Hi, I'm Pratik

▷ Software Engineer @ Loft Labs, Inc.

▷ Based in and made in India

pratikjagrut (LinkedIn)

@pratikjagrut (Twitter)

pratikjagrut (GitHub)

Product

Open Source

loft

DevSpace

vcluster

Kiosk

olicy

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What is Kubernetes?

Kubernetes is a portable, extensible, open source platform for managing containerized workloads and services, that facilitates both declarative configuration and automation. It has a large, rapidly growing ecosystem. Kubernetes services, support, and tools are widely available.

- Kubernetes documentation

What is Multi-tenancy in K8S?

- ▷ Sharing clusters between
  - ▶ Teams
  - ▶ Customers
- ▷ Saves cost
- ▷ Simplifies administration

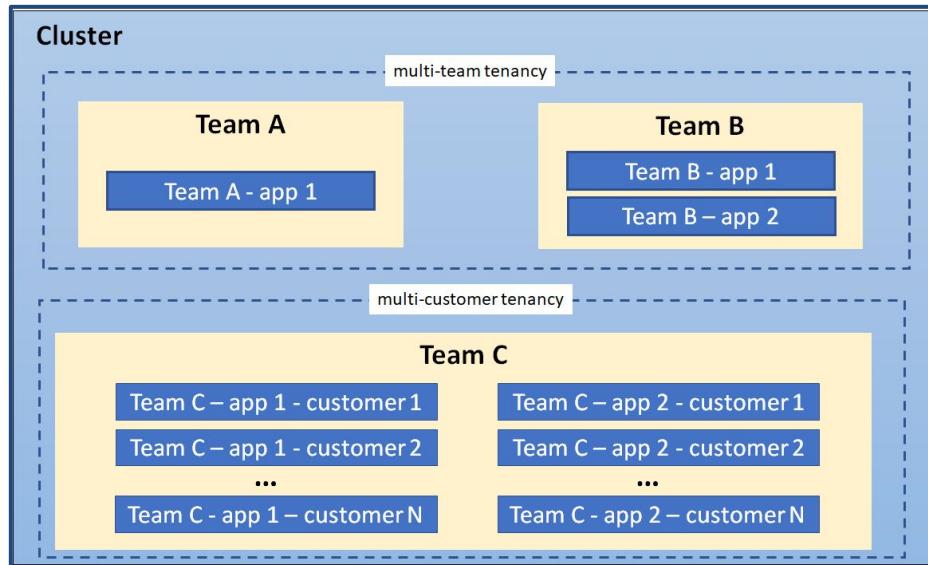- ▷ Security
  - ▶ Access for tenants
- ▷ Isolation

Cluster

multi-team tenancy

Team A

Team A - app 1

Team B

Team B - app 1

Team B – app 2

multi-customer tenancy

Team C

Team C – app 1 - customer 1

Team C – app 1 - customer 2

...

Team C - app 1 – customer N

Team C – app 2 - customer 1

Team C – app 2 - customer 2

...

Team C - app 2 – customer N

image source: k8s multi-tenancy doc

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	Separate Namespace For Each Tenant		Separate Cluster For Each Tenant
Isolation	very weak		very strong
Access For Tenants	very restricted	**VS**	cluster admin
Cost	very cheap		expensive
Resource Sharing	easy		very hard
Overhead	very low		very high

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Best of both worlds?

	Separate Namespace For Each Tenant	???	Separate Cluster For Each Tenant
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vcluster - Solution for multi-tenancy

	Separate Namespace For Each Tenant	vcluster	Separate Cluster For Each Tenant
Isolation	very weak	strong	very strong
Access For Tenants	very restricted	vcluster admin	cluster admin
Cost	very cheap	cheap	expensive
Resource Sharing	easy	easy	very hard
Overhead	very low	very low	very high

What is vcluster?

