

2-Ways Building HA Clusters

kubernetes

Kubespray & kubeadm

안승규 (Seungkyu Ahn)

seungkyua@gmail.com

저를 소개하자면



seungkyua@gmail.com

<https://www.ahnseungkyu.com/>

Developer: ~2010년

- Java enterprise applicaiton developer

Engineer: 2011년~

- OpenStack
- OpenStack Korea Group ex-부대표

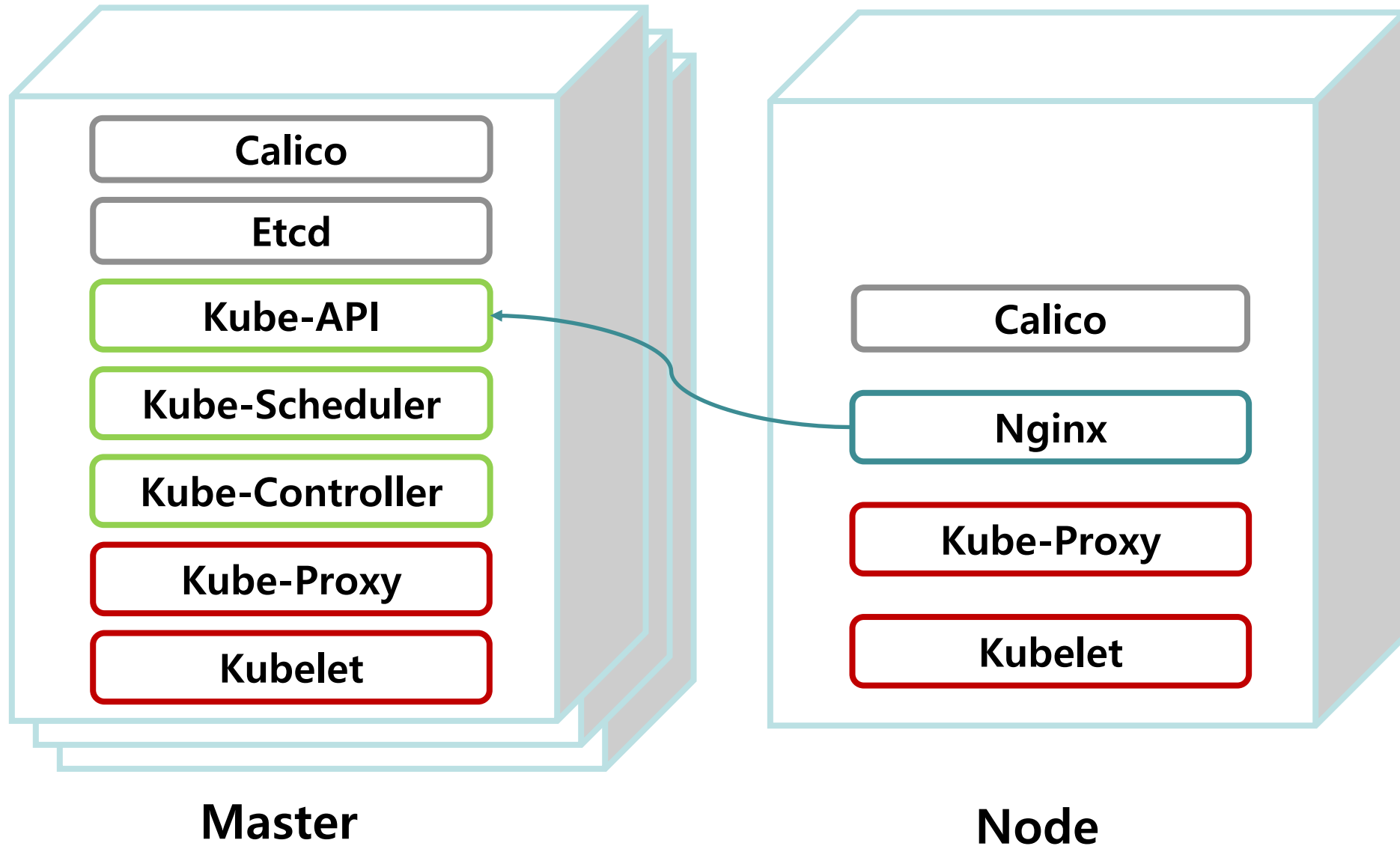
Engineer: 2016년~

- Kubernetes
- Kubernetes Korea Group 리더
- CNCF speaker 로 등재

최근 공부

- Deep Learning
- Go lang
- English

Kubernetes Architecture



- **Kubernetes incubator**
- **git clone <https://github.com/kubernetes-incubator/kubespray>**
- **Ansible**

