# Kubernetes The Hard Way

Masayuki Igawa
masayuki@igawa.io
masayukig on Freenode, GitHub, Twitter, LinkedIn

March 15, 2019

@FOSSASIA Summit 2019
https://bit.ly/k8s-the-hard-way-fossasia2019

# Agenda

1. Who am I?
2. Today's Goal
3. What's "Kubernetes The Hard Way"?
4. Kubernetes The Hard Way on GCP
5. Kubernetes The Hard Way on OpenStack
6. Conclusion

# These slides are my own opinion

# Who I am?

- Company：1998.4-2015.12 Traditional IT company in Japan, 2016.1-2017.3 HPE -> 2017.3- SUSE/Novell Japan -> 2019("Further Independence for SUSE")
  - SUSE OpenStack Cloud QE(Quality Engineering) Team
- Job: Senior Software Engineer/Open Source Programmer
  - OpenStack QA Up/Downstream development, Core Reviewer (Tempest, OpenStack-Health, Subunit2SQL, Stackviz), stestr
  - stackalytics.com/?user_id=igawa, github.com/masayukig

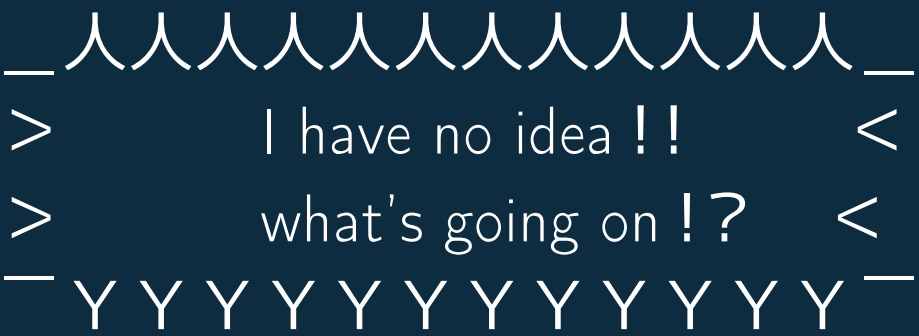

- Books
  - OpenStack Cloud Integration (Japanese book) (one of the authors)
  - Infra CI Pragmatic Guide - Ansible/GitLab (Japanese book) (as a reviewer)
- Hobby: Bike(BMC SLR02), Clouds(OpenStack...), Diet(Low-carb), etc.



# Today's Goal

- Understand "Kubernetes The Hard Way"
- Motivate to do "Kubernetes The Hard Way" by yourself

Do you feel about Kubernetes,




When you make a k8s cluster by using minikube, kubeadm, Rancher, GKE/AKS/EKS, etc...

# If you want to...

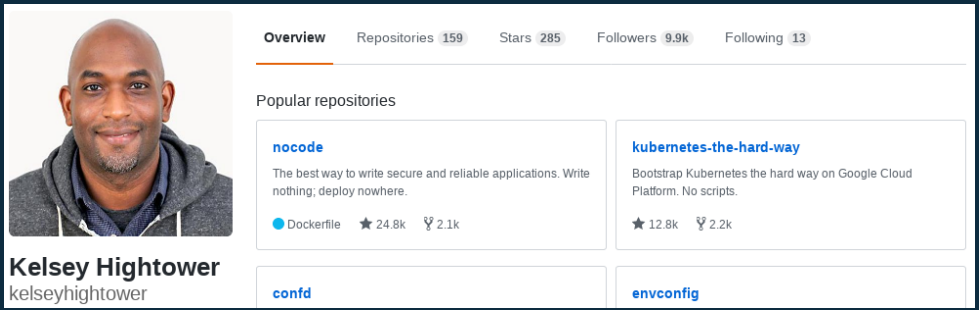
- Know its components and architecture
- Debug it
- Build a k8s cluster as you like
- Feel that it's too easy to build a k8s cluster
- Understand Kubernetes in detail
- Build a k8s cluster in a harder way :-p

when you make a k8s cluster by using minikube, kubeadm, Rancher, GKE/AKS/EKS, etc...

If you're interested in one or more, there's

# "Kubernetes the Hard Way"

- https://github.com/kelseyhightower/kubernetes-the-hard-way



# “Kubernetes the Hard Way” ?

Bootstrap Kubernetes the hard way on GCP. No scripts.

- Tutorial for Kubernetes
- Apache License Version 2.0
- Document consists of 14 chapters

# “Kubernetes the Hard Way” ? - components & versions

- Kubernetes 1.12.0 (Latest: v1.13)
- containerd Container Runtime 1.2.0-rc.0
- gVisor 50c283b9f56bb7200938d9e207355f05f79f0d17
- CNI Container Networking 0.6.0
- etcd v3.3.9
- CoreDNS v1.2.2

# “Kubernetes the Hard Way” ? - outline

1. Prerequisites
2. Installing the Client Tools
3. Provisioning Compute Resources
4. Provisioning a CA and Generating TLS Certificates
5. Generating Kubernetes Configuration Files for Authentication
6. Generating the Data Encryption Config and Key
7. Bootstrapping the etcd Cluster
8. Bootstrapping the Kubernetes Control Plane
9. Bootstrapping the Kubernetes Worker Nodes
10. Configuring kubectl for Remote Access
11. Provisioning Pod Network Routes
12. Deploying the DNS Cluster Add-on
13. Smoke Test
14. Cleaning Up

# “Kubernetes the Hard Way” ? (partial)

## Prerequisites

### Google Cloud Platform

This tutorial leverages the Google Cloud Platform to streamline provisioning of the compute infrastructure required to bootstrap a Kubernetes cluster from the ground up. Sign up for $300 in free credits.

