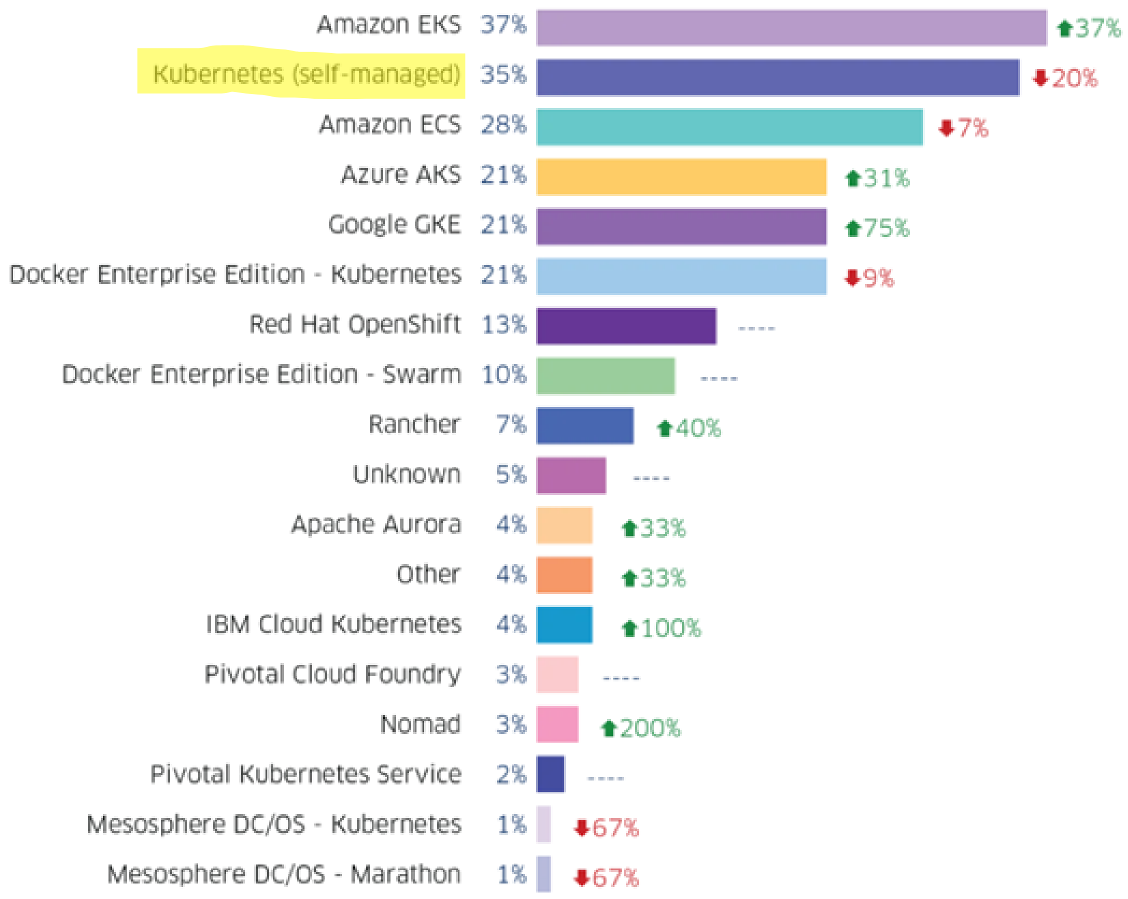
On-Premise

k8s를 활용한 Wordpress 구축 및 배포

시장조사

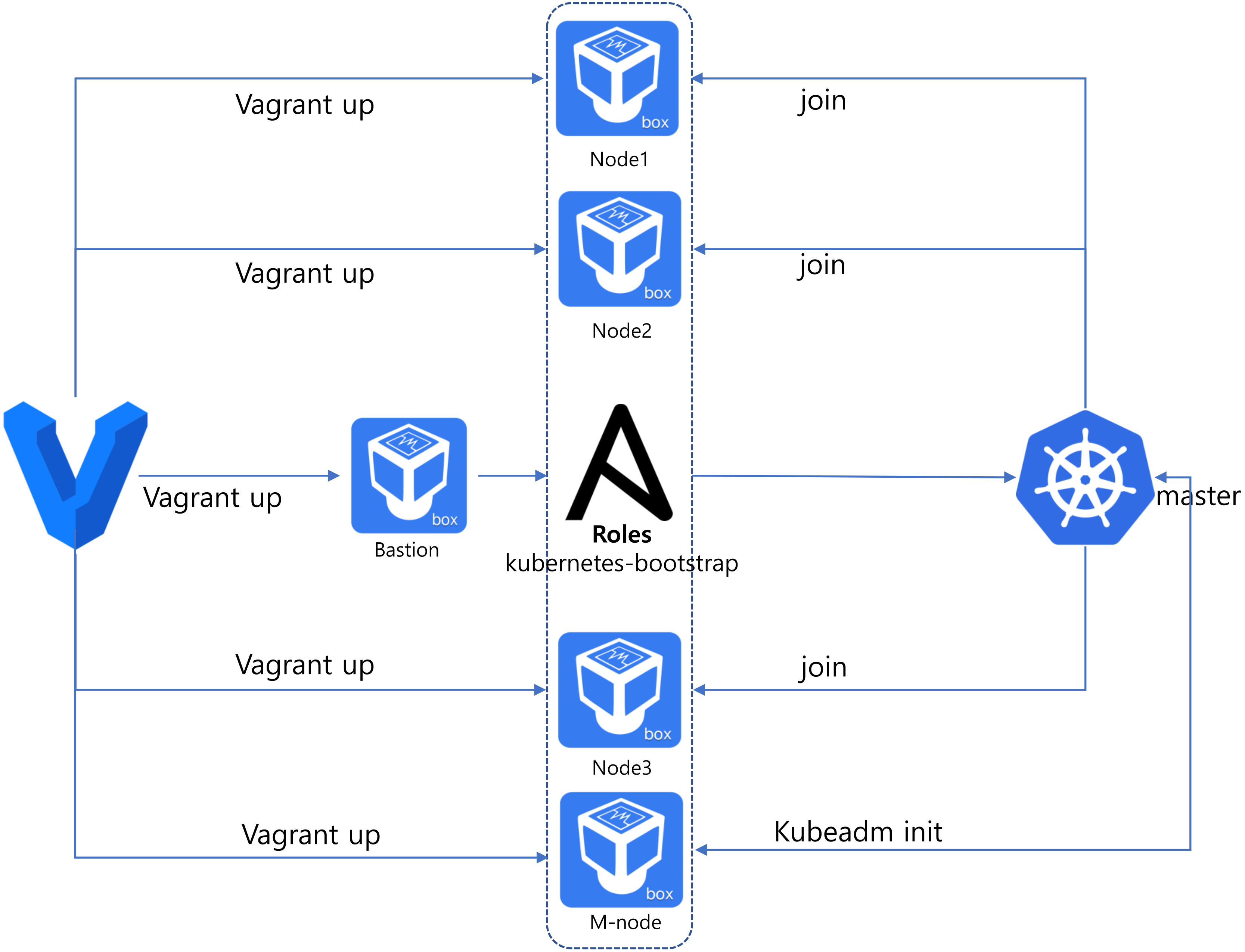
Which of the following container orchestrators do you use? (pick as many as apply)

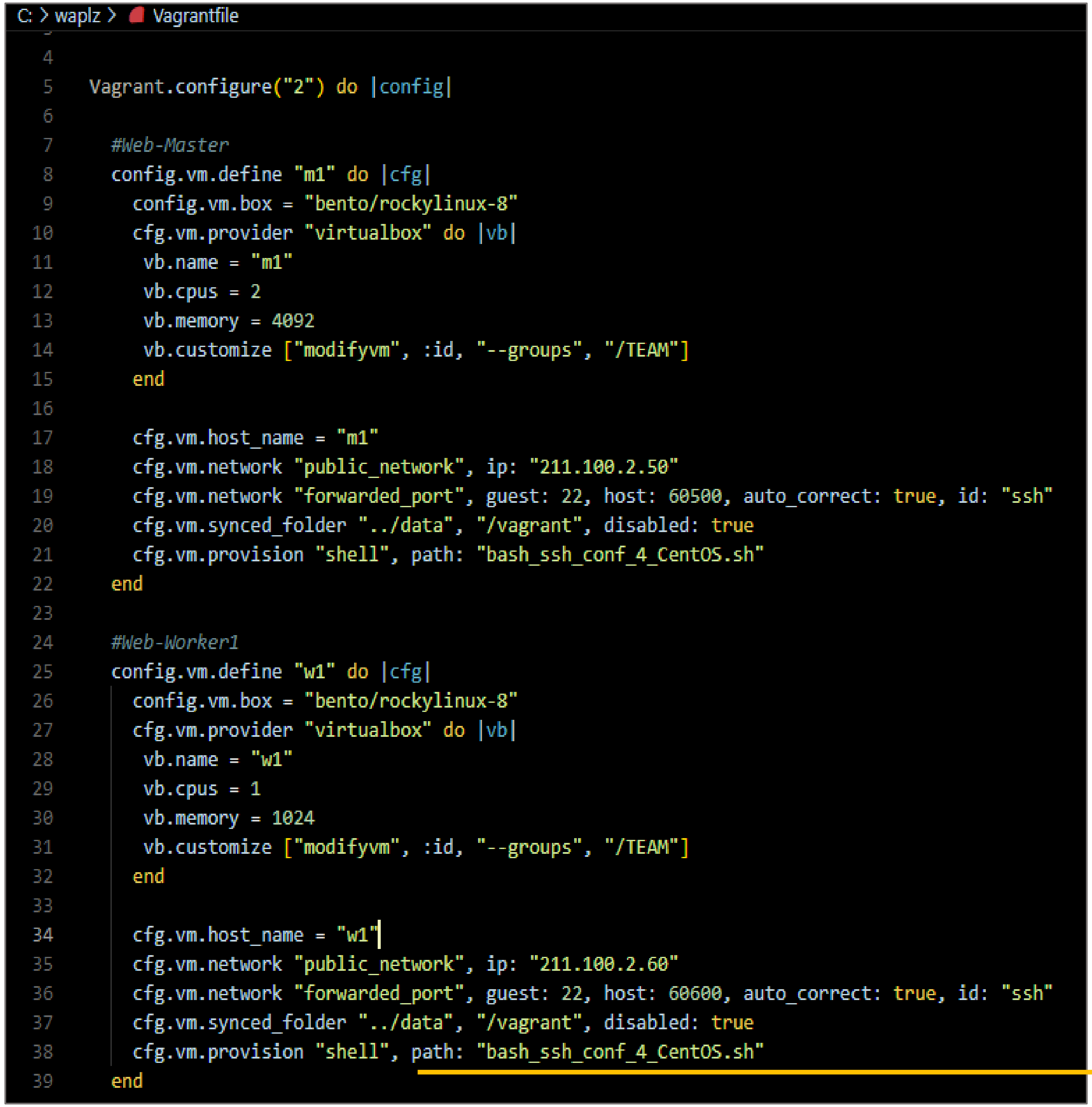


<출처: StackRox>

온프레미스 환경에서 컨테이너 오케스트레이션을 제공하는 대표적인 솔루션은 도커 스웜, 메소스, 노매드, 쿠버네티스 등이 있다.

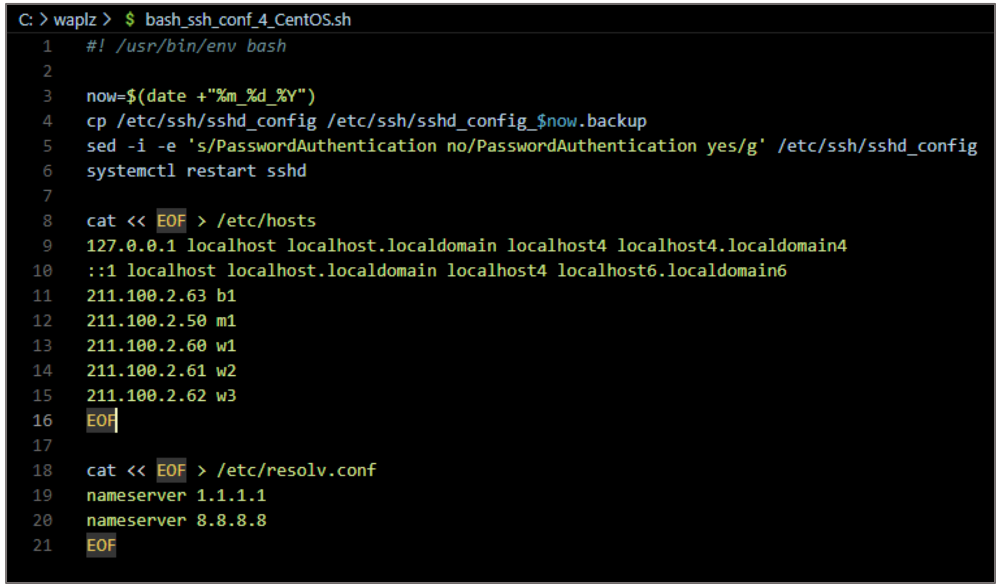
Vagrant + Ansible





C: > waplz > Vagrantfile

```
Vagrant.configure("2") do |config|

  #Web-Master
  config.vm.define "m1" do |cfg|
    config.vm.box = "bento/rockylinux-8"
    cfg.vm.provider "virtualbox" do |vb|
     vb.name = "m1"
     vb.cpus = 2
     vb.memory = 4092
     vb.customize ["modifyvm", :id, "--groups", "/TEAM"]
    end

    cfg.vm.host_name = "m1"
    cfg.vm.network "public_network", ip: "211.100.2.50"
    cfg.vm.network "forwarded_port", guest: 22, host: 60500, auto_correct: true, id: "ssh"
    cfg.vm.synced_folder "../data", "/vagrant", disabled: true
    cfg.vm.provision "shell", path: "bash_ssh_conf_4_CentOS.sh"
  end

  #Web-Worker1
  config.vm.define "w1" do |cfg|
    config.vm.box = "bento/rockylinux-8"
    cfg.vm.provider "virtualbox" do |vb|
     vb.name = "w1"
     vb.cpus = 1
     vb.memory = 1024
     vb.customize ["modifyvm", :id, "--groups", "/TEAM"]
    end

    cfg.vm.host_name = "w1"
    cfg.vm.network "public_network", ip: "211.100.2.60"
    cfg.vm.network "forwarded_port", guest: 22, host: 60600, auto_correct: true, id: "ssh"
    cfg.vm.synced_folder "../data", "/vagrant", disabled: true
    cfg.vm.provision "shell", path: "bash_ssh_conf_4_CentOS.sh"
  end
```



C: > waplz > $ bash_ssh_conf_4_CentOS.sh

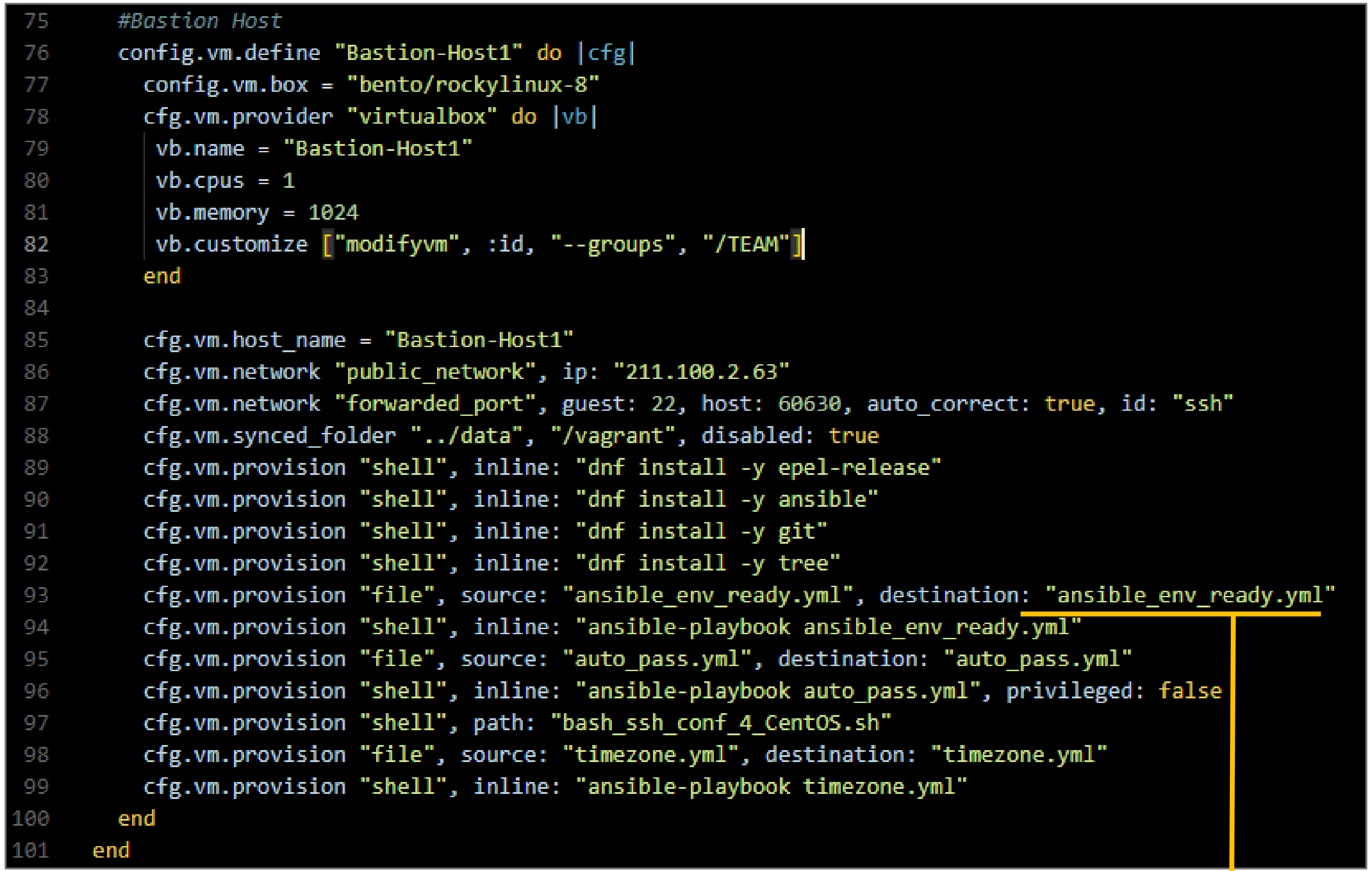
```
#! /usr/bin/env bash

now=$(date +"%m_%d_%Y")
cp /etc/ssh/sshd_config /etc/ssh/sshd_config_$now.backup
sed -i -e 's/PasswordAuthentication no/PasswordAuthentication yes/g' /etc/ssh/sshd_config
systemctl restart sshd

cat << EOF > /etc/hosts
127.0.0.1 localhost localhost.localdomain localhost4 localhost4.localdomain4
::1 localhost localhost.localdomain localhost4 localhost6.localdomain6
211.100.2.63 b1
211.100.2.50 m1
211.100.2.60 w1
211.100.2.61 w2
211.100.2.62 w3
EOF

cat << EOF > /etc/resolv.conf
nameserver 1.1.1.1
nameserver 8.8.8.8
EOF
```

Vagrantfile

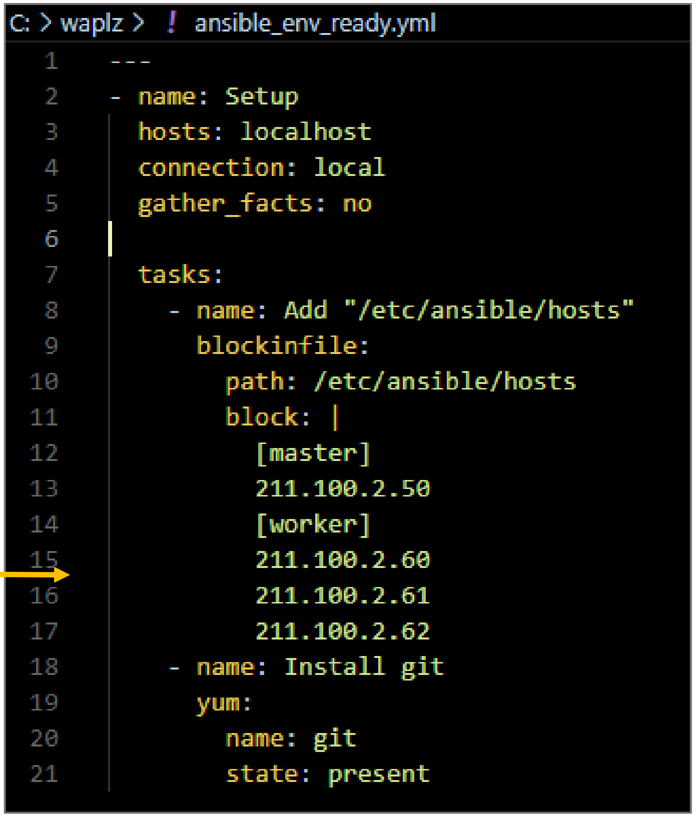
가상환경 구축을 위한 vagrantfile 작성
Master Node와 Worker Node 1,2,3 /
Bastion Node 생성

bash_ssh_conf_4_CentOS.sh

ssh 연결 설정 및 hosts 파일에 노드 정보 추가



```
  #Bastion Host
  config.vm.define "Bastion-Host1" do |cfg|
    config.vm.box = "bento/rockylinux-8"
    cfg.vm.provider "virtualbox" do |vb|
     vb.name = "Bastion-Host1"
     vb.cpus = 1
     vb.memory = 1024
     vb.customize ["modifyvm", :id, "--groups", "/TEAM"]
    end

    cfg.vm.host_name = "Bastion-Host1"
    cfg.vm.network "public_network", ip: "211.100.2.63"
    cfg.vm.network "forwarded_port", guest: 22, host: 60630, auto_correct: true, id: "ssh"
    cfg.vm.synced_folder "../data", "/vagrant", disabled: true
    cfg.vm.provision "shell", inline: "dnf install -y epel-release"
    cfg.vm.provision "shell", inline: "dnf install -y ansible"
    cfg.vm.provision "shell", inline: "dnf install -y git"
    cfg.vm.provision "shell", inline: "dnf install -y tree"
    cfg.vm.provision "file", source: "ansible_env_ready.yml", destination: "ansible_env_ready.yml"
    cfg.vm.provision "shell", inline: "ansible-playbook ansible_env_ready.yml"
    cfg.vm.provision "file", source: "auto_pass.yml", destination: "auto_pass.yml"
    cfg.vm.provision "shell", inline: "ansible-playbook auto_pass.yml", privileged: false
    cfg.vm.provision "shell", path: "bash_ssh_conf_4_CentOS.sh"
    cfg.vm.provision "file", source: "timezone.yml", destination: "timezone.yml"
    cfg.vm.provision "shell", inline: "ansible-playbook timezone.yml"
  end
end
```