Prerequisite

- **Connect using ssh without password for all node**
- **sudo no password**
- **Install Python - all node**
- **swapoff**
- **Disable firewall**
- **Install ntp**
- **Install pip**
- **pip install -r requirements.txt**
- **Install ansible**

Inventory & Host file

```
├─ inventory
│   ├── k0-seungkyua
│   ├── local
│   └─ sample
```

```
├─ inventory
│   ├── k0-seungkyua
│   │   ├── group_vars
│   │   │   ├── all
│   │   │   │   ├── all.yml
│   │   │   │   ├── azure.yml
│   │   │   │   ├── coreos.yml
│   │   │   │   ├── docker.yml
│   │   │   │   ├── oci.yml
│   │   │   │   └─ openstack.yml
│   │   │   ├── etcd.yml
│   │   │   └─ k8s-cluster
│   │   │       ├── addons.yml
│   │   │       ├── k8s-cluster.yml
│   │   │       ├── k8s-net-calico.yml
│   │   │       ├── k8s-net-canal.yml
│   │   │       ├── k8s-net-cilium.yml
│   │   │       ├── k8s-net-contiv.yml
│   │   │       ├── k8s-net-flannel.yml
│   │   │       └─ k8s-net-weave.yml
│   │   └─ hosts.ini
```

Host file

k0-master01 ansible_host=k0-master01 ip=10.0.0.177

k0-node01 ansible_host=k0-node01 ip=10.0.0.178

[etcd]

k0-master01

[kube-master]

k0-master01

[kube-node]

k0-node01

[k8s-cluster:children]

kube-node

kube-master

Install kubernetes

```
$ ansible-playbook -b W  
-i inventory/k0-seungkyua/hosts.ini W  
cluster.yml
```


Result

```
PLAY RECAP *****
k0-master01      : ok=330  changed=82  unreachable=0    failed=0
k0-node01        : ok=279  changed=65  unreachable=0    failed=0
localhost        : ok=2    changed=0   unreachable=0    failed=0

Monday 01 October 2018  09:40:07 +0000 (0:00:00.029)    0:07:25.981 *****
=====
download : file_download | Download item ----- 46.57s
kubernetes/master : Master | wait for the apiserver to be running ----- 24.27s
download : container_download | Download containers if pull is required or told to always pull (all nodes) ----- 21.72s
download : container_download | Download containers if pull is required or told to always pull (all nodes) ----- 20.23s
network_plugin/calico : Calico | Copy cni plugins from calico/cni container ----- 17.01s
download : container_download | Download containers if pull is required or told to always pull (all nodes) ----- 14.90s
docker : Docker | pause while Docker restarts ----- 10.13s
download : container_download | Download containers if pull is required or told to always pull (all nodes) ----- 9.69s
download : container_download | Download containers if pull is required or told to always pull (all nodes) ----- 8.16s
kubernetes/preinstall : Install packages requirements ----- 7.66s
etcd : wait for etcd up ----- 7.52s
download : container_download | Download containers if pull is required or told to always pull (all nodes) ----- 5.59s
kubernetes/master : Master | wait for kube-scheduler ----- 5.52s
etcd : Configure | Check if etcd cluster is healthy ----- 5.52s
download : container_download | Download containers if pull is required or told to always pull (all nodes) ----- 5.50s
download : container_download | Download containers if pull is required or told to always pull (all nodes) ----- 5.35s
kubernetes/preinstall : Update package management cache (APT) ----- 5.10s
docker : Docker | reload docker ----- 5.06s
download : container_download | Download containers if pull is required or told to always pull (all nodes) ----- 4.94s
kubernetes-apps/ansible : Kubernetes Apps | Start Resources ----- 4.00s
```


Kubernetes Process Status

```
root@k0-master01:~# kubectl get pods -n kube-system -o wide
```

