

Applications have changed and someone forgot to tell storage



India System Development Lab

2019 SNIA INDIA
23rd- 24th May | Bangalore





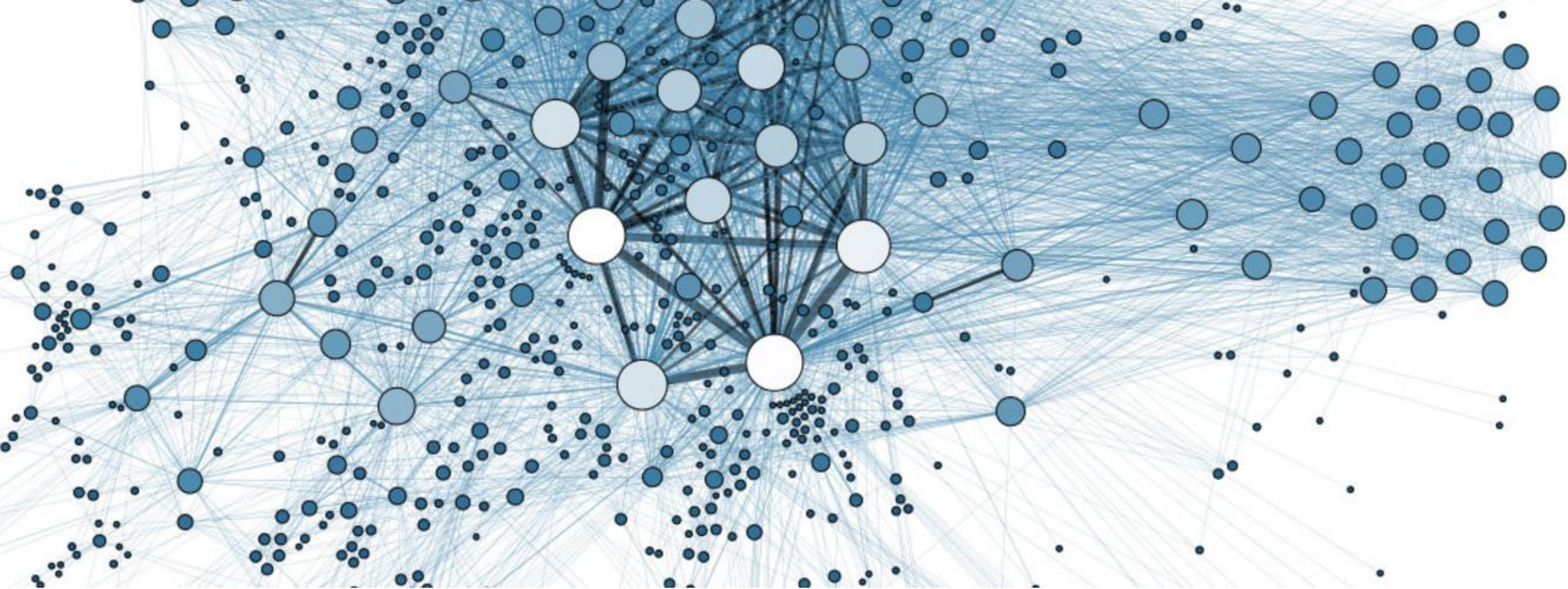
Abhishek Jain

Software Engineer




Yadavendra Yadav

Software Architect



Agenda

- **Application Modernization**
- **Evolution of Container**
- **Container Storage**
- **Distributed File System – An Example**
- **Container Native Storage**



