

STORAGE DEVELOPER CONFERENCE



BY Developers FOR Developers

A SNIA[®] Event

Virtual Conference
September 28-29, 2021

Data Management Going Beyond Storage Boxes

Exploring Trends in Cloud Native Data Management

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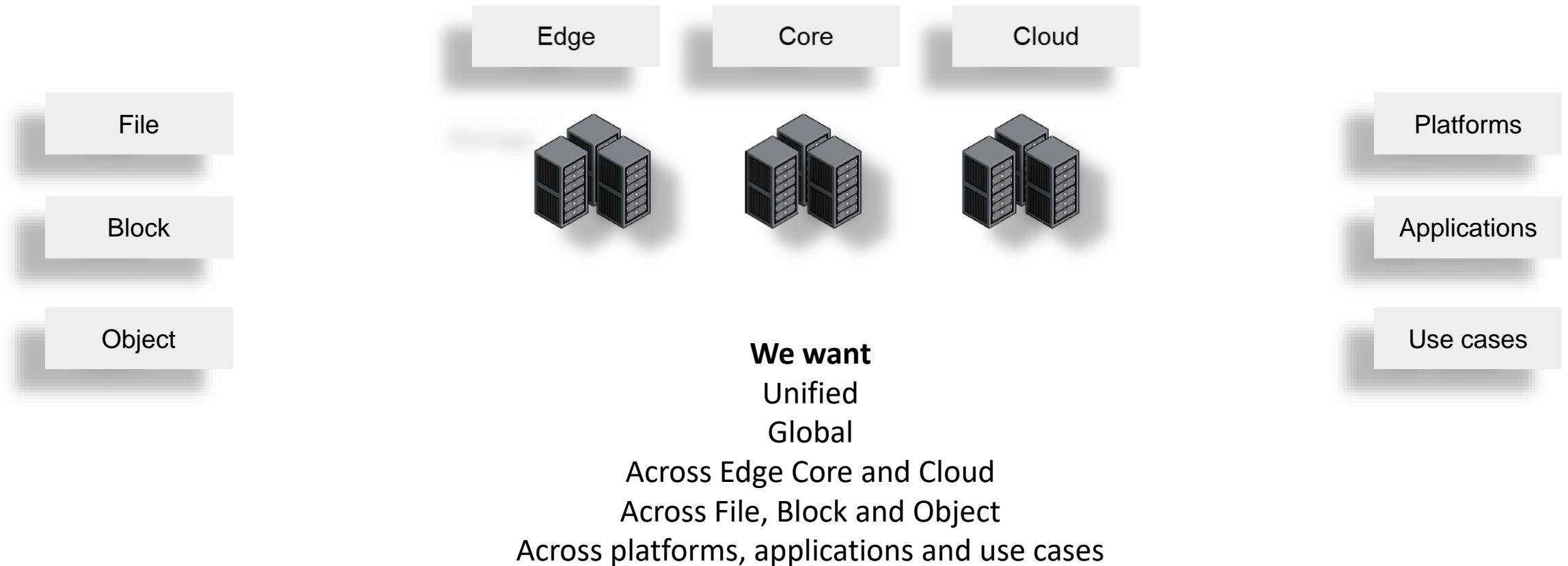
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**Connected.
Anywhere**

Data Management Across



STaaS to CSTaaS

(STorage as a Service to Container STorage as a Service)

SODA Data & Storage Survey 2021^{#0}

- Platform use pivoting to **container-based environments**
- Over the last 5 years there has been a seemingly **rapid transition from VMs to containers**.
- Kubernetes deployments came top (in fact **top 3 positions - K8S cloud, Hybrid K8S, K8S on prem**)
- Organizations are using **Container Storage for real use cases deployments**

Other Industry Reports / Surveys

- **Application Container** Market CAGR **26.5%** (2019-25)^{#1}
- **CaaS** CAGR **35%** (2021-26)^{#2}
- Installed base of **container instances** CAGR **62.1%**(2019-23)^{#3}
- **84%** using Container in **Production**^{#4}

Container centric storage solutions | Hybrid Cloud Data Management for DR | Momentum towards CSTaaS

Solutions Trend

- **Logical solutions to provide end to end data management**

- With Storage Boxes + Features
- Outside box features for Data Management, O&M, ...
- Third party storage support
- Container Deployment Support
- Multi-Cloud support
- Application Aware

A few examples:

- NetApp Astra : Application aware data management service built for Kubernetes
- VMware Tanzu & VMware Valero : enables you to build, run and manage modern apps on any cloud, back up and restore your Kubernetes cluster resources and persistent volumes
- Pure Service Orchestrator: Storage as a service for containers; gives developers the agility of public cloud with the reliability and security of on-premises infrastructure

Note: There are similar other products from other vendors and above are just examples for reference.

Not limited to Storage Box Features

Best utilize existing open source / own products to build the solution
Application Aware data management & Container Storage push this trend

<https://landscape.cncf.io/>



Container Data Management

Cloud Native Storage, Container Storage, CSI...

Container Storage

Cloud Native Storage(CNS)

Software Defined Storage - that is API driven and customers can auto-provision. A storage solution that is secure, performant and scalable to application demands.

Container centric storage solutions are Cloud Native Storage solutions and more.

Declarative API (GitOps), Auto-healing and 1000x in terms of Volume Churn. Scale up and down.

