



Connect

La soluzione di NetApp e Red Hat per la resilienza dei dati

Provisioning dinamico e protezione avanzata in ambienti OpenShift grazie a NetApp Trident e Trident Protect.

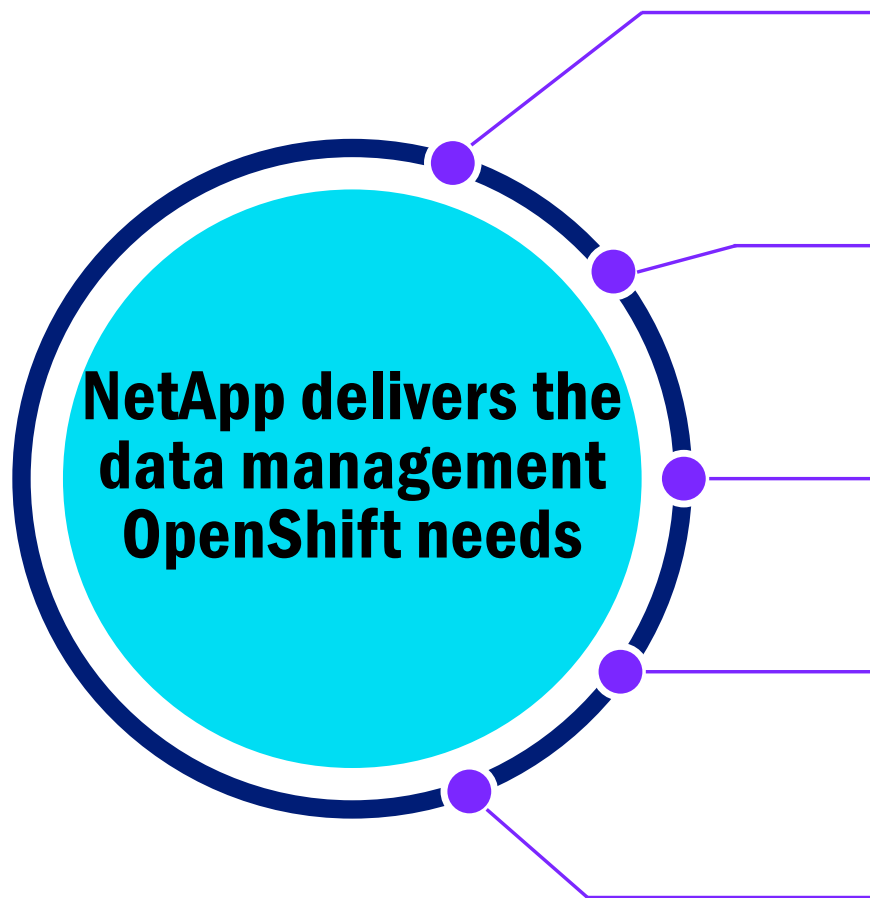
Matteo Calcagni, *Technical Partner Lead, NetApp*

Roberto Patano, *Sr. Manager System Solution Engineer, NetApp*



Red Hat





Performance

Provision persistent storage for performance and scale

Availability

DR and business continuity with SnapShots and SnapMirror

Security

The most secure storage on the planet – the only vendor certified to store top secret data by the NSA

Mobility

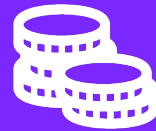
Transfer and synchronize data across environments without operational overhead

