

OpenAFS as Persistent Storage inside Kubernetes using Container Storage Interface plugin for OpenAFS



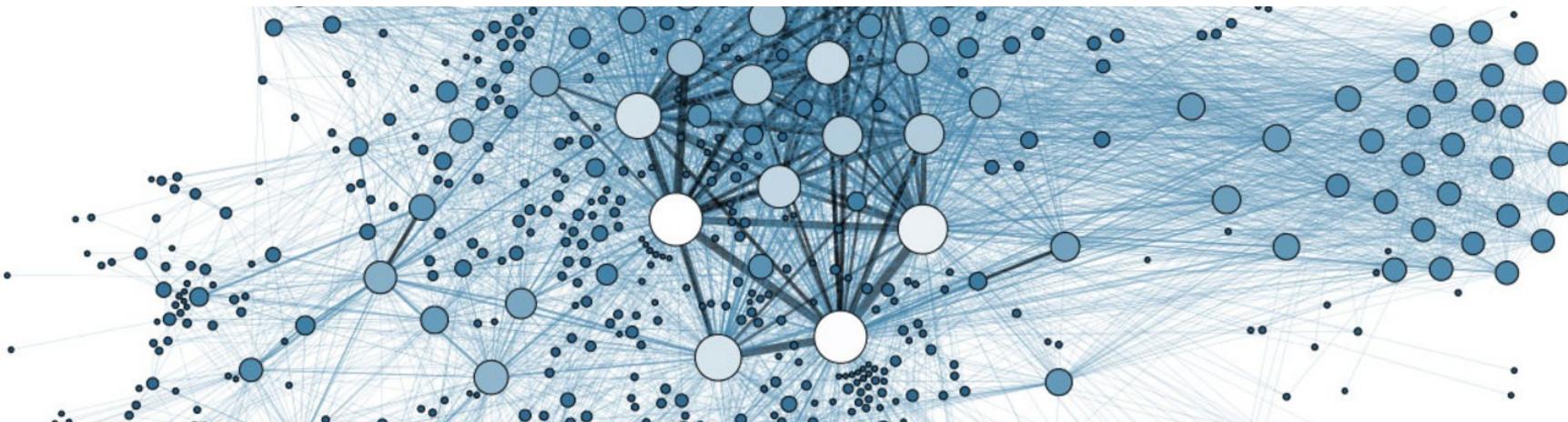
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OpenAFS WorkShop 2019
Pittsburgh, US



Agenda

- Application Modernization
- Evolution of Container
- Container Storage
- Container Storage Interface
- OpenAFS CSI Plugin
- Demo

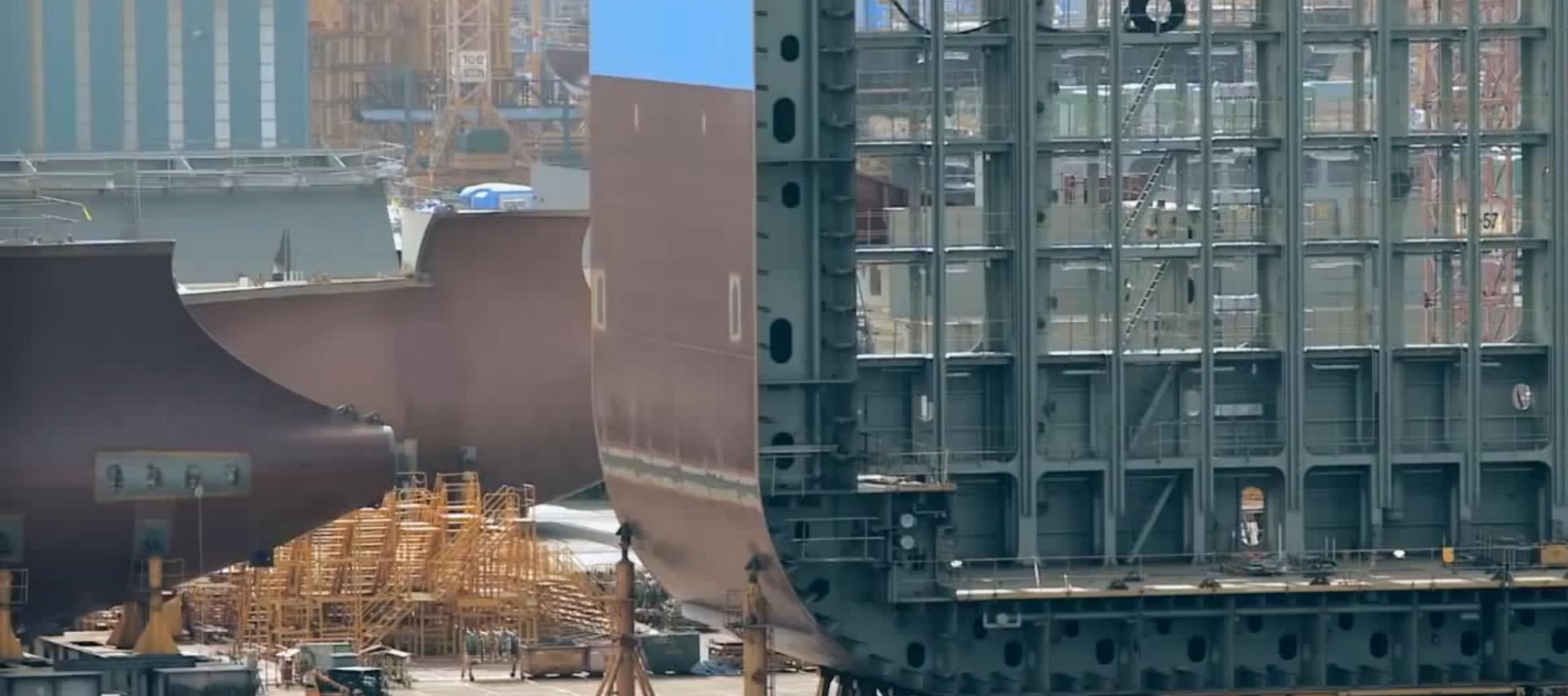




Monolithic

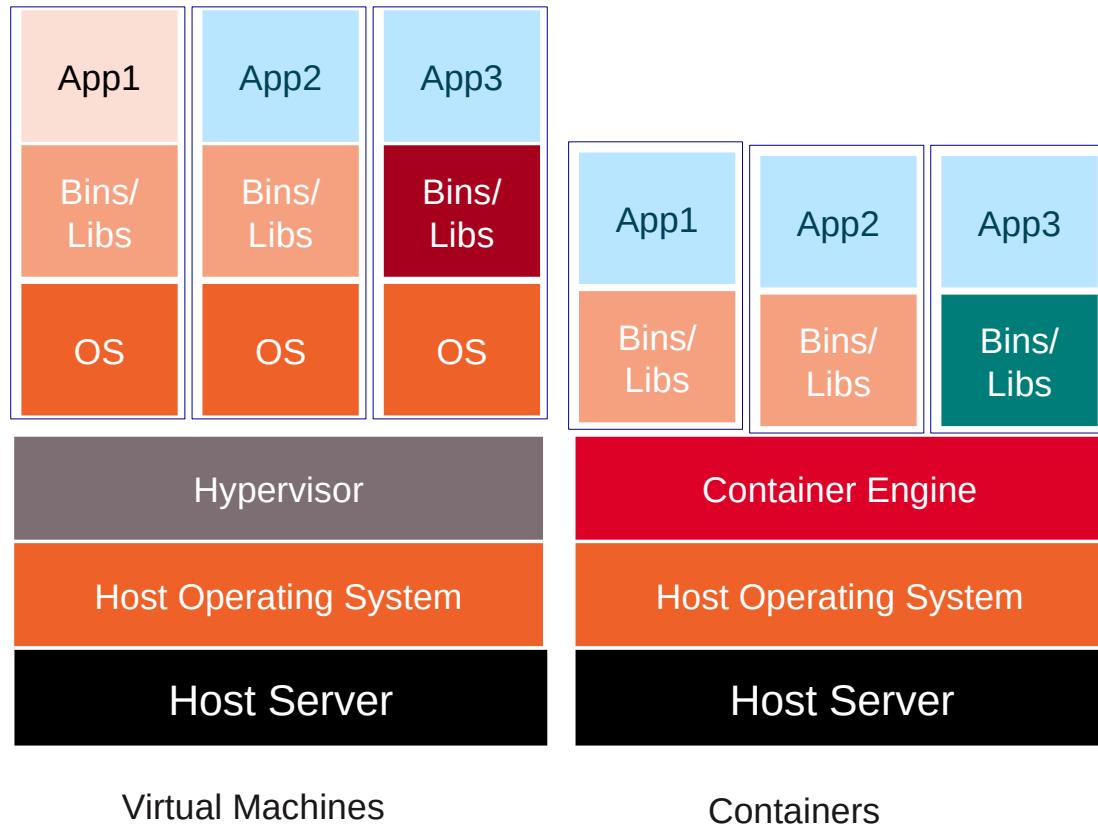
Microservice





Introduction to Container

Containers and VMs Solve Different Problems



Containers is more light and better performance:

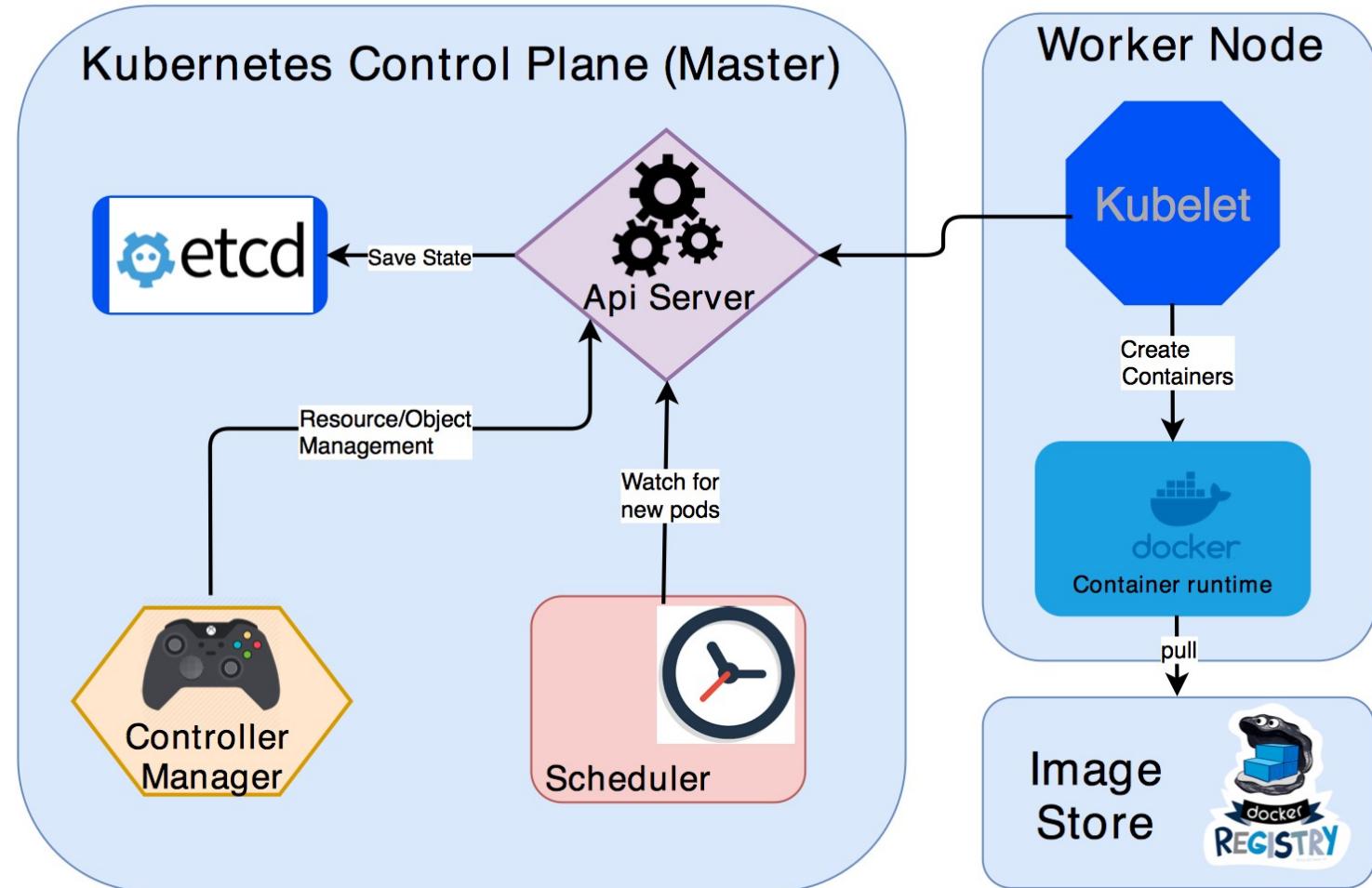
- Portability:** VM (Gigabytes) vs. Container (Megabytes), VMs are constraint to Hypervisor and hardware-emulation
- Performance:** Containers can boot and restart in seconds, compared to minutes for virtual machines. And no extra overhead of a hypervisor and guest OS makes containers consume less CPU and memory.
- Management cost:** Each VM requires a full functional operating system, and then extra management for them. Standalone executable package of software with no overhead of OS.

Advantage to use containers:

- Workload Isolation (less CPU/memory overhead and faster deployment than VMs)
- Resource limitations (cgroups can constrain containers' memory and CPU usage)
- Layered image architecture such that each change to the package is tracked
- Great to use container in DevOps, Batch processing, SaaS, Microservices etc

Build once and Run anywhere

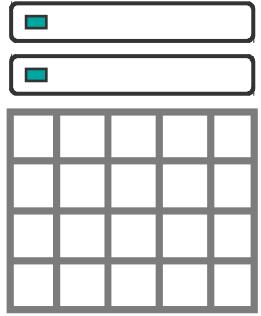
Kubernetes Architecture



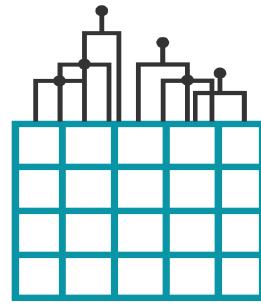
An aerial photograph of a massive cargo ship sailing across a dark blue ocean. The ship's deck is completely covered with a dense stack of shipping containers in various colors, including red, yellow, green, and blue. The wake of the ship cuts through the water, creating white foam and ripples.

Containers are
Ephemeral,
Storage is Not

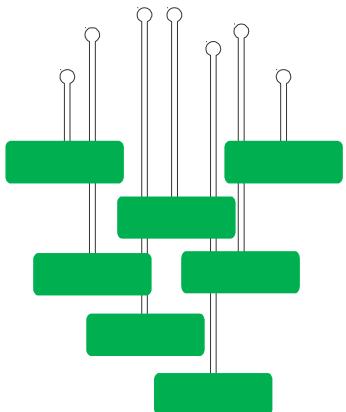
Block, File and Object Storage



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/Filer



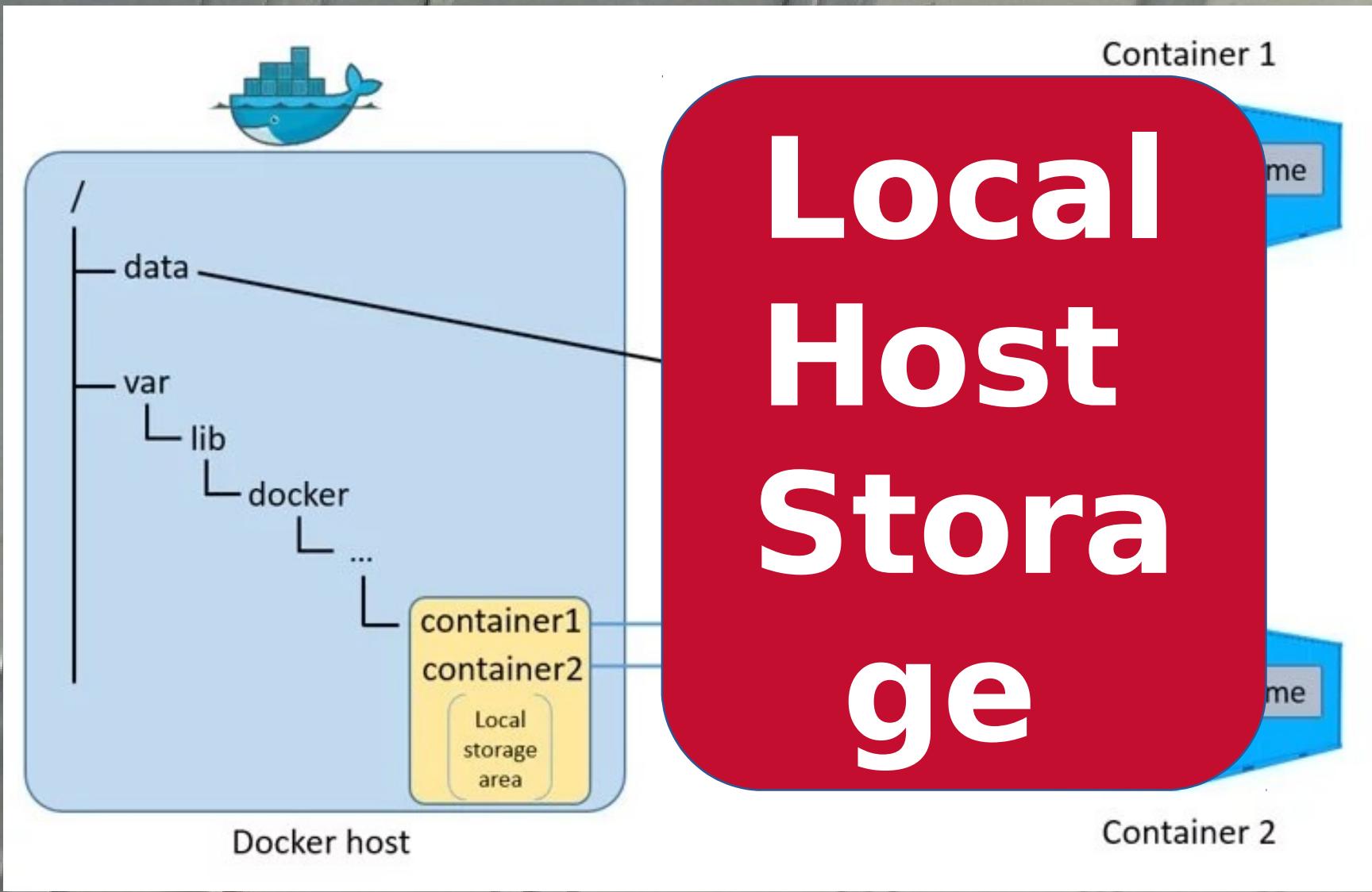
Object – Higher growth data is unstructured and managed by **APPLICATIONS**



