



11. Install and Configure NetApp Trident Storage Provisioner: NetApp HCI with Anthos

HCI

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Trident is a storage orchestrator for containers. With Trident, microservices and containerized applications can take advantage of enterprise-class storage services provided by the full NetApp portfolio of storage systems for persistent storage mounts. Depending on an application's requirements, Trident dynamically provisions storage for ONTAP-based products such as NetApp AFF and FAS systems and Element storage systems like NetApp SolidFire® and NetApp HCI.

To install Trident on the deployed user cluster and provision a persistent volume, complete the following steps:

1. Download the installation archive to the admin workstation and extract the contents. The current version of Trident is 19.10, which can be downloaded [here](#).

```
ubuntu@Anthos-Admin-Workstation:~$ wget
https://github.com/NetApp/trident/releases/download/v19.10.0/trident-installer-
19.10.0.tar.gz
--2019-11-07 16:45:33--
https://github.com/NetApp/trident/releases/download/v19.10.0/trident-installer-
19.10.0.tar.gz
Resolving github.com (github.com)... 140.82.118.4
Connecting to github.com (github.com)|140.82.118.4|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://github-production-release-asset-
2e65be.s3.amazonaws.com/77179634/4d3b5900-
Resolving github-production-release-asset-2e65be.s3.amazonaws.com (github-production-
release-asset-2e65be.s3.amazonaws.com)... 52.216.81.8
Connecting to github-production-release-asset-2e65be.s3.amazonaws.com (github-
production-release-asset-2e65be.s3.amazonaws.com)|52.216.81.8|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 68903585 (66M) [application/octet-stream]
Saving to: 'trident-installer-19.10.0.tar.gz.1'

trident-installer-19.10.0.tar 100%[=====>]
65.71M  53.8MB/s   in 1.2s

2019-11-07 16:45:35 (53.8 MB/s) - 'trident-installer-19.10.0.tar.gz.1' saved
[68903585/68903585]

ubuntu@Anthos-Admin-Workstation:~$ tar -xf trident-installer-19.10.0.tar.gz
```

2. First set the location of the user cluster's `kubeconfig` file as an environment variable so that you don't have to reference it, because Trident has no option to pass this file.

```
ubuntu@Anthos-Admin-Workstation:~$ export KUBECONFIG=~/.anthos-cluster01-kubeconfig
```

3. Navigate to the Trident directory and execute the `tridentctl` tool to install trident to your cluster. NetApp recommends installing Trident into its own namespace within the cluster. You can then verify that the install finished correctly.

```
ubuntu@Anthos-Admin-Workstation:~$ cd trident-installer --csi
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ ./tridentctl install -n trident
INFO Starting Trident installation.                namespace=trident
INFO Created namespace.                          namespace=trident
INFO Created service account.
INFO Created cluster role.
INFO Created cluster role binding.
INFO Created custom resource definitions.          namespace=trident
INFO Added finalizers to custom resource definitions.
INFO Created Trident deployment.
INFO Waiting for Trident pod to start.
INFO Trident pod started.                        namespace=trident pod=trident-
79c76ff764-77sgl
INFO Waiting for Trident REST interface.
INFO Trident REST interface is up.               version=19.10.0
INFO Trident installation succeeded.
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ ./tridentctl version -n trident
+-----+-----+
| SERVER VERSION | CLIENT VERSION |
+-----+-----+
| 19.10.0       | 19.10.0       |
+-----+-----+
```

4. The next step in enabling Trident integration with the NetApp HCI solution and Anthos is to create a backend that enables communication with the storage system. There are sample backend files available in the downloaded installation archive in the `sample-input` folder. Copy the `backend-solidfire.json` to your working directory and edit it to provide information detailing the storage system environment.

```
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ cp sample-input/backend-solidfire.json ./
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ vi backend-solidfire.json
```

5. Edit the user, password, and MVIP value on the EndPoint line.

6. Edit the SVIP value.

```
{
  "version": 1,
  "storageDriverName": "solidfire-san",
  "Endpoint": "https://trident:password@172.21.224.150/json-rpc/8.0",
  "SVIP": "10.63.172.100:3260",
  "TenantName": "trident",
  "Types": [{"Type": "Bronze", "Qos": {"minIOPS": 1000, "maxIOPS": 2000,
"burstIOPS": 4000}},
            {"Type": "Silver", "Qos": {"minIOPS": 4000, "maxIOPS": 6000,
"burstIOPS": 8000}},
            {"Type": "Gold", "Qos": {"minIOPS": 6000, "maxIOPS": 8000, "burstIOPS":
10000}}]
}
```

7. With this back-end file in place, run the following command to create your first backend.

```
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ ./tridentctl -n trident create
backend -f backend.json
+-----+-----+-----+-----+
+-----+
|   NAME           | STORAGE DRIVER |          UUID           | STATE |
VOLUMES |
+-----+-----+-----+-----+
+-----+
| solidfire-backend | solidfire-san  | a5f9e159-c8f4-4340-a13a-c615fef0f433 | online |
0 |
+-----+-----+-----+-----+
+-----+
```

8. With the backend created, you must next create a storage class. Just as with the backend, there is a sample storage class file that can be edited for the environment available in the sample-inputs folder. Copy it to the working directory and make necessary edits to reflect the backend created.

```
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ cp sample-input/storage-class-
csi.yaml.tmpl ./storage-class-basic.yaml
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ vi storage-class-basic.yaml
```

9. The only edit that must be made to this file is to define the **backendType** value to the name of the storage driver from the newly created backend. Also note the name-field value, which must be referenced in a later step.

```
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: basic-csi
provisioner: csi.trident.netapp.io
parameters:
  backendType: "solidfire-san"
```

10. Run the **kubectl** command to create the storage class.

```
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ kubectl create -f sample-
input/storage-class-basic.yaml
```

11. With the storage class created, you must then create the first persistent volume claim (PVC). There is a sample **pvc-basic.yaml** file that can be used to perform this action located in sample-inputs as well. The only edit that must be made to this file is ensuring that the `storageClassName` field matches the one just created.

```
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ vi sample-input/pvc-basic.yaml
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
  name: basic
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 1Gi
  storageClassName: basic-csi
```

12. Create the PVC by issuing the **kubectl** command, Creation can take some time depending on the size of the backing volume being created, so you can watch the process as it completes.

```
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ kubectl create -f sample-  
input/pvc-basic.yaml
```

```
ubuntu@Anthos-Admin-Workstation:~/trident-installer$ kubectl get pvc --watch
```

NAME	STATUS	VOLUME	CAPACITY	ACCESS MODES
STORAGECLASS	AGE			
basic	Pending			
basic	1s			
basic	Pending	pvc-2azg0d2c-b13e-12e6-8d5f-5342040d22bf	0	
basic	5s			
basic	Bound	pvc-2azg0d2c-b13e-12e6-8d5f-5342040d22bf	1Gi	RWO
basic	7s			

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