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— Global 2021 — July 13-14

Features of ODF for Container Storage : DEMO

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Contents

- SODA CSI Plugin
- CSI Plug-N-Play
- DR in Container Storage

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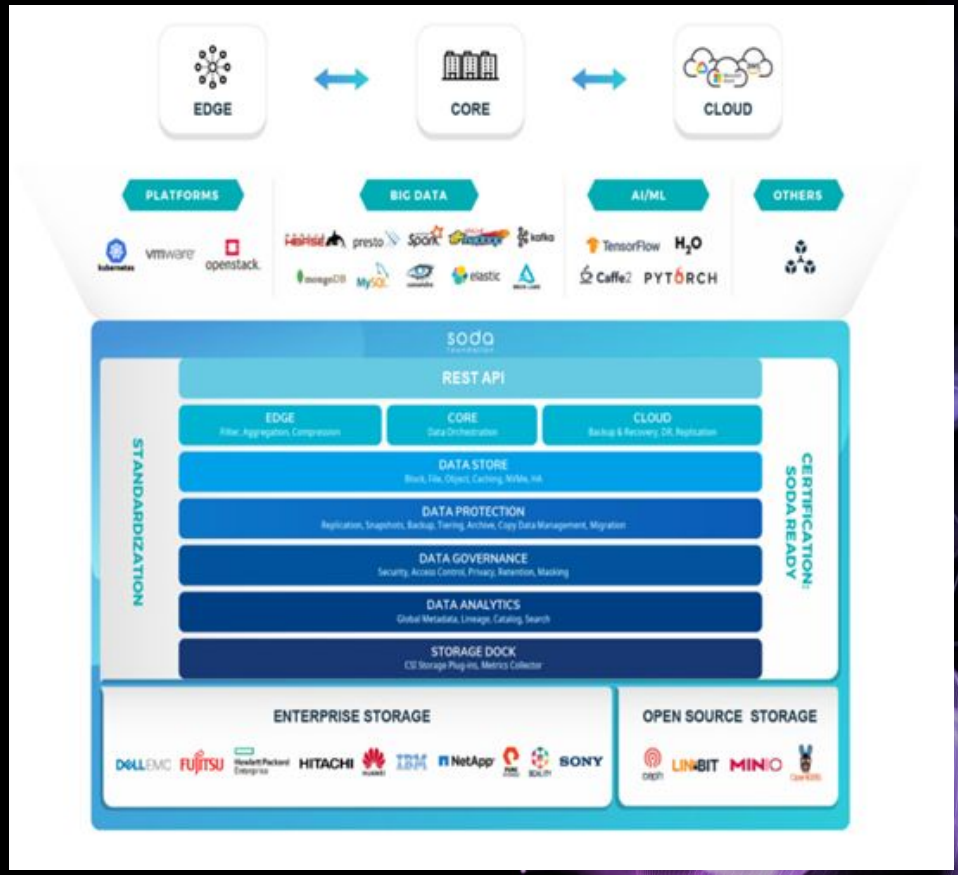
ODF (Open Data Framework) and Container Storage

- The SODA Open Data Framework is an open source unified autonomous data framework that connects data end to end
- Container Storage
- To support :
  - Stateful applications
  - Shareability of data : a single data set can be shared across many containers.
  - Scalability of data : ability to scale to exabytes of storage in a single namespace
  - Portability across various cloud systems, including multi-clouds, hybrid-clouds and on-premises deployments—container mobility provides cloud bursting capability.
- Container Storage Interface