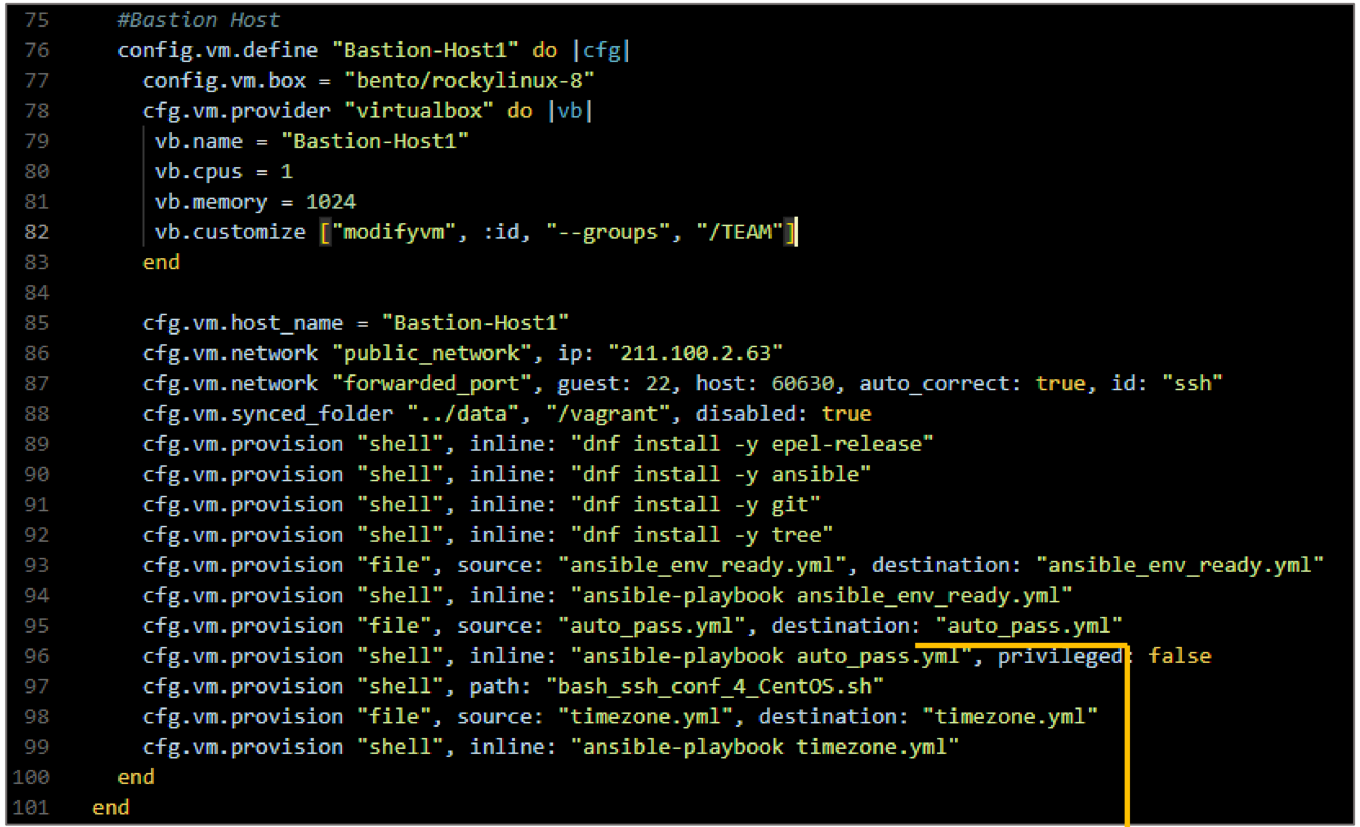


C: > waplz > ! ansible_env_ready.yml

```yaml
---
- name: Setup
  hosts: localhost
  connection: local
  gather_facts: no

  tasks:
    - name: Add "/etc/ansible/hosts"
      blockinfile:
        path: /etc/ansible/hosts
        block: |
          [master]
          211.100.2.50
          [worker]
          211.100.2.60
          211.100.2.61
          211.100.2.62
    - name: Install git
      yum:
        name: git
        state: present
```

Ansible_env_ready.yml

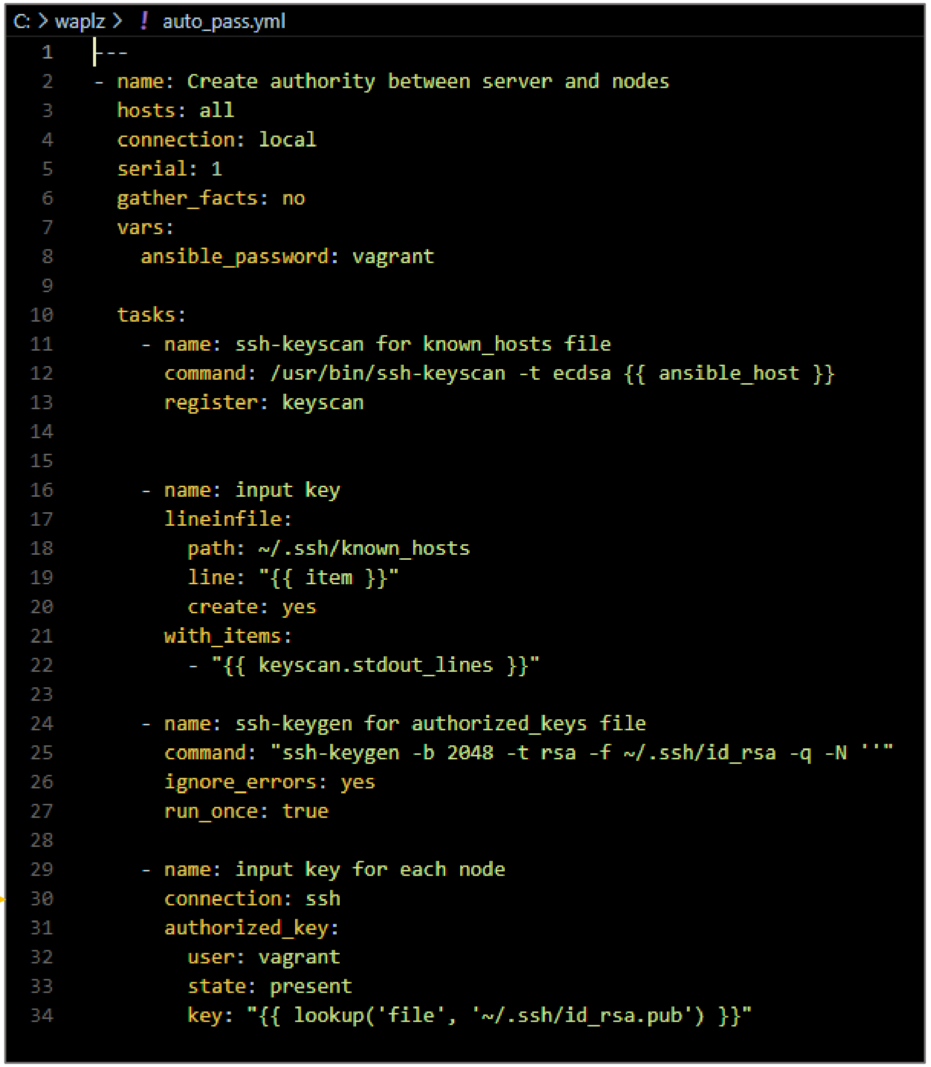
Inventory에 Node IP 추가



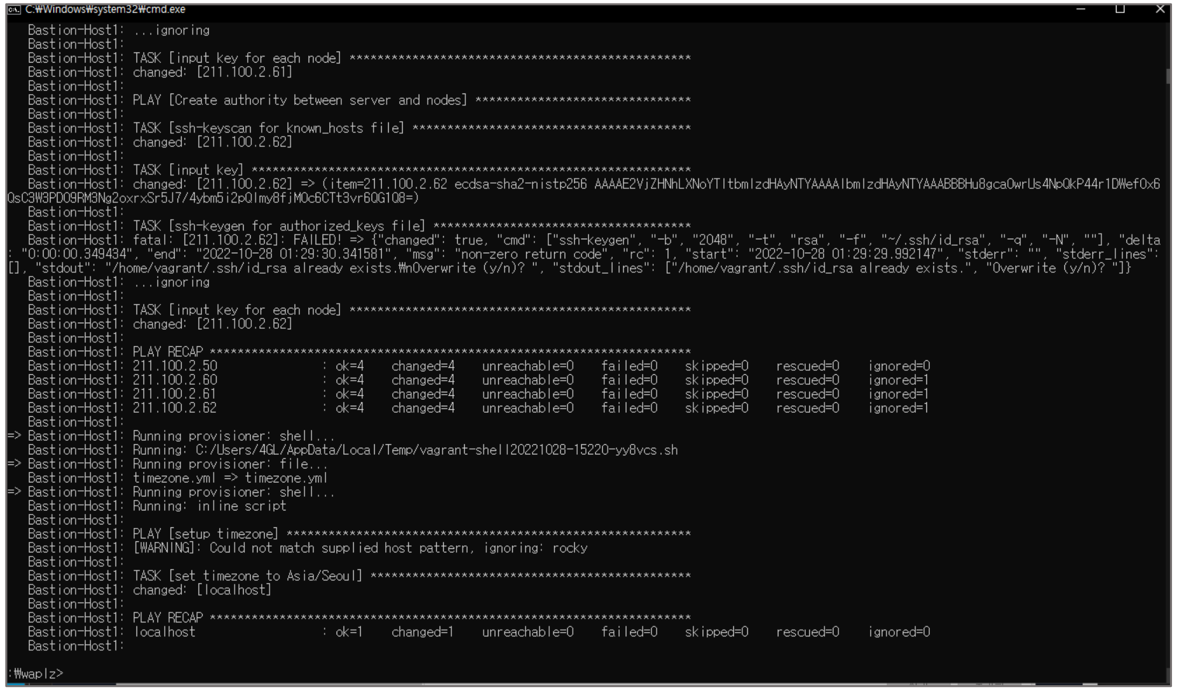
```
  #Bastion Host
  config.vm.define "Bastion-Host1" do |cfg|
    config.vm.box = "bento/rockylinux-8"
    cfg.vm.provider "virtualbox" do |vb|
      vb.name = "Bastion-Host1"
      vb.cpus = 1
      vb.memory = 1024
      vb.customize ["modifyvm", :id, "--groups", "/TEAM"]
    end

    cfg.vm.host_name = "Bastion-Host1"
    cfg.vm.network "public_network", ip: "211.100.2.63"
    cfg.vm.network "forwarded_port", guest: 22, host: 60630, auto_correct: true, id: "ssh"
    cfg.vm.synced_folder "../data", "/vagrant", disabled: true
    cfg.vm.provision "shell", inline: "dnf install -y epel-release"
    cfg.vm.provision "shell", inline: "dnf install -y ansible"
    cfg.vm.provision "shell", inline: "dnf install -y git"
    cfg.vm.provision "shell", inline: "dnf install -y tree"
    cfg.vm.provision "file", source: "ansible_env_ready.yml", destination: "ansible_env_ready.yml"
    cfg.vm.provision "shell", inline: "ansible-playbook ansible_env_ready.yml"
    cfg.vm.provision "file", source: "auto_pass.yml", destination: "auto_pass.yml"
    cfg.vm.provision "shell", inline: "ansible-playbook auto_pass.yml", privileged: false
    cfg.vm.provision "shell", path: "bash_ssh_conf_4_CentOS.sh"
    cfg.vm.provision "file", source: "timezone.yml", destination: "timezone.yml"
    cfg.vm.provision "shell", inline: "ansible-playbook timezone.yml"
  end
end
```

Auto_pass.yml

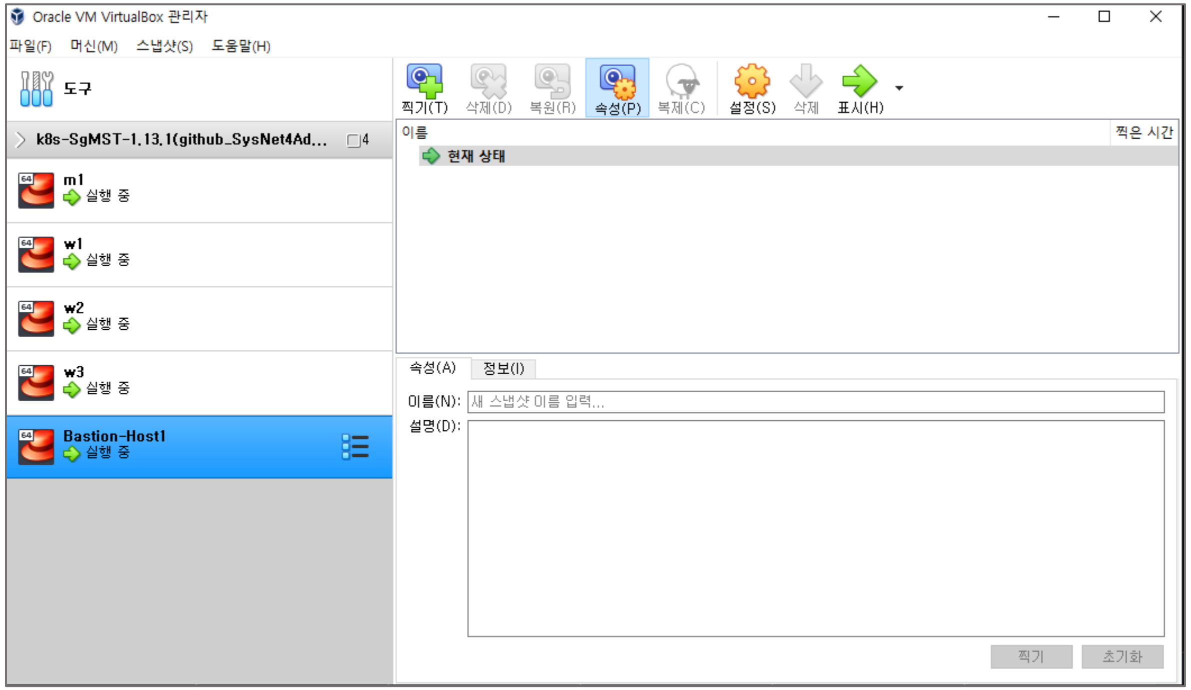
ssh 접속을 위한 key 생성 및 배포



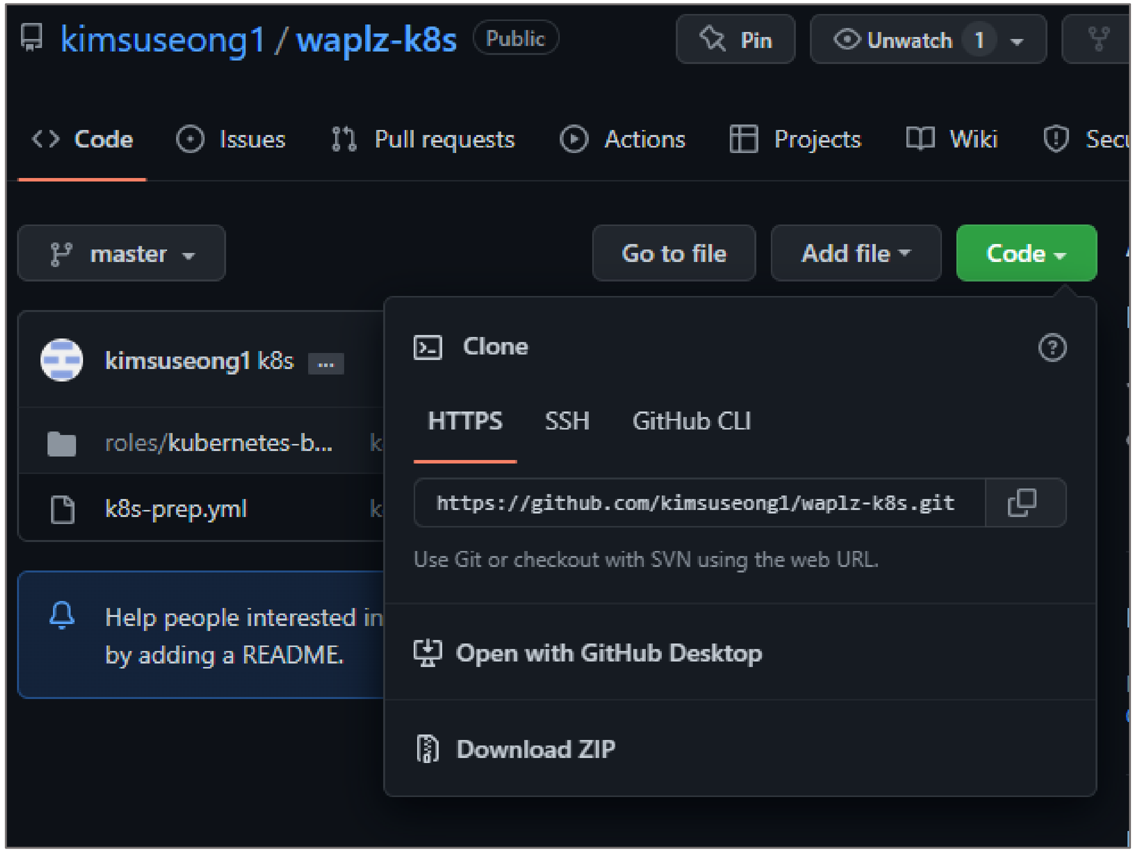
```
---
- name: Create authority between server and nodes
  hosts: all
  connection: local
  serial: 1
  gather_facts: no
  vars:
    ansible_password: vagrant

  tasks:
    - name: ssh-keyscan for known_hosts file
      command: /usr/bin/ssh-keyscan -t ecdsa {{ ansible_host }}
      register: keyscan


    - name: input key
      lineinfile:
        path: ~/.ssh/known_hosts
        line: "{{ item }}"
        create: yes
      with_items:
        - "{{ keyscan.stdout_lines }}"

    - name: ssh-keygen for authorized_keys file
      command: "ssh-keygen -b 2048 -t rsa -f ~/.ssh/id_rsa -q -N ''"
      ignore_errors: yes
      run_once: true

    - name: input key for each node
      connection: ssh
      authorized_key:
        user: vagrant
        state: present
        key: "{{ lookup('file', '~/.ssh/id_rsa.pub') }}"
```



```
   Bastion-Host1: ...ignoring
   Bastion-Host1:
   Bastion-Host1: TASK [input key for each node] **************************************************
   Bastion-Host1: changed: [211.100.2.61]
   Bastion-Host1:
   Bastion-Host1: PLAY [Create authority between server and nodes] *******************************
   Bastion-Host1:
   Bastion-Host1: TASK [ssh-keyscan for known_hosts file] *****************************************
   Bastion-Host1: changed: [211.100.2.62]
   Bastion-Host1:
   Bastion-Host1: TASK [input key] ****************************************************************
   Bastion-Host1: changed: [211.100.2.62] => (item=211.100.2.62 ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBHu8gcaOwrUs4NpQkP44r1DWefOx6
QsC3W3PDO9RM3Ng2oxrxSr5J7/4ybm5i2pQlmy8fjMOc6CTt3vr6QG1Q8=)
   Bastion-Host1:
   Bastion-Host1: TASK [ssh-keygen for authorized_keys file] **************************************
   Bastion-Host1: fatal: [211.100.2.62]: FAILED! => {"changed": true, "cmd": ["ssh-keygen", "-b", "2048", "-t", "rsa", "-f", "~/.ssh/id_rsa", "-q", "-N", ""], "delta
": "0:00:00.349434", "end": "2022-10-28 01:29:30.341581", "msg": "non-zero return code", "rc": 1, "start": "2022-10-28 01:29:29.992147", "stderr": "", "stderr_lines":
[], "stdout": "/home/vagrant/.ssh/id_rsa already exists.₩nOverwrite (y/n)? ", "stdout_lines": ["/home/vagrant/.ssh/id_rsa already exists.", "Overwrite (y/n)? "]}
   Bastion-Host1: ...ignoring
   Bastion-Host1:
   Bastion-Host1: TASK [input key for each node] **************************************************
   Bastion-Host1: changed: [211.100.2.62]
   Bastion-Host1:
   Bastion-Host1: PLAY RECAP **********************************************************************
   Bastion-Host1: 211.100.2.50               : ok=4    changed=4    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
   Bastion-Host1: 211.100.2.60               : ok=4    changed=4    unreachable=0    failed=0    skipped=0    rescued=0    ignored=1
   Bastion-Host1: 211.100.2.61               : ok=4    changed=4    unreachable=0    failed=0    skipped=0    rescued=0    ignored=1
   Bastion-Host1: 211.100.2.62               : ok=4    changed=4    unreachable=0    failed=0    skipped=0    rescued=0    ignored=1
   Bastion-Host1:
=> Bastion-Host1: Running provisioner: shell...
   Bastion-Host1: Running: C:/Users/4GL/AppData/Local/Temp/vagrant-shell20221028-15220-yy8vcs.sh
=> Bastion-Host1: Running provisioner: file...
   Bastion-Host1: timezone.yml => timezone.yml
=> Bastion-Host1: Running provisioner: shell...
   Bastion-Host1: Running: inline script
   Bastion-Host1:
   Bastion-Host1: PLAY [setup timezone] ***********************************************************
   Bastion-Host1: [WARNING]: Could not match supplied host pattern, ignoring: rocky
   Bastion-Host1:
   Bastion-Host1: TASK [set timezone to Asia/Seoul] ***********************************************
   Bastion-Host1: changed: [localhost]
   Bastion-Host1:
   Bastion-Host1: PLAY RECAP **********************************************************************
   Bastion-Host1: localhost                  : ok=1    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
   Bastion-Host1:

:₩waplz>
```



Vagrant up 완료 후 Bastion node로 접속



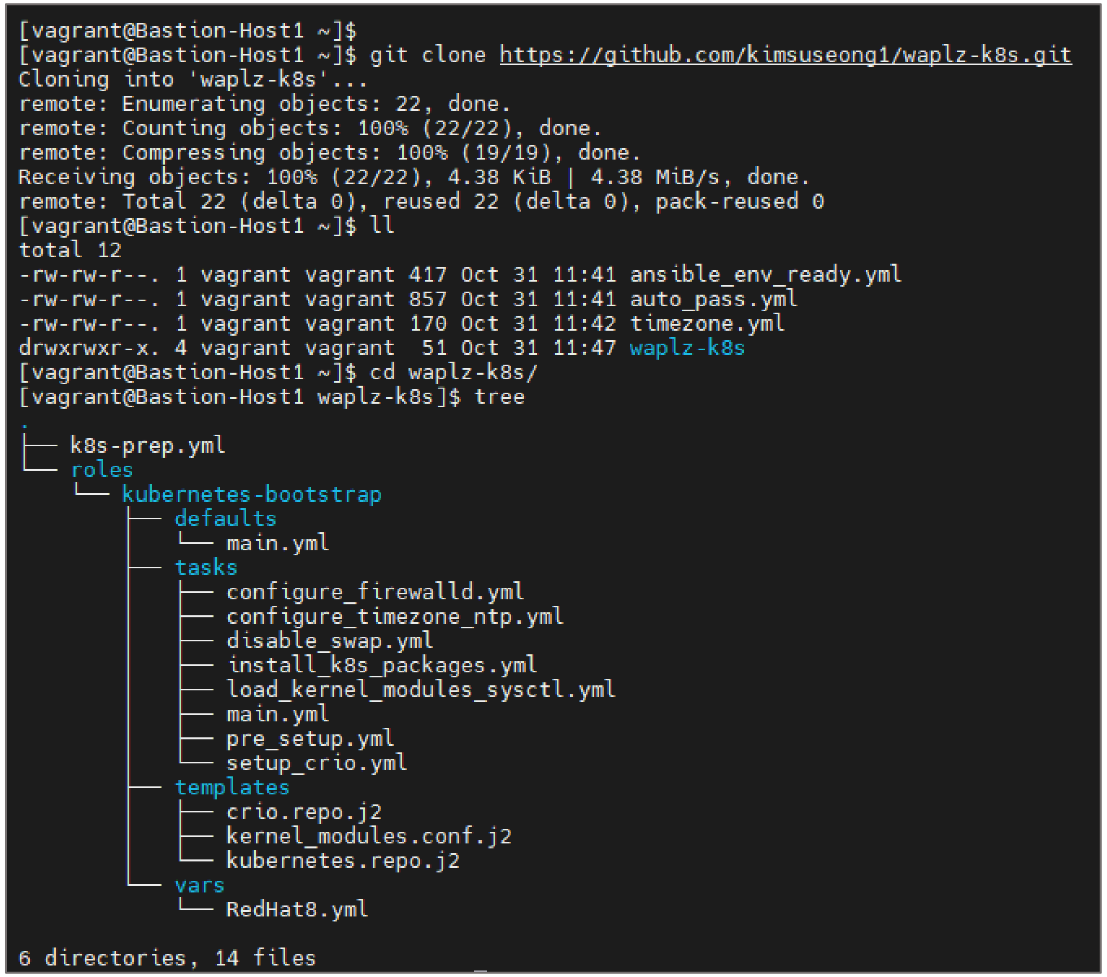
```
https://github.com/kimsuseong1/waplz-k8s.git
```

Use Git or checkout with SVN using the web URL.

Help people interested in
by adding a README.

