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WELCOME TO VALENCIA





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Kubernetes SIG Storage Deep Dive

Xing Yang, VMware & Jan Šafránek, Red Hat



Agenda

- Who we are
- Deep Dive: CSI Migration
- What we did in 1.23
- What we did in 1.24
- What we are working on in 1.25
- Features in design/prototyping
- Cross SIG WG/projects
- How to get involved

SIG-Storage Leads

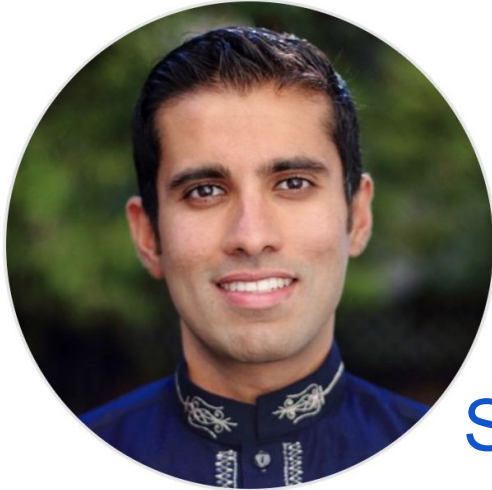


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Saad Ali

SIG-Storage
Co-Chair



Xing Yang



Michelle Au

SIG-Storage
Tech Lead



Jan Šafránek

SIG-Storage

It's not just leads!

- #sig-storage slack channel members: 4767
- #csi slack channel members: 1126
- SIG-Storage zoom meeting attendees: 25
- Unique approvers for SIG-owned packages: 32

What we do

- Defined in [SIG Storage Charter](#)
 - Persistent Volume Claims and Persistent Volumes
 - Storage Classes and Dynamic Provisioning
 - Kubernetes volume plugins
 - Secret Volumes, ConfigMap Volumes, DownwardAPI Volumes, EmptyDir Volumes (co-owned with SIG-Node)
 - Container Storage Interface (CSI)
 - CSI sidecars
 - Most CSI drivers are owned by [SIG Cloud Provider](#) or other community!



