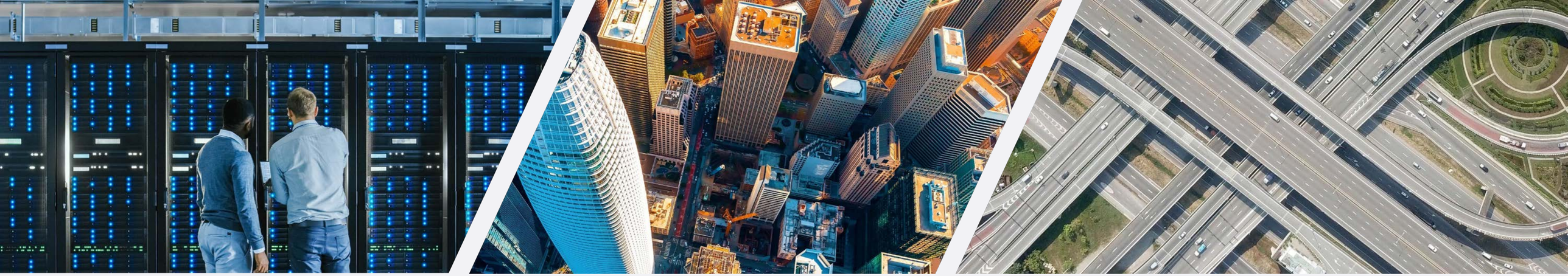


7 Critical Reasons for Kubernetes-Native Backup

kasten

about us

Mark Severson

Member of Technical Staff @ Kasten

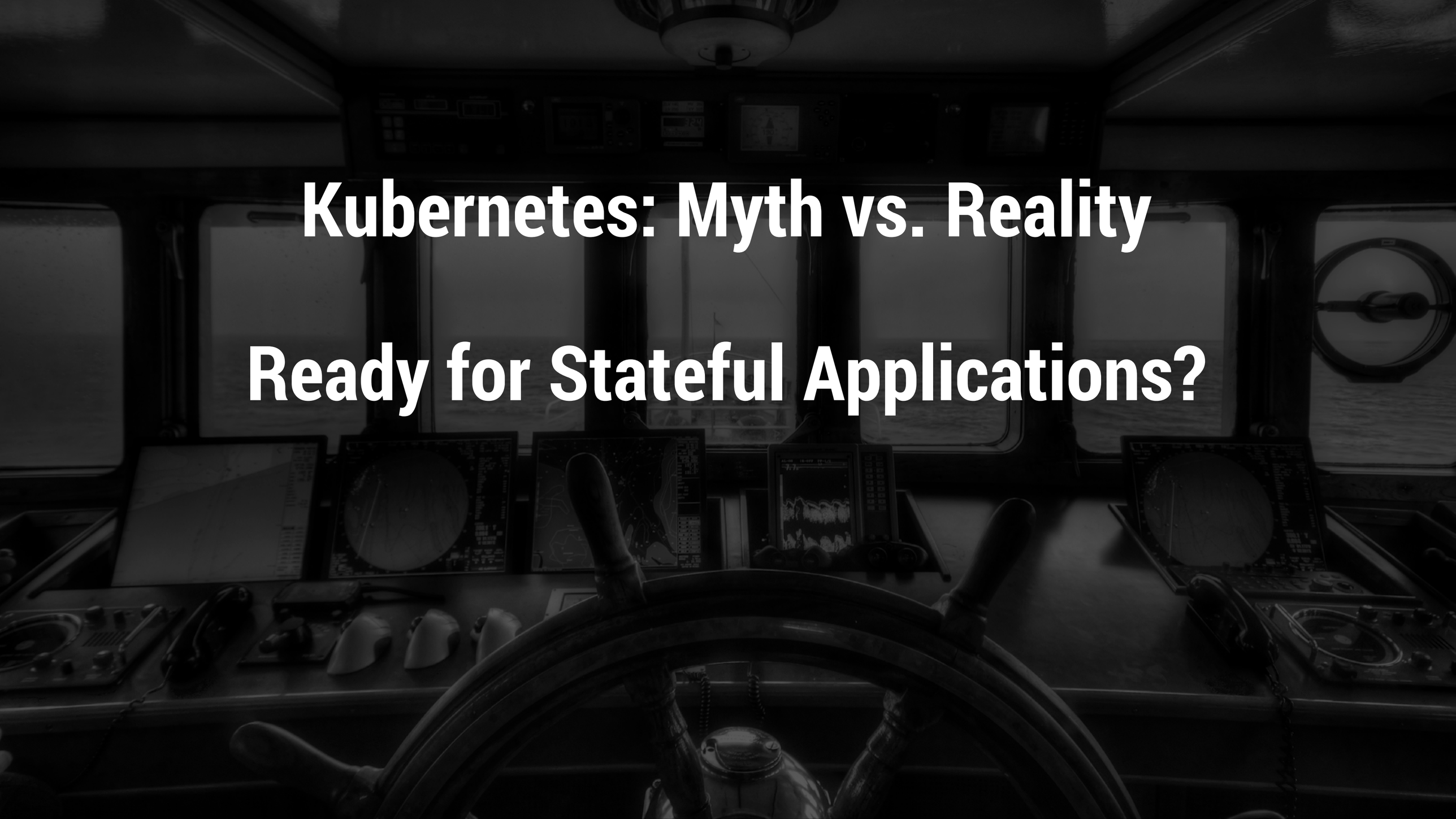
Previous Life
Senior Software Engineer,
Team Lead, and Architect @ Instructure

