



BY Developers FOR Developers

Storage Developer Conference
September 22-23, 2020

Track Overview: Containers

Mark Carlson

Kioxia

Co-chair SNIA Technical Council



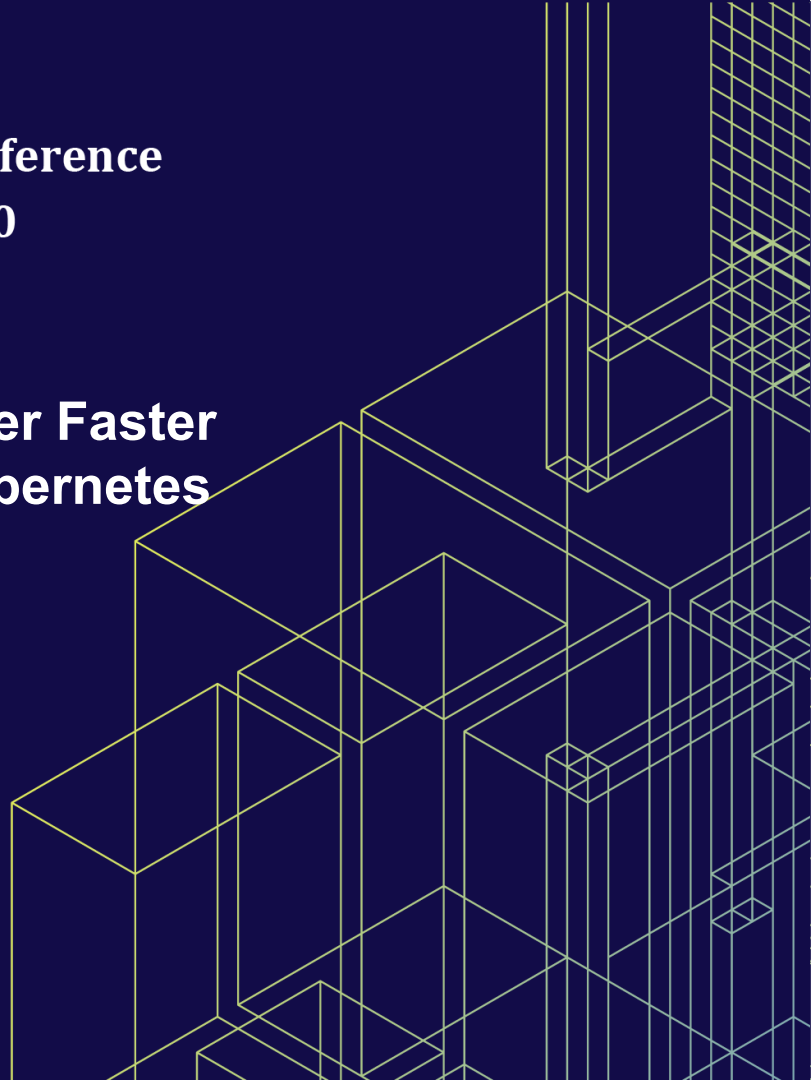


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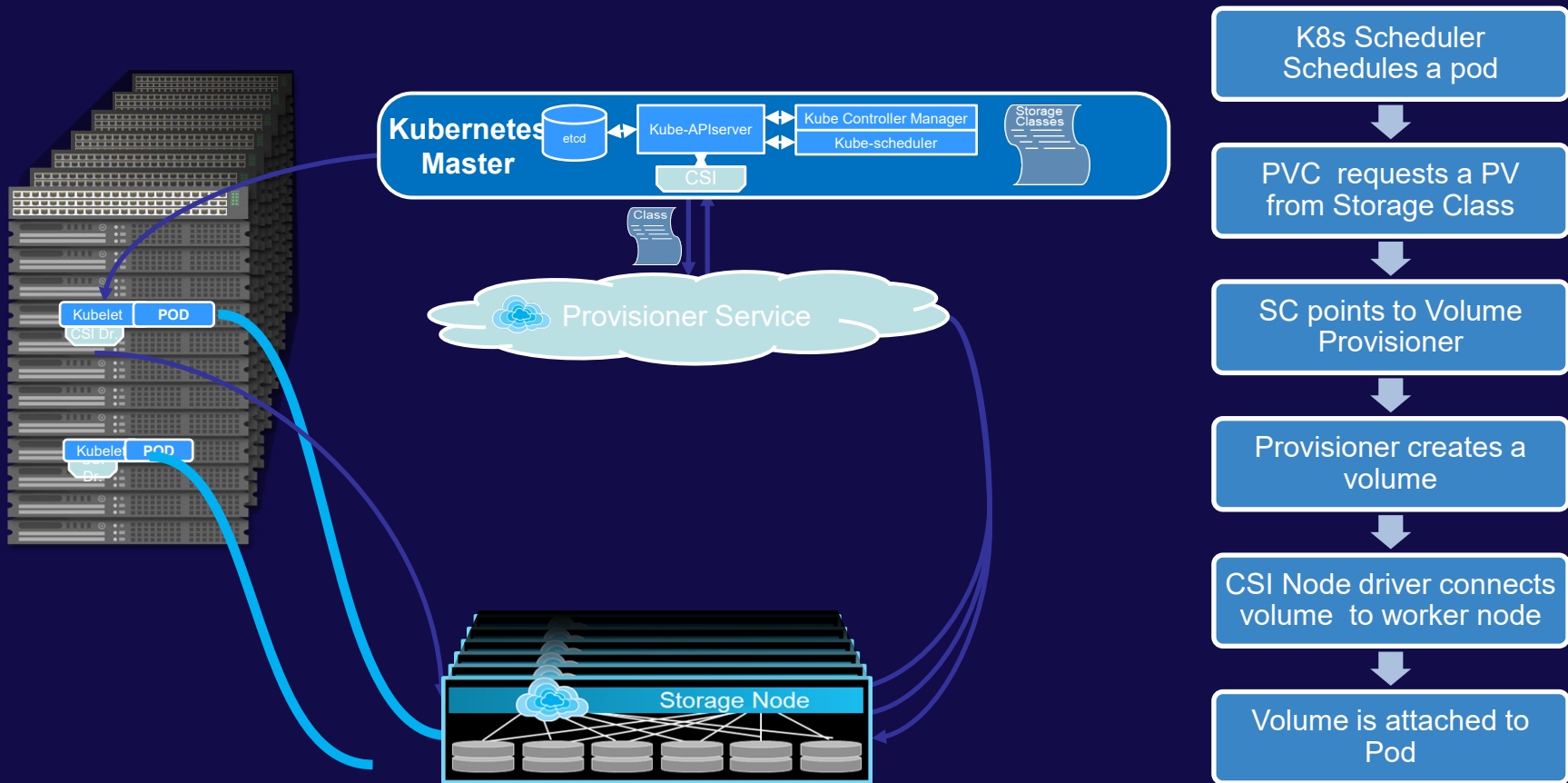
Leveraging Modern Networks to Deliver Faster Storage to Database Workloads in Kubernetes

Amarjit Singh
Kioxia America



- **Mostly used for Databases**
- **Require Permanent Storage**
- **Permanent Storage provided by Persistent Volumes**
- **Performance and Flexibility of Statefulset PVs**
- **Reattach same storage volume when Pod reschedules on new node**

Provisioning a Volume (Kubernetes)