Estimated cost to run this tutorial: $0.22 per hour ($5.39 per day).

> The compute resources required for this tutorial exceed the Google Cloud Platform free tier.

### Google Cloud Platform SDK

#### Install the Google Cloud SDK

Follow the Google Cloud SDK documentation to install and configure the `gcloud` command line utility.

Verify the Google Cloud SDK version is 218.0.0 or higher:

```
gcloud version
```

#### Set a Default Compute Region and Zone

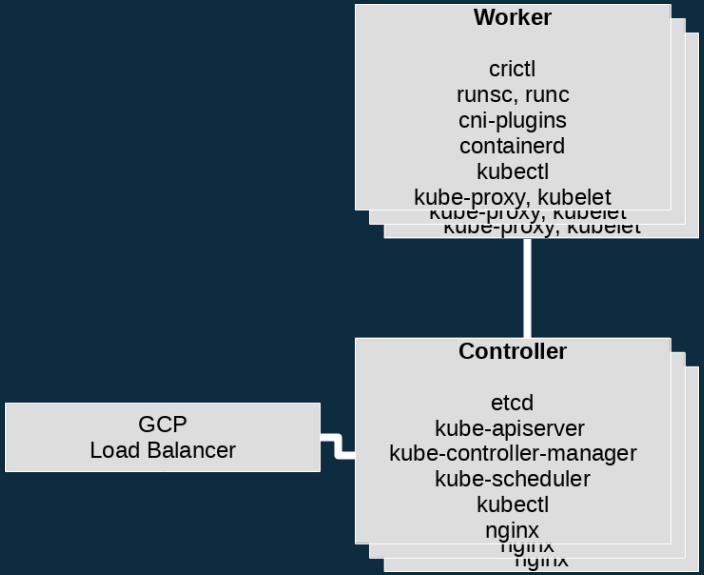
This tutorial assumes a default compute region and zone have been configured.

If you are using the `gcloud` command-line tool for the first time `init` is the easiest way to do this:

# Prerequisites

- It works on Google Cloud Platform basically.
  But I could run it on an OpenStack cloud with some tricks :)
- n1-standard-1(vCPU*1,MEM: 3.75GB) * 6
  -> Controller * 3 + Worker * 3 + Load Balancer

# Architechture, components for this k8s cluster



# Conclusion on GCP

- Hours: 2.5H, Cost: less than $1
- It says “Hard way”, but it was not so hard itself.
  -> It took only less than 2.5H
- I saw some warnings, but you don’t need to worry about that that much :)

# Kubernetes The Hard Way on OpenStack Cloud

- Hardware: ASRock DeskMini 310, Celeron G4920 3.2GHz, 16GB, 120GB SSD/HDD
- Software
  - OS: openSUSE 15, OpenStack version: Rocky, Components: [Nova, Glance, Cinder, Keystone, Neutron]
  - Follow the OpenStack Installation Guide and autemated by ansible
- Cost: $300/node(roughly) * 3

OLD

NEW(smaller, quiet, low energy & performance)

# Problems/Challenges

It can be run in an public/private OpenStack cloud, too!
But some challenges exist.

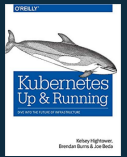
- Initial and maintenace costs are required
- OpenStack is also ***Hard*** :-P
  - The controller node was unstable with SSD.
  - It took a lot of hours to (re)build. -> automated by an ansible playbook
- Difference between GCP and OpenStack -> Next slide

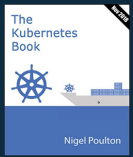
# Difference between GCP and OpenStack (`gcloud` vs `openstack`)

- Boot instances
- Configure network
- Set security groups
- Host name resolution is required (such as DNS, /etc/hosts)
- Load Balancer is also required (such as Octavia, Nginx, HA-Proxy)

# Conclusion

- Run and customize it on your own environment, try/error to understand
  -> I made Bash scripts
  (`https://github.com/masayukig/k8s-the-hard-way-script`)
- Only for learning, not for production (i.e. HA, Persistent Volume, etc.)
- It's open source! We can read, write and participate its code and community.
- Books and google search could help your understanding
  - Kubernetes: Up and Running: Dive into the Future of Infrastructure
  - The Kubernetes Book
  - Kubernetes.io




# Appendix

- Slides: https://bit.ly/k8s-the-hard-way-fossasia2019
- Contact info: masayukig on Freenode, GitHub, Twitter, LinkedIn
- Kubernetes The Hard Way:
  https://github.com/kelseyhightower/kubernetes-the-hard-way