▷ vcluster or virtual cluster is light weight k8s cluster

▷ Runs on top of another k8s cluster

▷ Has its own control plane

▷ Easy to create and destroy

▷ Virtual clusters are like virtual machines for Kubernetes

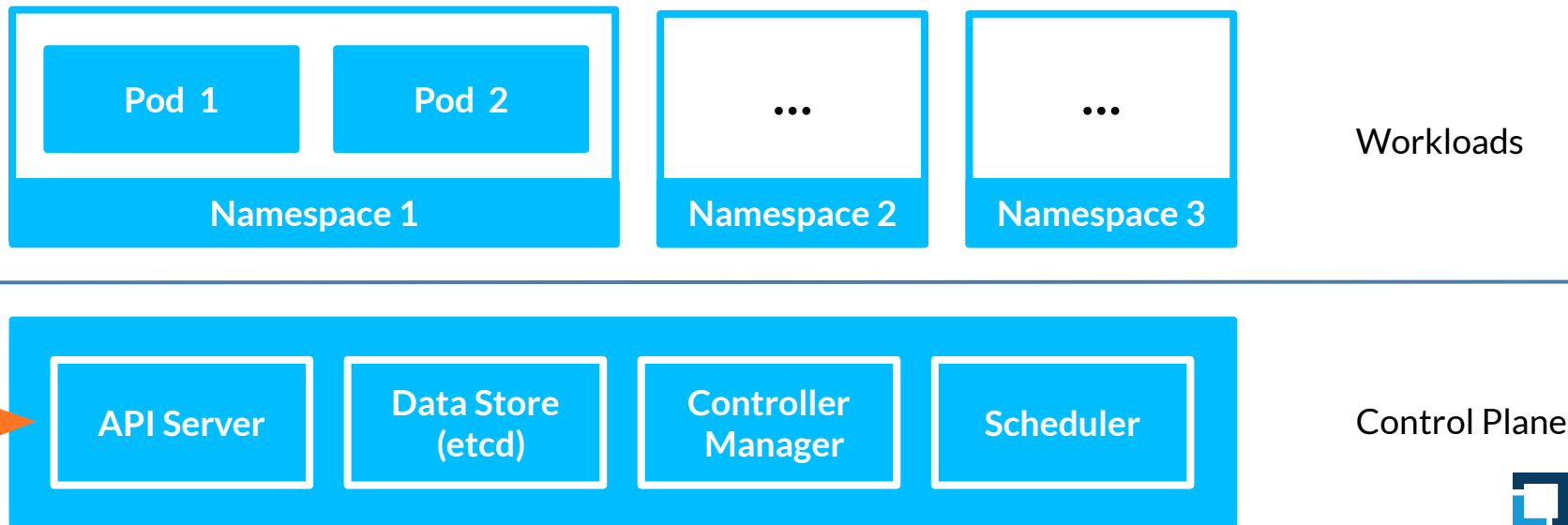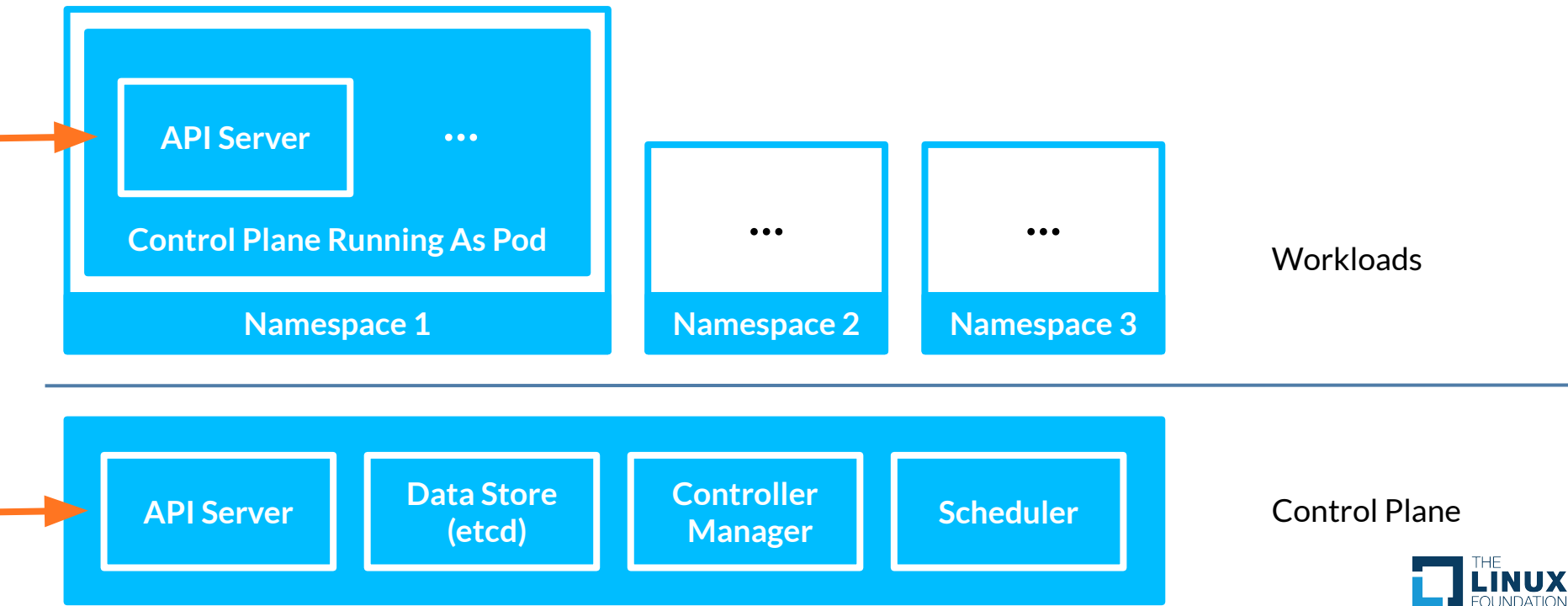Virtual Clusters →

