Is There Still Room for Innovation in Container Orchestration and Scheduling?

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LinuxCon China, June 19 2017

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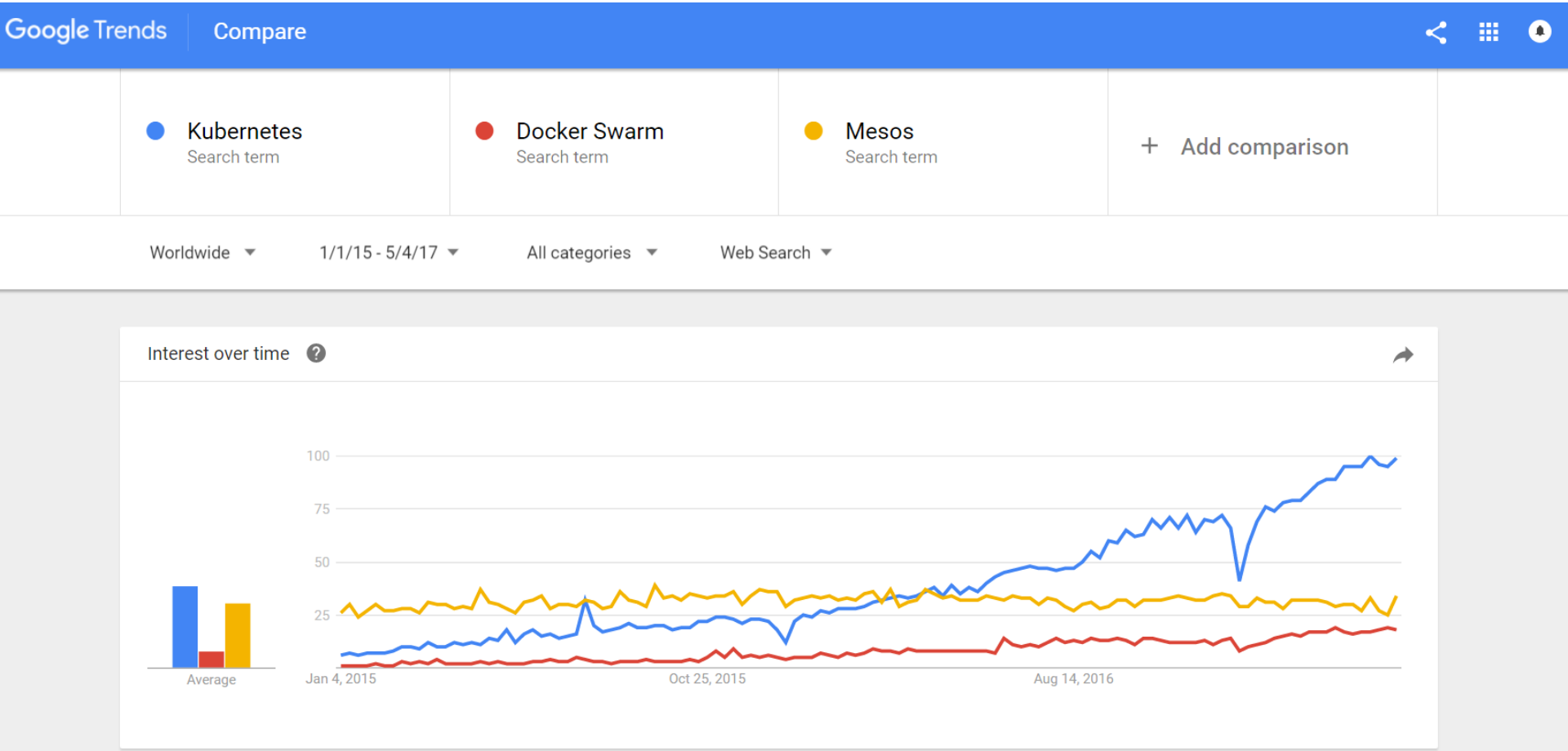

