



Configuration options and examples

Astra Trident

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Configuration options and examples

Learn about how to create and use ONTAP SAN drivers with your Astra Trident installation. This section provides backend configuration examples and details about how to map backends to StorageClasses.

Backend configuration options

See the following table for the backend configuration options:

Parameter	Description	Default
version		Always 1
storageDriverName	Name of the storage driver	"ontap-nas", "ontap-nas-economy", "ontap-nas-flexgroup", "ontap-san", "ontap-san-economy"
backendName	Custom name of the storage backend	Driver name + "_" + dataLIF
managementLIF	IP address of a cluster or SVM management LIF	"10.0.0.1", "[2001:1234:abcd::fefe]"
dataLIF	IP address of protocol LIF. Use square brackets for IPv6. Cannot be updated after you set it	Derived by the SVM unless specified
useCHAP	Use CHAP to authenticate iSCSI for ONTAP SAN drivers [Boolean]	false
chapInitiatorSecret	CHAP initiator secret. Required if useCHAP=true	""
labels	Set of arbitrary JSON-formatted labels to apply on volumes	""
chapTargetInitiatorSecret	CHAP target initiator secret. Required if useCHAP=true	""
chapUsername	Inbound username. Required if useCHAP=true	""
chapTargetUsername	Target username. Required if useCHAP=true	""
clientCertificate	Base64-encoded value of client certificate. Used for certificate-based auth	""
clientPrivateKey	Base64-encoded value of client private key. Used for certificate-based auth	""
trustedCACertificate	Base64-encoded value of trusted CA certificate. Optional. Used for certificate-based auth	""

Parameter	Description	Default
username	Username to connect to the cluster/SVM. Used for credential-based auth	""
password	Password to connect to the cluster/SVM. Used for credential-based auth	""
svm	Storage virtual machine to use	Derived if an SVM managementLIF is specified
igroupName	Name of the igroup for SAN volumes to use	"trident-<backend-UUID>"
storagePrefix	Prefix used when provisioning new volumes in the SVM. Cannot be updated after you set it	"trident"
limitAggregateUsage	Fail provisioning if usage is above this percentage. Does not apply to Amazon FSx for ONTAP	"" (not enforced by default)
limitVolumeSize	Fail provisioning if requested volume size is above this value for the economy driver.	"" (not enforced by default)
lunsPerFlexvol	Maximum LUNs per Flexvol, must be in range [50, 200]	"100"
debugTraceFlags	Debug flags to use when troubleshooting. Example, {"api":false, "method":true}	null

To communicate with the ONTAP cluster, you should provide the authentication parameters. This could be the username/password to a security login or an installed certificate.



If you are using an Amazon FSx for NetApp ONTAP backend, do not specify the `limitAggregateUsage` parameter. The `fsxadmin` and `vsadmin` roles provided by Amazon FSx for NetApp ONTAP do not contain the required access permissions to retrieve aggregate usage and limit it through Astra Trident.



Do not use `debugTraceFlags` unless you are troubleshooting and require a detailed log dump.

For the `ontap-san` drivers, the default is to use all data LIF IPs from the SVM and to use iSCSI multipath. Specifying an IP address for the `dataLIF` for the `ontap-san` drivers forces them to disable multipath and use only the specified address.



When creating a backend, remember that `dataLIF` and `storagePrefix` cannot be modified after creation. To update these parameters, you will need to create a new backend.

`igroupName` can be set to an igroup that is already created on the ONTAP cluster. If unspecified, Astra Trident automatically creates an igroup named `trident-<backend-UUID>`. If providing a pre-defined `igroupName`, NetApp recommends using an igroup per Kubernetes cluster, if the SVM is to be shared between environments. This is necessary for Astra Trident to maintain IQN additions/deletions automatically.

Backends can also have igroups updated after creation:

- `igroupName` can be updated to point to a new igroup that is created and managed on the SVM outside of Astra Trident.
- `igroupName` can be omitted. In this case, Astra Trident will create and manage a `trident-<backend-UUID>` igroup automatically.

In both cases, volume attachments will continue to be accessible. Future volume attachments will use the updated igroup. This update does not disrupt access to volumes present on the backend.

A fully-qualified domain name (FQDN) can be specified for the `managementLIF` option.

`managementLIF` for all ONTAP drivers can also be set to IPv6 addresses. Make sure to install Trident with the `--use-ipv6` flag. Care must be taken to define `managementLIF` IPv6 address within square brackets.



