



## **Release notes**

### **Astra Trident**

NetApp  
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# Release notes

## What's new

Release Notes provide information about new features, enhancements, and bug fixes in the latest version of Astra Trident.



The `tridentctl` binary for Linux that is provided in the installer zip file is the tested and supported version. Be aware that the `macos` binary provided in the `/extras` part of the zip file is not tested or supported.

## What's new in 24.06

### Enhancements

- **IMPORTANT:** The `limitVolumeSize` parameter now limits `qtree`/LUN sizes in the ONTAP economy drivers. Use the new `limitVolumePoolSize` parameter to control Flexvol sizes in those drivers. ([Issue #341](#)).
- Added ability for iSCSI self-healing to initiate SCSI scans by exact LUN ID if deprecated igroups are in use ([Issue #883](#)).
- Added support for volume clone and resize operations to be allowed even when the backend is in suspended mode.
- Added ability for user-configured log settings for the Trident controller to be propagated to Astra Trident node pods.
- Added support in Astra Trident to use REST by default instead of ZAPI for ONTAP versions 9.15.1 and later.
- Added support for custom volume names and metadata on the ONTAP storage backends for new persistent volumes.
- Enhanced the `azure-netapp-files` (ANF) driver to automatically enable the snapshot directory by default when the NFS mount options are set to use NFS version 4.x.
- Added Bottlerocket support for NFS volumes.
- Added technical preview support for Google Cloud NetApp Volumes.

### Kubernetes

- Added support for Kubernetes 1.30.
- Added ability for Astra Trident DaemonSet to clean zombie mounts and residual tracking files at startup ([Issue #883](#)).
- Added PVC annotation `trident.netapp.io/luksEncryption` for dynamically importing LUKS volumes ([Issue #849](#)).
- Added topology awareness to ANF driver.
- Added support for Windows Server 2022 nodes.

## Fixes

- Fixed Astra Trident installation failures due to stale transactions.
- Fixed tridentctl to ignore warning messages from Kubernetes ([Issue #892](#)).
- Changed Astra Trident controller `SecurityContextConstraint` priority to 0 ([Issue #887](#)).
- ONTAP drivers now accept volume sizes below 20MiB ([Issue\[#885\]](#)).
- Fixed Astra Trident to prevent shrinking of Flexvols during resize operation for the ONTAP-SAN driver.
- Fixed ANF volume import failure with NFS v4.1.

## Deprecations

- Removed support for EOL Windows Server 2019.

## Changes in 24.02

### Enhancements

- Added support for Cloud Identity.
  - AKS with ANF - Azure Workload Identity will be used as Cloud identity.
  - EKS with FSxN - AWS IAM role will be used as Cloud identity.
- Added support to install Astra Trident as an add-on on EKS cluster from EKS console.
- Added ability to configure and disable iSCSI self-healing ([Issue #864](#)).
- Added FSx personality to ONTAP drivers to enable integration with AWS IAM and SecretsManager, and to enable Astra Trident to delete FSx volumes with backups ([Issue #453](#)).

### Kubernetes

- Added support for Kubernetes 1.29.

### Fixes

- Fixed ACP warning messages, when ACP is not enabled ([Issue #866](#)).
- Added a 10-second delay before performing a clone split during snapshot delete for ONTAP drivers, when a clone is associated with the snapshot.

### Deprecations

- Removed in-toto attestations framework from multi-platform image manifests.

## Changes in 23.10

### Fixes

- Fixed volume expansion if a new requested size is smaller than the total volume size for `ontap-nas` and `ontap-nas-flexgroup` storage drivers ([Issue #834](#)).
- Fixed volume size to display only usable size of the volume during import for `ontap-nas` and `ontap-nas-flexgroup` storage drivers ([Issue #722](#)).
- Fixed FlexVol name conversion for ONTAP-NAS-Economy.

- Fixed Astra Trident initialization issue on a windows node when node is rebooted.

## Enhancements

### Kubernetes

Added support for Kubernetes 1.28.