Git repository

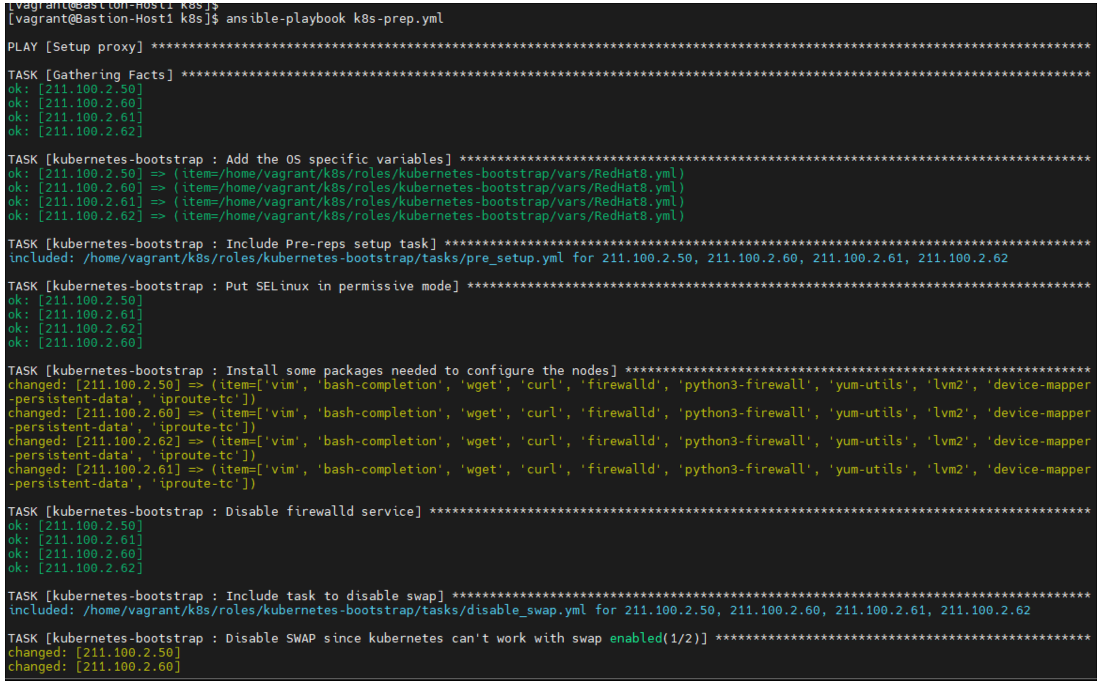
미리 waplz-k8s에 push 해 놓은
Yaml파일들을 clone



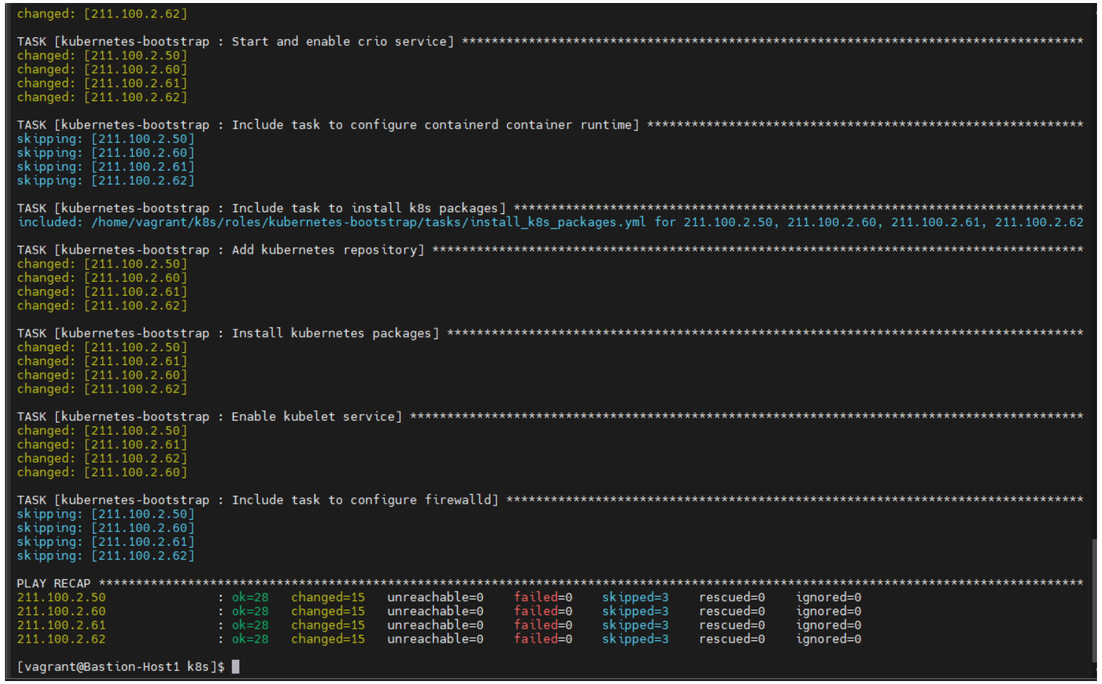
```
[vagrant@Bastion-Host1 ~]$
[vagrant@Bastion-Host1 ~]$ git clone https://github.com/kimsuseong1/waplz-k8s.git
Cloning into 'waplz-k8s'...
remote: Enumerating objects: 22, done.
remote: Counting objects: 100% (22/22), done.
remote: Compressing objects: 100% (19/19), done.
Receiving objects: 100% (22/22), 4.38 KiB | 4.38 MiB/s, done.
remote: Total 22 (delta 0), reused 22 (delta 0), pack-reused 0
[vagrant@Bastion-Host1 ~]$ ll
total 12
-rw-rw-r--. 1 vagrant vagrant 417 Oct 31 11:41 ansible_env_ready.yml
-rw-rw-r--. 1 vagrant vagrant 857 Oct 31 11:41 auto_pass.yml
-rw-rw-r--. 1 vagrant vagrant 170 Oct 31 11:42 timezone.yml
drwxrwxr-x. 4 vagrant vagrant  51 Oct 31 11:47 waplz-k8s
[vagrant@Bastion-Host1 ~]$ cd waplz-k8s/
[vagrant@Bastion-Host1 waplz-k8s]$ tree
.
├── k8s-prep.yml
└── roles
    └── kubernetes-bootstrap
        ├── defaults
        │   └── main.yml
        ├── tasks
        │   ├── configure_firewalld.yml
        │   ├── configure_timezone_ntp.yml
        │   ├── disable_swap.yml
        │   ├── install_k8s_packages.yml
        │   ├── load_kernel_modules_sysctl.yml
        │   ├── main.yml
        │   ├── pre_setup.yml
        │   └── setup_crio.yml
        ├── templates
        │   ├── crio.repo.j2
        │   ├── kernel_modules.conf.j2
        │   └── kubernetes.repo.j2
        └── vars
            └── RedHat8.yml

6 directories, 14 files
```

Git clone, Tree

Github 링크로 모든 파일 실행
Kubernetes Master Node, Worker Node
자동 설치

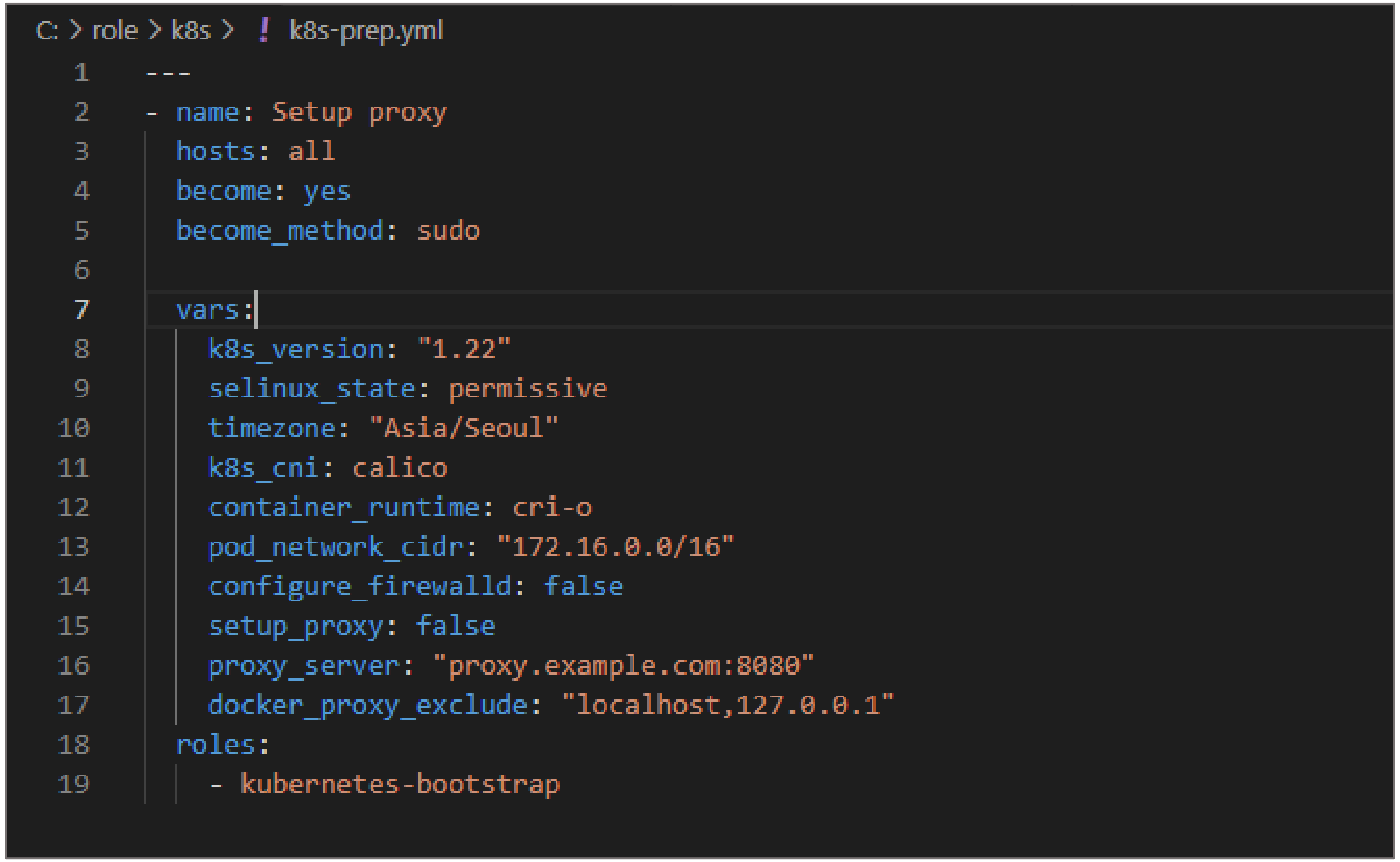


```
[vagrant@Bastion-Host1 k8s]$
[vagrant@Bastion-Host1 k8s]$ ansible-playbook k8s-prep.yml

PLAY [Setup proxy] **************************************************************************************************

TASK [Gathering Facts] **********************************************************************************************
ok: [211.100.2.50]
ok: [211.100.2.60]
ok: [211.100.2.61]
ok: [211.100.2.62]

TASK [kubernetes-bootstrap : Add the OS specific variables] *********************************************************
ok: [211.100.2.50] => (item=/home/vagrant/k8s/roles/kubernetes-bootstrap/vars/RedHat8.yml)
ok: [211.100.2.60] => (item=/home/vagrant/k8s/roles/kubernetes-bootstrap/vars/RedHat8.yml)
ok: [211.100.2.61] => (item=/home/vagrant/k8s/roles/kubernetes-bootstrap/vars/RedHat8.yml)
ok: [211.100.2.62] => (item=/home/vagrant/k8s/roles/kubernetes-bootstrap/vars/RedHat8.yml)

TASK [kubernetes-bootstrap : Include Pre-reps setup task] ***********************************************************
included: /home/vagrant/k8s/roles/kubernetes-bootstrap/tasks/pre_setup.yml for 211.100.2.50, 211.100.2.60, 211.100.2.61, 211.100.2.62

TASK [kubernetes-bootstrap : Put SELinux in permissive mode] ********************************************************
ok: [211.100.2.50]
ok: [211.100.2.61]
ok: [211.100.2.62]
ok: [211.100.2.60]

TASK [kubernetes-bootstrap : Install some packages needed to configure the nodes] ***********************************
changed: [211.100.2.50] => (item=['vim', 'bash-completion', 'wget', 'curl', 'firewalld', 'python3-firewall', 'yum-utils', 'lvm2', 'device-mapper
-persistent-data', 'iproute-tc'])
changed: [211.100.2.60] => (item=['vim', 'bash-completion', 'wget', 'curl', 'firewalld', 'python3-firewall', 'yum-utils', 'lvm2', 'device-mapper
-persistent-data', 'iproute-tc'])
changed: [211.100.2.62] => (item=['vim', 'bash-completion', 'wget', 'curl', 'firewalld', 'python3-firewall', 'yum-utils', 'lvm2', 'device-mapper
-persistent-data', 'iproute-tc'])
changed: [211.100.2.61] => (item=['vim', 'bash-completion', 'wget', 'curl', 'firewalld', 'python3-firewall', 'yum-utils', 'lvm2', 'device-mapper
-persistent-data', 'iproute-tc'])

TASK [kubernetes-bootstrap : Disable firewalld service] *************************************************************
ok: [211.100.2.50]
ok: [211.100.2.61]
ok: [211.100.2.60]
ok: [211.100.2.62]

TASK [kubernetes-bootstrap : Include task to disable swap] **********************************************************
included: /home/vagrant/k8s/roles/kubernetes-bootstrap/tasks/disable_swap.yml for 211.100.2.50, 211.100.2.60, 211.100.2.61, 211.100.2.62

TASK [kubernetes-bootstrap : Disable SWAP since kubernetes can't work with swap enabled(1/2)] ***********************
changed: [211.100.2.50]
changed: [211.100.2.60]
```



```
changed: [211.100.2.62]

TASK [kubernetes-bootstrap : Start and enable crio service] *********************************************************
changed: [211.100.2.50]
changed: [211.100.2.60]
changed: [211.100.2.61]
changed: [211.100.2.62]

TASK [kubernetes-bootstrap : Include task to configure containerd container runtime] ********************************
skipping: [211.100.2.50]
skipping: [211.100.2.60]
skipping: [211.100.2.61]
skipping: [211.100.2.62]

TASK [kubernetes-bootstrap : Include task to install k8s packages] **************************************************
included: /home/vagrant/k8s/roles/kubernetes-bootstrap/tasks/install_k8s_packages.yml for 211.100.2.50, 211.100.2.60, 211.100.2.61, 211.100.2.62

TASK [kubernetes-bootstrap : Add kubernetes repository] *************************************************************
changed: [211.100.2.50]
changed: [211.100.2.60]
changed: [211.100.2.61]
changed: [211.100.2.62]

TASK [kubernetes-bootstrap : Install kubernetes packages] ***********************************************************
changed: [211.100.2.50]
changed: [211.100.2.61]
changed: [211.100.2.60]
changed: [211.100.2.62]

TASK [kubernetes-bootstrap : Enable kubelet service] ****************************************************************
changed: [211.100.2.50]
changed: [211.100.2.61]
changed: [211.100.2.62]
changed: [211.100.2.60]

TASK [kubernetes-bootstrap : Include task to configure firewalld] ***************************************************
skipping: [211.100.2.50]
skipping: [211.100.2.60]
skipping: [211.100.2.61]
skipping: [211.100.2.62]

PLAY RECAP **********************************************************************************************************
211.100.2.50               : ok=28   changed=15   unreachable=0    failed=0    skipped=3    rescued=0    ignored=0
211.100.2.60               : ok=28   changed=15   unreachable=0    failed=0    skipped=3    rescued=0    ignored=0
211.100.2.61               : ok=28   changed=15   unreachable=0    failed=0    skipped=3    rescued=0    ignored=0
211.100.2.62               : ok=28   changed=15   unreachable=0    failed=0    skipped=3    rescued=0    ignored=0

[vagrant@Bastion-Host1 k8s]$
```

Ansible-playbook 명령어 실행

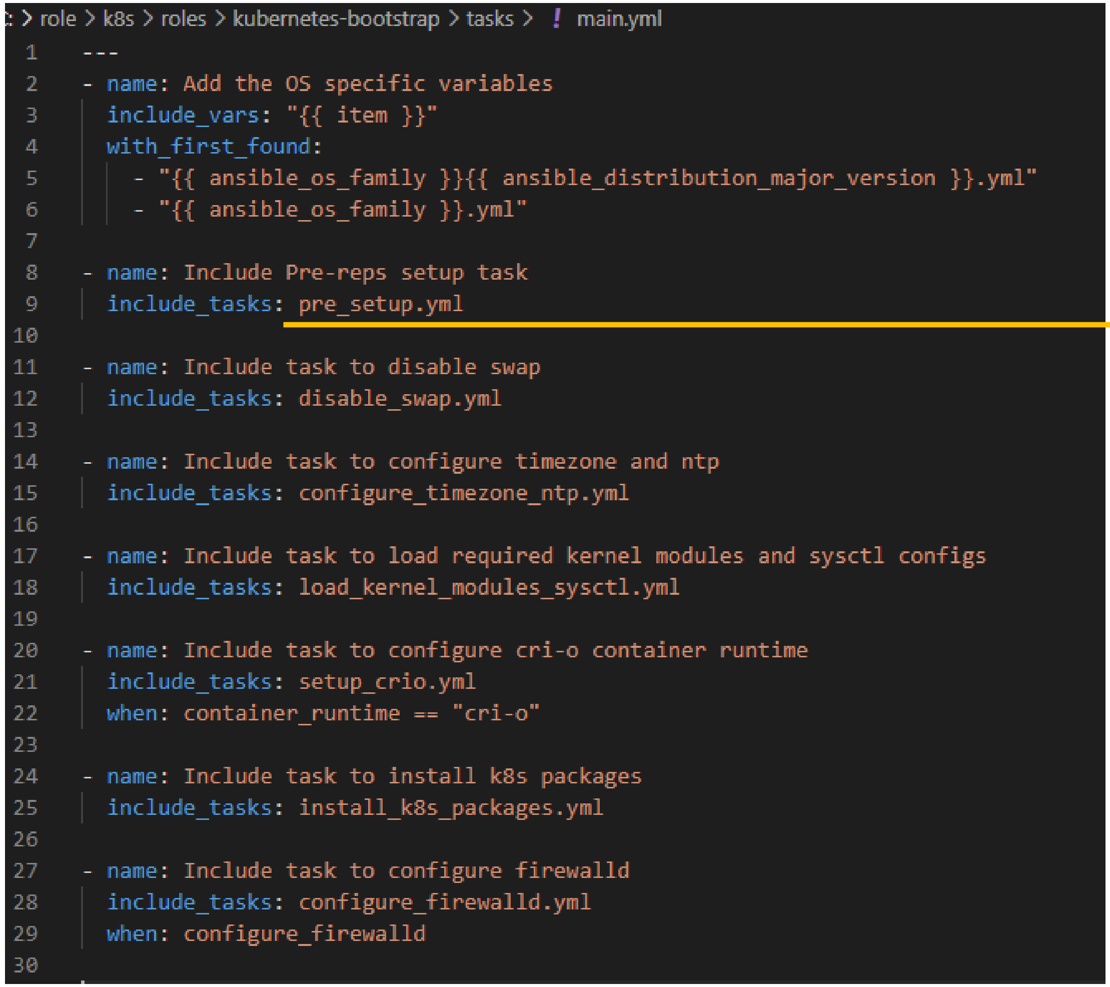


C: > role > k8s > ! k8s-prep.yml

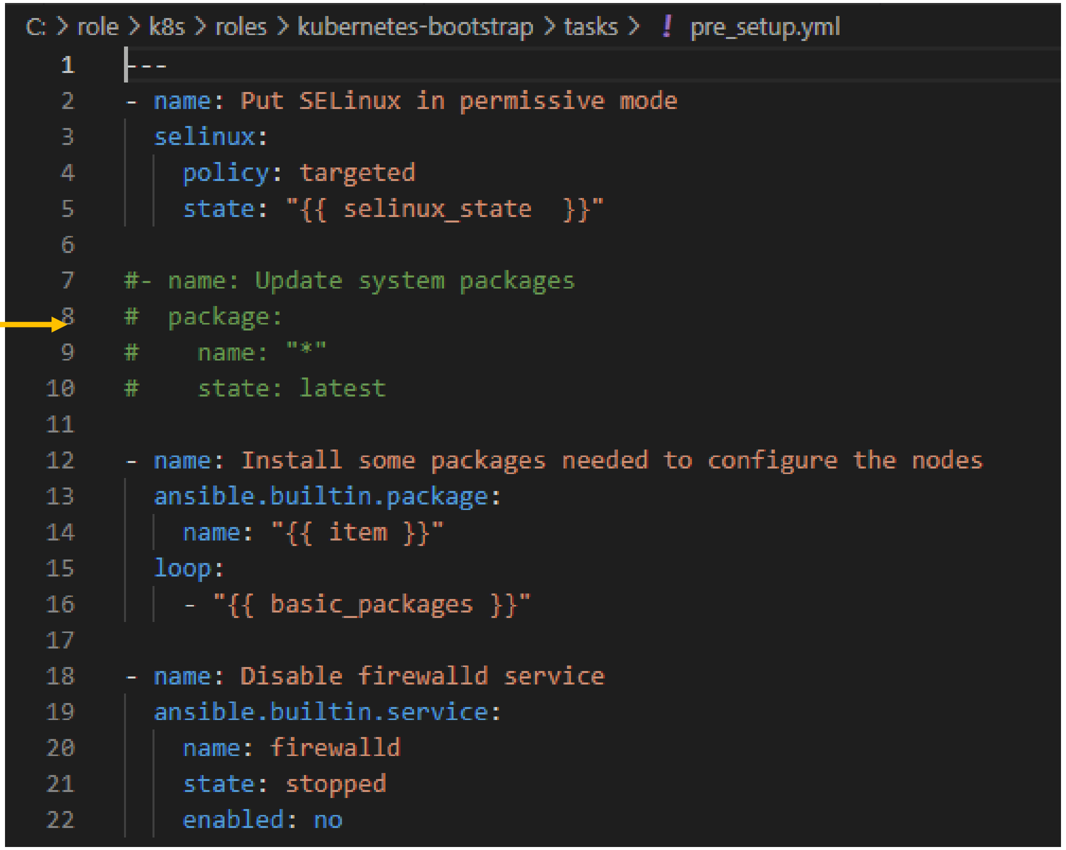
```yaml
---
- name: Setup proxy
  hosts: all
  become: yes
  become_method: sudo

  vars:
    k8s_version: "1.22"
    selinux_state: permissive
    timezone: "Asia/Seoul"
    k8s_cni: calico
    container_runtime: cri-o
    pod_network_cidr: "172.16.0.0/16"
    configure_firewalld: false
    setup_proxy: false
    proxy_server: "proxy.example.com:8080"
    docker_proxy_exclude: "localhost,127.0.0.1"
  roles:
    - kubernetes-bootstrap
```

K8s-prep.yml

Pod network cidr
172.16.0.0/16으로 고정


: > role > k8s > roles > kubernetes-bootstrap > tasks > ! main.yml

```yaml
---
- name: Add the OS specific variables
  include_vars: "{{ item }}"
  with_first_found:
    - "{{ ansible_os_family }}{{ ansible_distribution_major_version }}.yml"
    - "{{ ansible_os_family }}.yml"

- name: Include Pre-reps setup task
  include_tasks: pre_setup.yml

- name: Include task to disable swap
  include_tasks: disable_swap.yml

- name: Include task to configure timezone and ntp
  include_tasks: configure_timezone_ntp.yml

- name: Include task to load required kernel modules and sysctl configs
  include_tasks: load_kernel_modules_sysctl.yml

- name: Include task to configure cri-o container runtime
  include_tasks: setup_crio.yml
  when: container_runtime == "cri-o"

- name: Include task to install k8s packages
  include_tasks: install_k8s_packages.yml

- name: Include task to configure firewalld
  include_tasks: configure_firewalld.yml
  when: configure_firewalld

```


C: > role > k8s > roles > kubernetes-bootstrap > tasks > ! pre_setup.yml

```yaml
---
- name: Put SELinux in permissive mode
  selinux:
    policy: targeted
    state: "{{ selinux_state  }}"

#- name: Update system packages
#  package:
#    name: "*"
#    state: latest

- name: Install some packages needed to configure the nodes
  ansible.builtin.package:
    name: "{{ item }}"
  loop:
    - "{{ basic_packages }}"

- name: Disable firewalld service
  ansible.builtin.service:
    name: firewalld
    state: stopped
    enabled: no
```

