Building a Database as a Service on Kubernetes

By Abhi Vaidyanatha and Lucy Burns
Who are we anyway?

Abhi Vaidyanatha
He/Him/His
Software Engineer
PlanetScale

The PlanetScale Team

Lucy Burns
She/Her/Hers
Product Manager
PlanetScale
1. Defining the problem.
2. Choosing the technology.
3. Fitting it together.
Where are we? The Kubernetes Journey

Past

Inconsistent deployment of applications provides spice to my life.

I love immutable infrastructure!

What code is in production again? Why does it take ages to create new services?

How do I scale things that can't change?

Future

Containers seem cool. I guess this Kubernetes thing looks cool. I guess containers are too.

Wait. I need to store stuff.
What do we want from a database?

- Cloud Native
- Reliability
- Automation
- Scalability
- Logically Singular
- Anti-Horticulturism
What is the MVP of a Database?
Why Open Source?

• **Pros**
  • Ideal for container ecosystem
  • Motivated contributors, bleeding edge technology
  • Participation in the community
  • Why reinvent the wheel?

• **Cons**
  • Feature Prioritization
  • Longevity
  • Support

Cool. Now what?
What's our platform?

- Enables flexibility of deployment
- Scheduling of Jobs across heterogeneous compute clusters
- Services for network connectivity
The Bread and Butter.

- Vitess is a great database management system.
- But... Vitess is a challenge to configure
- Vitess is designed to manage one large distributed system.
- Network Policies and more!
- What's the best way to bring up Vitess?
Kubernetes Operators

1. Why are operators cool?
2. They exist for etcd and Prometheus... but how about our database?
3. Let's make one!
4. Yeah we did that all wrong; let's make another one.
How do we manage configuration?

- Etcd stores configuration for our distributed database.
- Can't we just use the operator?
- Storing state in a stateless object doesn't really work that well.
- How do we recover from loss of quorum?
If something is broken, how will we know?

- Installing Prometheus is mostly becoming a plumbing engineer.
- Most software knows about it, so metrics endpoints are very common.
- Why is transparent configuration cool?
- Don't use copypasta when CoreOS has taken care of all the hard work for you.
We want pretty colors!

- You're not a complete product without offering some sort of insights package.
- Grafana can be auto-provisioned, so we baked it into our Vitess operator.
- How do we manage ingress to our dashboards?
How do we handle internal connectivity?

- We have a lot of requirements here.
  - Proxy our services [Main function]
  - Lightweight
  - Concurrent
  - Integrate with the Kubernetes API

- OpenResty retains all NGINX functionality.
UI
Web Server

K8s API request

PlanetScale Operator

- OPENRESTY
- Grafana
- Prometheus
- etcd

Backup Controller
Hey, we built something!

- **PlanetScale CNDb Demo**
  www.console.planetscale.com

- **Wait. Was this actually that hard?**
  Well. Yeah. But not for the reasons we thought it would be.
What's next?

1. Building trust in cloud infrastructure
2. BYOK - Bring your own Kubernetes
3. Multi-Cloud Clusters
4. Predictive scaling

Come talk to us at Booth SE39!
Learn more about Vitess at KubeCon

1. **Tuesday 3:20 - 3:55pm** Vitess: Stateless Storage in the Cloud - Sugu Sougoumarane, PlanetScale

2. **Wednesday 2:25 pm - 3:00pm** Geo-partitioning with Vitess - Deepthi Sigireddi, PlanetScale & Jitendra Vaidya, PlanetScale

3. **Thursday 2:25 - 3:00pm** Gone in 60 Minutes: Migrating 20 TB from AKS to GKE in an Hour with Vitess - Derek Perkins, Nozzle

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