### Astra Trident

- Added support for using Azure Managed Identities (AMI) with azure-netapp-files storage driver.
- Added support for NVMe over TCP for the ONTAP-SAN driver.
- Added ability to pause the provisioning of a volume when backend is set to suspended state by user ([Issue #558](#)).

## Advanced features available in Astra Control

With Astra Trident 23.10, a new software component called Astra Control Provisioner is available to licensed Astra Control users. This provisioner provides access to a superset of advanced management and storage provisioning features beyond those that Astra Trident supports on its own. For the 23.10 release, these features include:

- Backup and restore capabilities for applications with ontap-nas-economy driver-backed storage backends
- Enhanced storage backend security with Kerberos 5 encryption
- Data recovery using a snapshot
- SnapMirror enhancements

[Learn more about Astra Control Provisioner.](#)

## Changes in 23.07.1

**Kubernetes:** Fixed daemonset deletion to support zero-downtime upgrades ([Issue #740](#)).

## Changes in 23.07

### Fixes

#### Kubernetes

- Fixed Trident upgrade to disregard old pods stuck in terminating state ([Issue #740](#)).
- Added toleration to "transient-trident-version-pod" definition ([Issue #795](#)).

#### Astra Trident

- Fixed ONTAP ZAPI requests to ensure LUN serial numbers are queried when getting LUN attributes to identify and fix ghost iSCSI devices during Node Staging operations.
- Fixed error handling in storage driver code ([Issue #816](#)).
- Fixed quota resize when using ONTAP drivers with use-rest=true.
- Fixed LUN clone creation in ontap-san-economy.

- Revert publish info field from `rawDevicePath` to `devicePath`; added logic to populate and recover (in some cases) `devicePath` field.

## Enhancements

### Kubernetes

- Added support for importing pre-provisioned snapshots.
- Minimized deployment and daemonset linux permissions ([Issue #817](#)).

### Astra Trident

- No longer reporting the state field for "online" volumes and snapshots.
- Updates the backend state if the ONTAP backend is offline ([Issues #801, #543](#)).
- LUN Serial Number is always retrieved and published during the ControllerVolumePublish workflow.
- Added additional logic to verify iSCSI multipath device serial number and size.
- Additional verification for iSCSI volumes to ensure correct multipath device is unstaged.

### Experimental Enhancement

Added tech preview support for NVMe over TCP for the ONTAP-SAN driver.

### Documentation

Many organizational and formatting improvements have been made.

## Deprecations

### Kubernetes

- Removed support for v1beta1 snapshots.
- Removed support for pre-CSI volumes and storage classes.
- Updated minimum supported Kubernetes to 1.22.

## Changes in 23.04



Force volume detach for ONTAP-SAN-\* volumes is supported only with Kubernetes versions with the Non-Graceful Node Shutdown feature gate enabled. Force detach must be enabled at install time using the `--enable-force-detach` Trident installer flag.

## Fixes

- Fixed Trident Operator to use IPv6 localhost for installation when specified in spec.
- Fixed Trident Operator cluster role permissions to be in sync with the bundle permissions ([Issue #799](#)).
- Fixed issue with attaching raw block volume on multiple nodes in RWX mode.
- Fixed FlexGroup cloning support and volume import for SMB volumes.
- Fixed issue where Trident controller could not shut down immediately ([Issue #811](#)).
- Added fix to list all igroup names associated with a specified LUN provisioned with `ontap-san-*` drivers.

- Added a fix to allow external processes to run to completion.
- Fixed compilation error for s390 architecture ([Issue #537](#)).
- Fixed incorrect logging level during volume mount operations ([Issue #781](#)).
- Fixed potential type assertion error ([Issue #802](#)).