Niraj Tolia

Co-founder & CEO @ Kasten

Industry and Academic Storage Experience
(20+ patents filed, ~3000 citations)

Dell EMC (Cloudboost), Maginatics (Distributed File Systems), HP Labs (Next Gen Storage), Carnegie Mellon (PhD, Deduplication)



Kubernetes: Myth vs. Reality

Ready for Stateful Applications?

50%

of Top 10 containers running in Kubernetes are stateful

57%

of monitored Kubernetes clusters are running StatefulSets

70+

Kubernetes storage drivers available for use today!

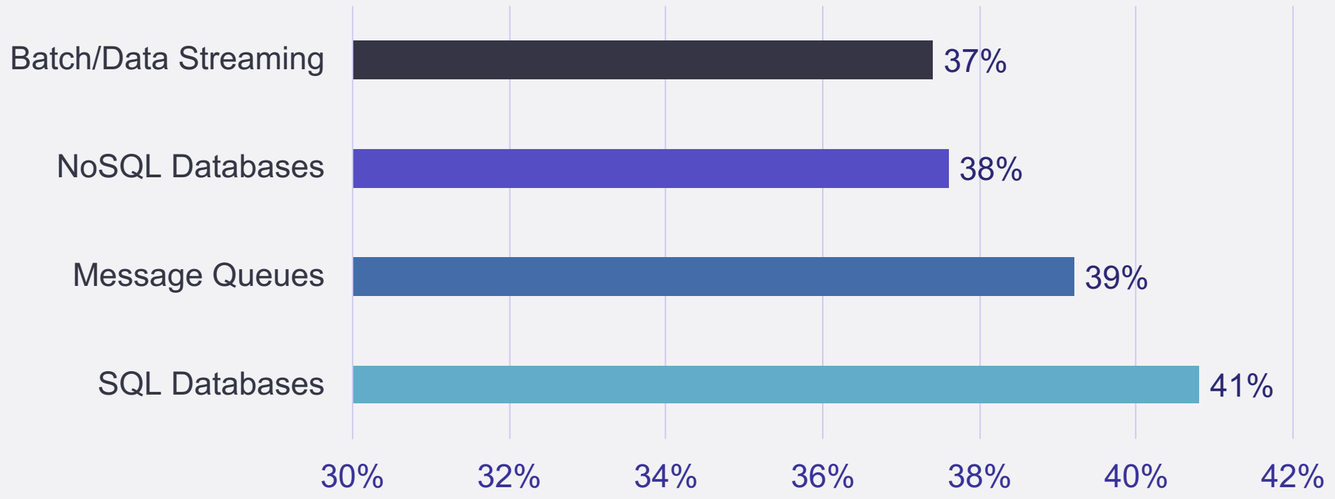
2019 Container Usage Report, Sysdig
Kubernetes CSI Project, 2020

2020 Data

55%

of organizations indicate that **half or more** of their container applications are stateful (451 Research)