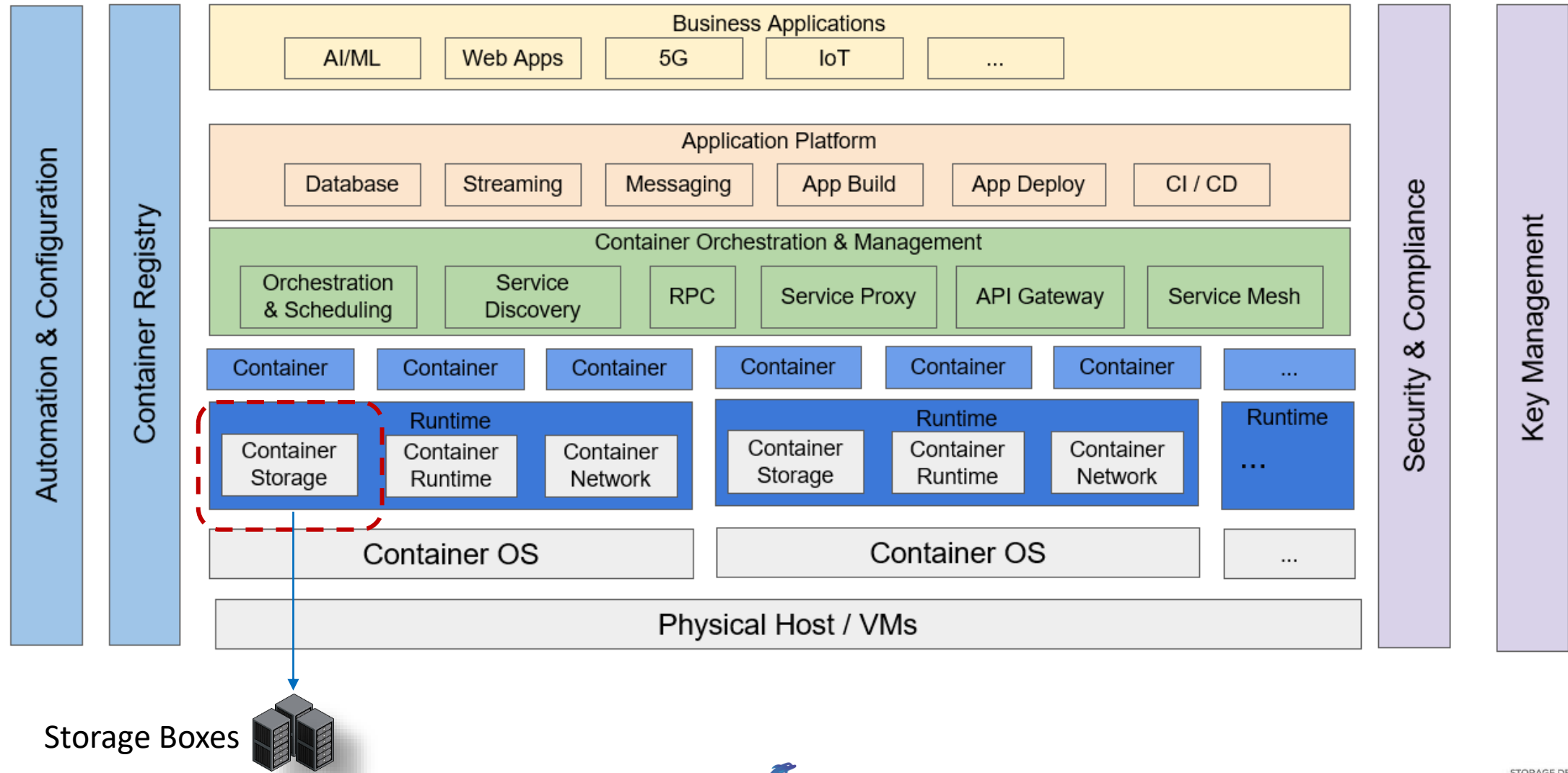
Developer productivity, cost optimization and truly hybrid.

Container Storage Interface


























































Container Storage Interface (CSI) is a specification on how Container Orchestrators interact with Storage Solutions to connect to Containers.

Container Storage is CNS, other way need not be true | CSI is an interface specification