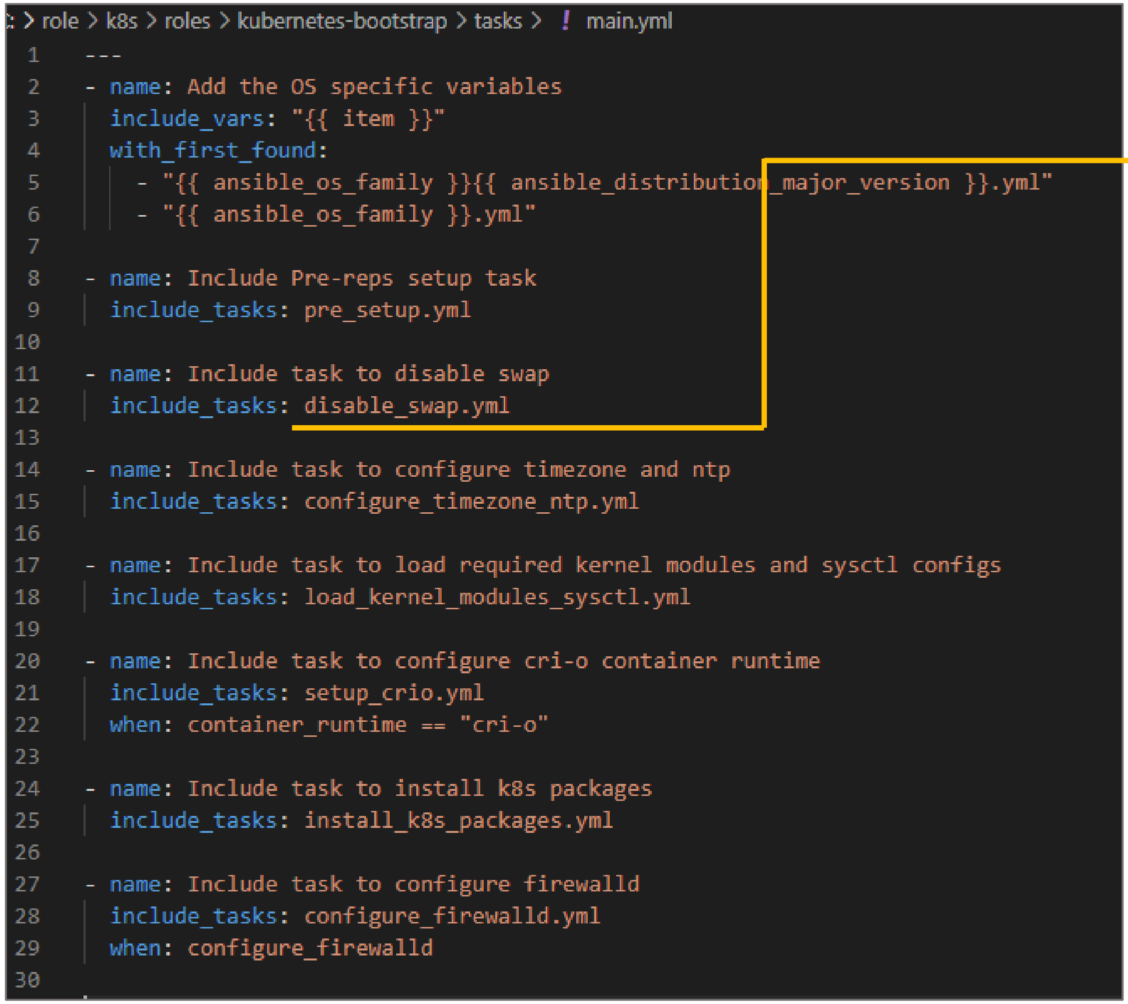
tasks_main.yml

Include_tasks 를 이용해서
이하 yaml 파일을 실행

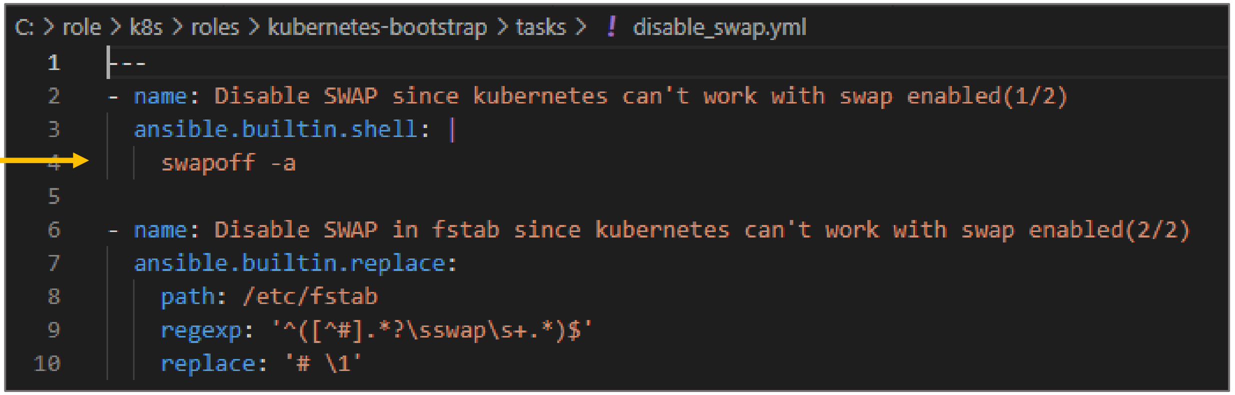
pre_setup.yml

-기초 설정-

* SELinux 의 동작 모드를 permissive로 변경
* 필수 패키지 다운로드
* 방화벽 사용 중지


: > role > k8s > roles > kubernetes-bootstrap > tasks > ! main.yml

```yaml
---
- name: Add the OS specific variables
  include_vars: "{{ item }}"
  with_first_found:
    - "{{ ansible_os_family }}{{ ansible_distribution_major_version }}.yml"
    - "{{ ansible_os_family }}.yml"

- name: Include Pre-reps setup task
  include_tasks: pre_setup.yml

- name: Include task to disable swap
  include_tasks: disable_swap.yml

- name: Include task to configure timezone and ntp
  include_tasks: configure_timezone_ntp.yml

- name: Include task to load required kernel modules and sysctl configs
  include_tasks: load_kernel_modules_sysctl.yml

- name: Include task to configure cri-o container runtime
  include_tasks: setup_crio.yml
  when: container_runtime == "cri-o"

- name: Include task to install k8s packages
  include_tasks: install_k8s_packages.yml

- name: Include task to configure firewalld
  include_tasks: configure_firewalld.yml
  when: configure_firewalld

```

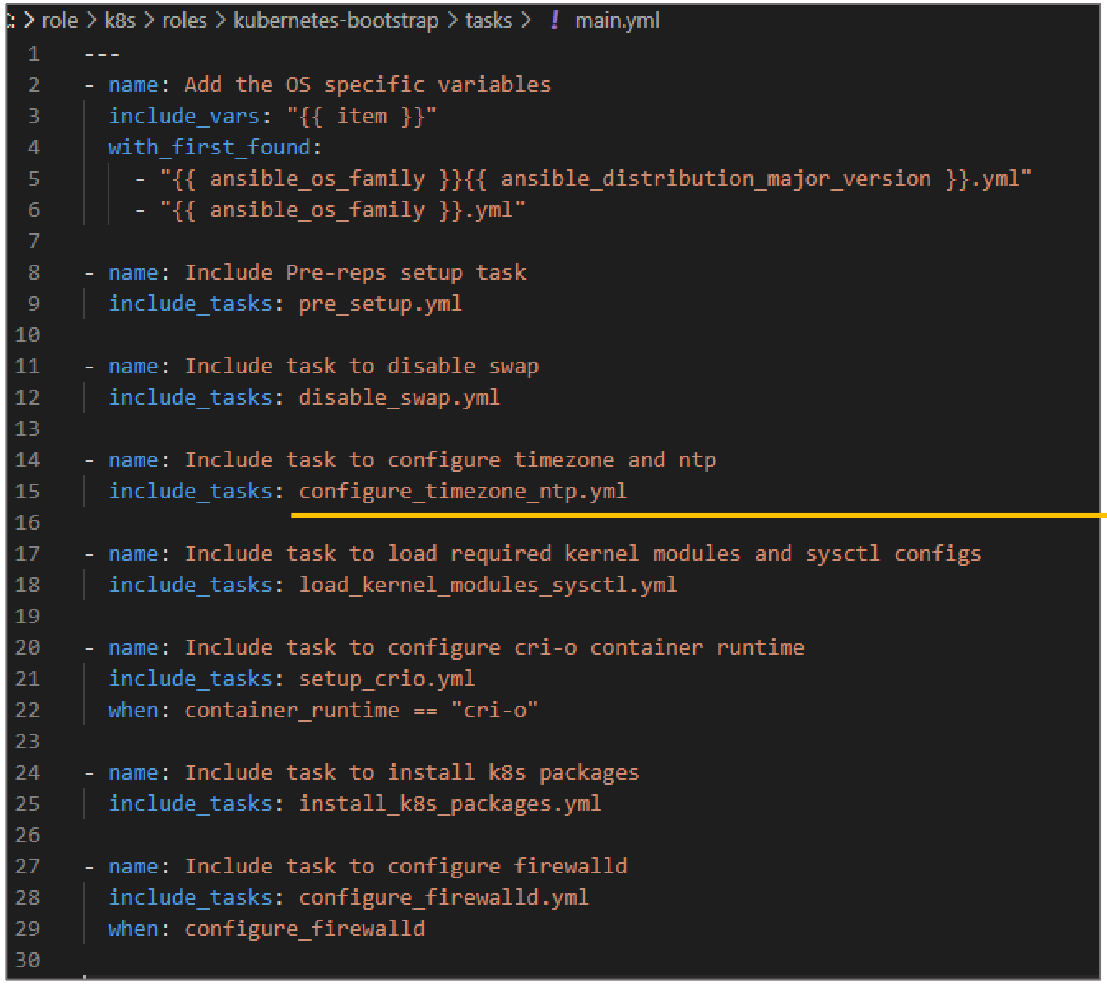

C: > role > k8s > roles > kubernetes-bootstrap > tasks > ! disable_swap.yml

```yaml
---
- name: Disable SWAP since kubernetes can't work with swap enabled(1/2)
  ansible.builtin.shell: |
    swapoff -a

- name: Disable SWAP in fstab since kubernetes can't work with swap enabled(2/2)
  ansible.builtin.replace:
    path: /etc/fstab
    regexp: '^([^#].*?\sswap\s+.*)$'
    replace: '# \1'
```

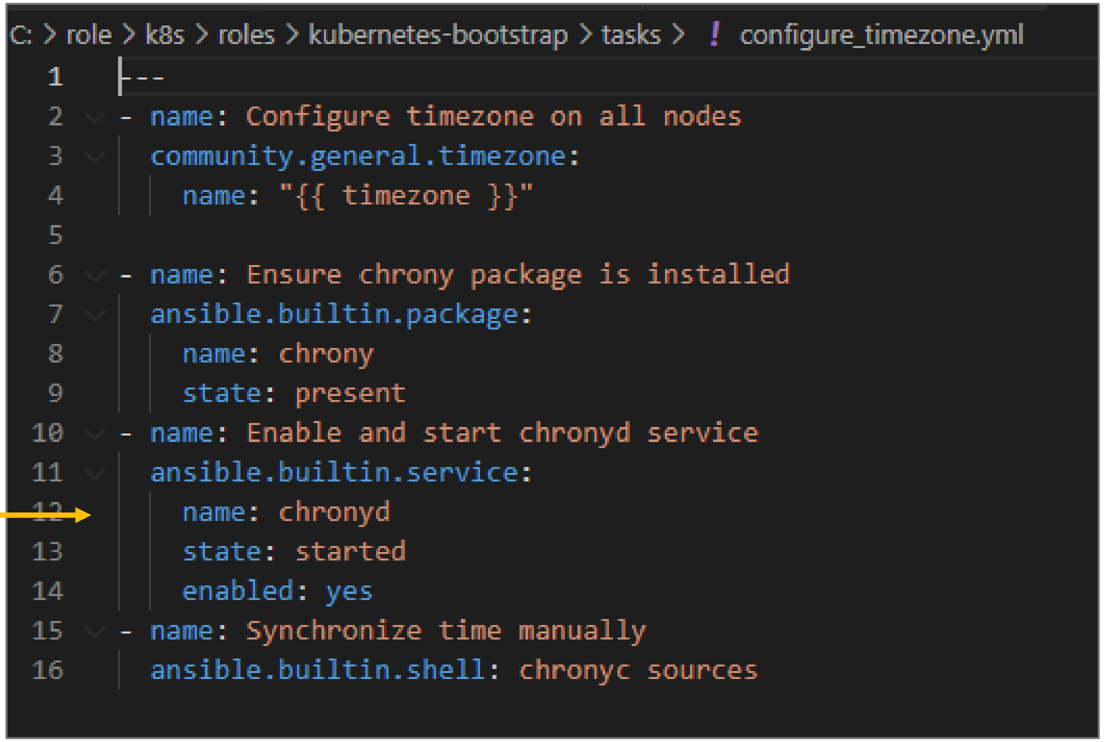
Disable_swap.yml

Kubernetes 설치 시 swap 메모리를
사용하면 안되기 때문에 swapoff 설정

/etc/fstab에도 swap 메모리가 마운트 되지
않게 적용


: > role > k8s > roles > kubernetes-bootstrap > tasks > ! main.yml

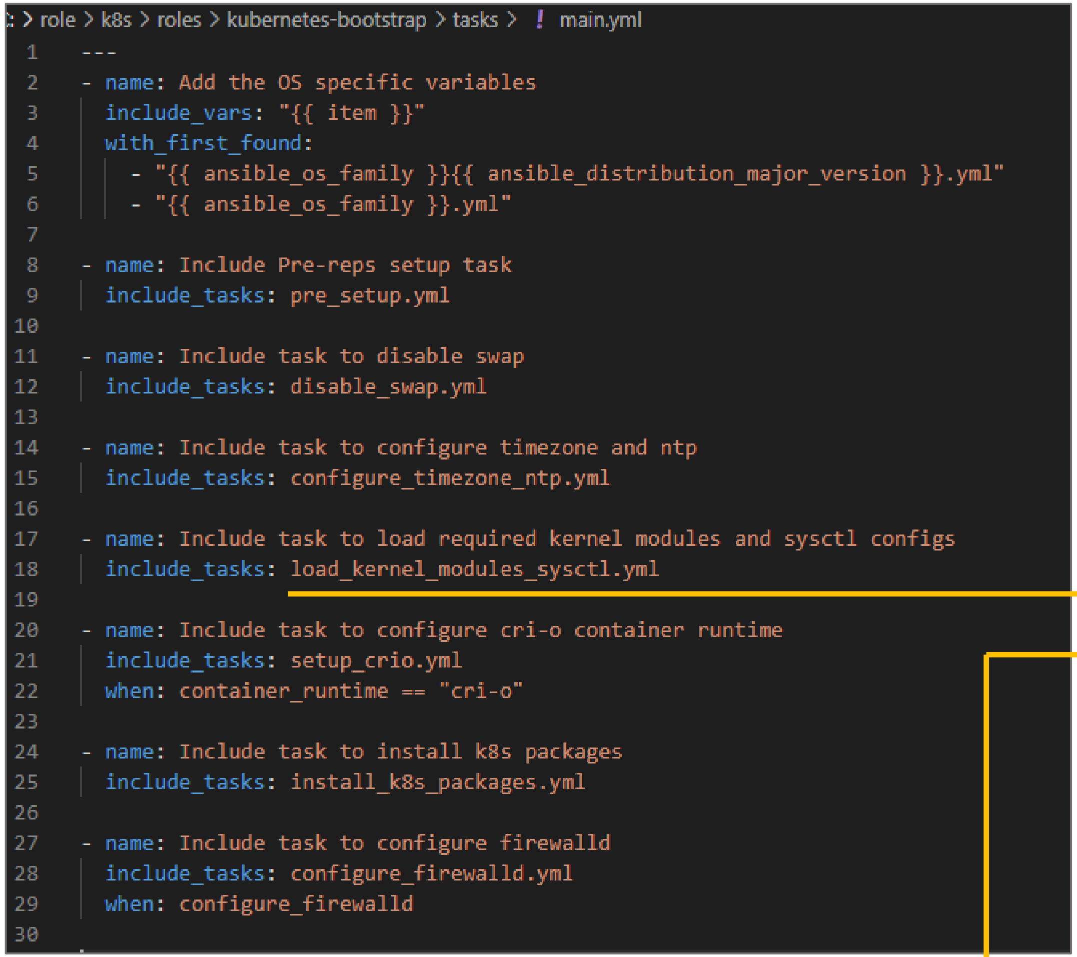
```yaml
---
- name: Add the OS specific variables
  include_vars: "{{ item }}"
  with_first_found:
    - "{{ ansible_os_family }}{{ ansible_distribution_major_version }}.yml"
    - "{{ ansible_os_family }}.yml"

- name: Include Pre-reps setup task
  include_tasks: pre_setup.yml

- name: Include task to disable swap
  include_tasks: disable_swap.yml

- name: Include task to configure timezone and ntp
  include_tasks: configure_timezone_ntp.yml

- name: Include task to load required kernel modules and sysctl configs
  include_tasks: load_kernel_modules_sysctl.yml

- name: Include task to configure cri-o container runtime
  include_tasks: setup_crio.yml
  when: container_runtime == "cri-o"

- name: Include task to install k8s packages
  include_tasks: install_k8s_packages.yml

- name: Include task to configure firewalld
  include_tasks: configure_firewalld.yml
  when: configure_firewalld

```


C: > role > k8s > roles > kubernetes-bootstrap > tasks > ! configure_timezone.yml

```yaml
---
- name: Configure timezone on all nodes
  community.general.timezone:
    name: "{{ timezone }}"

- name: Ensure chrony package is installed
  ansible.builtin.package:
    name: chrony
    state: present
- name: Enable and start chronyd service
  ansible.builtin.service:
    name: chronyd
    state: started
    enabled: yes
- name: Synchronize time manually
  ansible.builtin.shell: chronyc sources
```

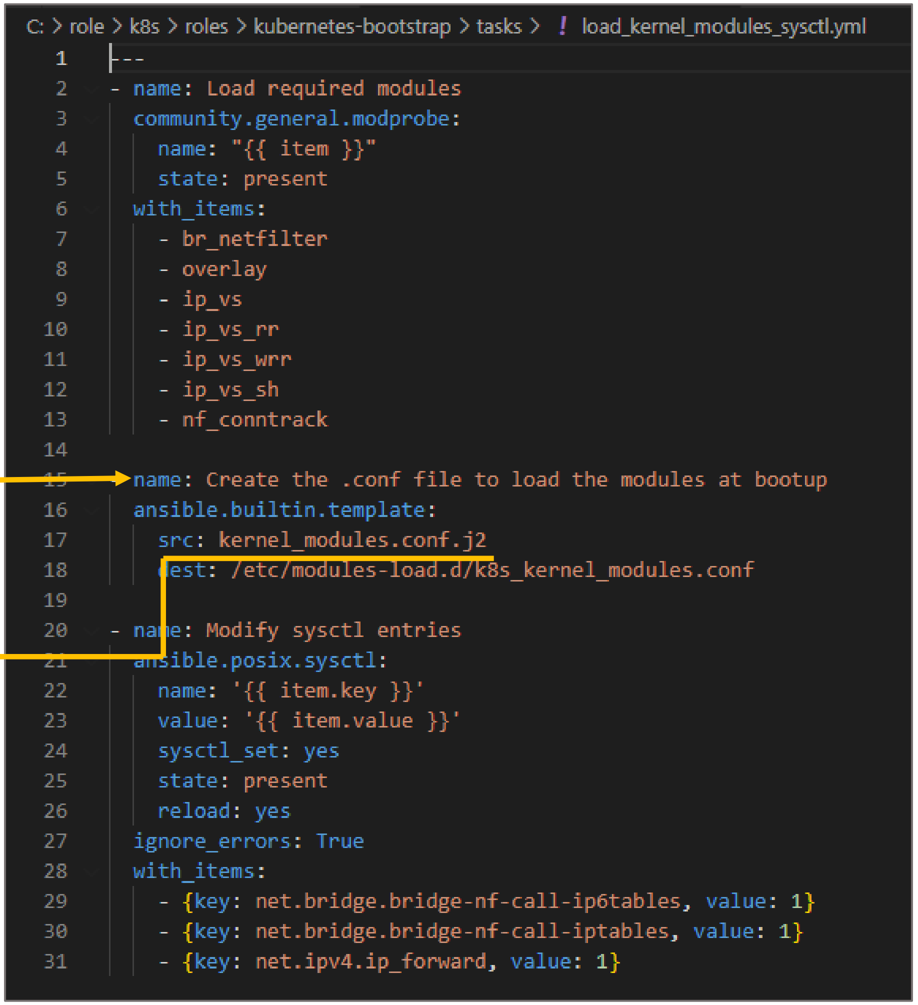
Configure_timezone.yml

시간 동기화를 위해 chrony service
설치 및 가동



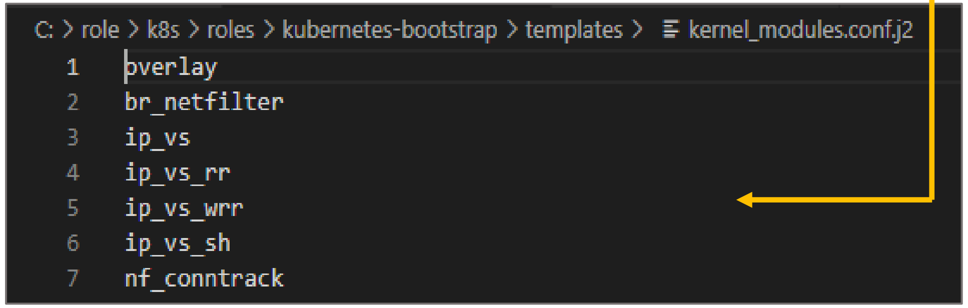
: > role > k8s > roles > kubernetes-bootstrap > tasks > ! main.yml

```yaml
---
- name: Add the OS specific variables
  include_vars: "{{ item }}"
  with_first_found:
    - "{{ ansible_os_family }}{{ ansible_distribution_major_version }}.yml"
    - "{{ ansible_os_family }}.yml"

- name: Include Pre-reps setup task
  include_tasks: pre_setup.yml

- name: Include task to disable swap
  include_tasks: disable_swap.yml

- name: Include task to configure timezone and ntp
  include_tasks: configure_timezone_ntp.yml

- name: Include task to load required kernel modules and sysctl configs
  include_tasks: load_kernel_modules_sysctl.yml

- name: Include task to configure cri-o container runtime
  include_tasks: setup_crio.yml
  when: container_runtime == "cri-o"

- name: Include task to install k8s packages
  include_tasks: install_k8s_packages.yml

- name: Include task to configure firewalld
  include_tasks: configure_firewalld.yml
  when: configure_firewalld

```



C: > role > k8s > roles > kubernetes-bootstrap > tasks > ! load_kernel_modules_sysctl.yml

```yaml
---
- name: Load required modules
  community.general.modprobe:
    name: "{{ item }}"
    state: present
  with_items:
    - br_netfilter
    - overlay
    - ip_vs
    - ip_vs_rr
    - ip_vs_wrr
    - ip_vs_sh
    - nf_conntrack

- name: Create the .conf file to load the modules at bootup
  ansible.builtin.template:
    src: kernel_modules.conf.j2
    dest: /etc/modules-load.d/k8s_kernel_modules.conf

- name: Modify sysctl entries
  ansible.posix.sysctl:
    name: '{{ item.key }}'
    value: '{{ item.value }}'
    sysctl_set: yes
    state: present
    reload: yes
  ignore_errors: True
  with_items:
    - {key: net.bridge.bridge-nf-call-ip6tables, value: 1}
    - {key: net.bridge.bridge-nf-call-iptables, value: 1}
    - {key: net.ipv4.ip_forward, value: 1}
```

