



## **9. Download and Install NetApp Trident: NetApp HCI for Red Hat OpenShift on RHV**

### **NetApp Solutions**

Dorian Henderson, Kevin Hoke  
February 19, 2021

This PDF was generated from [https://docs.netapp.com/us-en/netapp-solutions/containers/rh-os-rhv-9\\_download\\_and\\_install\\_netapp\\_trident.html](https://docs.netapp.com/us-en/netapp-solutions/containers/rh-os-rhv-9_download_and_install_netapp_trident.html) on August 03, 2021. Always check docs.netapp.com for the latest.

# Table of Contents

9. Download and Install NetApp Trident: NetApp HCI for Red Hat OpenShift on RHV ..... 1

## 9. Download and Install NetApp Trident: NetApp HCI for Red Hat OpenShift on RHV

To download and install NetApp Trident, complete the following steps:

1. Make sure that the user that is logged in to the OCP cluster has sufficient privileges for installing Trident.

```
[user@rhel7 openshift-deploy]$ oc auth can-i '*' '*' --all-namespaces
yes
```

2. Verify that you can download an image from the registry and access the MVIP of the NetApp Element cluster.

```
[user@rhel7 openshift-deploy]$ oc run -i --tty ping --image=busybox
--restart=Never --rm -- ping 10.63.172.140
If you don't see a command prompt, try pressing enter.
64 bytes from 10.63.172.140: seq=1 ttl=63 time=0.312 ms
64 bytes from 10.63.172.140: seq=2 ttl=63 time=0.271 ms
64 bytes from 10.63.172.140: seq=3 ttl=63 time=0.254 ms
64 bytes from 10.63.172.140: seq=4 ttl=63 time=0.309 ms
64 bytes from 10.63.172.140: seq=5 ttl=63 time=0.319 ms
64 bytes from 10.63.172.140: seq=6 ttl=63 time=0.303 ms
^C
--- 10.63.172.140 ping statistics ---
7 packets transmitted, 7 packets received, 0% packet loss
round-trip min/avg/max = 0.254/0.387/0.946 ms
pod "ping" deleted
```

3. Download the Trident installer bundle using the following commands and extract it to a directory.

```
[user@rhel7 ~]$ wget
[user@rhel7 ~]$ tar -xf trident-installer-20.04.0.tar.gz
[user@rhel7 ~]$ cd trident-installer
```

4. The Trident installer contains manifests for defining all the required resources. Using the appropriate manifests, create the TridentProvisioner custom resource definition.

```
[user@rhel7 trident-installer]$ oc create -f
deploy/crds/trident.netapp.io_tridentprovisioners_crd_post1.16.yaml

customresourcedefinition.apiextensions.k8s.io/tridentprovisioners.triden
t.netapp.io created
```

5. Create a Trident namespace, which is required for the Trident operator.

```
[user@rhel7 trident-installer]$ oc create namespace trident
namespace/trident created
```

6. Create the resources required for the Trident operator deployment, such as a ServiceAccount for the operator, a ClusterRole and ClusterRoleBinding to the ServiceAccount, a dedicated PodSecurityPolicy, or the operator itself.

```
[user@rhel7 trident-installer]$ oc kustomize deploy/ >
deploy/bundle.yaml
[user@rhel7 trident-installer]$ oc create -f deploy/bundle.yaml
serviceaccount/trident-operator created
clusterrole.rbac.authorization.k8s.io/trident-operator created
clusterrolebinding.rbac.authorization.k8s.io/trident-operator created
deployment.apps/trident-operator created
podsecuritypolicy.policy/tridentoperatorpods created
```

7. Verify that the Trident operator is deployed.

```
[user@rhel7 trident-installer]$ oc get deployment -n trident
NAME                READY    UP-TO-DATE    AVAILABLE    AGE
trident-operator    1/1      1              1            56s
[user@rhel7 trident-installer]$ oc get pods -n trident
NAME                                READY    STATUS    RESTARTS    AGE
trident-operator-564d7d66f-qrz7v    1/1      Running    0            71s
```

8. After the Trident operator is installed, install Trident using this operator. In this example, TridentProvisioner custom resource (CR) was created. The Trident installer comes with definitions for creating a TridentProvisioner CR. These can be modified based on the requirements.

```
[user@rhel7 trident-installer]$ oc create -f
deploy/crds/tridentprovisioner_cr.yaml
tridentprovisioner.trident.netapp.io/trident created
```

9. Approve the Trident serving CSR certificates by using `oc get csr -o name | xargs oc adm certificate approve`.

```
[user@rhel7 trident-installer]$ oc get csr -o name | xargs oc adm
certificate approve
certificatesigningrequest.certificates.k8s.io/csr-4b7zh approved
certificatesigningrequest.certificates.k8s.io/csr-4hkwk approved
certificatesigningrequest.certificates.k8s.io/csr-5bgh5 approved
certificatesigningrequest.certificates.k8s.io/csr-5g4d6 approved
certificatesigningrequest.certificates.k8s.io/csr-5j9hz approved
certificatesigningrequest.certificates.k8s.io/csr-5m8qb approved
certificatesigningrequest.certificates.k8s.io/csr-66hv2 approved
certificatesigningrequest.certificates.k8s.io/csr-6rdgg approved
certificatesigningrequest.certificates.k8s.io/csr-6t24f approved
certificatesigningrequest.certificates.k8s.io/csr-76wgv approved
certificatesigningrequest.certificates.k8s.io/csr-78qsq approved
certificatesigningrequest.certificates.k8s.io/csr-7r58n approved
certificatesigningrequest.certificates.k8s.io/csr-8ghmk approved
certificatesigningrequest.certificates.k8s.io/csr-8sn5q approved
```