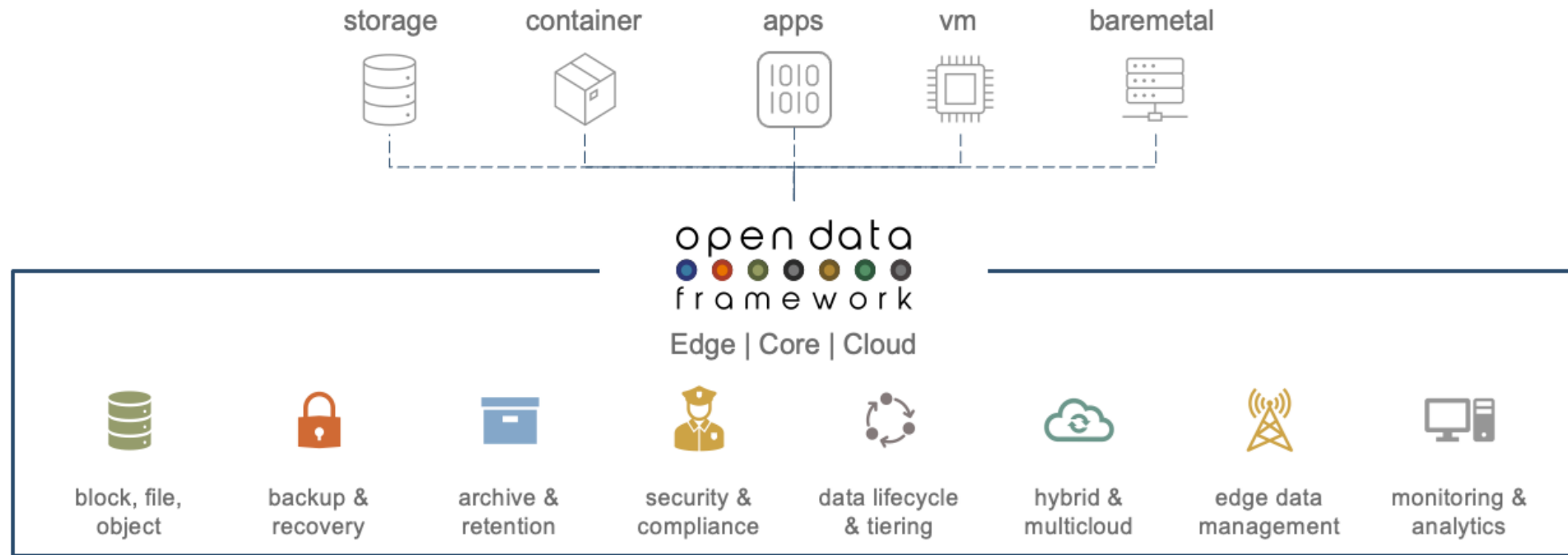
Cloud Native Stack



Cloud Native Storage Projects

| | | | | | | | | | | | | | |
|---|--|---|--|--|---|---|---|---|--|--|---|---|--|
|  <p>Alibaba Cloud File Storage</p> <p>Alibaba Cloud File Storage</p> <p>MCap: \$414.2B</p> <p>Alibaba Cloud</p> |  <p>Alibaba Cloud File Storage CPFS</p> <p>Alibaba Cloud File Storage CPFS</p> <p>MCap: \$414.2B</p> <p>Alibaba Cloud</p> |  <p>ALLUXIO</p> <p>Alluxio</p> <p>★ 5,233</p> <p>Funding: \$23M</p> |  <p>Amazon Elastic Block Store (EBS)</p> <p>Amazon Elastic Block Store (EBS)</p> <p>MCap: \$1.7T</p> <p>Amazon Web Services</p> |  <p>Arrikto</p> <p>Arrikto</p> <p>Funding: \$15M</p> |  <p>Azure Disk Storage</p> <p>Azure Disk Storage</p> <p>MCap: \$2.2T</p> <p>Microsoft</p> |  <p>ceph</p> <p>Ceph</p> <p>Ceph Foundation</p> <p>★ 9,884</p> |  <p>ChubaoFS</p> <p>ChubaoFS</p> <p>Cloud Native Computing Foundation (CNCF)</p> <p>★ 2,352</p> <p>Funding: \$3M</p> |  <p>COMMVAULT</p> <p>Commvault</p> <p>MCap: \$3.4B</p> |  <p>CSI</p> <p>Container Storage Interface (CSI)</p> <p>★ 888</p> <p>MCap: \$1.9T</p> <p>Google</p> |  <p>Curve</p> <p>Curve</p> <p>NetEase</p> <p>★ 884</p> <p>MCap: \$13.8B</p> |  <p>DATERA</p> <p>Datera</p> <p>Funding: \$83.9M</p> |  <p>DELL EMC</p> <p>Dell EMC</p> | |
|  <p>DIAMANTI</p> <p>Diamanti</p> <p>Funding: \$78M</p> |  <p>DriveScale</p> <p>DriveScale</p> <p>Funding: \$28M</p> |  <p>GLUSTER</p> <p>Gluster</p> <p>Red Hat</p> <p>★ 3,300</p> <p>MCap: \$119.2B</p> |  <p>Google Persistent Disk</p> <p>Google</p> <p>MCap: \$1.9T</p> |  <p>HITACHI</p> <p>Hitachi</p> <p>MCap: \$96B</p> |  <p>Hewlett Packard Enterprise</p> <p>HPE Storage</p> <p>MCap: \$17.4B</p> <p>Hewlett Packard Enterprise</p> |  <p>HUAWEI</p> <p>Huawei</p> <p>Huawei Technologies</p> |  <p>IBM</p> <p>IBM Storage</p> <p>MCap: \$119.2B</p> |  <p>INFINIDAT</p> <p>Infodatal</p> <p>Funding: \$325M</p> |  <p>IO Mesh</p> <p>IO Mesh</p> <p>by SmartX</p> <p>Funding: \$67.1M</p> |  <p>ionir</p> <p>Ionir</p> <p>Funding: \$11M</p> |  <p>kasten</p> <p>Kasten</p> <p>by VMware</p> <p>Funding: \$17.5M</p> |  <p>LIN+STOR</p> <p>Lin+stor</p> <p>Funding: \$17.5M</p> |  <p>sodaeco PROJECT</p> |
|  <p>LONGHORN</p> <p>Longhorn</p> <p>Cloud Native Computing Foundation (CNCF)</p> <p>★ 3,117</p> <p>Funding: \$3M</p> |  <p>MayaData</p> <p>MayaData</p> <p>Funding: \$28M</p> |  <p>MINIO</p> <p>MinIO</p> <p>★ 20,388</p> <p>Funding: \$23.3M</p> |  <p>MooseFS</p> <p>MooseFS</p> <p>Tuohetuo</p> <p>★ 1,123</p> |  <p>NetApp</p> <p>NetApp</p> <p>MCap: \$19.7B</p> |  <p>NUTANIX</p> <p>Nutanix</p> <p>MCap: \$8.3B</p> |  <p>OpenEBS</p> <p>OpenEBS</p> <p>sodaeco PROJECT</p> |  <p>OpenIO</p> <p>OpenIO</p> <p>★ 504</p> <p>Funding: \$8M</p> |  <p>Piraeus</p> <p>Piraeus</p> <p>Cloud Native Computing Foundation (CNCF)</p> <p>★ 269</p> <p>Funding: \$3M</p> |  <p>portworx</p> <p>Portworx</p> <p>by Pure Storage</p> <p>Funding: \$55.5M</p> |  <p>PURE STORAGE</p> <p>Pure Storage</p> <p>MCap: \$7.3B</p> |  <p>QINGSTOR</p> <p>Qingstor</p> <p>Funding: \$280.8M</p> |  <p>Qumulo</p> <p>Qumulo</p> <p>Funding: \$347.3M</p> | |
|  <p>Quobyte</p> <p>Quobyte</p> |  <p>ROBIN</p> <p>Robin Systems</p> <p>Funding: \$84M</p> |  <p>ROOK</p> <p>Rook</p> <p>Cloud Native Computing Foundation (CNCF)</p> <p>★ 9,022</p> <p>Funding: \$3M</p> |  <p>杉岩数据 SANDSTONE</p> <p>SandStone</p> <p>Funding: \$23M</p> |  <p>RING</p> <p>Scality RING</p> <p>Funding: \$172M</p> |  <p>soda foundation</p> <p>Soda Foundation</p> <p>★ 797</p> |  <p>Stash</p> <p>Stash by AppCode</p> <p>★ 1,033</p> |  <p>STORAGEOS</p> <p>StorageOS</p> <p>Funding: \$20M</p> |  <p>StorPool</p> <p>StorPool</p> <p>Funding: \$263.3K</p> |  <p>SWIFT</p> <p>Swift</p> <p>Open Infrastructure Foundation</p> <p>★ 2,237</p> |  <p>TRILI</p> <p>Trilio</p> <p>Funding: \$22M</p> |  <p>TRITON Object Storage</p> <p>Trident Object Storage</p> <p>★ 562</p> <p>Funding: \$13.1M</p> |  <p>VELERO</p> <p>Velero</p> <p>★ 5,584</p> <p>MCap: \$57.8B</p> | |
|  <p>Vineyard</p> <p>Vineyard</p> <p>Cloud Native Computing Foundation (CNCF)</p> <p>★ 513</p> <p>Funding: \$3M</p> |  <p>XSKY</p> <p>XSKY</p> <p>XSKY Data Technology</p> <p>Funding: \$213.8M</p> |  <p>焱融云 YAN RONG</p> <p>YRCloudFile</p> <p>Funding: \$1.8M</p> |  <p>ZENKO</p> <p>Zenko</p> <p>sodaeco PROJECT</p> | | | | | | | | | | |