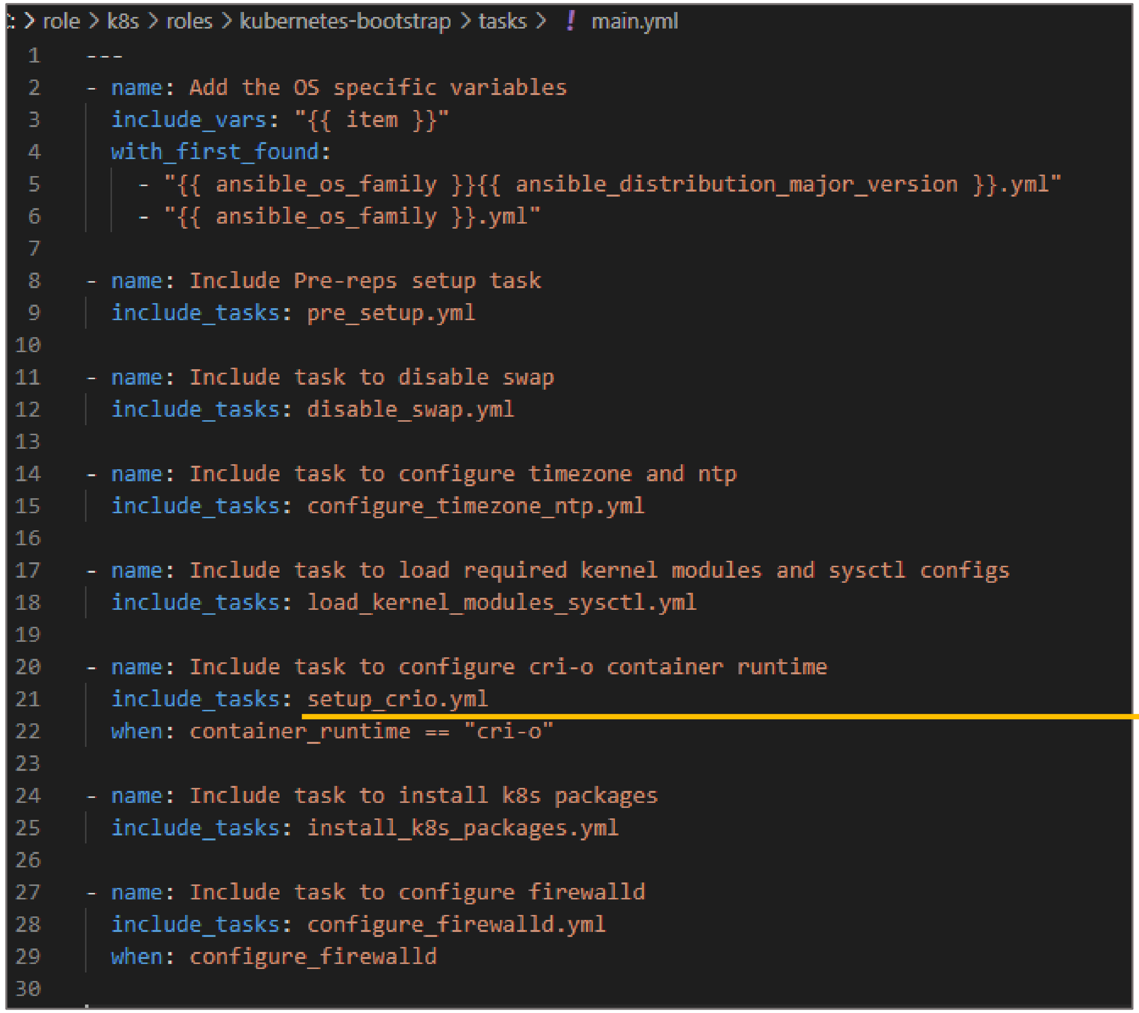


C: > role > k8s > roles > kubernetes-bootstrap > templates > kernel_modules.conf.j2

```
overlay
br_netfilter
ip_vs
ip_vs_rr
ip_vs_wrr
ip_vs_sh
nf_conntrack
```

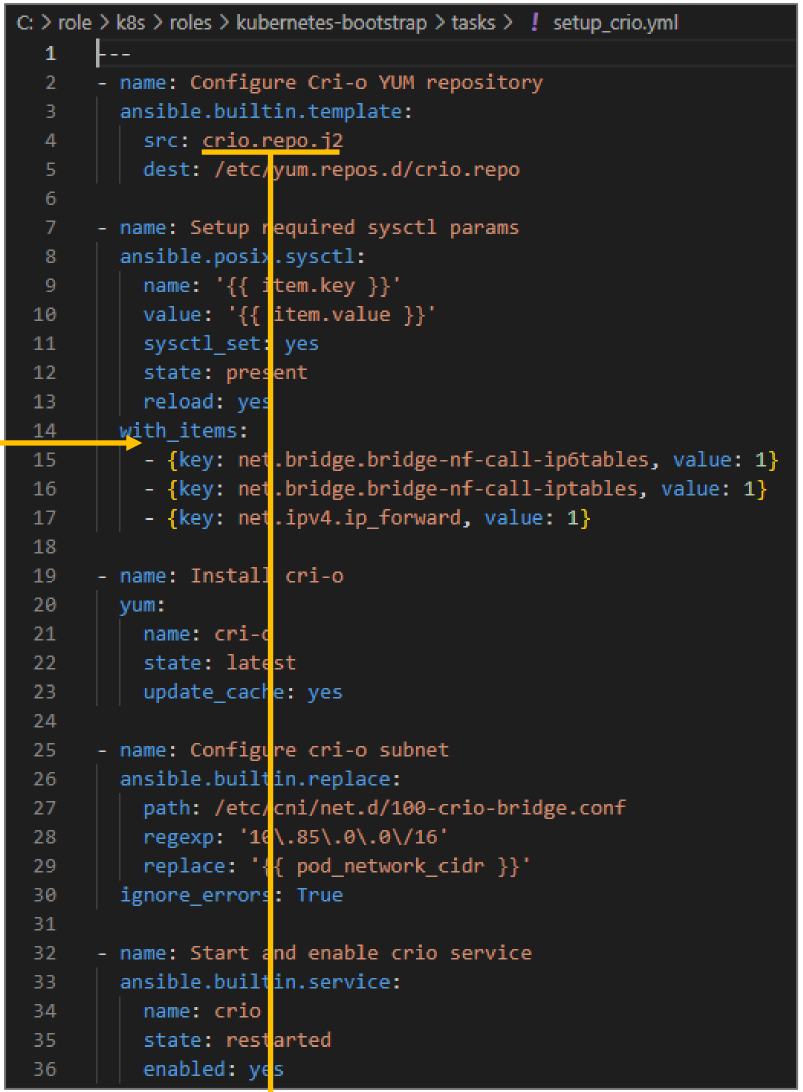
Load_kernel_modules_sysctl.yml

쿠버네티스 실행 시 필요한 모듈 로드
및 활성화를 위한 모듈 파라미터 수정


: > role > k8s > roles > kubernetes-bootstrap > tasks > ! main.yml

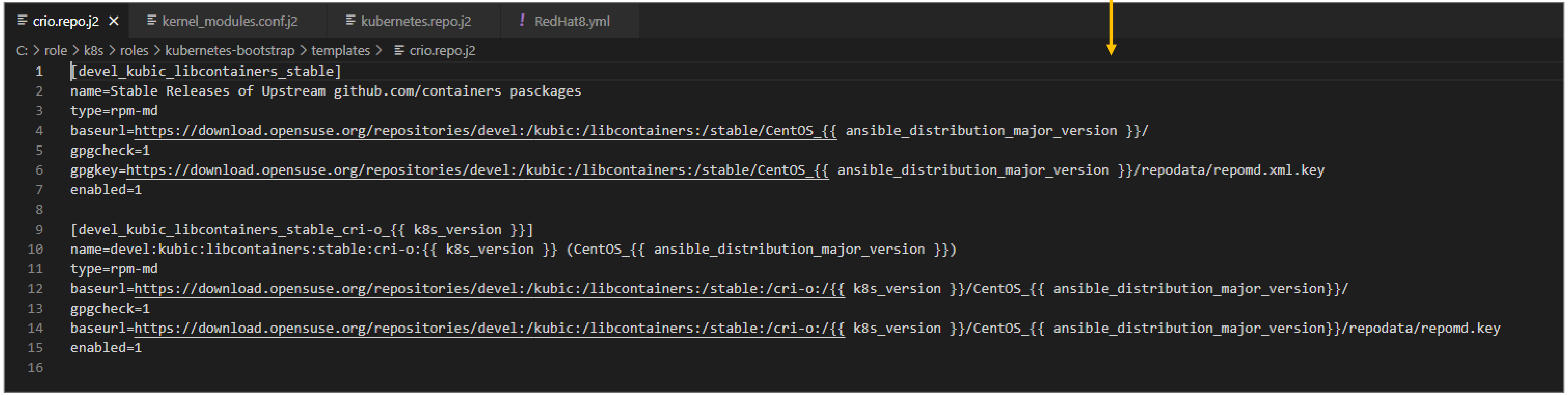
```yaml
---
- name: Add the OS specific variables
  include_vars: "{{ item }}"
  with_first_found:
    - "{{ ansible_os_family }}{{ ansible_distribution_major_version }}.yml"
    - "{{ ansible_os_family }}.yml"

- name: Include Pre-reps setup task
  include_tasks: pre_setup.yml

- name: Include task to disable swap
  include_tasks: disable_swap.yml

- name: Include task to configure timezone and ntp
  include_tasks: configure_timezone_ntp.yml

- name: Include task to load required kernel modules and sysctl configs
  include_tasks: load_kernel_modules_sysctl.yml

- name: Include task to configure cri-o container runtime
  include_tasks: setup_crio.yml
  when: container_runtime == "cri-o"

- name: Include task to install k8s packages
  include_tasks: install_k8s_packages.yml

- name: Include task to configure firewalld
  include_tasks: configure_firewalld.yml
  when: configure_firewalld
```

Setup_crio.yml


C: > role > k8s > roles > kubernetes-bootstrap > tasks > ! setup_crio.yml

```yaml
---
- name: Configure Cri-o YUM repository
  ansible.builtin.template:
    src: crio.repo.j2
    dest: /etc/yum.repos.d/crio.repo

- name: Setup required sysctl params
  ansible.posix.sysctl:
    name: '{{ item.key }}'
    value: '{{ item.value }}'
    sysctl_set: yes
    state: present
    reload: yes
  with_items:
    - {key: net.bridge.bridge-nf-call-ip6tables, value: 1}
    - {key: net.bridge.bridge-nf-call-iptables, value: 1}
    - {key: net.ipv4.ip_forward, value: 1}

- name: Install cri-o
  yum:
    name: cri-o
    state: latest
    update_cache: yes

- name: Configure cri-o subnet
  ansible.builtin.replace:
    path: /etc/cni/net.d/100-crio-bridge.conf
    regexp: '10\.85\.0\.0\/16'
    replace: '{{ pod_network_cidr }}'
  ignore_errors: True

- name: Start and enable crio service
  ansible.builtin.service:
    name: crio
    state: restarted
    enabled: yes
```

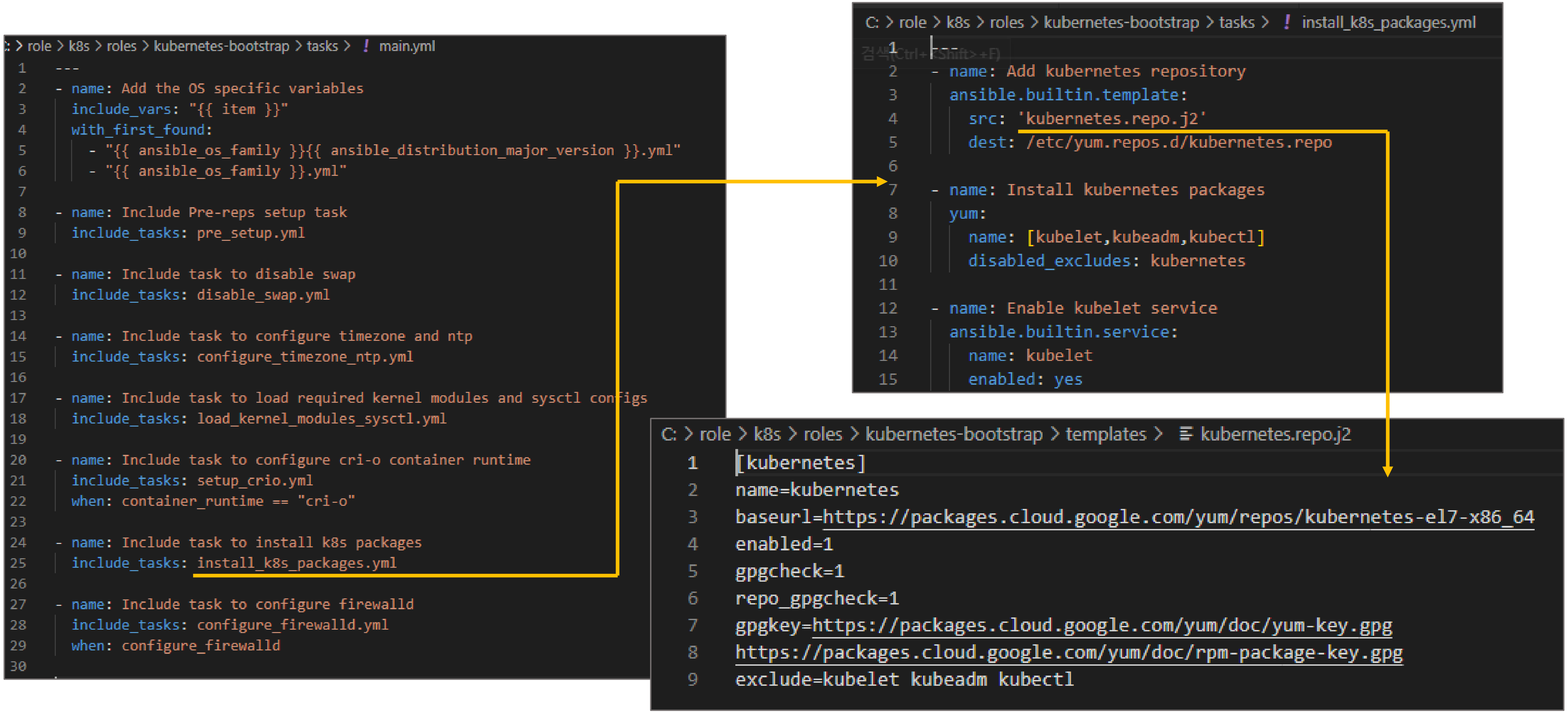
* Cri-o repository, 파라미터 설정
* Cri-o 다운로드 및 서비스 시작
* '10\.85\.0\.0\/16'으로 표시되어 있는 서브넷을 k8s-prep.yml에서 설정한 pod_network_cidr로 치환 (172.16.0.0/16)


crio.repo.j2
kernel_modules.conf.j2
kubernetes.repo.j2
RedHat8.yml
C: > role > k8s > roles > kubernetes-bootstrap > templates > crio.repo.j2

```
[devel_kubic_libcontainers_stable]
name=Stable Releases of Upstream github.com/containers pasckages
type=rpm-md
baseurl=https://download.opensuse.org/repositories/devel:/kubic:/libcontainers:/stable/CentOS_{{ ansible_distribution_major_version }}/
gpgcheck=1
gpgkey=https://download.opensuse.org/repositories/devel:/kubic:/libcontainers:/stable/CentOS_{{ ansible_distribution_major_version }}/repodata/repomd.xml.key
enabled=1

[devel_kubic_libcontainers_stable_cri-o_{{ k8s_version }}]
name=devel:kubic:libcontainers:stable:cri-o:{{ k8s_version }} (CentOS_{{ ansible_distribution_major_version }})
type=rpm-md
baseurl=https://download.opensuse.org/repositories/devel:/kubic:/libcontainers:/stable:/cri-o:/{{ k8s_version }}/CentOS_{{ ansible_distribution_major_version}}/
gpgcheck=1
baseurl=https://download.opensuse.org/repositories/devel:/kubic:/libcontainers:/stable:/cri-o:/{{ k8s_version }}/CentOS_{{ ansible_distribution_major_version}}/repodata/repomd.key
enabled=1
```

Crio.repo.j2

Cri-o repository 주소를
포함하고 있는 진자 파일



: > role > k8s > roles > kubernetes-bootstrap > tasks > ! main.yml

```yaml
---
- name: Add the OS specific variables
  include_vars: "{{ item }}"
  with_first_found:
    - "{{ ansible_os_family }}{{ ansible_distribution_major_version }}.yml"
    - "{{ ansible_os_family }}.yml"

- name: Include Pre-reps setup task
  include_tasks: pre_setup.yml

- name: Include task to disable swap
  include_tasks: disable_swap.yml

- name: Include task to configure timezone and ntp
  include_tasks: configure_timezone_ntp.yml

- name: Include task to load required kernel modules and sysctl configs
  include_tasks: load_kernel_modules_sysctl.yml

- name: Include task to configure cri-o container runtime
  include_tasks: setup_crio.yml
  when: container_runtime == "cri-o"

- name: Include task to install k8s packages
  include_tasks: install_k8s_packages.yml

- name: Include task to configure firewalld
  include_tasks: configure_firewalld.yml
  when: configure_firewalld

```

C: > role > k8s > roles > kubernetes-bootstrap > tasks > ! install_k8s_packages.yml

```yaml
---
- name: Add kubernetes repository
  ansible.builtin.template:
    src: 'kubernetes.repo.j2'
    dest: /etc/yum.repos.d/kubernetes.repo

- name: Install kubernetes packages
  yum:
    name: [kubelet,kubeadm,kubectl]
    disabled_excludes: kubernetes

- name: Enable kubelet service
  ansible.builtin.service:
    name: kubelet
    enabled: yes
```

C: > role > k8s > roles > kubernetes-bootstrap > templates > kubernetes.repo.j2

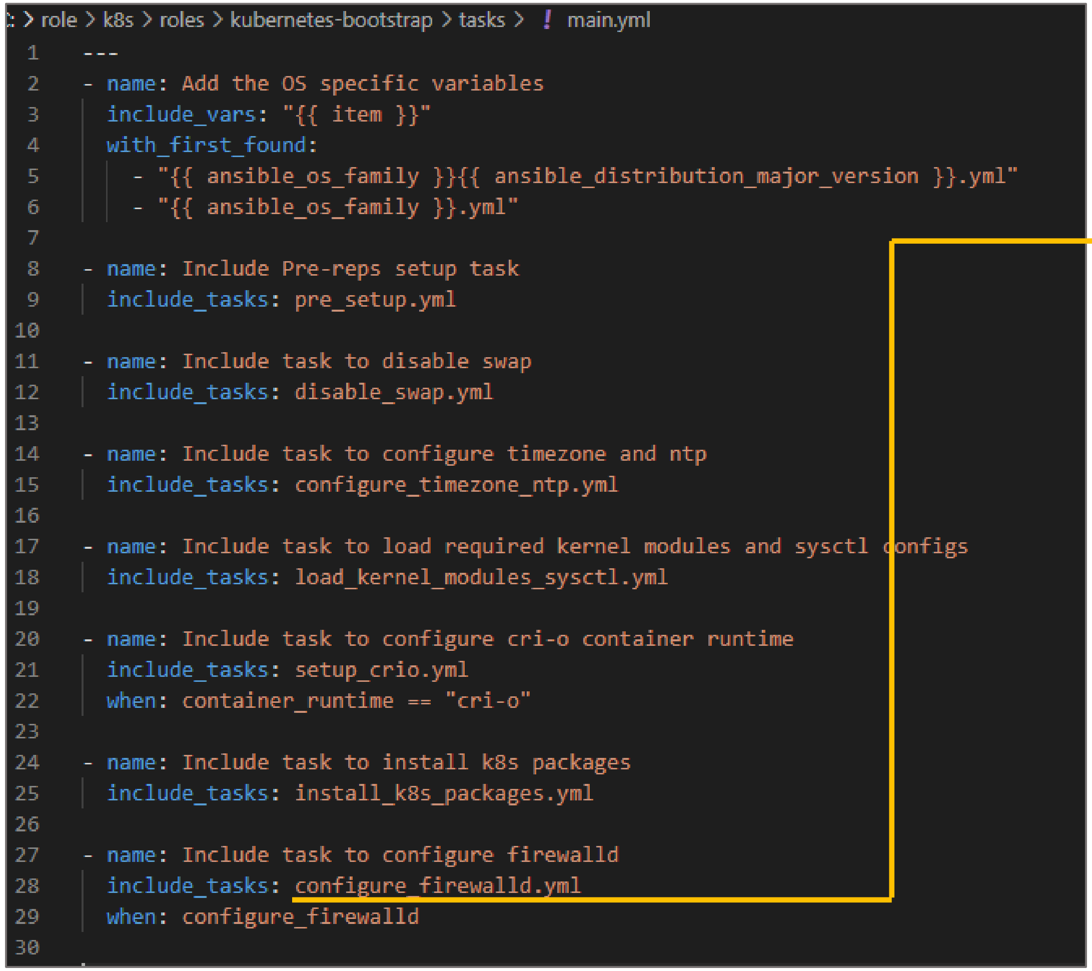
```
[kubernetes]
name=kubernetes
baseurl=https://packages.cloud.google.com/yum/repos/kubernetes-el7-x86_64
enabled=1
gpgcheck=1
repo_gpgcheck=1
gpgkey=https://packages.cloud.google.com/yum/doc/yum-key.gpg
https://packages.cloud.google.com/yum/doc/rpm-package-key.gpg
exclude=kubelet kubeadm kubectl
```

Install_k8s_packages.yml

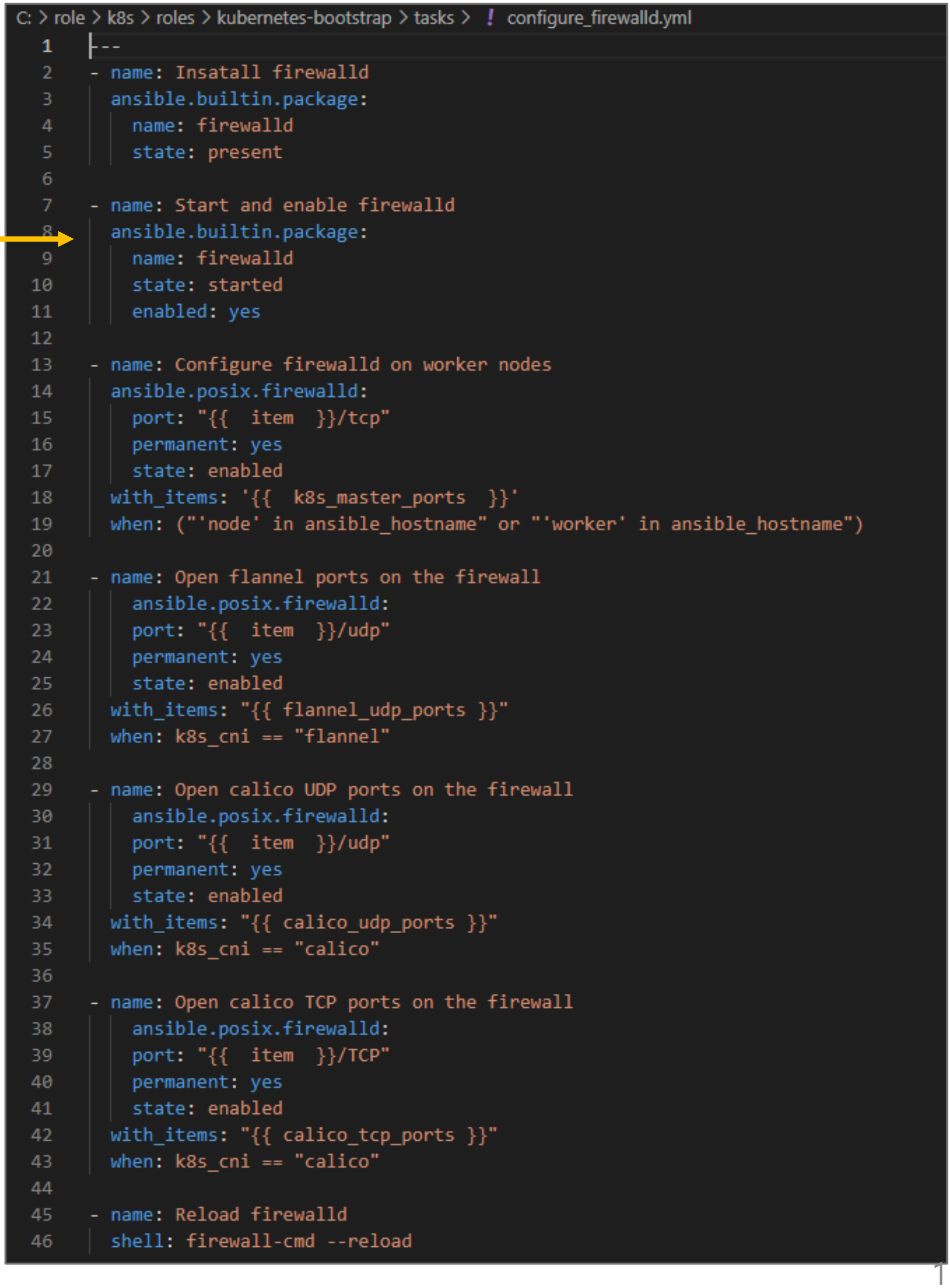
Kubernetes repository 추가,
패키지 다운로드 및 kubelet 서비스 가동