Host 🛞 Cluster

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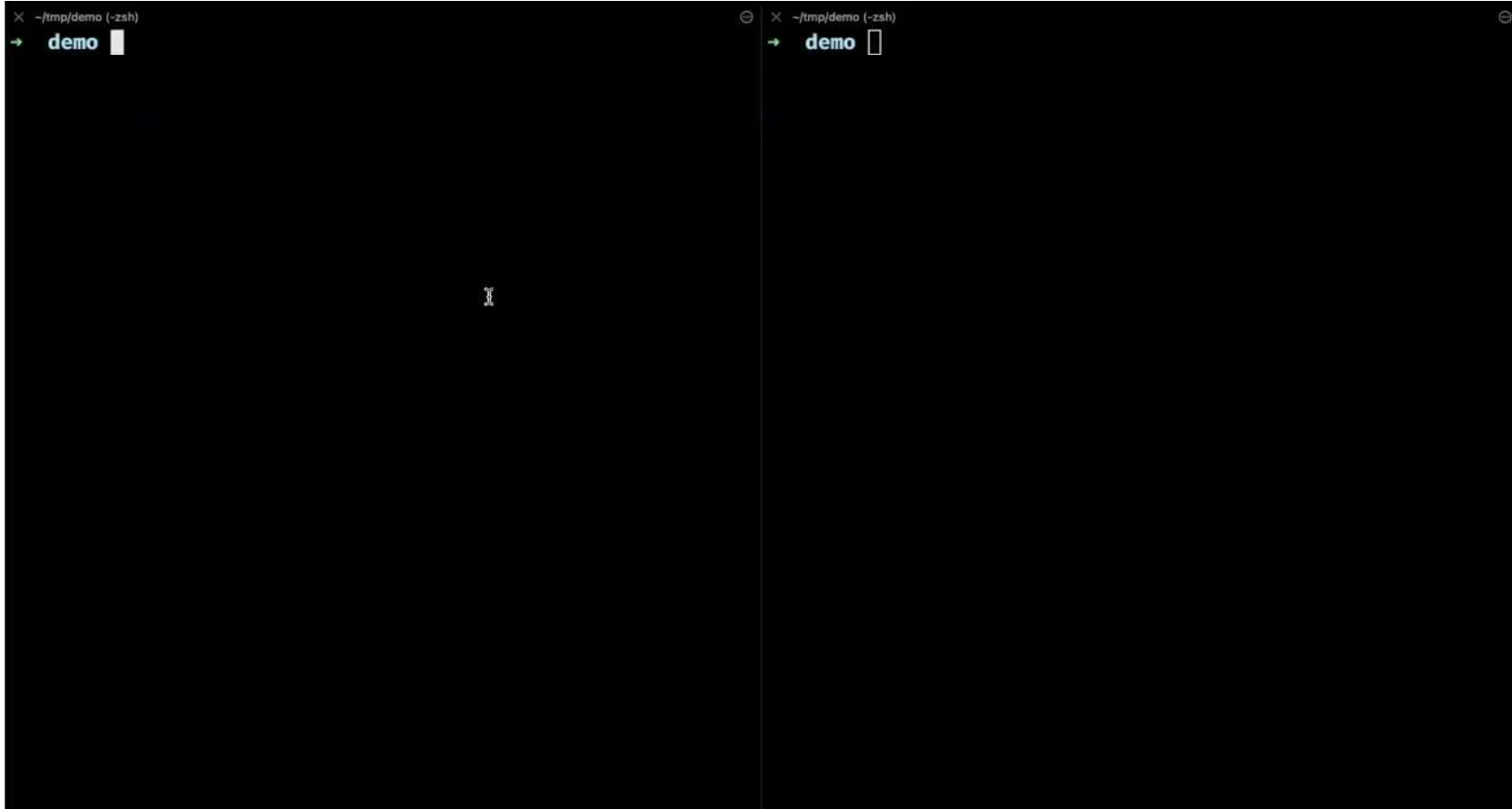
vcluster - How does this work?