 SODA ECO Projects



Unify Data And Storage Management With A Single Open Framework Across The Core, Cloud And Edge

SODA ODF

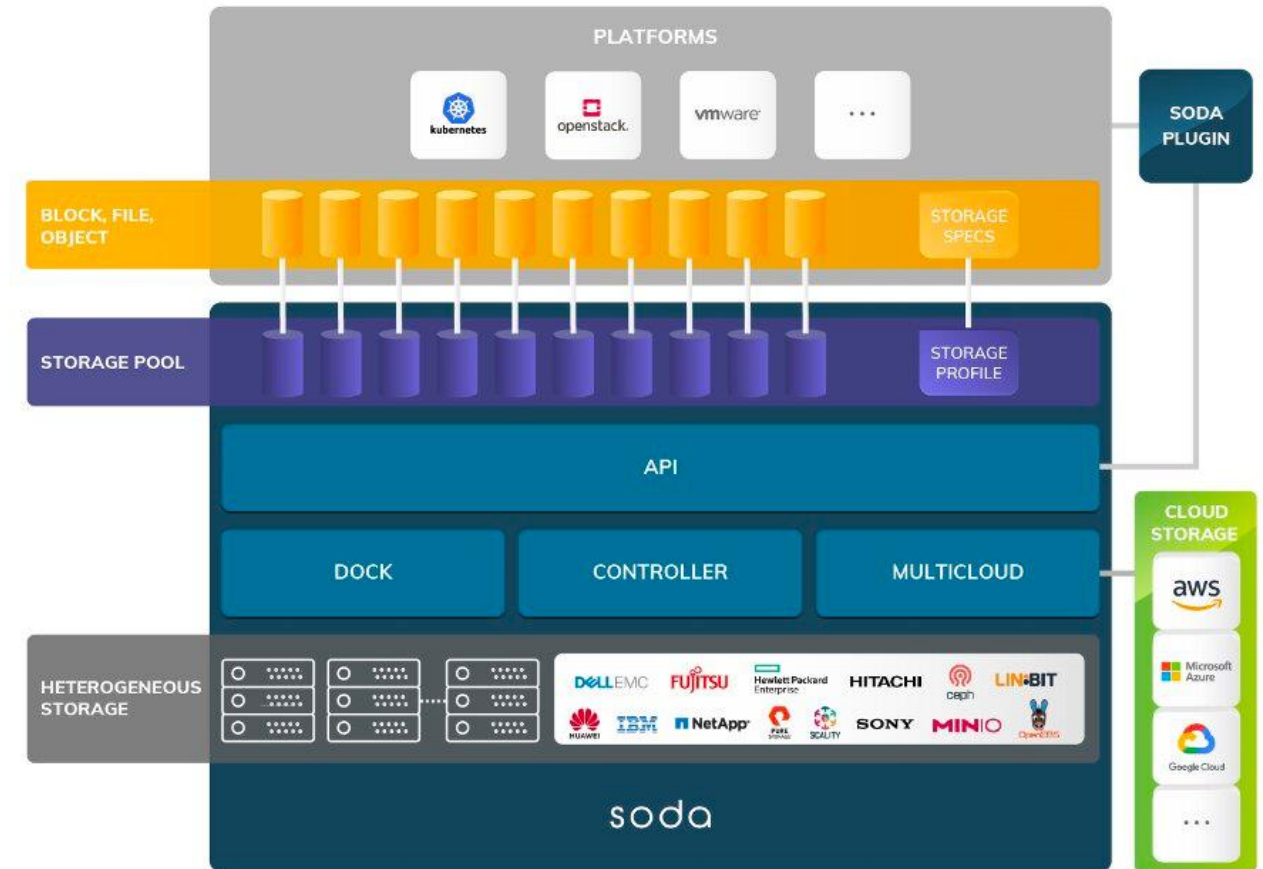
SODA Open Data Framework (ODF) is an open source software developed by SODA Foundation. ODF connects **data end to end**, from platform to storage, and from **edge to core to cloud**, and manages all the data in between. Goal is to let users use this data framework with **any platform and application** to build **end to end** solutions easily.