Efficiency

Automated provisioning of storage for Kubernetes apps

The Combined Advantage

NetApp and Red Hat OpenShift



Cost Efficiency



Unified Platform



Enhanced Data Management



Robust Data Protection



Proven Expertise



Containerization

NetApp Intelligent Data Infrastructure for Red Hat OpenShift

Consistency by design



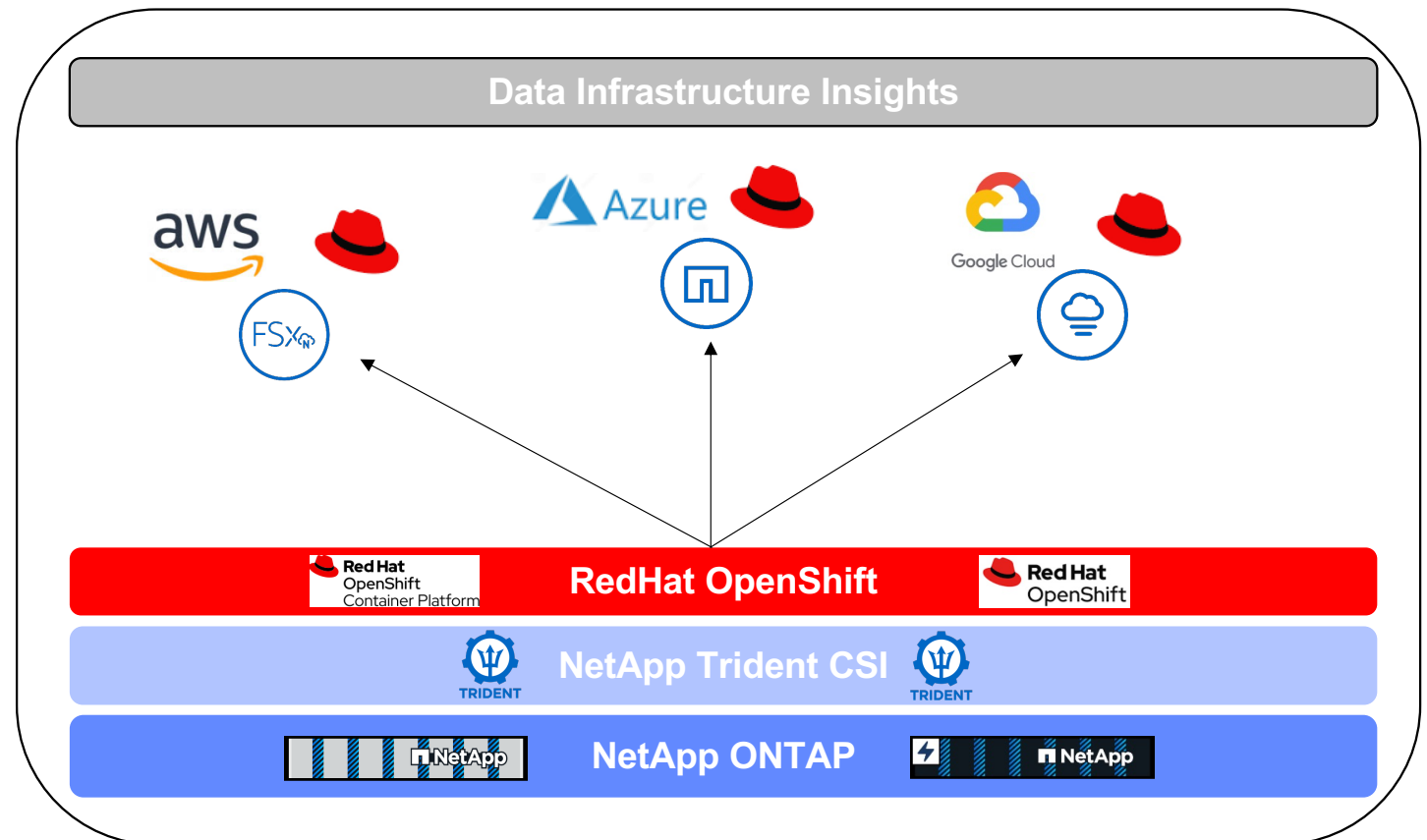
Manage Kubernetes apps and VMs across the hybrid cloud