Kubernetes.repo.j2

Kubernetes repository 주소를
포함하고 있는 진자 파일


: > role > k8s > roles > kubernetes-bootstrap > tasks > ! main.yml

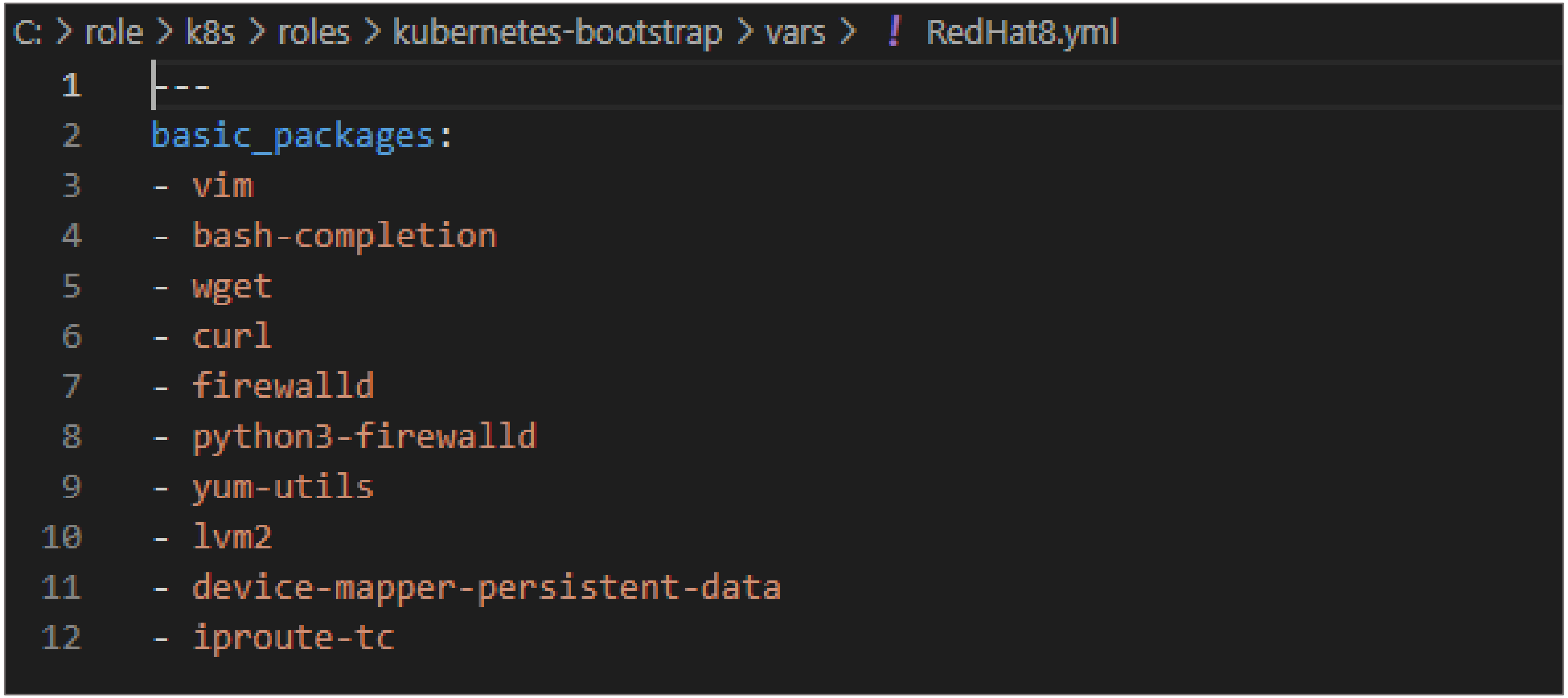
```yaml
---
- name: Add the OS specific variables
  include_vars: "{{ item }}"
  with_first_found:
    - "{{ ansible_os_family }}{{ ansible_distribution_major_version }}.yml"
    - "{{ ansible_os_family }}.yml"

- name: Include Pre-reps setup task
  include_tasks: pre_setup.yml

- name: Include task to disable swap
  include_tasks: disable_swap.yml

- name: Include task to configure timezone and ntp
  include_tasks: configure_timezone_ntp.yml

- name: Include task to load required kernel modules and sysctl configs
  include_tasks: load_kernel_modules_sysctl.yml

- name: Include task to configure cri-o container runtime
  include_tasks: setup_crio.yml
  when: container_runtime == "cri-o"

- name: Include task to install k8s packages
  include_tasks: install_k8s_packages.yml

- name: Include task to configure firewalld
  include_tasks: configure_firewalld.yml
  when: configure_firewalld

```


C: > role > k8s > roles > kubernetes-bootstrap > tasks > ! configure_firewalld.yml

```yaml
---
- name: Insatall firewalld
  ansible.builtin.package:
    name: firewalld
    state: present

- name: Start and enable firewalld
  ansible.builtin.package:
    name: firewalld
    state: started
    enabled: yes

- name: Configure firewalld on worker nodes
  ansible.posix.firewalld:
    port: "{{  item  }}/tcp"
    permanent: yes
    state: enabled
  with_items: '{{  k8s_master_ports  }}'
  when: ("'node' in ansible_hostname" or "'worker' in ansible_hostname")

- name: Open flannel ports on the firewall
    ansible.posix.firewalld:
    port: "{{  item  }}/udp"
    permanent: yes
    state: enabled
  with_items: "{{ flannel_udp_ports }}"
  when: k8s_cni == "flannel"

- name: Open calico UDP ports on the firewall
    ansible.posix.firewalld:
    port: "{{  item  }}/udp"
    permanent: yes
    state: enabled
  with_items: "{{ calico_udp_ports }}"
  when: k8s_cni == "calico"

- name: Open calico TCP ports on the firewall
    ansible.posix.firewalld:
    port: "{{  item  }}/TCP"
    permanent: yes
    state: enabled
  with_items: "{{ calico_tcp_ports }}"
  when: k8s_cni == "calico"

- name: Reload firewalld
  shell: firewall-cmd --reload
```

Configure_firewalld.yml

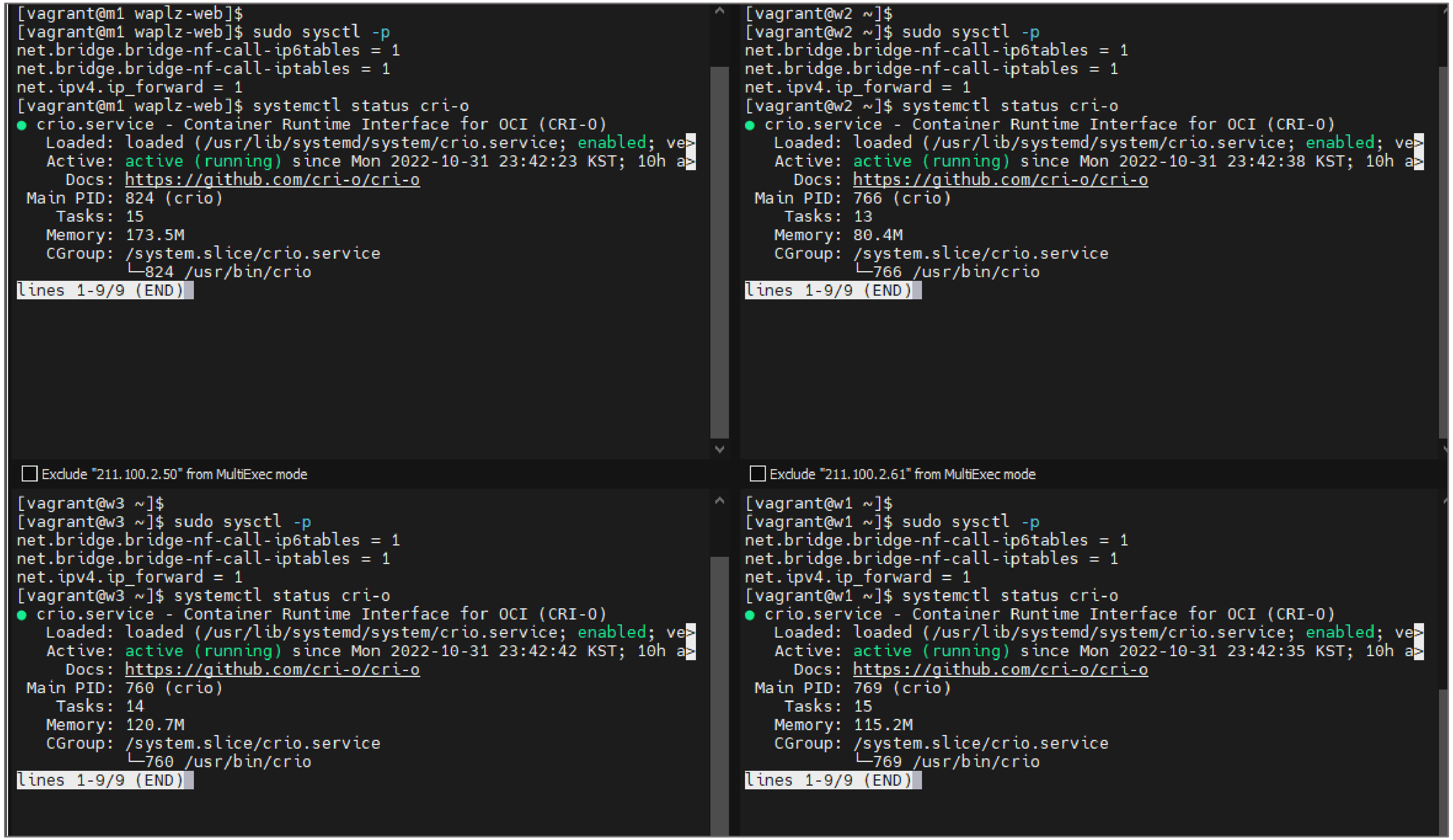
master node, worker node
방화벽 설치 및 포트 허용, 재시작


C: > role > k8s > roles > kubernetes-bootstrap > vars > ! RedHat8.yml

```yaml
---
basic_packages:
- vim
- bash-completion
- wget
- curl
- firewalld
- python3-firewalld
- yum-utils
- lvm2
- device-mapper-persistent-data
- iproute-tc
```

RedHat8.yml

기본적인 명령어 packages가 담긴 yaml 파일



```
[vagrant@m1 waplz-web]$
[vagrant@m1 waplz-web]$ sudo sysctl -p
net.bridge.bridge-nf-call-ip6tables = 1
net.bridge.bridge-nf-call-iptables = 1
net.ipv4.ip_forward = 1
[vagrant@m1 waplz-web]$ systemctl status cri-o
● crio.service - Container Runtime Interface for OCI (CRI-O)
   Loaded: loaded (/usr/lib/systemd/system/crio.service; enabled; ve>
   Active: active (running) since Mon 2022-10-31 23:42:23 KST; 10h a>
     Docs: https://github.com/cri-o/cri-o
 Main PID: 824 (crio)
    Tasks: 15
   Memory: 173.5M
   CGroup: /system.slice/crio.service
           └─824 /usr/bin/crio
lines 1-9/9 (END)
```

```
[vagrant@w2 ~]$
[vagrant@w2 ~]$ sudo sysctl -p
net.bridge.bridge-nf-call-ip6tables = 1
net.bridge.bridge-nf-call-iptables = 1
net.ipv4.ip_forward = 1
[vagrant@w2 ~]$ systemctl status cri-o
● crio.service - Container Runtime Interface for OCI (CRI-O)
   Loaded: loaded (/usr/lib/systemd/system/crio.service; enabled; ve>
   Active: active (running) since Mon 2022-10-31 23:42:38 KST; 10h a>
     Docs: https://github.com/cri-o/cri-o
 Main PID: 766 (crio)
    Tasks: 13
   Memory: 80.4M
   CGroup: /system.slice/crio.service
           └─766 /usr/bin/crio
lines 1-9/9 (END)
```

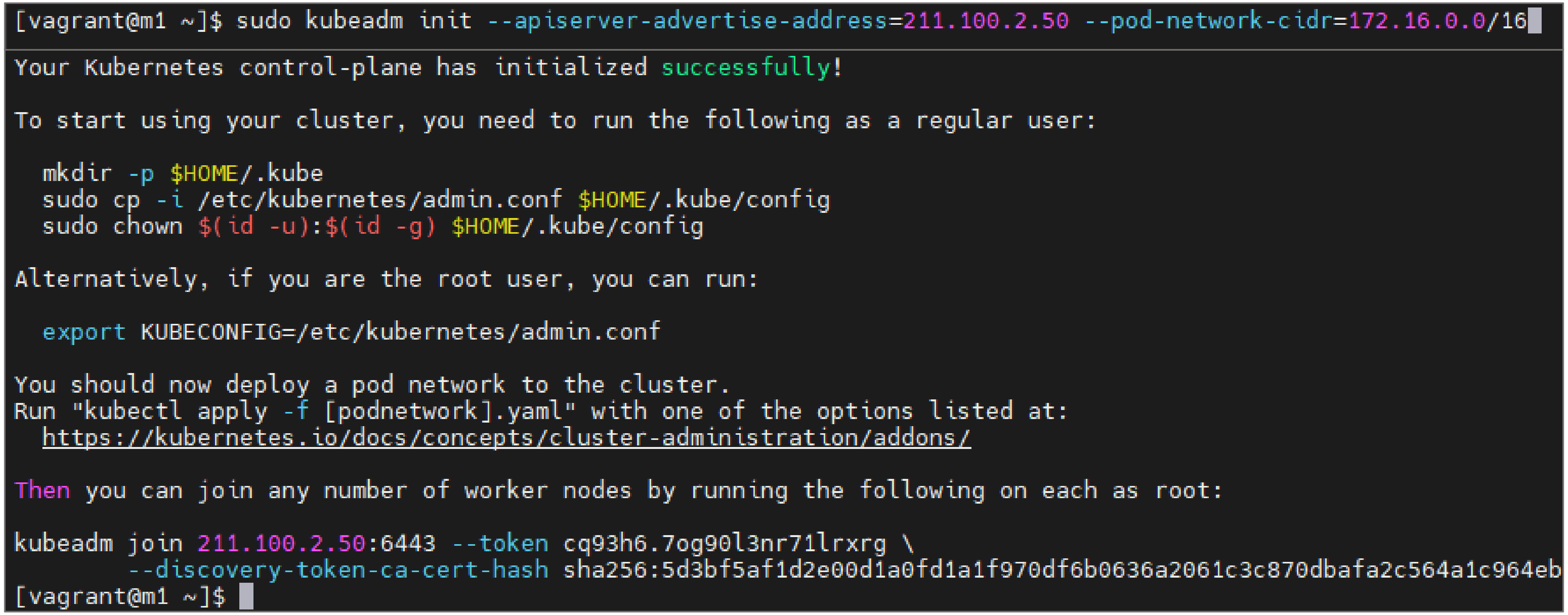
□ Exclude "211.100.2.50" from MultiExec mode
□ Exclude "211.100.2.61" from MultiExec mode

```
[vagrant@w3 ~]$
[vagrant@w3 ~]$ sudo sysctl -p
net.bridge.bridge-nf-call-ip6tables = 1
net.bridge.bridge-nf-call-iptables = 1
net.ipv4.ip_forward = 1
[vagrant@w3 ~]$ systemctl status cri-o
● crio.service - Container Runtime Interface for OCI (CRI-O)
   Loaded: loaded (/usr/lib/systemd/system/crio.service; enabled; ve>
   Active: active (running) since Mon 2022-10-31 23:42:42 KST; 10h a>
     Docs: https://github.com/cri-o/cri-o
 Main PID: 760 (crio)
    Tasks: 14
   Memory: 120.7M
   CGroup: /system.slice/crio.service
           └─760 /usr/bin/crio
lines 1-9/9 (END)
```

```
[vagrant@w1 ~]$
[vagrant@w1 ~]$ sudo sysctl -p
net.bridge.bridge-nf-call-ip6tables = 1
net.bridge.bridge-nf-call-iptables = 1
net.ipv4.ip_forward = 1
[vagrant@w1 ~]$ systemctl status cri-o
● crio.service - Container Runtime Interface for OCI (CRI-O)
   Loaded: loaded (/usr/lib/systemd/system/crio.service; enabled; ve>
   Active: active (running) since Mon 2022-10-31 23:42:35 KST; 10h a>
     Docs: https://github.com/cri-o/cri-o
 Main PID: 769 (crio)
    Tasks: 15
   Memory: 115.2M
   CGroup: /system.slice/crio.service
           └─769 /usr/bin/crio
lines 1-9/9 (END)
```

작동 확인

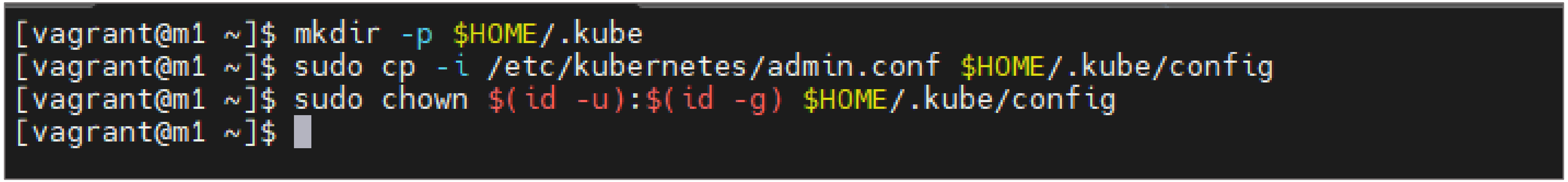
각 노드에 sysctl –p , systemctl status cri-o 명령어로
의도한 role이 제대로 설치되었고 작동하는지 확인



```
[vagrant@m1 ~]$ sudo kubeadm init --apiserver-advertise-address=211.100.2.50 --pod-network-cidr=172.16.0.0/16
Your Kubernetes control-plane has initialized successfully!

To start using your cluster, you need to run the following as a regular user:

  mkdir -p $HOME/.kube
  sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
  sudo chown $(id -u):$(id -g) $HOME/.kube/config

Alternatively, if you are the root user, you can run:

  export KUBECONFIG=/etc/kubernetes/admin.conf

You should now deploy a pod network to the cluster.
Run "kubectl apply -f [podnetwork].yaml" with one of the options listed at:
  https://kubernetes.io/docs/concepts/cluster-administration/addons/

Then you can join any number of worker nodes by running the following on each as root:

kubeadm join 211.100.2.50:6443 --token cq93h6.7og90l3nr71lrxrg \
        --discovery-token-ca-cert-hash sha256:5d3bf5af1d2e00d1a0fd1a1f970df6b0636a2061c3c870dbafa2c564a1c964eb
[vagrant@m1 ~]$ 
```

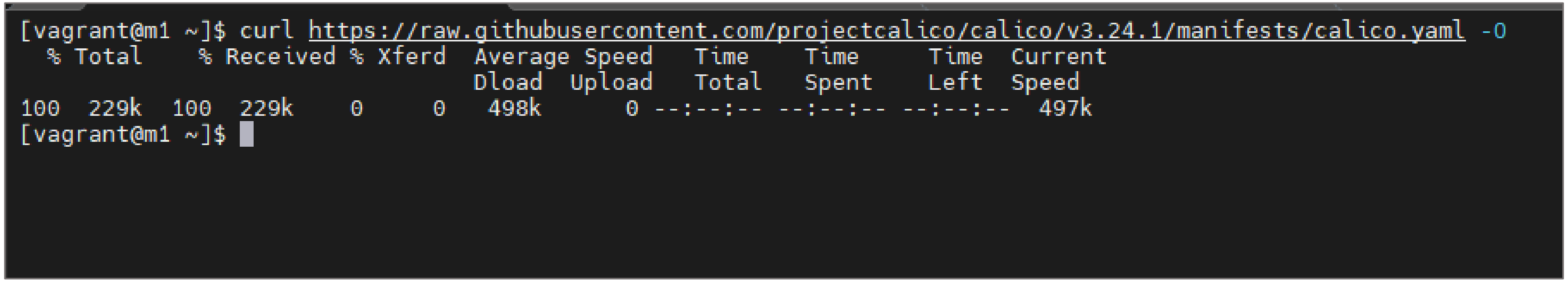
Kubernetes 시작

master node에서 kubeadm init 코드 입력으로
Kubernetes 시작



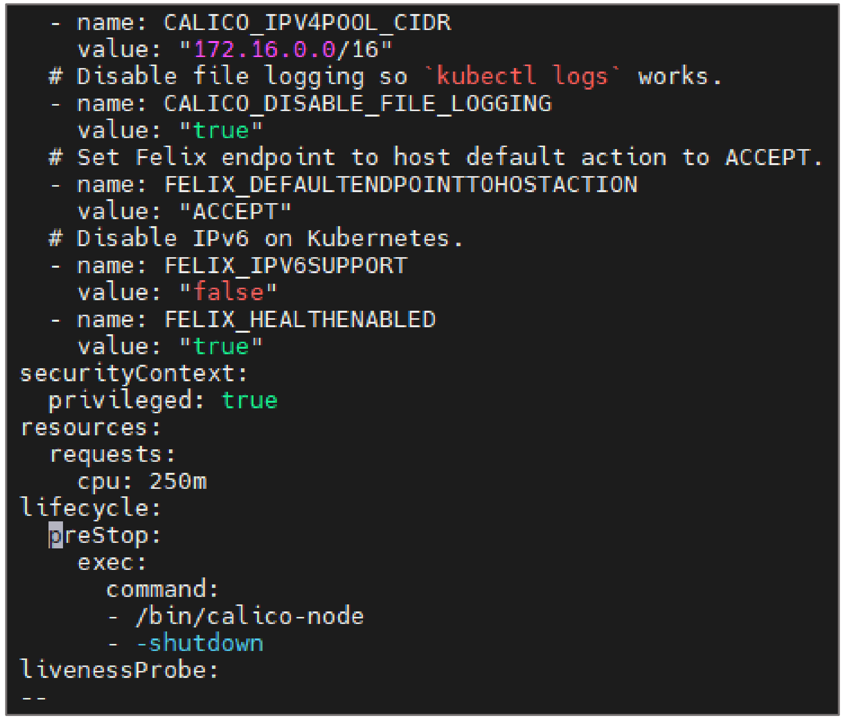
```
[vagrant@m1 ~]$ mkdir -p $HOME/.kube
[vagrant@m1 ~]$ sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
[vagrant@m1 ~]$ sudo chown $(id -u):$(id -g) $HOME/.kube/config
[vagrant@m1 ~]$ 
```