KEY PROPOSITIONS

- Open Source** – prevents vendor lock-in
- Connects Data Silos** – eliminates data fragmentation
- Extensible** – can integrate solutions and products easily

HIGHLIGHTS

- Standardization** – data and storage management
- Ecosystem** – hardware, software, solutions, services
- Certification** – ecosystem components, developers, operators



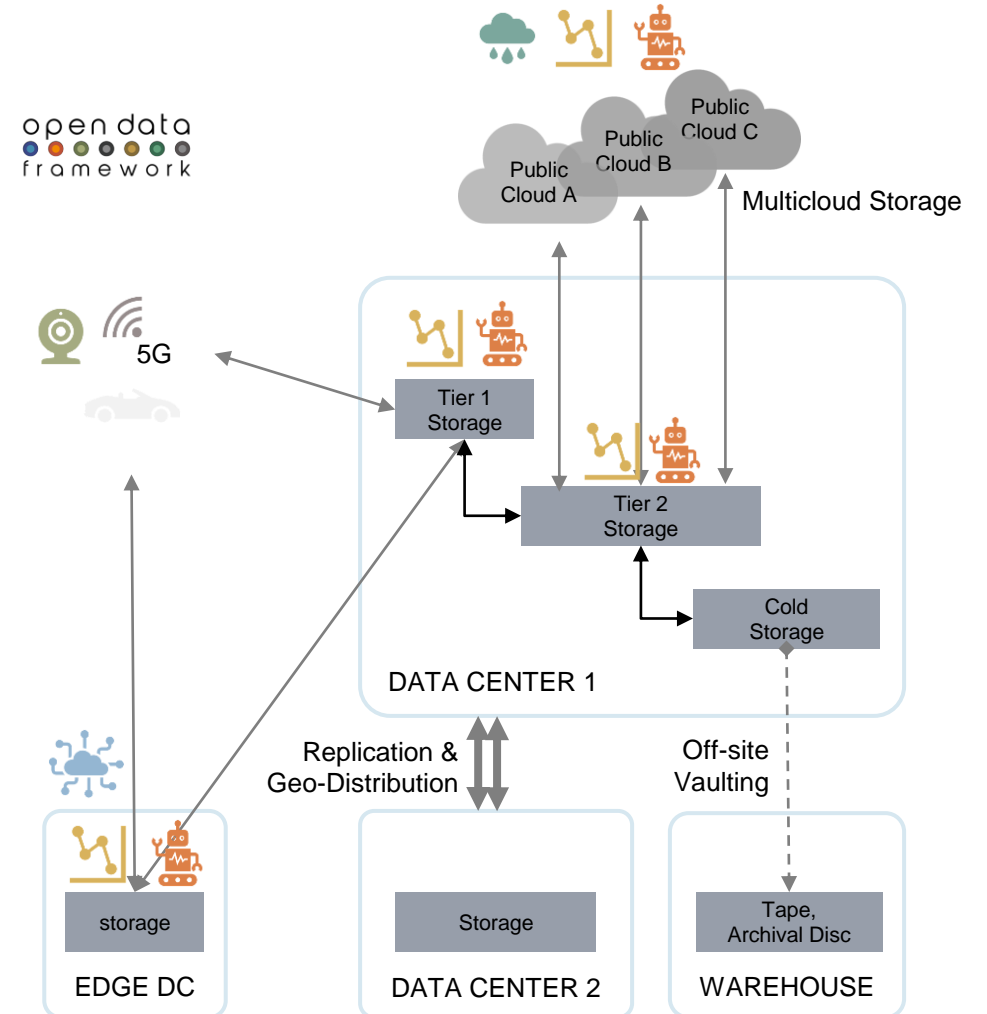
SODA ODF runs in your cluster out side and agnostic to your storage boxes

