VERICA

Continuous Verification Platform

Casey Rosenthal, CEO, Cofounder

- Built and Managed the Chaos Engineering Team at Netflix
- Built the Chaos Automation Platform (ChAP)
- Defined Chaos Engineering and wrote the book

Live demos & Continuous Verification use cases

Service Level Objectives - What They Are and How to Use Them

- **Service Level Indicators** *"a carefully defined quantitative measure of some aspect of the level of service that is provided." Examples are response latency, error rate, dropped packets*
- **Service Level Objectives** *"A target value or range of values for a service level that is measured by an SLI. A natural structure for SLOs is thus SLI ≤ target."*

Excerpts From
Site Reliability Engineering
Beyer et. al., 2006

> *"How can you set a reasonable target if you don't yet have any users, and therefore may not know what an acceptable failure percentage might look like for them? The honest answer is: just take an educated guess!"*

Excerpt From
Implementing Service Level Objectives
Hidalgo, 2020

Brian Weyer, Senior Software Engineer - Platform

- Loves building software that solves problems
- Enjoys designing and 3D printing useful things

Optimal Kubernetes

The Kubernetes team has a corporate standard Kubernetes

+ new apps and microservices being built

+ new developers added with varying levels of experience

= Inconsistent Kubernetes clusters across the organization

The Verica Solution

Pod Best Practices creates a paved path for all teams to use and lets you scale the institutional knowledge of your Kubernetes expert and verify industry best practices.

Secure Kubernetes

Certs are critical to meet compliance requirements, but...

+ unknown dates/unknown automation

+ application deploys and modifications

= Container security stopped working and no one knew.

The Verica Solution

Expired Certs lets a platform operator verify cluster certificates are up-to-date, indicating the need for rotation before an issue occurs.

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Secure Kubernetes

An aviation customer has a core application that builds a cache on deployment in an init container

+ cache usage grows over time

+ cache readiness time increases

= Pod deploy times increase to unsafe durations

The Verica Solution

Deployment Pod Recovery Time lets a platform operator know if your kubernetes application can reach a ready state within the specified time

Jay Landro, Engineering Manager - Kafka

- Passionate about event driven systems
- Frontender at heart (CSS is the best)
- Loves to ski (Telemark, XC & Downhill)
- Learns by breaking things

Visible Kubernetes

A security incident has occured requiring invalidation of logging API keys

+ Logs are crucial data points for system health

+ Metrics are also used for business objectives

= Potentially out of compliance with ISO 27001

The Verica Solution

Log Delivery can help maintain compliance by validating that logs produced within a cluster are collected by a collector and properly sent to logging provider within a reasonable time period

kafka

2 companies have merged and applications now utilize Kafka as single source of truth

+ Variety of skill levels among programmers

+ Kafka clients integrated in multiple programming languages

= Potential for loss of availability or degradidation

The Verica Solution

Consumer Group Rebalance is designed to optimize for performance & availability by triggering a common consumer group rebalancing event and recording the latencies

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kafka

Organization migrated to centralized cloud based Kafka service (like Confluent Cloud)

+ Applications distributed across multiple regions

+ End to end latencies are difficult to determine for Kafka based applications

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= Periods of operation outside of SLO

The Verica Solution

Client Latency adds latency between clients and the Kafka cluster to ensure that messages will continue to be consumed within the specified consumption SLO

