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— Global 2021 — July 13-14

ODF for Cloud Native: Container Storage, is it so important?!

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soda foundation

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ARCTIC OCEAN
GREENLAND
NORTH AMERICA
PACIFIC OCEAN
AFRICA
SOUTH AMERICA
ATLANTIC OCEAN
SOUTHERN OCEAN
FADING BOUNDARIES
CONNECTED SEAMLESSLY

Cloud Native and Containers...Really important?!

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)

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]

It is NO MORE notional..!

...so..how about Container Storage?

SODA Data & Storage Survey 2021

Organizations are using Container Storage for real use cases deployments

Industry Reports / Analysis

Container centric storage solutions

Hybrid Cloud Data Management for DR

Momentum towards STaaS

Hybrid, Vendor Agnostic, CSTaaS...

...so..wait.. is it Container or Cloud Native 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 Storage

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 is CNS, but CNS is not Container Storage.

...I see.. So Container Storage is CSI?

CSI

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

Container Storage

Container centric storage solutions implement CSI. Any storage can implement CSI - as additional layer.

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

Developer productivity, cost optimization and truly hybrid.

CSI is a specification, so is COSI. Container storage solutions implement them.

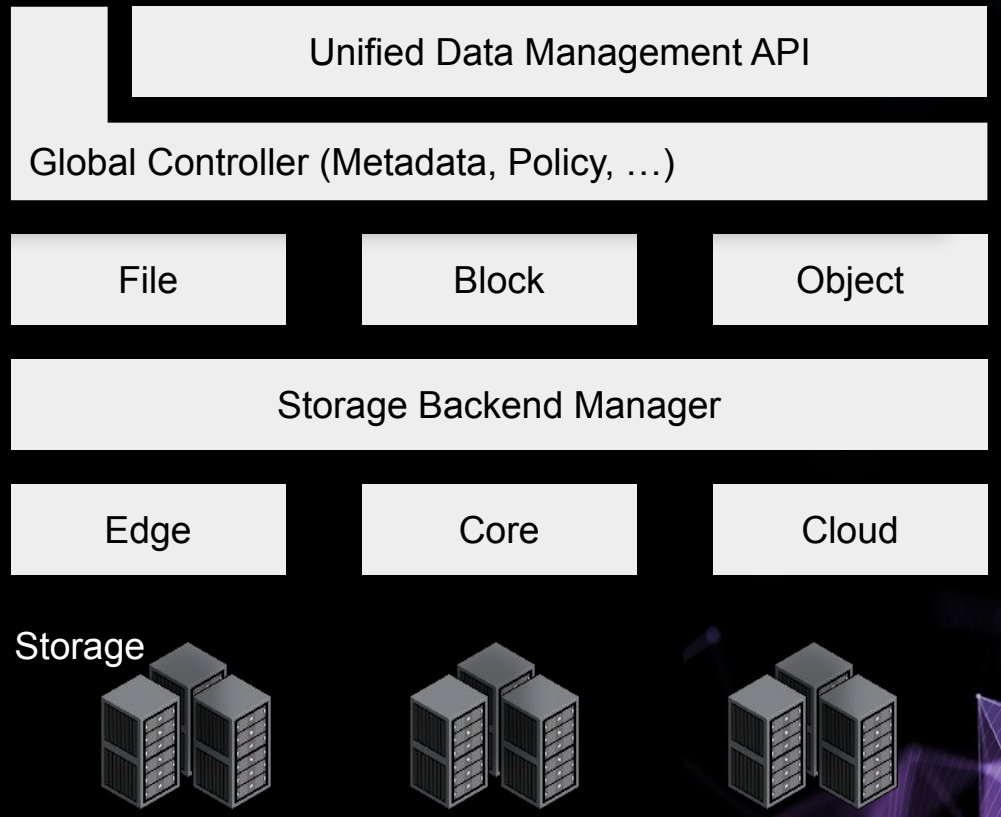
SODA Open Data Framework (ODF) : Connecting Data

UNIFY ACROSS VENDORS, PLATFORMS & DOMAINS

UNSETTLED TYPES OF STORAGE

UNPRECEDENTED DATA MOBILITY & SCALE

"REALLY" DISTRIBUTED HETEROGENEOUS



SODA ODF Introduction, Project Architecture...