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CSI Migration Deep Dive





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CSI Migration

~~Deep Dive~~

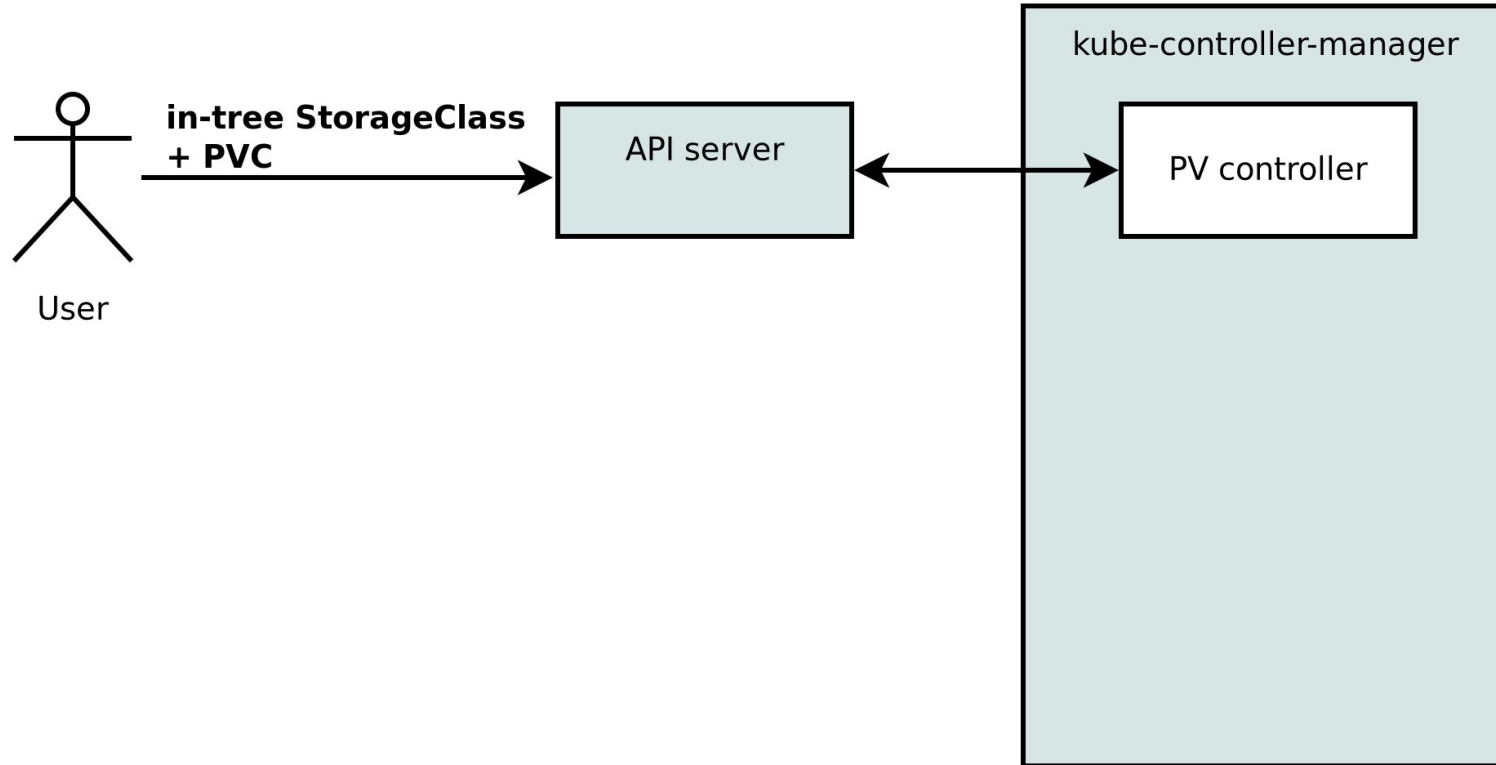
Scratching the Surface



CSI Migration

- Moving code from kubernetes/kubernetes to CSI drivers.
 - Cloud providers are moving away, so volume plugins must follow.
 - Reduce maintenance costs.
- Not migrating any data!
- No user visible changes in API.
 - In-tree PVs/PVCs/StorageClasses will work.
- Cloud-based volumes first.
 - Other will follow (slowly).