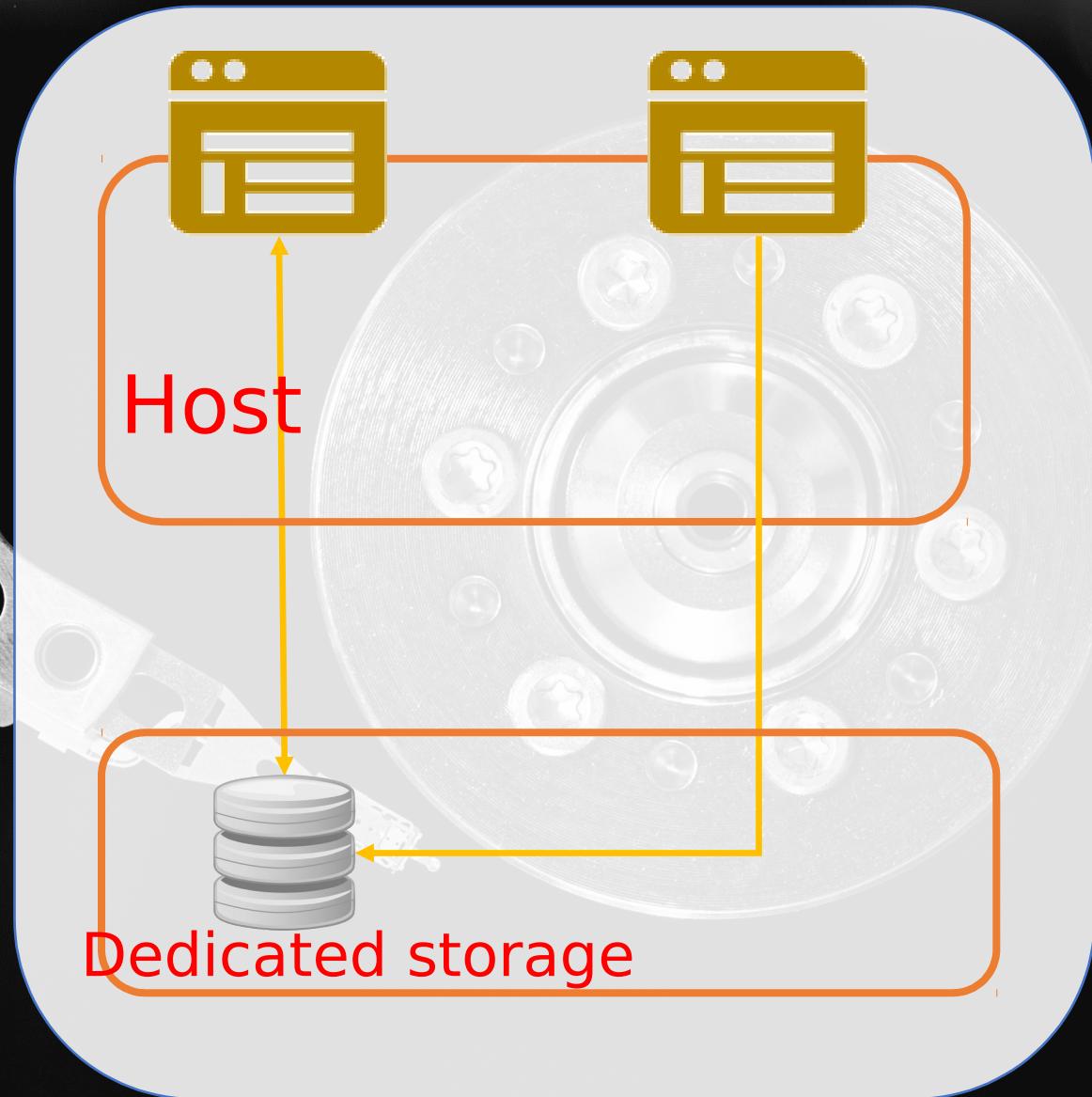
An aerial photograph of a massive cargo ship sailing on the ocean. The ship's deck is covered with thousands of shipping containers stacked in long rows. The containers are various colors, including red, blue, yellow, and white. The ship is moving from left to right, creating a white wake behind it. The ocean water is a deep blue with some white foam near the ship.