When using IPv6 addresses, make sure `managementLIF` and `dataLIF` (if included in your backend definition) are defined within square brackets, such as `[28e8:d9fb:a825:b7bf:69a8:d02f:9e7b:3555]`. If `dataLIF` is not provided, Astra Trident will fetch the IPv6 data LIFs from the SVM.

To enable the `ontap-san` drivers to use CHAP, set the `useCHAP` parameter to `true` in your backend definition. Astra Trident will then configure and use bidirectional CHAP as the default authentication for the SVM given in the backend. See [here](#) to learn about how it works.

For the `ontap-san-economy` driver, the `limitVolumeSize` option will also restrict the maximum size of the volumes it manages for qtrees and LUNs.



Astra Trident sets provisioning labels in the “Comments” field of all volumes created using the `ontap-san` driver. For each volume created, the “Comments” field on the FlexVol will be populated with all labels present on the storage pool it is placed in. Storage administrators can define labels per storage pool and group all volumes created in a storage pool. This provides a convenient way of differentiating volumes based on a set of customizable labels that are provided in the backend configuration.

Backend configuration options for provisioning volumes

You can control how each volume is provisioned by default using these options in a special section of the configuration. For an example, see the configuration examples below.

Parameter	Description	Default
<code>spaceAllocation</code>	Space-allocation for LUNs	“true”
<code>spaceReserve</code>	Space reservation mode; “none” (thin) or “volume” (thick)	“none”
<code>snapshotPolicy</code>	Snapshot policy to use	“none”
<code>qosPolicy</code>	QoS policy group to assign for volumes created. Choose one of <code>qosPolicy</code> or <code>adaptiveQosPolicy</code> per storage pool/backend	“”

Parameter	Description	Default
adaptiveQosPolicy	Adaptive QoS policy group to assign for volumes created. Choose one of qosPolicy or adaptiveQosPolicy per storage pool/backend	""
snapshotReserve	Percentage of volume reserved for snapshots "0"	If snapshotPolicy is "none", else ""
splitOnClone	Split a clone from its parent upon creation	"false"
splitOnClone	Split a clone from its parent upon creation	"false"
encryption	Enable NetApp volume encryption	"false"
securityStyle	Security style for new volumes	"unix"
tieringPolicy	Tiering policy to use "none"	"snapshot-only" for pre-ONTAP 9.5 SVM-DR configuration



Using QoS policy groups with Astra Trident requires ONTAP 9.8 or later. It is recommended to use a non-shared QoS policy group and ensure the policy group is applied to each constituent individually. A shared QoS policy group will enforce the ceiling for the total throughput of all workloads.

Here's an example with defaults defined:

```
{
  "version": 1,
  "storageDriverName": "ontap-san",
  "managementLIF": "10.0.0.1",
  "dataLIF": "10.0.0.2",
  "svm": "trident_svm",
  "username": "admin",
  "password": "password",
  "labels": {"k8scluster": "dev2", "backend": "dev2-sanbackend"},
  "storagePrefix": "alternate-trident",
  "igroupName": "custom",
  "debugTraceFlags": {"api":false, "method":true},
  "defaults": {
    "spaceReserve": "volume",
    "qosPolicy": "standard",
    "spaceAllocation": "false",
    "snapshotPolicy": "default",
    "snapshotReserve": "10"
  }
}
```



For all volumes created using the `ontap-san` driver, Astra Trident adds an extra 10 percent capacity to the FlexVol to accommodate the LUN metadata. The LUN will be provisioned with the exact size that the user requests in the PVC. Astra Trident adds 10 percent to the FlexVol (shows as Available size in ONTAP). Users will now get the amount of usable capacity they requested. This change also prevents LUNs from becoming read-only unless the available space is fully utilized. This does not apply to `ontap-san-economy`.

For backends that define `snapshotReserve`, Astra Trident calculates the size of volumes as follows:

```
Total volume size = [(PVC requested size) / (1 - (snapshotReserve
percentage) / 100)] * 1.1
```

The 1.1 is the extra 10 percent Astra Trident adds to the FlexVol to accommodate the LUN metadata. For `snapshotReserve = 5%`, and PVC request = 5GiB, the total volume size is 5.79GiB and the available size is 5.5GiB. The `volume show` command should show results similar to this example:

Vserver	Volume	Aggregate	State	Type	Size	Available	Used%
		_pvc_89f1c156_3801_4de4_9f9d_034d54c395f4	online	RW	10GB	5.00GB	0%
		_pvc_e42ec6fe_3baa_4af6_996d_134adbbb8e6d	online	RW	5.79GB	5.50GB	0%
		_pvc_e8372153_9ad9_474a_951a_08ae15e1c0ba	online	RW	1GB	511.8MB	0%

3 entries were displayed.