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Applications

Container Orchestration and Scheduling

Infrastructure

Linux | Linux | Linux | Linux | Linux | Linux

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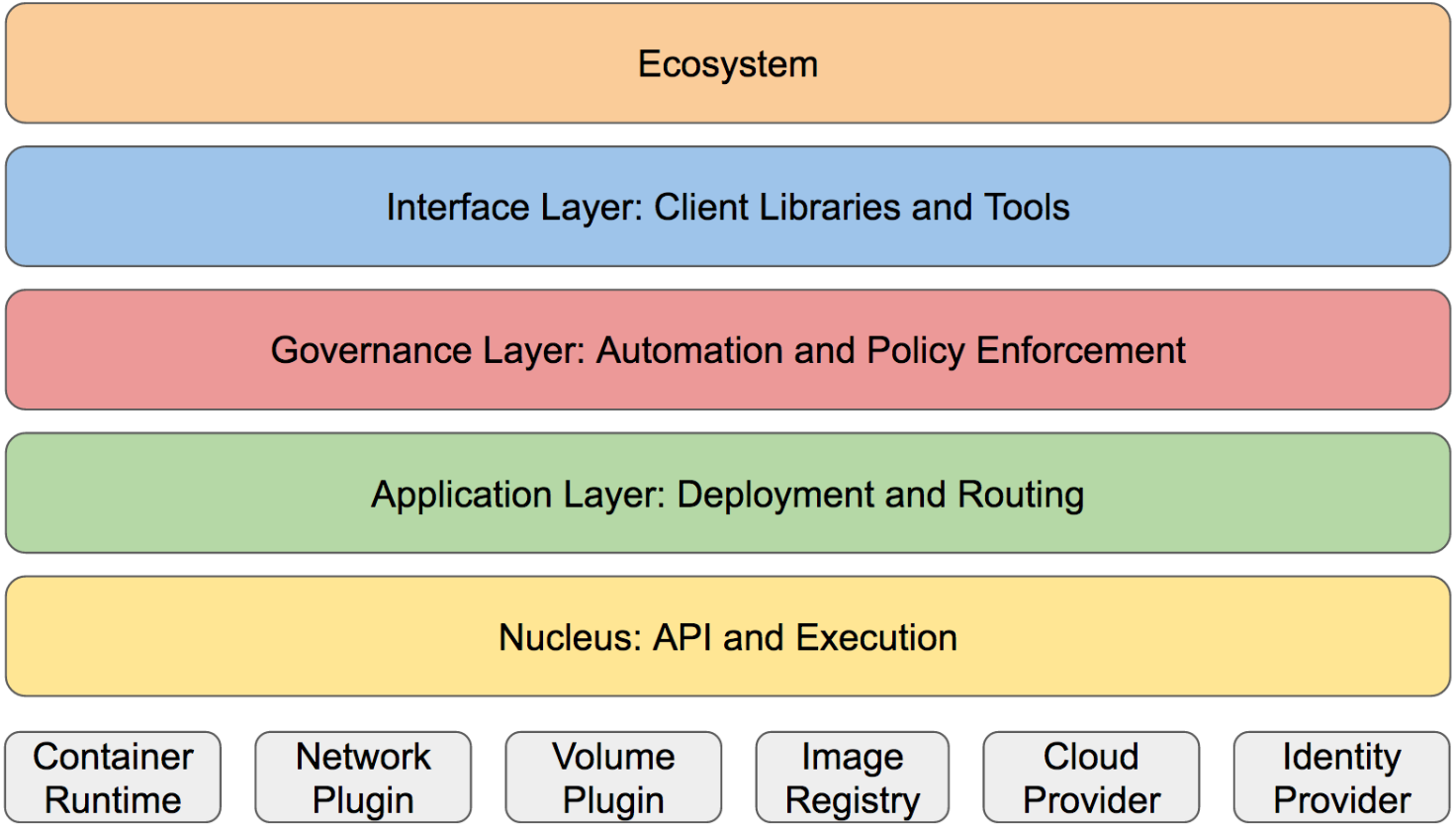

Kubernetes internal architecture by Brian Grant

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Our experience with Kubernetes

Rancher 1.0: Kubernetes distro

2016: Make Kubernetes easy to install

2017: Make Kubernetes easy to operate

Manage all this?