NAME	READY	STATUS	RESTARTS	AGE	IP	NODE
calico-kube-controllers-7774dddb8-9bwqm	1/1	Running	3	8d	10.0.0.178	k0-node01
calico-node-4nn6s	1/1	Running	0	83m	10.0.0.177	k0-master01
calico-node-j9qg9	1/1	Running	0	83m	10.0.0.178	k0-node01
kube-apiserver-k0-master01	1/1	Running	0	84m	10.0.0.177	k0-master01
kube-controller-manager-k0-master01	1/1	Running	1	84m	10.0.0.177	k0-master01
kube-dns-5bfff646c-dzv9j	3/3	Running	0	82m	10.233.85.70	k0-master01
kube-dns-5bfff646c-kpcnz	3/3	Running	0	82m	10.233.127.6	k0-node01
kube-proxy-k0-master01	1/1	Running	0	83m	10.0.0.177	k0-master01
kube-proxy-k0-node01	1/1	Running	0	83m	10.0.0.178	k0-node01
kube-scheduler-k0-master01	1/1	Running	1	84m	10.0.0.177	k0-master01
kubedns-autoscaler-5db95c6cf5-tmz2t	1/1	Running	1	8d	10.233.85.68	k0-master01
kubernetes-dashboard-789d954c6f-nsv2n	1/1	Running	1	8d	10.233.127.3	k0-node01
nginx-proxy-k0-node01	1/1	Running	0	83m	10.0.0.178	k0-node01

kubernetes cluster status

```
root@k0-master01:~# kubectl get cs
```

NAME	STATUS	MESSAGE	ERROR
controller-manager	Healthy	ok	
scheduler	Healthy	ok	
etcd-0	Healthy	{"health": "true"}	

```
root@k0-master01:~#
```

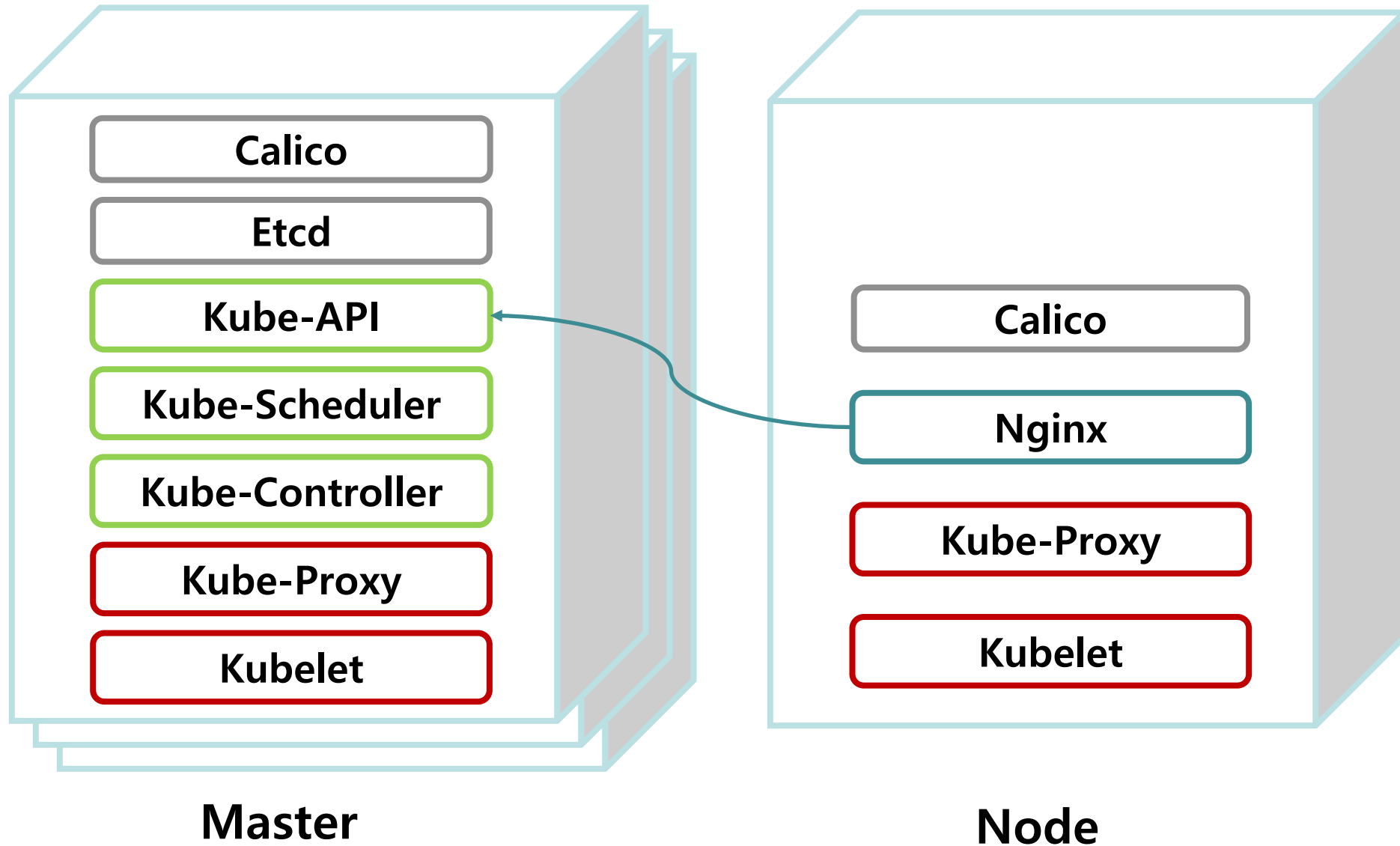
```
root@k0-master01:~#
```

```
root@k0-master01:~#
```

```
root@k0-master01:~# kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
k0-master01	Ready	master	8d	v1.12.1
k0-node01	Ready	node	8d	v1.12.1

Kubernetes Architecture



1. (Highest) `ansible-playbook -e var=value`
2. `set_fact`
3. `group_vars` set in the inventory
4. Inventory variables
5. In `defaults/main.yml` of a role

k8s-cluster.yml

