

Data Protection in a Kubernetes-Native World kasten



@nirajtolia CEO, Kasten

about me



Co-founder & CEO @ Kasten Leading Kubernetes Backup Platform Using Kubernetes since 2015

Industry and Academic Storage Experience (20+ patents filed, ~3000 citations) 3rd SNIA SDC Talk

Dell EMC Data Protection (Cloudboost) Maginatics (Distributed File Systems) HP Labs (Next Gen Storage) Carnegie Mellon (BS, MS, PhD on Deduplication)



Niraj Tolia

Kubernetes

Container Orchestration: Automated Deployment, Scaling, & Management

talk agenda kubernetes today, futures, providers





Kubernetes Today

Where is Kubernetes today? Why is it important? How big is it?

Kubernetes Futures

Looking ahead. How has Kubernetes changed application deployment and ops?





Kubernetes Storage

Is Kubernetes storage ready? Are people using it in production? How do we protect it?



Kubernetes Is The Next Wave Of Infrastructure!

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Observability and Analysis



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l.cncf.io

previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path.

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kubernetes adoption it's still early but it feels like 😥





59%

of respondents are running Kubernetes in production

20%

of those with Kubernetes in production have 50 or more clusters

> page 08

Source: The State of Kubernetes, 2020, VMware

kubernetes standarization coming faster than one might think...





Length of Time To **Standardize on Kubernetes**

Source: Voice of the Enterprise, DevOps, 2H 2019, 451 Research

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developer adoption they are the key influencers today

6.5M Cloud-Native Developers Driving Digital Transformation



Kubernetes Developers Influencing Buying Decisions



page 010 Source: State of Developer Nation, Aug 2020, DATA/CNCF

Kubernetes "Day 1" is winding down

The initial challenges to provision, install and roll out Kubernetes have been addressed

This is visible in the ongoing consolidation for companies that tackle Day 1 problems



Kubernetes "Day 2" is the focus now

production deployments at scale

Important areas here include data management, security, observability



Day 2 challenges include operationalizing

Kubernetes: Storage and Data Management Exploding Day 2 Use Case

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!



2020 Data

(451 Research)



of organizations indicate that half or more of their container applications are stateful



Talk Colored By Shifting Dev and Ops Roles

kubernetes-native data management silo breakdown, self-service, use case merge





Cross-AZ and Region, Multi and Hybrid Cloud, Storage Transforms

what's different? deployment patterns





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Kubernetes Deployment Patterns

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











VM-based solutions loses application visibility with the introduction of Kubernetes







VM-based solutions loses application visibility with the introduction of Kubernetes

Transition to microservices increases scale by 100X with Kubernetes



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VM-based solutions loses application visibility with the introduction of Kubernetes

Transition to microservices increases scale by 100X with Kubernetes



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No single VM has a complete application and breaks VM-based protection platforms

Х





Transition to microservices increases scale by 100X with Kubernetes \times



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No single VM has a complete application and breaks VM-based protection platforms

95% of application components are now Kubernetes resources and not on disk

what's different? scale





Application Scale

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

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



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

Applications as the operational unit

kubernetes-native backup must be battle hardened for day 2 scale







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 100% transparent to developers

USE CASE DIVERSITY

Backup Disaster Recovery Application Mobility

APPLICATION DIVERSITY





what's different? rise of devops and "shift left"





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DevOps and "Shift Left"

Focus on Applications, Not Infrastructure

Backup needs to be on Day1 in dev and not just in prod

• Self-Service and Dynamic Provisioning via Infrastructure as Code (IaC)

Greater Accidental Risk w/ self-service

devsecops: shift left for data protection backup/recovery baked into "golden" stack





BUILT FOR KUBERNETES 1500+ devs, 100+ projects, multi-tenant accounts, small ops teams

BACKUP/DR REQUIREMENTS

Easy to deploy via CI/CD 100% automation (backup, DR) Extensible for custom needs



END-TO-END SECURITY

Encryption, IAM, RBAC, Auth Compliance: 30+ to 3-5 days Future-proof multi-app policies

what's different? kubernetes operator challenges





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Operator Challenges

Skills gap and talent shortage is critical Ops has to be application vs. infra-centric Must enable self-service for team scaling Multi-cluster, GitOps, CI/CD calls for 100% automation Must deal with rapidly evolving Kubernetes releases

kubernetes moves quickly upgrade frequently or be left behind

Releases

Kubernetes releases minor (x.Y.z) releases every 3 months. No official roadmap.

EOL in 9 Months

Only 3 versions supported at a given time. Fixes can only show up in most recent patch releases

	jan	feb	mar	apr	may	jun	j
Kubernetes 1.17		Full S	Support			Ра	atch
Kubernetes 1.18					Full S	upport	
Kubernetes 1.19							





Restore Xforms

Restores must deal with deprecated API transforms, object refreshes (e.g., secrets), etc.



Other Data Management Concerns To Watch Out For



data management cloud-native protection gaps





Infra. & Software Protection Gaps

Backup vs. replication fault-tolerance differences Public cloud annual failure rates (AFR) > 0 File system freeze typically unavailable or insecure Need to understand entire stack: OS, Kubernetes, application, database, networking, security

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





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Ecosystem Integration

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



Want to learn more? **Download ebooks today!**

https://kasten.io/resources/



Reasons For Kubernetes-**Native Backup**

kasten



Want to learn more? Download "Phippy In Space" today! https://kasten.io/resources/



Summing Up: Things to Look for











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