App Catalog	Helm, …
Orchestration	Compose, Kubernetes, Marathon,
Scheduling	Swarm, Kubernetes, Mesos, …
Monitoring	cAdvisor, Prometheus, Datadog, …
Access Control	LDAP, AD, GitHub, …
Registry	Nexus, Artifactory, DTR…
Engine	Docker, runC, Rocket …
Security	Notary, Vault, …
Network	VXLAN, IPSEC, HAProxy, …
Storage	Ceph, Gluster, Swift, …
Distributed DB	Etcd, Consul, MongoDB, …

…or this?

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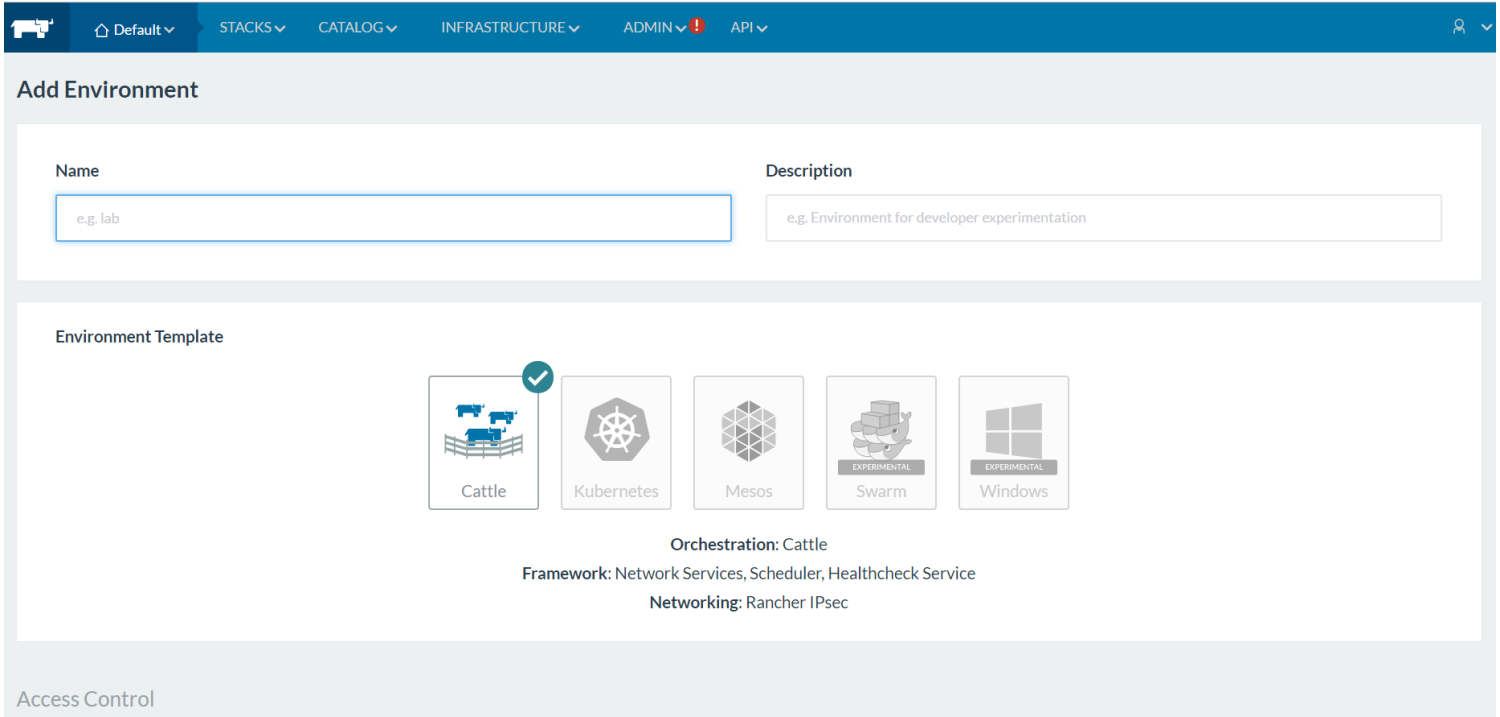
Support multiple orchestrators