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DYNAMIC STORAGE PROVISIONING IN KUBERNETES

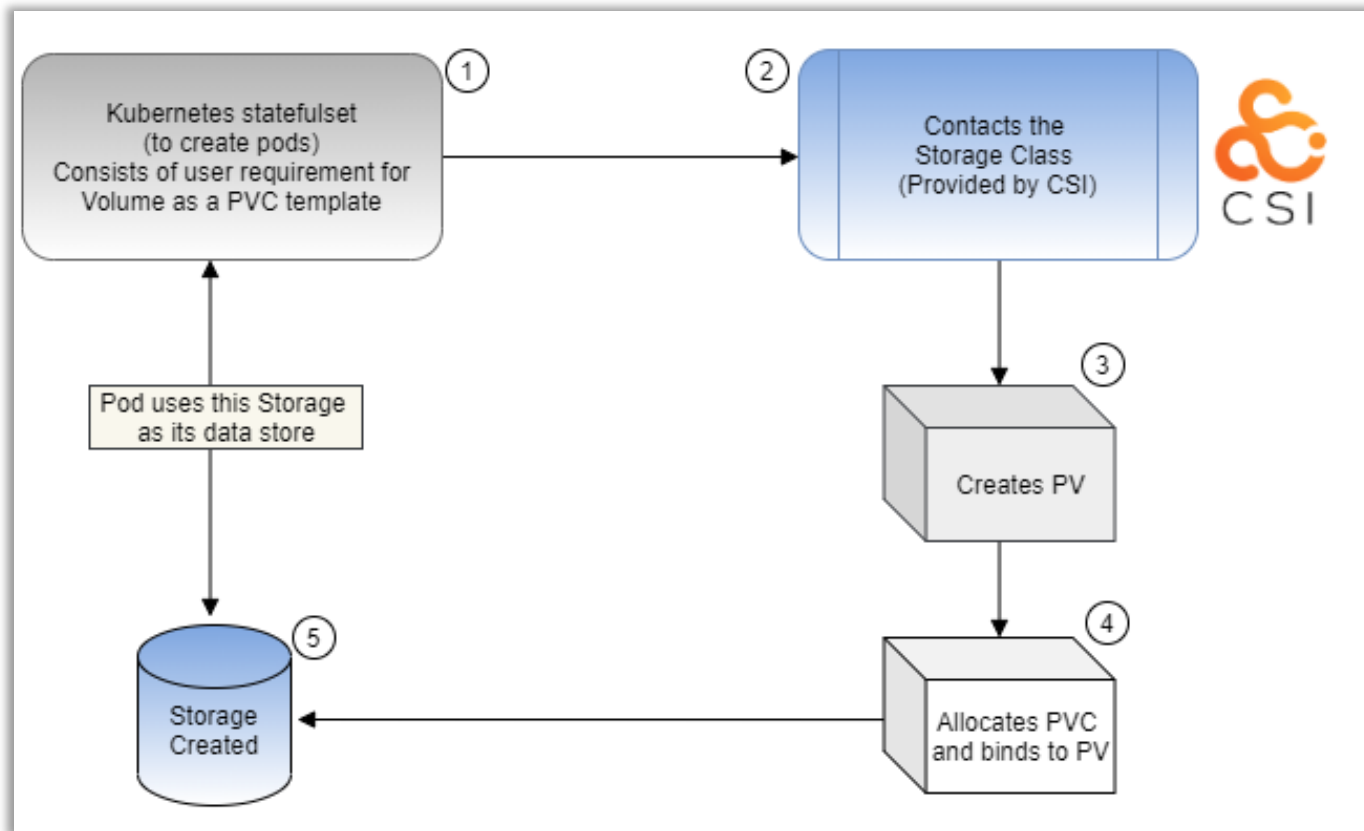
**Divya Vijayakumar, Arun
Kandasamy**
MSys Technologies, LLC



Concept of Dynamic Provisioning

- Dynamic Provisioning of Volume allows storage volumes to be created on demand.
- Previously, cluster management was a manual process by contacting storage provider to create new storage volumes. Subsequently, Persistent Volume objects were created to represent them in Kubernetes.
- Dynamic Provisioning eliminated the need for cluster managers to pre-provision storage. Instead, it automatically provisions storage when requested by users.
- Persistent Volume types are implemented as plugins. Kubernetes currently supports many plugins like: AWSElasticBlockStore, AzureDisk, CSI, FlexVolume, NFS, Cinder, Glusterfs, etc.

SC-PV-PVC Relationship



Why We Opted for CSI

- Owing to the drawback from other methods, we opted for external storage provided via CSI driver.
- When provisioning volume for a huge framework with vast amount of data and complexity that needs to be orchestrated using Kubernetes, CSI driver appears as the best approach to manage the data store.
- Storage provisioned via CSI drivers was external to the host and was easy to incorporate into the Kubernetes manifest file.
- This was like creating any other resource on K8s - like pod, service or volume, and linking it to the storage array present elsewhere.