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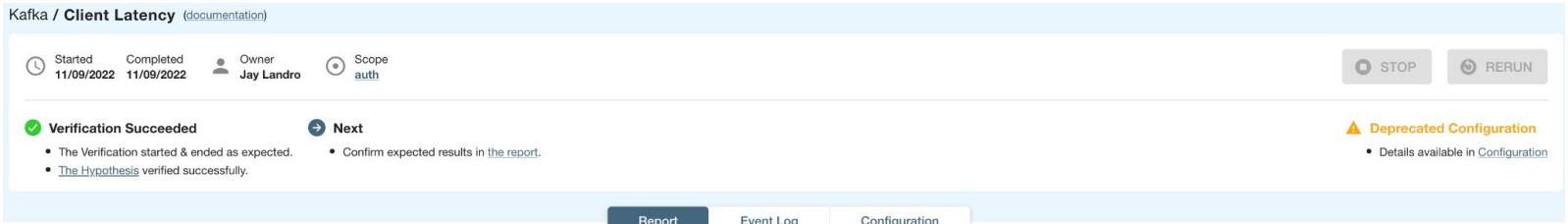
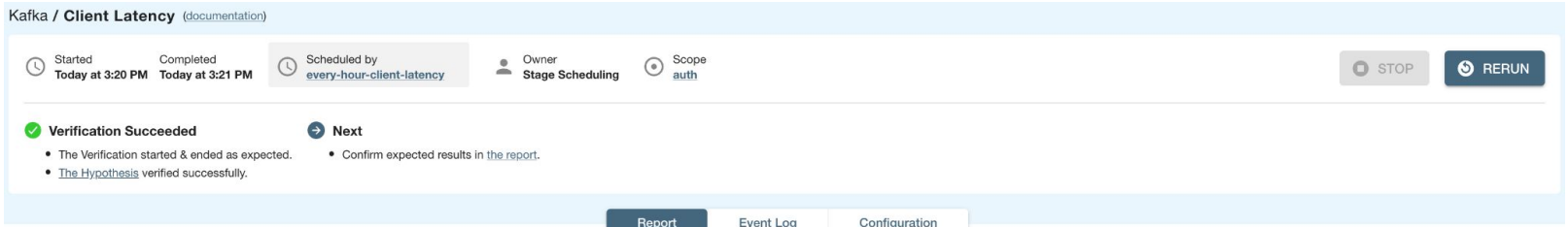
Applications running in US-West-2, Kafka service in US-East-1



	50%	90%	95%	99%	99.9%
Roundtrip Latency	152 ms	230 ms	305 ms	1126 ms	1543 ms

Description	Value
Configured Latency	0 ms
Record Size	100 bytes
Consumption SLO	15000 ms
Expected consumption percentage within SLO	99 %
Observed consumption percentage within SLO	100 %
Messages consumed within SLO	200000 msgs
Messages consumed outside SLO	0 msgs

Applications running in US-West-2, Kafka service in US-West-2



	50%	90%	95%	99%	99.9%
Roundtrip Latency	23 ms	84 ms	148 ms	287 ms	531 ms

Description	Value
Configured Latency	0 ms
Record Size	100 bytes
Consumption SLO	6000 ms
Expected consumption percentage within SLO	90 %
Observed consumption percentage within SLO	100 %
Messages consumed within SLO	200000 msgs
Messages consumed outside SLO	0 msgs

Demo by **Alex Wise**

Alex Wise, Sr. Solutions Architect

Visible Kubernetes

A company used a storage driver to create persistent volumes in the on-premises Kubernetes cluster

+ the driver was forgotten during upgrade cycles

+ eventually it was too far out of specification to function

= the cluster could not create new volumes and no one knew

The Verica Solution

Cluster Functional confirms that a Kubernetes Cluster can provide the core functionality that is required of it.

Visible Kubernetes

Build confidence in your infrastructure by proactively testing its capabilities and known modes of failure

Cluster Functional verification will test for:

- Are all the components in the kube-system namespace operational?
- Are all nodes in a Ready status
- Can every node deploy a pod?
- Can pods communicate with each other?
- Can nodes mount volumes?

The Verica Solution

Cluster Functional confirms that a Kubernetes Cluster can provide the core functionality that is required of it.

Visible Kubernetes

A communications company ran a large Kubernetes cluster that spanned a complex network topology

+ One of the nodes was in an edge computing datacenter

+ overloaded networking gear meant that node saw triple the latency of other nodes

= that latency resulted in slow feedback loops and poor operational control

The Verica Solution

Node Reachability confirms that each node in the Kubernetes cluster can communicate with each other node within a given latency percentile.

Visible Kubernetes

Build confidence in your infrastructure by proactively testing its capabilities and known modes of failure

Node Reachability verification will test for:

- Can pods on each Kubernetes node send network packets to the other nodes?
- Is the latency of node-node communication above a given threshold for a percentile?

The Verica Solution

Node Reachability confirms that each node in the Kubernetes cluster can communicate with each other node within a given latency percentile.

Visible  Kubernetes

A software development team used a Helm chart created by a central Platform team to deploy applications.

+ they changed the port their application listened on

+ they did not know to also change the port specified in the Helm chart.

= traffic could not reach the application and they did not understand why

The Verica Solution

Application Endpoint Reachability checks Kubernetes objects for common misconfigurations that prevent traffic from reaching the application.

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Visible Kubernetes

Build confidence in your infrastructure by proactively testing its capabilities and known modes of failure

Application Endpoint Reachability verification will test for:

- 6 common misconfigurations of pods
- 6 common misconfigurations of services
- 2 misconfigurations of ingresses
- An end-to-end test of reachability

The Verica Solution

Application Endpoint Reachability checks Kubernetes objects for common misconfigurations that prevent traffic from reaching the application.