Currently, resizing is the only way to use the new calculation for an existing volume.

Minimal configuration examples

The following examples show basic configurations that leave most parameters to default. This is the easiest way to define a backend.



If you are using Amazon FSx on NetApp ONTAP with Astra Trident, the recommendation is to specify DNS names for LIFs instead of IP addresses.

`ontap-san` driver with certificate-based authentication

This is a minimal backend configuration example. `clientCertificate`, `clientPrivateKey`, and `trustedCACertificate` (optional, if using trusted CA) are populated in `backend.json` and take the base64-encoded values of the client certificate, private key, and trusted CA certificate, respectively.

```

{
  "version": 1,
  "storageDriverName": "ontap-san",
  "backendName": "DefaultSANBackend",
  "managementLIF": "10.0.0.1",
  "dataLIF": "10.0.0.3",
  "svm": "svm_iscsi",
  "useCHAP": true,
  "chapInitiatorSecret": "cl9qxIm36DKyawxy",
  "chapTargetInitiatorSecret": "rqxigXgkesIpwxyz",
  "chapTargetUsername": "iJF4heBRT0TCwxyz",
  "chapUsername": "uh2aNCLSD6cNwxyz",
  "igroupName": "trident",
  "clientCertificate": "ZXR0ZXJwYXB...ICMgJ3BhcGVyc2",
  "clientPrivateKey": "vciwKIyAgZG...0cnksIGRlc2NyaX",
  "trustedCACertificate": "zcyBbaG...b3Igb3duIGNsYXNz"
}

```

ontap-san **driver with bidirectional CHAP**

This is a minimal backend configuration example. This basic configuration creates an ontap-san backend with useCHAP set to true.

```

{
  "version": 1,
  "storageDriverName": "ontap-san",
  "managementLIF": "10.0.0.1",
  "dataLIF": "10.0.0.3",
  "svm": "svm_iscsi",
  "labels": {"k8scluster": "test-cluster-1", "backend": "testcluster1-
sanbackend"},
  "useCHAP": true,
  "chapInitiatorSecret": "cl9qxIm36DKyawxy",
  "chapTargetInitiatorSecret": "rqxigXgkesIpwxyz",
  "chapTargetUsername": "iJF4heBRT0TCwxyz",
  "chapUsername": "uh2aNCLSD6cNwxyz",
  "igroupName": "trident",
  "username": "vsadmin",
  "password": "secret"
}

```

ontap-san-economy **driver**


```

{
  "version": 1,
  "storageDriverName": "ontap-san-economy",
  "managementLIF": "10.0.0.1",
  "svm": "svm_iscsi_eco",
  "useCHAP": true,
  "chapInitiatorSecret": "cl9qxIm36DKyawxy",
  "chapTargetInitiatorSecret": "rqxigXgkesIpwxyz",
  "chapTargetUsername": "iJF4heBRT0TCwxyz",
  "chapUsername": "uh2aNCLSD6cNwxyz",
  "igroupName": "trident",
  "username": "vsadmin",
  "password": "secret"
}

```

Examples of backends with virtual storage pools

In the sample backend definition file shown below, specific defaults are set for all storage pools, such as `spaceReserve` at `none`, `spaceAllocation` at `false`, and `encryption` at `false`. The virtual storage pools are defined in the storage section.

In this example, some of the storage pool sets their own `spaceReserve`, `spaceAllocation`, and `encryption` values, and some pools overwrite the default values set above.

```

{
  "version": 1,
  "storageDriverName": "ontap-san",
  "managementLIF": "10.0.0.1",
  "dataLIF": "10.0.0.3",
  "svm": "svm_iscsi",
  "useCHAP": true,
  "chapInitiatorSecret": "cl9qxIm36DKyawxy",
  "chapTargetInitiatorSecret": "rqxigXgkesIpwxyz",
  "chapTargetUsername": "iJF4heBRT0TCwxyz",
  "chapUsername": "uh2aNCLSD6cNwxyz",
  "igroupName": "trident",
  "username": "vsadmin",
  "password": "secret",

  "defaults": {
    "spaceAllocation": "false",
    "encryption": "false",
    "qosPolicy": "standard"
  },
  "labels": {"store": "san_store", "kubernetes-cluster": "prod-cluster-