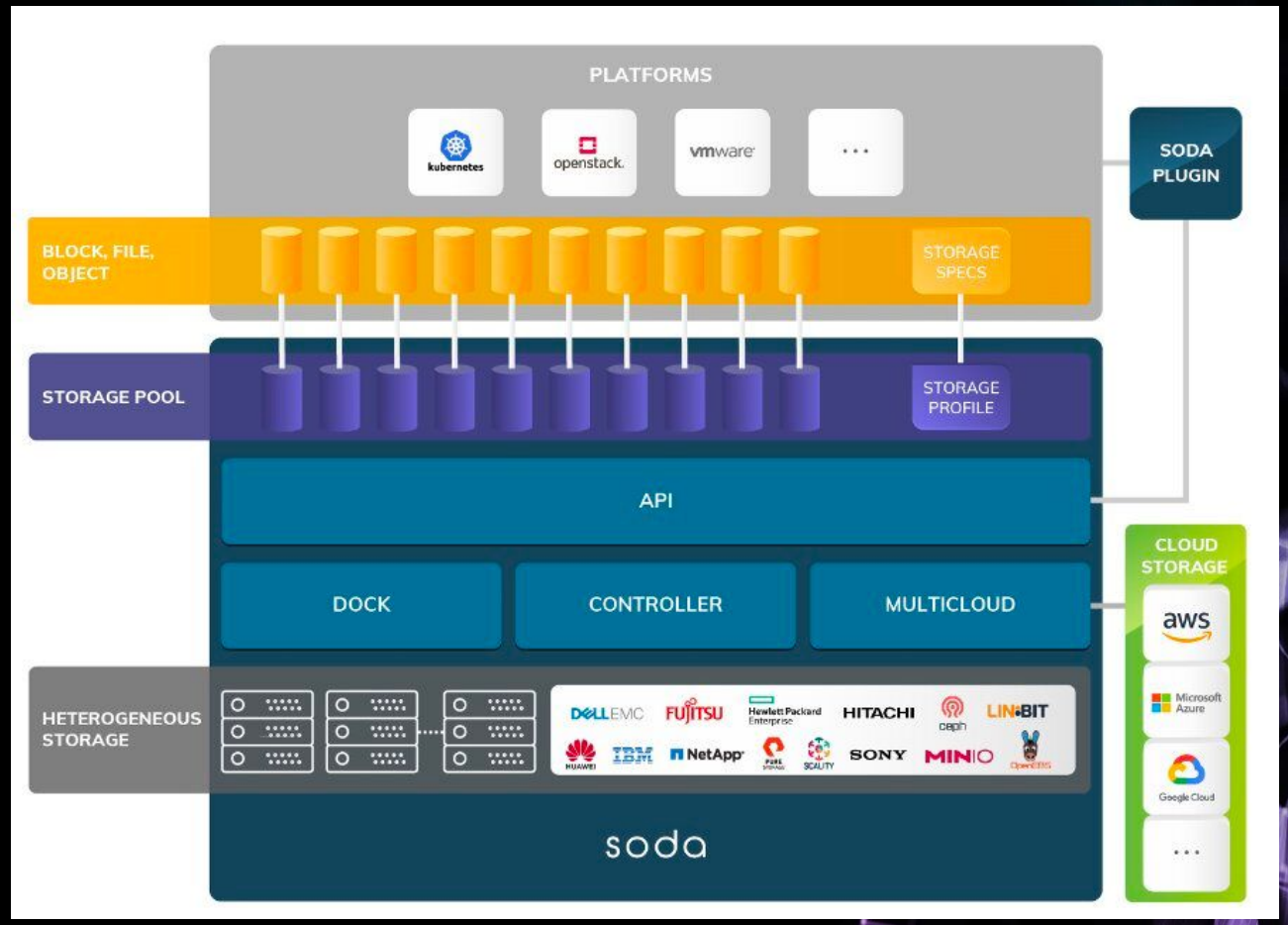
SODA Open Data Framework (ODF) is an open source software developed by SODA Foundation. ODF connects data end to end, from platform to storage, and from edge to core to cloud, and manages all the data in between. Goal is to let users use this data framework with any platform and application to build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