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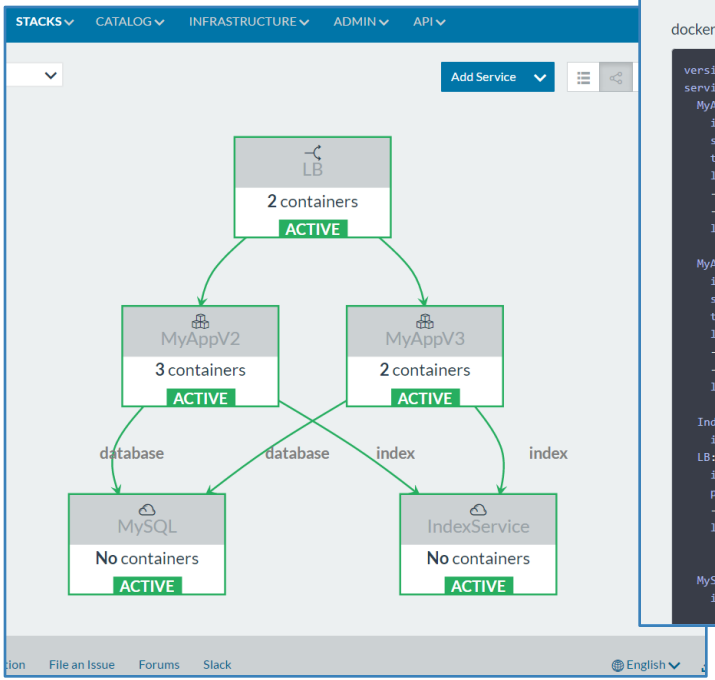
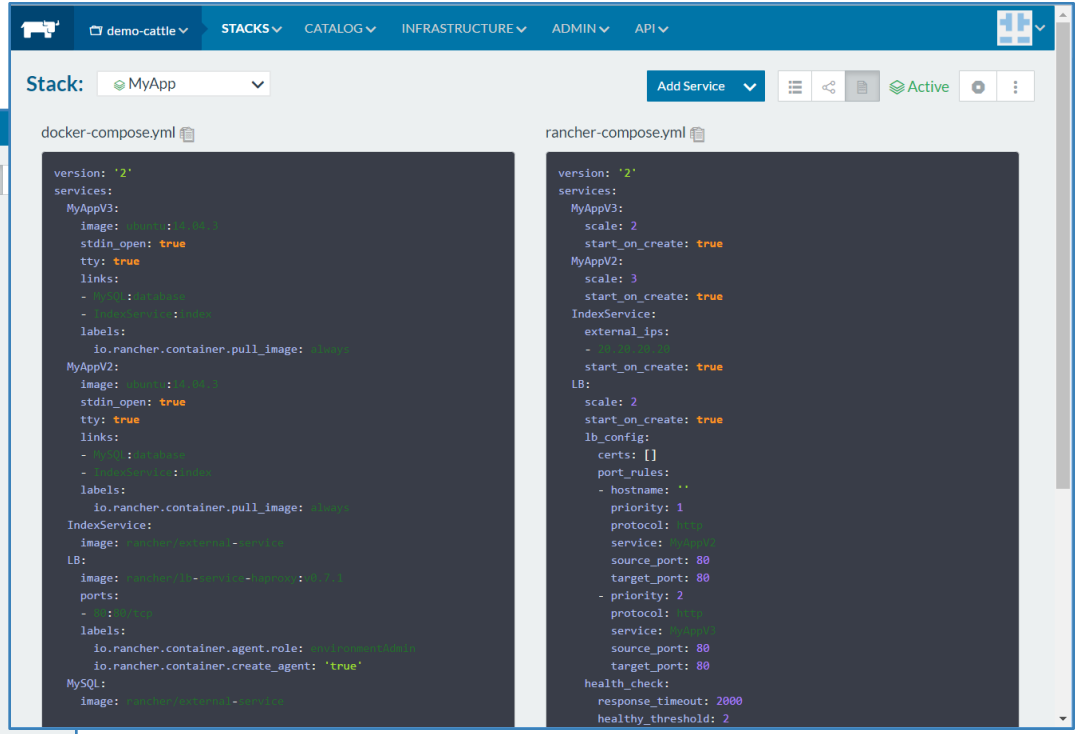
Cattle orchestrator remains popular





