



KubeCon



CloudNativeCon

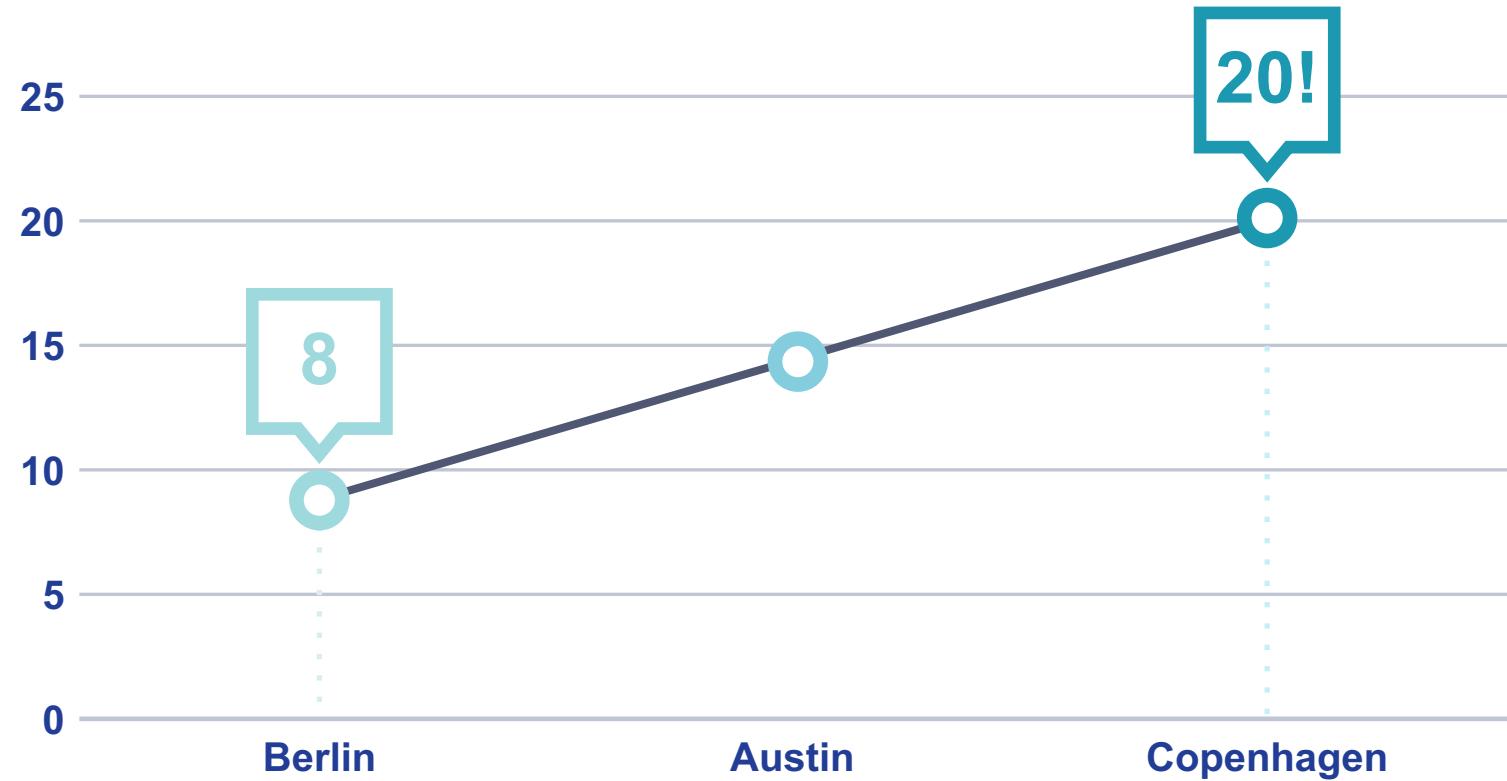
Europe 2018

# CNCF Project Updates

Liz Rice



# 20 CNCF Projects



# CNCF Project Stages



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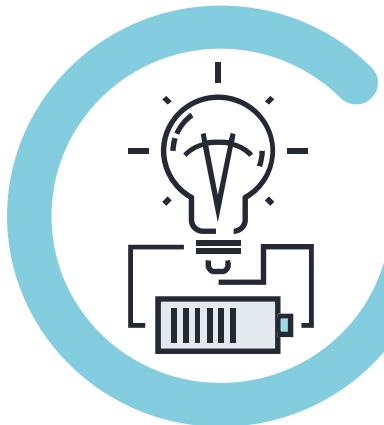


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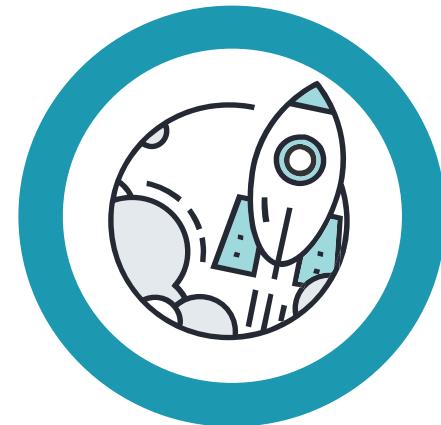
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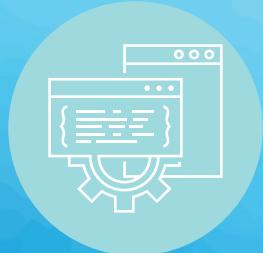
SANDBOX



INCUBATION



GRADUATED



# Sandbox Projects





Rook



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Cloud-native storage orchestrator

Portable abstractions for storage

Integrated with Kubernetes



# Open Policy Agent



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## GENERAL-PURPOSE POLICY ENGINE

authorization

admission control

rate limiting

and more



HOW DO  
WORKLOADS  
IDENTIFY  
THEMSELVES  
AND EACH  
OTHER?