APPLICATION MODERNIZATION



Monolithic



Microservice

Independent

**Rich User
Interface**

Decentral

**Business
Agility**

Cloud Native

**Scalable
Architecture**

Automation

**Fast Time to
Market**

Dev Ops

Dynamic

Example





Evolution of Container

1979
chroot
system
call





2000 FreeBSD Jails



There is no Escape



2001 Linux VServer Virtualization of Operating System



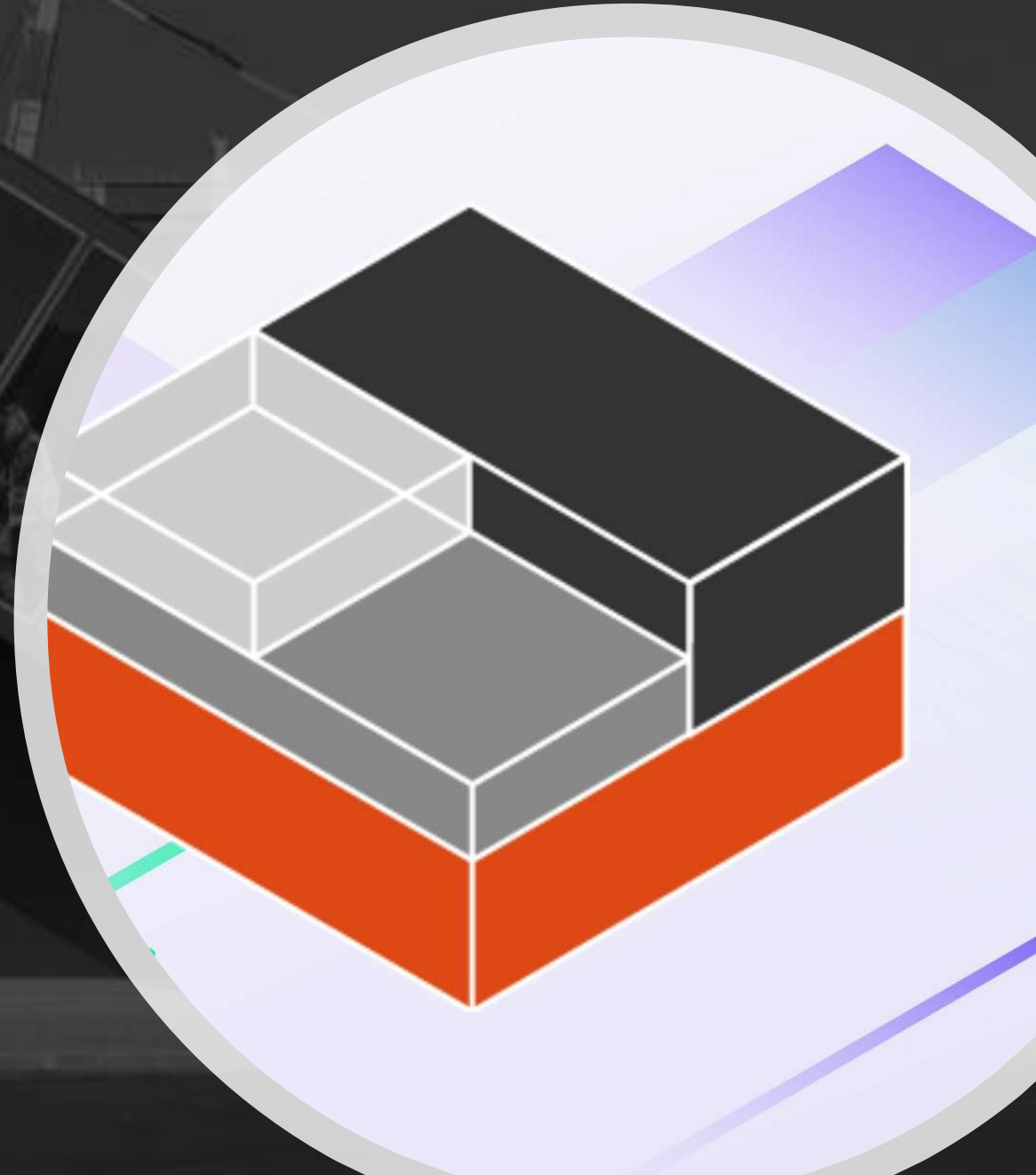
2006 Process Container

2007
CONTROL
GROUPS
&
AIX WPARS



2008

LXC
Container





2013

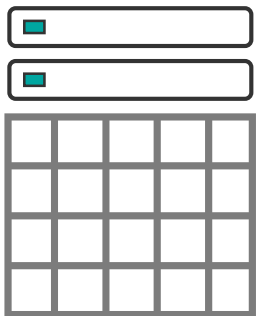


docker

An aerial photograph of a large container ship sailing on a dark blue ocean. The ship is viewed from above, showing its long hull and the dense stacks of colorful shipping containers (red, yellow, blue, green) on its deck. The ship is moving towards the bottom right, leaving a white wake behind it. Overlaid on the right side of the ship is white text.

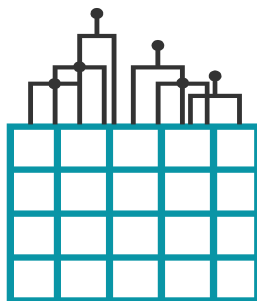
Containers are
Ephemeral,
Storage is Not

Block, File and Object Storage



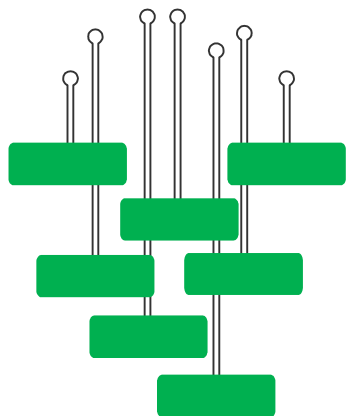
Block – Traditional storage is managed by OS i.e. **LUN, DISK**

Which Array/Volume/LUN



File – Unstructured data is managed with folders i.e. **FILE SYSTEMS**

Which Directory/ Subdirectory/File

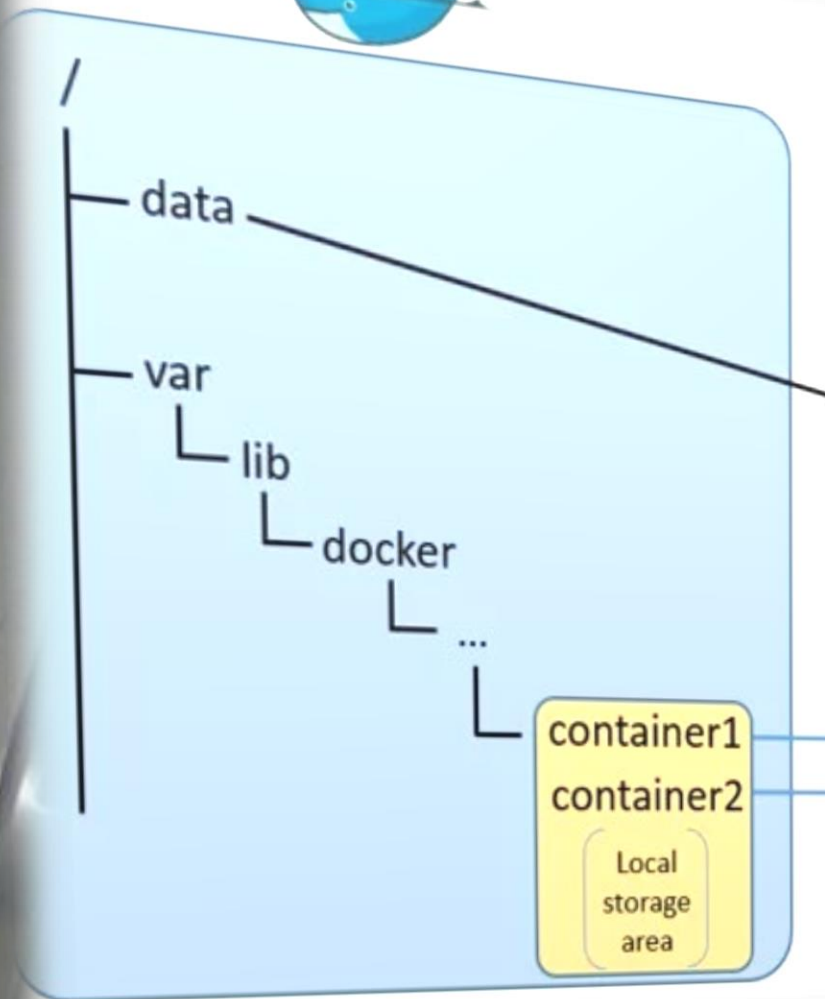


Object – Higher growth data is unstructured and managed by **APPLICATIONS**



An aerial photograph of two large container ships sailing on a deep blue ocean. The ships are covered in multi-colored shipping containers. Three concentric white circles are drawn over the image, centered on the larger ship. A semi-transparent dark blue circle is also present, partially overlapping the larger ship. The text "Container storage" is written in white, sans-serif font over the dark blue circle.