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Reason for Cattle's popularity: Simplicity

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Cattle 2.0: even simpler

Service as basic unit of operation		Container as basic unit of operation
Service reconciliation		Scaling group
Service discovery and service aliases		Load balancer and DNS

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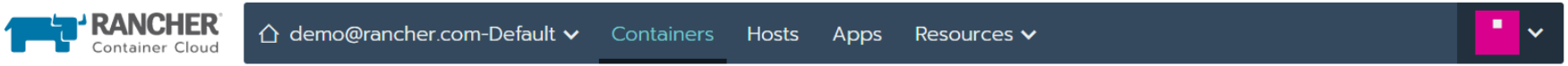

Containers | Scaling Groups | Load Balancers | DNS | Volumes

Import compose.yml | Add Container

Search

State	Name	Image
Running	Default-mysql-1	mysql 10.42.2.156 / caas-demo-aws-2 / Created a month ago
Running	Default-nginx-1	nginx 10.42.70.165 / caas-demo-aws-3 / Created a month ago
Running	elasticsearch-2-elasticsearch-clients-1	rancher/elasticsearch-conf:v0.5.0 10.42.168.109 / caas-demo-aws-2 / Created a month ago
Running	elasticsearch-2-elasticsearch-clients-elasticsearch-base-clients-1	elasticsearch:2.4.3-alpine caas-demo-aws-2 / Created a month ago
Started-Once	elasticsearch-2-elasticsearch-clients-elasticsearch-datavolume-cli...	elasticsearch:2.4.3-alpine 10.42.126.39 / caas-demo-aws-2 / Created a month ago
Running	elasticsearch-2-elasticsearch-datanodes-1	rancher/elasticsearch-conf:v0.5.0 10.42.137.29 / caas-demo-aws-1 / Created a month ago
Running	elasticsearch-2-elasticsearch-datanodes-elasticsearch-base-data...	elasticsearch:2.4.3-alpine caas-demo-aws-1 / Created a month ago
Started-Once	elasticsearch-2-elasticsearch-datanodes-elasticsearch-datavolum...	elasticsearch:2.4.3-alpine 10.42.246.11 / caas-demo-aws-1 / Created a month ago
Running	elasticsearch-2-elasticsearch-masters-1	rancher/elasticsearch-conf:v0.5.0 10.42.240.160 / caas-demo-aws-3 / Created a month ago
Running	elasticsearch-2-elasticsearch-masters-elasticsearch-base-master-1	elasticsearch:2.4.3-alpine caas-demo-aws-3 / Created a month ago

Future of Container Scheduling and Orchestration

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The Operator pattern

“Orchestrator as Code”

Introducing the etcd Operator: Simplify etcd cluster configuration and management

November 03, 2016 • By Hongchao Deng

Tags: *Announcements*

Today, CoreOS introduced a new class of software in the Kubernetes community called an *Operator*. An Operator builds upon the basic Kubernetes resource and controller concepts but includes application domain knowledge to take care of common tasks. They reduce the complexity of running distributed systems and help you focus on the desired configuration, not the details of manual deployment and lifecycle management.

etcd is a distributed key-value store. In fact, etcd is the primary datastore of Kubernetes; storing and replicating all Kubernetes cluster state. As a critical component of a Kubernetes cluster having a reliable automated approach to its configuration and management is imperative.