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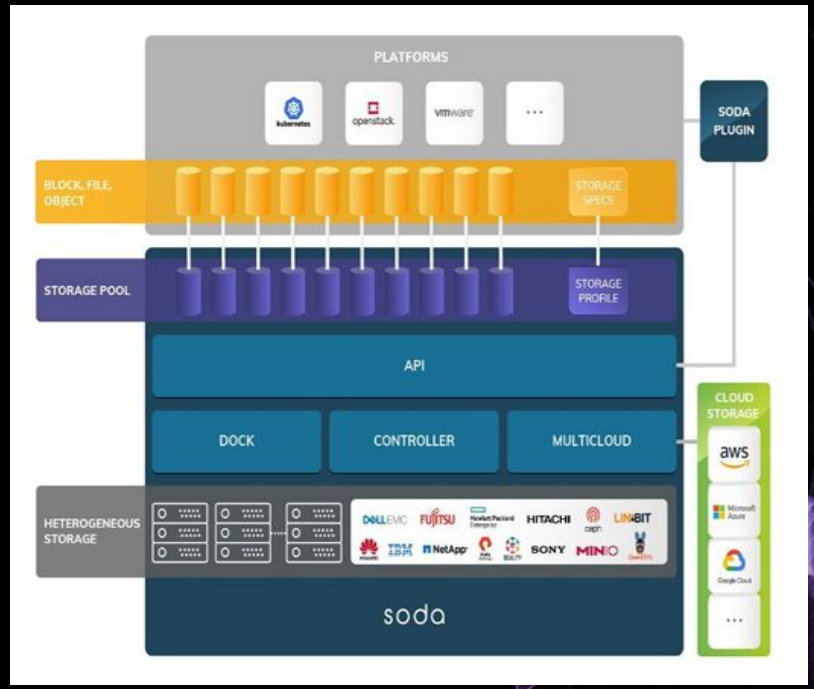
Unified Heterogeneous Storage

- Provides the standardization for Data / Storage Management APIs. Currently we support block and file APIs for key features of data management (provisioning, migration, fileshare, etc). Working to add the storage management APIs.
- Provides metadata management, control/configurations, scheduler and all such bookkeeping features and utilities
- SODA Dock is a docking station for heterogeneous storage backends! This is where all the different storage vendors drivers for various storage backend models get attached.
- SODA North-Bound Plugin Project focuses to extend all the industry platforms and application solutions to interface with SODA API or be compliant with it.