Dynamic provisioning in-tree volume plugins



Dynamic provisioning in-tree volume plugins

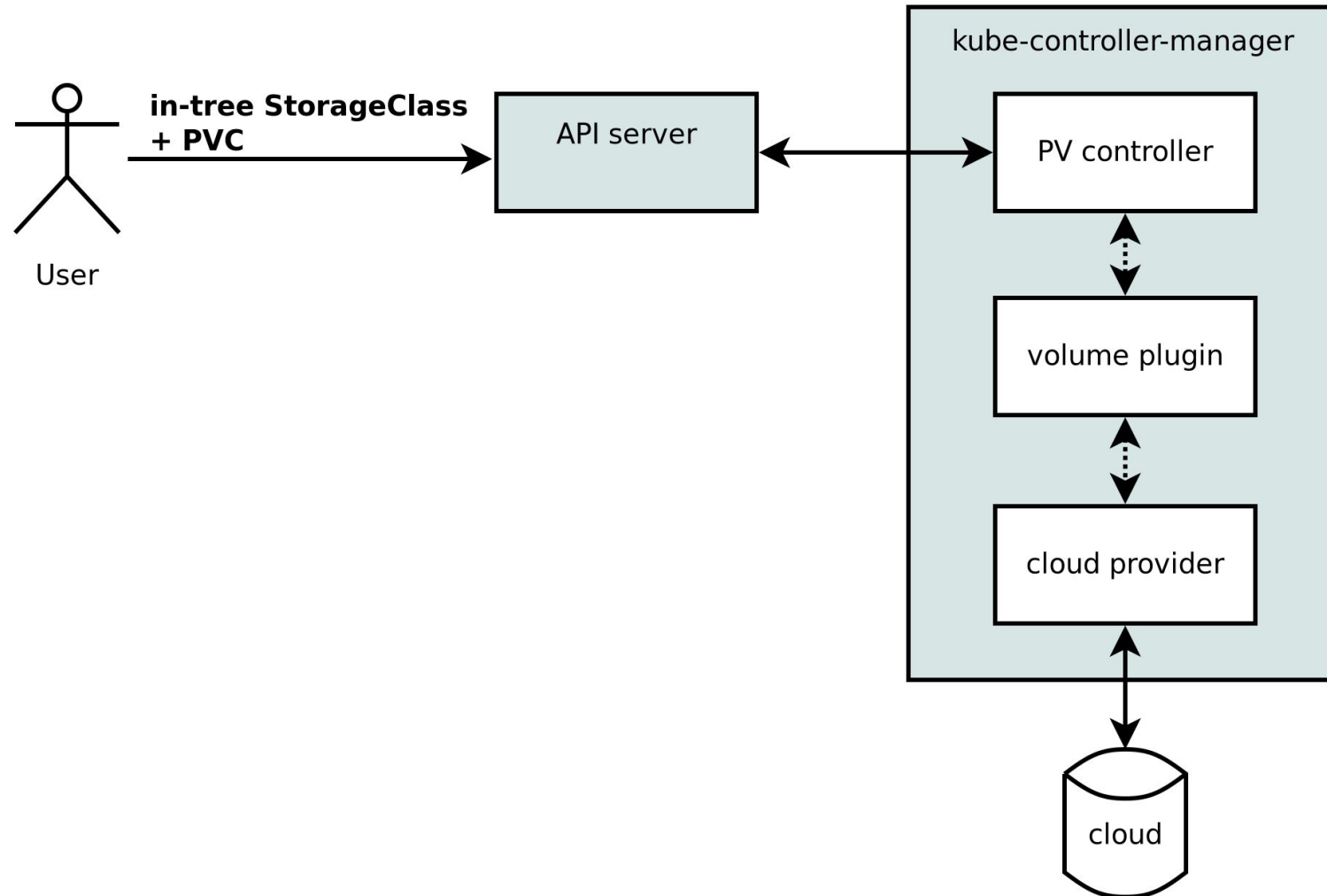