As a distributed consensus-based system, the cluster configuration of etcd can be complicated. Bootstrapping, maintaining quorum, reconfiguring cluster membership, creating backups, handling disaster recovery, and monitoring

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Scheduling	1. Allocate resources 2. Usually a relatively simple operation that can be completed in a very short amount of time 3. Requires global knowledge
Orchestration	1. Performs configuration operations 2. A potentially long-running operation consisting of many small operations 3. Can usually be partitioned

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Other features

Authentication
Authorization/RBAC/Governance
API gateway/server
Usage metering and chargeback
Plugins and drivers
Secret management

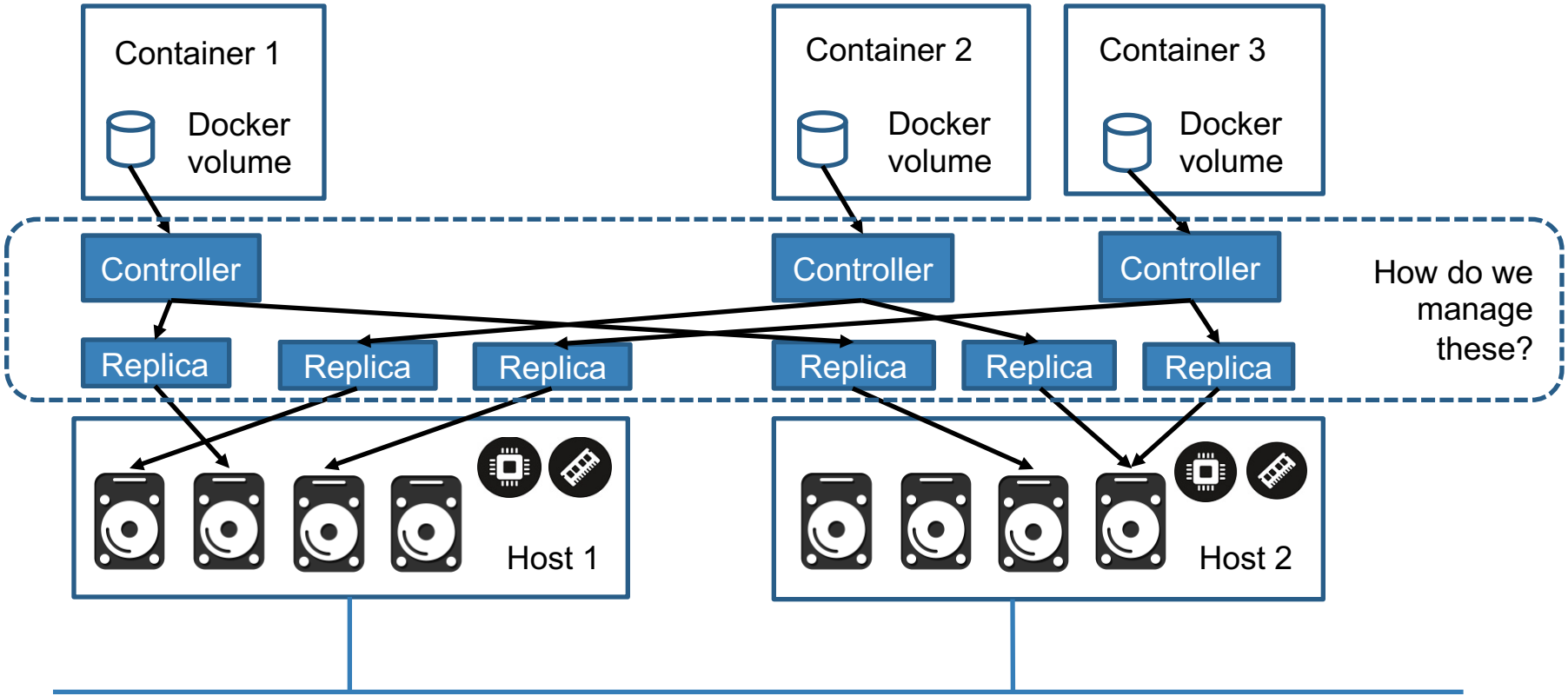
State management in Orchestration

Desired state: usually very small

An approximation of actual state: usually (unnecessarily) kept in the database

Job state: need not persist

Example: Longhorn storage orchestration



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Longhorn storage orchestration

Orchestrator runs on every node without centralized master

Desired state: hardcoded, try to keep volumes healthy

An approximation of actual state: volume meta data

Job state: kept in memory, ephemiral

If you have experience operating a distributed system, you have knowledge to write an orchestrator

There will be many more orchestrators in the future

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Thank you

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