Container Storage

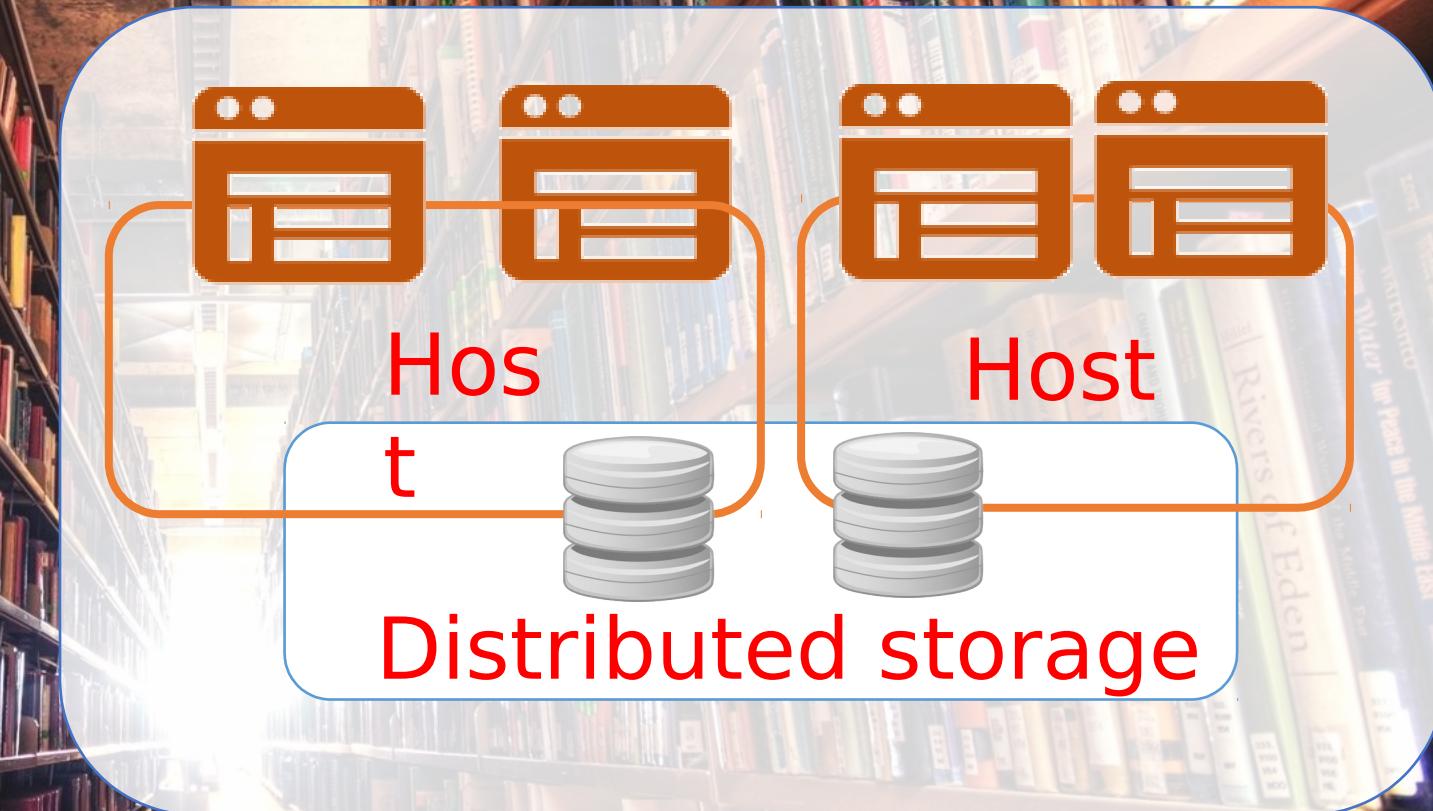
Local Host Storage



Storage Appliance



Distributed File System

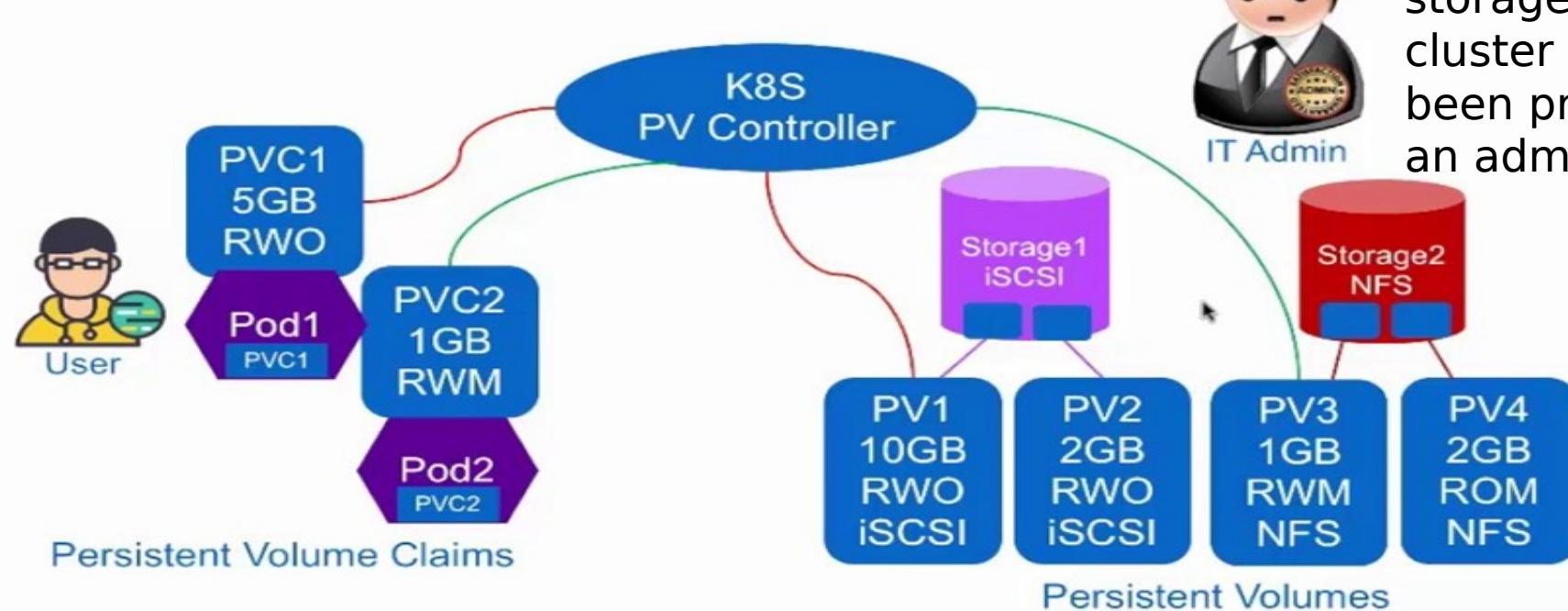


Kubernetes Container Storage

Persistent Volume Claim:

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

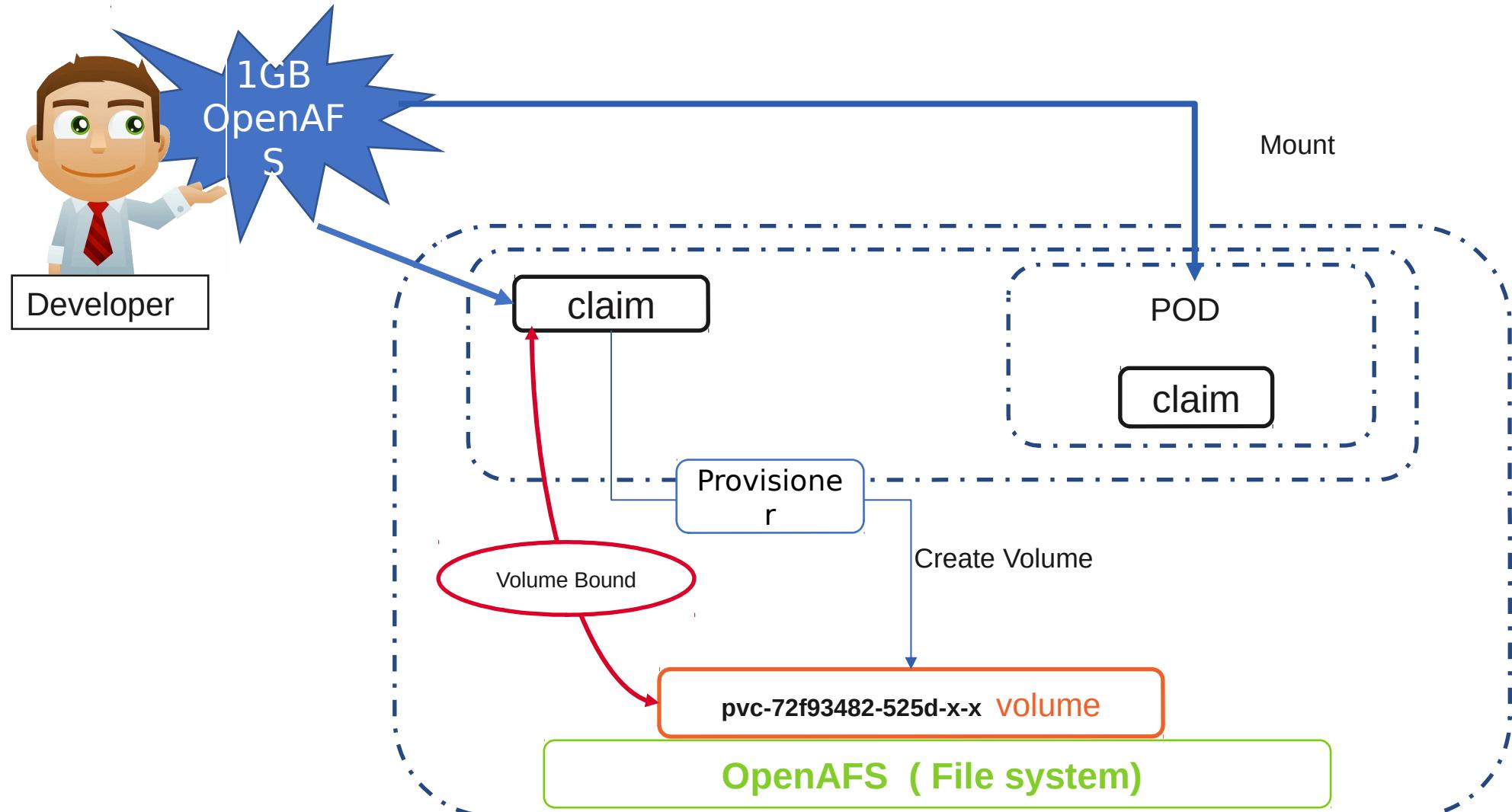
Persistent Volume Framework



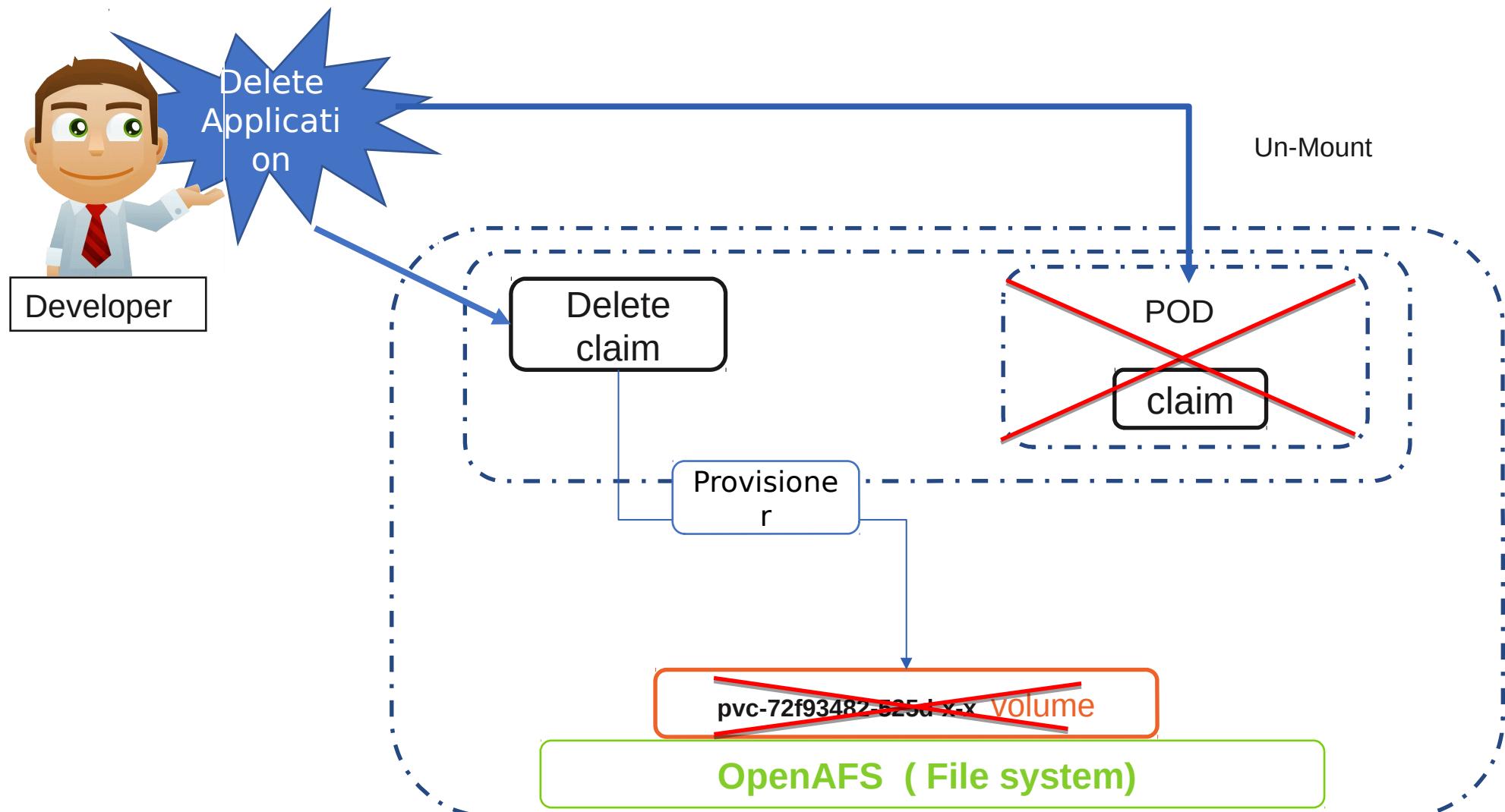
Persistent Volumes:

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

OpenAFS Dynamic Volume Provisioner (Create & Mount Volume)

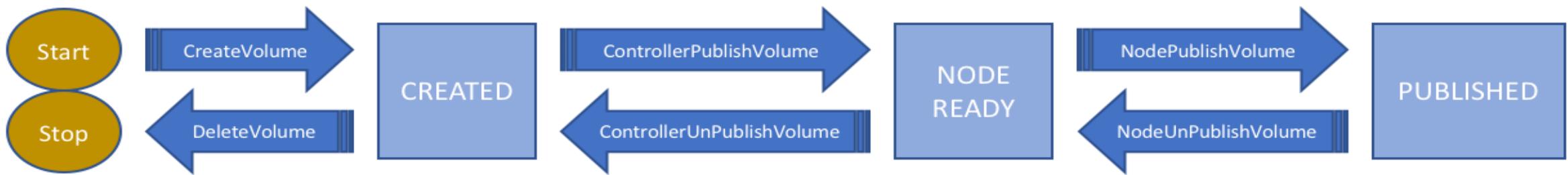


OpenAFS Dynamic Volume Provisioner (Unmount & Delete Volume)