Prevent app downtime and data loss



Secure OpenShift Virtualization workloads



Gartner Critical Capabilities 2024

Containers workload

NetApp AFF A-Series
Rated **#1** for Kubernetes workloads

NetApp® AFF scores highest for the 3rd year in a row

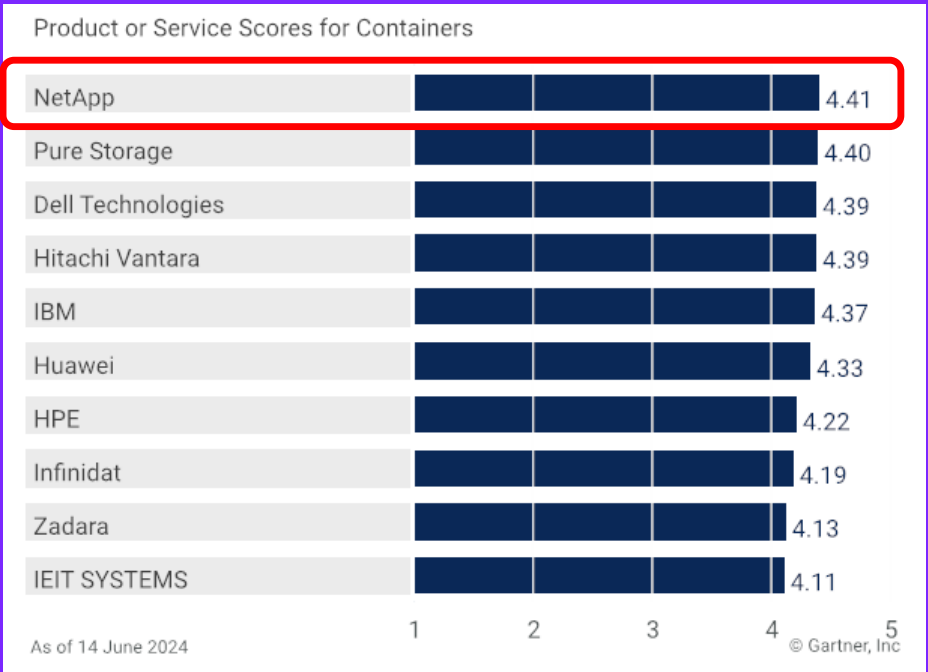
High score due to its blend of performance, features, and storage efficiencies compared to the competition

NetApp ONTAP® delivers data protection, reliability, and flexibility for containers and Kubernetes deployments



© 2025 NetApp, Inc. All rights reserved.

“NetApp’s AFF exceeds requirements for all use cases. It performs particularly well with hybrid IT operations management and containers due to support for all major distributions of Kubernetes on-premises and in the cloud.”