Virtual Clusters = Control Planes Running In Another Cluster

API Server	...

Control Plane Running As Pod

Namespace 1

...

Namespace 2

...

Namespace 3

Workloads

API Server	Data Store (etcd)	Controller Manager	Scheduler

Control Plane

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vcluster - Architecture

vcluster Service

vcluster Pod

API Server
+ Controller Manager

Data Store
(sqlite, etcd, ...)

Syncer

vcluster StatefulSet (vc1)

host-namespace

certified kubernetes

API Server

Data Store
(etcd)

Controller
Manager

Scheduler

Control Plane

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vcluster - Workload - Create namespace

```
$ kubectl create namespace ns1
```

ns1

vcluster Service

vcluster Pod

API Server + Controller Manager
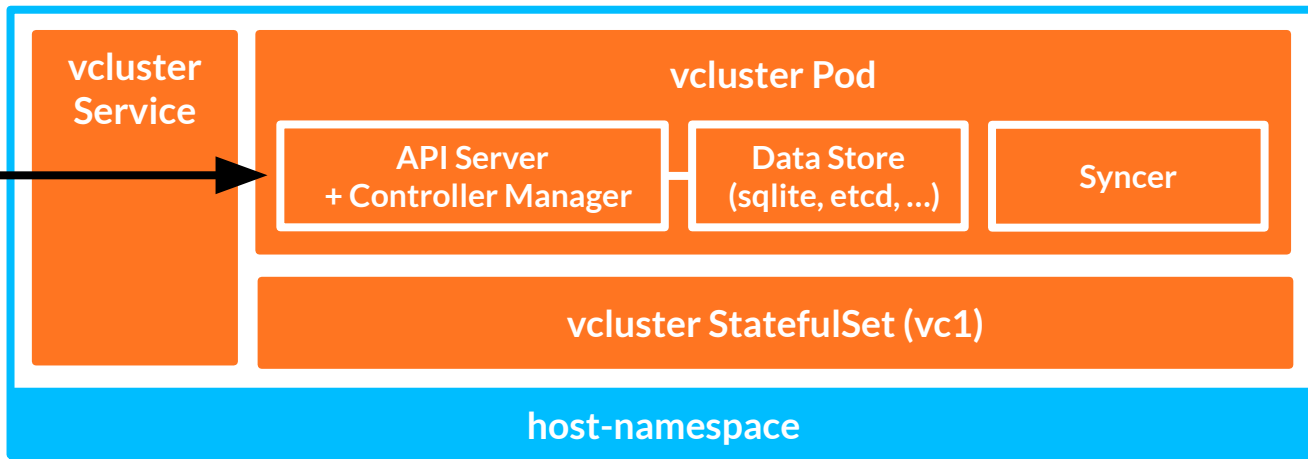
Data Store (sqlite, etcd, ...)

