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Kubernetes is Everywhere – What About Cloud Native Storage?

Live Webcast

July 19, 2022

10:00 am PT / 1:00 pm ET

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SNIA - By the Numbers

Industry Leading
Organizations

Active Contributing
Members

IT End Users &
Storage Pros
Worldwide

180

2,500

50,000

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What We Do

Educate vendors and users on cloud storage, data services and orchestration

Support & promote business models and architectures: OpenStack, Software Defined Storage, Kubernetes, Object Storage

Understand Hyperscaler requirements Incorporate them into standards and programs

Collaborate with other industry associations

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Topics

- Quick Kubernetes Overview

- Quick Overview of Persistent Storage

- Discussion

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Digital Transformation

- Desire for faster innovation

- There is a need for
  - Scalability
  - Flexibility
  - Consistency

- The world is becoming software defined!
  - Infrastructure modernization
  - Application modernization
  - Cloud native

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Modernization

Infrastructure

- **Physical Infrastructure**
  - Hardware is a 'permanent' asset
  - Keep it running at all costs
- **Virtual Infrastructure**
  - Platform is a virtual machine
  - Automated deployment, snapshots
- **Ephemeral Infrastructure**
  - Declarative - Infrastructure as Code
  - Immutable infrastructure

Application

- **Traditional environment**
  - Monolithic application
  - Shared system resources
- **Virtualized environment**
  - Private system resources
- **Containerization**
  - Resource partitions
  - Microservices
- **Kubernetes**

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Cloud Native

Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.

Source: CNCF Cloud Native Definition v1.0

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Cloud Native Storage

- **Attributes**
  - Availability, Scalability, Performance, Consistency, Durability, Deployment
- **Storage Stack**
  - Topology – Centralized, Distributed, Sharded. Hyperconverged
  - Data Protection – RAID (striping, mirrors, parity), Erasure Coding, Replicas
  - Data Services – Replication, Snapshots, Data Reduction, Encryption
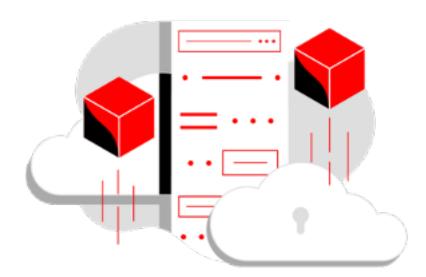 - Physical Layer – SATA/SAS, SSD, NVMe
- **Data Access**
  - Block, Filesystem, Shared Filesystem, Object, Key Value, Databases
  - Volumes, Application API

bit.ly/cncf-storage-whitepaperV2

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Broad spectrum of workloads are being deployed in containers and Kubernetes[1]

76% Databases and data cache

65% AI/ML software

59% Web servers

58% Logging and monitoring

57% Data Ingestion, cleansing, and analytics

48% Programming languages and frameworks

45% Application servers

25% Message broker service

1 Pulse, sponsored by Red Hat. "State of workloads adoption on containers and Kubernetes," November 2021.

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Considerations for container storage

Persistent data platform for Kubernetes

Data management

- Containers are ephemeral. Persistent storage provides state for applications
- Orchestration and management
- Static and dynamic provisioning
- Data access modes (RWX, ROX, RWO)
- Data protocols (file, block, object) – support for varied workloads
- Hybrid/multi-cloud support
- Object bucket claims, namespace buckets
- Mixed-media support
- Consistency across infrastructures – public & private cloud, VMs, bare metal
- Delivery models – edge, core, cloud, managed

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Considerations for container storage

Business continuity for workloads in Kubernetes

Data resilience

- Data replication
- Recovering from node failures
- Support for multiple failure zones
- Snapshots and clones
- Cluster-aware backup and recovery of data in context with applications
- Disaster recovery
  - Regional failover for site disasters
  - Metro clusters for hardware system failures
- Data migration

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Considerations for container storage

Confidentiality, Integrity and Accessibility

Data security & governance

- Authentication and authorization
- Policies
- Cluster-level data encryption
- Integrates with key management services
- Volume encryption for isolation between tenants
- Immutability – write once, read many
- Auditing and Compliance
- SEC & FINRA
- GDPR

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Considerations for container storage
Confidentiality, Integrity and Accessibility

Data discovery

- Data ingestion
- Preparation, tagging and enhancement
- Search
- Data federation
- Object caching

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Thank You!

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