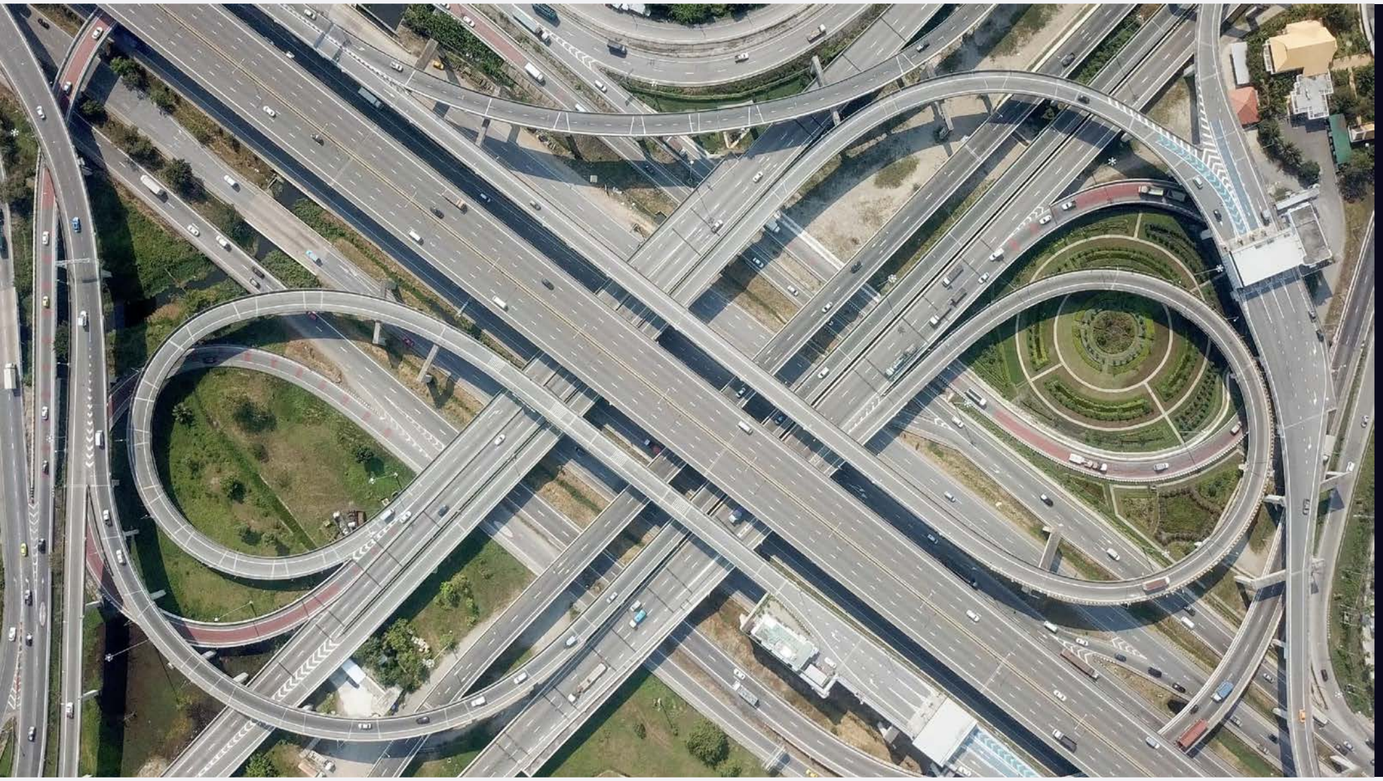
Stateful Application Type Deployed on Kubernetes



451 Research, Voice of the Enterprise: DevOps Workloads and Key Projects 2020
Kubernetes Application Survey, 2018

Does The Old Data Management Way Still Work?