Container storage

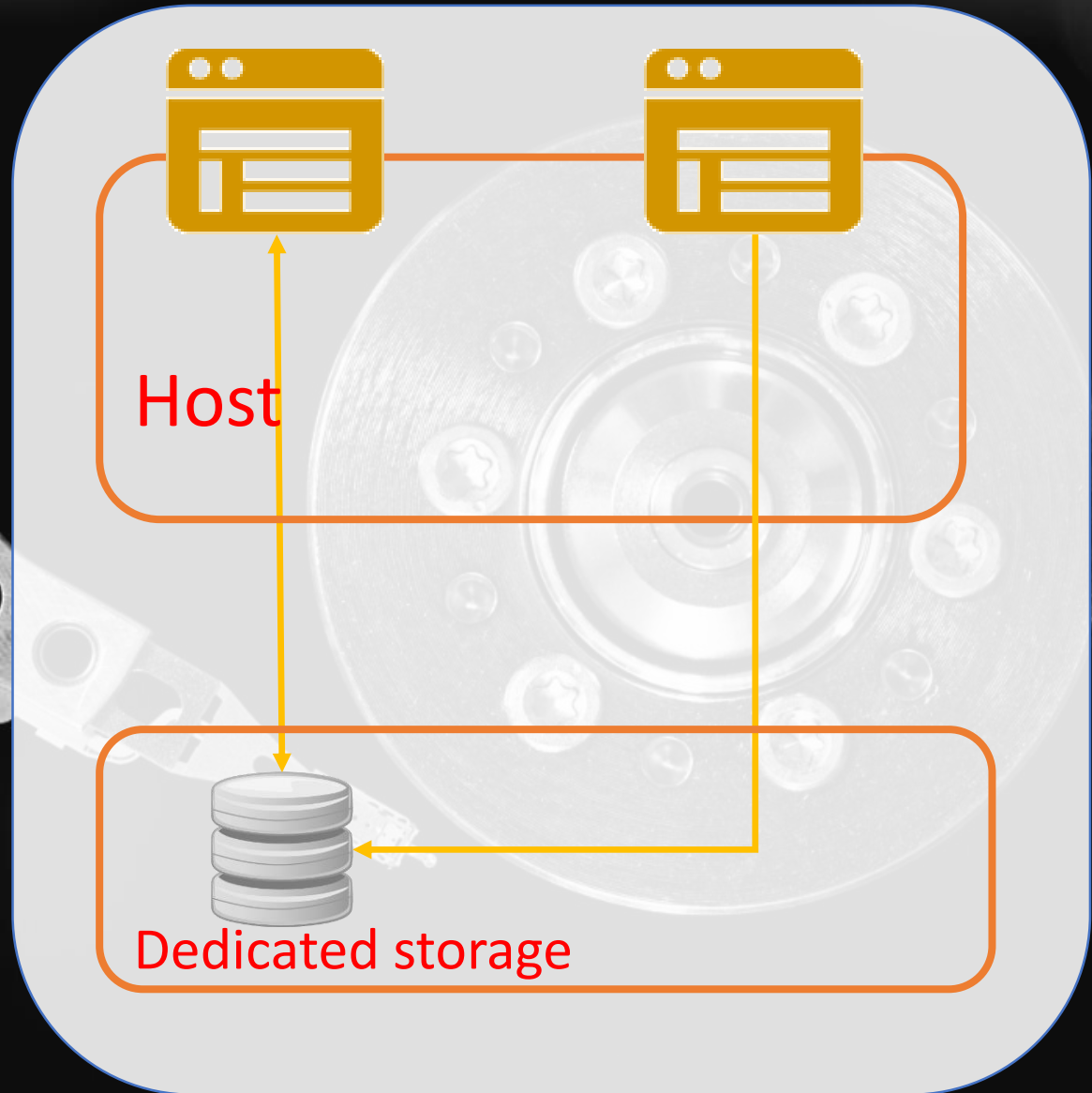


Docker host

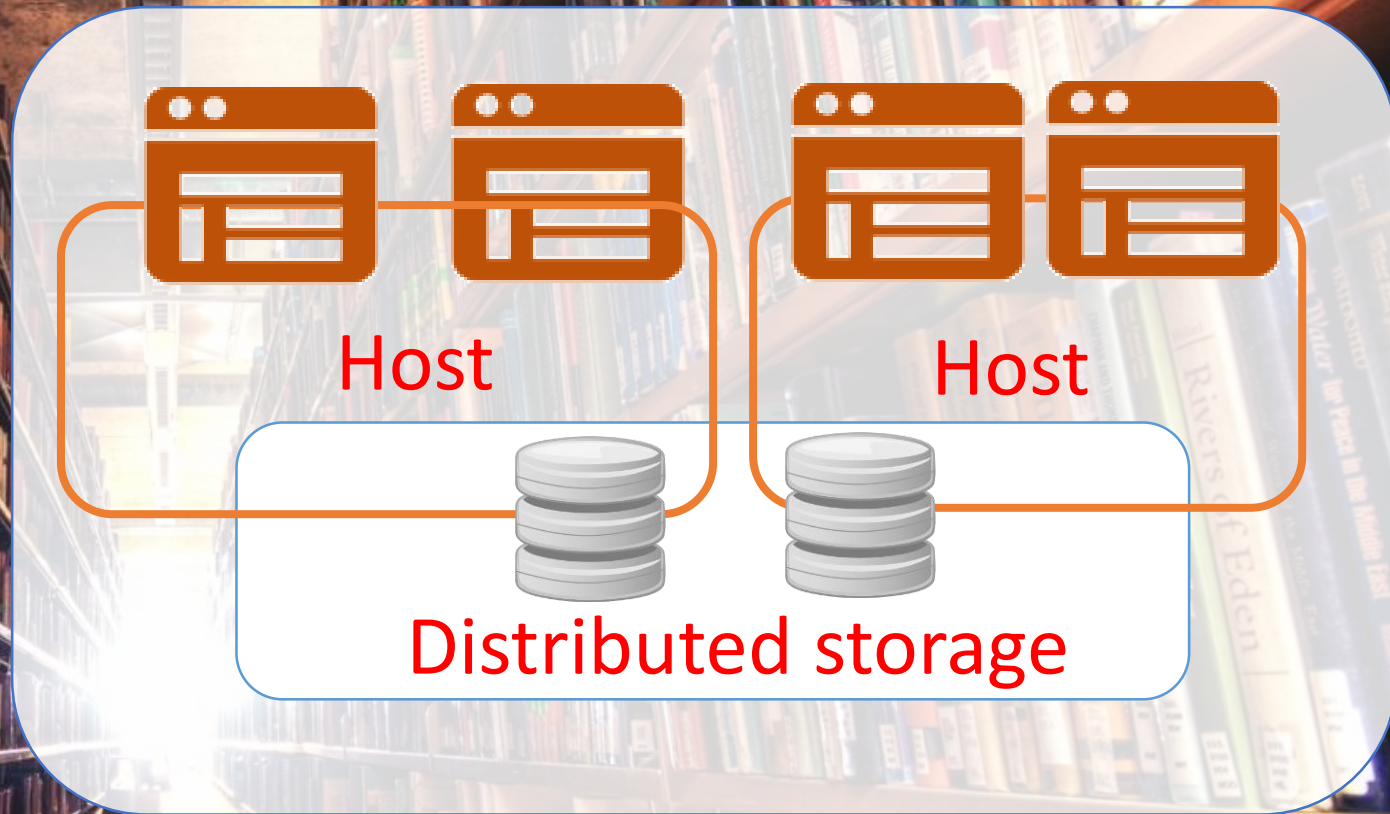
Local Host storage

Container 2

Storage Appliance



Distributed File System