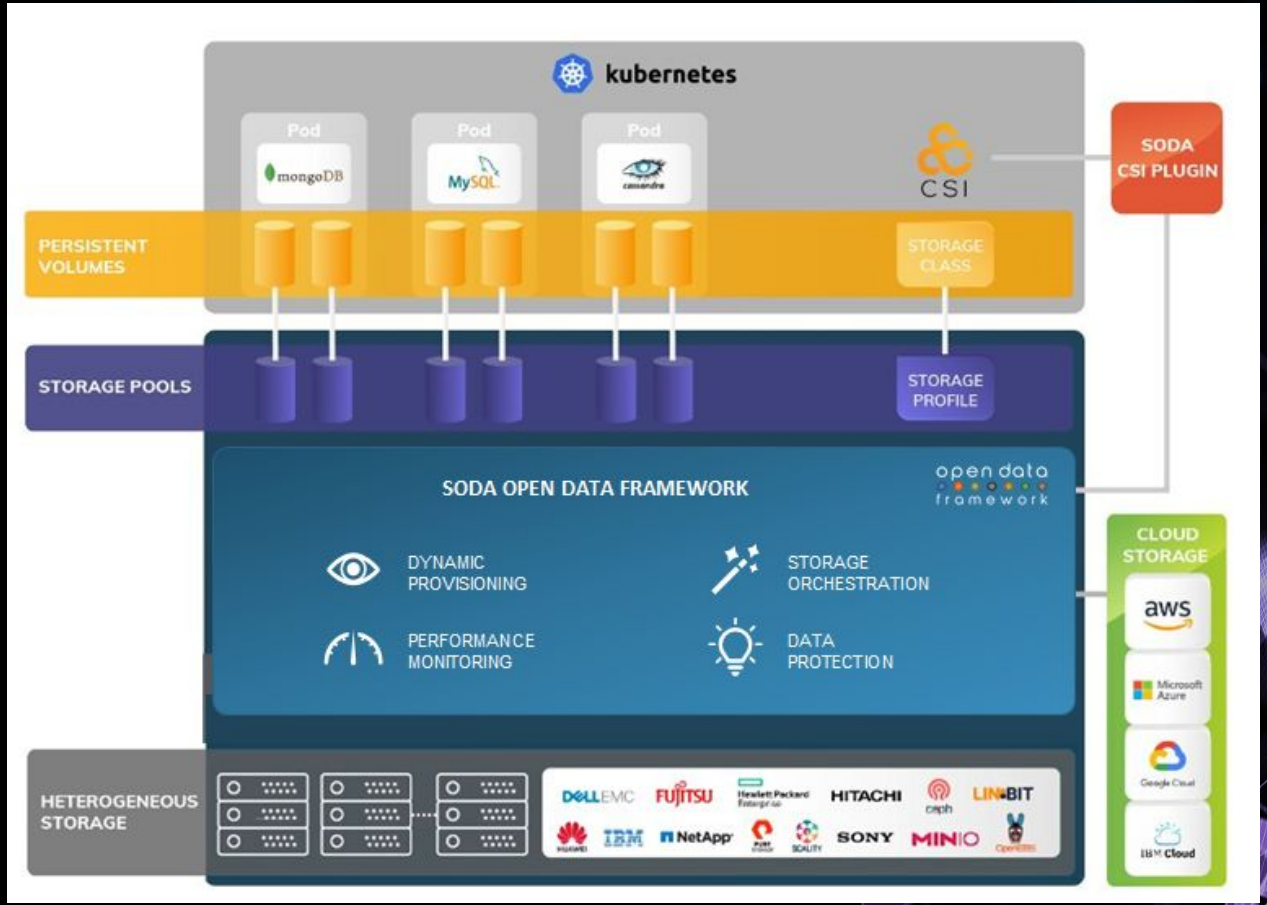


ODF, Kubernetes, CSI...