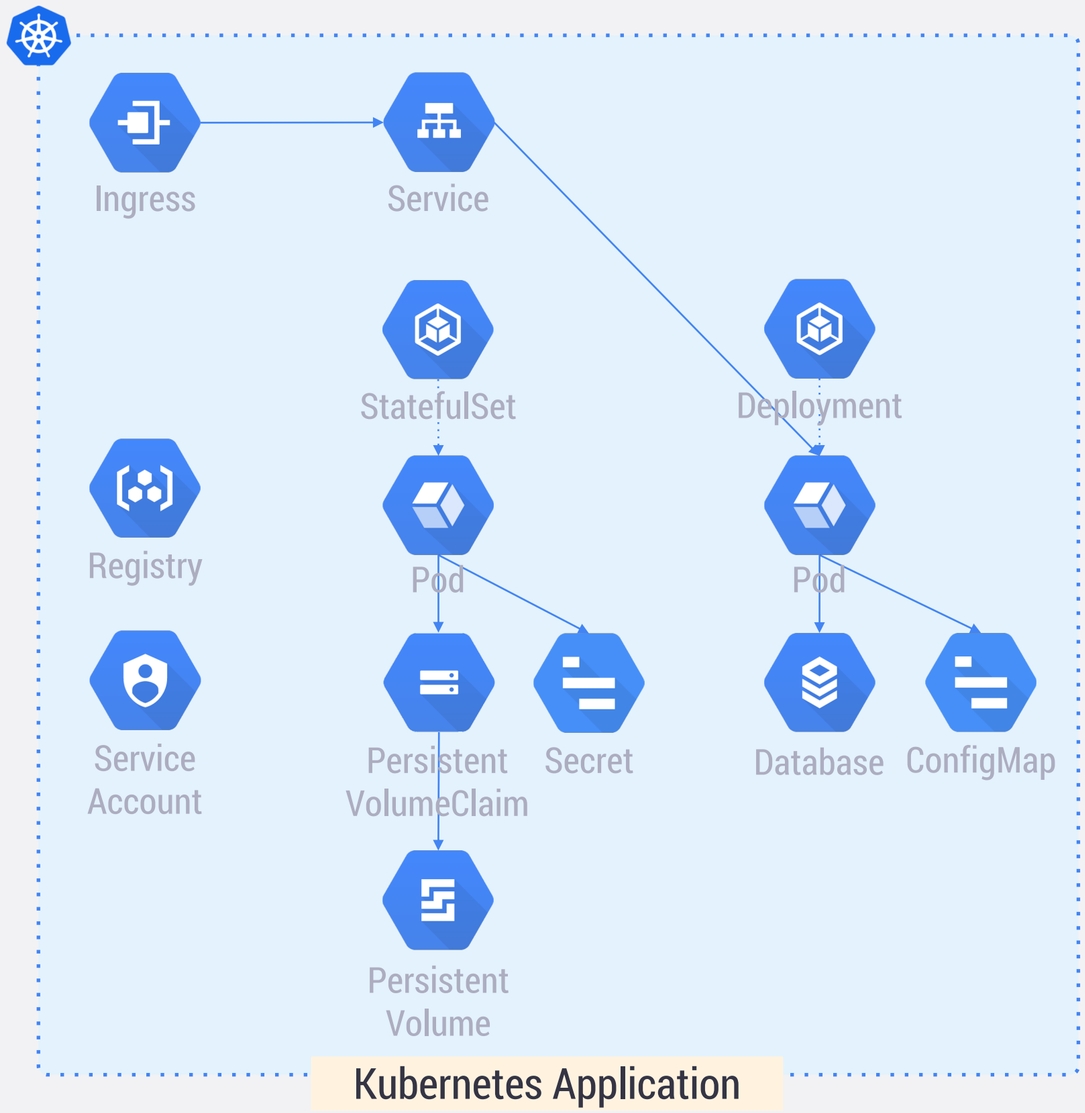
what’s different?
deployment patterns



Kubernetes Deployment Patterns

- No VM <-> Application Mapping,
- Dynamic Rescheduling
- Constant Redeployments
- Multi-Tenant Clusters

required approach: focus on complete application
kubernetes resources and persistent state



Applications as the Operational Unit

Automatic and complete application capture
Consistent data and application resources capture
Namespaced objects + non-namespaced dependencies

Abstract underlying infrastructure
Seamless support for storage and data services within and across clusters, regions, and clouds

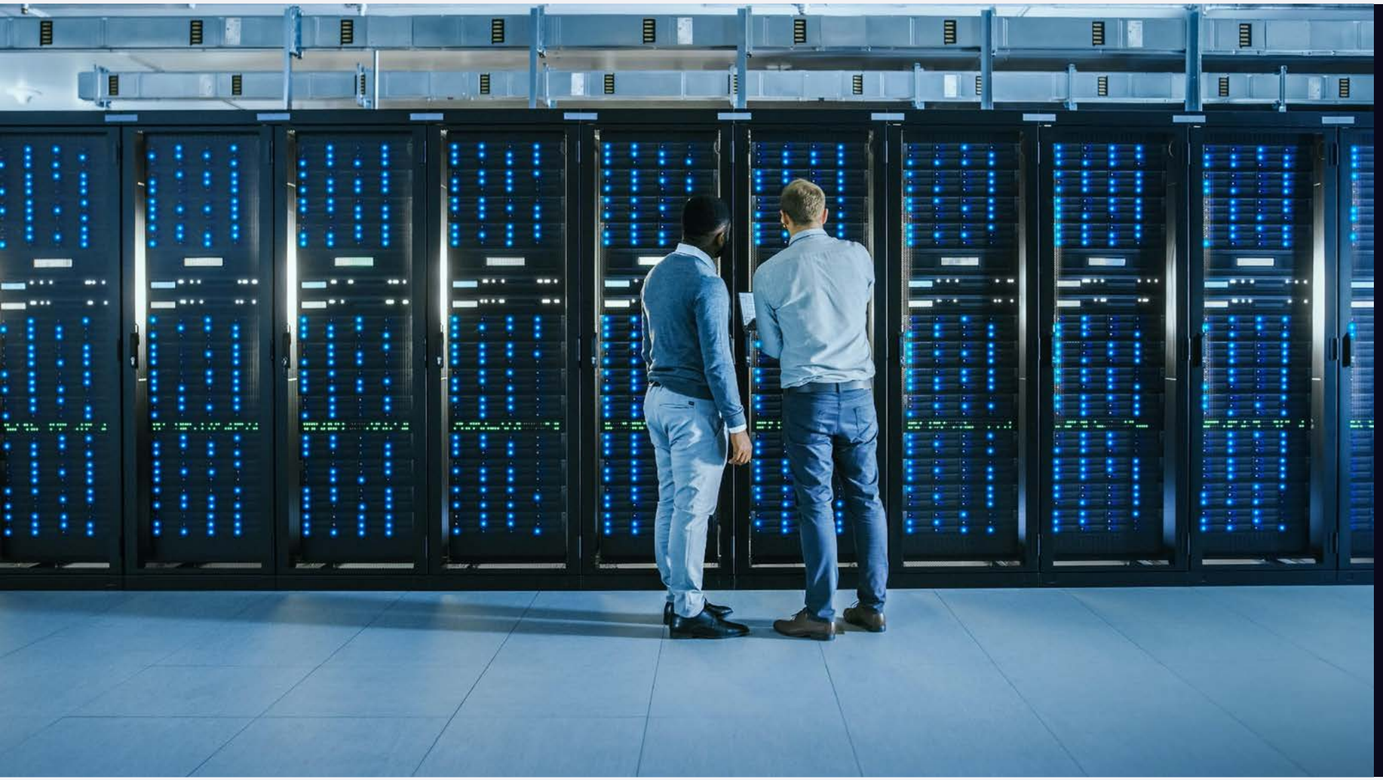
Perform coordinated operations
Proper sequencing of resource and data operations
Meaningful applications cannot be restored as-is

