Concepts

Astra Data Store

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Concepts

Learn about Astra Data Store

Astra Data Store is Kubernetes-native, shared file software-defined storage (SDS) solution for on-premises data centers that helps customers manage their cloud-native applications. Astra Data Store provides a native shared file service for both container and VM workloads along with NetApp enterprise data management.

With Astra Data Store, you can do the following:

- **Support Kubernetes containerized workloads**: With enterprise data management services and tools you are used to.
- **Use Kubernetes "application-as-a-service" platform for DevOps**: Create elastic, software-defined, self-serve platforms that deliver automated, repeatable services, removing complexity from developers.

Astra Data Store is part of the Astra product family. Learn about the Astra family.

Astra Data Store features

Astra Data Store provides end-to-end Kubernetes-native storage and data management for your cloud-native applications with these features:

- **Kubernetes-native shared file service**: Provides a shared file service native to Kubernetes using a standard NFS client as a unified data store for containers and VMs.
- **Cloud scale**: Offers Kubernetes-native multiple parallel file systems on the same resource pool to achieve cloud-like scale and utilization, removing the need to manage storage separately from the cluster.
- **API-first approach**: Delivers infrastructure as code for automated cluster and workload management.
- **Enterprise-grade data management**: Delivers automated application-aware data protection and disaster recovery:
  - **NetApp technologies**: Leverages NetApp data management technology for snapshots, backups, replication, and cloning so users can build and deploy enterprise apps in Kubernetes.
  - **Resiliency**: Uses replication and erasure coding technologies for Kubernetes-native workloads for greater resiliency.
  - **Data efficiency**: Controls cost as you scale through inline deduplication and compression features.
- **Fits into your existing environment**: Supports your microservices-based and traditional workloads, serves major Kubernetes distributions, provides file storage, and runs on your choice of hardware.
- **Integration with NetApp Cloud Insights**: Delivers observability, analytics and monitoring for continuous optimization.

Get started with Astra Data Store

First, learn about Astra Data Store requirements.

Then, get started.

For more information

- Astra family introduction
- Astra Control Service documentation
- Astra Control Center documentation
- Astra Trident documentation
- Use the Astra Control API
- Cloud Insights documentation
- ONTAP documentation

Astra Data Store deployment models

Astra Data Store manages storage drives directly on the hosts using an application deployed and orchestrated with Kubernetes.

You can install Astra Data Store on bare metal or virtual servers by using one of the following options:

- Deploy on a standalone dedicated Kubernetes cluster serving persistent volumes to Kubernetes applications running in a separate cluster (standalone cluster).
- Deploy on a Kubernetes cluster also hosting other workload applications on the same node pool (converged cluster).
- Deploy on a Kubernetes cluster also hosting other workload applications on a different node pool (disaggregated cluster).

Learn more about Astra Data Store hardware requirements.

Astra Data Store is part of the Astra product family. For a perspective on the entire Astra family, see Astra family introduction.

Astra Data Store ecosystem

Astra Data Store works with the following:

- **Astra Control Center**: Use Astra Control Center software for application-aware data management of Kubernetes clusters in your on-premise environment. Easily back up Kubernetes apps, migrate data to a different cluster, and instantly create working application clones.

  Astra Control Center supports Kubernetes clusters with an Astra Trident storage backend with ONTAP or an Astra Data Store storage backend.

- **Astra Trident**: As a fully supported open source storage provisioner and orchestrator maintained by NetApp, Astra Trident enables you to create storage volumes for containerized applications managed by Docker and Kubernetes.

  You use Astra Trident to create volumes on Astra Data Store.

- **Cloud Insights**: A NetApp cloud infrastructure monitoring tool, Cloud Insights enables you to monitor performance and utilization for your Kubernetes clusters managed by Astra Control. Cloud Insights correlates storage usage to workloads.

  When you enable the Cloud Insights connection in Astra Control, telemetry information shows in Astra

Control UI pages. Cloud Insights displays information about resources managed in Astra Data Store.

Astra Data Store interfaces

You can complete tasks using different interfaces:

- **Web user interface (UI)**: Astra Control Service and Astra Control Center use the same web-based UI where you can manage, migrate and protect apps. This UI also displays information about Astra Data Store volumes.
- **API**: Astra Control Service and Astra Control Center use the same Astra Control API. Using the API, you can perform the same tasks that you would using the UI. You can also retrieve information about Astra Data Store with the Astra Control API.
- **kubectl commands**: To work with Astra Data Store, you can use kubectl commands directly.
- **Kubernetes extension**: Additionally, you can use the Astra Data Store kubernetes API extension.

  Custom Resource Definitions (CRDs) are extensions to the kubernetes REST API that are created when the Astra Data Store operator is deployed. External entities interact with the CRDs by making calls to the Kubernetes API server. Astra Data Store watches for updates to specific CRDs and then makes calls to internal REST APIs.

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Cluster expansion

Astra Data Store supports nodes of different types and capabilities in a cluster. If you are expanding a cluster, Astra Data Store supports adding nodes with any performance capabilities, as long as they are not lower than the least performant node in the cluster. New nodes must have the same storage capacity as existing nodes. All nodes, including new nodes during an expansion, need to at least meet the minimum requirements in Astra Data Store requirements.

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Storage efficiency in Astra Data Store

Astra Data Store uses storage efficiency technologies based on NetApp ONTAP and SolidFire technologies including:

- **Thin provisioning**: A thin-provisioned volume is one for which storage is not reserved in advance. Instead, storage is allocated dynamically, as it is needed. Free space is released back to the storage system when data in the volume or LUN is deleted.
- **Zero-block detection and elimination**: Astra Data Store storage systems with thin provisioning provide the ability to detect areas of a volume that have been zeroed out so they can reclaim that space and use it elsewhere.
- **Compression**: Compression reduces the amount of physical storage required for a volume by combining data blocks in compression groups, each of which is stored as a single block. Reads of compressed data are faster than in traditional compression methods because Astra Data Store decompresses only the compression groups that contain the requested data, not an entire file.
- **Deduplication**: Deduplication reduces the amount of storage required for a volume (or all the volumes in an AFF aggregate) by discarding duplicate blocks and replacing them with references to a single shared block. Reads of deduplicated data typically incur no performance charge. Writes incur a negligible charge except on overloaded nodes.

All of these features are enabled by default.

See storage efficiency details.

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Security in Astra Data Store

Astra Data Store uses several methods to secure client and administrator access to storage, protect communication and data, and protect against viruses.

Astra Data Store uses the following security methods:

- Communication encryption using mutual transport layer security (mTLS)
- Role-based access control, which governs access to features
- Deployment security
- Certificate management
- Software encryption at rest including internal and external key management

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