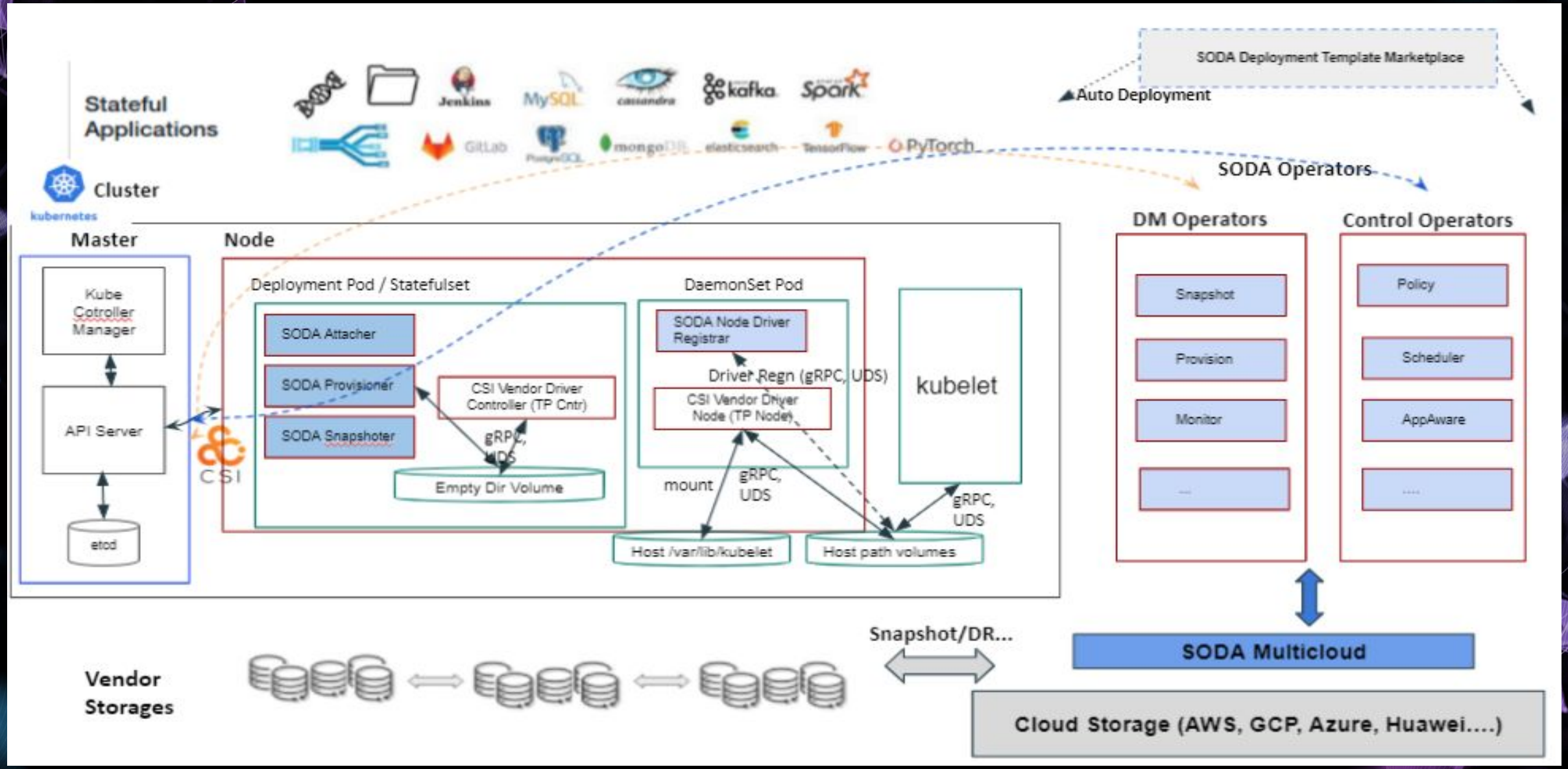
Unified SODA CSI plugin which can support multiple heterogeneous third party CSI drivers.

ODF for Kubernetes Highlights:

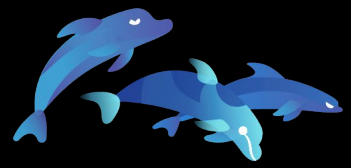
- Abstracts multi-vendor heterogeneous storage as block/file/object services
- Provision K8S persistent storage dynamically with Storage Class and Storage Profile mapping
- Plug any CSI storage as SODA storage backend (No third party driver modifications)
- Intelligent provisioning, storage orchestration, monitoring and data protection
- Hybrid data management for cloud native



Focus : Seamless Provisioning, Data Management, Monitoring...



