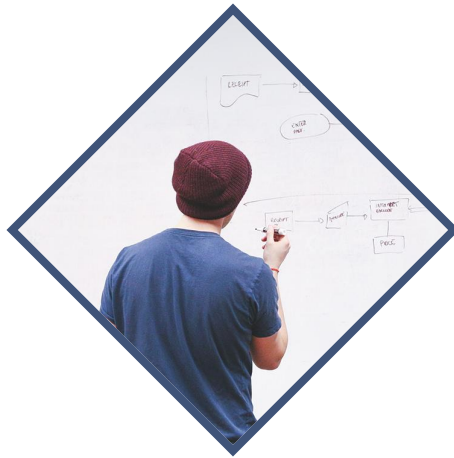


USING KUBERNETES, DOCKER, AND HELM TO DEPLOY ON-DEMAND POSTGRESQL STREAMING REPLICAS

by Steve Hetzel



kubernetes



HELLO!

I am Steve Hetzel

PostgreSQL and DevOps Enthusiast

Based out of the Boulder, Colorado area

You can find me on LinkedIn:

<https://www.linkedin.com/in/stevehetzeldataengineer/>



Use-case: Disaster Recovery and Horizontal Scaling

- While the use of Containers and Kubernetes is growing at an astounding rate – most of the primary use-cases that we've seen are homogenous in nature (entire stacks deployed to k8s – all within the Cloud).
- Disaster Recovery/Business Continuity between multiple environments is an under-served need - cross-DC links between on-prem and cloud providers is an evolving proposition.
- Deploying Postgres via Containers/Kubernetes allows for automation, easy scalability, consistency, and a quick path to DR/BC.

EXPLAIN ALL THE THINGS

What are Containers? What is Kubernetes?
What is Helm? What does the architecture look like?



WHAT ARE CONTAINERS?

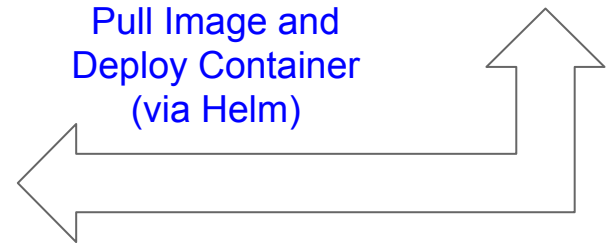
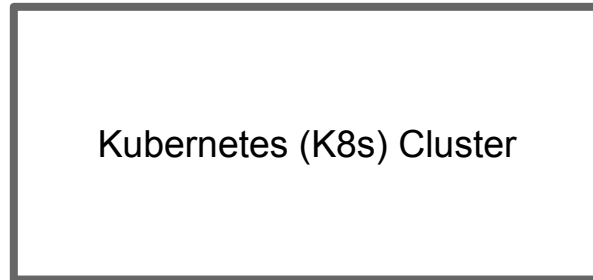
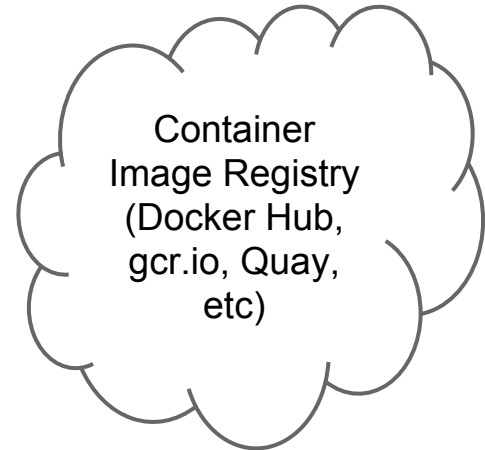
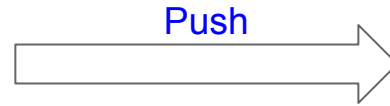
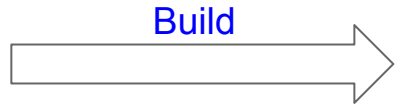
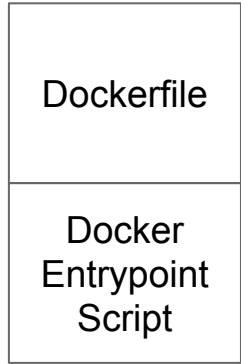
“A container image is a lightweight, stand-alone, executable package of a piece of software that includes everything needed to run it: code, runtime, system tools, system libraries, settings. Available for both Linux and Windows based apps, containerized software will always run the same, regardless of the environment.” - - Docker.com