## Enhancements

- Kubernetes:
  - Added support for Kubernetes 1.27.
  - Added support for importing LUKS volumes.
  - Added support for ReadWriteOncePod PVC access mode.
  - Added support for force detach for ONTAP-SAN-\* volumes during Non-Graceful Node Shutdown scenarios.
  - All ONTAP-SAN-\* volumes will now use per-node igroups. LUNs will only be mapped to igroups while actively published to those nodes to improve our security posture. Existing volumes will be opportunistically switched to the new igroup scheme when Trident determines it is safe to do so without impacting active workloads ([Issue #758](#)).
  - Improved Trident security by cleaning up unused Trident-managed igroups from ONTAP-SAN-\* backends.
- Added support for SMB volumes with Amazon FSx to the `ontap-nas-economy` and `ontap-nas-flexgroup` storage drivers.
- Added support for SMB shares with the `ontap-nas`, `ontap-nas-economy` and `ontap-nas-flexgroup` storage drivers.
- Added support for arm64 nodes ([Issue #732](#)).
- Improved Trident shutdown procedure by deactivating API servers first ([Issue #811](#)).
- Added cross-platform build support for Windows and arm64 hosts to Makefile; see BUILD.md.

## Deprecations

**Kubernetes:** Backend-scoped igroups will no longer be created when configuring `ontap-san` and `ontap-san-economy` drivers ([Issue #758](#)).

## Changes in 23.01.1

### Fixes

- Fixed Trident Operator to use IPv6 localhost for installation when specified in spec.
- Fixed Trident Operator cluster role permissions to be in sync with the bundle permissions [Issue #799](#).
- Added a fix to allow external processes to run to completion.
- Fixed issue with attaching raw block volume on multiple nodes in RWX mode.
- Fixed FlexGroup cloning support and volume import for SMB volumes.

## Changes in 23.01



Kubernetes 1.27 is now supported in Trident. Please upgrade Astra Trident prior to upgrading Kubernetes.

## Fixes

- Kubernetes: Added options to exclude Pod Security Policy creation to fix Trident installations via Helm ([Issues #783, #794](#)).

## Enhancements

### Kubernetes

- Added support for Kubernetes 1.26.
- Improved overall Trident RBAC resource utilization ([Issue #757](#)).
- Added automation to detect and fix broken or stale iSCSI sessions on host nodes.
- Added support for expanding LUKS encrypted volumes.
- Kubernetes: Added credential rotation support for LUKS encrypted volumes.

### Astra Trident

- Added support for SMB volumes with Amazon FSx for ONTAP to the `ontap-nas` storage driver.
- Added support for NTFS permissions when using SMB volumes.
- Added support for storage pools for GCP volumes with CVS service level.
- Added support for optional use of `flexgroupAggregateList` when creating FlexGroups with the `ontap-nas-flexgroup` storage driver.
- Improved performance for the `ontap-nas-economy` storage driver when managing multiple FlexVols.
- Enabled dataLIF updates for all ONTAP NAS storage drivers.
- Updated the Trident Deployment and DaemonSet naming convention to reflect the host node OS.

## Deprecations

- Kubernetes: Updated minimum supported Kubernetes to 1.21.
- Data LIFs should no longer be specified when configuring `ontap-san` or `ontap-san-economy` drivers.

## Changes in 22.10

You must read the following critical information before upgrading to Astra Trident 22.10.

### Critical information about Astra Trident 22.10

- Kubernetes 1.25 is now supported in Trident. You must upgrade Astra Trident to 22.10 prior to upgrading to Kubernetes 1.25.
- Astra Trident now strictly enforces the use of multipathing configuration in SAN environments, with a recommended value of `find_multipaths: no` in `multipath.conf` file.



Use of non-multipathing configuration or use of `find_multipaths: yes` or `find_multipaths: smart` value in `multipath.conf` file will result in mount failures. Trident has recommended the use of `find_multipaths: no` since the 21.07 release.



## Fixes

- Fixed issue specific to ONTAP backend created using `credentials` field failing to come online during 22.07.0 upgrade ([Issue #759](#)).
- **Docker:** Fixed an issue causing the Docker volume plugin to fail to start in some environments ([Issue #548](#) and [Issue #760](#)).
- Fixed SLM issue specific to ONTAP SAN backends to ensure only subset of data LIFs belonging to reporting nodes are published.
- Fixed performance issue where unnecessary scans for iSCSI LUNs happened when attaching a volume.
- Removed granular retries within the Astra Trident iSCSI workflow to fail fast and reduce external retry intervals.
- Fixed issue where an error was returned when flushing an iSCSI device when the corresponding multipath device was already flushed.