Project Friends are also in the similar direction...



sodaeco PROJECT

LINSTOR

Block Storage Management for Containers

OpenEBS

Kubernetes Storage Simplified

ZENKO

Multi-Cloud Data Controller

CORTX™

Optimized Object Store

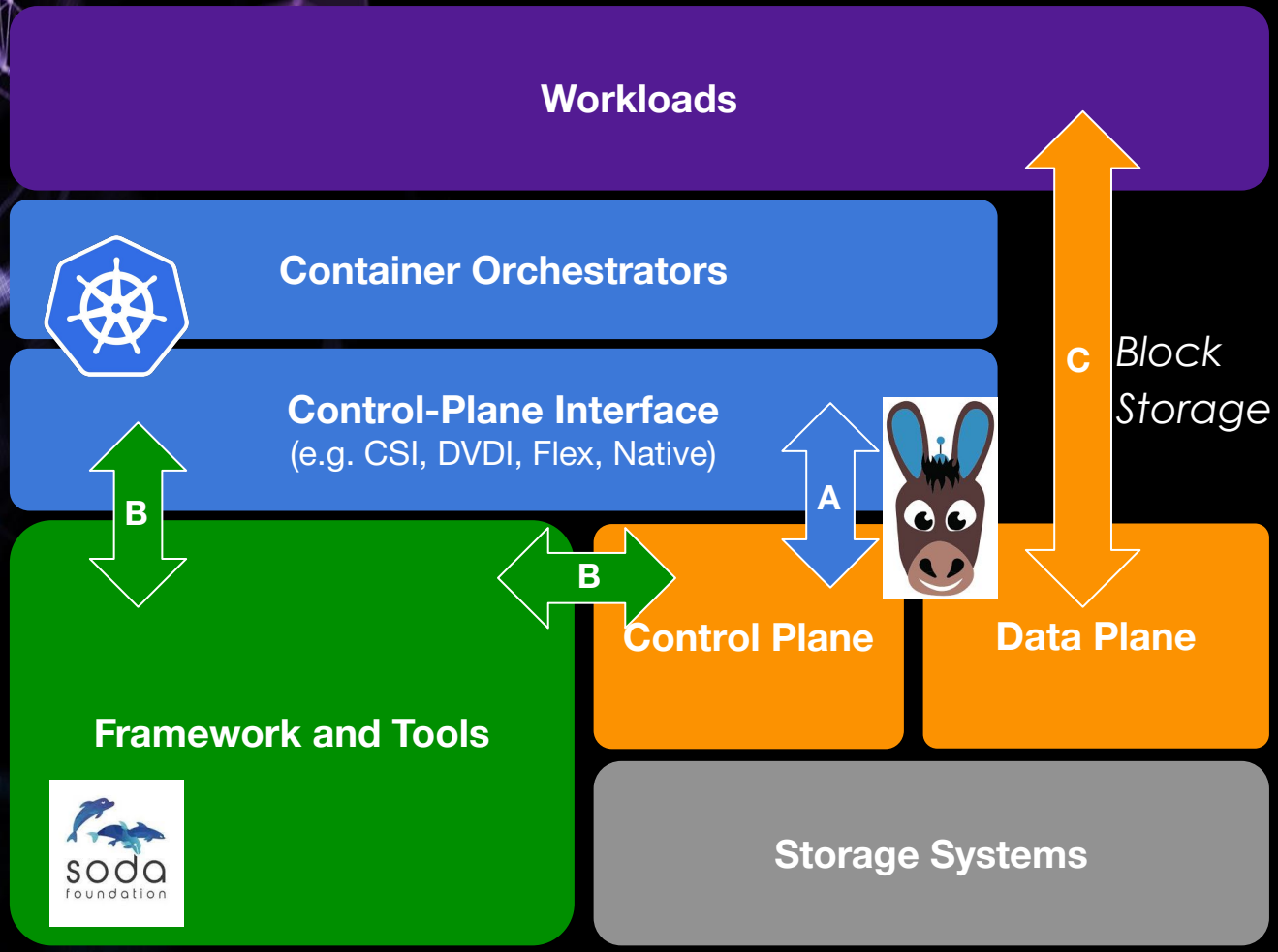
Exploring Ecosystem Solutions...