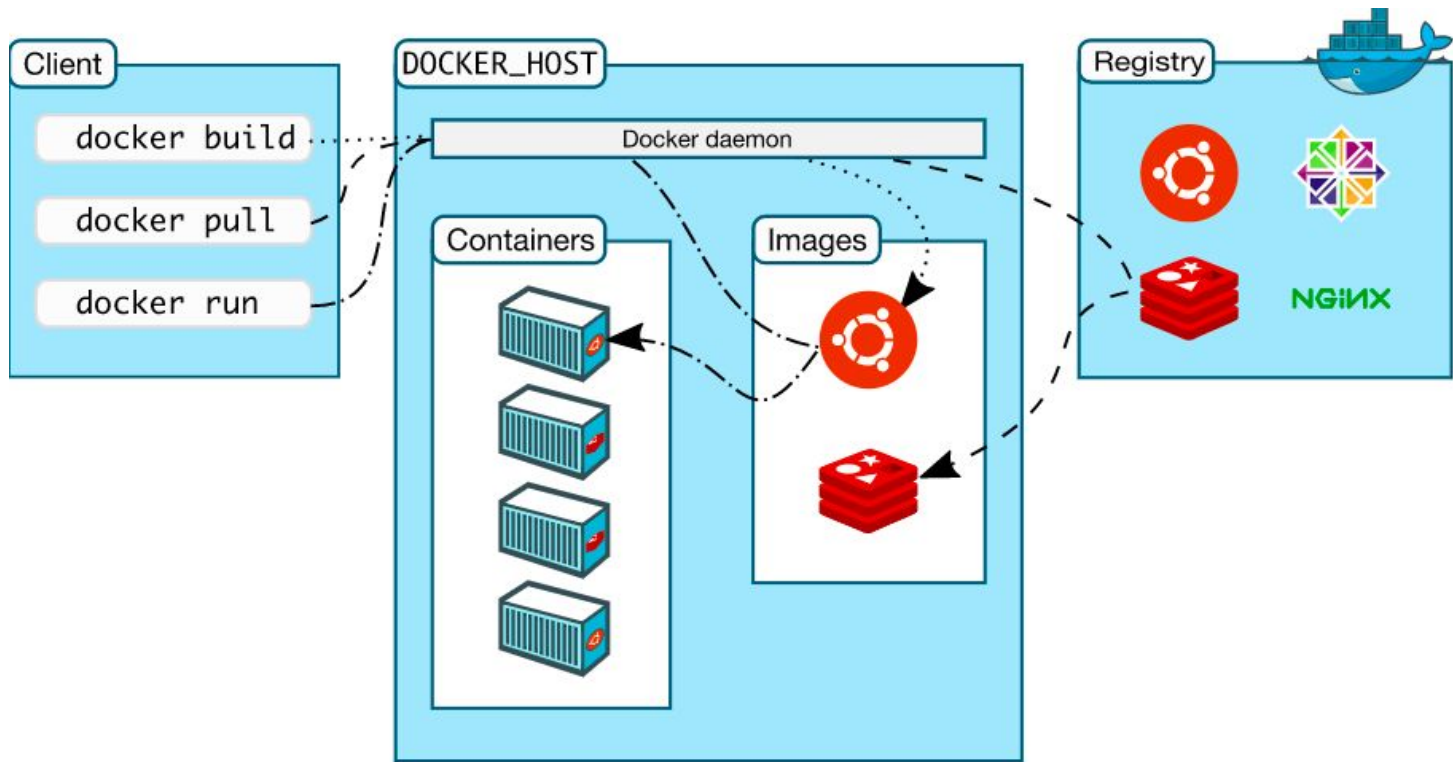
Docker is one example of a Container format - others include rkt and OCI (Open Container Initiative).



