A stage for Samba in the era of the container platform!?...

sambaXP 2020

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SAMBA Red Hat

What we'll discuss today

Kubernetes

- Intro
- Storage
- CSI
- Operators

Storage Location

- Platform
- Infra vs Platform
- Kubevirt

Enter Samba

- Use cases
- Container
- Operator
- Provisioner?

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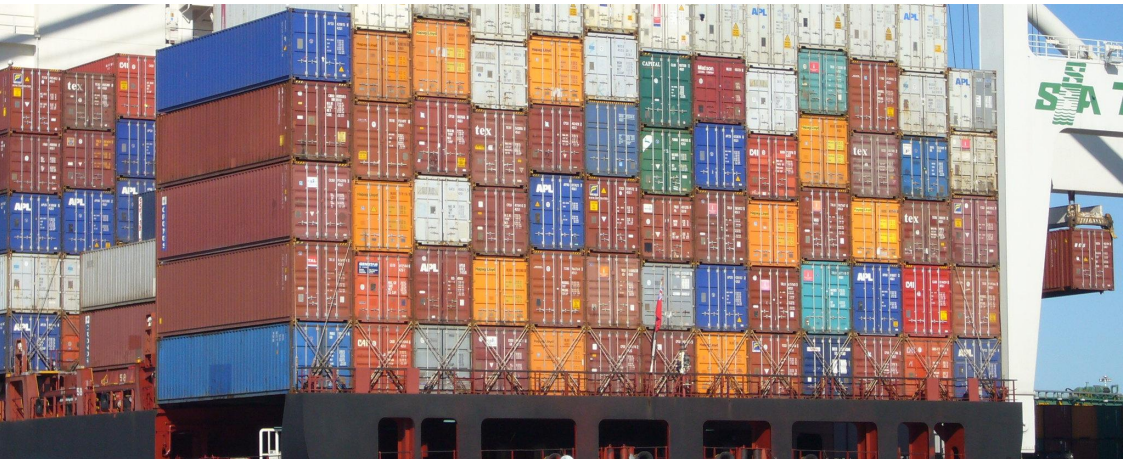
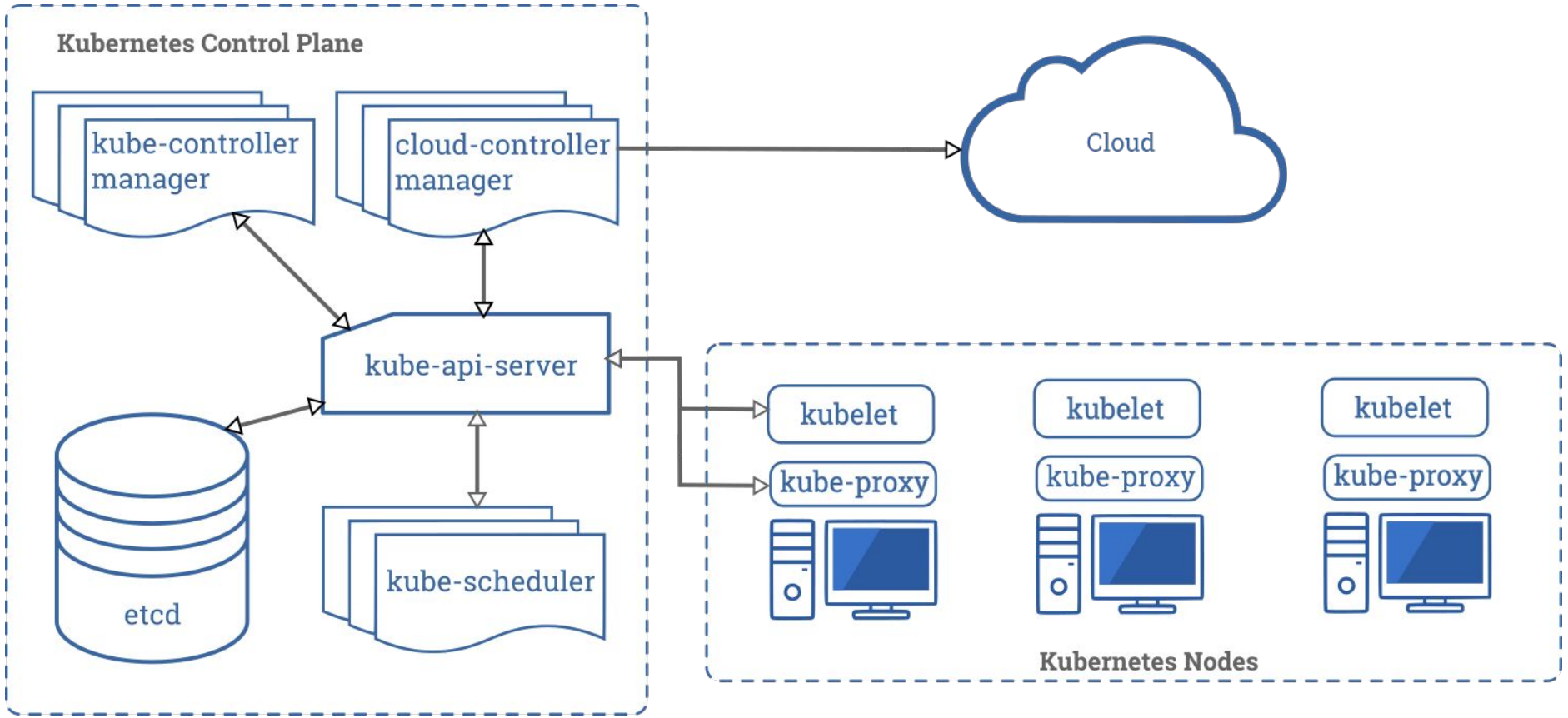
kubernetes