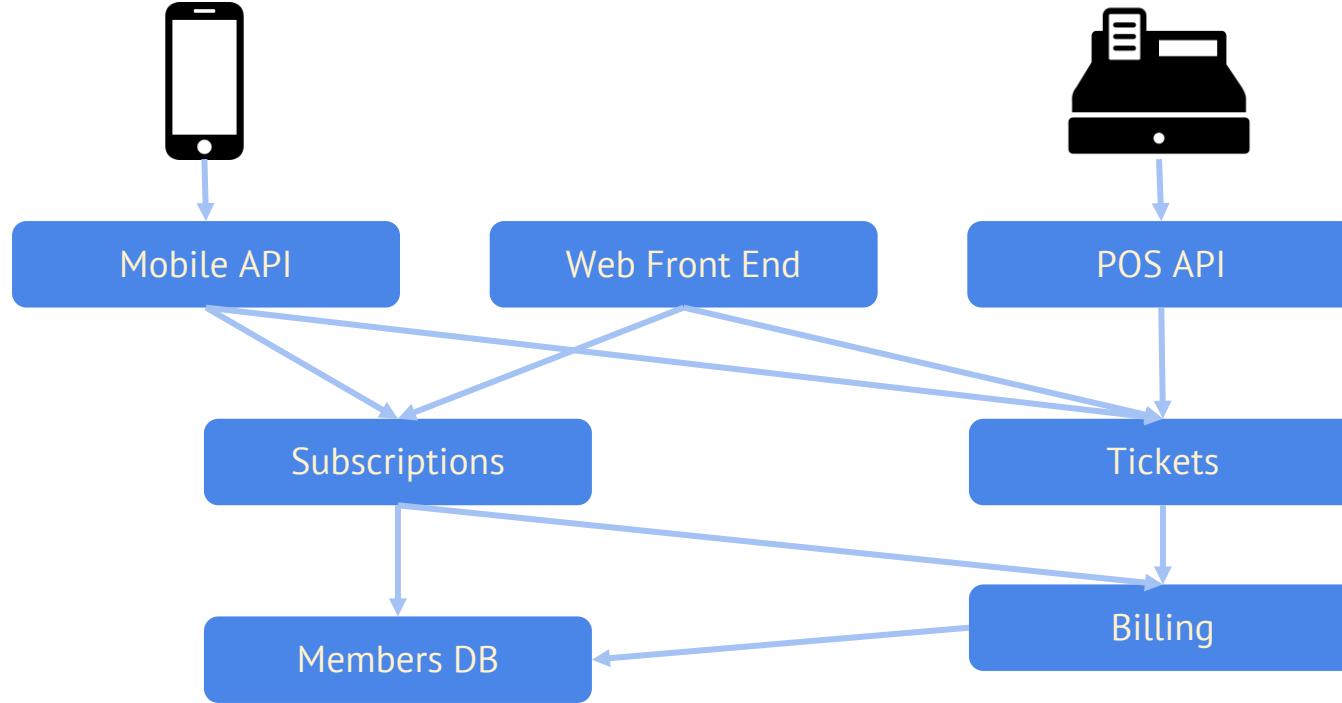


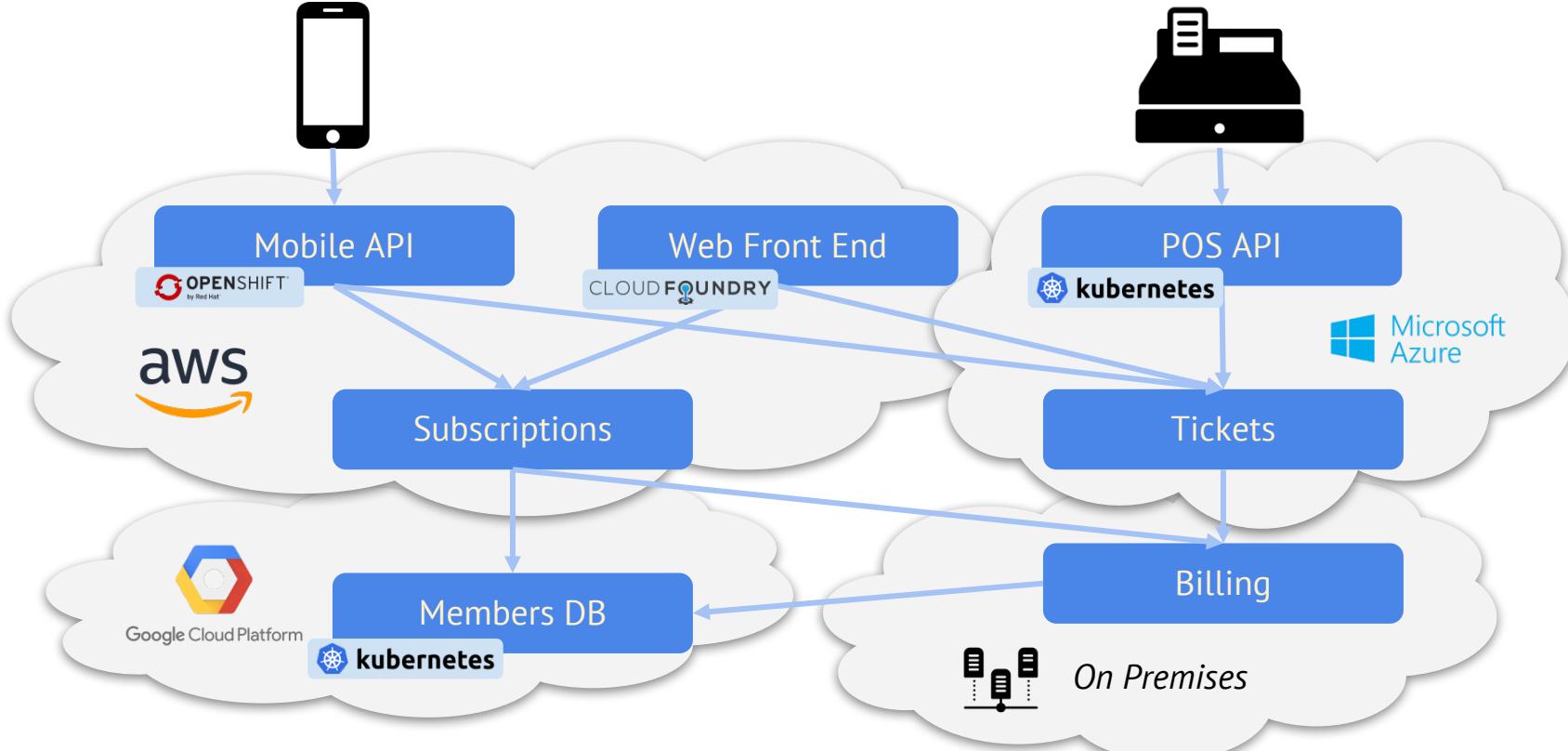
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# Our Design Goals

- Be **extensible** and **easily deployed** into a wide range of infrastructure and middleware environments.
- Support workloads that **scale elastically**.