## Enhancements

- Kubernetes:
  - Added support for Kubernetes 1.25. You must upgrade Astra Trident to 22.10 prior to upgrading to Kubernetes 1.25.
  - Added a separate ServiceAccount, ClusterRole, and ClusterRoleBinding for the Trident Deployment and DaemonSet to allow future permissions enhancements.
  - Added support for [cross-namespace volume sharing](#).
- All Trident `ontap-*` storage drivers now work with the ONTAP REST API.
- Added new operator yaml (`bundle_post_1_25.yaml`) without a `PodSecurityPolicy` to support Kubernetes 1.25.
- Added [support for LUKS-encrypted volumes](#) for `ontap-san` and `ontap-san-economy` storage drivers.
- Added support for Windows Server 2019 nodes.
- Added [support for SMB volumes on Windows nodes](#) through the `azure-netapp-files` storage driver.
- Automatic MetroCluster switchover detection for ONTAP drivers is now generally available.

## Deprecations

- **Kubernetes:** Updated minimum supported Kubernetes to 1.20.
- Removed Astra Data Store (ADS) driver.
- Removed support for `yes` and `smart` options for `find_multipaths` when configuring worker node multipathing for iSCSI.

## Changes in 22.07

### Fixes

#### Kubernetes

- Fixed issue to handle boolean and number values for node selector when configuring Trident with Helm or the Trident Operator. ([GitHub issue #700](#))

- Fixed issue in handling errors from non-CHAP path, so that kubelet will retry if it fails. ([GitHub issue #736](#))

## Enhancements

- Transition from k8s.gcr.io to registry.k8s.io as default registry for CSI images
- ONTAP-SAN volumes will now use per-node igroups and only map LUNs to igroups while actively published to those nodes to improve our security posture. Existing volumes will be opportunistically switched to the new igroup scheme when Astra Trident determines it is safe to do so without impacting active workloads.
- Included a ResourceQuota with Trident installations to ensure Trident DaemonSet is scheduled when PriorityClass consumption is limited by default.
- Added support for Network Features to Azure NetApp Files driver. ([GitHub issue #717](#))
- Added tech preview automatic MetroCluster switchover detection to ONTAP drivers. ([GitHub issue #228](#))

## Deprecations

- **Kubernetes:** Updated minimum supported Kubernetes to 1.19.
- Backend config no longer allows multiple authentication types in single config.

## Removals

- AWS CVS driver (deprecated since 22.04) has been removed.
- Kubernetes
  - Removed unnecessary SYS\_ADMIN capability from node pods.
  - Reduces nodeprep down to simple host info and active service discovery to do a best-effort confirmation that NFS/iSCSI services are available on worker nodes.

## Documentation

A new [Pod Security Standards](#) (PSS) section has been added detailing permissions enabled by Astra Trident on installation.

## Changes in 22.04

NetApp is continually improving and enhancing its products and services. Here are some of the latest features in Astra Trident. For previous releases, Refer to [Earlier versions of documentation](#).



If you are upgrading from any previous Trident release and use Azure NetApp Files, the `location` config parameter is now a mandatory, singleton field.

## Fixes

- Improved parsing of iSCSI initiator names. ([GitHub issue #681](#))
- Fixed issue where CSI storage class parameters weren't allowed. ([GitHub issue #598](#))
- Fixed duplicate key declaration in Trident CRD. ([GitHub issue #671](#))
- Fixed inaccurate CSI Snapshot logs. ([GitHub issue #629](#))
- Fixed issue with unpublishing volumes on deleted nodes. ([GitHub issue #691](#))

- Added handling of filesystem inconsistencies on block devices. ([GitHub issue #656](#))
- Fixed issue pulling auto-support images when setting the `imageRegistry` flag during installation. ([GitHub issue #715](#))
- Fixed issue where Azure NetApp Files driver failed to clone a volume with multiple export rules.