```

```

1"},
  "region": "us_east_1",
  "storage": [
    {
      "labels":{"protection":"gold", "creditpoints":"40000"},
      "zone":"us_east_1a",
      "defaults": {
        "spaceAllocation": "true",
        "encryption": "true",
        "adaptiveQosPolicy": "adaptive-extreme"
      }
    },
    {
      "labels":{"protection":"silver", "creditpoints":"20000"},
      "zone":"us_east_1b",
      "defaults": {
        "spaceAllocation": "false",
        "encryption": "true",
        "qosPolicy": "premium"
      }
    },
    {
      "labels":{"protection":"bronze", "creditpoints":"5000"},
      "zone":"us_east_1c",
      "defaults": {
        "spaceAllocation": "true",
        "encryption": "false"
      }
    }
  ]
}

```

Here is an iSCSI example for the `ontap-san-economy` driver:

```

{
  "version": 1,
  "storageDriverName": "ontap-san-economy",
  "managementLIF": "10.0.0.1",
  "svm": "svm_iscsi_eco",
  "useCHAP": true,
  "chapInitiatorSecret": "cl9qxIm36DKyawxy",
  "chapTargetInitiatorSecret": "rqxigXgkesIpwxyz",
  "chapTargetUsername": "iJF4heBRT0TCwxyz",
  "chapUsername": "uh2aNCLSD6cNwxyz",
  "igroupName": "trident",

```

```

"username": "vsadmin",
"password": "secret",

"defaults": {
  "spaceAllocation": "false",
  "encryption": "false"
},
"labels":{"store":"san_economy_store"},
"region": "us_east_1",
"storage": [
  {
    "labels":{"app":"oracledb", "cost":"30"},
    "zone":"us_east_1a",
    "defaults": {
      "spaceAllocation": "true",
      "encryption": "true"
    }
  },
  {
    "labels":{"app":"postgresdb", "cost":"20"},
    "zone":"us_east_1b",
    "defaults": {
      "spaceAllocation": "false",
      "encryption": "true"
    }
  },
  {
    "labels":{"app":"mysqldb", "cost":"10"},
    "zone":"us_east_1c",
    "defaults": {
      "spaceAllocation": "true",
      "encryption": "false"
    }
  }
]
}

```

Map backends to StorageClasses

The following StorageClass definitions refer to the above virtual storage pools. Using the `parameters.selector` field, each StorageClass calls out which virtual pool(s) can be used to host a volume. The volume will have the aspects defined in the chosen virtual pool.

- The first StorageClass (`protection-gold`) will map to the first, second virtual storage pool in the `ontap-nas-flexgroup` backend and the first virtual storage pool in the `ontap-san` backend. These are the only pool offering gold level protection.

- The second StorageClass (`protection-not-gold`) will map to the third, fourth virtual storage pool in `ontap-nas-flexgroup` backend and the second, third virtual storage pool in `ontap-san` backend. These are the only pools offering protection level other than gold.
- The third StorageClass (`app-mysqldb`) will map to the fourth virtual storage pool in `ontap-nas` backend and the third virtual storage pool in `ontap-san-economy` backend. These are the only pools offering storage pool configuration for `mysqldb` type app.
- The fourth StorageClass (`protection-silver-creditpoints-20k`) will map to the third virtual storage pool in `ontap-nas-flexgroup` backend and the second virtual storage pool in `ontap-san` backend. These are the only pools offering gold-level protection at 20000 creditpoints.
- The fifth StorageClass (`creditpoints-5k`) will map to the second virtual storage pool in `ontap-nas-economy` backend and the third virtual storage pool in `ontap-san` backend. These are the only pool offerings at 5000 creditpoints.

Astra Trident will decide which virtual storage pool is selected and will ensure the storage requirement is met.

```
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: protection-gold
provisioner: netapp.io/trident
parameters:
  selector: "protection=gold"
  fsType: "ext4"
---
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: protection-not-gold
provisioner: netapp.io/trident
parameters:
  selector: "protection!=gold"
  fsType: "ext4"
---
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: app-mysqldb
provisioner: netapp.io/trident
parameters:
  selector: "app=mysqldb"
  fsType: "ext4"
---
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: protection-silver-creditpoints-20k
provisioner: netapp.io/trident
parameters:
  selector: "protection=silver; creditpoints=20000"
  fsType: "ext4"
---
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: creditpoints-5k
provisioner: netapp.io/trident
parameters:
  selector: "creditpoints=5000"
  fsType: "ext4"
```

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