what’s different?
rise of devops

DevOps and “Shift Left”

- Focus on Applications, Not Infrastructure
- Infrastructure-as-Code
- Self-Service and Dynamic Provisioning
- Greater Accidental Risk

what’s different?
scale



Application Scale

- Explosion in Application Components
- Dynamic Autoscaling (Clusters and Applications)
- Polyglot Persistence
- Multi-Cluster Use Exploding

kubernetes data management
must be hardened for day 2 scale

RED HAT® OPENSHIFT aws ceph AWS EBS

54 nodes, 216 CPUs, 1.7 TB RAM
173 Applications/Projects
Multi-Vendor Storage: 415 Volumes, Multi-TB

Number	**Component** (subset)
2,126	Pods (1,380 workloads)
3,166	Secrets
1,411	Services
3,483	Image Information
768	Service Accounts
915	Configuration
3,484	Role Bindings
5,137	Other Components
18,393	**Total** (average 112/app)

sopra steria

Top 3 French IT Firm

DEVOPS RUN

700 dev:2 ops ratio
Communication challenges

APPLICATION DIVERSITY

COBOL php GO Java
PostgreSQL elastic MySQL HIVE redis etcd
mongoDB ORACLE cassandra

the old way is infra-centric
scales poorly and leaves data exposed

Use existing VM-level data protection solutions

- ✓ Data-store snapshots
- ✗ Limited recovery options
- ✗ Weak consistency
- ✗ Complex restore procedure