- Support workloads that are **dynamically scheduled**.
- Be **API & policy** driven.
- Be **highly available**, even over heterogeneous infrastructure.



11th USENIX Security Symposium (2002)  
**Plan9 security design published**

GlueCon 2016  
**Joe Beda proposes SPIFFE**

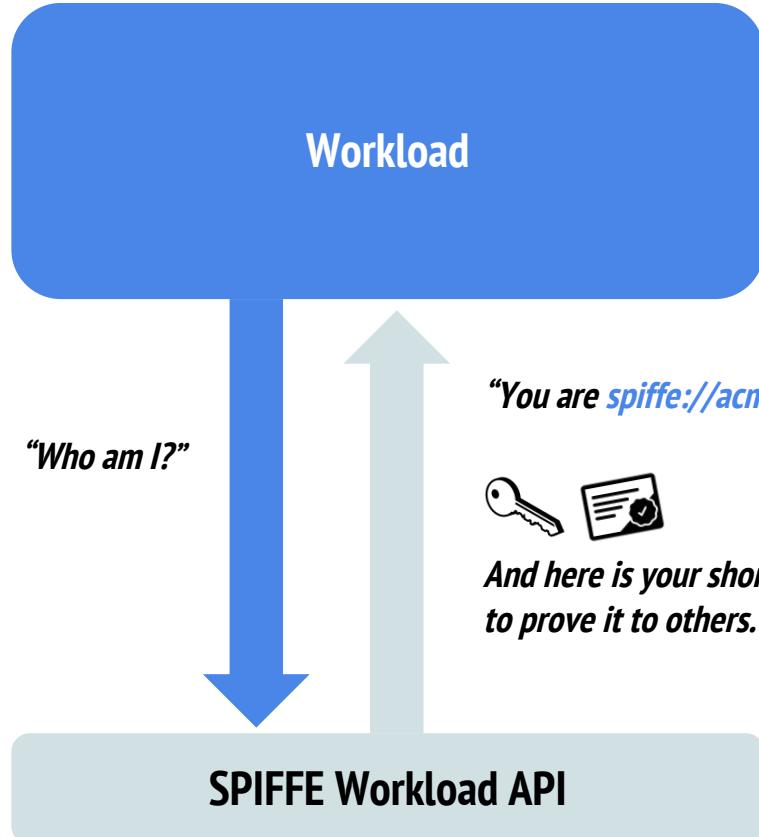
April 2018  
**CNCF welcomes SPIFFE & SPIRE**