10. Verify that Trident 20.04 is installed by using the TridentProvisioner CR, and verify that the pods related to Trident are.

```
[user@rhel7 trident-installer]$ oc get tprov -n trident
NAME          AGE
trident        9m49s

[user@rhel7 trident-installer]$ oc describe tprov trident -n trident
Name:          trident
Namespace:     trident
Labels:        <none>
Annotations:   <none>
API Version:   trident.netapp.io/v1
Kind:          TridentProvisioner
Metadata:
  Creation Timestamp:  2020-05-26T18:49:19Z
  Generation:         1
  Resource Version:    640347
  Self Link:
/apis/trident.netapp.io/v1/namespaces/trident/tridentprovisioners/trident
  UID:                52656806-0414-4ed8-b355-fc123fafbf4e
Spec:
  Debug:  true
Status:
  Message:  Trident installed
  Status:   Installed
  Version:  v20.04
```

Events:

Type	Reason	Age	From
Message			
----	-----	----	----
-----			

Normal	Installing	9m32s	trident-operator.netapp.io
Installing Trident			

Normal	Installed	3m47s (x5 over 8m56s)	trident-operator.netapp.io
Trident installed			

```
[user@rhel7 trident-installer]$ oc get pods -n trident
```

NAME	READY	STATUS	RESTARTS	AGE
trident-csi-7f769c7875-s6fmt	5/5	Running	0	10m
trident-csi-cp7wg	2/2	Running	0	10m
trident-csi-hhx94	2/2	Running	0	10m
trident-csi-l72bt	2/2	Running	0	10m
trident-csi-xfl9d	2/2	Running	0	10m
trident-csi-xrhqx	2/2	Running	0	10m
trident-csi-zb7ws	2/2	Running	0	10m
trident-operator-564d7d66f-qrz7v	1/1	Running	0	27m

```
[user@rhel7 trident-installer]$ ./tridentctl -n trident version
```

```
+-----+
| SERVER VERSION | CLIENT VERSION |
+-----+
| 20.04.0        | 20.04.0        |
+-----+
```

11. Create a storage backend that will be used by Trident to provision volumes. The storage backend specifies the Element cluster in NetApp HCI. You also can specify sample bronze, silver, and gold types with corresponding QoS specs.

```
[user@rhel7 trident-installer]$ vi backend.json
{
    "version": 1,
    "storageDriverName": "solidfire-san",
    "Endpoint": "https://admin: admin- password@10.63.172.140/json-
rpc/8.0",
    "SVIP": "10.61.185.205:3260",
    "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}}]
}
[user@rhel7 trident-installer]$ ./tridentctl -n trident create backend
-f backend.json
+-----+-----+
+-----+-----+-----+-----+
|          NAME          | STORAGE DRIVER |          UUID          |
| STATE | VOLUMES |          |
+-----+-----+-----+-----+
+-----+-----+-----+-----+
| solidfire_10.61.185.205 | solidfire-san  | 40f48d99-5d2e-4f6c-89ab-
8aee2be71255 | online |          0 |
+-----+-----+-----+-----+
+-----+-----+-----+-----+
```

Modify the `backend.json` to accommodate the details or requirements of your environment for the following values:

- Endpoint corresponds to the credentials and the MVIP of the NetApp HCI Element cluster.
- SVIP corresponds to the SVIP configured over the VM network in the section titled [Create Storage Network VLAN](#).
- Types corresponds to different QoS bands. New persistent volumes can be created with specific QoS settings by specifying the exact storage pool.

12. Create a StorageClass that specifies Trident as the provisioner and the storage backend as `solidfire-san`.

```
[user@rhel7 trident-installer]$ vi storage-class-basic.yaml
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: basic-csi
  annotations:
    storageclass.kubernetes.io/is-default-class: "true"
provisioner: csi.trident.netapp.io
parameters:
  backendType: "solidfire-san"
  provisioningType: "thin"

[user@rhel7 trident-installer]$ oc create -f storage-class-basic.yaml
storageclass.storage.k8s.io/basic created
```



In this example, the StorageClass created is set as a default, however an OpenShift administrator can define multiple storage classes corresponding to different QoS requirements and other factors based upon their applications. Trident selects a storage backend that can satisfy all the criteria specified in the parameters section in the storage class definition. End users can then provision storage as needed, without administrative intervention.

[Next: Validation Results: NetApp HCI for Red Hat OpenShift on RHV](#)



## Copyright Information

Copyright © 2021 NetApp, Inc. All rights reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means-graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system-without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

## Trademark Information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.