC 8276 and enabled in modern NFS clients. They can be used to attach user-defined metadata to file system objects, and are of interest in advanced security deployments.

NFS extended attributes are not currently supported for NDMP dump operations. If extended attributes are encountered on files or directories, the dump proceeds but does not back up the extended attributes on those files or directories.

If you need to disable extended attributes, use the `vserver nfs modify -v4.2-xattrs disabled` command.

ONTAP support for parallel NFS

ONTAP supports parallel NFS (pNFS). The pNFS protocol offers performance improvements by giving clients direct access to the data of a set of files distributed across multiple nodes of a cluster. It helps clients locate the optimal path to a volume.

Use of hard mounts

When troubleshooting mounting problems, you need to be sure that you are using the correct mount type. NFS supports two mount types: soft mounts and hard mounts. You should use only hard mounts for reliability reasons.

You should not use soft mounts, especially when there is a possibility of frequent NFS timeouts. Race conditions can occur as a result of these timeouts, which can lead to data corruption.

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