- Intro
- Storage
- CSI
- Operators

Kubernetes (K8s) is an open-source system for automating deployment, scaling, and management of containerized applications.

https://kubernetes.io/


Kubernetes Control Plane
kube-controller manager
cloud-controller manager
Cloud
kube-api-server
kubelet
kube-proxy
kubelet
kube-proxy
kubelet
kube-proxy
etcd
kube-scheduler
Kubernetes Nodes

Storage abstraction in k8s

Some terminology

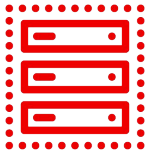
PersistentVolume (PV)

K8s object wrapping a backend storage volume. This could live inside of k8s or somewhere outside.

Types: *FileSystem* and *Block*

PersistentVolumeClaim (PVC)

Handle for a user to consume a PV in an application / namespace.



Mount plugin

Volumes are mounted on the host node and bind-mounted into the container. (Block PVs: device in container)

Dynamic Provisioning:

Volume self-service for users

More terminology...

(Dynamic) Provisioner

Server component responding to PVC create requests

StorageClass (SC)

K8s resource pointing to a dynamic provisioner, configured with a certain backend storage pool.

Flow

- User issues `kubectl create -f pvc.yml`
- PVC ⇒ StorageClass ⇒ provisioner
- Provisioner reacts and creates PVC

Small Demo

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Operators

Automating Application Management

- Server component: controller
- Custom resources (CR): new type k8s APIs
- CR: Desired state
- Operator reconciles to achieve desired state

- Initial deployment
- Keeps application running (fixes outages)
- Changes in scaling (replica)
- etc...

Infrastructure:

- https://github.com/operator-framework
- https://operatorhub.io/
- operator-lifecycle-manager

Examples:

- Rook-ceph (https://github.com/rook/rook)
- prometheus-operator
- ...

CSI

Container Storage Interface

- Further standardizing storage abstractions beyond k8s.
  - (kubernetes, cloud foundry, mesos, nomad, ...)
- The new standard in kubernetes.

- https://github.com/container-storage-interface/spec

- Example: https://github.com/ceph/ceph-csi

File, Block, and... Object?