```
└─ inventory
  └─ k0-seungkyua
    └─ group_vars
      └─ all
        ├── all.yml
        ├── azure.yml
        ├── coreos.yml
        ├── docker.yml
        ├── oci.yml
        └── openstack.yml
      ├── etcd.yml
      └─ k8s-cluster
        ├── addons.yml
        └─ k8s-cluster.yml
        ├── k8s-net-calico.yml
        ├── k8s-net-canal.yml
        ├── k8s-net-cilium.yml
        ├── k8s-net-contiv.yml
        ├── k8s-net-flannel.yml
        └── k8s-net-weave.yml
      └─ hosts.ini
```


kube_version: v1.12.1

kube_network_plugin: calico

kube_service_addresses: 10.233.0.0/18

kube_pods_subnet: 10.233.64.0/18

kube_proxy_mode: iptables or ipvs

dns_mode: kubedns or coredns

1. kubespray-defaults role

- defaults/main.yml: 기본 변수 설정
- meta/main.yml: download role 로 trigger

2. download role

- binary file or docker image 다운로드

3. bootstrap-os role

4. docker role

5. etcd role

6. kubernetes/node role

7. kubernetes/master role

8. kubernetes-apps/network_plugin role

roles

```
| roles
|   |-- adduser
|   |-- bastion-ssh-config
|   |-- bootstrap-os
|   |-- cri-o
|   |-- dnsmasq
|   |-- docker
|   |-- download
|   |-- etcd
|   |-- kubernetes
|   |-- kubernetes-apps
|   |-- kubespary-defaults
|   |-- network_plugin
|   |-- remove-node
|   |-- reset
|   |-- rkt
|   |-- upgrade
|   |-- vault
|   |-- win_nodes
```

kube_network_plugin: calico or cilium

docker_options: >-

...

dashboard_enabled: true

helm_enabled: false

local_volume_provisioner_enabled: false

ingress_nginx_enabled: false

etcd_version: v3.2.24

calico_version: "v3.1.3"

calico_ctl_version: "v3.1.3"

calico_cni_version: "v3.1.3"

calico_policy_version: "v3.1.3"

calico_rr_version: "v0.6.1"

hyperkube_checksums:

v1.12.1: xxxxxxxx

helm_version: "v2.9.1"

override_system_hostname: true

Install kubernetes using kubeadm

- 사전 준비 사항은 kubespray 와 거의 동일함
 1. etcd certs 생성 및 etcd 설치 (the external etcd cluster)
 2. kubeadm init with config-file
 3. network plugin 설치 (calico)
 4. 새로운 master02 노드 추가
 - 4-1. master02 에 필요한 cert key 복사
 - 4-2. kubeadm alpha phase certs 로 master02 에 맞는 certs 생성
 - 4-3. master02 에서 kubeadm join
 - 4-4. master02 에 대한 label, taint 세팅

Install kubernetes using kubeadm with kubeadm

roles/kubeadm-defaults/defaults/main.yaml

kubeadm_enabled: true

영향을 받는 부분은...

```
| roles
|   |-- adduser
|   |-- bastion-ssh-config
|   |-- bootstrap-os
|   |-- cri-o
|   |-- dnsmasq
|   |-- docker
|   |-- download
|   |-- etcd
|   |-- kubernetes
|   |-- kubernetes-apps
|   |-- kubespary-defaults
|   |-- network_plugin
|   |-- remove-node
|   |-- reset
|   |-- rkt
|   |-- upgrade
|   |-- vault
|   |-- win_nodes
```

Kubernetes Korea Group

<https://www.facebook.com/groups/k8skr/>

Q&A