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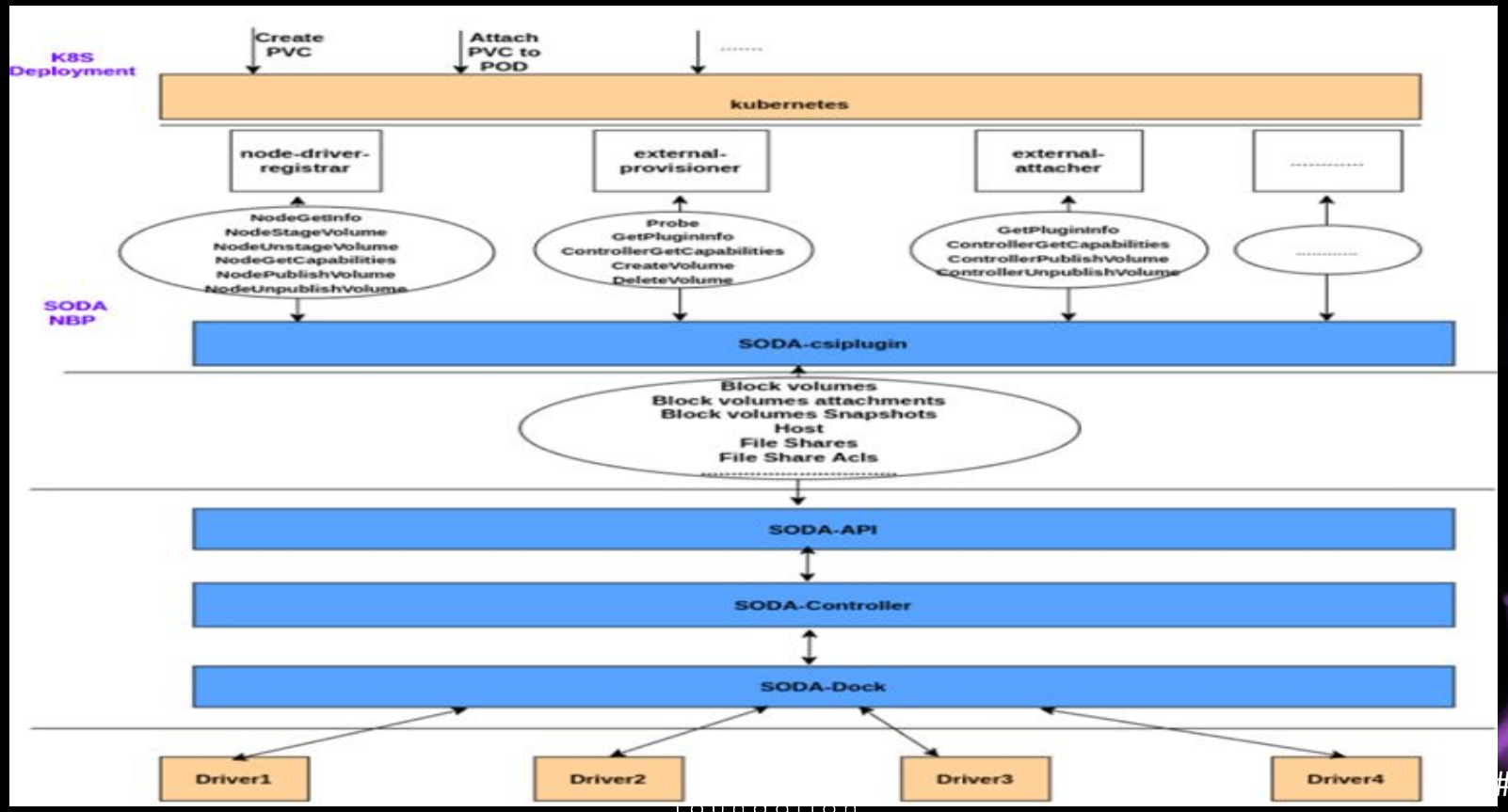
Unified CSI Plugin (SODA Way)



CSI Plug-N-Play

SODA CSI Plug-N-Play is a mechanism by which users can use the heterogeneous storage vendors in a unified way, Users need to define the requirements while creating SODA Profile, Users need to use this profile ID while creating the PVC in the Kubernetes, the SODA-CSI-Provisioner will automatically select the vendor CSI-Driver and help in provisioning the Volumes for Pods.

Selecting the Vendor CSI Driver can be done by following some pre-requites and changes shown in the official SODA Website, Demo for the below CSI Driver will be shown here.

1. CEPH CSI RBD DRIVER
2. OPENEBS LVM

Prerequisites

1. An installation of Kubernetes (V1.17+)
2. SODA installation
3. SODA CSI provisioner image v1.4.0

Pre-requisites for CEPH CSI Driver:

```
ceph auth get-or-create  client.kube osd 'allow rwx pool=osdsrbd' mon 'allow r' –o /etc/ceph/ceph.client.kube.keyring
ceph osd pool application enable osdsrbd rbd
rbd pool  init osdsrbd
ceph osd crush tunables hammer
grep -q "^rbd default features"  /etc/ceph/ceph.conf || sed -i '/\[global\]/arbd default features = 1' /etc/ceph/ceph.conf
```

Pre-requisites for OPENEBS LVM CSI Driver:

```
truncate -s 1024G /tmp/disk.img
sudo losetup -f /tmp/disk.img –show
sudo pvcreate /dev/loop0
sudo vgcreate lvmvg /dev/loop0
```