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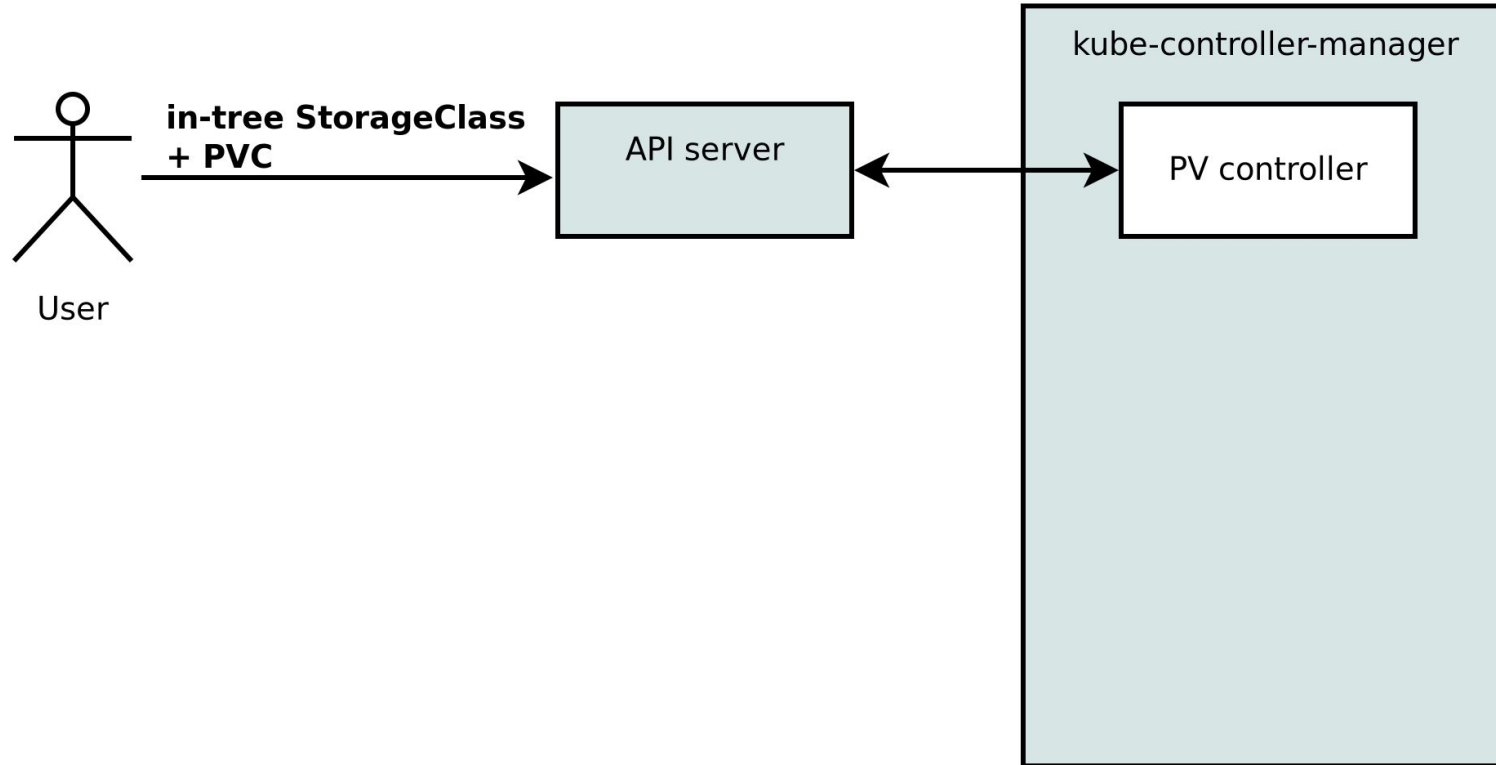