Syncer

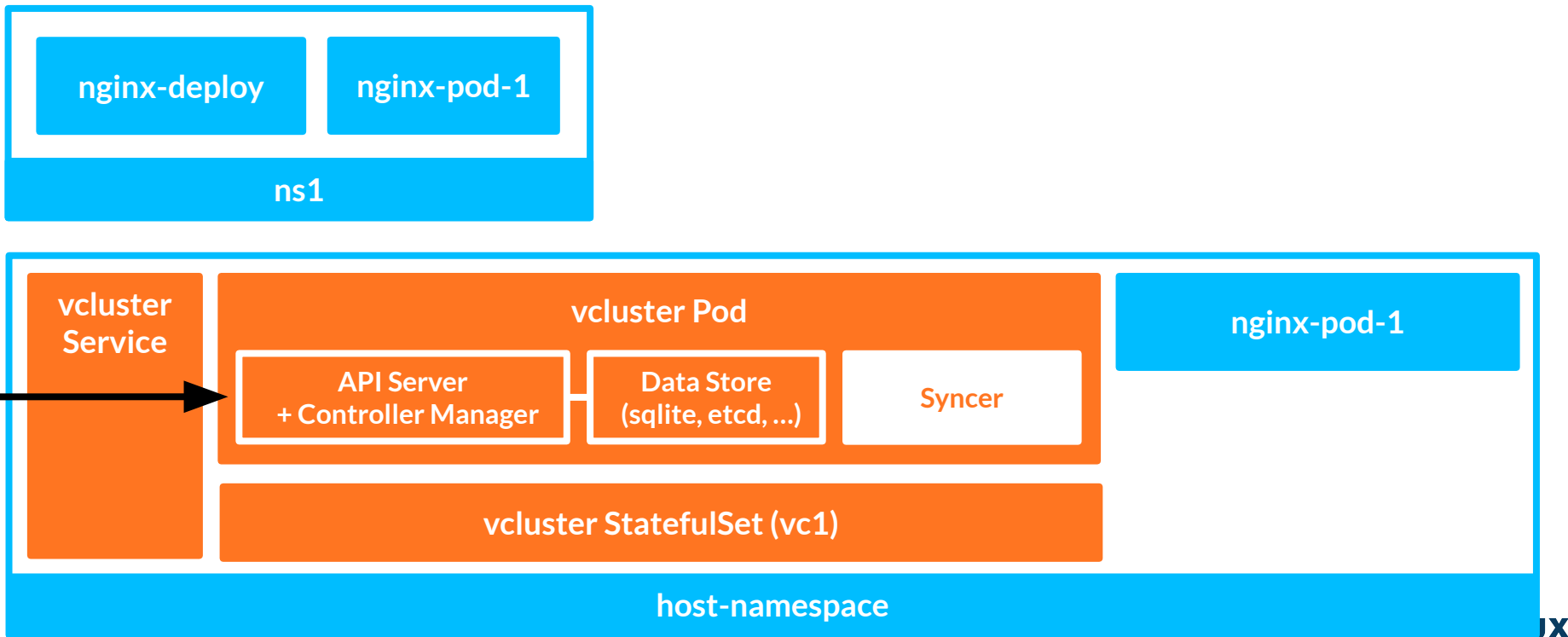**vcluster StatefulSet (vc1)**

host-namespace

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vcluster - Workload - Create deployment

nginx-deploy   nginx-pod-1

ns1

```
$ kubectl create deployment nginx-deploy
  -n ns1 --image=nginx
```

vcluster Service

vcluster Pod

API Server + Controller Manager

Data Store (sqlite, etcd, ...)

