

# CVMFS-CSI: CVMFS in Kubernetes

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<https://indico.cern.ch/event/1347727/>

# What is a CSI Driver?

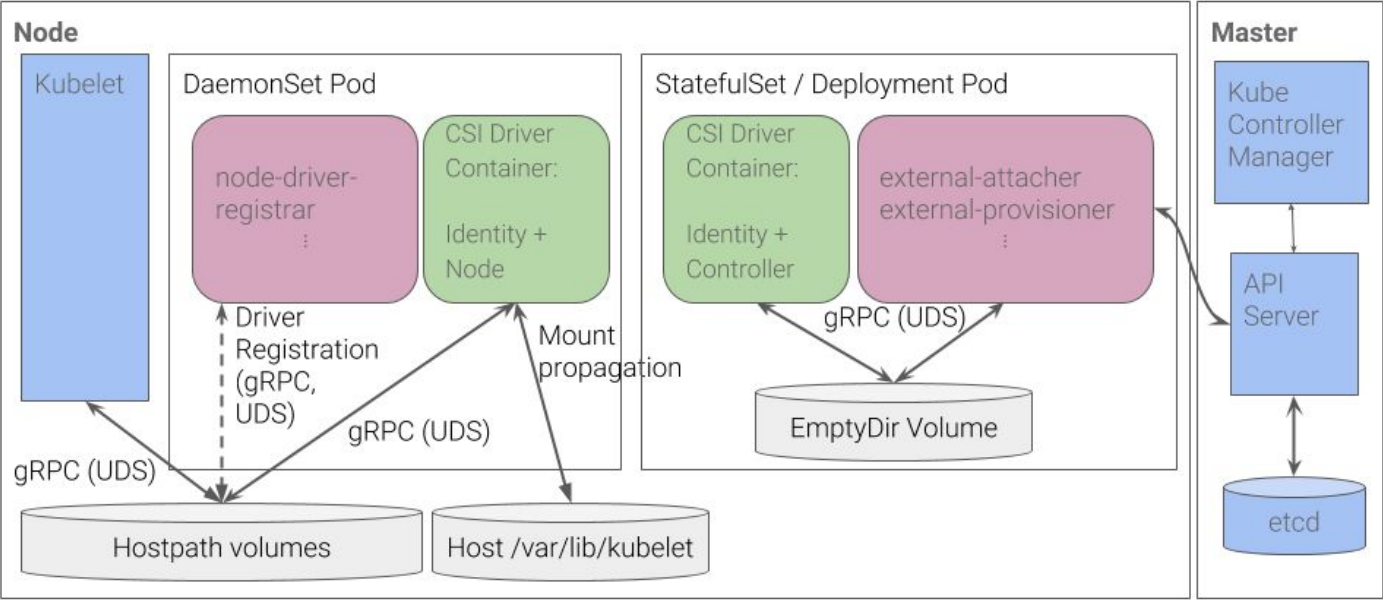
***Container storage interface is a standardisation that allows container orchestration systems to communicate with different storage backends.***



- \* **Vendor Neutral:** Any storage system supporting CSI can be integrated.
- \* **Dynamic Provisioning:** Automates creation & management of storage volumes.
- \* **Decoupled:** Integration of storage vendors is decoupled from your orchestrator.

Addresses difficulties in the core Kubernetes binaries with adding vendor integrations that was challenging to maintain and would have scaled poorly as more storage backends were added.



# How does a CSI Driver work?



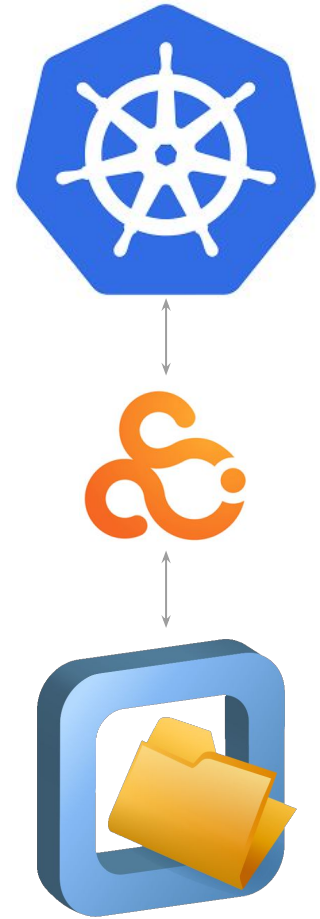
-  Third Party Storage Vendor Container
-  Sidecar containers by Kubernetes Team