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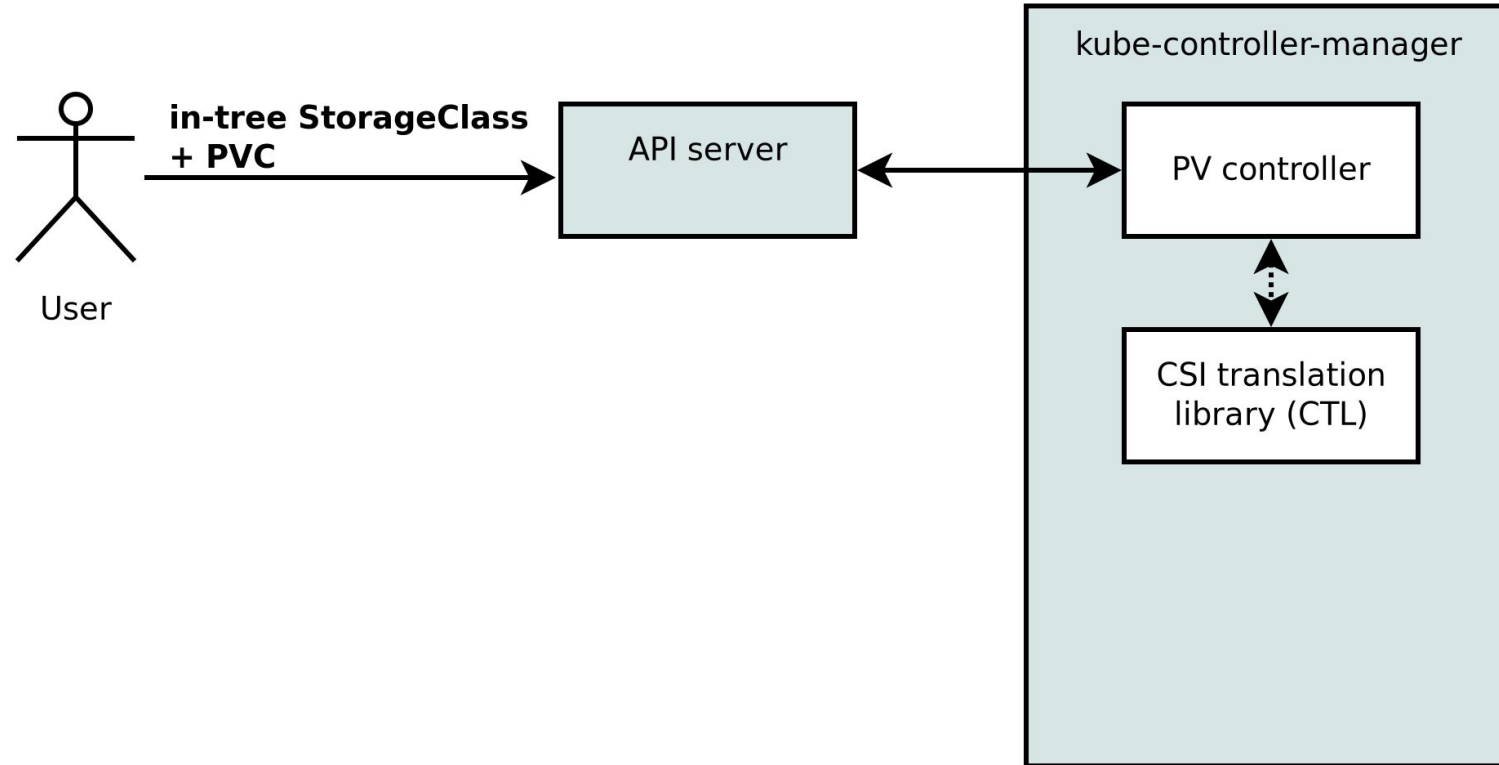
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Dynamic provisioning CSI migration