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SPDK-CSI :

Bring SPDK to Kubernetes Storage

Yibo Cai

arm



What is SPDK

SPDK ARCHITECTURE

Block Storage Protocols

Networking: NVMe-oF (RDMA, TCP, FC), iSCSI

Virtualization: vhost-scsi, vhost-blk

File Storage Services

Filesystems: BlobFS

Block Storage Services

Partitioning: Logical Volumes, GPT

Caching: OCF

Host FTL: Open Channel

Pooling: RAID-0

Transforms: Crypto, Compression

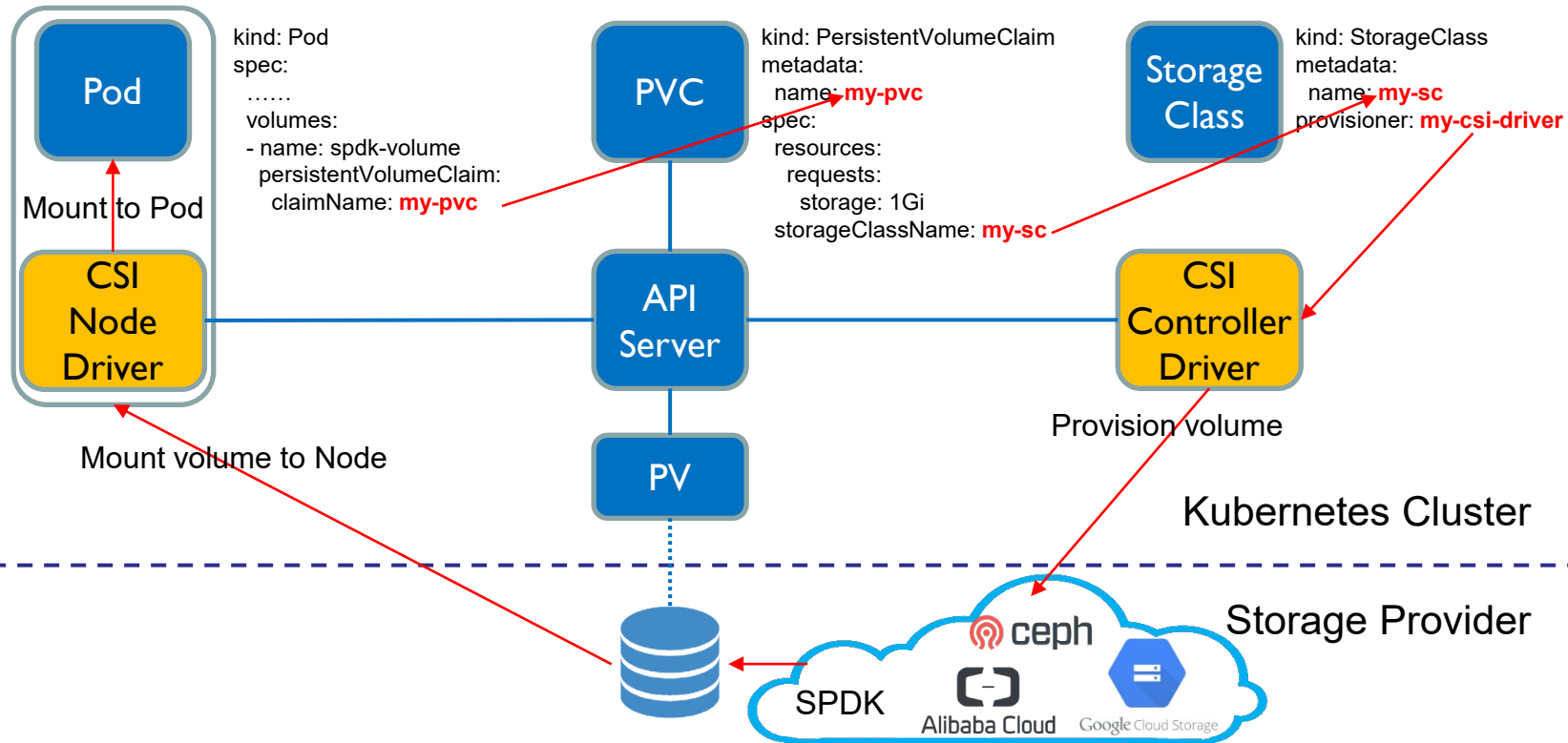
Block Storage Providers

NVMe, io_uring, Linux AIO, virtio, iSCSI, Ceph RBD

Drivers

NVMe (PCIe, RDMA, TCP), **virtio** (scsi, blk)

Dynamic Volume Provisioning



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- For additional details see the *Introduction to Virtual SDC* video (<https://www.snia.org/SDCintro>)
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