UDS - Unix Domain Socket

# CVMFS-CSI provides read-only mounting of CernVM-FS repositories in Kubernetes.

*Used in Production across:*

- *Cern IT*
- *Nautilus, US National Research Platform*
- *Fermilab, San Diego*
- *Supercomputing Center, University of Utah (CHPC)*
- *University Melbourne*
- *University Victoria*
- *University Nebraska*
- *BASF Belgium*
- *And many more deployments across WCLG / OSG.*



# How Do I Get Started?

## At CERN

Clusters in the CERN Kubernetes service are pre-installed with CVMFS-CSI and have the appropriate storage classes pre-created.

## Externally

```
helm install -n cvmfs-csi cvmfs-csi oci://registry.cern.ch/kubernetes/charts/cvmfs-csi
```

```
# values.yaml
automountStorageClass:
  create: true
  name: cvmfs
specificRepositoryStorageClasses:
- name: my-repo
  repository: repo1.cern.ch
- name: my-other-repo
  repository: repo2.opensciencegrid.org
```

```
---
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: cvmfs
provisioner: cvmfs.csi.cern.ch
```

# How Do I Get Started?

1. Ensure your cluster has a `cvmfs.csi.cern.ch StorageClass`.  
*This can be optionally restricted to a single repository of your choosing.*
2. Create a `PersistentVolumeClaim` using this `StorageClass`.
3. Mount the PVC to your pod to a mount point of your choosing. i.e. `/cvmfs`, `/my-cvmfs`,  
...

```
---
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: cvmfs
spec:
  accessModes:
  - ReadOnlyMany
  resources:
    # Has no effect as Read-Only Access: must be non-zero.
    requests:
      storage: 1
  storageClassName: cvmfs
```

```
---
apiVersion: v1
kind: Pod
metadata:
  name: cvmfs-demo
spec:
  containers:
  - name: nginx
    image: nginx
    volumeMounts:
    - name: my-cvmfs
      mountPath: /my-cvmfs
      mountPropagation: HostToContainer
  volumes:
  - name: my-cvmfs
    persistentVolumeClaim:
      claimName: cvmfs
```