Use case covering hybrid demands

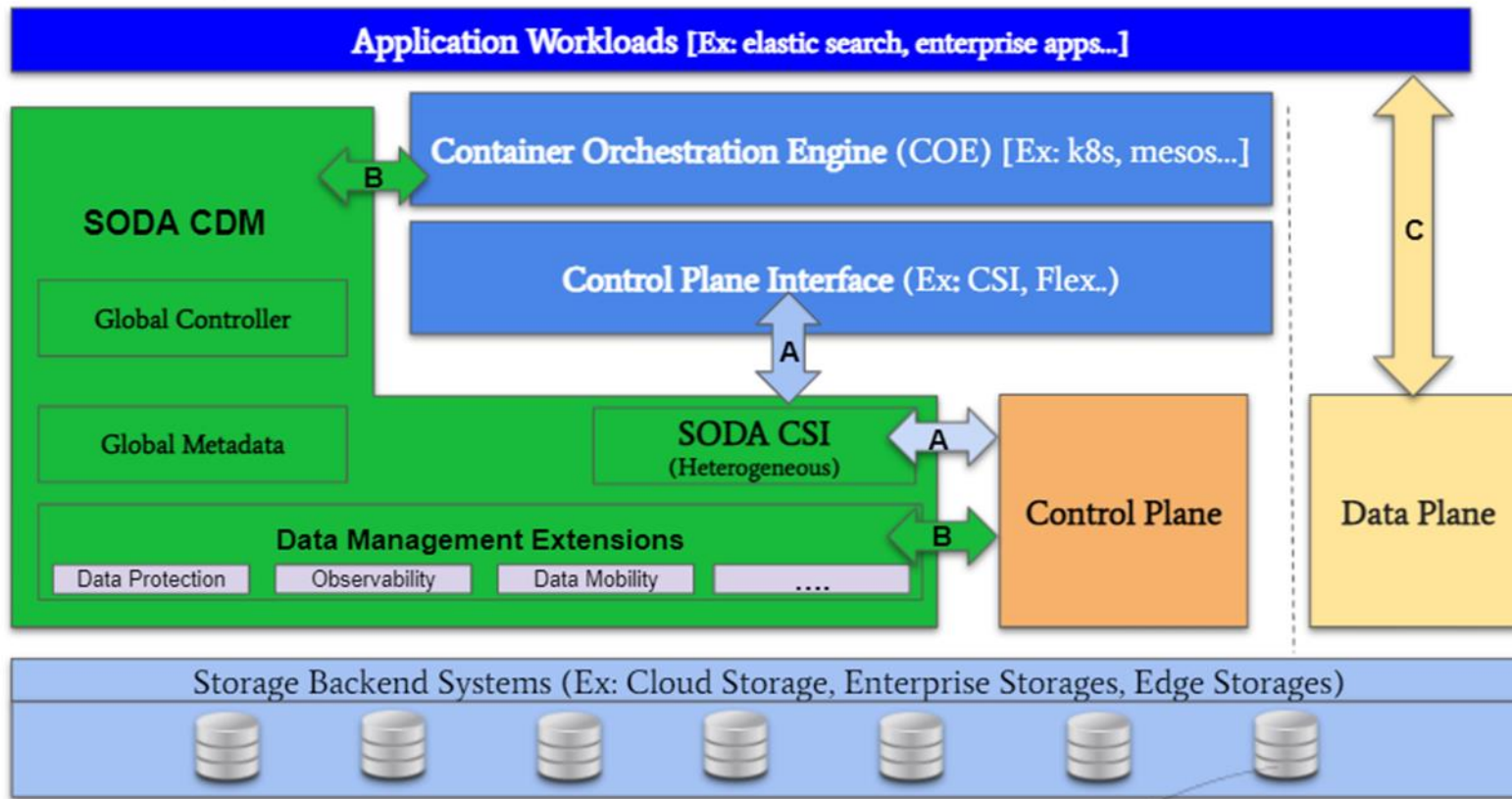


Services For Connected Car Platform

| | |
|--------------------------|---|
| block, file, object | block, file, object storage for edge, DC multicloud storage |
| backup & recovery | backup to cloud or tape snapshots from tier2 to cloud |
| lifecycle & tiering | edge to DC tier 1 to tier 2, tier2 to cloud, tier2 to cold |
| security & compliance | edge, DC, & cloud security and compliance offsite tape/archive |
| retention & archive | tier2 to cold storage (tape/archive disc) tier2 to cloud for long term retention |
| analytics & intelligence | data integration for analytics and AI/ML applications |



SODA CDM (Container Data Management)

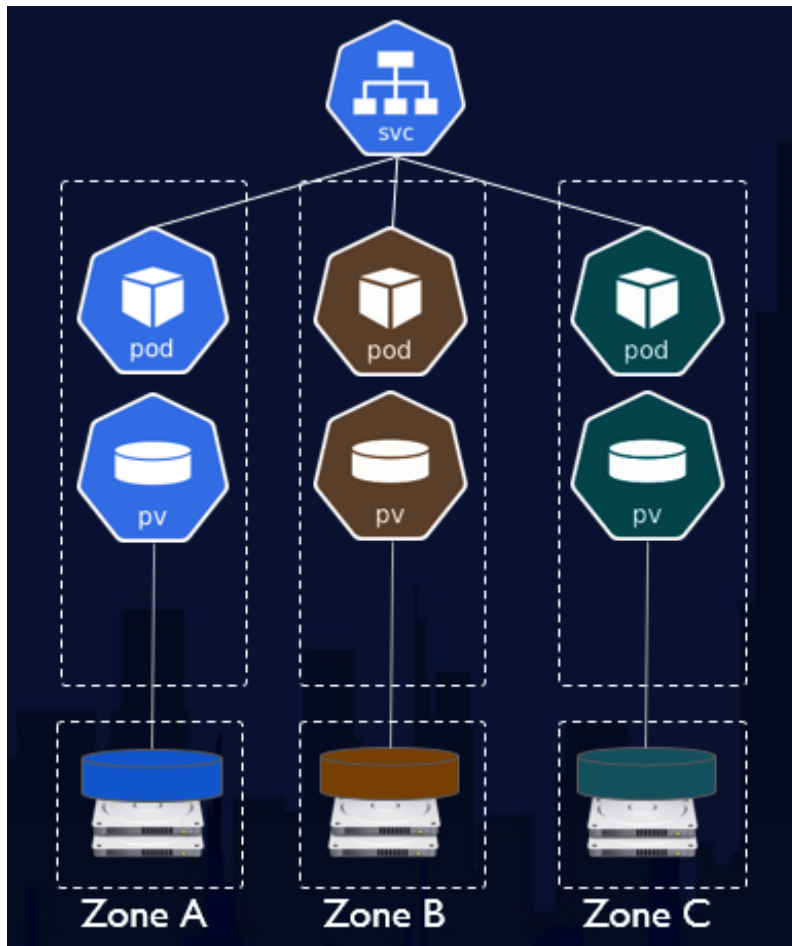


Augment Kubernetes (or COE) capabilities for heterogeneous and hybrid container data management.

- Unified CSI
- Heterogeneous Ready
- Designed for Container Data Management: Data Protection, Data Observability, Data Mobility and more
- Hybrid Data Management Ready

A: Support control plane interface API directly and interact with respective COE
B: Interact with Orchestrator through Data Management Framework(SODA)
C: Workloads consume storage through data access interfaces.

SODA CSI



VANILLA CSI

- 3 Different PVC requests
- There is no information on pods (other than pod name passed down to storage)
- There is no zone or tenant information passed down.
- Distributed applications using distributed storage. Even with single vendor - multiple storage classes.