Object access (S3) not currently part of core k8s / CSI

Extensions possible with CRDs:

- ObjectBucket
- ObjectBucketClaim
- bucket provisioner

Discussed as native k8s enhancement:

https://github.com/kubernetes/enhancements/pull/1383

Storage Location

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Storage in the platform (k8s)

Converged with the platform

- Block storage coming from somewhere
  - local, SAN, cloud, ...
- SDS layer as containers in k8s
- Scaling with k8s
- Managed by operator(s)

Red Hat Openshift Container Storage (OCS)

Evolution

1st Generation

- Based on Gluster
- Openshift 3.X
- Pioneer in dynamic provisioning
- Started 2016

2nd Generation

- Based on Ceph
- OpenShift 4.X
- Operator driven
- CSI
- GUI (“Console”)
- 2019/2020

ceph

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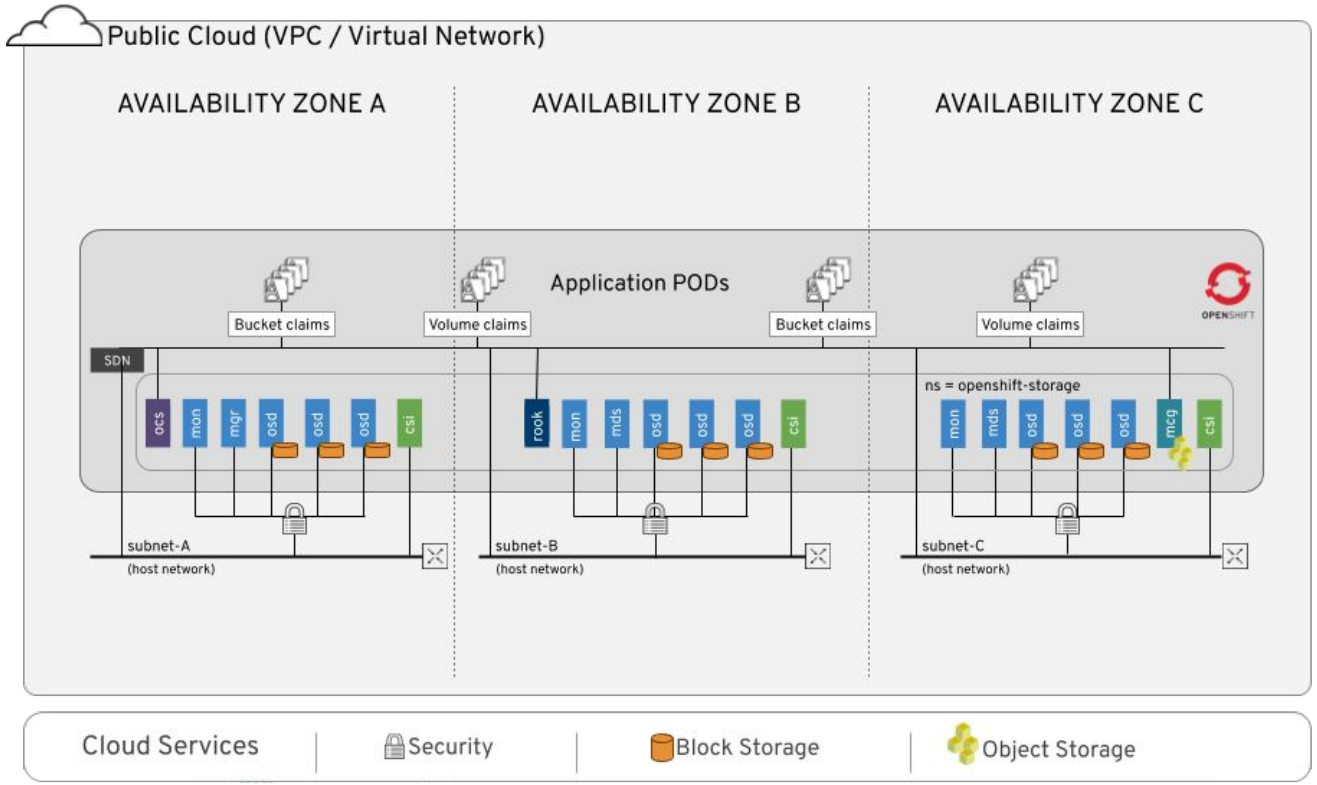
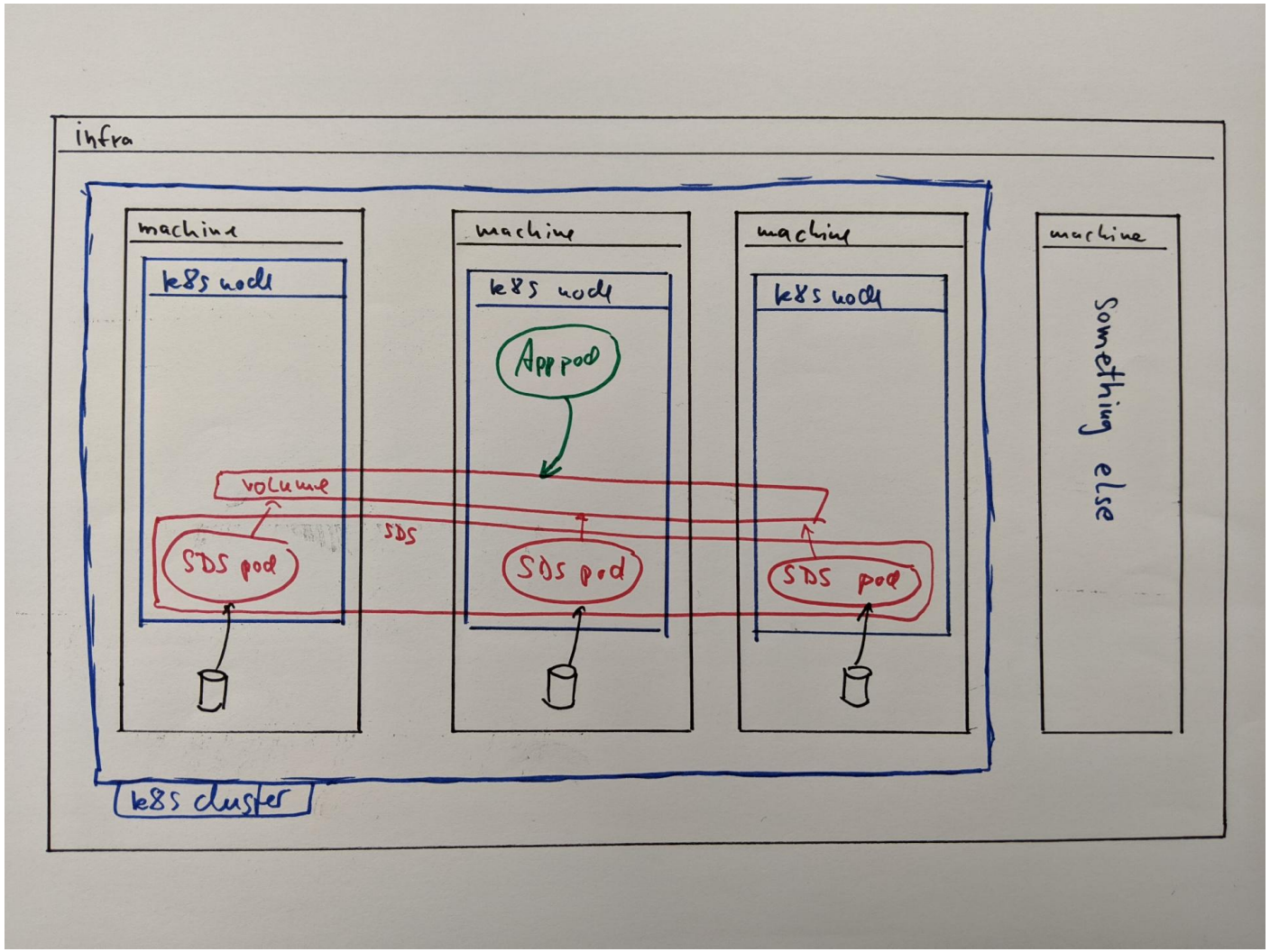
OCS