Dynamic provisioning CSI migration



Dynamic provisioning CSI migration

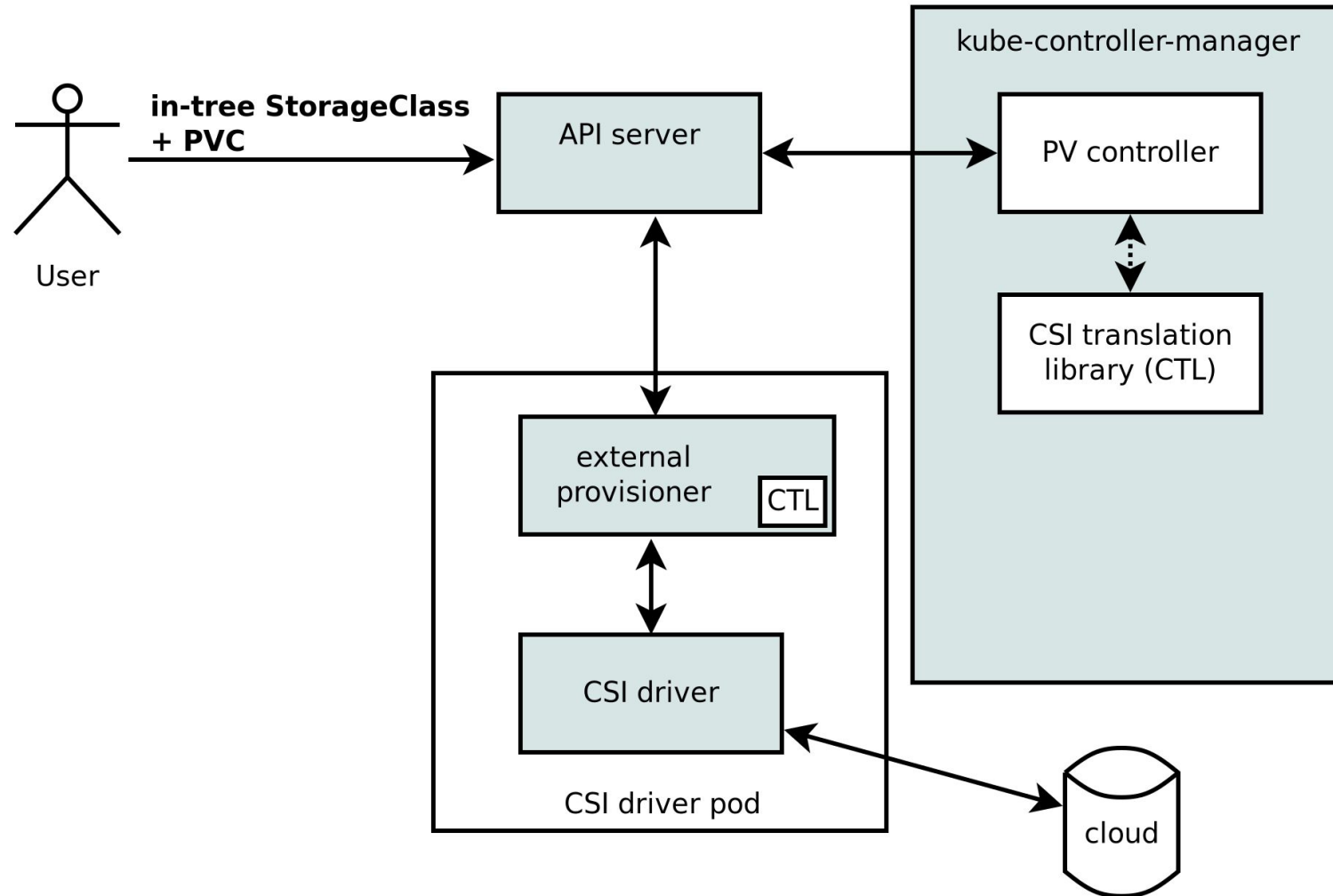


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CSI Migration

- Why so complicated?!
 - API server does not allow changing PVs nor StorageClasses.
 - Allow downgrade.
- Detailed [KEP](#) + [design](#).

CSI Migration Schedule

Driver	Alpha	Beta (in-tree deprecated)	Beta (on-by-default)	GA	Target "in-tree plugin" removal
OpenStack Cinder	1.14	1.18	1.21	1.24	1.26 (Target)
Azure Disk	1.15	1.19	1.23	1.24	1.26 (Target)
Azure File	1.15	1.21	1.24	1.25 (Target)	1.27 (Target)
AWS EBS	1.14	1.17	1.23	1.25 (Target)	1.27 (Target)
GCE PD	1.14	1.17	1.23	1.25 (Target)	1.27 (Target)
vSphere *	1.18	1.19	1.25 (Target)	1.26 (Target)	1.28 (Target)
Ceph RBD	1.23	1.25 (Target)			
Portworx	1.23	1.25 (Target)			

* vSphere version < 7.0u2 is deprecated in 1.24

CSI Migration Testing

- What do I do?
 - Using a managed Kubernetes distribution? Check your distro's documentation. In many cases, distro will take care of everything.
 - Managing your own Kubernetes?
 - Install the replacement CSI driver for your cloud.
 - Enable CSIMigration and CSIMigrationX feature gates (X is the specific driver): [detailed ordering](#) + drain nodes.
- Caveats
 - CSI-only features do not work (e.g., snapshots, cloning, etc).
 - Manually re-import PV as CSI type.
 - Some in-tree functionality has been deprecated and won't work with migration (check Kubernetes release notes).