Kubectl 명령어 준비

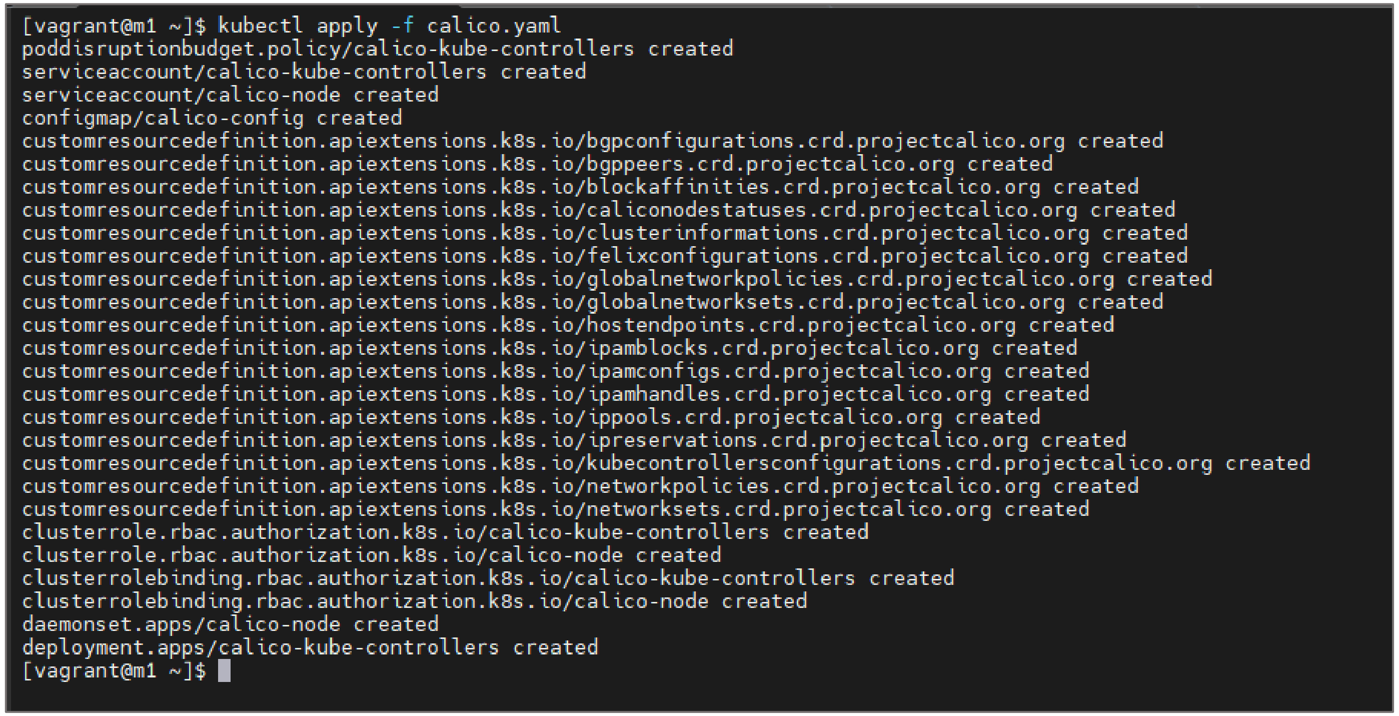


```
[vagrant@m1 ~]$ curl https://raw.githubusercontent.com/projectcalico/calico/v3.24.1/manifests/calico.yaml -O
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100  229k  100  229k    0     0   498k      0 --:--:-- --:--:-- --:--:--  497k
[vagrant@m1 ~]$ 
```

Calico CNI 설치를 위해 링크 입력



```
  - name: CALICO_IPV4POOL_CIDR
    value: "172.16.0.0/16"
  # Disable file logging so `kubectl logs` works.
  - name: CALICO_DISABLE_FILE_LOGGING
    value: "true"
  # Set Felix endpoint to host default action to ACCEPT.
  - name: FELIX_DEFAULTENDPOINTTOHOSTACTION
    value: "ACCEPT"
  # Disable IPv6 on Kubernetes.
  - name: FELIX_IPV6SUPPORT
    value: "false"
  - name: FELIX_HEALTHENABLED
    value: "true"
securityContext:
  privileged: true
resources:
  requests:
    cpu: 250m
lifecycle:
  preStop:
    exec:
      command:
      - /bin/calico-node
      - -shutdown
livenessProbe:
--
```

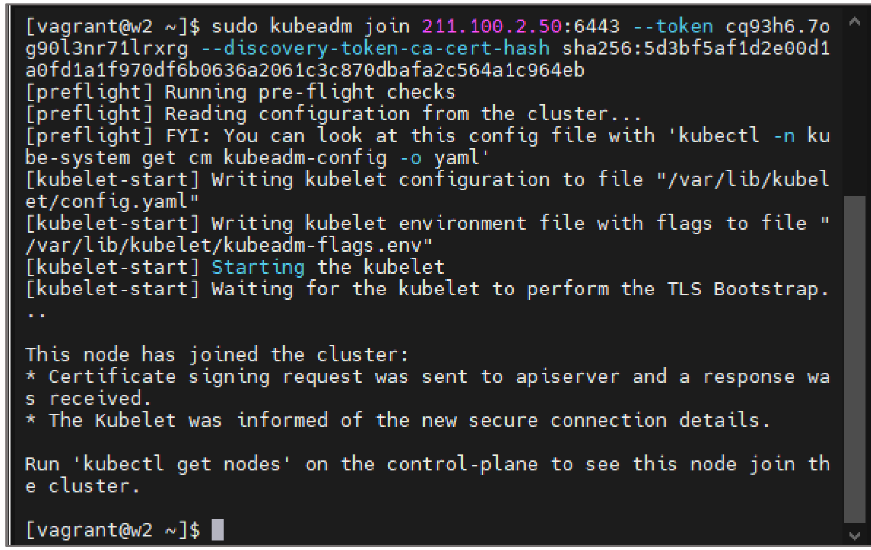


```
[vagrant@m1 ~]$ kubectl apply -f calico.yaml
poddisruptionbudget.policy/calico-kube-controllers created
serviceaccount/calico-kube-controllers created
serviceaccount/calico-node created
configmap/calico-config created
customresourcedefinition.apiextensions.k8s.io/bgpconfigurations.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/bgppeers.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/blockaffinities.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/caliconodestatuses.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/clusterinformations.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/felixconfigurations.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/globalnetworkpolicies.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/globalnetworksets.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/hostendpoints.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/ipamblocks.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/ipamconfigs.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/ipamhandles.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/ippools.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/ipreservations.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/kubecontrollersconfigurations.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/networkpolicies.crd.projectcalico.org created
customresourcedefinition.apiextensions.k8s.io/networksets.crd.projectcalico.org created
clusterrole.rbac.authorization.k8s.io/calico-kube-controllers created
clusterrole.rbac.authorization.k8s.io/calico-node created
clusterrolebinding.rbac.authorization.k8s.io/calico-kube-controllers created
clusterrolebinding.rbac.authorization.k8s.io/calico-node created
daemonset.apps/calico-node created
deployment.apps/calico-kube-controllers created
[vagrant@m1 ~]$
```

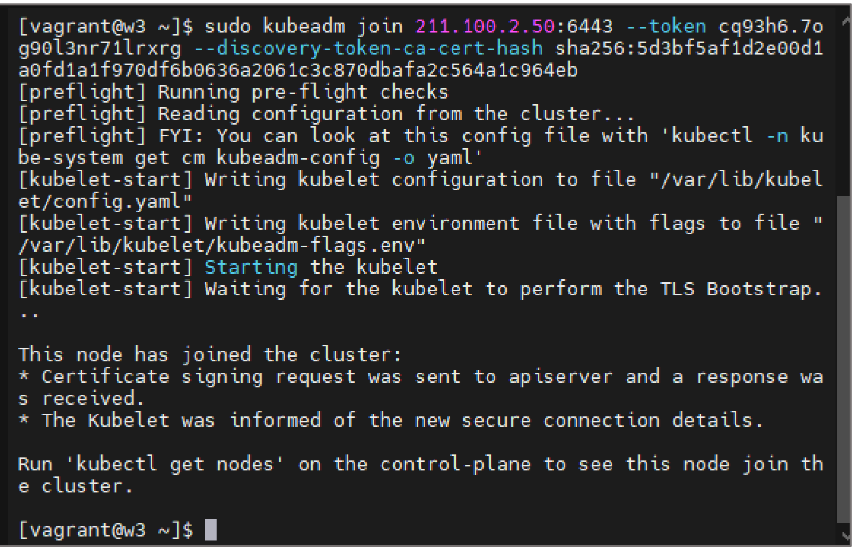
Calico.yaml

Pod_network_cidr 주소 변경

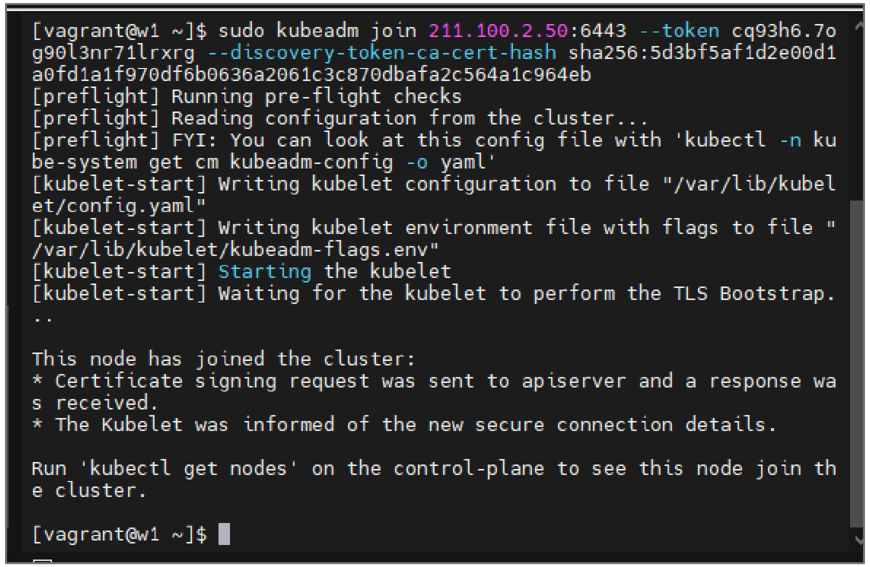
설치 시 지정한 Pod_network 주소로 설정 후
매니페스트를 실행하여 Calico CNI 설치



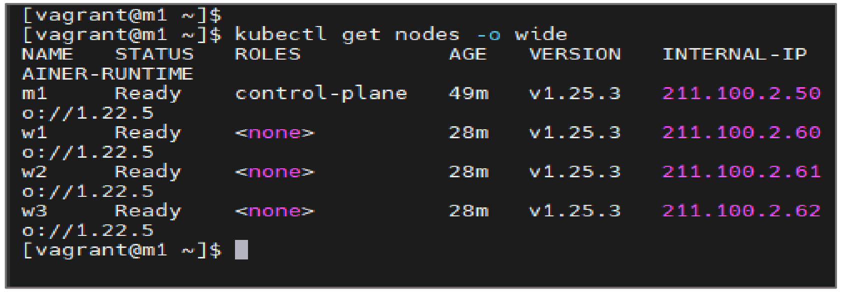
```
[vagrant@w2 ~]$ sudo kubeadm join 211.100.2.50:6443 --token cq93h6.7o
g90l3nr71lrxrg --discovery-token-ca-cert-hash sha256:5d3bf5af1d2e00d1
a0fd1a1f970df6b0636a2061c3c870dbafa2c564a1c964eb
[preflight] Running pre-flight checks
[preflight] Reading configuration from the cluster...
[preflight] FYI: You can look at this config file with 'kubectl -n ku
be-system get cm kubeadm-config -o yaml'
[kubelet-start] Writing kubelet configuration to file "/var/lib/kubel
et/config.yaml"
[kubelet-start] Writing kubelet environment file with flags to file "
/var/lib/kubelet/kubeadm-flags.env"
[kubelet-start] Starting the kubelet
[kubelet-start] Waiting for the kubelet to perform the TLS Bootstrap.
..

This node has joined the cluster:
* Certificate signing request was sent to apiserver and a response wa
s received.
* The Kubelet was informed of the new secure connection details.

Run 'kubectl get nodes' on the control-plane to see this node join th
e cluster.

[vagrant@w2 ~]$ 
```



```
[vagrant@w3 ~]$ sudo kubeadm join 211.100.2.50:6443 --token cq93h6.7o
g90l3nr71lrxrg --discovery-token-ca-cert-hash sha256:5d3bf5af1d2e00d1
a0fd1a1f970df6b0636a2061c3c870dbafa2c564a1c964eb
[preflight] Running pre-flight checks
[preflight] Reading configuration from the cluster...
[preflight] FYI: You can look at this config file with 'kubectl -n ku
be-system get cm kubeadm-config -o yaml'
[kubelet-start] Writing kubelet configuration to file "/var/lib/kubel
et/config.yaml"
[kubelet-start] Writing kubelet environment file with flags to file "
/var/lib/kubelet/kubeadm-flags.env"
[kubelet-start] Starting the kubelet
[kubelet-start] Waiting for the kubelet to perform the TLS Bootstrap.
..

This node has joined the cluster:
* Certificate signing request was sent to apiserver and a response wa
s received.
* The Kubelet was informed of the new secure connection details.

Run 'kubectl get nodes' on the control-plane to see this node join th
e cluster.

[vagrant@w3 ~]$ 
```



```
[vagrant@w1 ~]$ sudo kubeadm join 211.100.2.50:6443 --token cq93h6.7o
g90l3nr71lrxrg --discovery-token-ca-cert-hash sha256:5d3bf5af1d2e00d1
a0fd1a1f970df6b0636a2061c3c870dbafa2c564a1c964eb
[preflight] Running pre-flight checks
[preflight] Reading configuration from the cluster...
[preflight] FYI: You can look at this config file with 'kubectl -n ku
be-system get cm kubeadm-config -o yaml'
[kubelet-start] Writing kubelet configuration to file "/var/lib/kubel
et/config.yaml"
[kubelet-start] Writing kubelet environment file with flags to file "
/var/lib/kubelet/kubeadm-flags.env"
[kubelet-start] Starting the kubelet
[kubelet-start] Waiting for the kubelet to perform the TLS Bootstrap.
..

This node has joined the cluster:
* Certificate signing request was sent to apiserver and a response wa
s received.
* The Kubelet was informed of the new secure connection details.

Run 'kubectl get nodes' on the control-plane to see this node join th
e cluster.

[vagrant@w1 ~]$ 
```

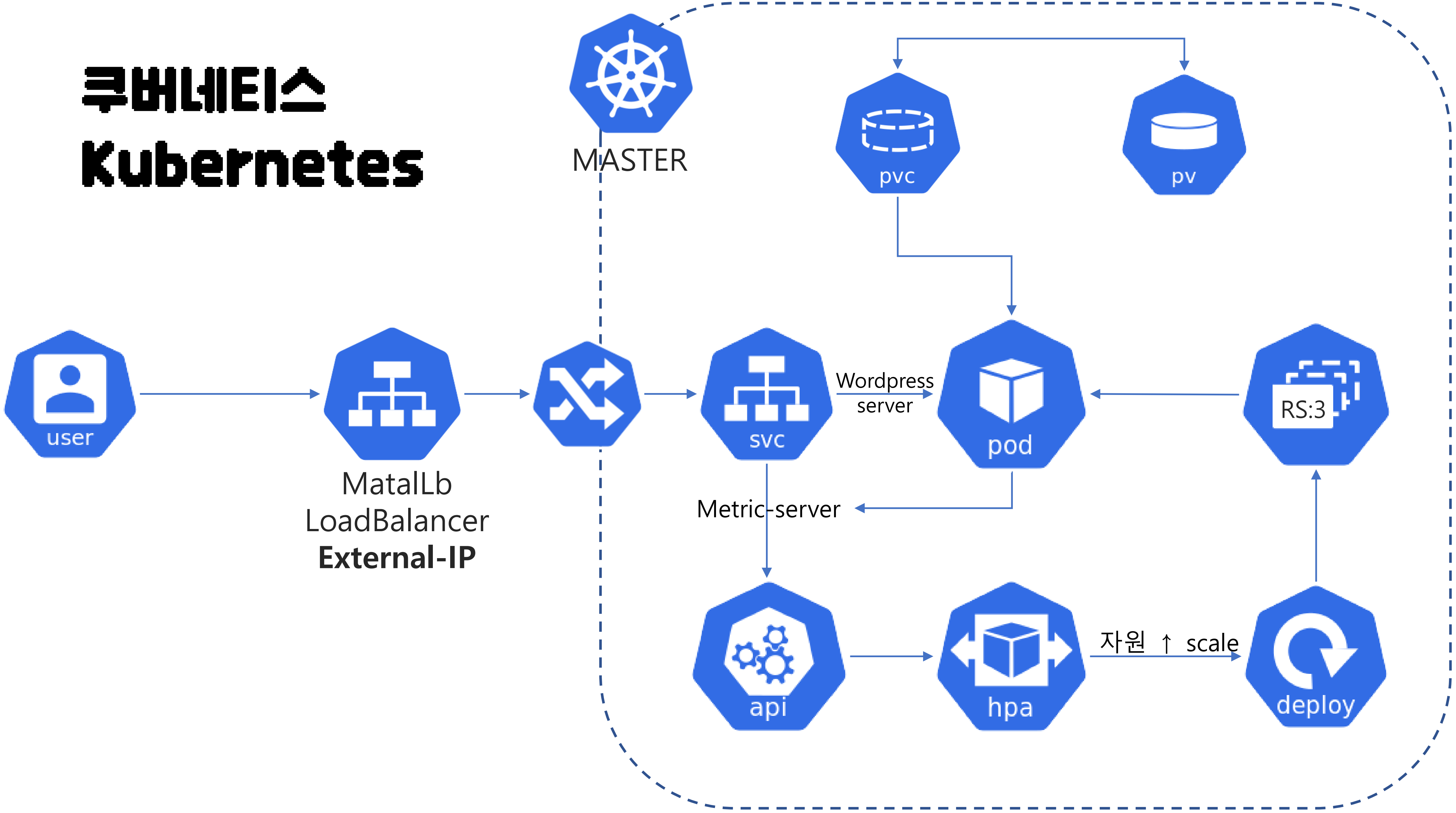


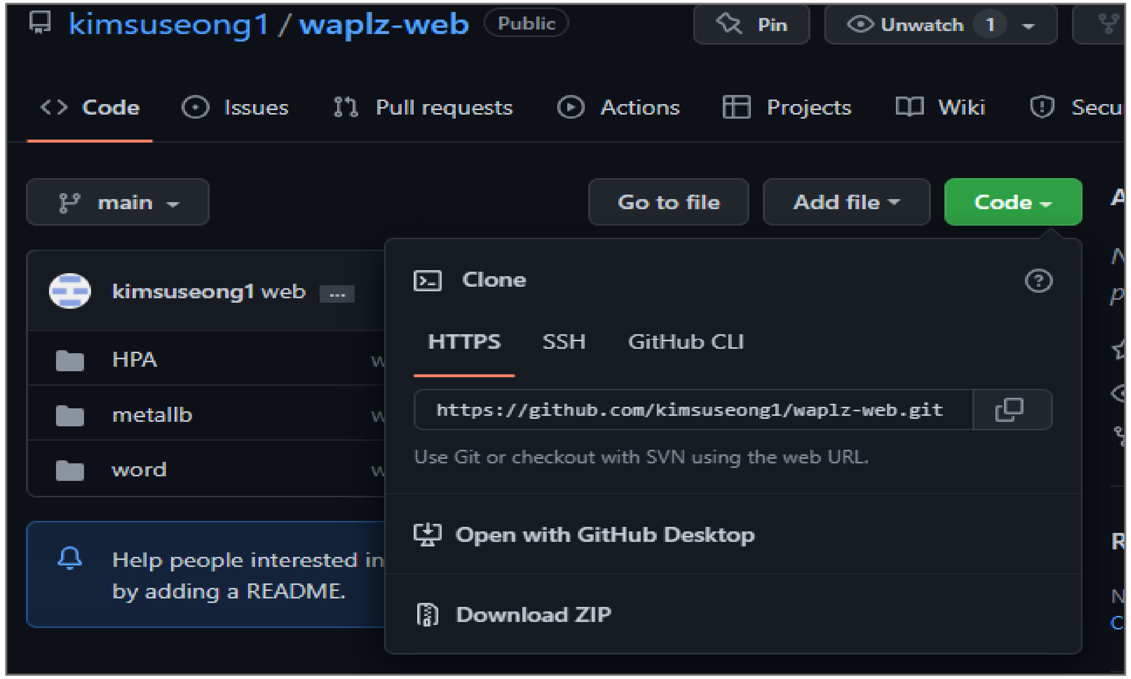
```
[vagrant@m1 ~]$
[vagrant@m1 ~]$ kubectl get nodes -o wide
NAME   STATUS   ROLES           AGE   VERSION   INTERNAL-IP
AINER-RUNTIME
m1     Ready    control-plane   49m   v1.25.3   211.100.2.50
o://1.22.5
w1     Ready    <none>          28m   v1.25.3   211.100.2.60
o://1.22.5
w2     Ready    <none>          28m   v1.25.3   211.100.2.61
o://1.22.5
w3     Ready    <none>          28m   v1.25.3   211.100.2.62
o://1.22.5
[vagrant@m1 ~]$ 
```

워커 노드 조인

master node에서 kubeadm init
명령어로 받은 토큰과 해시 값으로
worker node들에서 조인

쿠버네티스
Kubernetes

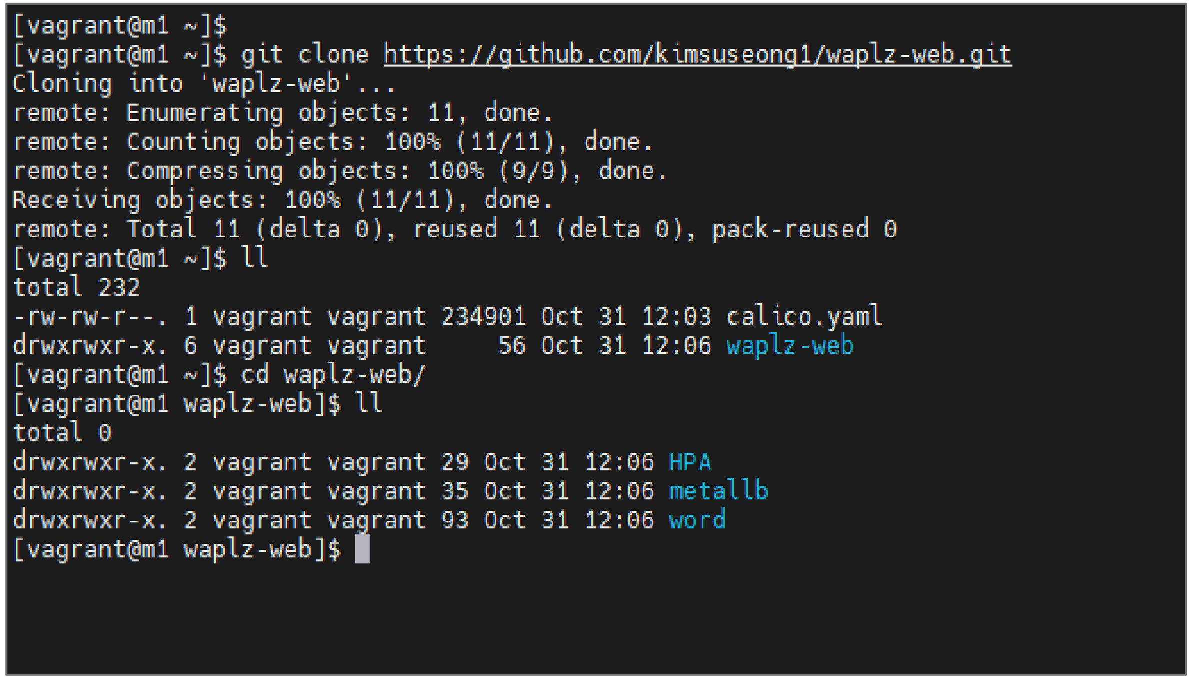




https://github.com/kimsuseong1/waplz-web.git

Use Git or checkout with SVN using the web URL.

Help people interested in
by adding a README.