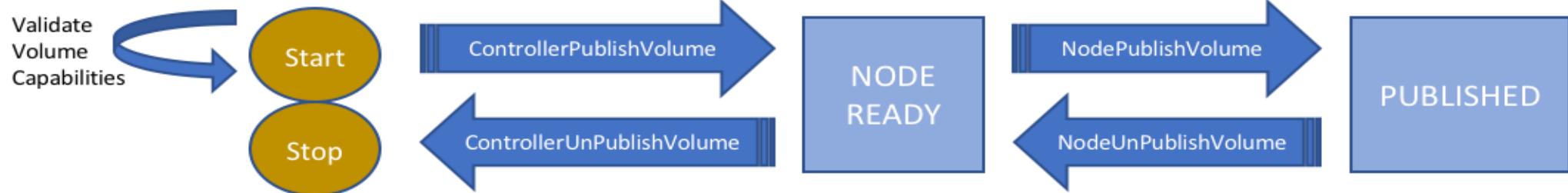


Volume Lifecycle

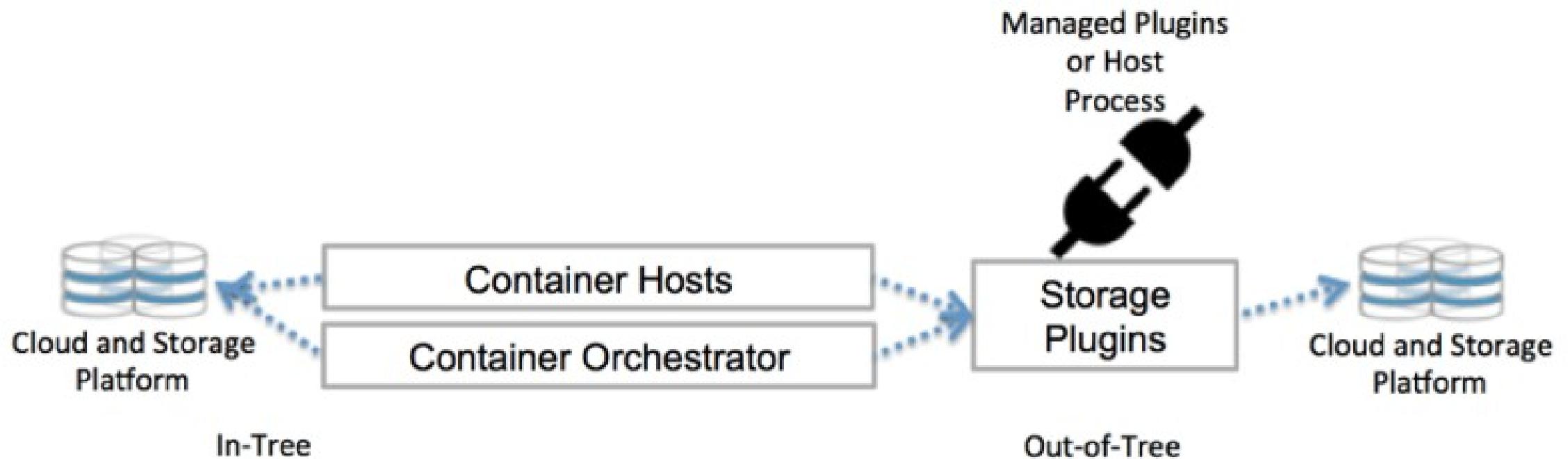
DYNAMICALLY PROVISIONED VOLUME



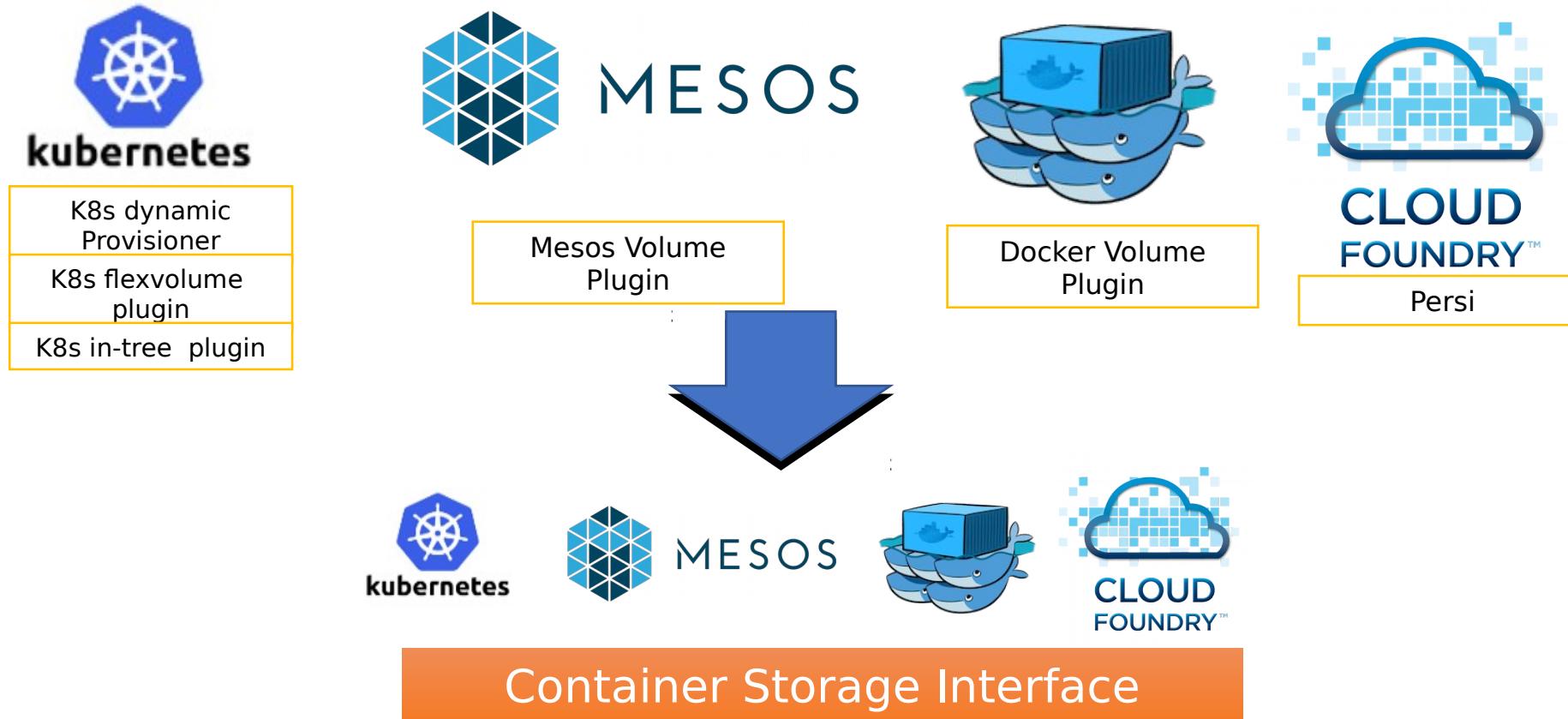
PRE-PROVISIONED VOLUME



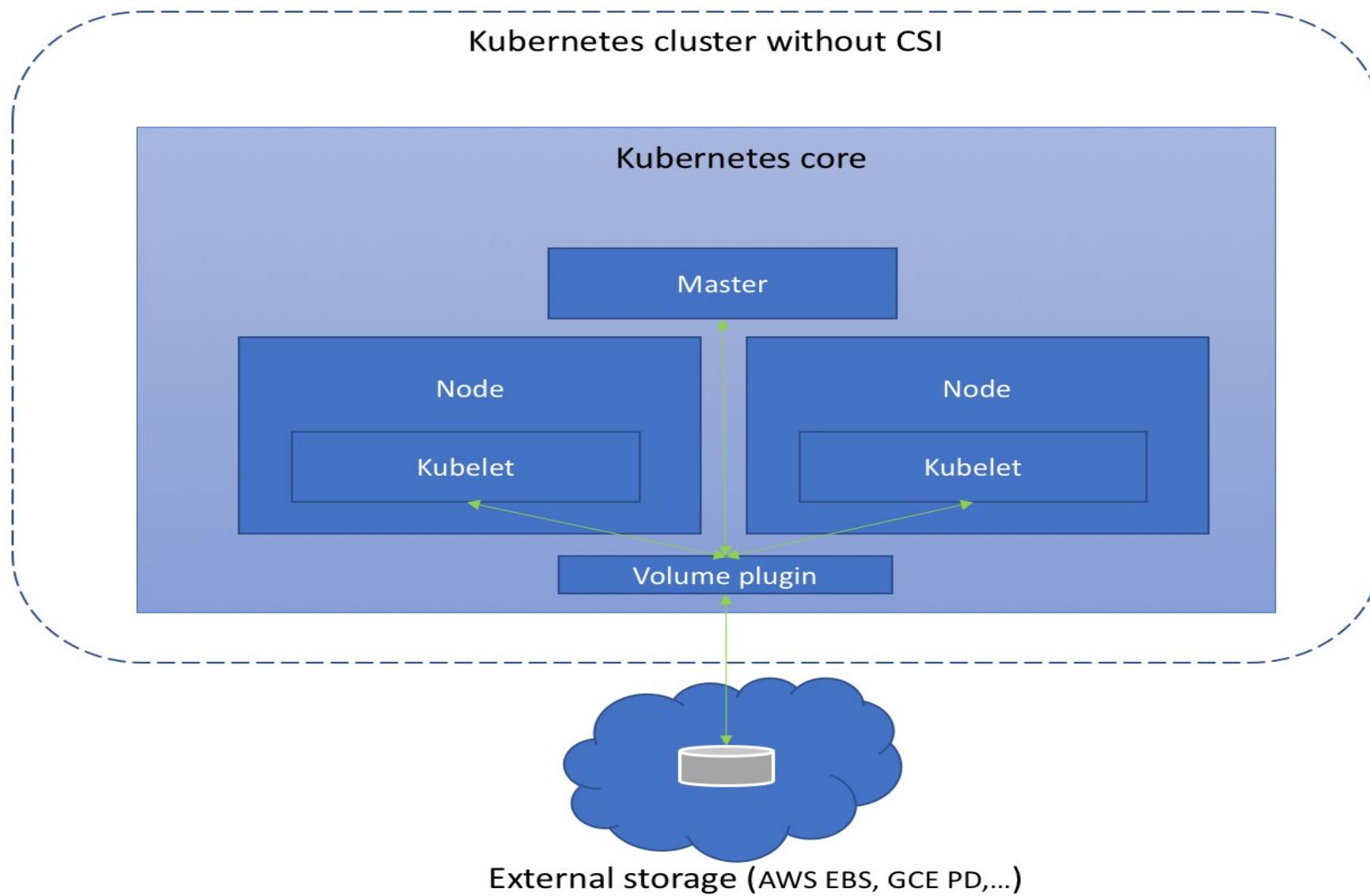