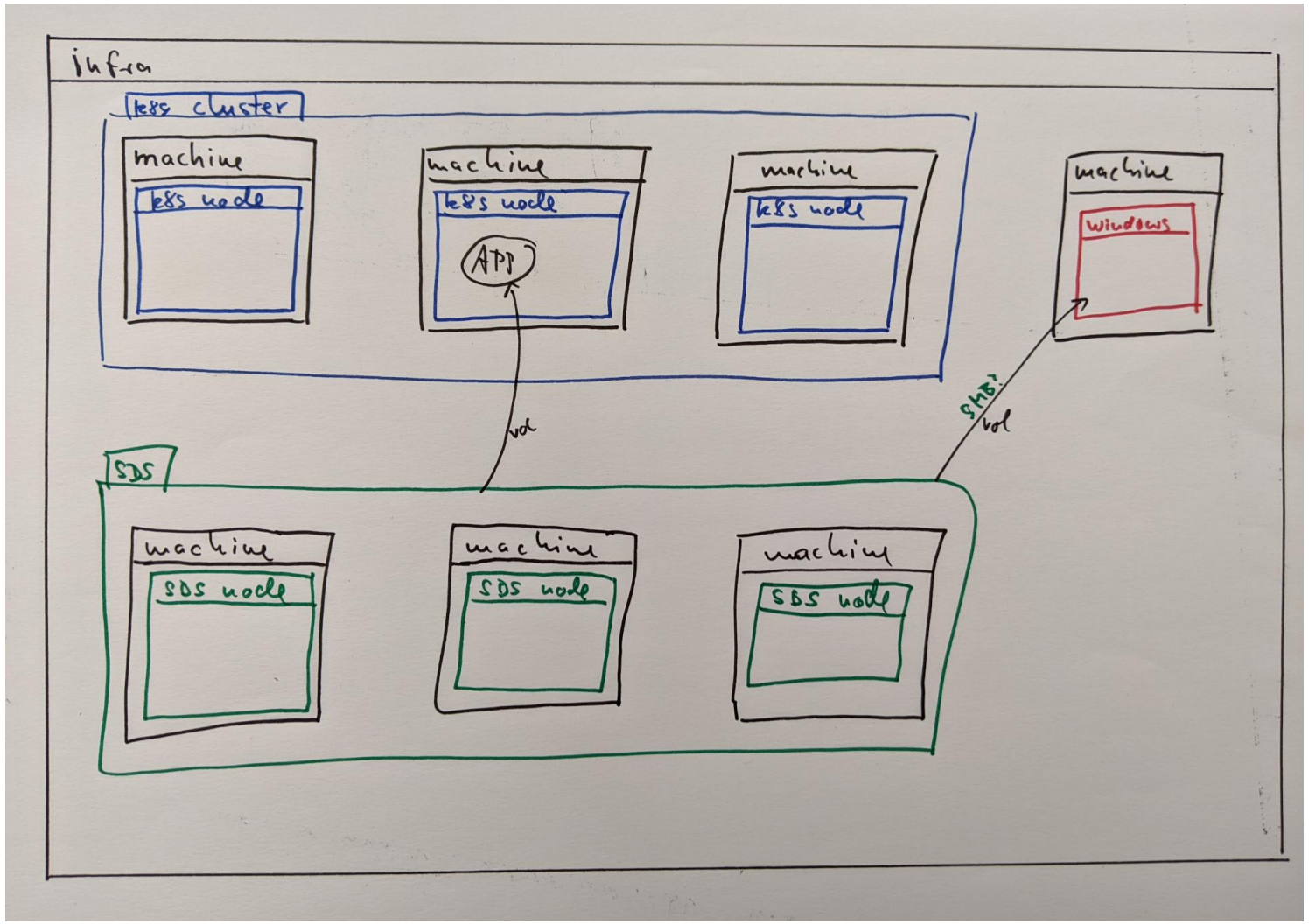
Architecture