## Enhancements

- Inbound connections to Trident's secure endpoints now require a minimum of TLS 1.3. ([GitHub issue #698](#))
- Trident now adds HSTS headers to responses from its secure endpoints.
- Trident now attempts to enable the Azure NetApp Files unix permissions feature automatically.
- **Kubernetes:** Trident daemonset now runs at system-node-critical priority class. ([GitHub issue #694](#))

## Removals

E-Series driver (disabled since 20.07) has been removed.

## Changes in 22.01.1

### Fixes

- Fixed issue with unpublishing volumes on deleted nodes. ([GitHub issue #691](#))
- Fixed panic when accessing nil fields for aggregate space in ONTAP API responses.

## Changes in 22.01.0

### Fixes

- **Kubernetes:** Increase node registration backoff retry time for large clusters.
- Fixed issue where azure-netapp-files driver could be confused by multiple resources with the same name.
- ONTAP SAN IPv6 Data LIFs now work if specified with brackets.
- Fixed issue where attempting to import an already imported volume returns EOF leaving PVC in pending state. ([GitHub issue #489](#))
- Fixed issue when Astra Trident performance slows down when > 32 snapshots are created on a SolidFire volume.
- Replaced SHA-1 with SHA-256 in SSL certificate creation.
- Fixed Azure NetApp Files driver to allow duplicate resource names and limit operations to a single location.
- Fixed Azure NetApp Files driver to allow duplicate resource names and limit operations to a single location.

## Enhancements

- Kubernetes enhancements:
  - Added support for Kubernetes 1.23.
  - Add scheduling options for Trident pods when installed via Trident Operator or Helm. ([GitHub issue #651](#))
- Allow cross-region volumes in GCP driver. ([GitHub issue #633](#))

- Added support for 'unixPermissions' option to Azure NetApp Files volumes. ([GitHub issue #666](#))

## Deprecations

Trident REST interface can listen and serve only at 127.0.0.1 or [::1] addresses

## Changes in 21.10.1



The v21.10.0 release has an issue that can put the Trident controller into a `CrashLoopBackOff` state when a node is removed and then added back to the Kubernetes cluster. This issue is fixed in v21.10.1 ([GitHub issue 669](#)).

## Fixes

- Fixed potential race condition when importing a volume on a GCP CVS backend resulting in failure to import.
- Fixed an issue that can put the Trident controller into a `CrashLoopBackOff` state when a node is removed and then added back to the Kubernetes cluster ([GitHub issue 669](#)).
- Fixed issue where SVMs were no longer discovered if no SVM name was specified ([GitHub issue 612](#)).

## Changes in 21.10.0

### Fixes

- Fixed issue where clones of XFS volumes could not be mounted on the same node as the source volume ([GitHub issue 514](#)).
- Fixed issue where Astra Trident logged a fatal error on shutdown ([GitHub issue 597](#)).
- Kubernetes-related fixes:
  - Return a volume's used space as the minimum `restoreSize` when creating snapshots with `ontap-nas` and `ontap-nas-flexgroup` drivers ([GitHub issue 645](#)).
  - Fixed issue where `Failed to expand filesystem` error was logged after volume resize ([GitHub issue 560](#)).
  - Fixed issue where a pod could get stuck in `Terminating` state ([GitHub issue 572](#)).
  - Fixed the case where an `ontap-san-economy FlexVol` might be full of snapshot LUNs ([GitHub issue 533](#)).
  - Fixed custom YAML installer issue with different image ([GitHub issue 613](#)).
  - Fixed snapshot size calculation ([GitHub issue 611](#)).
  - Fixed issue where all Astra Trident installers could identify plain Kubernetes as OpenShift ([GitHub issue 639](#)).
  - Fixed the Trident operator to stop reconciliation if the Kubernetes API server is unreachable ([GitHub issue 599](#)).

### Enhancements

- Added support for `unixPermissions` option to GCP-CVS Performance volumes.
- Added support for scale-optimized CVS volumes in GCP in the range 600 GiB to 1 TiB.

- Kubernetes-related enhancements:
  - Added support for Kubernetes 1.22.
  - Enabled the Trident operator and Helm chart to work with Kubernetes 1.22 (GitHub issue 628).
  - Added operator image to `tridentctl images` command (GitHub issue 570).