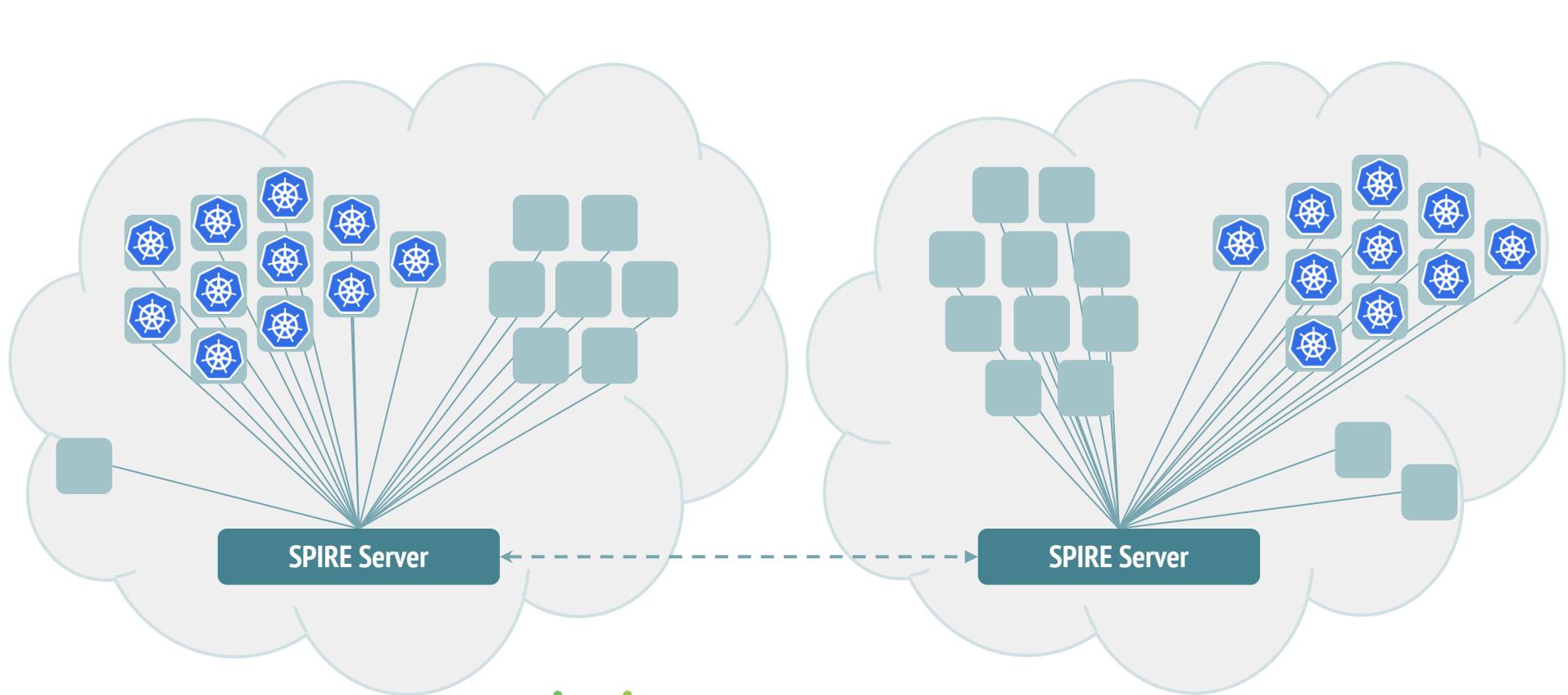
Circa 2005  
**Google rolls-out LOAS**

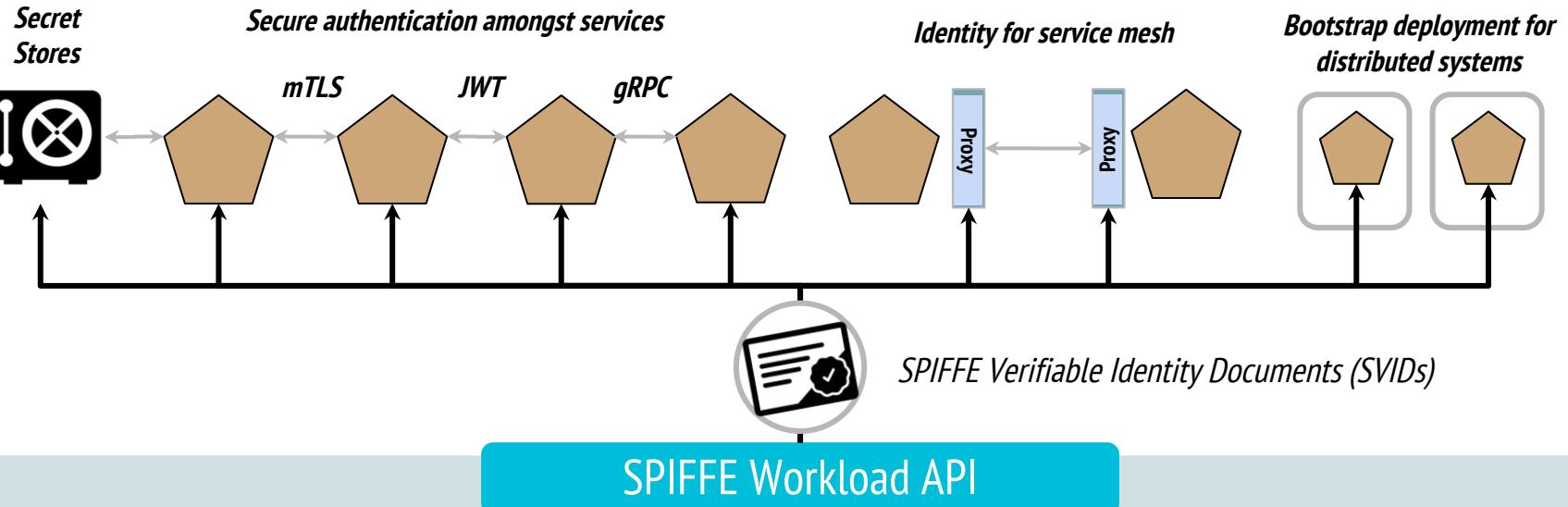


KubeCon NA 2017  
**SPIFFE & SPIRE 0.1 are released**









Cloud platform  
attestation plug-ins

OS attestation  
plug-ins

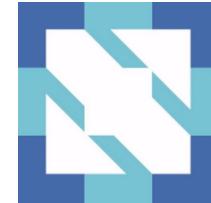
Scheduler and PaaS  
attestation plug-ins