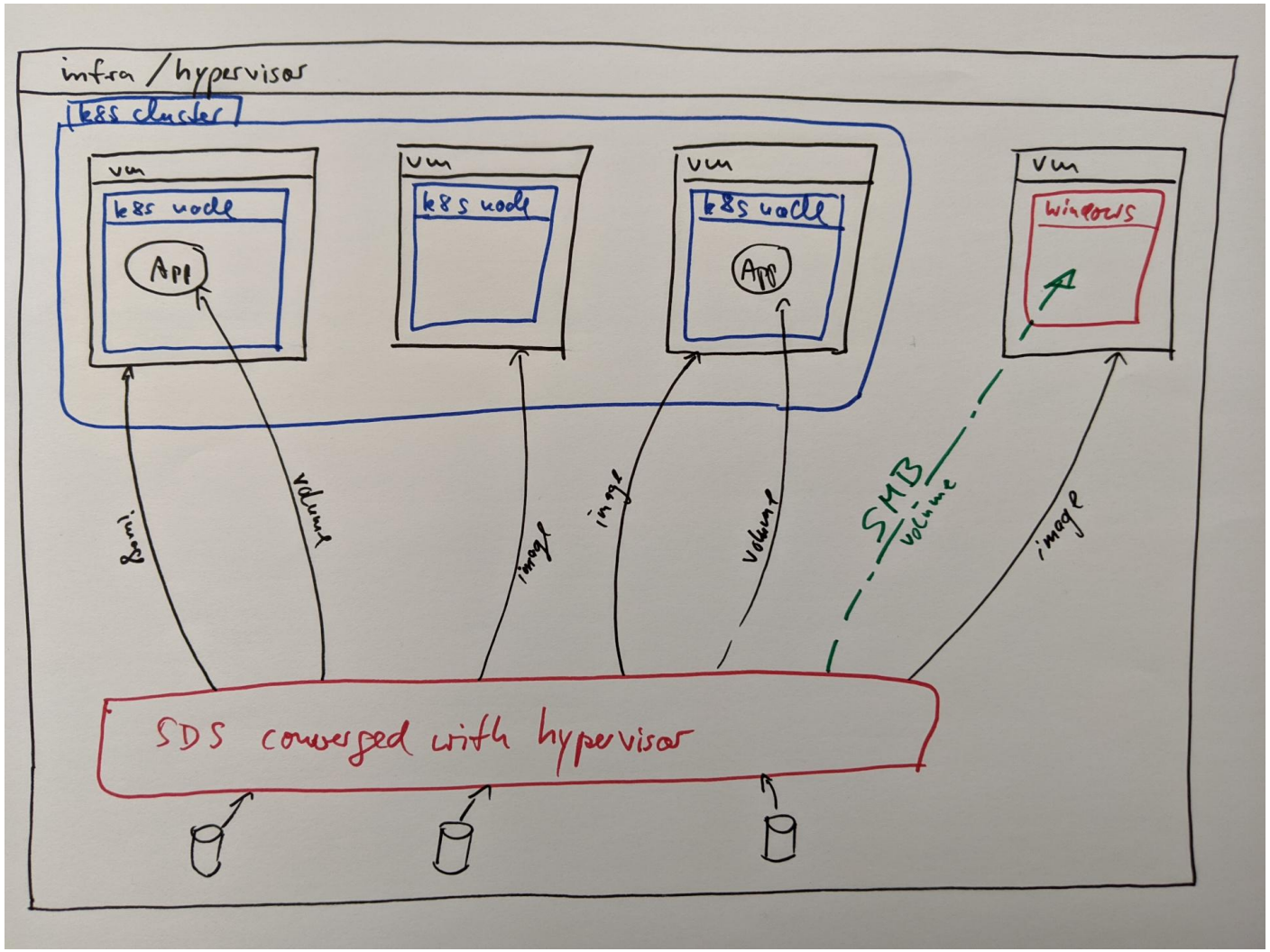
Storage converged with the platform (k8s)