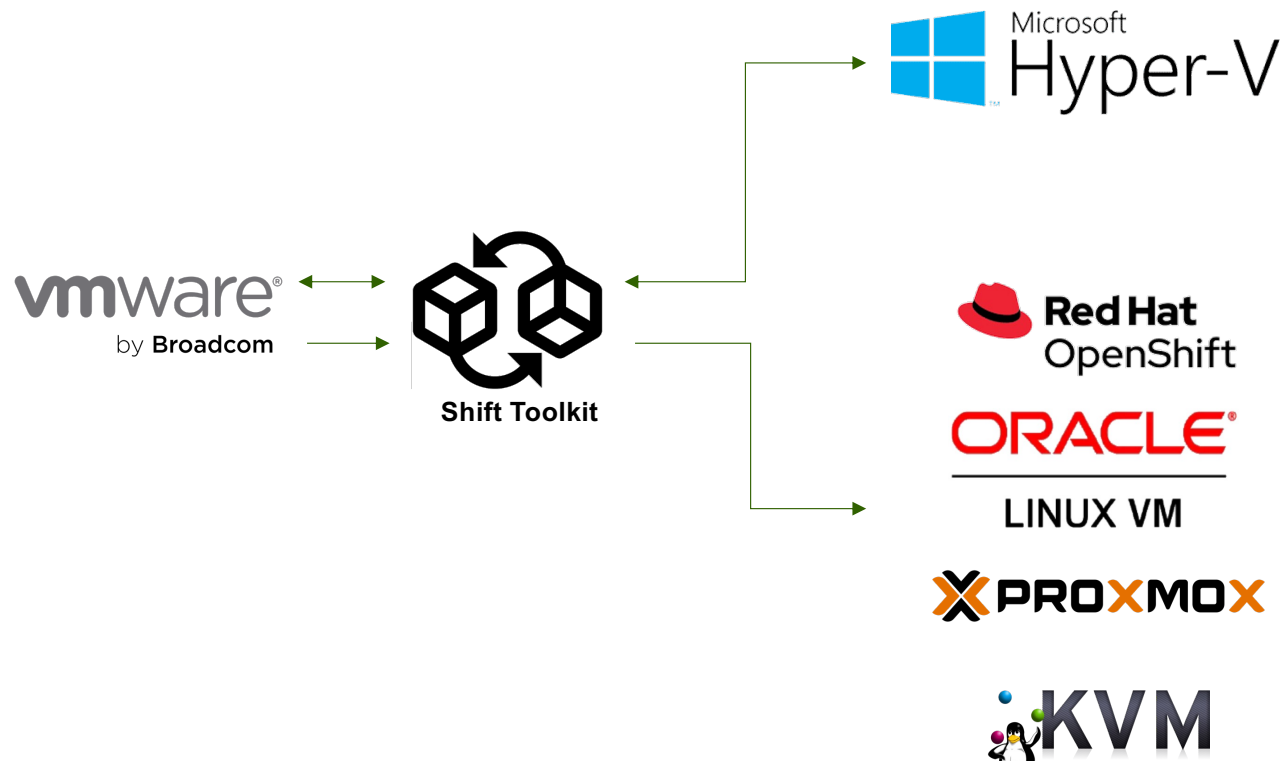
[Critical Capabilities for Primary Storage Platforms](#)

Simplify your migrations

NetApp Shift Toolkit

Convert and
migrate in minutes

Reduced
downtime and
disruption



Reduce migration
& licensing costs

Separate dev/test
& production

Joint, Validated Solutions

Virtualization

- Red Hat OpenShift Virtualization with ONTAP and Trident
 - Fast VM migration with NetApp Shift

Containers

- Red Hat OpenShift Container Platform with CSI integration for Trident
 - Pulls ONTAP functionality into existing workflows
 - Integrated protection, migration, DR at no additional cost

