# Dell EMC Container Storage Modules

Dell EMC Container Storage Modules (CSM) brings powerful enterprise storage features and functionality to Kubernetes for easier adoption of cloud native workloads, improved productivity, and scalable operations. This release delivers software modules for storage management that provide developers with access to build automation for enhanced IT needs and other critical enterprise storage features like data replication across data centers, role-based access control (RBAC) authorization, observability and resiliency for disaster recovery and avoidance. Each of the modules will be available for download via the CSM installer found on GitHub.

What is Container Storage Modules?

Dell EMC Container Storage Modules are a set of modules that aim to provide additional capabilities beyond what is available with the Container Storage Interface (CSI) drivers. CSM consists of six modules;

• Observability – delivers a high-level view of the storage capacity and performance usage via Grafana dashboards to the Kubernetes users.

• Replication – enables array replication capabilities for Kubernetes users.

• Authorization – provides both storage and Kubernetes administrators the ability to apply RBAC for Dell EMC CSI Drivers.

• Resiliency – designed to make Kubernetes applications more resilient to node failures.

• Volume Placement – analyzes capacity and automates volume placement for Kubernetes workloads

• Snapshots – Delivers additional snapshot capabilities such as group/crash consistent snapshots with referential integrity.
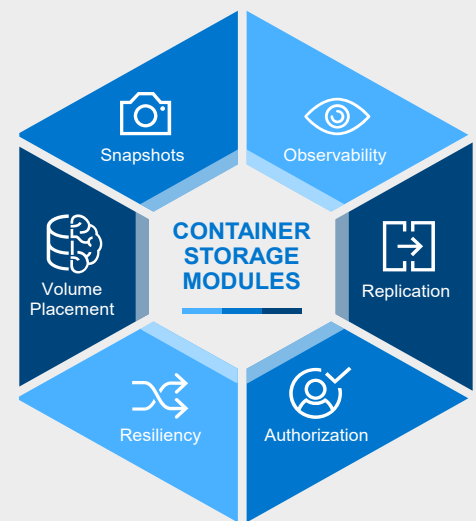

Observability module:

CSM Observability delivers a high-level view of the storage capacity and performance usage via Grafana dashboards to the Kubernetes users. Kubernetes administrators have insight into CSI Driver persistent storage topology, usage, and performance. Metrics data is collected at a fast rate (<1minute), pushed to the OpenTelemetry Collector, and exported in a format consumable by Prometheus. Topology data related to containerized volumes that are provisioned by a CSI Driver is also captured.

Other capabilities include:

• Storage pool consumption by CSI Driver

• Storage system I/O performance by Kubernetes node

• CSI Driver positioned volume I/O performance

• CSI Driver provisioned volume topology

Replication module:

CSM Replication helps to implement a high availability architecture for business critical applications and it is a key component of any Disaster Recovery plan. Kubernetes users can decide that their StatefulApp will use a volume that is replicated on another site. Behind the scenes the replication module is in charge of creating the replicated volume, checking the replication process and mounting the volumes to the workload. In case of a failover / failback, the data replicator will take care or reconfiguring the replication group and remounting the volumes. CSM Replication supports stretched Kubernetes cluster (one cluster with nodes on the different sites) or replicated Kubernetes cluster (separate clusters on the different sites). This enables to choose the right disaster recovery plan for their workloads.
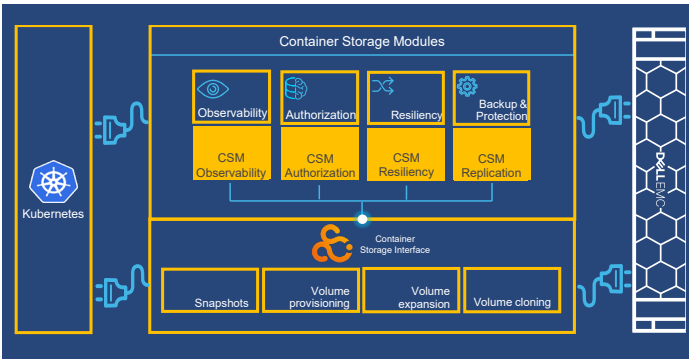
Authorization module:

CSM Authorization enables storage administrators to limit and control storage consumption in Kubernetes environments. The authorization module is an independent service that is installed and owned by the storage administrator. Storage administrators will be able to apply quota and Roll-Based Access Control rules that instantly and automatically restrict cluster tenant's usage of storage resources. The module does this by deploying a proxy between the CSI driver and the storage system to enforce role-based access and usage rules. The access is granted with an access token that can be revoked at any point in time. Quotas can be changed on the fly to limit or increase storage consumption from the different tenants. Logical resource isolation makes multi-tenant architecture real by enforcing Role Based Access Control on storage objects coming from multiple and independent Kubernetes cluster. Users of storage through CSM Authorization do not need to have storage admin root credentials to access the storage system, therefore, enabling provisioning operations to non-admin users.

Resiliency module:

CSM Resiliency is designed to make Kubernetes applications that utilize persistent storage, more resilient to failures. The first component of Resiliency is a Pod monitor that is specifically designed to protect stateful applications from various failures. It is not a standalone application, but rather is deployed as a sidecar to CSI (Container Storage Interface) drivers, in both the driver's controller pods and the

driver's node pods. Deploying CSM Resiliency as a sidecar allows it to make direct requests to the driver through the Unix domain socket that Kubernetes sidecars use to make CSI requests. The module is focused on detecting node failures (power failure), K8s control plane network failures and array I/O network failures, and move the protected pods to hardware that is functioning correctly.

Snapshots (through CSI):

Snapshots capabilities are part of the CSI plugins of the different Dell EMC arrays and take advantage of state-of-the-art snapshot technology to protect and re-purpose data. In addition to point-in-time recovery, these snapshots are writable and can be mounted for Test/Dev and analytics use cases without impacting the production. The Volumesnapshot group feature is built on top of the CSI snapshots to deliver additional capabilities such as group/crash consistent snapshots with referential integrity.

Volume Placement module

Intelligent volume placing for Kubernetes workloads.

• The intelligent volume placements module will place the volume on the proper array corresponding to capacity and performance.

• Additional details on volume placement will be available upon module availabilty*

CSM Installer

The CSM installer offers a one stop shop which would simplify CSI drivers' and Container Storage Modules deployment, lifecycle management and tech support. The common installer allows all the modules and CSI drivers to be deployed from the online registry or a dark site.

Additional Information and Resources

• CSM Github
• Top Reasons to use Container Storage Modules
• CSI Solution Brief

*Will be available 1H 2022

Learn more about Dell EMC Container Storage Modules solutions

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