SODA and OpenEBS (just one example…)

sodaeco PROJECT

OpenEBS

Where does OpenEBS fit?



Benefits

- Kubernetes native - ease of use and operations. integrates into the standard cloud native tooling
- Lower footprint. Flexible deployment options. Fastest NVMe Replicated Storage.
- Controlled and predictable blast radius. Easy to visualize the location of the data of an application or volume
- Horizontally scalable. Scale up and/or down
- Highly composable. Choice of data engines matching the node capabilities and storage requirements
- Open Source and Avoid vendor lock-in
- Cost optimized - operational

How does Container Storage work?

3

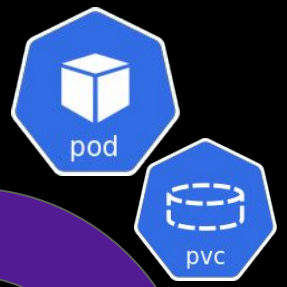
2

Platform SREs/K8s administrators (using K8s API) will setup OpenEBS and create Storage Classes

1

Platform SREs will setup the Kubernetes nodes with required Storage

Application Developers will create stateful workloads with Persistent Volume Claims (PVCs)



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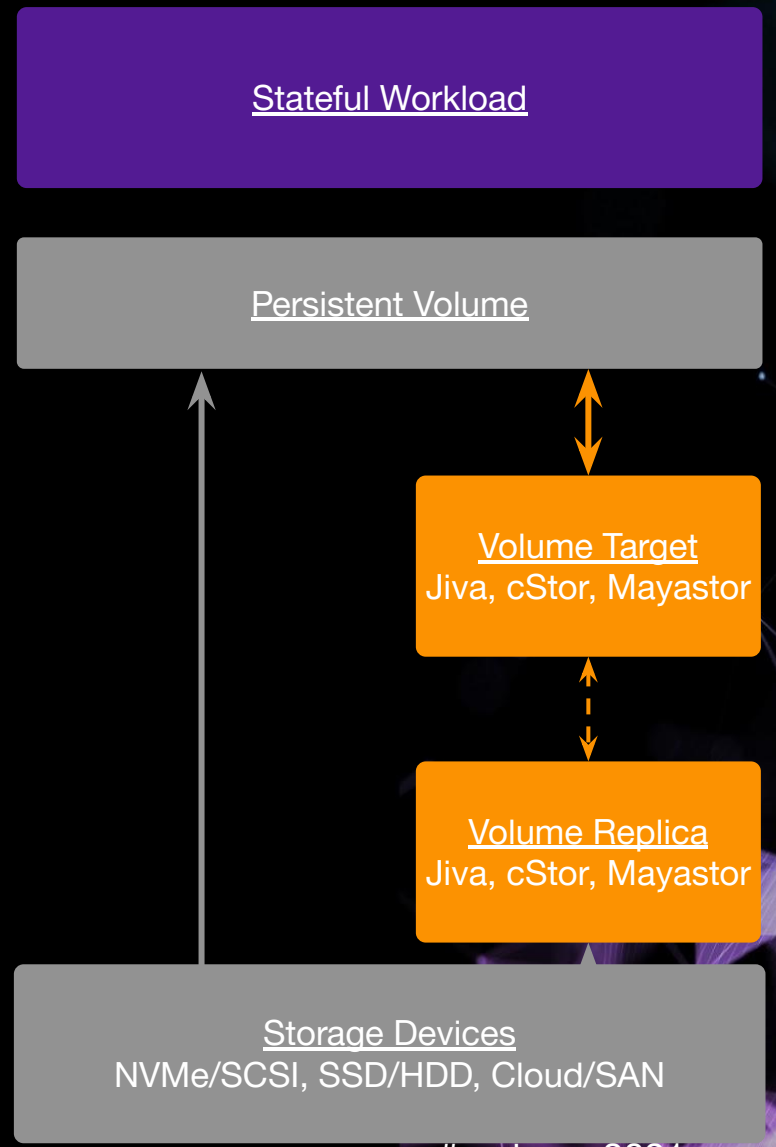
OpenEBS, using Data Engines, CSI and K8s extensions will create the required Persistent Volumes (PVs)

5

Platform and Operations team will observe and maintain the system using cloud native tooling.