Managed Cloud

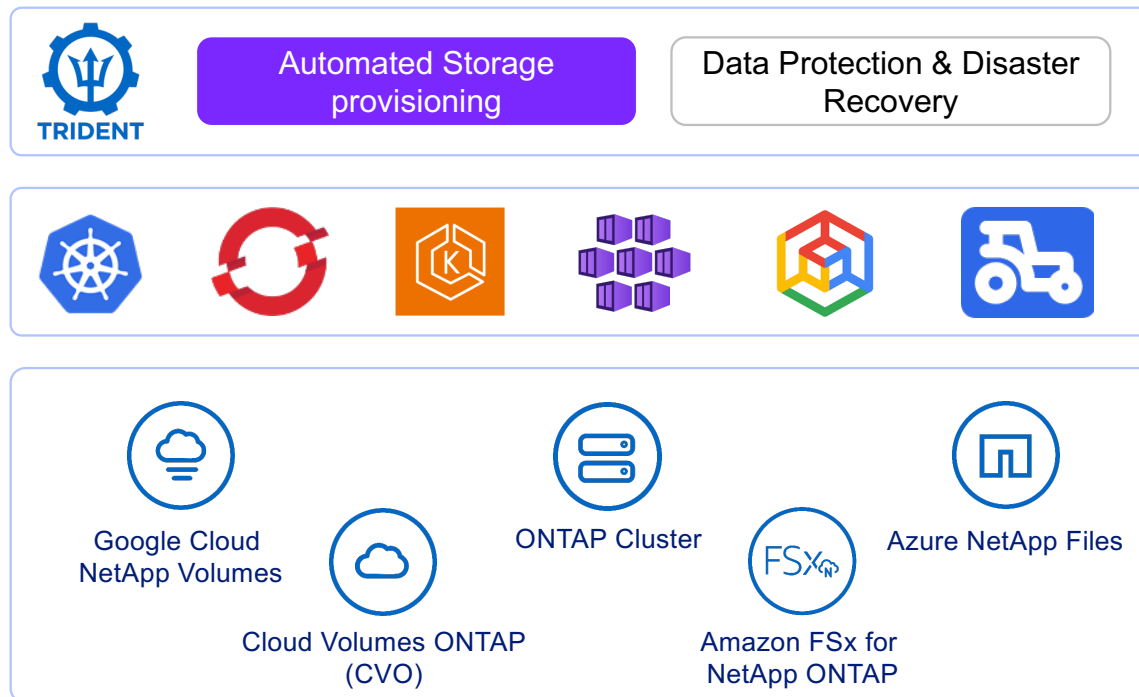
- Red Hat OpenShift Service on AWS with FSxN
- Red Hat OpenShift Dedicated with GGNV
- Red Hat OpenShift on Azure with CVO

FlexPod Cisco Validated Designs

- FlexPod hybrid cloud for Red Hat OpenShift Virtualization
- FlexPod Data Center for OpenShift Container Platform
- FlexPod for OpenShift AI

NetApp Trident

















Automated storage provisioning



- Automated storage provisioning
- Open Source and free-of-charge
 - Maintained and supported by NetApp
- CSI compliant
 - Snapshots, Topology, Online expansion,...
- Multi-protocol support
 - iSCSI, NFS, SMB, NVMe/TCP, FCP
- All access modes supported
 - RWO, RWOP, RWX, ROX
- Multiple Installation methods
 - Operator, HELM based, tridentctl cli based