Kubernetes Container Storage

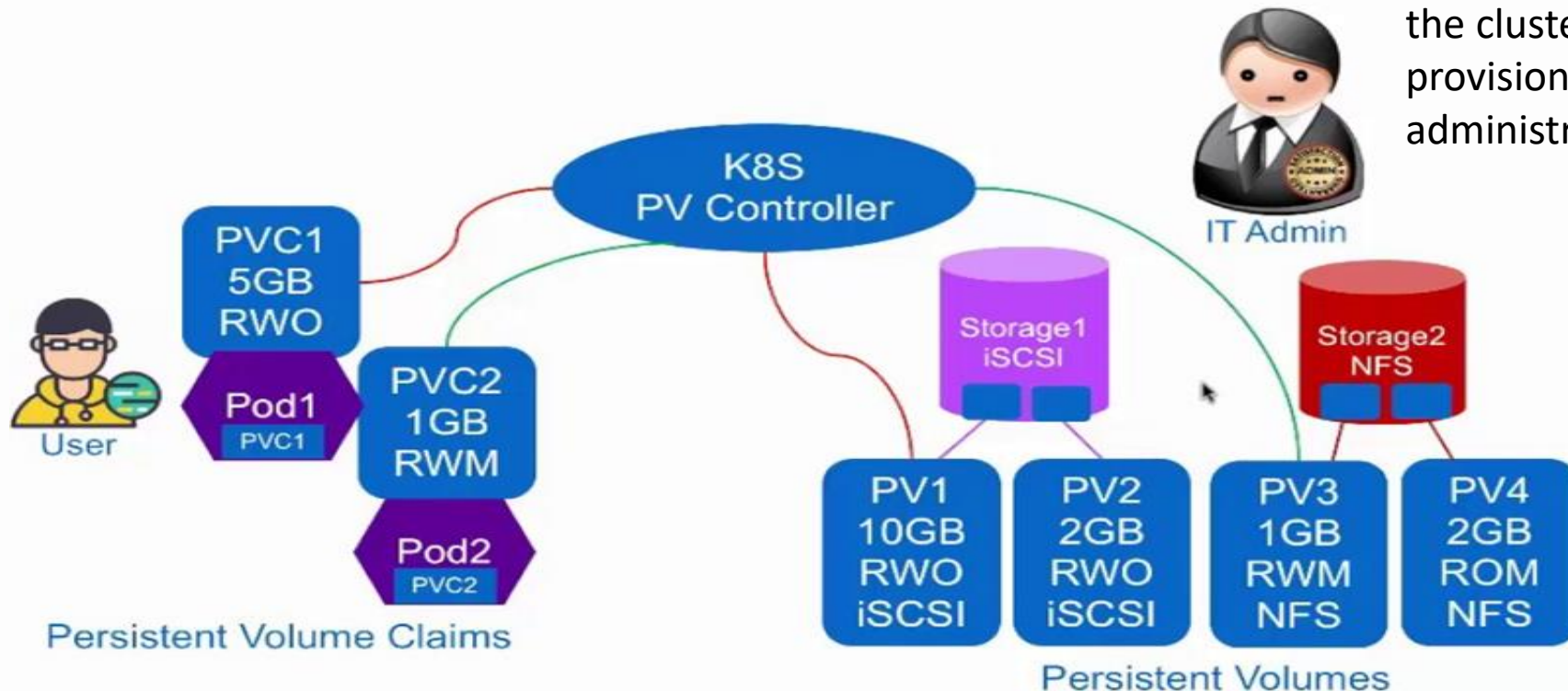
Persistent Volume Claim:

A Persistent Volume Claim (PVC) is a request for storage by a user.

Persistent Volumes:

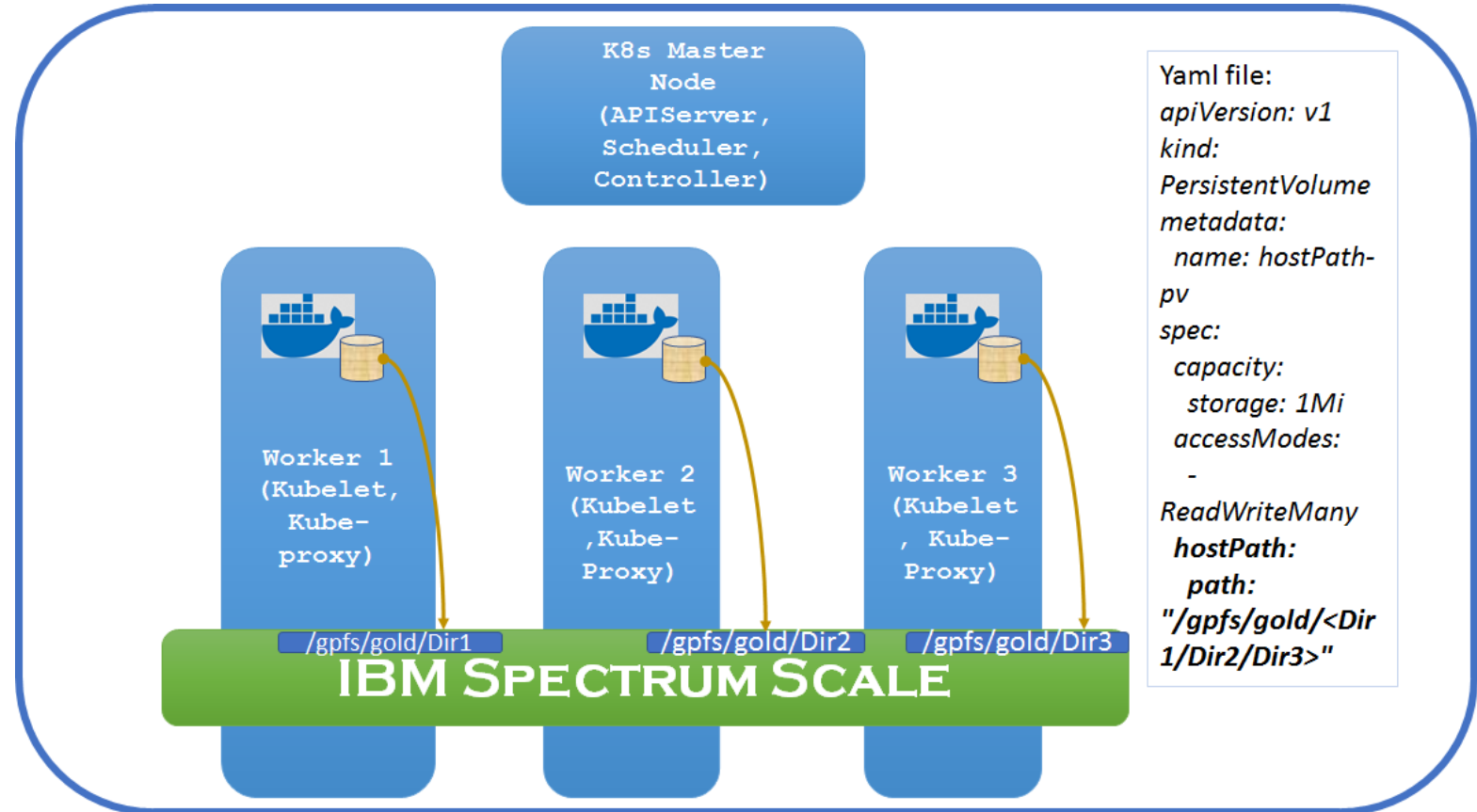
A Persistent Volume (PV) is a piece of storage in the cluster that has been provisioned by an administrator.

Persistent Volume Framework



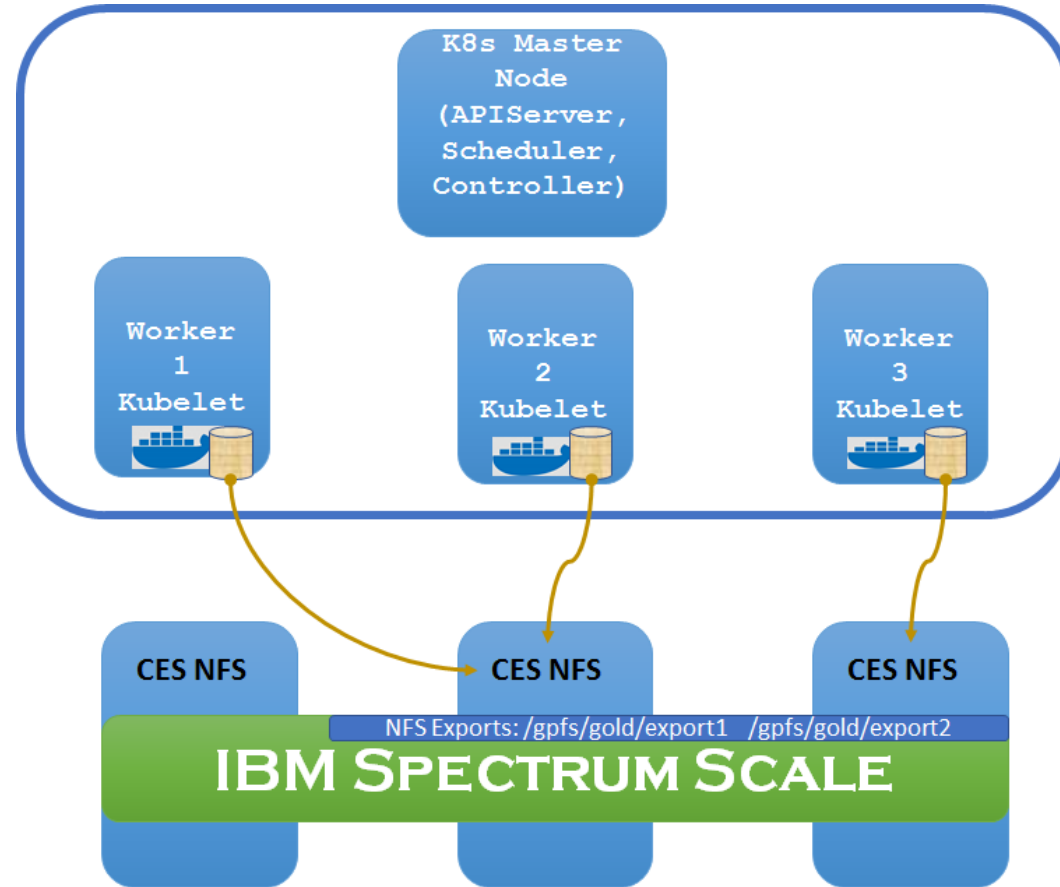
Possible Ways to Configure Containers Storage:

K8s HostPath Plugin



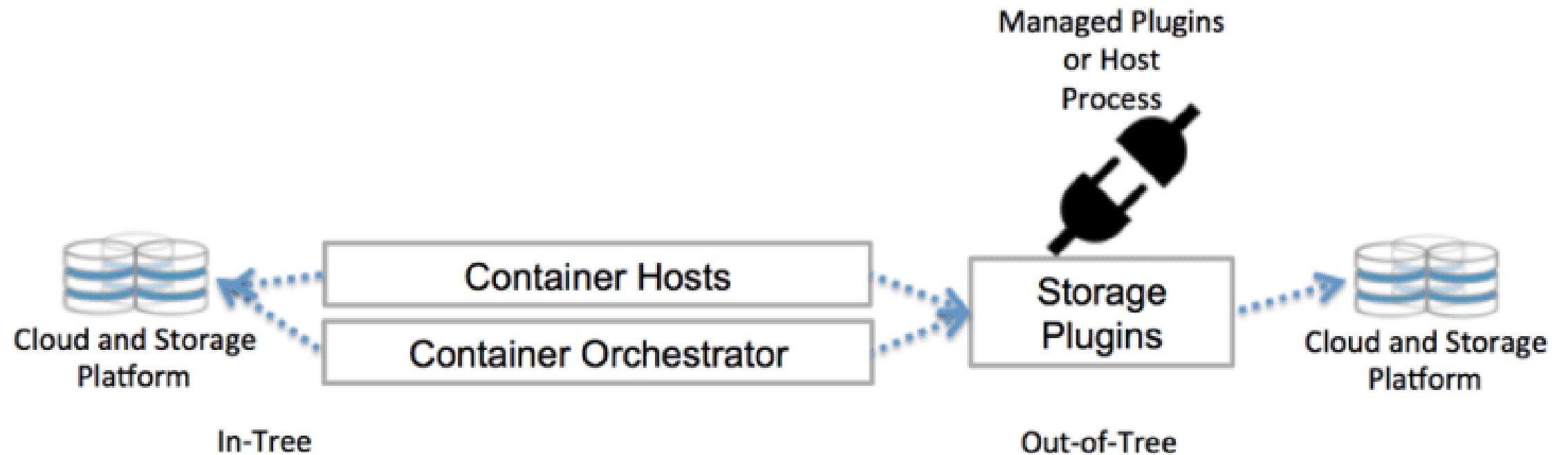
Possible Ways to Configure Containers Storage:

K8s NFS Plugin

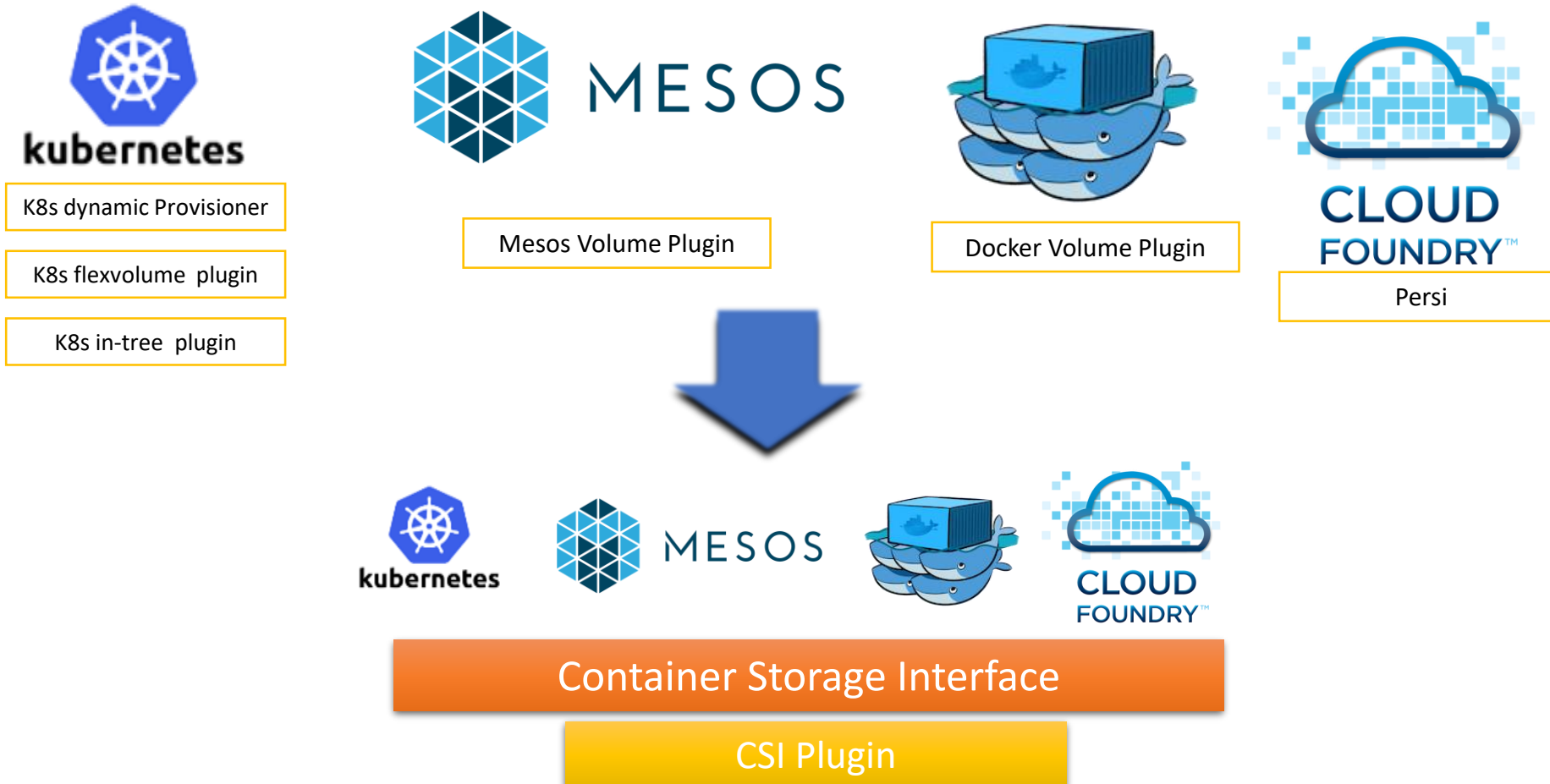


Yaml File:
NFS Plugin:
`apiVersion: v1`
`kind: PersistentVolume`
`metadata:`
 `name: nfs-cluster-pv`
`spec:`
 `capacity:`
 `storage: 1Mi`
 `accessModes: -`
 `ReadWriteMany`
 `nfs:`
 `server: <Server IP>`
 `path:`
 `</gpfs/gold/export1 OR`
 `/gpfs/gold/export2`