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OpenEBS

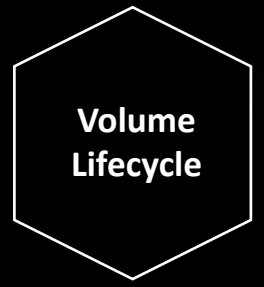
ODF for Container Storage

Prepare the nodes prior to adding to K8s cluster or post cleanup activities. Node upgrades, attaching storage. Optimize Infrastructure Costs.

- Node preparation
- Cluster and Node Lifecycle
- Disaggregated (Rack-scale) Data centers
- Multi-vendor and multi-product data stacks

Augment K8s capabilities that can be used by Data(Application) Operators.

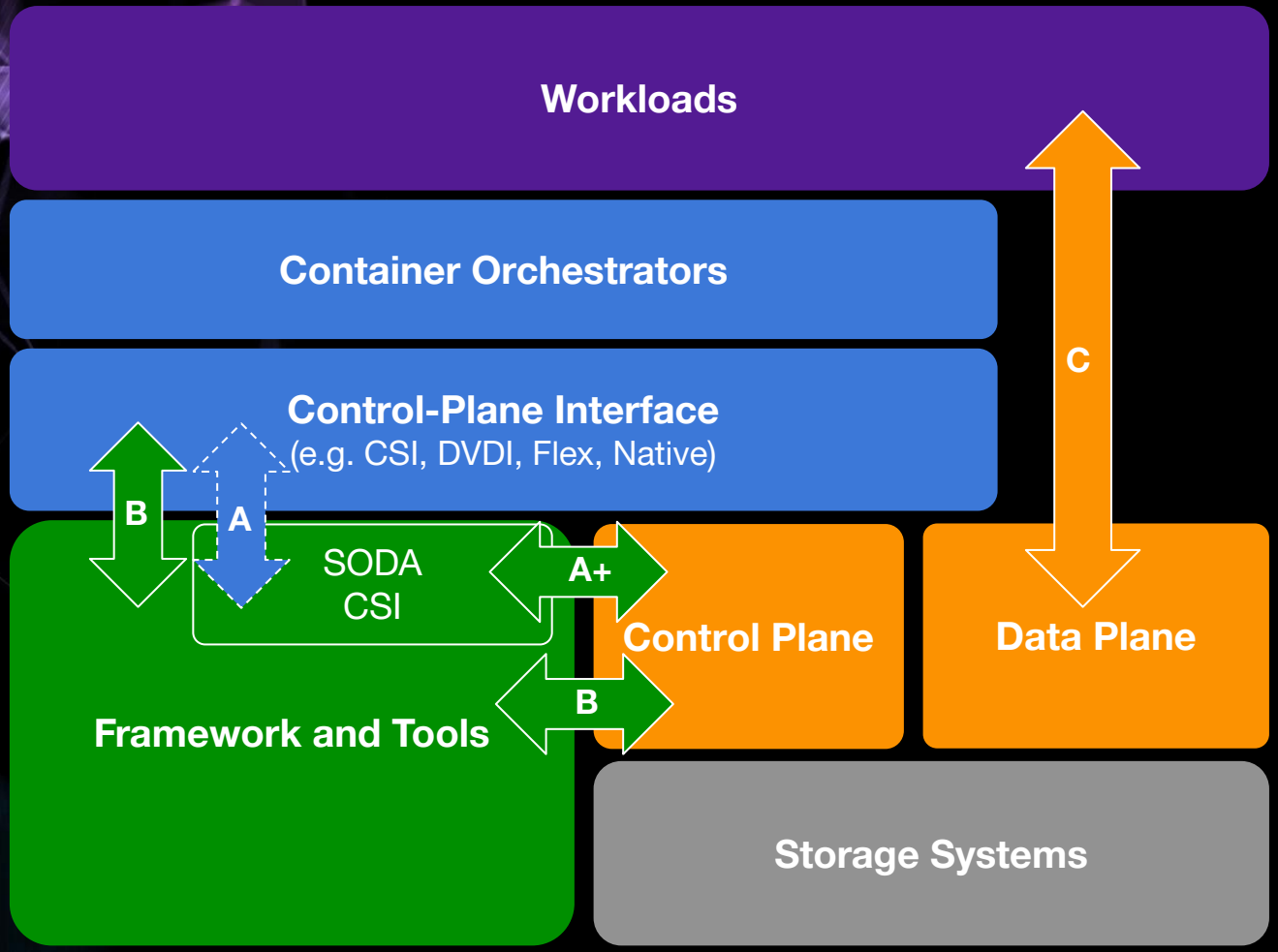
- Capacity / QoS Scheduling
- Fault Domains
- Volume Groups
- Network Hotspots



Manage the data beyond the life of a single K8s cluster. And beyond the application purview.