Confidence in Infrastructure = Higher Availability

- Faster remediation, start debugging at the application level
  - Cluster Functional = Confidence in Cluster Operations
  - Node Reachability = Confidence in the Network
  - Application Endpoint Reachability = Confidence in Kubernetes Manifests

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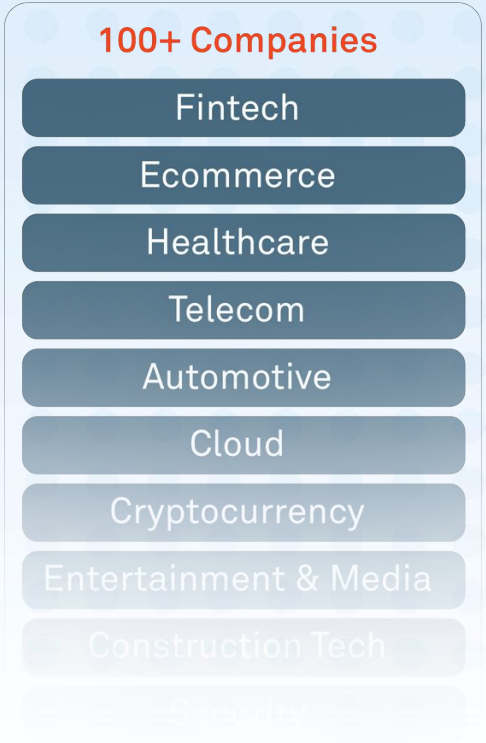
> “ The industry is focused on **reactive** tactics like detection, remediation, service degradation, and disaster recovery, but to identify vulnerabilities in a complex system we need a **proactive** approach.
>
> Verica is that approach. ”

JOHN ALLSPAW
CEO of Adaptive Capacity Labs,
Leader in software-based
Resilience Engineering

Common pain points across industries

- Unexpected outages
- Broken SLOs
- Misconfigurations with outsized impact
- Clusters limited by headroom
- Unmitigated security vulnerabilities
- Configuration drift
- and more...



CONTINUOUS VERIFICATION

An experimentation platform that allows teams to proactively, safely discover system weakness before they disrupt business outcomes.

verica.io

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Continuous Verification for Kubernetes

Do you know when a component is nearing failure and a risk for breaking SLOs?

Is your cluster secure and defended against adversaries?

Do you have confidence in app and cluster upgrades?

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Secure Kubernetes

A large Telco uses a popular container security product to meet compliance requirements, but...

+ configuration changes over time

+ application deploys and modifications

= container security stopped working and no one knew.

The Verica Solution

Vulnerable Image Detection Verification lets a platform operator determine if security measures on the system are adequately protecting the cluster.

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Getting value where you need it

Platform validation
- Ensure new clusters are fully functional
- Confirm deployments meet SLAs

Operational Efficiency
- Identify configuration drift
- Provide more information for troubleshooting
- Proactively identify SLO impacts

Platform Observability
- SLO Calculation and Accuracy
- SLO Attainment

Cost optimization
- Node instance type optimization
- Pod resource right-sizing

Harden security
- Confirm vulnerable images are blocked
- Validate protected components are unaltered

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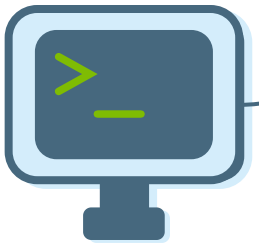

Developer

- Management and setup
- Verification edit/load
- View reports and Visualization

CVP Server

- On Prem install
- Dynamic instrumentation
- Orchestration
- Verification monitoring

Kubernetes Cluster

Kafka Cluster

- Production or test systems
- No agents needed
- Only instrumented while Verifications are running
- Blast radius controlled

CONTINUOUS VERIFICATION FOR YOU

- The latest verifications and releases of Verica
- Our team of world-class Kafka and Kubernetes engineers
- Roadmap Input

Appendix

Evolution of complex system operations

CI → CD → CV

Continuous Integration was promoted heavily as part of XP methodology as a way to achieve this and is now a common industry norm.

Continuous Delivery builds on the success of CI by automating the steps of preparing code and deploying it to an environment.

Continuous Verification Like CI/CD, **Continuous Verification** is born out of a need to navigate increasingly complex systems.