Syncer

vcluster StatefulSet (vc1)

host-namespace

vcluster - Naming conflicts?
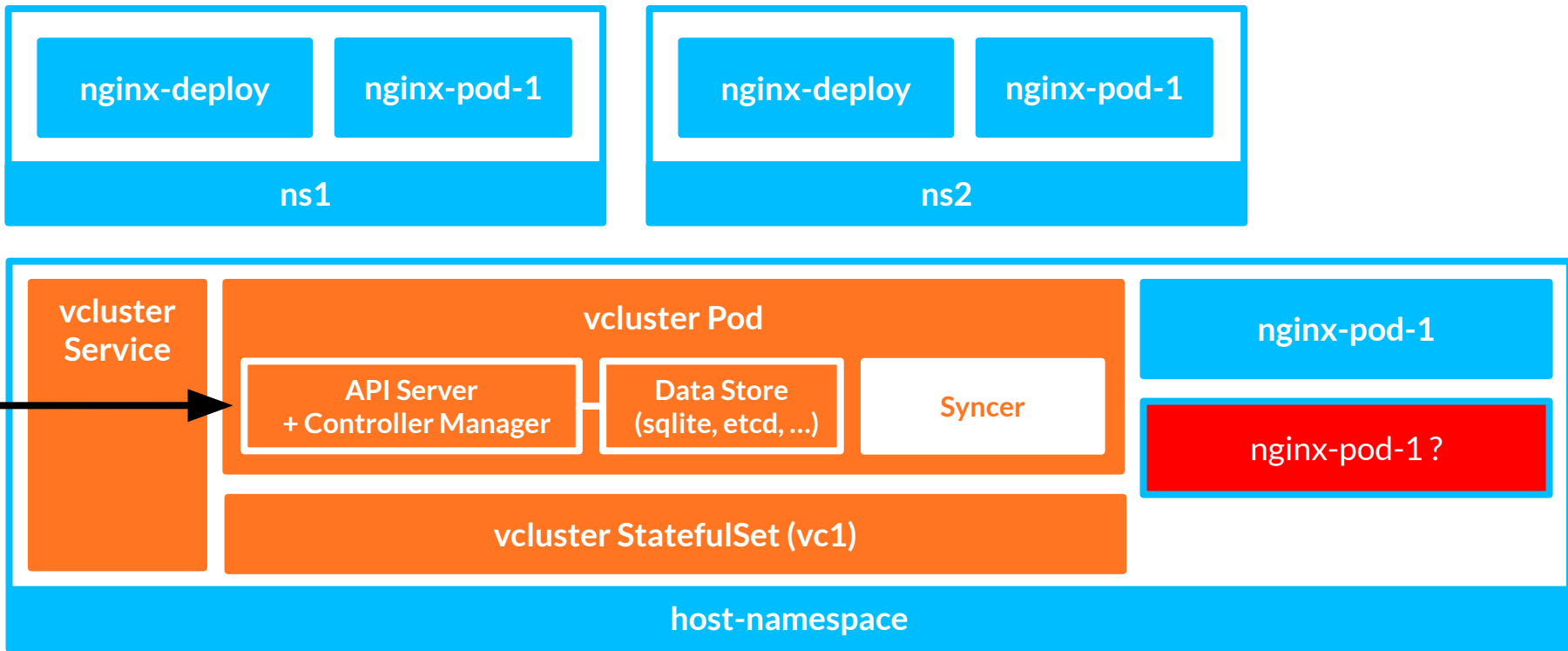