# Roadmap

## *Recent Feature Developments*

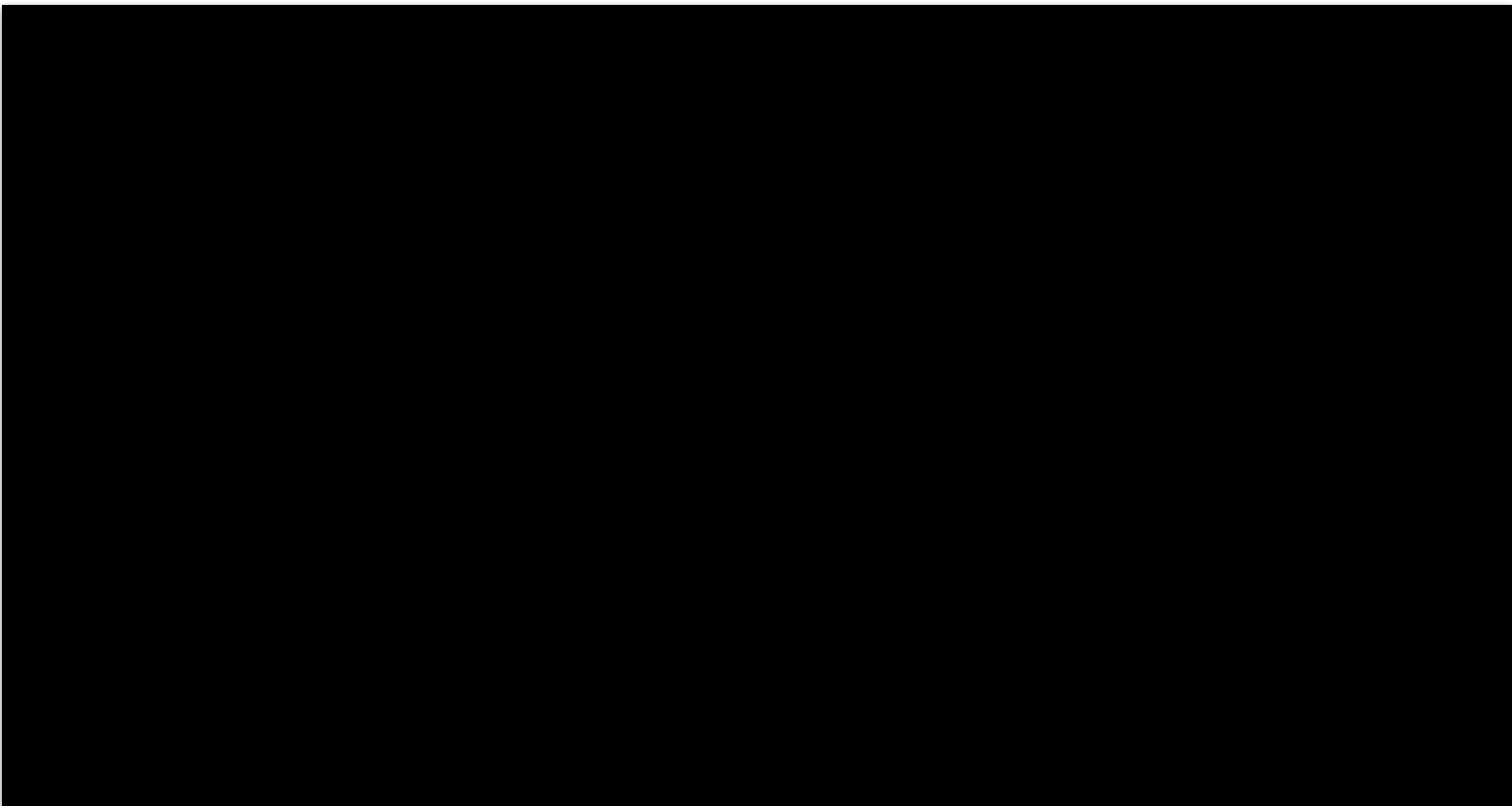
- \* Support for pre-fetching repositories on a schedule to keep client cache warm.
- \* `default.local` configuration can be overridden to allow pulling cvmfs configuration from alternate sources. e.g. Open Science Grid Consortium.
- \* Graceful support for handling closing of automounts when receiving a `SIGKILL`.

## *Outstanding Development Activities*

- \* Focus on addressing feature gap between cvmfs-csi and existing kubernetes implementations / charts.
- \* Adding a set of end-to-end tests that integrate with the Kubernetes services existing integration testing.
- \* Publishing chart more publicly in `artifacthub.io`, `gcr.io`, etc.

# Demo





[https://drive.google.com/file/d/1M1LxJDz\\_xJ1XLcEH6NEAGefGKRcY2D3/view](https://drive.google.com/file/d/1M1LxJDz_xJ1XLcEH6NEAGefGKRcY2D3/view)

```
cvmfs-demos demos/cvmfs-csi:main # using prefetching to keep client cache warm
```

<https://drive.google.com/file/d/1yPdXw2cfS0RjNSD1tUYZeDaBsUsxMiE->

# For more information, please visit:



[github.com/cvmfs-contrib/cvmfs-csi](https://github.com/cvmfs-contrib/cvmfs-csi)



[registry.cern.ch/kubernetes/charts/cvmfs-csi](https://registry.cern.ch/kubernetes/charts/cvmfs-csi)



[kubernetes.docs.cern.ch/docs/storage/cvmfs](https://kubernetes.docs.cern.ch/docs/storage/cvmfs)

*If you have a feature request or contribution, please let us know by opening an issue or submitting a PR.*



[home.cern](https://home.cern)