HSM, TPM, Kerberos  
attestation plug-ins

CA and secret  
store plug-ins



# spiffe



### May 2 (Today)

Case Study:  
“Cloud Native Identity”  
*(QAware) 2.45pm*

SPIFFE Intro Session  
*(Scytale) 4.25pm*

### May 3 (Tomorrow)

TheNewStack Pancake Breakfast  
talks SPIFFE 7.30am

SPIFFE Deep Dive  
*(Scytale & VMWare) 2pm*

### May 4 (Friday)

Panel: App Security Requires  
Containers 4.25pm

[blog.scytale.io](http://blog.scytale.io)

[github.com/spiffe](https://github.com/spiffe)

[slack.spiffe.io](https://slack.spiffe.io)



# Incubation Projects





# CoreDNS



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## DNS & service discovery

### Beta support in Kubernetes 1.10

### Security release v1.1.1



# Linkerd



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NOW IN  
INCUBATION!

## Service Mesh

v1.4.0

10+ Fortune 500 end users



# Envoy



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## DISTRIBUTED PROXY / SERVICE MESH DATA PLANE

v1.6

New load balancer  
& routing options

TCP proxy  
enhancements

Better tracing  
support



# Prometheus



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Metrics collection

Time series database

Querying language

v2.0

Performance  
improvements



## DISTRIBUTED TRACING APIs & LIBRARIES

OpenTracing-  
Python 2.0

OpenTracing-  
C# 0.12

Dynamic loading in  
OpenTracing-C++

Community updates  
& examples



# Jaeger



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## DISTRIBUTED TRACING

v1.3.0

Archive  
traces

Elasticsearch  
storage  
performance

New C#  
client

New UI  
design

New website  
[jaegertracing.io](http://jaegertracing.io)



# Fluentd



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## LOG COLLECTION & AGGREGATION

v1.2

Fluentd-kubernetes-daemonset upgrade

New API counter & metrics

Splunk Enterprise connector

Better buffer mgmt

Fluent Bit v0.13



# MESSAGING FOR CLOUD NATIVE SERVICES



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**Colin Sullivan, Product Manager  
Waldemar Quevedo, Developer**





# What is NATS?

NATS is a seven year old, production proven, cloud-native messaging system.

- Message oriented middleware, *an infrastructure to send and receive messages between distributed systems.*
- Made for developers and operators who want to spend more time doing their work and less time worrying about how to do messaging.
- Joined CNCF in late March



# NATS Features

- Multiple communication patterns
- Highly performant
- Highly available
- Simple and cloud friendly
- Client support for over 30 programming languages
- Log based streaming with guaranteed delivery
- CNCF project integrations
  - ✓ Prometheus NATS Exporter
  - ✓ Kubernetes Operator (GitHub: [@pires](#))



# Use Cases



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NATS supports a range of technical use cases:

- Messaging in the cloud
  - ✓ General messaging
  - ✓ Microservices transport
  - ✓ Control planes
  - ✓ Service discovery
- IoT messaging
- Mobile and big data
- Augment (or replace) legacy messaging



# Contribution and Usage Statistics



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- 200+ contributors
- 30 public repos
  - ✓ 50+ releases
  - ✓ 8000+ GitHub stars across repos
- ~25M NATS server Docker Hub pulls
- ~7M NATS streaming server Docker Hub pulls
- 680+ Slack members
- 20+ releases of the NATS server since June 2014,  $\approx 5/\text{year}$



# Users and Adopters



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Acadian | Apcera | Apporeto | Baidu | Bridgevine | Capital One | Clarifai | Cloud Foundry | Comcast | Ericsson | Faber | Fission | General Electric | Greta | HTC | Logimethods | Netlify | Pex | Pivotal | Platform9 | Rapidloop | Samsung | Sendify | Sensay | StorageOS | VMware | Weaveworks | Workiva



# Find Out More



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**Introduction to NATS:** *Thursday, May 3 14:45 - 15:20*

**Deep Dive into NATS:** *Thursday, May 3 16:35 - 17:10*

Come find us and chat!

- Waldemar Quevedo / [wally@nats.io](mailto:wally@nats.io)
- Ginger Collison / [ginger@nats.io](mailto:ginger@nats.io)
- Colin Sullivan / [colin@nats.io](mailto:colin@nats.io)

<https://nats.io>



# Demo: NATS in Kubernetes



We'll demonstrate **NATS** performance and availability using the **NATS Kubernetes** operator with metrics aggregated by **Prometheus** and displayed in **Grafana**.