## Experimental enhancements

- Added support for volume replication in the `ontap-san` driver.
- Added **tech preview** REST support for the `ontap-nas-flexgroup`, `ontap-san`, and `ontap-nas-economy` drivers.

## Known issues

Known issues identify problems that might prevent you from using the product successfully.

- When upgrading a Kubernetes cluster from 1.24 to 1.25 or later that has Astra Trident installed, you must update `values.yaml` to set `excludePodSecurityPolicy` to `true` or add `--set excludePodSecurityPolicy=true` to the `helm upgrade` command before you can upgrade the cluster.
- Astra Trident now enforces a blank `fsType` (`fsType=""`) for volumes that do not have the `fsType` specified in their `StorageClass`. When working with Kubernetes 1.17 or later, Trident supports providing a blank `fsType` for NFS volumes. For iSCSI volumes, you are required to set the `fsType` on your `StorageClass` when enforcing an `fsGroup` using a Security Context.
- When using a backend across multiple Astra Trident instances, each backend configuration file should have a different `storagePrefix` value for ONTAP backends or use a different `TenantName` for SolidFire backends. Astra Trident cannot detect volumes that other instances of Astra Trident have created. Attempting to create an existing volume on either ONTAP or SolidFire backends succeeds, because Astra Trident treats volume creation as an idempotent operation. If `storagePrefix` or `TenantName` do not differ, there might be name collisions for volumes created on the same backend.
- When installing Astra Trident (using `tridentctl` or the Trident Operator) and using `tridentctl` to manage Astra Trident, you should ensure the `KUBECONFIG` environment variable is set. This is necessary to indicate the Kubernetes cluster that `tridentctl` should work against. When working with multiple Kubernetes environments, you should ensure that the `KUBECONFIG` file is sourced accurately.
- To perform online space reclamation for iSCSI PVs, the underlying OS on the worker node might require mount options to be passed to the volume. This is true for RHEL/RedHat CoreOS instances, which require the `discard` [mount option](#); ensure that the `discard` mountOption is included in your `StorageClass` to support online block discard.
- If you have more than one instance of Astra Trident per Kubernetes cluster, Astra Trident cannot communicate with other instances and cannot discover other volumes that they have created, which leads to unexpected and incorrect behavior if more than one instance runs within a cluster. There should be only one instance of Astra Trident per Kubernetes cluster.
- If Astra Trident-based `StorageClass` objects are deleted from Kubernetes while Astra Trident is offline, Astra Trident does not remove the corresponding storage classes from its database when it comes back online. You should delete these storage classes using `tridentctl` or the REST API.
- If a user deletes a PV provisioned by Astra Trident before deleting the corresponding PVC, Astra Trident does not automatically delete the backing volume. You should remove the volume via `tridentctl` or the REST API.

- ONTAP cannot concurrently provision more than one FlexGroup at a time unless the set of aggregates are unique to each provisioning request.
- When using Astra Trident over IPv6, you should specify `managementLIF` and `dataLIF` in the backend definition within square brackets. For example, `[fd20:8b1e:b258:2000:f816:3eff:feec:0]`.



You cannot specify `dataLIF` on an ONTAP SAN backend. Astra Trident discovers all available iSCSI LIFs and uses them to establish the multipath session.

- If using the `solidfire-san` driver with OpenShift 4.5, ensure that the underlying worker nodes use MD5 as the CHAP authentication algorithm. Secure FIPS-compliant CHAP algorithms SHA1, SHA-256, and SHA3-256 are available with Element 12.7.

## Find more information

- [Astra Trident GitHub](#)
- [Astra Trident blogs](#)

## Earlier versions of documentation

If you aren't running Astra Trident 24.06, the documentation for previous releases is available based on the [Astra Trident support lifecycle](#).

- [Astra Trident 24.02](#)
- [Astra Trident 23.10](#)
- [Astra Trident 23.07](#)
- [Astra Trident 23.04](#)
- [Astra Trident 23.01](#)
- [Astra Trident 22.10](#)
- [Astra Trident 22.07](#)
- [Astra Trident 22.04](#)
- [Astra Trident 22.01](#)
- [Astra Trident 21.10](#)

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