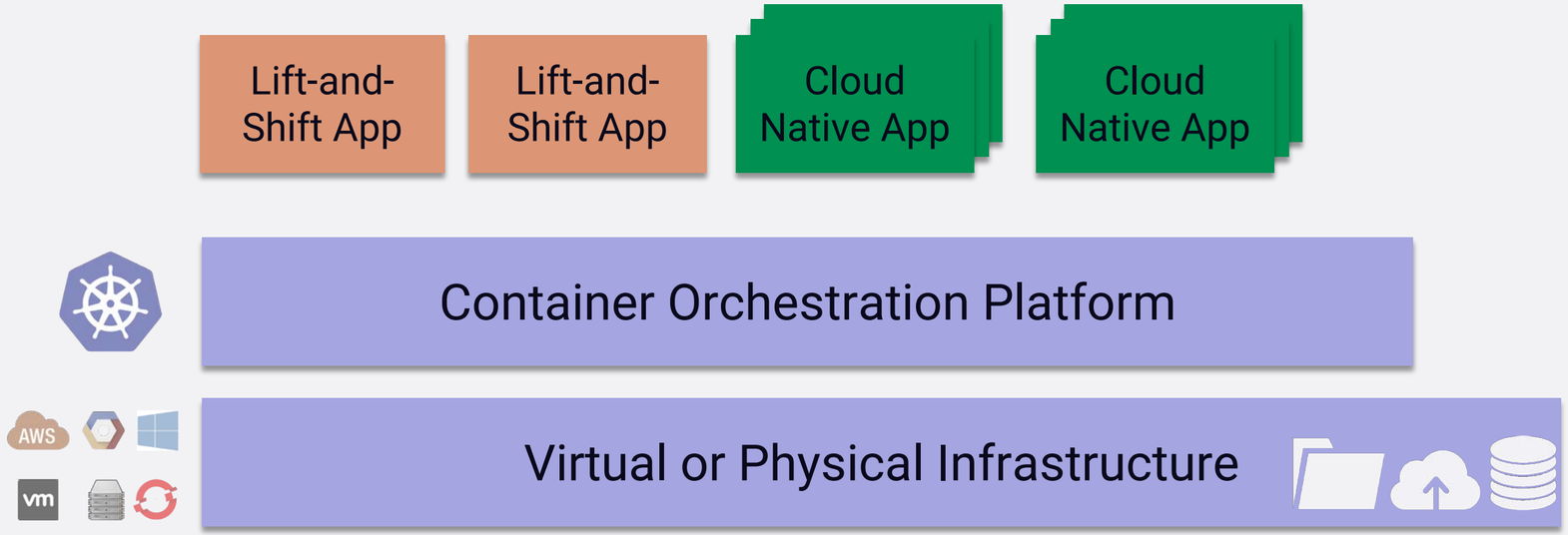
Let me put together a “quick” script

- ✓ Tailored to application
- ✗ More complex than expected
- ✗ Often tied to infrastructure
- ✗ Difficult to maintain

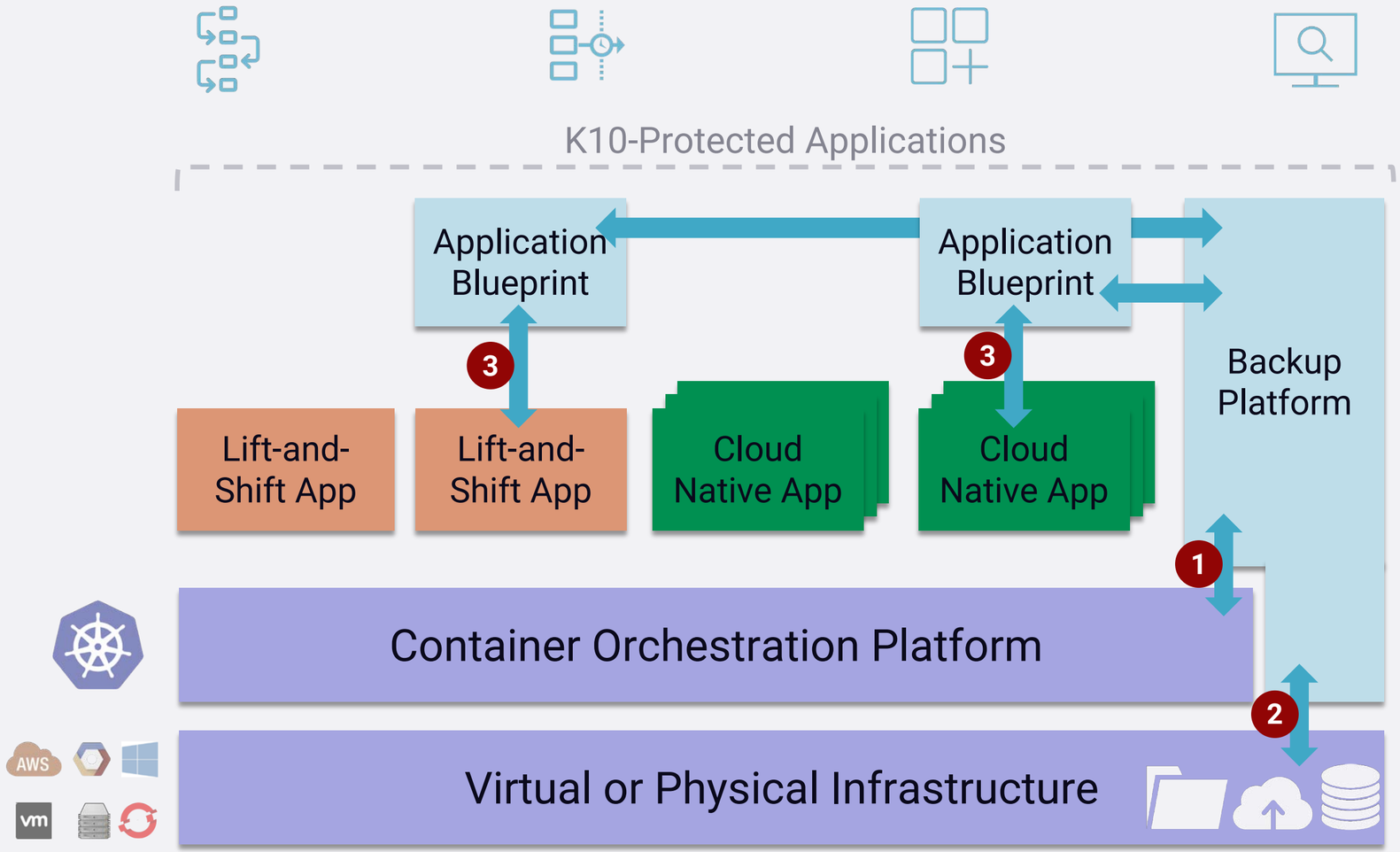
My storage overlay does backups & migration

- ✗ No fault isolation
- ✗ Lowest common denominator
- ✗ 2X management complexity
- ✗ Performance cost for overlays

kubernetes deployment architecture
a high-level overview



kubernetes-native backup architecture
essential touchpoints



1 Orchestrator APIs

Uses Kubernetes API to discover applications and underlying components and perform lifecycle operations.