- Application and Data Versioning
- Blue/Green Upgrades
- Data Migration
- Disaster Recovery / Cloud Native DR

How will SODA CSI enhance vendor capabilities?

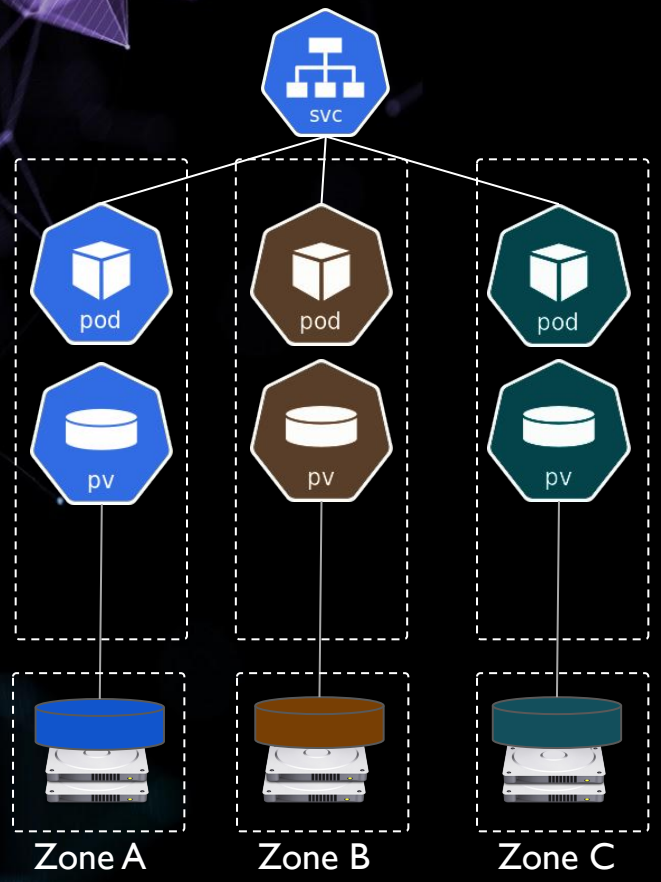


Volume Provisioning

Augment K8s capabilities that can be used by Data(Application) Operators.

- Capacity / QoS Scheduling
- Fault Domains
- Volume Groups
- Network Hotspots

How will SODA CSI help with Provisioning?



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.

SODA CSI

- Standardized Class of Service
- Gather additional information about the pod/application/tenant and pass along with the (pass through) storage requests.
- Vendors are ready, but CSI isn't. As CSI gets augmented transparently remove additional layers.
- Abstract the data migration capabilities that almost always differ from vendor to vendor from the application layer.

Container Storage Next…?

ODF

STaaS Support
Data Protection
Monitoring

SODA Data & Storage Survey 2021
(Pain Points)

Performance
Scalability
Cost

High Demand
Lack of Maturity
Lack of Tools

Industry

Storage Vendors v/s Cloud Vendors
Block v/s File v/s Object
Open Solutions v/s Vendor Locked
Storage box v/s Storage Ecosystem

Waana Bootstrap..?

Kubernetes Storage Concepts
https://kubernetes.io/docs/concepts/storage/

CSI Intro
https://kubernetes-csi.github.io/docs/

Understand the basics plus more of Storage Area Networks SAN and Network Attached Storage NAS :
https://www.udemy.com/share/101wGG2@PkdgV11cQ1cIc0JAO0tNVD1u/

OpenEBS
https://github.com/openebs/openebs

Google More!

Join SODA Slack (https://sodafoundation.io/slack) to discuss and work on it! :)

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Thank you

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