# Container Network Interface



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Networking spec, libraries & plugins

Working towards spec 0.4.0

Amazon ECS plugins added



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# CLIENT/SERVER COMMUNICATIONS

v1.11

gRPC-Web

gRPC-Dart



# containerd



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## CONTAINER RUNTIME

v1.1

Kubernetes  
CRI

Working  
on

Windows containers  
KataContainers



TUF



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# SECURE FRAMEWORK FOR SOFTWARE UPDATES

v0.10.2

Targets across  
multiple repos

CII Best  
Practices

Quickstart  
guide & CLI

[theupdate  
framework.com](http://theupdateframework.com)



## SECURE SOFTWARE DISTRIBUTION

v0.6.1

Improved root  
key rotations

Support wildcards to allow single root  
certificate for multiple repositories

# DATABASE ORCHESTRATION FOR MYSQL HORIZONTAL SCALING



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# Vitess

High performance, scalable, and available MySQL  
clustering system for the Cloud

*Sugu Sougoumarane*  
*CTO, PlanetScale*  
*@ssougou*

# Database trends

- Transactional data explosion
- Move to the cloud
- DBAs transitioning to DBEs



# Vitess capabilities

- Leverage MySQL
- Take away the pain of sharding (and resharding)
- Cloud-ready
- Observability



# The Community

In production



Evaluating



# MySQL Community Award



“Application of the year 2018”

# Demo

- Bring up single shard vitess on kubernetes
- Generate load
- Bring up 16 new shards for resharding
- Perform resharding
- Scale up load to 16x



## ☰ Overview

Cluster

Namespaces

Nodes

Persistent Volumes

Roles

Storage Classes

Namespace

default ▾

## Overview

## Workloads

Cron Jobs

Daemon Sets

Deployments

Jobs

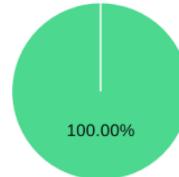
Pods

Replica Sets

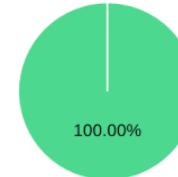
Replication Controllers

Workloads

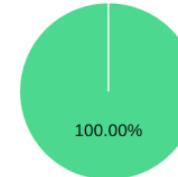
## Workloads Statuses



Daemon Sets



Pods



Replication Controllers

## Daemon Sets

| Name   | Labels                     | Pods    | Age        | Images                       | ⋮ |
|--|----------------------------|---------|------------|------------------------------|---|
| <input checked="" type="checkbox"/> nginx-ingress-kubernetes | juju-application: nginx-i- | 22 / 22 | 41 minutes | k8s.gcr.io/nginx-ingress-... | ⋮ |

## Pods

| Name          | Node | Status | Restarts | Age | CPU (cores) | Memory (bytes) |
|---------------|------|--------|----------|-----|-------------|----------------|
| ip-172-31-45- |      |        |          |     |             |                |



Dashboard

Schema

Topology

Workflows

## messagedb



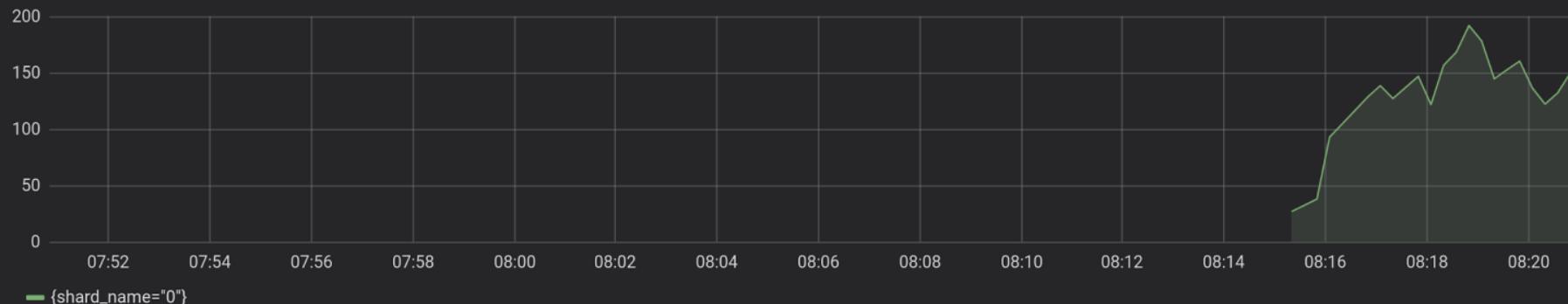
### Serving Shards

0

## QPS



## QPS per shard



Dashboard

Schema

Topology

Workflows

## messagedb



### Serving Shards

0

### Nonserving Shards

-10

10-20

20-30

30-40

40-50

50-60

60-70

70-80

80-90

90-a0

a0-b0

b0-c0

c0-d0

d0-e0

e0-f0

f0-

```
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess>
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> kubectl create -f splitclone.yaml
job.batch "vtworker" created
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> ./lvtctl.sh MigrateServedTypes messagedb/0 ronly
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> ./lvtctl.sh MigrateServedTypes messagedb/0 replica
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> ./lvtctl.sh MigrateServedTypes messagedb/0 master
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> █
```