Output

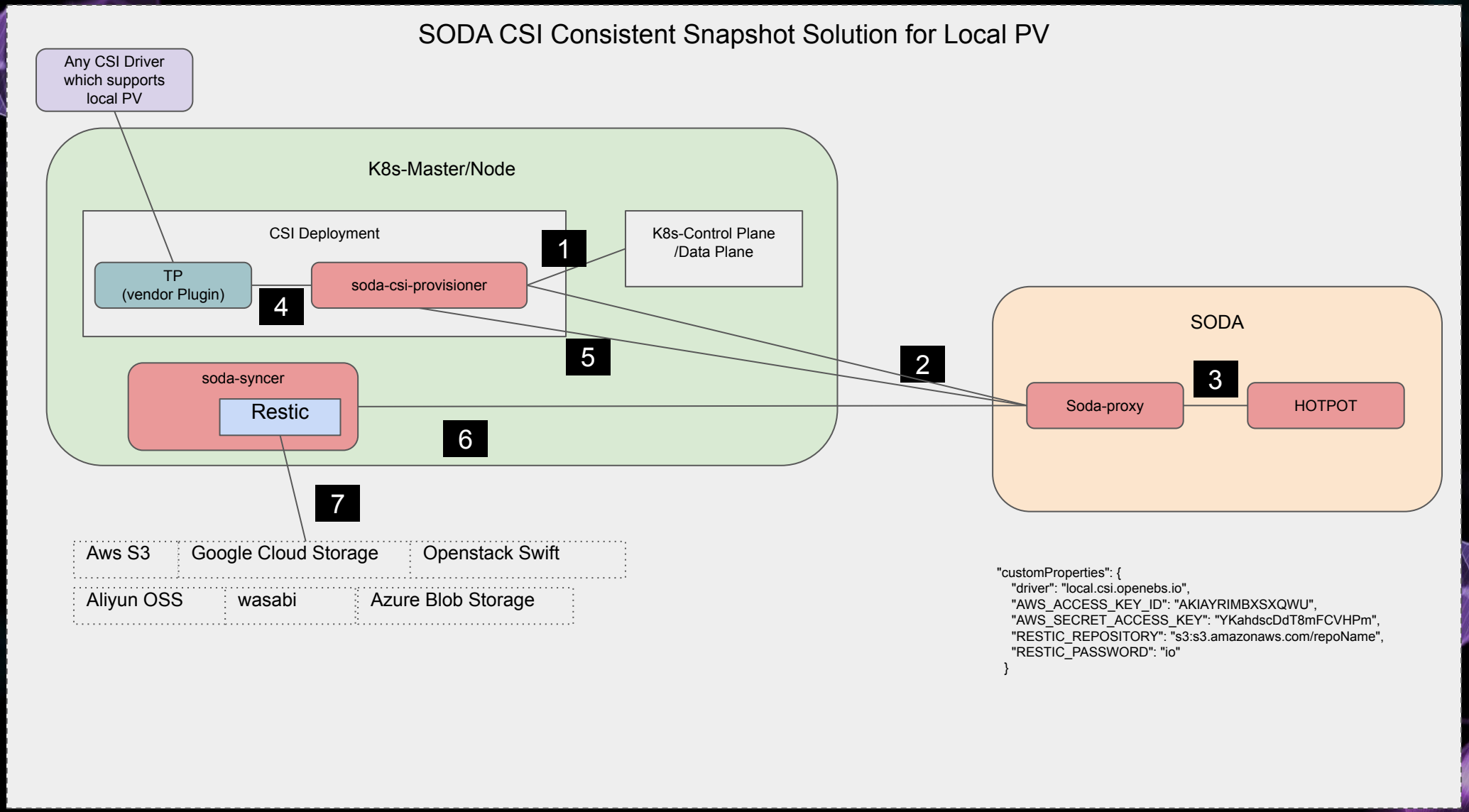
```
root@server:~# k get all -A
NAMESPACE     NAME                                                READY   STATUS    RESTARTS   AGE
default       pod/csi-rbdplugin-6fsvk                             3/3     Running   0          5m8s
default       pod/csi-rbdplugin-provisioner-757576c7f9-xb927      7/7     Running   0          5m8s
default       pod/fio-867cc4bc4b-mvvpt                            1/1     Running   0          40s
default       pod/pod-with-raw-block-volume                       1/1     Running   0          4m45s
default       pod/soda-proxy-555c495c57-57blc                     1/1     Running   0          95m
kube-system   pod/kube-dns-58fd9b49f7-5cgkk                       3/3     Running   0          175m
kube-system   pod/openebs-lvm-controller-0                        5/5     Running   0          40s
kube-system   pod/openebs-lvm-node-4fd5b                          2/2     Running   0          40s

NAMESPACE     NAME                                  TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
default       service/csi-metrics-rbdplugin         ClusterIP   10.0.0.94       <none>        8080/TCP         5m8s
default       service/csi-rbdplugin-provisioner     ClusterIP   10.0.0.181      <none>        8080/TCP         5m8s
default       service/kubernetes                    ClusterIP   10.0.0.1        <none>        443/TCP          175m
default       service/soda-proxy                    ClusterIP   10.0.0.163      <none>        50029/TCP        95m
kube-system   service/kube-dns                      ClusterIP   10.0.0.10       <none>        53/UDP,53/TCP    175m

NAMESPACE     NAME                                 DESIRED   CURRENT   READY   UP-TO-DATE   AVAILABLE   NODE SELECTOR   AGE
default       daemonset.apps/csi-rbdplugin         1         1         1       1            1           <none>          5m8s
kube-system   daemonset.apps/openebs-lvm-node      1         1         1       1            1           <none>          40s

NAMESPACE     NAME                                        READY   UP-TO-DATE   AVAILABLE   AGE
default       deployment.apps/csi-rbdplugin-provisioner   1/1     1            1           5m8s