2 Infrastructure APIs

No proprietary storage layer. Minimal integration with infrastructure specific APIs for the following:

- **Block storage provider** - Snapshot functionality, snapshot and block copy
- **Object/file provider** - S3-compatible object store or other file storage like NFS for artifacts

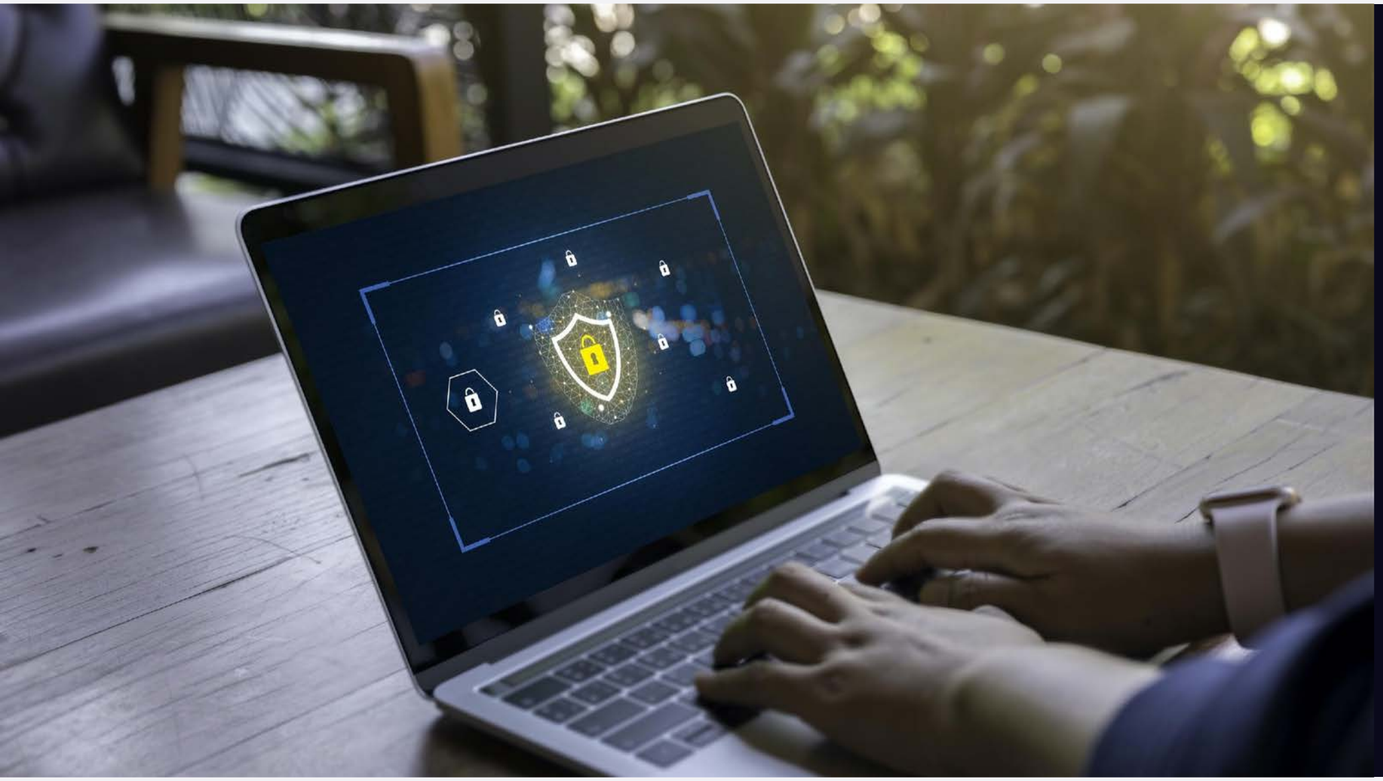
3 Application Framework

Optional agentless application-centric hooks can be invoked by easy-to-use blueprints

DEMO

Other Data Management Concerns to Watch out for

data management
security



Security and Protection Gaps

- Support for Network Policies
- Authentication (OIDC, Token, etc.) w/ Self-Service
- End-to-End Encryption w/ Customer Managed Keys
- Quick Recovery from Ransomware Attacks

data management
ecosystem integration

Ecosystem Integration

- Database and NoSQL System Hooks
- Cloud-Native Monitoring and Alerting
- Kubernetes-Native CRD-Based APIs
- Mobility and Freedom of Choice

DEMO

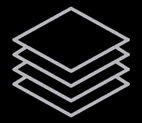
Summing Up: Things to Look for

Backup & Recovery

Application Mobility

Disaster Recovery

Multi & Hybrid Cloud



Polyglot Persistence

Multi-Tenancy RBAC

Built for Kubernetes

Purpose-built for Kubernetes using cloud-native architectural principles.

