Logical space reporting and enforcement for volumes

ONTAP 9

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Logical space reporting and enforcement for volumes overview

Beginning with ONTAP 9.4, you can allow the logical space used in a volume and the amount of remaining storage space to be displayed to users. Beginning with 9.5, you can limit the amount of logical space consumed by users.

Logical space reporting and enforcement are disabled by default.

The following volume types support logical space reporting and enforcement.

Volume type	Is space reporting supported?	Is space enforcement supported?
FlexVol volumes	Yes, beginning with ONTAP 9.4	Yes, beginning with ONTAP 9.5
SnapMirror destination volumes	Yes, beginning with ONTAP 9.8	No
FlexGroup volumes	Yes, beginning with ONTAP 9.9.1	Yes, beginning with ONTAP 9.9.1

What logical space reporting shows

When you enable logical space reporting on a volume, your system can display the amount of logical used and available space in addition to the total space in a volume. In addition, users on Linux and Windows client systems can see logical used and available space instead of physical used and physical available space.

Definitions:

- Physical space refers to the physical blocks of storage available or used in the volume.
- Logical space refers to the usable space in a volume.
- Logical space used is physical space used plus savings from storage efficiency features (such as deduplication and compression) that have been configured.

Beginning with ONTAP 9.5, you can enable logical space enforcement together with space reporting.

When enabled, logical space reporting displays the following parameters with the `volume show` command:

Parameter	Meaning
`-logical-used`	Displays information only about the volume or volumes that have the specified logical used size. This value includes all the space saved by the storage efficiency features along with the physically used space. This does not include Snapshot reserve but does consider Snapshot spill.
`-logical-used-by-afs`	Displays information only about the volume or volumes that have the specified logical size used by the active file system. This value differs from the`-logical-used` value by the amount of Snapshot spill that exceeds the Snapshot reserve.
`-logical-available`	When only logical space reporting is enabled, only physical-available space is displayed. When both space reporting and enforcement are enabled, it displays the amount of free space currently available considering space saved by the storage efficiency features as being used. This does not include the Snapshot reserve.
`-logical-used-percent`	Displays the percentage of the current `-logical-used` value with the provisioned size excluding Snapshot reserve of the volume. This value can be greater than 100%, because the `-logical-used-by-afs` value includes efficiency savings in the volume. The `-logical-used-by-afs` value of a volume does not include Snapshot spill as used space. The `-physical-used` value of a volume includes Snapshot spill as used space.
`-used`	Displays the amount of used space without considering the space saved by storage efficiency features.

Enabling logical space reporting in the CLI also allows the Logical Used Space (%) and Logical Space values to display in System Manager

Client systems see logical space displayed as “used” space on the following system displays:

- **df** output on Linux systems
- Space details under Properties using Windows Explorer on Windows systems.

If logical space reporting is enabled without logical space enforcement, the total displayed on client systems can be higher than the provisioned space.

What logical space enforcement does

When you enable logical space enforcement in ONTAP 9.5 and later, ONTAP counts the logical-used blocks in a volume to determine the amount of space that is still available in that volume. If there is no space available in a volume, the system returns an ENOSPC (out-of-space) error message.

Logical space enforcement ensures that users are notified when a volume is full or nearly full. Logical space enforcement returns three types of alerts to inform you about the available space in a volume:

- `Monitor.vol.full.inc.sav`: This alert is triggered when 98% of the logical space in the volume has been used.
- `Monitor.vol.nearFull.inc.sav`: This alert is triggered when 95% of the logical space in the volume has been used.
- `Vol.log.overalloc.inc.sav`: This alert is triggered when the logical space used in the volume is greater than the total size of the volume.

  This alert tells you that adding to the size of the volume might not create available space since that space will already be consumed by overallocated logical blocks.

Total (logical space) should be equal to provisioned space excluding Snapshot reserve of the volume with logical space enforcement.

For more information, see Configuring volumes to automatically provide more space when they are full

Enable logical space reporting and enforcement

Beginning with ONTAP 9.4, you can enable logical space reporting. Beginning with 9.5, you can enable logical space enforcement, or both reporting and enforcement together.

About this task

In addition to enabling logical space reporting and enforcement at the individual volume level, you can enable them at the SVM level for every volume that supports the functionality. If you enable logical space features for the entire SVM, you can also disable them for individual volumes.

Beginning with 9.8, if you enable logical space reporting on a SnapMirror source volume, it is automatically enabled on the destination volume after the transfer.

If the enforcement option is enabled on a SnapMirror source volume, the enforcement setting is transferred to the destination volume. However, because the destination volume does not support enforcement, the destination will report logical space consumption but not honor its enforcement.

Choices

- Enable logical space reporting for a volume:

  ```
  volume modify -vserver SVM-name -volume volume-name -size volume-size -is
  -space-reporting-logical true
  ```

- Enable logical space enforcement for a volume:

  ```
  volume modify -vserver SVM-name -volume volume-name -size volume-size -is
  -space-enforcement-logical true
  ```

- Enable logical space reporting and enforcement together for a volume:

  ```
  volume modify -vserver SVM-name -volume volume-name -size volume-size -is
  -space-reporting-logical true -is-space-enforcement-logical true
  ```

- Enable logical space reporting or enforcement for a new SVM:

```
vserver create -vserver SVM-name -rootvolume root-volume-name -rootvolume
-security-style unix -data-services {desired-data-services} [-is-space-
reporting-logical true] [-is-space-enforcement-logical true]
```

- Enable logical space reporting or enforcement for an existing SVM:

```
vserver modify -vserver SVM-name {desired-data-services} [-is-space-reporting-
logical true] [-is-space-enforcement-logical true]
```