Kubernetes Trials & Tribulations: Cloud, Data Center, Edge

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Today’s Presenters

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SNIA - By the Numbers

Industry Leading Organizations: 180
Active Contributing Members: 2,500
IT End Users & Storage Pros Worldwide: 50,000
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

- Kubernetes Challenges:
  - Costs, data sovereignty, security
  - Data gravity, latency, and extending workloads to the edge

- Discussion:
  - How are trends converging?
  - Is cloud repatriation really a thing?
  - Are traditional hardware vendors reinventing themselves to compete?
  - Where does the data live?
  - How is the data accessed?
  - What workloads are emerging?
Modernizing Application Development in the Hybrid Cloud

Michael St-Jean
### Reality of Enterprise IT Environments Today

Diverse app portfolios, mixed infrastructure environments, and limited automation

<table>
<thead>
<tr>
<th>Applications</th>
<th>Infrastructure</th>
<th>Development, IT processes, and skills</th>
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<tr>
<td>AI/ML</td>
<td><img src="image" alt="Cloud-native and microservices" /></td>
<td><img src="image" alt="Developer tools" /></td>
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<td>Analytics</td>
<td><img src="image" alt="Infrastructure" /></td>
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<td>Serverless</td>
<td><img src="image" alt="63% of organizations are already using hybrid cloud today." /></td>
<td><img src="image" alt="People and policies" /></td>
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<td>Cloud-native and microservices</td>
<td><img src="image" alt="54% of those not using hybrid cloud today plan to within 24 months." /></td>
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<td>Java™</td>
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Cloud native and Kubernetes lead to multicloud and multicloud...

29% have more than 10 production Kubernetes clusters

74% of customers have DevSecOps initiatives

93% Use multiple infrastructure clouds

81% Use multiple public clouds and one or more private clouds
…which leads to complexity, inconsistency and security risks

In a hybrid cloud world, it’s hard to:

- Ensure a consistent experience for developers
- Scale Kubernetes to multiple clusters, clouds
- Manage data across environments
- Apply consistent security controls at scale
- Shift security left into the development process
- Verify configurations, policies, and compliance
But multiple clusters and hybrid cloud are useful for many reasons:

- Application availability
- Reduced latency
- Address industry standards
- Geopolitical data residency guidelines
- Disaster recovery
- Manage security and compliance
- CapEx cost reduction
- Avoid vendor lock-in
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

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What’s in a modern application platform?

- Unified platform for Dev, Sec and Ops
- Transparent to developers
- Extensible - works with what you have
- Observability, management and monitoring
- Runs on any infrastructure or cloud
- Security configuration management and enforcement
- Consistent data management
- Vulnerability scanning and secure image management
Accelerate application modernization with KubeVirt

**Rehost**
- Lift and shift traditional applications
- Easy and low friction
- Consolidate resources

**Refactor**
- Run traditional .NET framework apps on Windows Server Containers
- Extend benefits of containers to Windows
- Supports newer versions of Windows

**Rearchitect**
- Rearchitect traditional apps to cloud-native
- Full integration with emerging apps and services
- Schedule when it makes sense for the business

**Rebuild**
- Develop and test new applications to replace existing
- Take advantage of a robust community
- Integration with other apps and operationalized lifecycle
“96% of customer-obsessed firms adopt new technologies before their competitors do”\(^1\)

“800% increase in the number of apps deployed at the edge”\(^2\)

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1 Forrester: The Tools That Matter: Demystifying Emerging Technologies, May 2021
The business drivers behind edge computing
Bringing new technologies and containerized applications to create differentiation

**Fostering** faster data-driven outcomes
- Deliver better products
- Make faster decisions
- Use resources more efficiently

**Delivering** better experiences, anywhere
- Use immersive apps
- Online streaming, gaming, etc.
- On a train, ship, oil rig, or even in space

**Meet** data residency/sovereignty requirements
- Storing or processing of personal data (subject to legal protections of a country) within a geographical area
Edge computing comes with its own considerations

**Scale**
Infrastructure and application scale-out to 100s to 1000s of nodes and sites

**Location**
Variability in space, power /cooling, hardware resources, and network connectivity

**People**
As your architecture scales, how will your teams scale?

**Security**
Reduced security when compute is geographically dispersed
Edge Tiers

End-User Premises Edge
- Edge Endpoint
- Edge Gateway
- Edge Server

Provider Edge
- Provider Far Edge
- Provider Access Edge
- Provider Aggregation Edge

Provider/Enterprise Core
- Regional Data Center
- Core Data Center

"last mile"

* Edge computing == Fog computing (there is no real difference other than marketing)
Distributed event-driven architectures

Configuration as code
Go beyond documentation using GitOps process to simplify deployment

Maintained over time
Each use case has a lifecycle to ensure they are kept up to date while they are being used

Highly reproducible
So that you can scale out your deployments with consistency

From POC to production
Ensure your teams are ready to operate at scale

Tested as a use case
Confidence the configuration continues to work

Open for collaboration
Anyone can suggest improvements and contribute

hybrid-cloud-patterns.io
IT Toolbox: How to Build Validated Patterns for Continuous AI Deployment at the Edge

Article
Panel Discussion
Discussion Points

- So how are all these trends coming together?
- Is cloud repatriation really a thing?
- How are traditional hardware vendors reinventing themselves to compete?
- Where does the data live and how is the data accessed?
- What workloads are emerging?
- How and why will Kubernetes succeed?
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