vcluster - Workload nomenclature
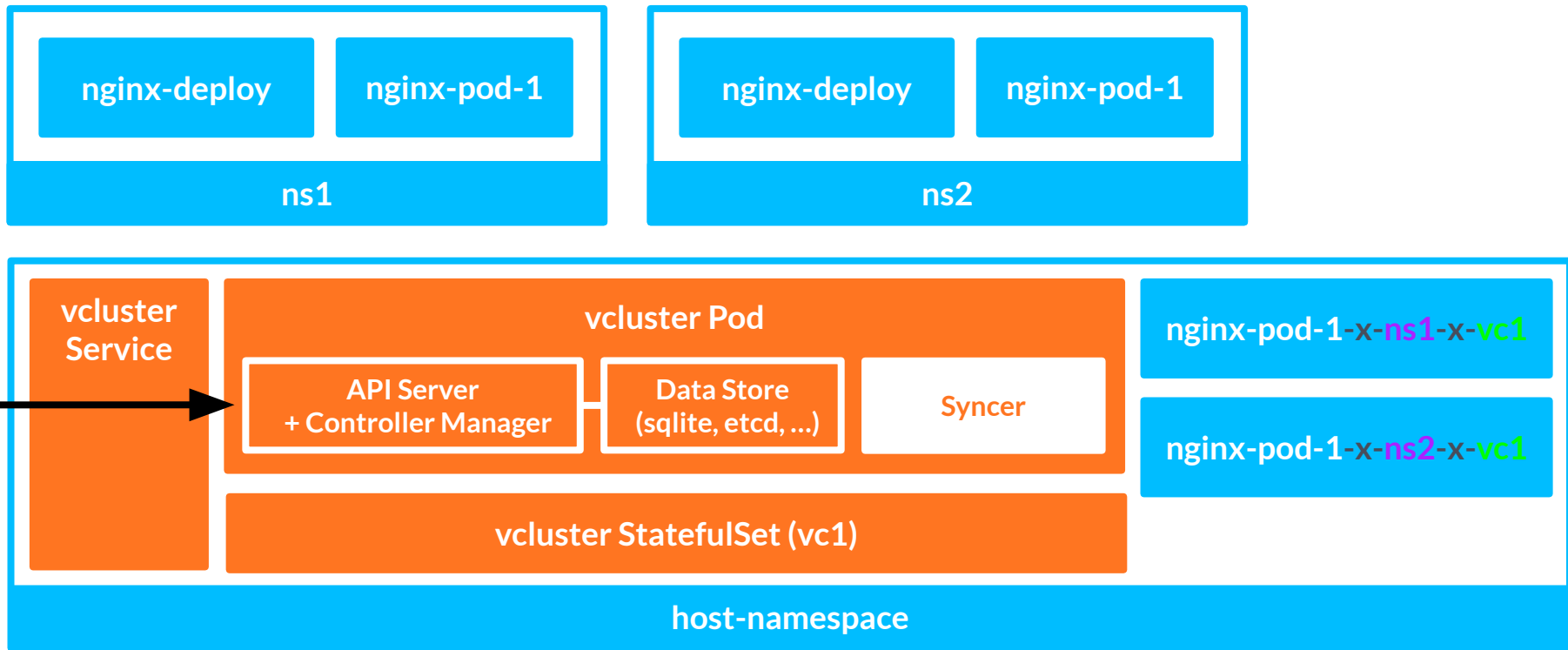
vcluster - What resources does syncer sync?