Ease of Use

State-of-the-art management interface; cloud-native API, easy install, extensible.

End-to-End Security

Support for RBAC, OIDC, Token Auth, IAM, and industry-standard encryption

Rich Ecosystem

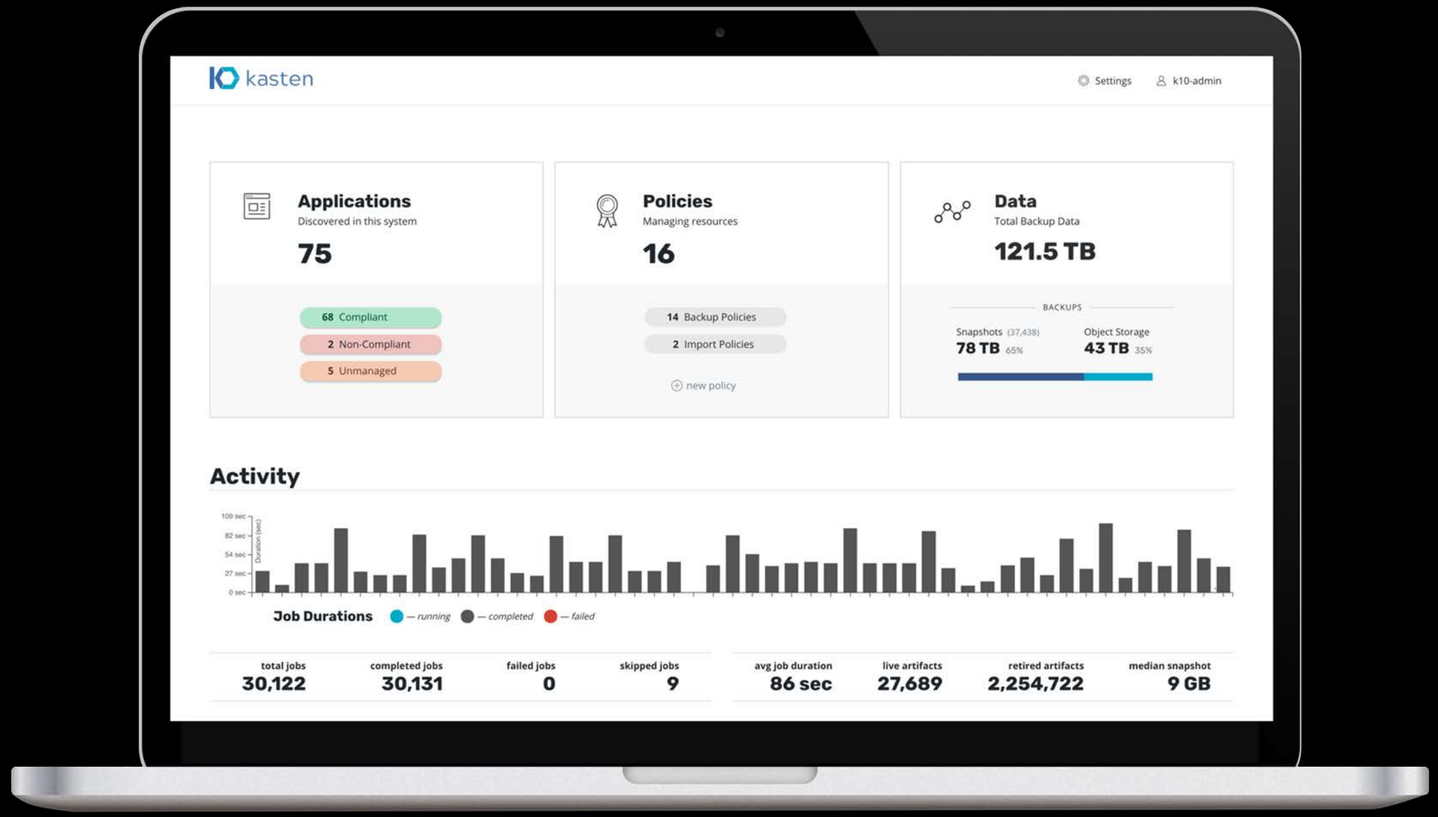
Extensive support across the entire application stack. Select the best tools or infrastructure.

kasten k10

kubernetes backup and mobility made easy

K10 PLATFORM

Use Our Forever-Free Starter Edition!

https://kasten.io/product
info@kasten.io

- Application Discovery
- Policy-driven Automation
- Ease of Use, Simple UX
- End-to-End Security