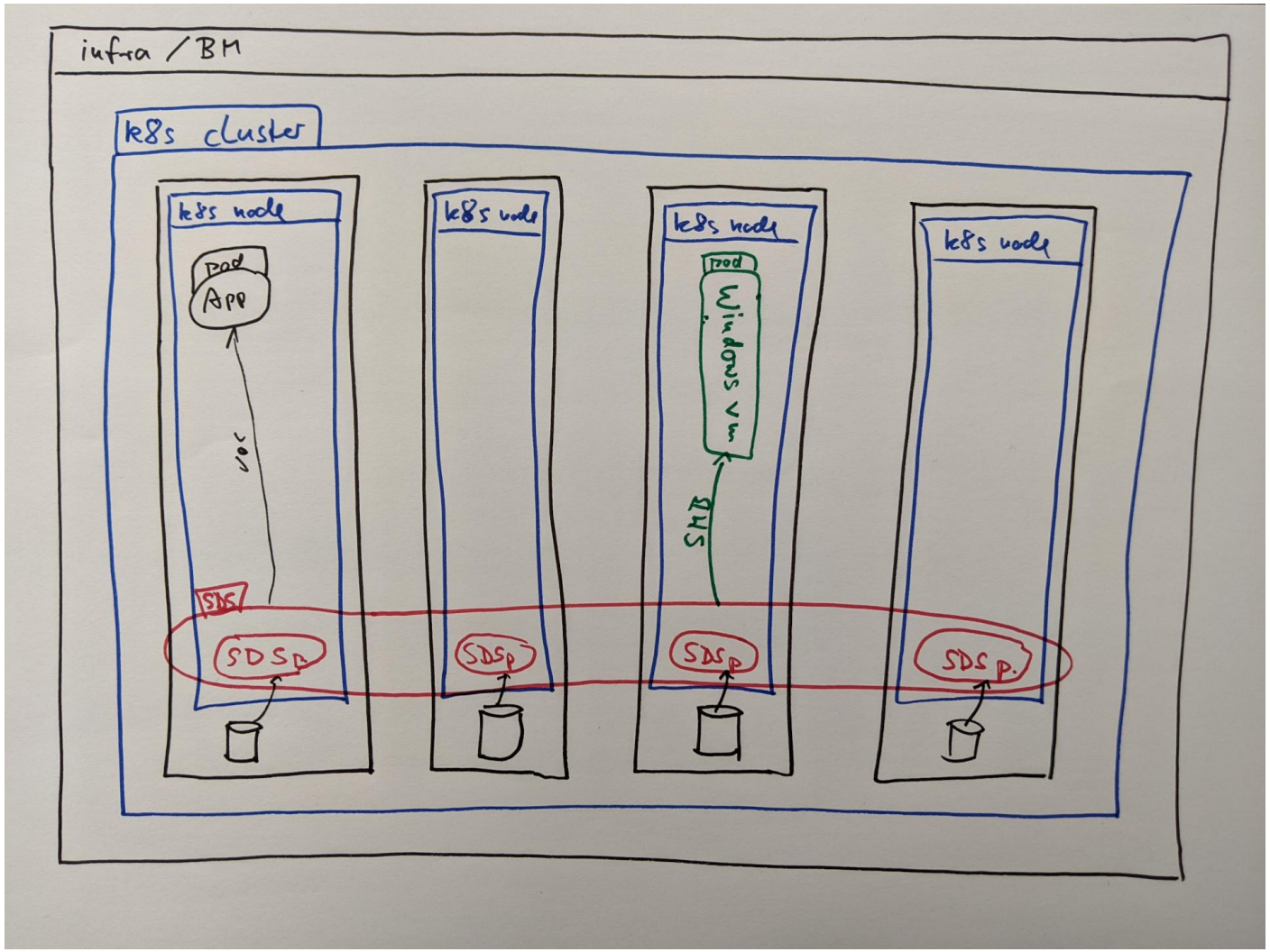
Storage on top of the infrastructure



Storage converged with infrastructure



Reverse the layers: Platform is Infrastructure



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kubevirt

Running VMs in containers

- Expand k8s with APIs to run an manage VMs
- Run VMs alongside container apps
- Consume the same stoage

- https://github.com/kubevirt/kubevirt
- https://kubevirt.io/

Enter SAMBA

- Use Cases
- Container
- Operator
- Provisioner?

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Use cases for Samba in k8s

Windows VMs running in kubevirt as k8s containers.

- Need storage to store their application data
- Need to exchange data between VMs
- Prefer SMB over NFS...

