



## Trident

A dynamic persistent storage orchestrator for containers



<http://netapp.io>

Application containers are becoming more critical to accelerate development and delivery of cloud-native applications and to modernize existing applications. In many cases, these applications have persistent data requirements that you must consider when you deploy a container framework.

### Challenges in Achieving Application Data Persistence

It can be challenging to support application persistent data with containers, however. Some key questions are:

- How do infrastructure teams configure the container system with storage volumes?
- How do infrastructure teams control which volumes are used by which applications?
- How are the storage volumes reclaimed when an application no longer needs them?
- How difficult is it to match a persistent volume request with an available volume that has the right capacity and performance characteristics?
- How many steps must a developer follow to make a persistent volume request?
- How long must developers wait for volume requests to be fulfilled?

Container orchestrators have made some steps forward to help automate provisioning of storage to support persistence. However, it is still a manual and time-consuming process for both developer and infrastructure teams.

The introduction of Kubernetes StorageClasses has enabled NetApp to introduce new core capabilities that dramatically simplify the persistent volume provisioning process.

### Trident: An Open-Source Storage Provisioner and Orchestrator

Enter Trident, an open-source project that NetApp maintains for application container persistent storage. Trident has been implemented as an external provisioner controller that runs as a pod itself, monitoring volumes and completely automating the provisioning process. Trident builds upon NetApp's 26 years of experience and is fully supported by NetApp.

Some common use cases that can take advantage of persistent storage support for Kubernetes are:

- DevOps teams who want to accelerate the Continuous Integration/Continuous Delivery (CI/CD) pipeline
- Lift and shift of traditional enterprise applications that are deployed on the premises or in the cloud
- Cloud-native applications and microservices

### Powerful Features to Improve DevOps Efficiency

In addition to basic persistent volume integration, Trident also enables advanced data management capabilities, all designed to provide storage deployment flexibility for your containerized applications. You get:

- Support for the full NetApp® portfolio: NetApp HCI, ONTAP®, SolidFire®, and E-Series technologies.
- Application data that is managed and protected by enterprise-class storage.
- The ability to use multiple storage back ends simultaneously. Deployment of each back end with a different configuration allows Trident to provision and to consume storage with different characteristics and costs. Trident can also present composable infrastructure to containerized workloads in a straightforward fashion, without complexity.

### Enabling the Containers Ecosystem

The growing ecosystem for application containers can improve usability and can augment deployments. And through NetApp's participation in the [Cloud Native Computing Foundation](#) and in the [Container Storage Interface](#) initiative, we are committed to the open ecosystem. By using Trident with your NetApp storage, you can natively support many popular application container platforms, such as:

- Kubernetes
- Red Hat OpenShift
- Docker Enterprise Edition

### Unlocking Speed and Agility

Persistent storage with containers has a wide variety of use cases. From monolithic applications to 12-factor microservices, most DevOps workflows can benefit from development and deployment in containers. Workloads that require stateful data with containers include databases, artificial intelligence (AI) and machine learning (ML), CI/CD, big data, and many more. No matter what your use case or your workload is, Trident can enable a faster, more agile software lifecycle.

NetApp believes that containers are the future of multicloud workloads. Containers abstract the application from the underlying operating system, which enables portability and flexibility in software development and increases efficiency for development and infrastructure teams. Trident can help bring your enterprise closer to fully embracing a cloud-native future.

Trident is available from [NetApp's GitHub site](#). You can get details about deployment and configuration from the documentation and from our developer and open-source community, [thePub](#).

You can also send an email to [trident@netapp.com](mailto:trident@netapp.com) to receive a list of comprehensive resources for Trident.