Trident Qualification Matrix

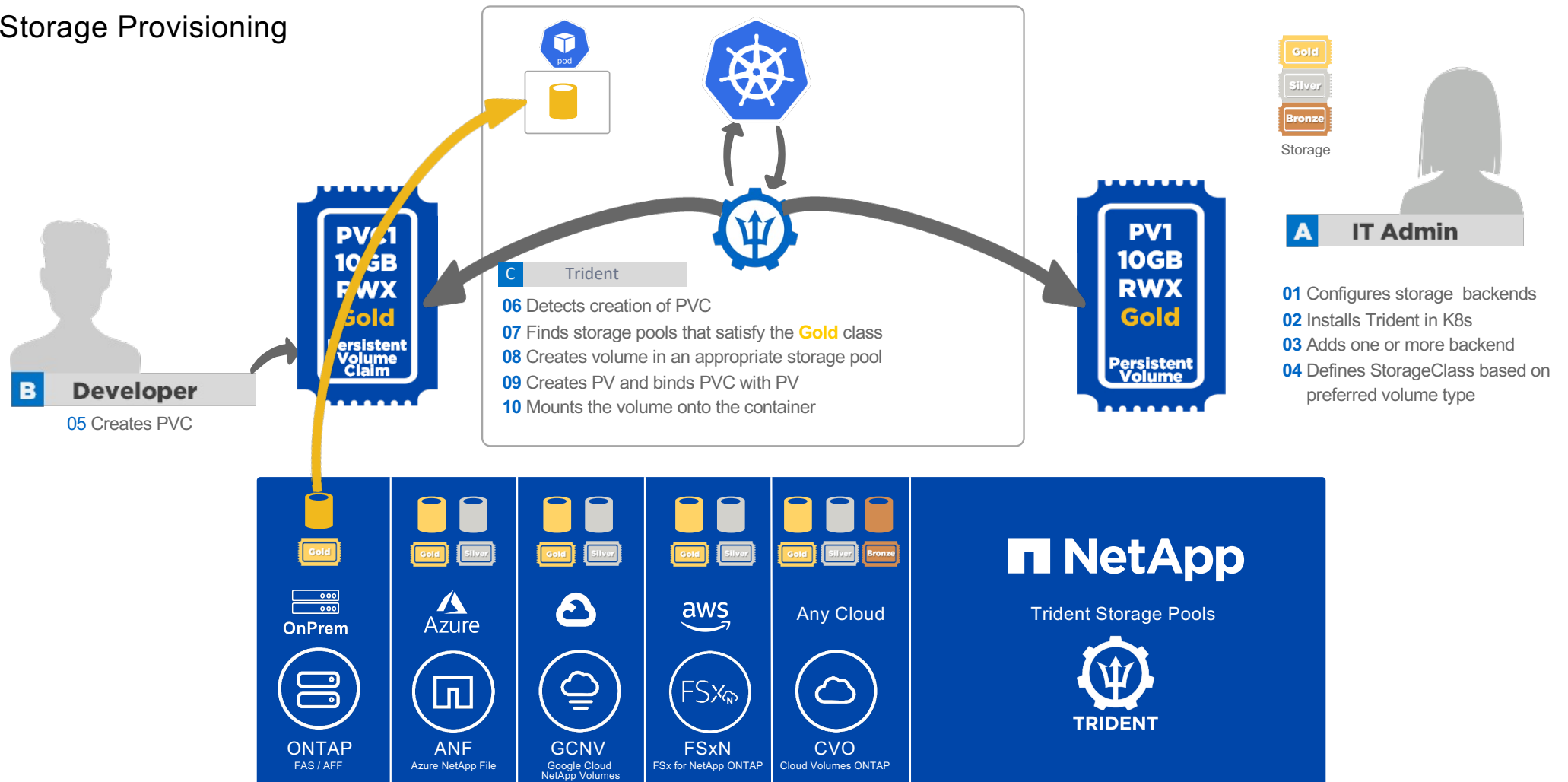
Updated with Trident 25.10

Operating System ⁽¹⁾	Container Platform ⁽²⁾	Storage Backend
 RHEL (AMD64 & ARM64) 8+	 Kubernetes 1.27 - 1.33	  FAS, AFF, ONTAP Select
 Ubuntu (AMD64 & ARM64) 22.04 or later	 OpenShift 4.14 - 4.19	 Element OS
 RHCOS	 Anthos On-Prem 1.16 (VMware & Bare Metal)	 Azure NetApp Files ANF
 Windows Server 2019, 2022	 Rancher RKE2 1.27 - 1.33	 Google Cloud NetApp Volume GCNV
 Bottlerocket		 Cloud Volume ONTAP CVO
		 Amazon FSx for NetApp ONTAP

(1) Trident does not officially "support" specific operating systems, the following Linux distributions are known to work
(2) Trident also works with a host of other fully managed and self-managed Kubernetes offerings, including Google Kubernetes Engine (GKE), AWS's Elastic Kubernetes Services (EKS), Azure's Azure Kubernetes Service (AKS), Mirantis Kubernetes Engine (MKE), and VMware Tanzu Portfolio.