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What we did



What we did in 1.23

- GA
 - [Skip volume ownership](#) (FSGroup)
 - [CSI FSGroup Policy](#)
 - [Generic ephemeral volumes](#)
- Beta
 - [Delegate FSGroup to CSI Driver instead of Kubelet](#)
 - On-going effort: [CSI migration](#) ([blog](#))
 - [GCE](#) (Beta, on-by-default)
 - [Azure Disk](#) (Beta, on-by-default)
 - [AWS EBS](#) (Beta, on-by-default)

What we did in 1.23

- Alpha
 - [Recovering from resize failures](#)
 - [Always honor reclaim policy](#) ([blog](#))
 - SIG-Apps: [Auto remove PVCs created by statefulset](#) ([blog](#))
 - On-going effort: [CSI migration](#)
 - [RBD](#)
 - [Portworx](#)

1.23 Deprecations

- [Deprecation of Flexvolume](#)

What we did in 1.24

- GA
 - [Volume expansion](#)
 - [Volume expansion GA blog](#)
 - [Recovering from resize failures](#) (Alpha in 1.23)
 - [CSI Storage Capacity Tracking](#)
 - [Storage capacity tracking GA blog](#)
 - [CSI Migration](#)
 - [Azure Disk](#)
 - [OpenStack Cinder](#)
- Beta
 - [Volume populator](#) ([1.22 blog](#))
 - [CSI Migration](#)
 - [Azure File](#) (Beta, on-by-default)
- Alpha
 - [CSI volume health](#) (metrics; Alpha update)
 - [Non-graceful Node Shutdown](#)
 - [Control volume mode conversion between source and target PVC](#)

Deprecations and removals in 1.24

- **VolumeSnapshot v1beta1 API is removed in 1.24**
(<https://github.com/kubernetes/enhancements/issues/177>).
- **CSIStorageCapacity v1beta1 API is deprecated in 1.24**
(<https://github.com/kubernetes/enhancements/issues/1472>).
- **vSphere version < 7.0u2 is deprecated in 1.24 (related to CSI Migration)**

What we are working on in 1.25

- Targeting GA
 - [CSI ephemeral inline volumes](#)
 - [Delegate FSGroup to CSI Driver instead of Kubelet](#)
 - [Local ephemeral storage capacity isolation](#)
 - On-going effort: [CSI Migration](#)
 - [Azure File](#)
 - [GCE](#)
- Targeting Beta
 - [CSI volume health](#)
 - [Recovering from resize failures](#)
 - [Non-graceful Node Shutdown](#)
 - On-going effort: [CSI migration](#)
 - [vSphere](#) (Beta, on-by-default)
 - [RBD](#) and [Portworx](#) (Beta, off-by-default)

What we are working on in 1.25

- Targeting Alpha
 - [Object Storage API](#) (COSI)
 - [SELinux relabeling with mount options](#)
 - [VolumeSnapshot namespace transfer](#)
 - [Provision volumes from Cross-namespace snapshot/PVC](#)
 - [NodeExpansionSecret](#)
 - On-going effort: [CSI Migration](#)
 - [CephFS](#)

Features in Design/Prototyping

- [Secret Deletion Protection \(“Liens”\)](#)
- [VolumeGroup and VolumeGroupSnapshot](#)

Cross SIG WG/projects

- Data Protection WG
 - [Change block tracking](#) (Targeting Alpha in 1.25)
- SIG-Apps
 - [Auto remove PVCs created by statefulset](#) (Targeting Beta in 1.25)
- SIG-Node
 - [ContainerNotifier](#) (KEP in review)
 - [Runtime assisted mounting of persistent volumes](#) (Targeting Alpha in 1.25)
- SIG-API-Machinery
 - [in-use protection \(Liens\)](#) (Targeting Alpha in 1.25)



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How to get involved



How to Get Involved

- Start at the SIG Storage page:
 - <https://github.com/kubernetes/community/tree/master/sig-storage>
- Attend the bi-weekly meetings: 9 AM PT every second Thursday.
- Mailing List:
 - kubernetes-sig-storage@googlegroups.com
- Slack channel:
 - #sig-storage
 - #csi
 - #sig-storage-cosi

Resources

- [SIG Storage page](#)
- [Storage concepts](#)
- [CSI driver docs](#)
- [CSI spec](#)
- [CSI sample driver hostpath deployment example](#)
- [SIG Storage annual report](#)