default       deployment.apps/fio                         1/1     1            1           40s
default       deployment.apps/soda-proxy                  1/1     1            1           95m
kube-system   deployment.apps/kube-dns                    1/1     1            1           175m

NAMESPACE     NAME                                                  DESIRED   CURRENT   READY   AGE
default       replicaset.apps/csi-rbdplugin-provisioner-757576c7f9   1         1         1       5m8s
default       replicaset.apps/fio-867cc4bc4b                        1         1         1       40s
default       replicaset.apps/soda-proxy-555c495c57                 1         1         1       95m
kube-system   replicaset.apps/kube-dns-58fd9b49f7                   1         1         1       175m

NAMESPACE     NAME                                     READY   AGE
kube-system   statefulset.apps/openebs-lvm-controller  1/1     40s
root@server:~#
```

DR Solutions in Container Storage

Disaster Recovery for Container Storage is a bigger problem what stateful applications are facing. Challenges remains to do the DR solutions in Kubernetes way as most of the current solutions are based on machine backup.
Firstly to do the efficient backup of volumes and using them in active-active or active-passive mode is having a generic way of taking consistent snapshots and backing up to cloud which SODA provides in the following ways:

- Leverage Soda-profile to set the Snapshot Policy and let user configure the intervals and backend available with Restic
- Provides option of Consistent Snapshot as an add-on to any CSI driver using Soda-csi-plug-n-play.
- Adds a soda-syncer component which provides the functionality of snapshot, restore and data mover.
- TimeInterval based solution to consistently snapshot or one time event based snapshot.

DR Solutions in Container Storage



References

SODA Github : https://github.com/sodafoundation/
SODA DOC : https://docs.sodafoundation.io/
Slack : https://opensds.slack.com
Twitter : https://twitter.com/sodafoundation
CSI Specification: https://github.com/container-storage-interface/spec
Kubernetes CSI : https://github.com/kubernetes-csi/docs
SODA CSI Plugin : https://github.com/sodafoundation/nbp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Thank You