NetApp Trident

Storage Provisioning



What features does NetApp Trident propose? (*aside from provisioning volumes ...*)

CSI Specific

- CSI NetApp® Snapshot™ copies and volume creation from CSI Snapshot copies
- CSI topology
- Volume expansion

Security

- Dynamic NFS export policy
- Dynamic iSCSI initiator groups management
- iSCSI bidirectional CHAP
- Host-side encryption using Linux Unified Key Setup (LUKS)

Control & Data Protection

- Storage and performance consumption
- Cross Namespace Volume Access (NFS)
- Monitoring
- Volume & Snapshot Import
- Custom volume/label names
- In-Place Snapshot Restore
- SnapMirror integration

Installation methods

- Binary
- Helm Chart
- EKS add-on
- Operator
- GitOps

Choose your access mode

- RWO (*ReadWriteOnce*, ie 1↔1 Volume/Host)
- RWOP (*ReadWriteOncePod*, ie 1↔1 Volume/Pod)
- RWX (*ReadWriteMany*, ie 1↔n)
- ROX (*ReadOnlyMany*)

Choose your protocol

- NFS
- SMB
- iSCSI
- NVMe over TCP
- Fibre Channel

NetApp Trident Protect

Advanced data management and protection

- Kubernetes-native, free to use CRDs for data protection and disaster recovery
- Snapshots, backups, and restores
- Migration and portability of apps with their data
- Disaster recovery with storage replication
- KubeVirt / OpenShift Virtualization DR
- Simplified blue-green upgrades



Automated Storage
provisioning

Data Protection & Disaster
Recovery



Google Cloud
NetApp Volumes



Cloud Volumes ONTAP
(CVO)



ONTAP Cluster

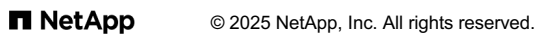


Amazon FSx for
NetApp ONTAP



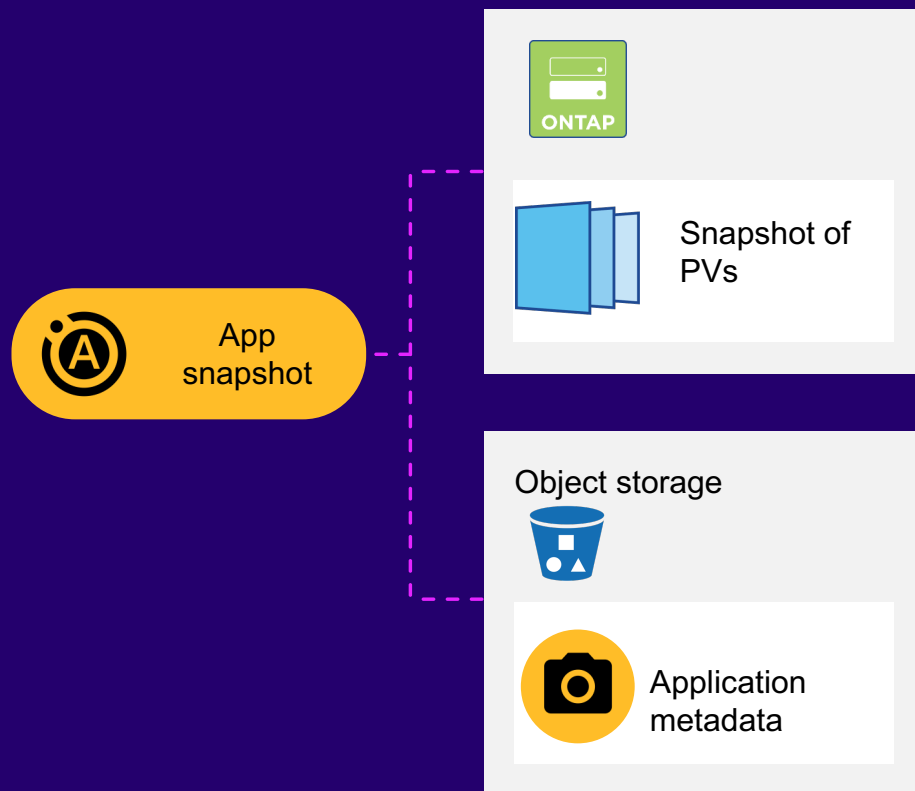
Azure NetApp Files

NetApp Trident is a Certified Operator for Openshift Virtualization



Data protection on-demand or scheduled

Protect your application, metadata and persistent data



- **Define application – apply manifest:**

```
apiVersion: protect.trident.netapp.io/v1
```

```
kind: Application
```

```
metadata:
```

```
  name: wordpress-app
```

```
  namespace: trident-protect
```

```
spec:
```

```
  includedNamespaces:
```

```
  - namespace: wordpress
```