Container Storage Plugin



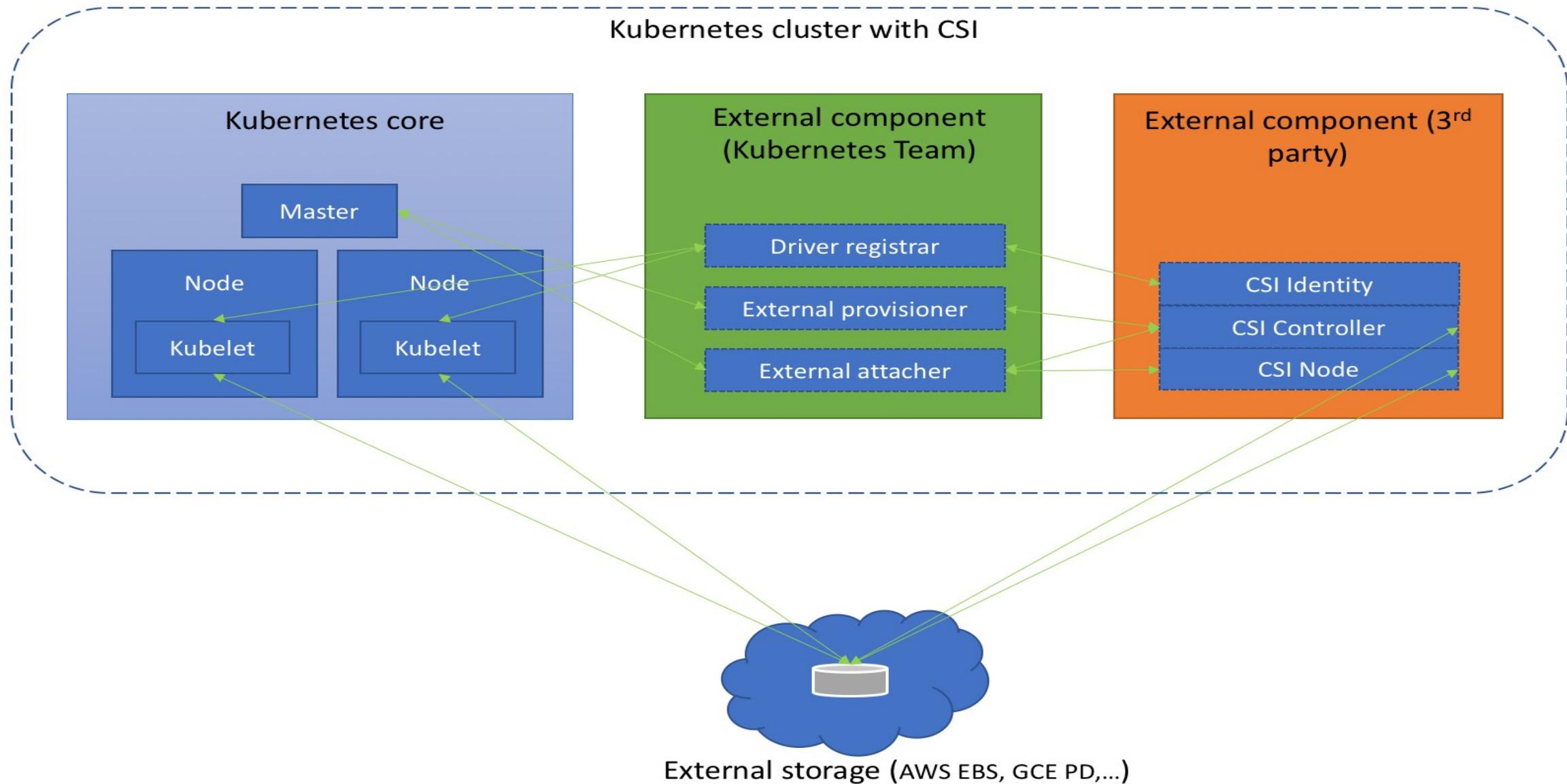
Container Storage Plugin



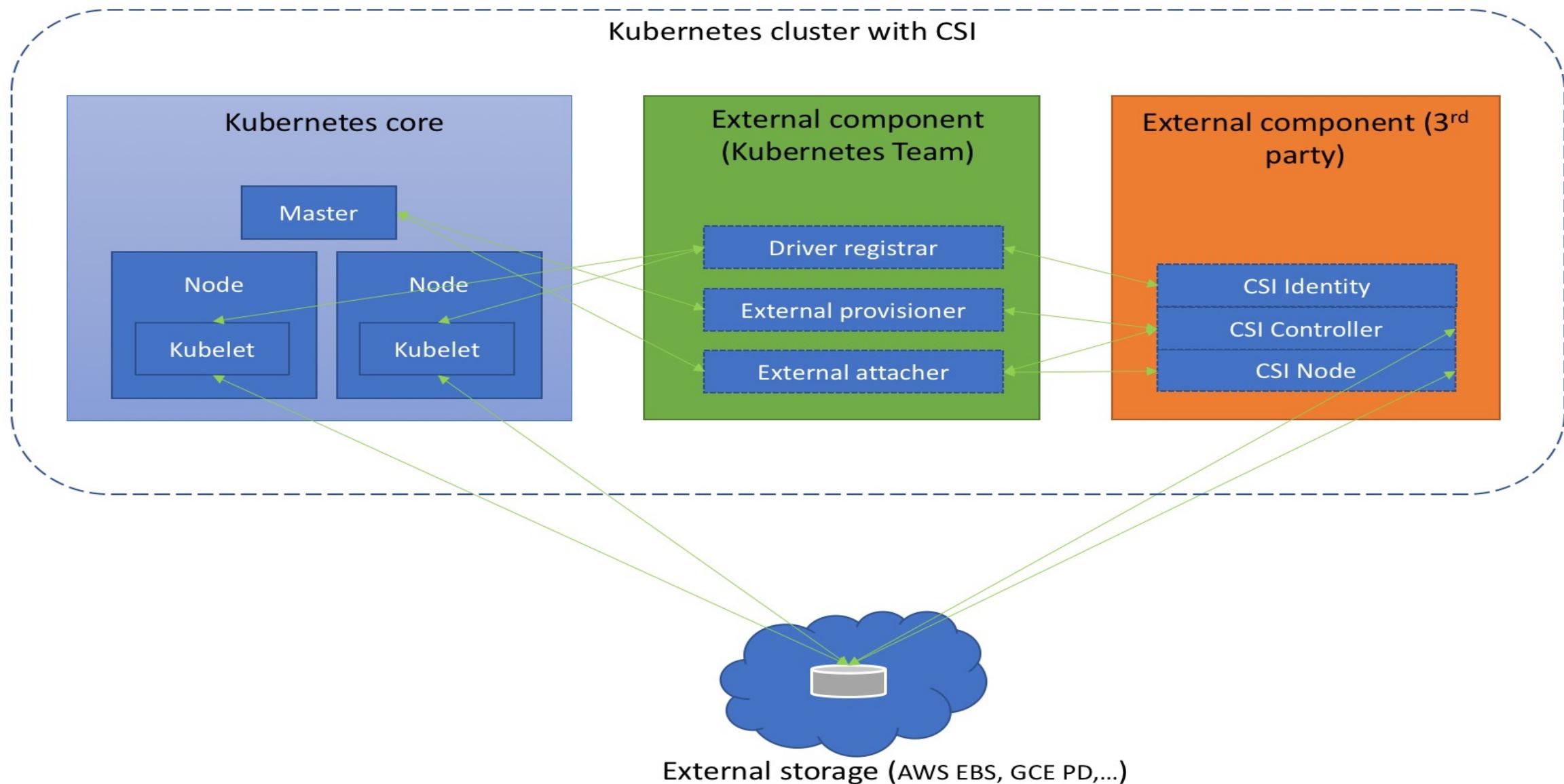
Container Storage Interface



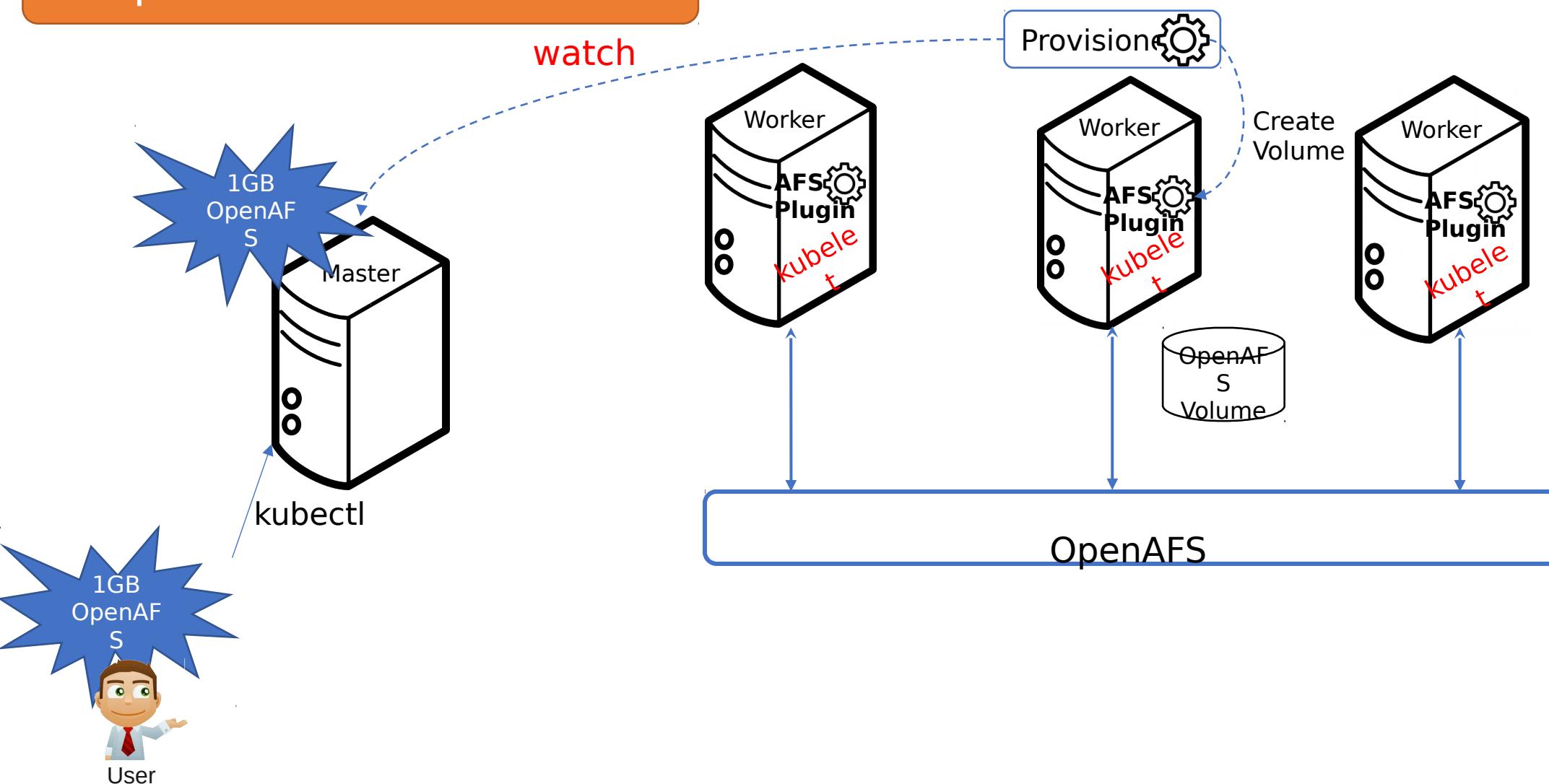