Extra thought:

- Provide an AD service for projects with Samba!

Mixed k8s clusters: Windows worker nodes

- How can Windows workers use PVCs from Linux nodes?
- SMB for file
- iSCSI for block

The basic idea

Extremely simple Samba service container concept

SMB Service on PVCs

Establish notion of an SMB Service per PVC. Even an SMB-PVC. (1:1 correspondence.)

Managed by an operator.

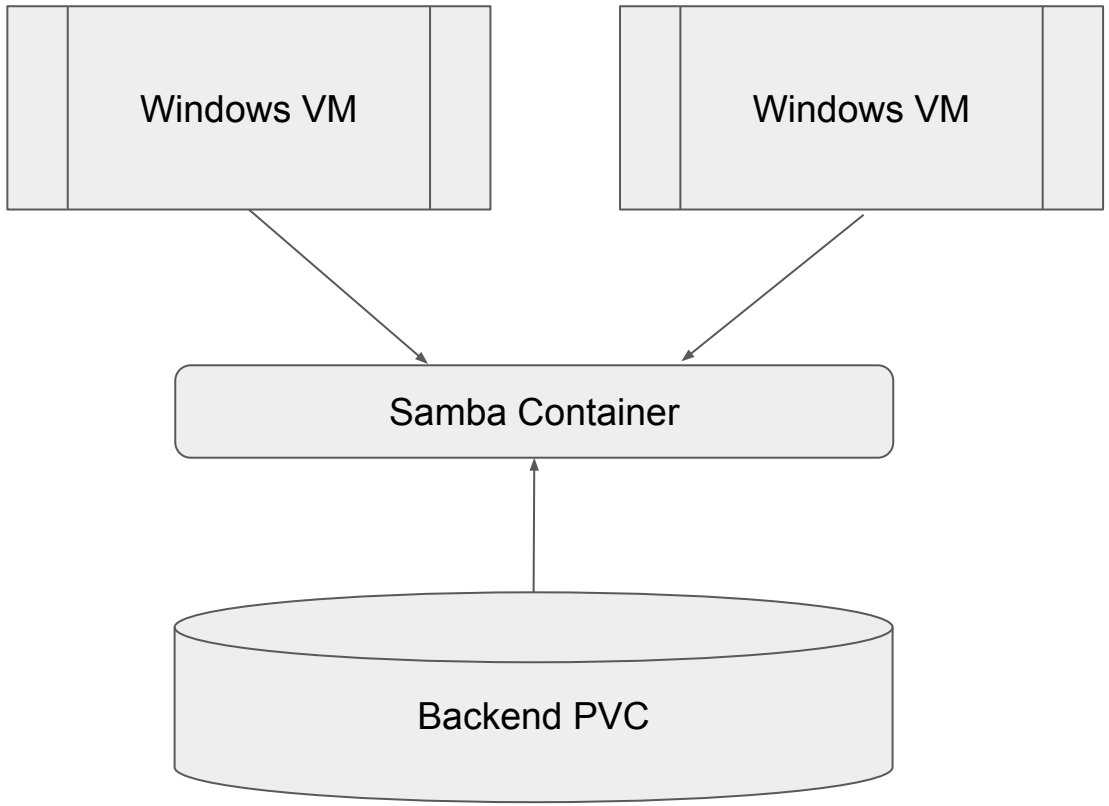
Very simple Samba container

No complicated clustered Samba.

Just re-exporting a directory from the container.

Possibly: Provisioner for SMB-access PVCs

A CSI driver for mounting PVCs via SMB already exists.


Windows VM
Windows VM
Samba Container
Backend PVC

Simple Samba Container

https://github.com/obnoxxx/samba-container

https://quay.io/repository/obnox/samba-centos8

- Runs only smbd
- Serves /share out as [share]
- Currently only supports one user

TODO:

- Multiple users
- AD integration

Samba Operator

https://github.com/obnoxxx/samba-operator

https://quay.io/repository/obnox/samba-operator

Two CRDs:

- SmbService : use existing PVC
- SmbPvc: create new PVC and SmbService

Demo!

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Thank you!

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Questions?

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