Container Workflow

Docker Client







WHAT IS KUBERNETES?

“Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications.

It groups containers that make up an application into logical units (Pods) for easy management and discovery. Kubernetes builds upon 15 years of experience of running production workloads at Google, combined with best-of-breed ideas and practices from the community.” - - [Kubernetes.io](https://kubernetes.io)



kubernetes



WHAT IS KUBERNETES?

Kubernetes is ancient Greek for *Helmsman*. Root of the word *Governor/Cybernetics*

Kubernetes is an open-source Container Orchestrator/Cluster Manager (written in Go) and is maintained by the Cloud Native Computing Foundation (CNCF). Some of the functionality Kubernetes provides:

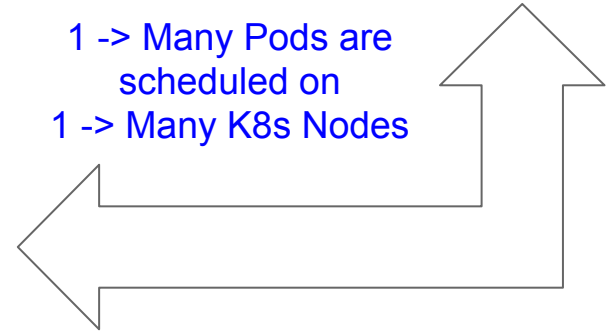
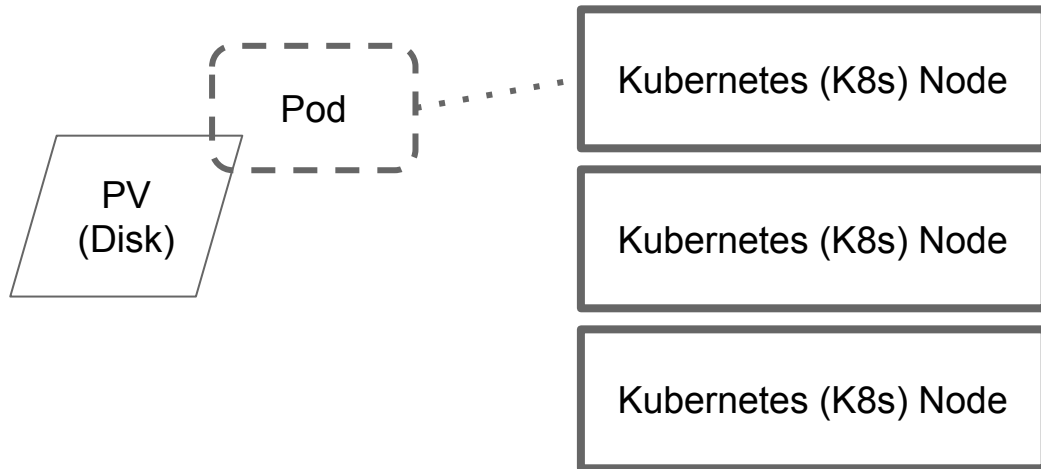
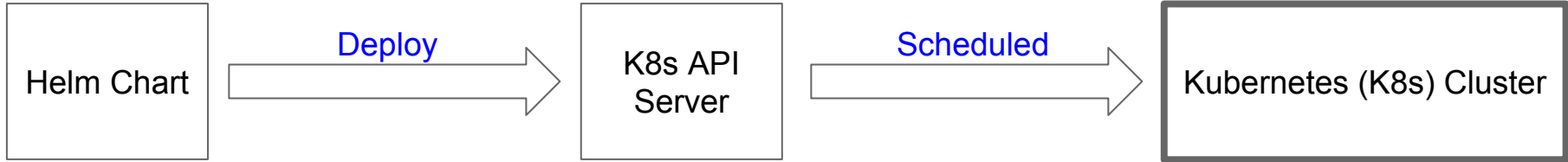
- Declarative in nature
- Places containers on nodes
- Recovers automatically from failure
- Basic monitoring, logging, health checking
- Enables containers to find each other.