Container Storage Plugin

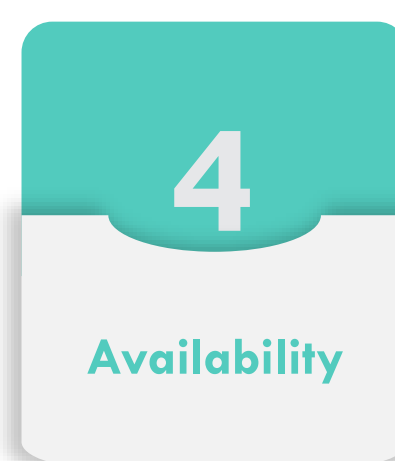
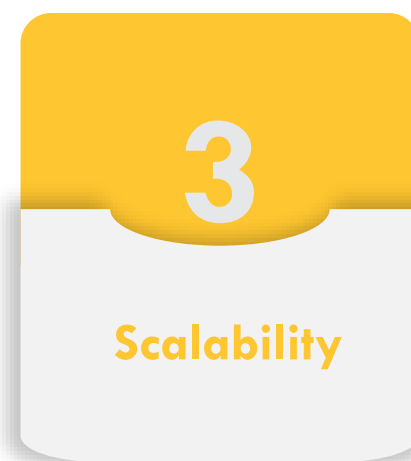
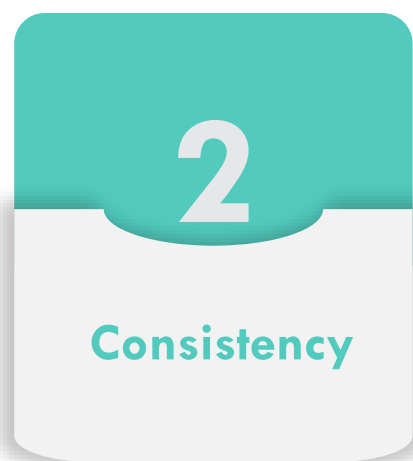
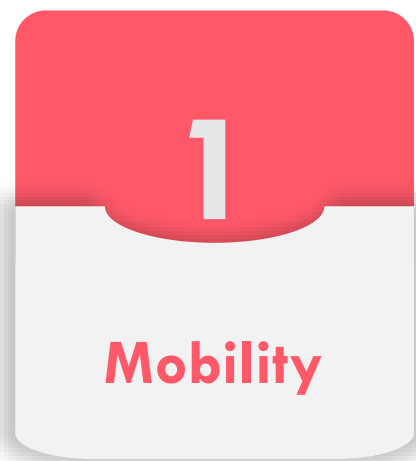
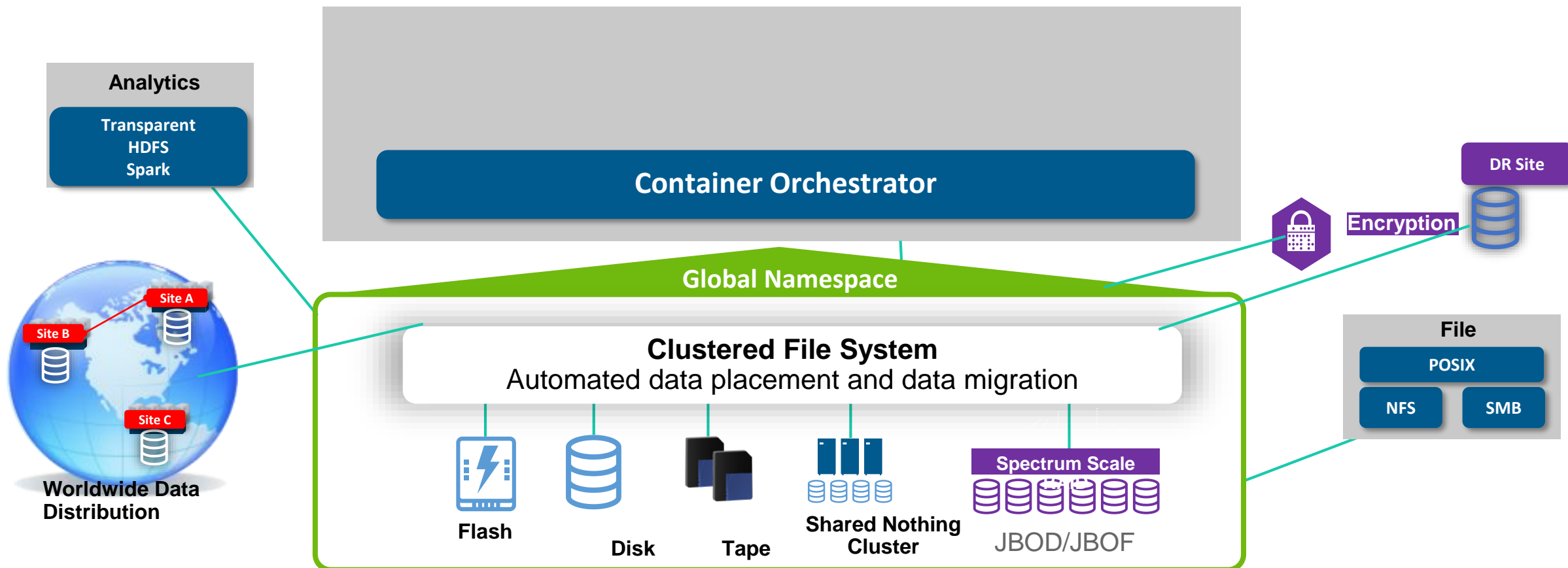