- **Or run protectctl command:**

```
$ tridentctl-protect create application wordpress-app --  
namespaces wordpress -n wordpress
```

- **Snapshot application – apply manifest:**

```
apiVersion: protect.trident.netapp.io/v1
```

```
kind: Snapshot
```

```
metadata:
```

```
  name: wp-snap-1
```

```
  namespace: trident-protect
```

```
spec:
```

```
  appVaultRef: bucket1
```

```
  applicationRef: wordpress-app
```

- **Or run protectctl command:**

```
$ tridentctl-protect create snapshot wp-snap-1 --app  
wordpress-app --appvault bucket1 -n wordpress
```

Disaster Recovery with SnapMirror



Problem

Enterprise applications require a clear Disaster Recovery strategy



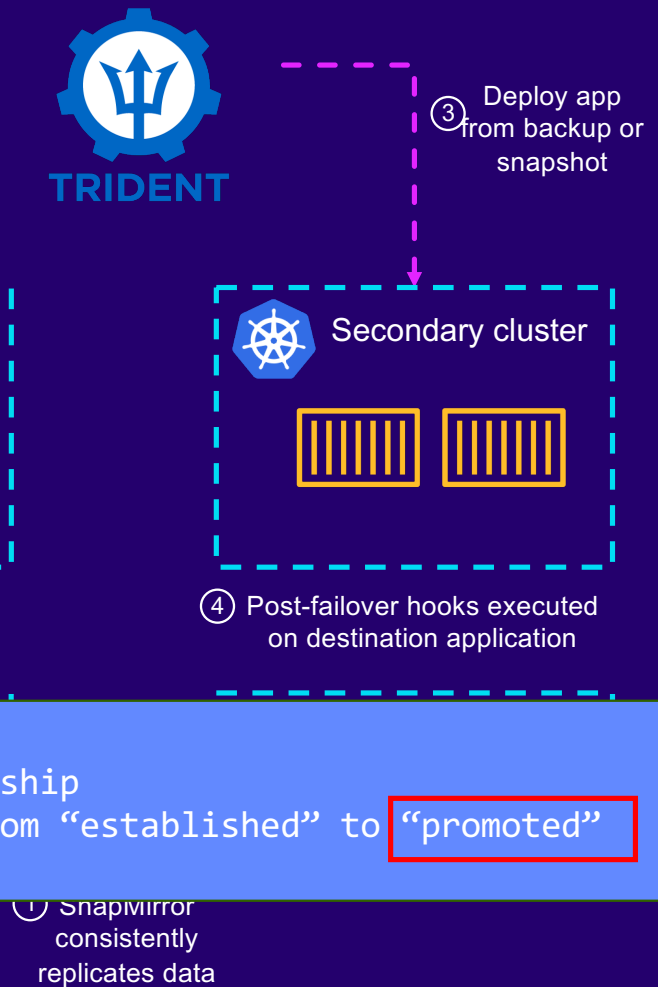
Solution

Replicate applications to a remote cluster in for disaster recovery using SnapMirror

• Failover at Destination cluster:

```
$ kubectl edit appmirror-relationship
```

→ Change **desiredState** from “established” to **“promoted”**





NETAPP TRIDENT PROTECT

Demo of VM Protection

Matteo Calcagni
Partner Technical Lead



Red Hat
Summit

Connect

Grazie



linkedin.com/company/red-hat



facebook.com/redhatinc



youtube.com/user/RedHatVideos



twitter.com/RedHat