V/S

SODA CSI

- Unified CSI for All
- Any vendor CSI plug and play
- Future ready to enhance for container data management services like Data Protection, Observability and Global Metadata Management

SODA CDM Features

CURRENT

- CSI Plug and Play : Plug-in support for any CSI driver
- Support multiple concurrent CSI drivers in Kubernetes deployment
- Container data protection framework based on Restic
- Policy-based application-consistent snapshot to cloud

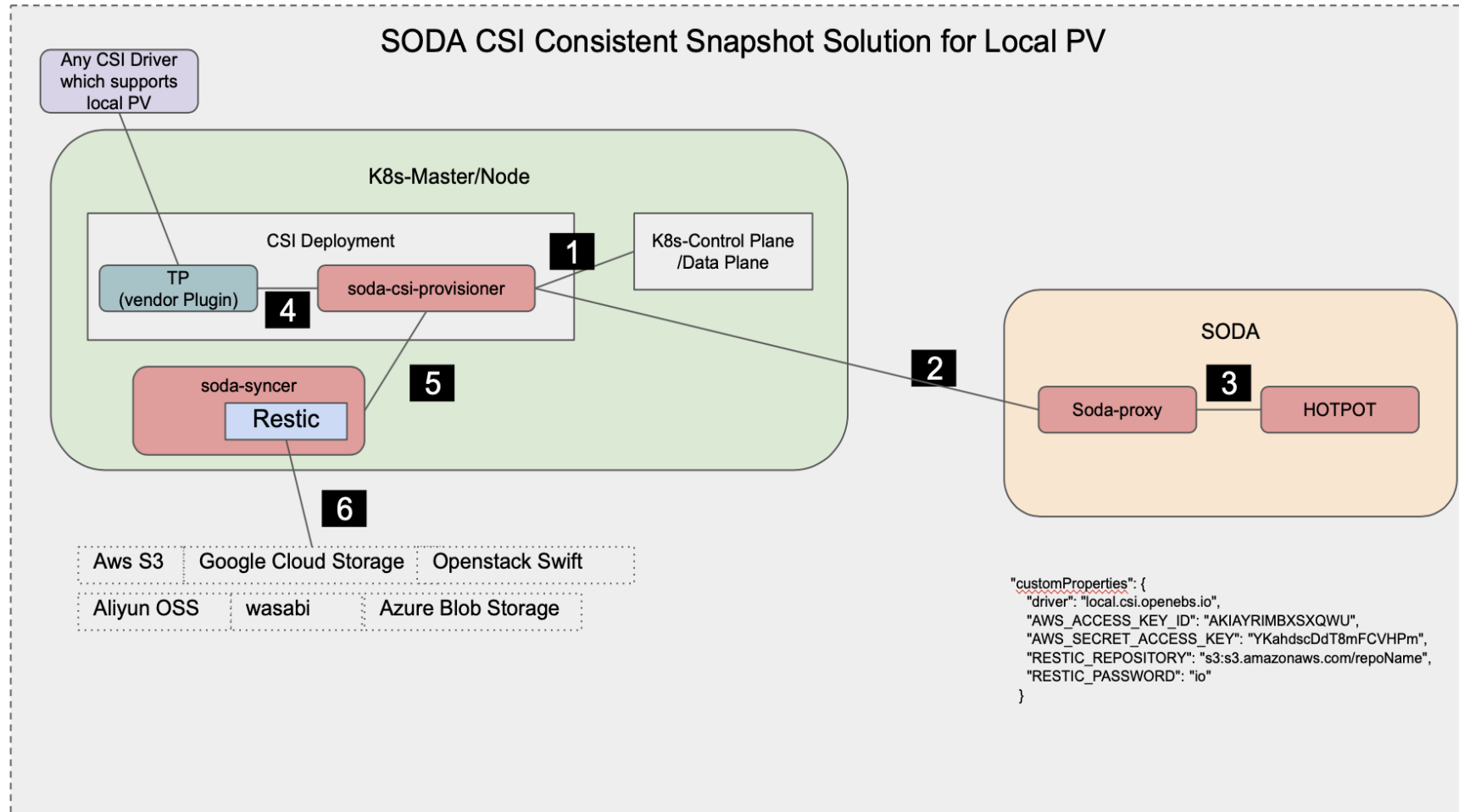
Jerba Release :