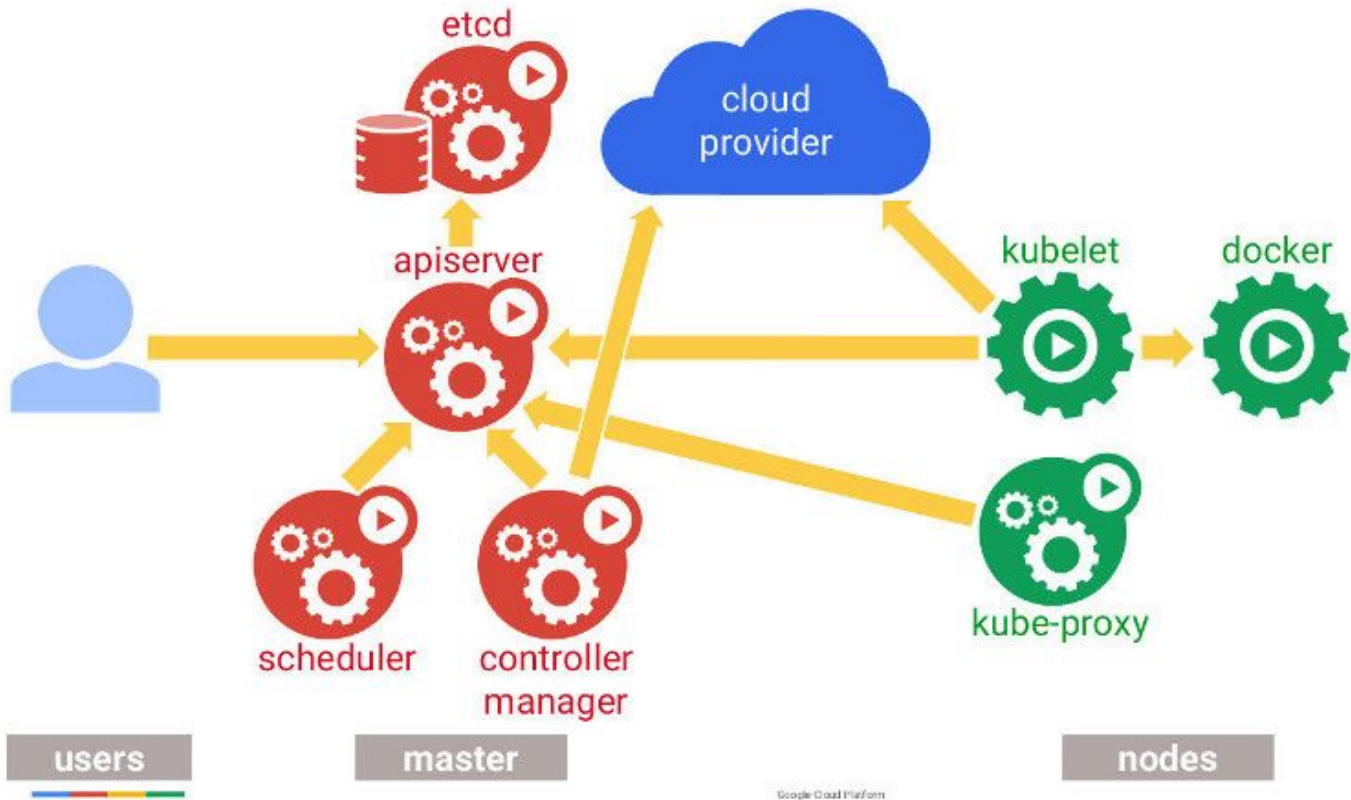


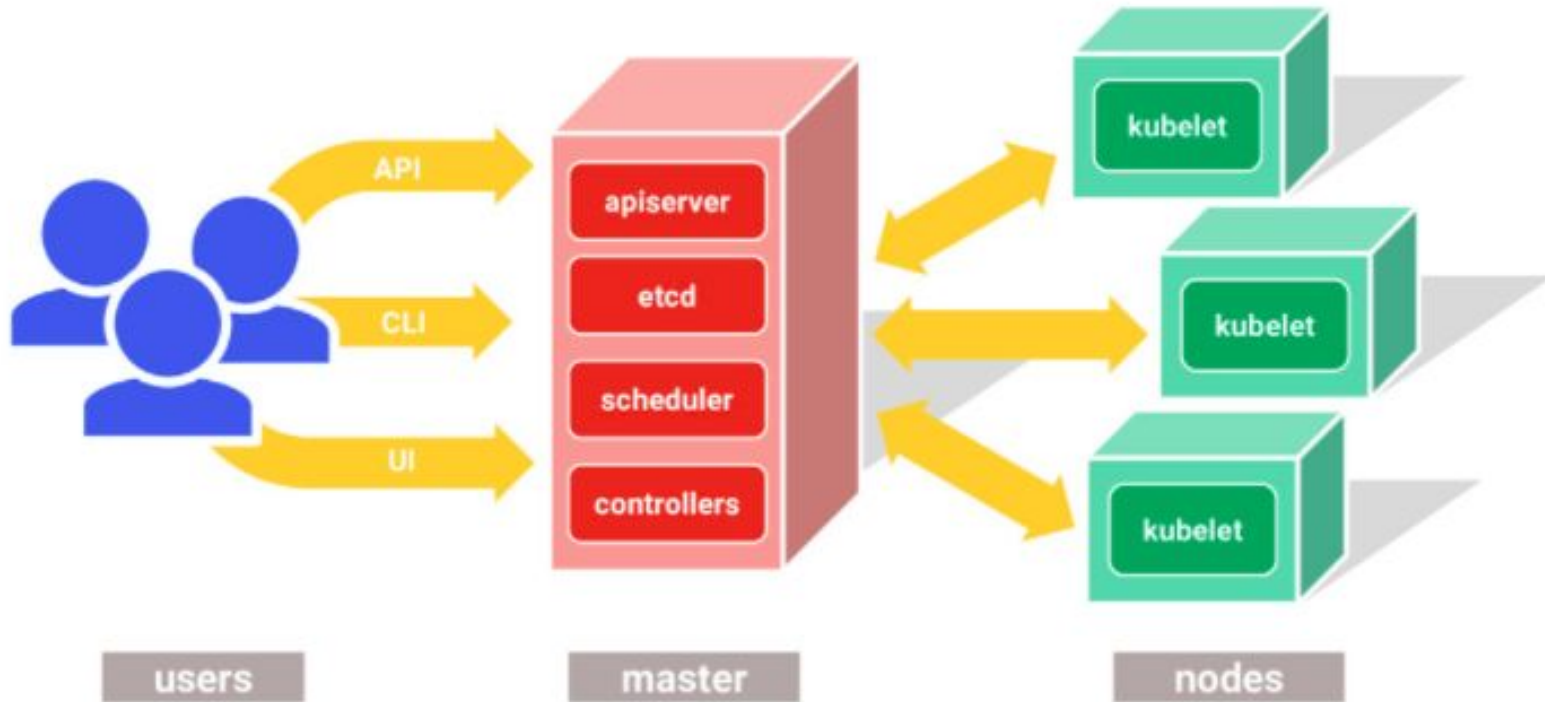
kubernetes

Kubernetes Workflow

Helm Client
(calls kubectl)







Google Cloud Platform

All you really need to care about!



