



# Kubernetes The Hard Way

Masayuki Igawa  
masayuki@igawa.io

masayukig on Freenode, GitHub, Twitter, LinkedIn

July 20, 2019

@openSUSE mini Summit 2019  
<https://github.com/masayukig/k8s-the-hard-way/>

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# Agenda



1. 自己紹介
2. 今日のゴール
3. “Kubernetes The Hard Way” って何?
4. Kubernetes The Hard Way を GCP 上で
5. Kubernetes The Hard Way を自分の OpenStack 上で
6. Conclusion

## DISCLAIMER

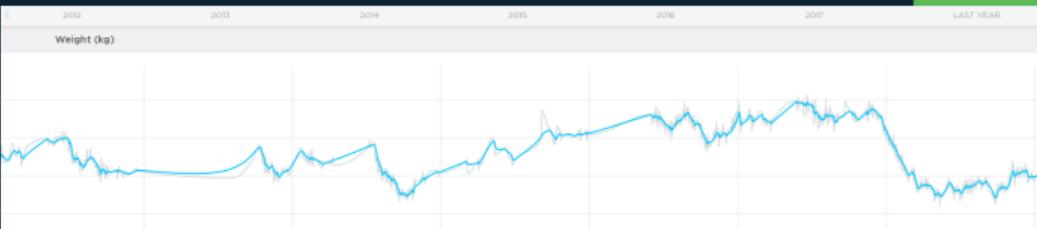
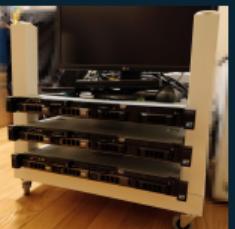
このスライドは私個人の意見です



# Who I am?



- ▶ Company : 1998.4-2015.12 Traditional IT company in Japan,  
2016.1-2017.3 HPE -> 2017.3- SUSE -> 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.



# 今日のゴール

- ▶ “Kubernetes The Hard Way” をざっくり理解する
- ▶ “Kubernetes The Hard Way” をご自身でやってみたいという気持ちに



k8s 使うとき、こんなことを感じませんか？



\_人人人人人人人人人\_

> It's like a magic !! <

> what's going on !? <

— Y Y Y Y Y Y Y Y —

k8s クラスタを、各種デプロイメントツールを使って作るようなとき。  
例えば、minikube, kubeadm, Rancher, GKE/AKS/EKS, etc...

もし...



- ▶ コンポーネント・アーキテクチャを理解したい
- ▶ デバッグしたい
- ▶ 自分好みの k8s クラスタを作りたい
- ▶ k8s クラスタ作るが簡単過ぎて面白みがない
- ▶ k8s をより詳しく理解したい
- ▶ k8s クラスタをとにかく苦労して作りたい！

そんなあなたに…



# “Kubernetes the Hard Way”

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



A screenshot of Kelsey Hightower's GitHub profile page. It shows his profile picture, a dark-skinned man with short hair and a beard, wearing a grey hoodie. Below the picture is his name, "Kelsey Hightower", and his GitHub handle, "kelseyhightower". The profile has 159 repositories, 285 stars, 9.9k followers, and 13 people followed. The "Overview" tab is selected. Under "Popular repositories", there are four cards: "nocode" (description: "The best way to write secure and reliable applications. Write nothing; deploy nowhere."), "kubernetes-the-hard-way" (description: "Bootstrap Kubernetes the hard way on Google Cloud Platform. No scripts."), "confd" (description: "A configuration management daemon for distributed systems"), and "envconfig" (description: "A Go library for generating environment variables from configuration files").

Overview    Repositories 159    Stars 285    Followers 9.9k    Following 13

Popular repositories

**nocode**  
The best way to write secure and reliable applications. Write nothing; deploy nowhere.  
Dockerfile ★ 24.8k 2.1k

**kubernetes-the-hard-way**  
Bootstrap Kubernetes the hard way on Google Cloud Platform. No scripts.  
★ 12.8k 2.2k

**confd**

**envconfig**

# “Kubernetes the Hard Way” ?



Bootstrap Kubernetes the hard way on GCP. No scripts.

- ▶ Kubernetes のチュートリアル
- ▶ Apache License Version 2.0
- ▶ 14 章構成のドキュメント

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



- ▶ `Kubernetes` 1.12.0 (Latest: v1.15)
- ▶ `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” ? - 目次



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:

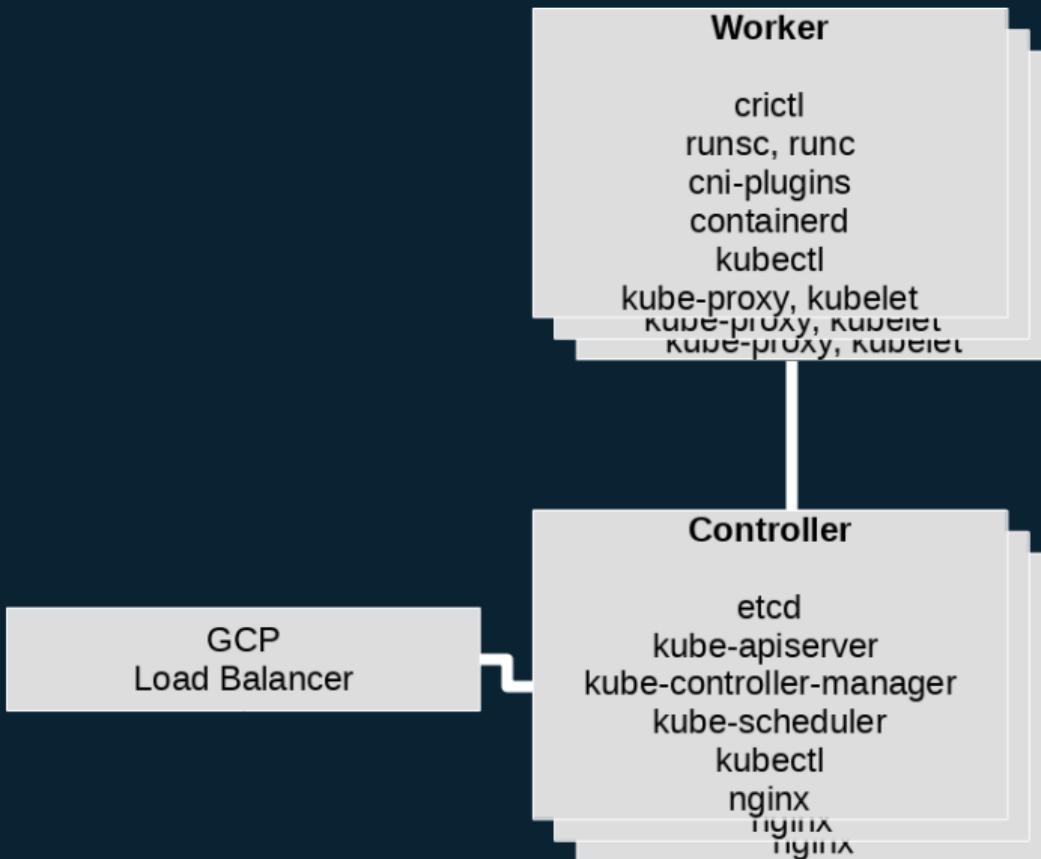


# 準備



- ▶ 基本的に Google Cloud Platform 上で動かすことを想定  
でも、私の OpenStack クラウドでも動いたよ！（ちょっとコツが必要でした  
けど :）
- ▶ n1-standard-1(vCPU\*1, MEM: 3.75GB) \* 6  
-> Controller \* 3 + Worker \* 3 + Load Balancer

# Architecture, components for this k8s cluster



# Summary on GCP



- ▶ Hours: 2.5H, Cost: \$1 以下
- ▶ “Hard way” とは言うものの、実行自体はそんなに大変じゃない  
-> 2.5H 以下で終わる
- ▶ いくつかウォーニングは出たものの、あんまり気にしない！ :)

# 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 automated by ansible
- ▶ Cost: \$300/node(roughly) \* 3



OLD



NEW(smaller, quiet, low energy & performance)



## Problems/Challenges



public/private OpenStack cloud 上でも動かせるよ！  
ただ、ちょっと課題はあります..

- ▶ 初期＆メンテナンスコストが結構かかります
- ▶ OpenStack は（も） \*Hard\* :-P
  - ▶ コントローラーノードの SSD が不安定
  - ▶ 再構築に何時間もかかってしまった -> ansible playbook書いて解決
- ▶ GCP と OpenStack の差異 -> 次のスライド

# GCP と OpenStack での差異 (gcloud vs openstack)

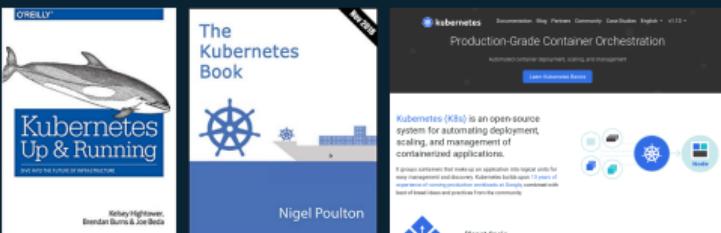


- ▶ instances 起動
- ▶ network 設定
- ▶ security groups 設定
- ▶ ホスト名解決が必要 (DNS, /etc/hosts)
- ▶ ロードバランサーも必要 (Octavia, Nginx, HA-Proxy)

# Summary



- ▶ 自分の環境で、動かし、色々カスタマイズし、Try & Errorで、理解が深まる  
-> Bash scripts 作りました  
(<https://github.com/masayukig/k8s-the-hard-way-script>)
- ▶ 学習目的、プロダクション環境では使わないように (i.e. HA, Persistent Volume, etc.)
- ▶ オープンソース! ソースコードを読めるし、書けるし、PR出したりしてコミュニティに参加したほうが面白い
- ▶ 各種書籍、ググって見ると色々な本があって、理解に役立ちます
  - ▶ Kubernetes: Up and Running: Dive into the Future of Infrastructure
  - ▶ The Kubernetes Book
  - ▶ Kubernetes.io



# Question?



## Information

- ▶ Slides: <https://github.com/masayukig/k8s-the-hard-way/>
- ▶ Contact info: masayukig on [Freenode](#), [GitHub](#), [Twitter](#), [LinkedIn](#)
- ▶ Kubernetes The Hard Way:  
<https://github.com/kelseyhightower/kubernetes-the-hard-way>