Container Storage Plugin



Distributed File system – A solution







Container Native Storage



Container Native Storage Evolution



Container Granular Operations

Unified Orchestration for Apps and storage



Containerized Software-defined Storage

Seamless user experience for developers and devops

Container Native Storage Evolution



Seamless Scaling and upgrades

Run on any infrastructure

Lower TCO

Native Integration With Container Orchestrator

Container Orchestration Feature



Placement

Deployment



Scheduling

Update



Health



Horizontal Scaling

Failover



Rollout and Rollback

Configuration Management



Service Discovery

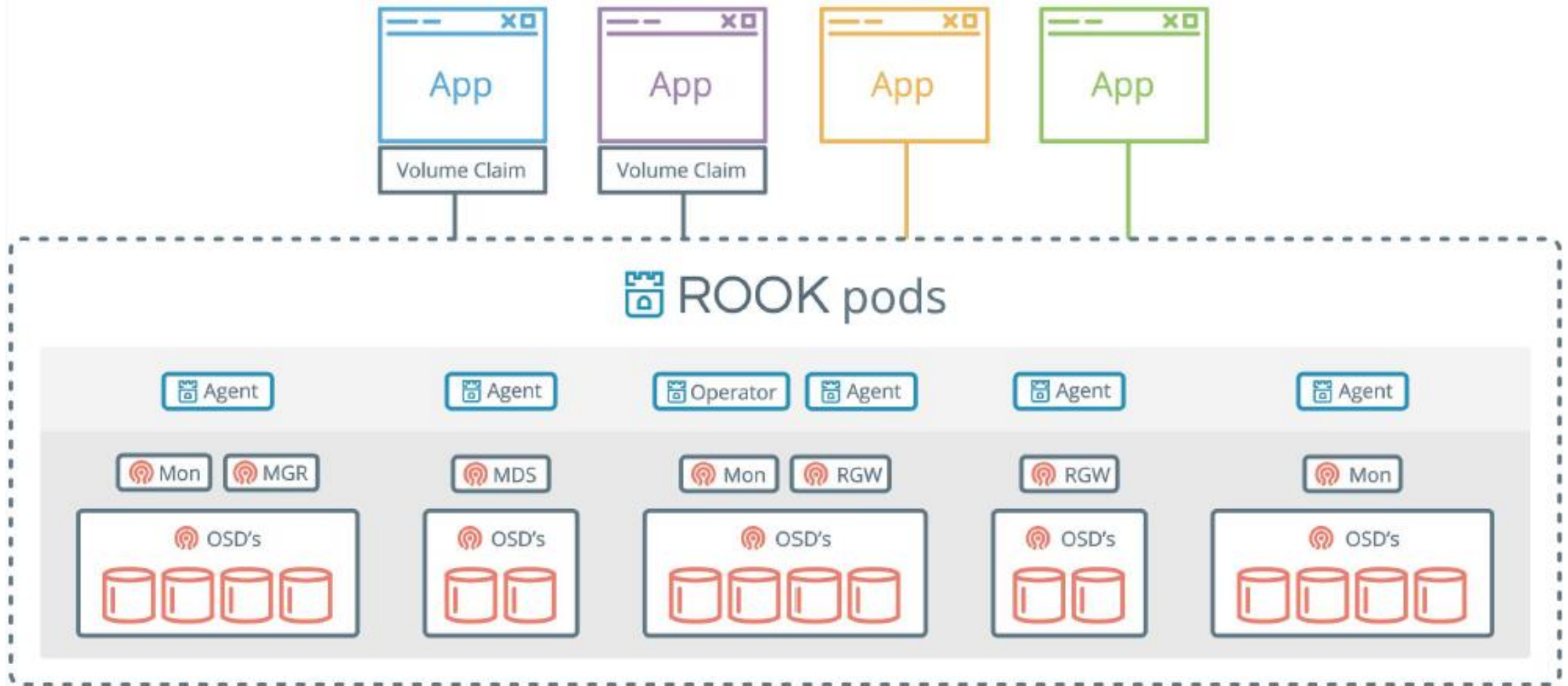
Rook Architecture

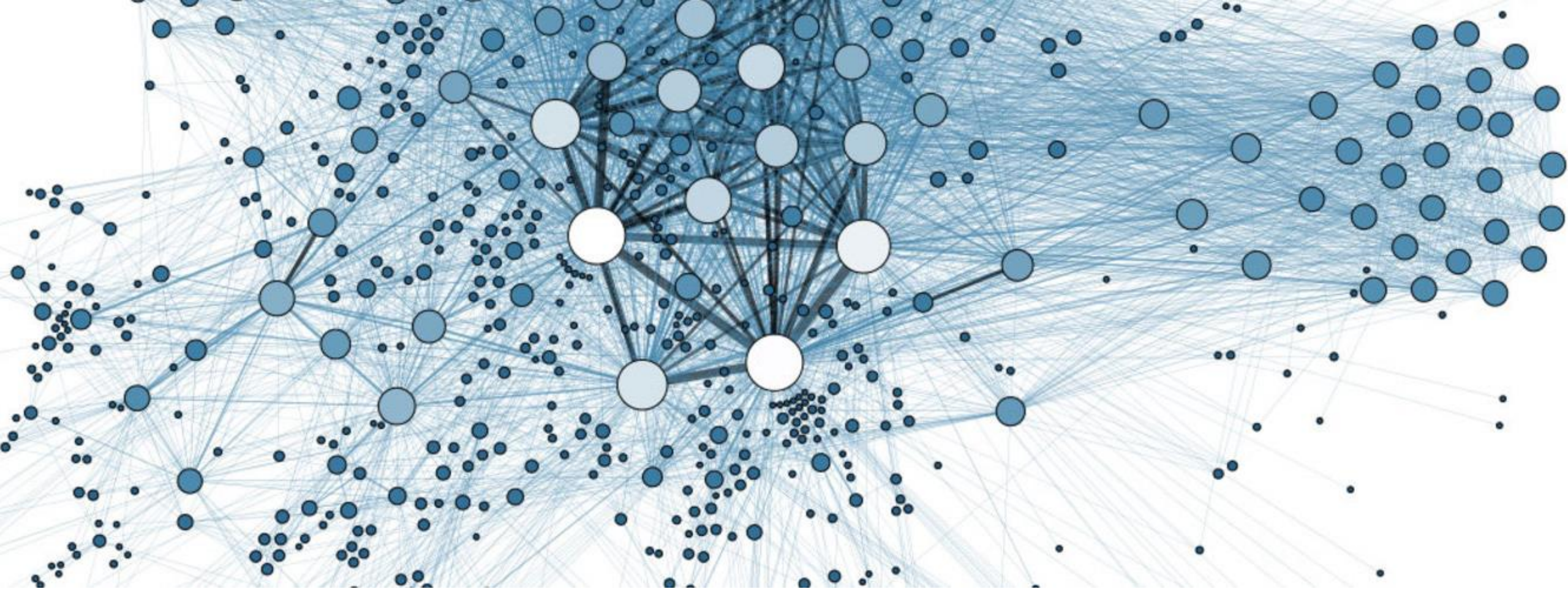
A cloud Native Storage Example

Rook Architecture



Rook Architecture





Thank you