Dashboard

Schema

Topology

Workflows

## messagedb

c



### Serving Shards

-10

10-20

20-30

30-40

40-50

50-60

60-70

70-80

80-90

90-a0

a0-b0

b0-c0

c0-d0

d0-e0

e0-f0

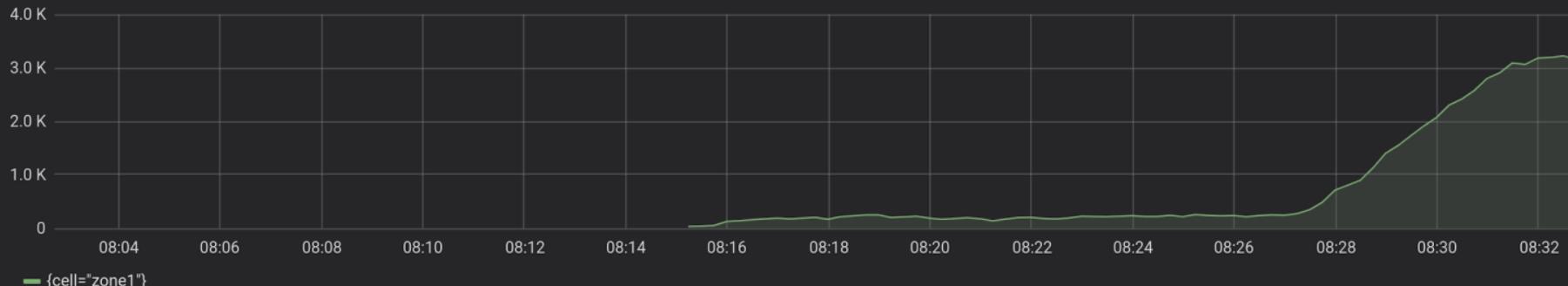
f0-

### Nonserving Shards

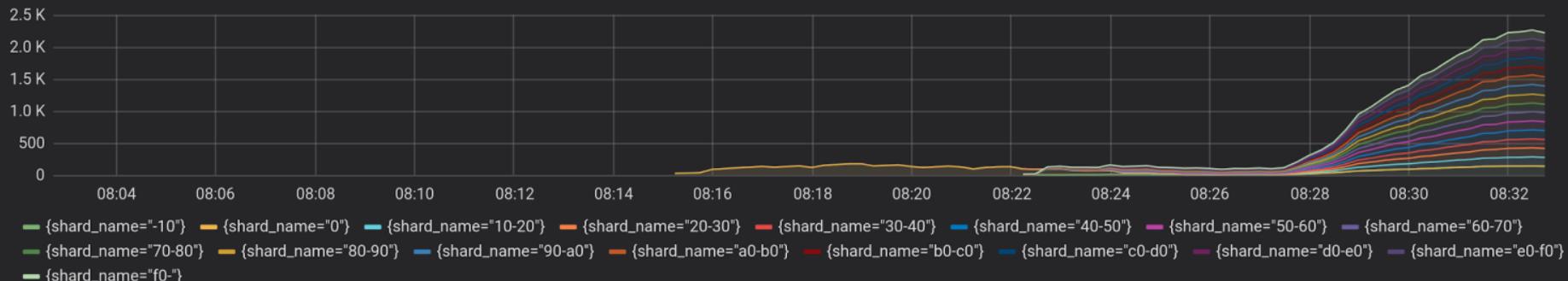
0

```
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess>
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> kubectl create -f splitclone.yaml
job.batch "vtworker" created
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> ./lvtctl.sh MigrateServedTypes messagedb/0 rdonly
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> ./lvtctl.sh MigrateServedTypes messagedb/0 replica
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> ./lvtctl.sh MigrateServedTypes messagedb/0 master
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> kubectl scale --replicas=16 deployment/loadgen
deployment.extensions "loadgen" scaled
ip-172-31-31-15: ~/dev/src/vitess.io/vitess/helm/vitess> █
```

QPS



QPS per shard



# What's new

- Prometheus integration
- Helm charts and operators
- Vitess session
  - Vitess and a Kubernetes Operator





# Graduated Projects





# Kubernetes 1.10

**29 SIGs  
10 Working Groups**





# Kubernetes 1.10

**29 SIGs  
10 Working Groups**



# Graduated Projects



# Graduated Projects

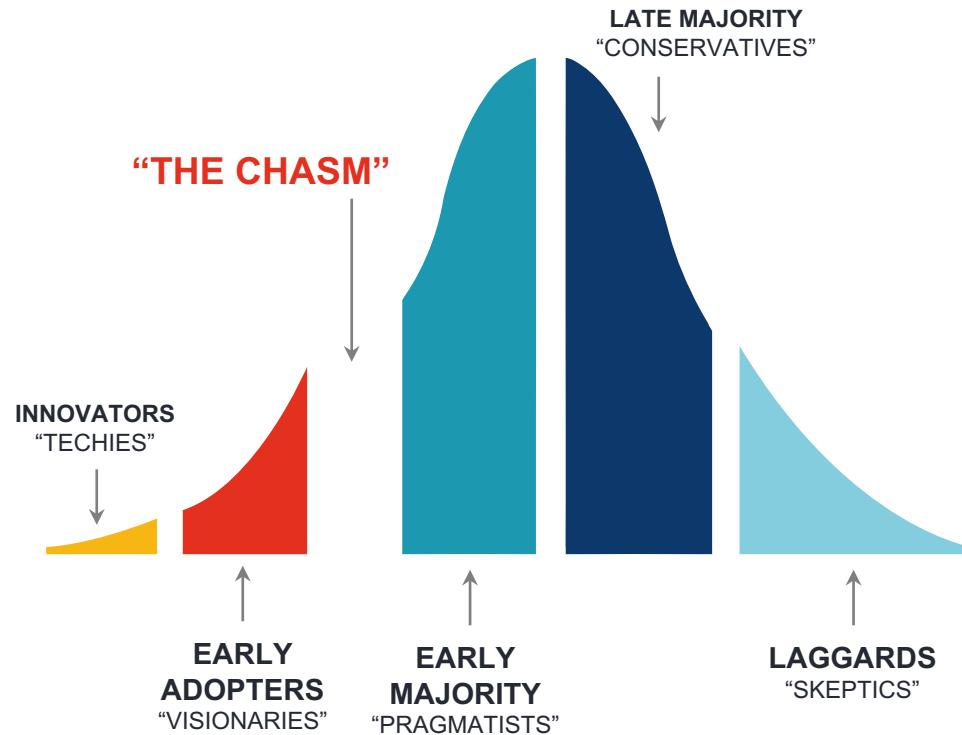
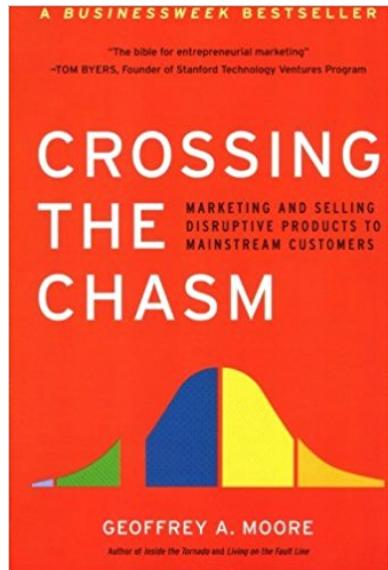