<https://github.com/sodafoundation/soda/releases/tag/v1.4.0>

NEXT

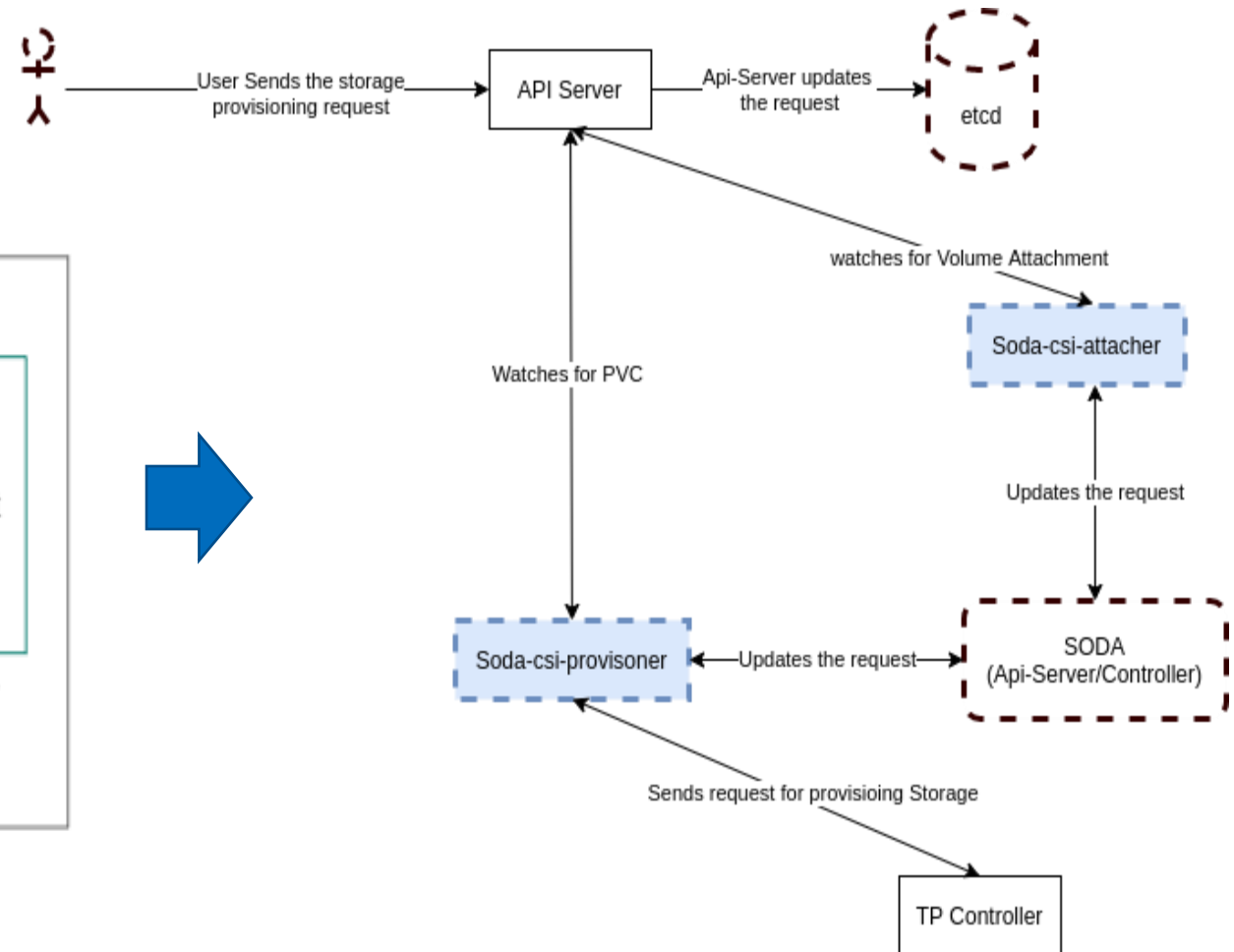
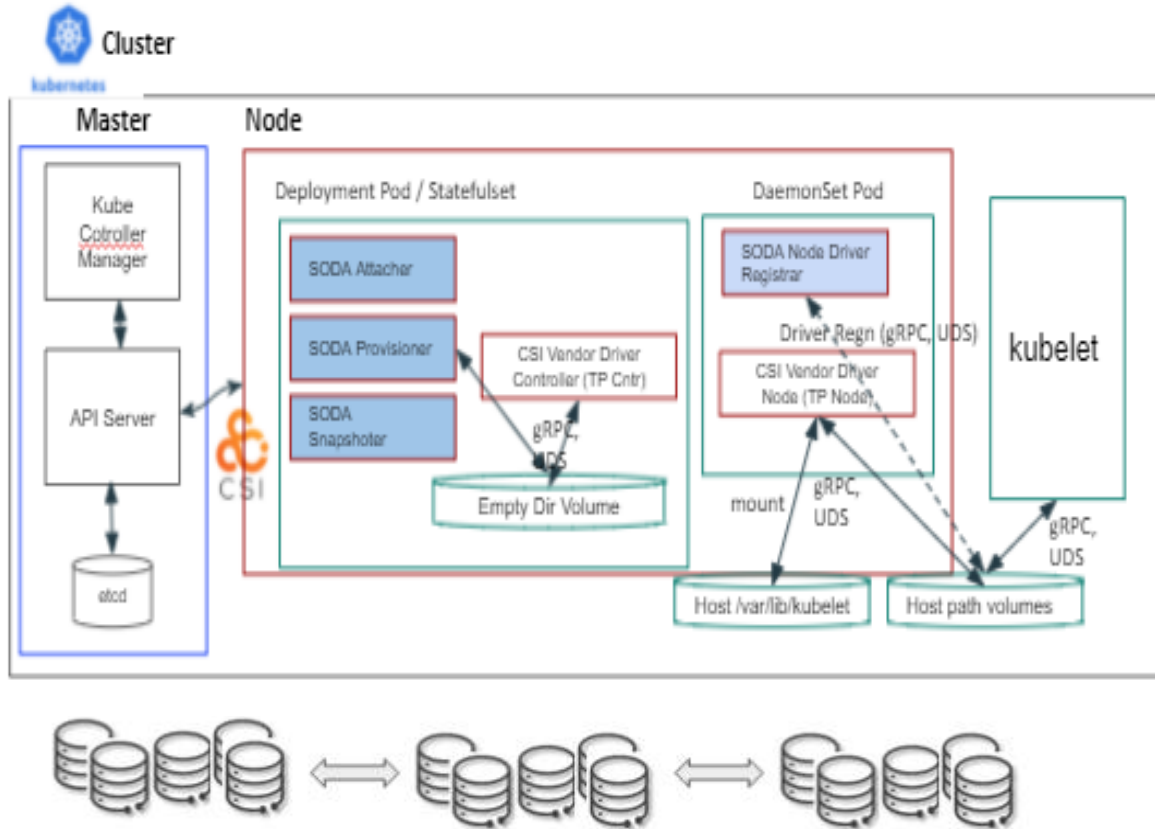
- Unified SODA CSI Enhance
- Data Protection (Snapshot, Backup, Recovery) Enhance
- Observability

SODA CDM Data Protection PoC



SODA CDM CSI Plug N Play

Standard vendor CSI driver can plug and play with SODA ODF



TP Controller : CSI driver provided by each vendor

SODA ODF for Container Storages : Demo

https://www.youtube.com/watch?v=_hv6Sap1bxQ&t=481s

Demo presented by our team during SODACON based on Jerba Release , July 2021

Data Management Going Forward

- Mutually complementing solutions and standards between In Box features and Out of Box features for Storages
- STaaS and CSTaaS
- Cross Cluster, Cross Cloud, Cross Domain (Edge/Cloud/On Prem)
- Storage Vendors come up with out of the box solutions for Hybrid scenarios (bundle all components needed)
- Cloud vendors moving to enterprise/on prem and storage vendors to cloud!

Thank You

<https://sodafoundation.io/>

SODA **Source Code**: <https://github.com/sodafoundation>

SODA **Docs**: <https://docs.sodafoundation.io/>

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