SYNCER, by-default, only syncs resources needed by POD to run

Syncs

- Pods, with:
  - Mounted ConfigMaps and Secrets
  - Persistent volumes and claims
- Services
- Endpoints
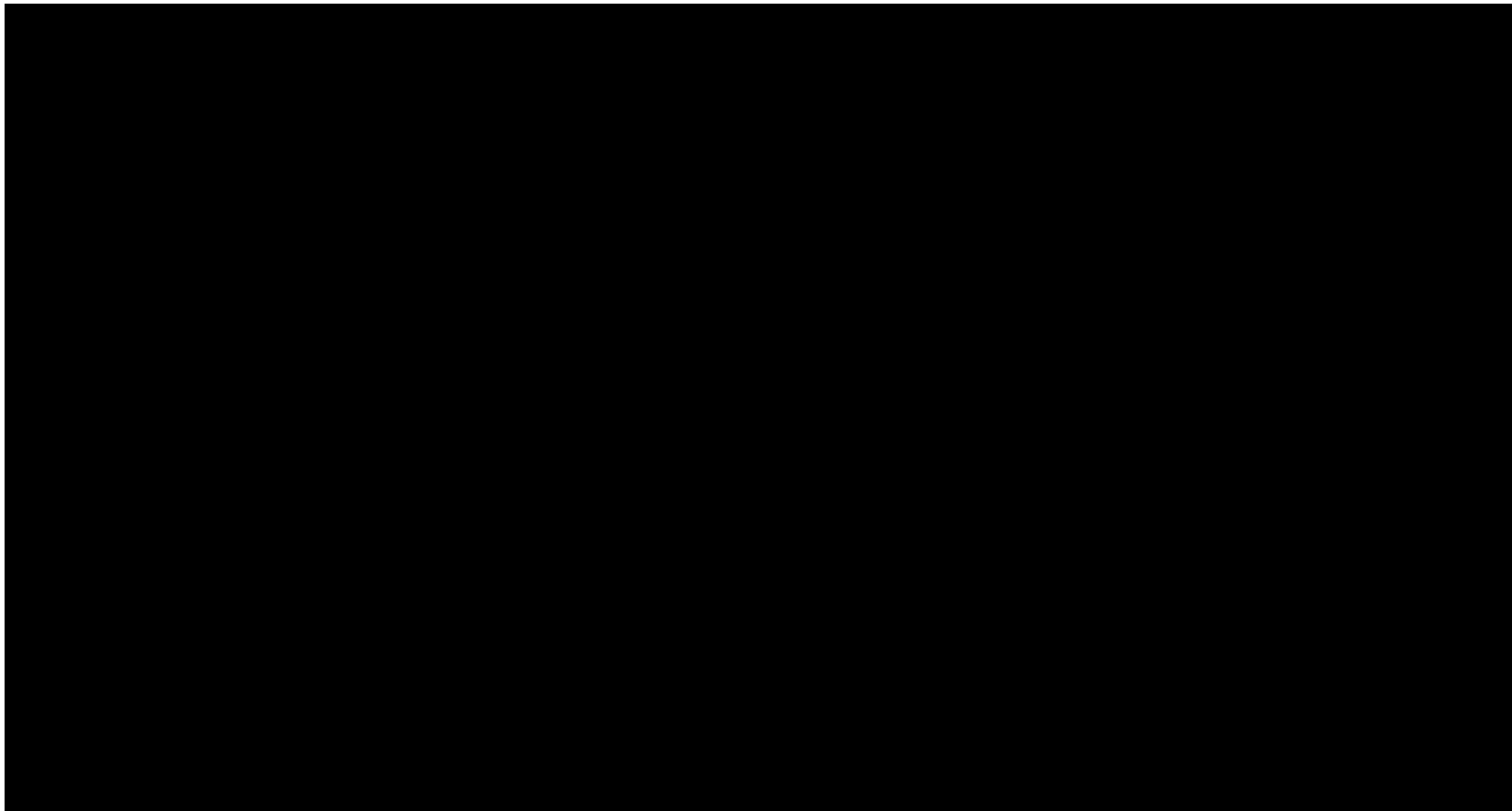- Nodes(configurable)
  etc.

Syncer syncs back the status of each object

Does not Sync

- Higher Level Resources
  - Deployments
  - StatefulSets
  - DaemonSets
  - CustomResourceDefinitions
- Not mounted ConfigMaps, Secrets
  etc.

Enabling the synchronization of optional resources is possible through vcluster configuration

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vcluster - Key features

▷ Isolation mode

▷ Rootless mode

▷ Pause and resume cluster

▷ Expose vcluster API server via Ingress, LB, etc.

▷ You can install k3s, k0s, k8s or eks distro using --distro flag

▷ vcluster in vcluster

vcluster - Use Cases

▷ Ephemeral CI/CD Environments

  ► Integration, End-To-End, Acceptance Testing

  ► Instant Preview Environments Per Pull-Request

▷ Remote Development Environments

▷ Experimentation

▷ Cluster Simulations

▷ More Resilient Multi-Tenant Clusters In Production

▷ Demo and training environments

vcluster - Getting started

▷ Download CLI && `$ vcluster create my-vc`

▷ Getting Started: https://www.vcluster.com/docs/quickstart

▷ GitHub: https://github.com/loft-sh/vcluster

▷ Website: www.vcluster.com

▷ Twitter: https://twitter.com/loft_sh

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Thank you and Questions?

you can write me on my social handles or at pj@loft.sh