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# Graduated Projects

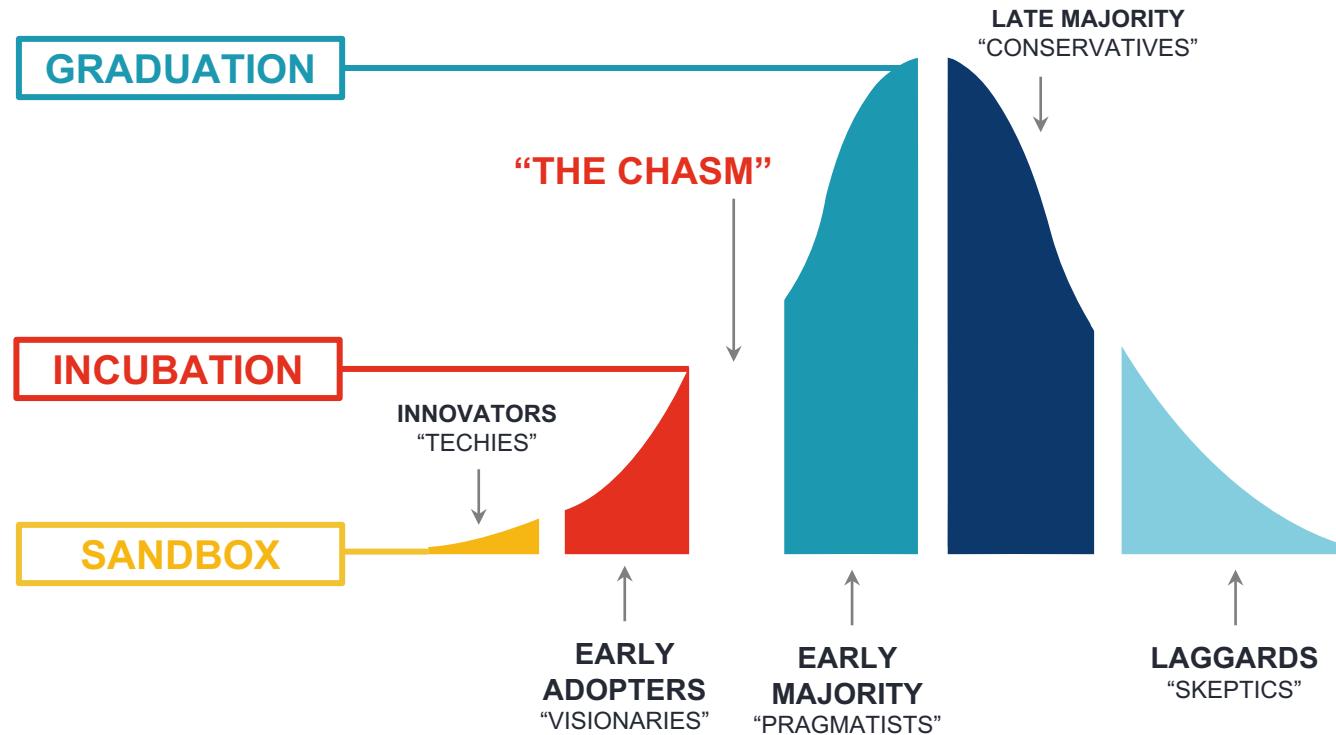
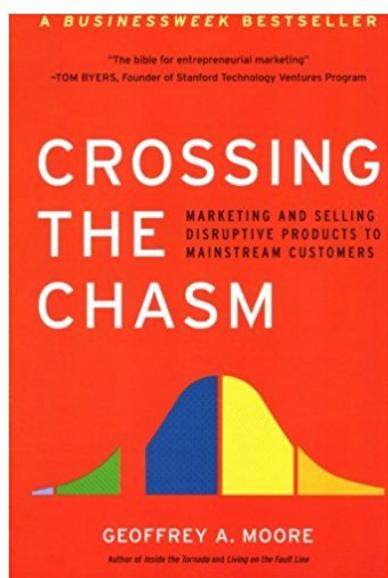


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# Getting Involved



# Getting Involved



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**Sessions**



**Intros & Deep Dives**

Projects



**Hallway Track**

Kubernetes Special Interest Groups  
CNCF Working Groups



# You are the Community