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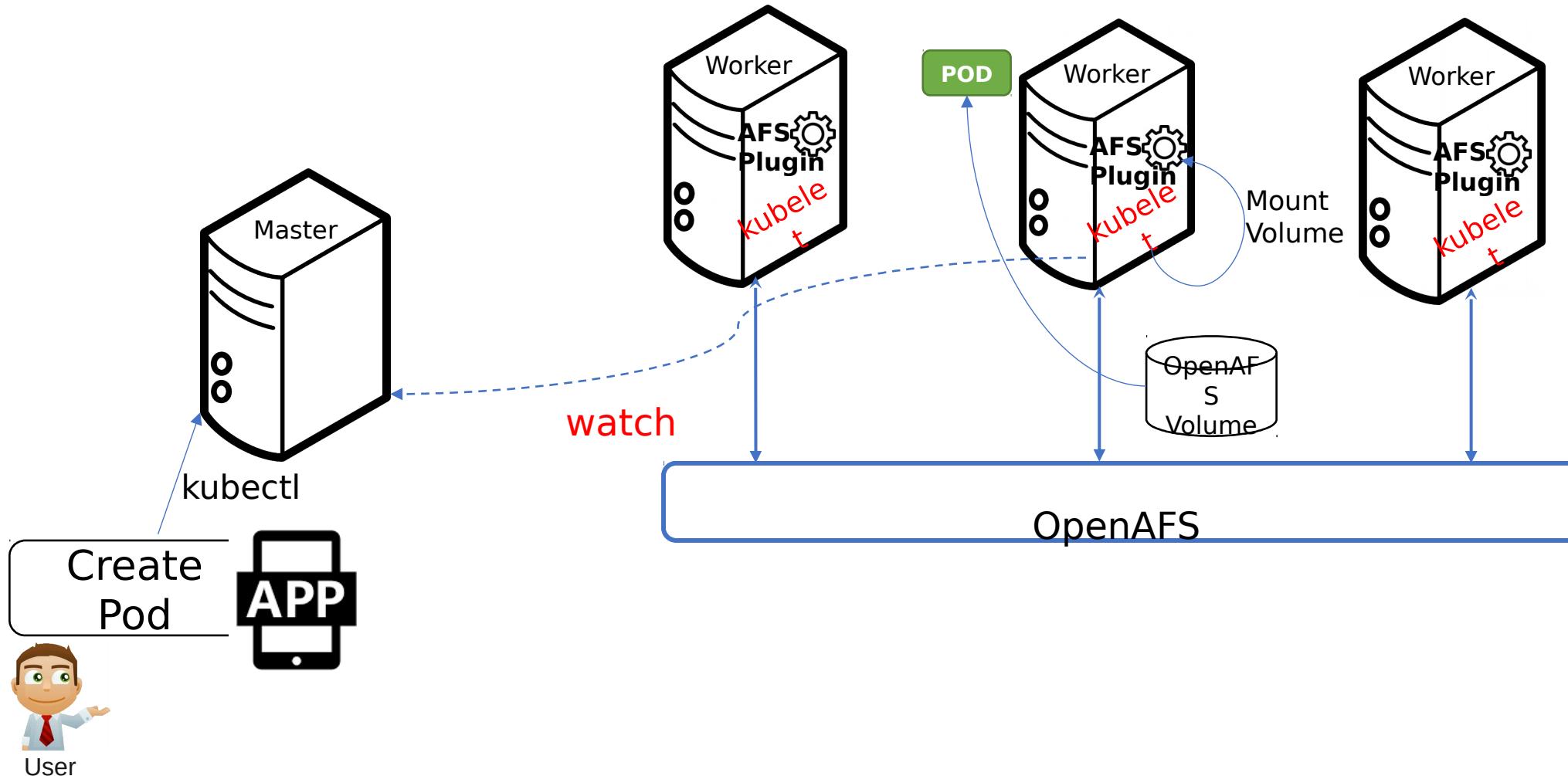
Container Storage Interface



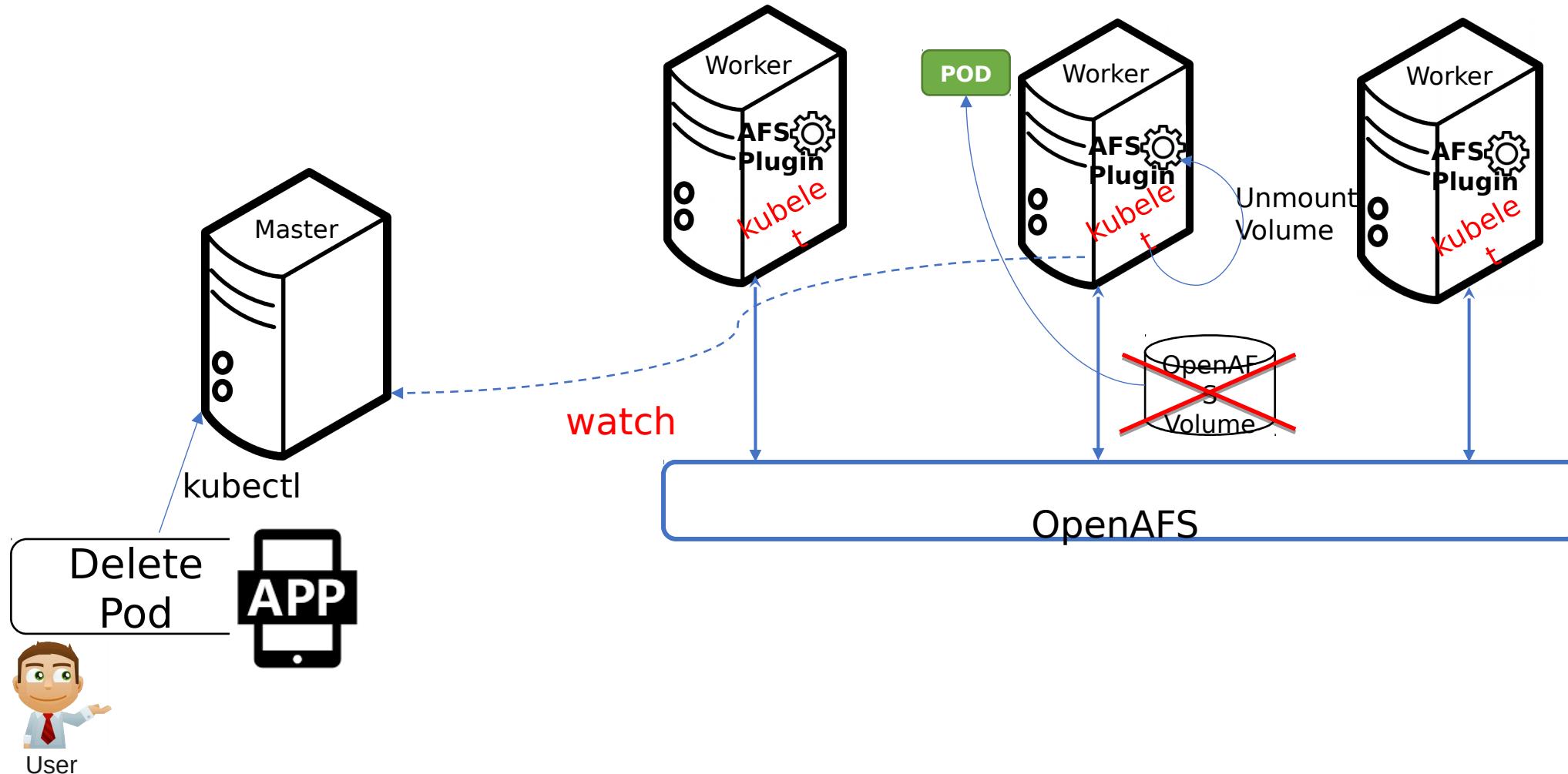
OpenAFS PVC Creation



POD Creation



POD Deletion



DEMO

Thank You