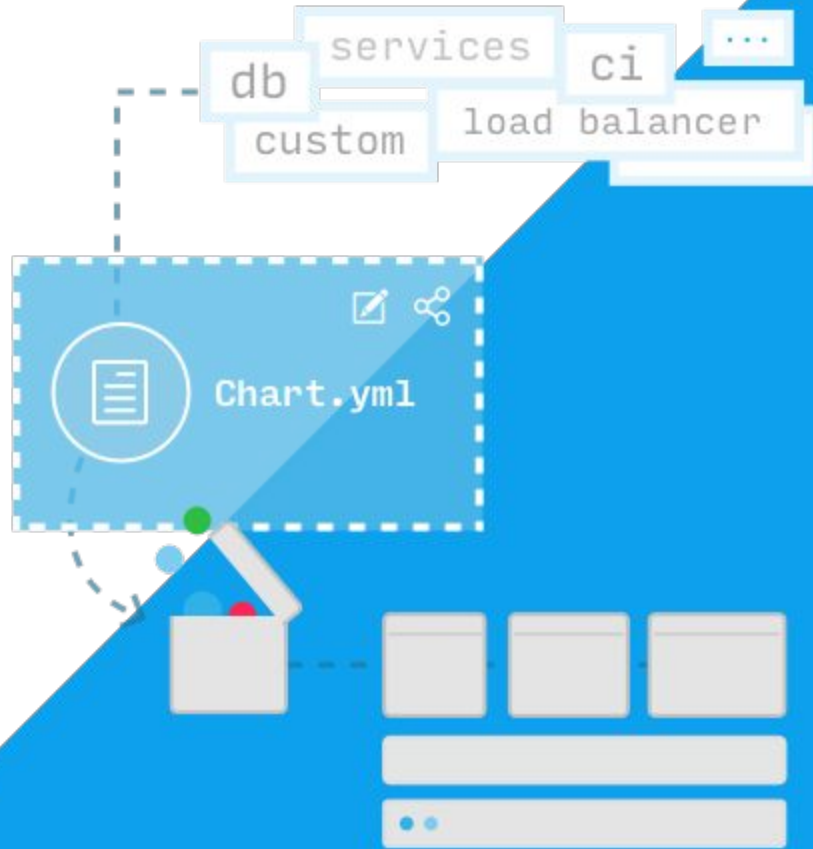
Google Cloud Platform



WHAT IS HELM?

Helm is an open-source package manager that helps you manage Kubernetes applications – Helm Charts define, install, and upgrade even the most complex Kubernetes application. They provide an atomic unit of deployment that can be version, upgraded, rolled-back, and deleted. Charts are easy to share and be tracked via source control.





The Lego® analogy:

Individual Lego® bricks == The various parts/building blocks of Kubernetes (Containers, Services, PersistentVolumes, ConfigMaps, Secrets, etc.)

Pods == A fully-functioning Lego® mini-kit

Helm == Instructions (a template) for a building a mini-kit

Kubernetes == The entire Lego® set - everything working together as one/as designed.

Orchestration == A technical/social construct - how your Lego® set plays nicely with your friends' Lego sets



Kubernetes Functionality Used in this demo:

- ConfigMaps
- Persistent Volumes/Persistent Volume Claims
- Secrets
- Services (NodePort)
- Stateful Sets
- Storage Classes



Once everything is assembled - ship it!

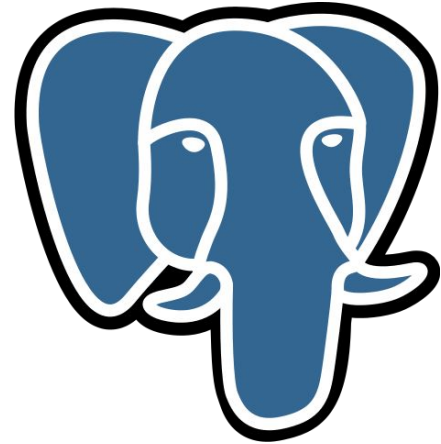





SO WHAT DOES THIS MEAN FOR POSTGRES?

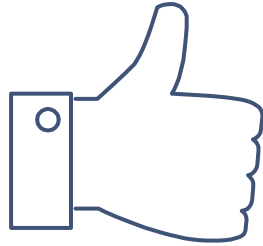
Postgres can be easily deployed, maintained/operated, upgraded, and scaled via Kubernetes. Literally anything you can do with Postgres via traditional infrastructure (bare metal, VM's, etc) - can be done with Containers.

Containerized databases also have the added benefit of being portable and resource-scaled (CPU, Memory, etc). Containers have shown increased performance, lower overhead, and dramatically faster deployment times/elasticity versus VM's.



A person with short dark hair, wearing a grey and black striped sweater, is seen from behind, looking at a wall covered in various design sketches, photos, and documents. The wall is filled with creative work, including wireframes, hand-drawn diagrams, and photographs of people and objects. A dark blue arrow graphic points towards the top left corner of the image.

Time for the
Demo!



THANKS!

Any questions?

You can find me on LinkedIn:

<https://www.linkedin.com/in/stevehetzeldataengineer/>