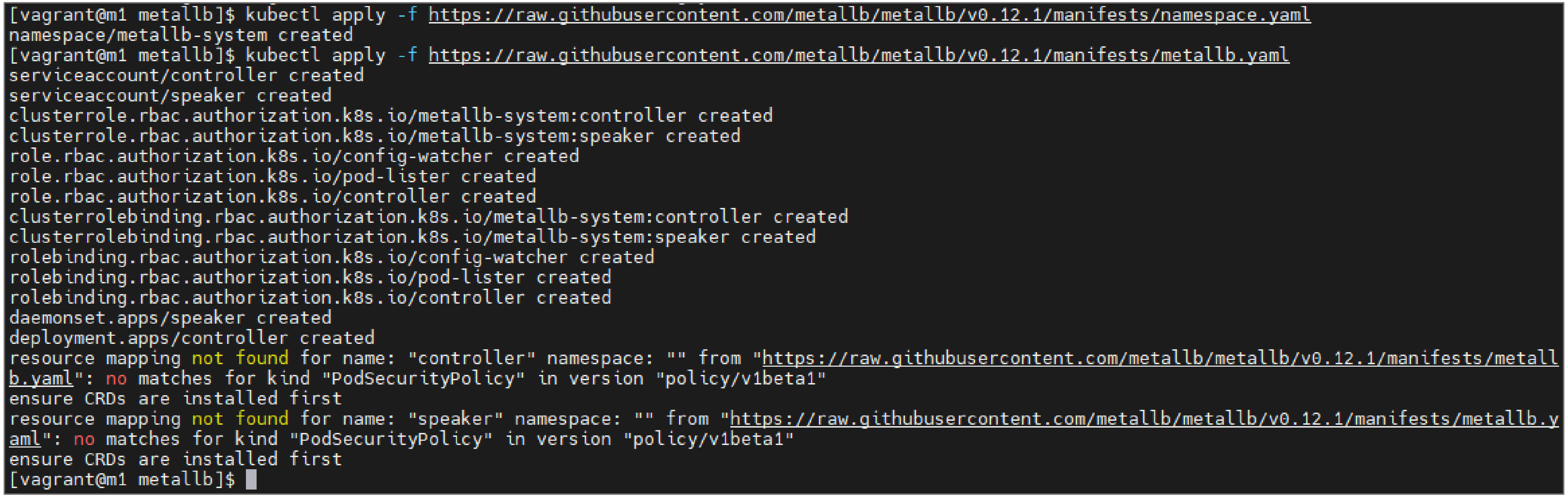
```
[vagrant@m1 ~]$
[vagrant@m1 ~]$ git clone https://github.com/kimsuseong1/waplz-web.git
Cloning into 'waplz-web'...
remote: Enumerating objects: 11, done.
remote: Counting objects: 100% (11/11), done.
remote: Compressing objects: 100% (9/9), done.
Receiving objects: 100% (11/11), done.
remote: Total 11 (delta 0), reused 11 (delta 0), pack-reused 0
[vagrant@m1 ~]$ ll
total 232
-rw-rw-r--. 1 vagrant vagrant 234901 Oct 31 12:03 calico.yaml
drwxrwxr-x. 6 vagrant vagrant     56 Oct 31 12:06 waplz-web
[vagrant@m1 ~]$ cd waplz-web/
[vagrant@m1 waplz-web]$ ll
total 0
drwxrwxr-x. 2 vagrant vagrant 29 Oct 31 12:06 HPA
drwxrwxr-x. 2 vagrant vagrant 35 Oct 31 12:06 metallb
drwxrwxr-x. 2 vagrant vagrant 93 Oct 31 12:06 word
[vagrant@m1 waplz-web]$
```

GitHub Repositories

Git Clone

GitHub 에서 미리 Waplz-web 리포지터리에
push 해놓은 (HPA, metallb, word) 파일
HTPS Code 를 복사

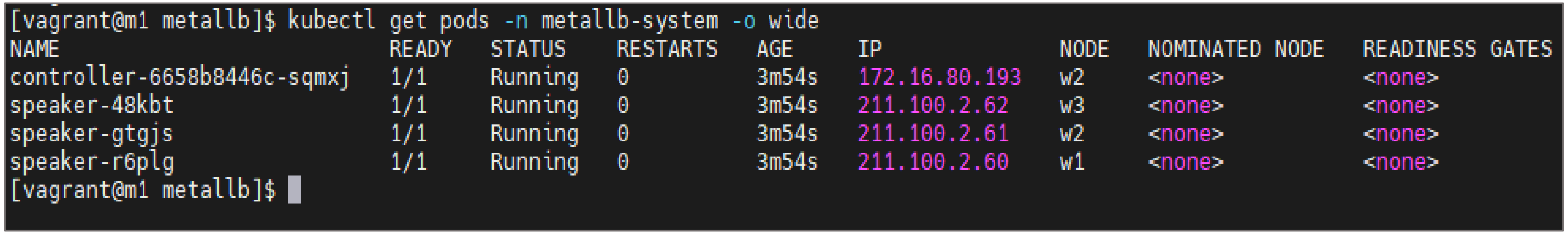
master node 에서 git clone 명령어로 복사한
code로 waplz-web 디렉토리를 복사



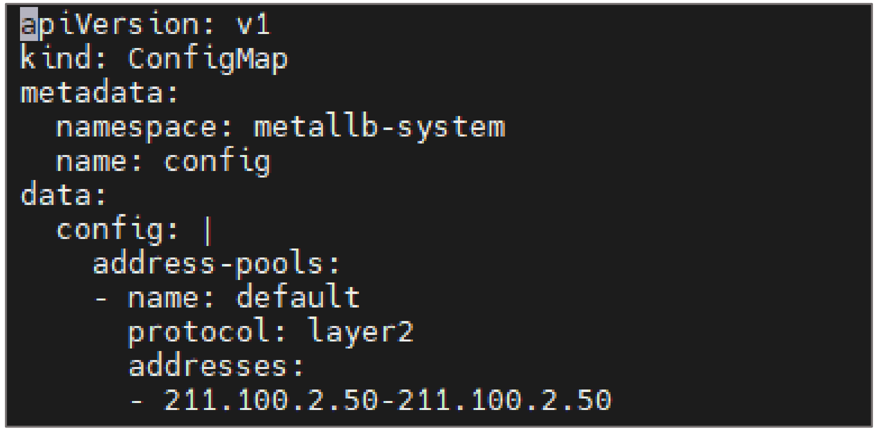
```
[vagrant@m1 metallb]$ kubectl apply -f https://raw.githubusercontent.com/metallb/metallb/v0.12.1/manifests/namespace.yaml
namespace/metallb-system created
[vagrant@m1 metallb]$ kubectl apply -f https://raw.githubusercontent.com/metallb/metallb/v0.12.1/manifests/metallb.yaml
serviceaccount/controller created
serviceaccount/speaker created
clusterrole.rbac.authorization.k8s.io/metallb-system:controller created
clusterrole.rbac.authorization.k8s.io/metallb-system:speaker created
role.rbac.authorization.k8s.io/config-watcher created
role.rbac.authorization.k8s.io/pod-lister created
role.rbac.authorization.k8s.io/controller created
clusterrolebinding.rbac.authorization.k8s.io/metallb-system:controller created
clusterrolebinding.rbac.authorization.k8s.io/metallb-system:speaker created
rolebinding.rbac.authorization.k8s.io/config-watcher created
rolebinding.rbac.authorization.k8s.io/pod-lister created
rolebinding.rbac.authorization.k8s.io/controller created
daemonset.apps/speaker created
deployment.apps/controller created
resource mapping not found for name: "controller" namespace: "" from "https://raw.githubusercontent.com/metallb/metallb/v0.12.1/manifests/metall
b.yaml": no matches for kind "PodSecurityPolicy" in version "policy/v1beta1"
ensure CRDs are installed first
resource mapping not found for name: "speaker" namespace: "" from "https://raw.githubusercontent.com/metallb/metallb/v0.12.1/manifests/metallb.y
aml": no matches for kind "PodSecurityPolicy" in version "policy/v1beta1"
ensure CRDs are installed first
[vagrant@m1 metallb]$
```

온프레미스에서 로드밸런서를 제공하는 metallb, namespace 배포

MetalLB 스피커 확인 및 L2/ARP 경로 생성

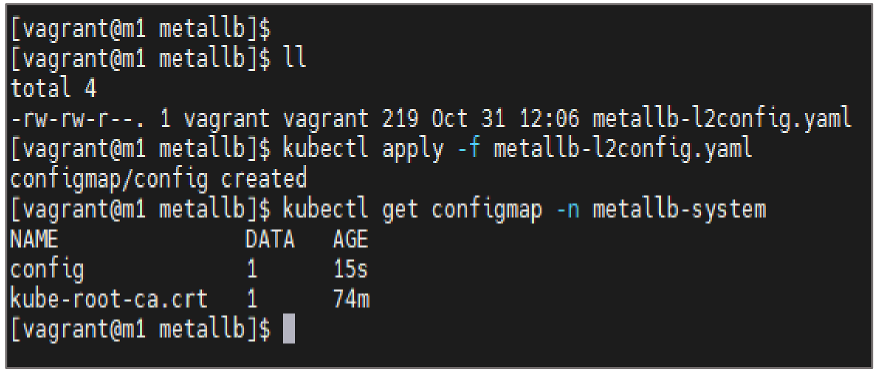


```
[vagrant@m1 metallb]$ kubectl get pods -n metallb-system -o wide
NAME                         READY   STATUS    RESTARTS   AGE     IP              NODE   NOMINATED NODE   READINESS GATES
controller-6658b8446c-sqmxj  1/1     Running   0          3m54s   172.16.80.193   w2     <none>           <none>
speaker-48kbt                1/1     Running   0          3m54s   211.100.2.62    w3     <none>           <none>
speaker-gtgjs                1/1     Running   0          3m54s   211.100.2.61    w2     <none>           <none>
speaker-r6plg                1/1     Running   0          3m54s   211.100.2.60    w1     <none>           <none>
[vagrant@m1 metallb]$
```



```
apiVersion: v1
kind: ConfigMap
metadata:
  namespace: metallb-system
  name: config
data:
  config: |
    address-pools:
    - name: default
      protocol: layer2
      addresses:
      - 211.100.2.50-211.100.2.50
```

~/waplz-web/metallb/metallb-l2config.yaml

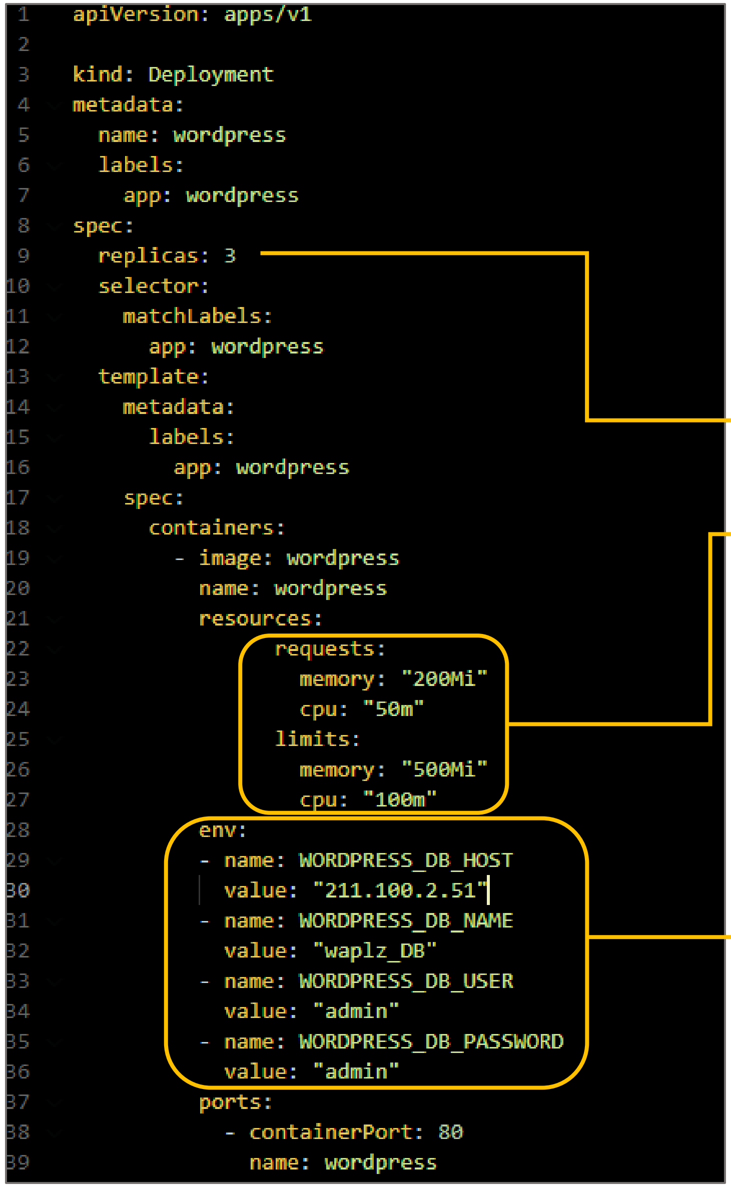


```
[vagrant@m1 metallb]$
[vagrant@m1 metallb]$ ll
total 4
-rw-rw-r--. 1 vagrant vagrant 219 Oct 31 12:06 metallb-l2config.yaml
[vagrant@m1 metallb]$ kubectl apply -f metallb-l2config.yaml
configmap/config created
[vagrant@m1 metallb]$ kubectl get configmap -n metallb-system
NAME               DATA   AGE
config             1      15s
kube-root-ca.crt   1      74m
[vagrant@m1 metallb]$
```

- 정해진 작동 방식 L2(ARP)에 따라 경로를 만들 수 있도록 경로를 제공하는 Speaker 동작을 확인합니다.

- MetalLB 설정을 적용 하기 위해 오브젝트는 ConfigMap을 사용 하고, L2 네트워크(ARP/NDP)에서 211.100.2.50 고정 대역으로 로드밸런서를 구현 합니다.

- ConfigMap이 생성됐는지 다음 명령으로 확인 합니다.



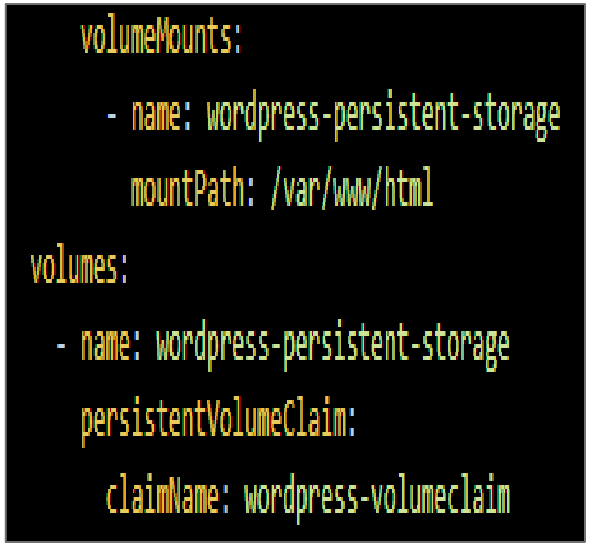
```yaml
apiVersion: apps/v1

kind: Deployment
metadata:
  name: wordpress
  labels:
    app: wordpress
spec:
  replicas: 3
  selector:
    matchLabels:
      app: wordpress
  template:
    metadata:
      labels:
        app: wordpress
    spec:
      containers:
        - image: wordpress
          name: wordpress
          resources:
                requests:
                  memory: "200Mi"
                  cpu: "50m"
                limits:
                  memory: "500Mi"
                  cpu: "100m"
          env:
          - name: WORDPRESS_DB_HOST
            value: "211.100.2.51"
          - name: WORDPRESS_DB_NAME
            value: "waplz_DB"
          - name: WORDPRESS_DB_USER
            value: "admin"
          - name: WORDPRESS_DB_PASSWORD
            value: "admin"
          ports:
            - containerPort: 80
              name: wordpress
```

wordpress.yaml

Wordpress 배포를 위한 yaml 코드 분석

- 파드 수를 보장하는 replicas 오브젝트를 제공.
- 파드마다 주어진 부하량을 결정하는 requests, limits 항목에 값을 추가합니다.
- Wordpress에 연결할 DB-Server의 mariadb에서 생성한 DB_NAME, DB_USER, DB_PASSWORD를 입력합니다.

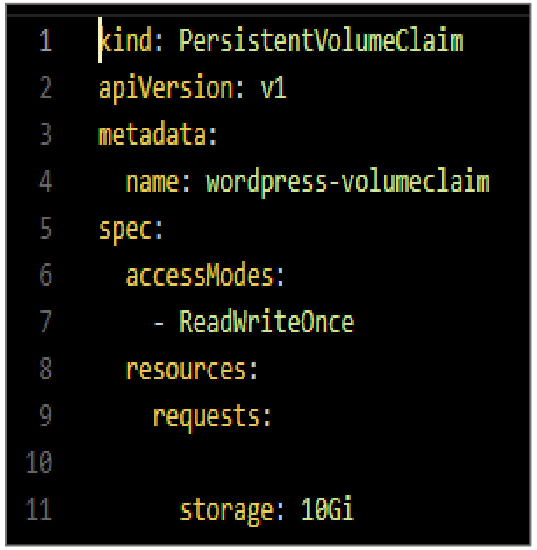
Wordpress 배포를 위한 yaml 코드 분석



```
    volumeMounts:
      - name: wordpress-persistent-storage
        mountPath: /var/www/html
volumes:
  - name: wordpress-persistent-storage
    persistentVolumeClaim:
      claimName: wordpress-volumeclaim
```

wordpress.yaml

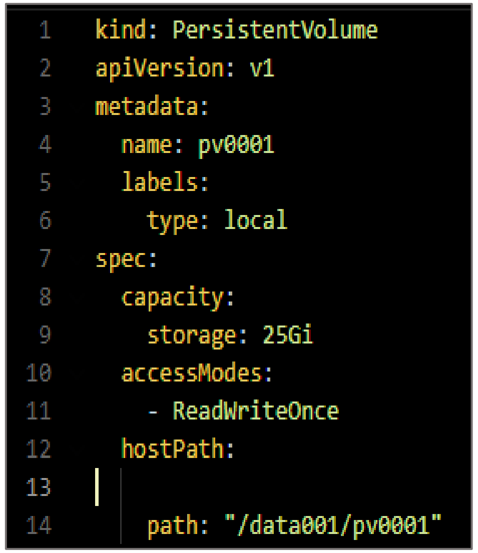
PVC로 생성된 Persistent-storage 를 /var/www/html 경로를 volum에 mount 합니다.



```
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
  name: wordpress-volumeclaim
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:

      storage: 10Gi
```

PVC.yaml

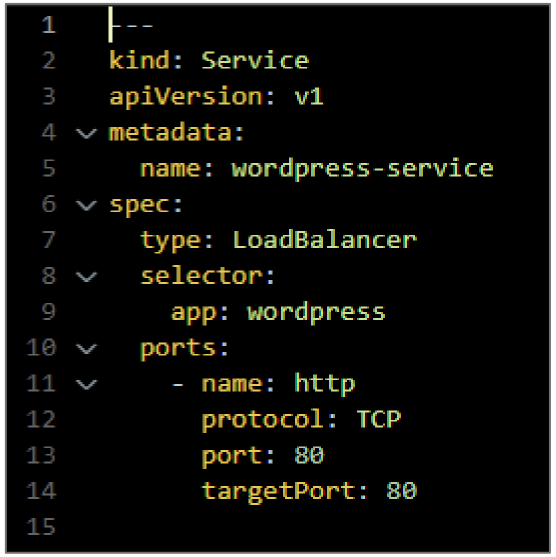
지속적으로 사용 가능한 볼륨을 요청 하고 준비된 볼륨에서 10G 공간을 할당합니다.



```
kind: PersistentVolume
apiVersion: v1
metadata:
  name: pv0001
  labels:
    type: local
spec:
  capacity:
    storage: 25Gi
  accessModes:
    - ReadWriteOnce
  hostPath:

    path: "/data001/pv0001"
```

PV.yaml

지속적으로 사용 가능한 볼륨으로 선언 하며 pv0001 공간에 볼륨을 사용할 수 있게 준비합니다.



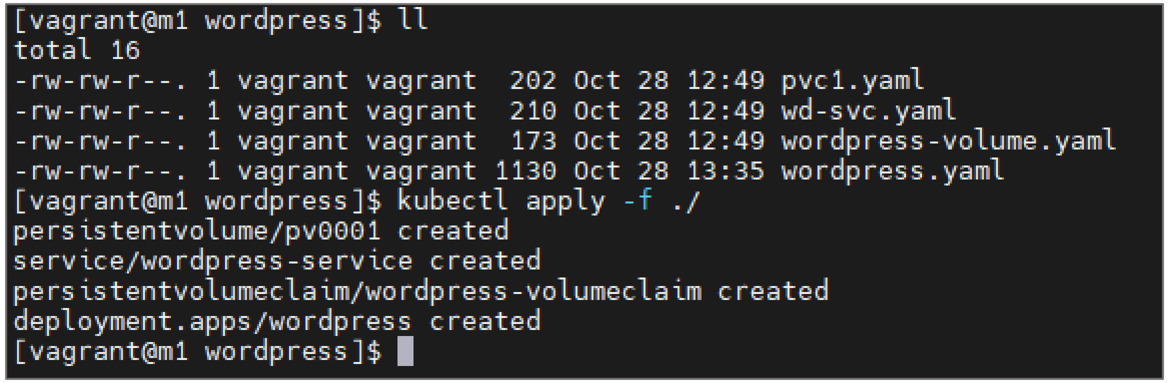
```
---
kind: Service
apiVersion: v1
metadata:
  name: wordpress-service
spec:
  type: LoadBalancer
  selector:
    app: wordpress
  ports:
    - name: http
      protocol: TCP
      port: 80
      targetPort: 80

```

Wordpress-service.yaml

MetalLB를 구성했으므로 Wordpress 서비스를 로드밸런서 서비스로 설정 합니다.

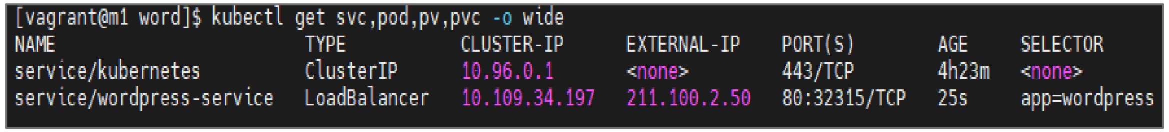
파드에서 생성한 내용을 기록하고 보관하는 PV, PVC yaml

Wordpress 관련 서비스, 파드 배포



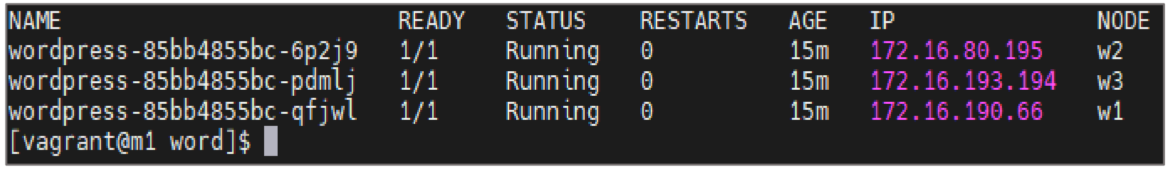
```
[vagrant@m1 wordpress]$ ll
total 16
-rw-rw-r--. 1 vagrant vagrant  202 Oct 28 12:49 pvc1.yaml
-rw-rw-r--. 1 vagrant vagrant  210 Oct 28 12:49 wd-svc.yaml
-rw-rw-r--. 1 vagrant vagrant  173 Oct 28 12:49 wordpress-volume.yaml
-rw-rw-r--. 1 vagrant vagrant 1130 Oct 28 13:35 wordpress.yaml
[vagrant@m1 wordpress]$ kubectl apply -f ./
persistentvolume/pv0001 created
service/wordpress-service created
persistentvolumeclaim/wordpress-volumeclaim created
deployment.apps/wordpress created
[vagrant@m1 wordpress]$
```

service



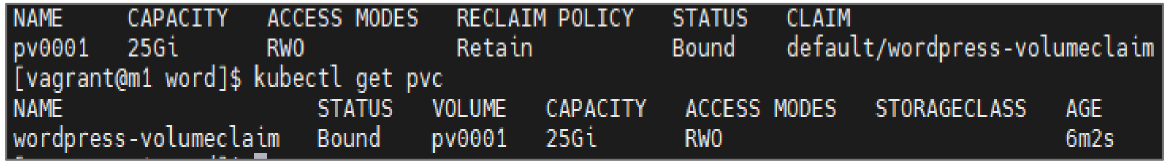
```
[vagrant@m1 word]$ kubectl get svc,pod,pv,pvc -o wide
NAME                        TYPE           CLUSTER-IP      EXTERNAL-IP    PORT(S)        AGE     SELECTOR
service/kubernetes          ClusterIP      10.96.0.1       <none>         443/TCP        4h23m   <none>
service/wordpress-service   LoadBalancer   10.109.34.197   211.100.2.50   80:32315/TCP   25s     app=wordpress
```

pod



```
NAME                         READY   STATUS    RESTARTS   AGE   IP               NODE
wordpress-85bb4855bc-6p2j9   1/1     Running   0          15m   172.16.80.195    w2
wordpress-85bb4855bc-pdmlj   1/1     Running   0          15m   172.16.193.194   w3
wordpress-85bb4855bc-qfjwl   1/1     Running   0          15m   172.16.190.66    w1
[vagrant@m1 word]$
```

pv ,pvc



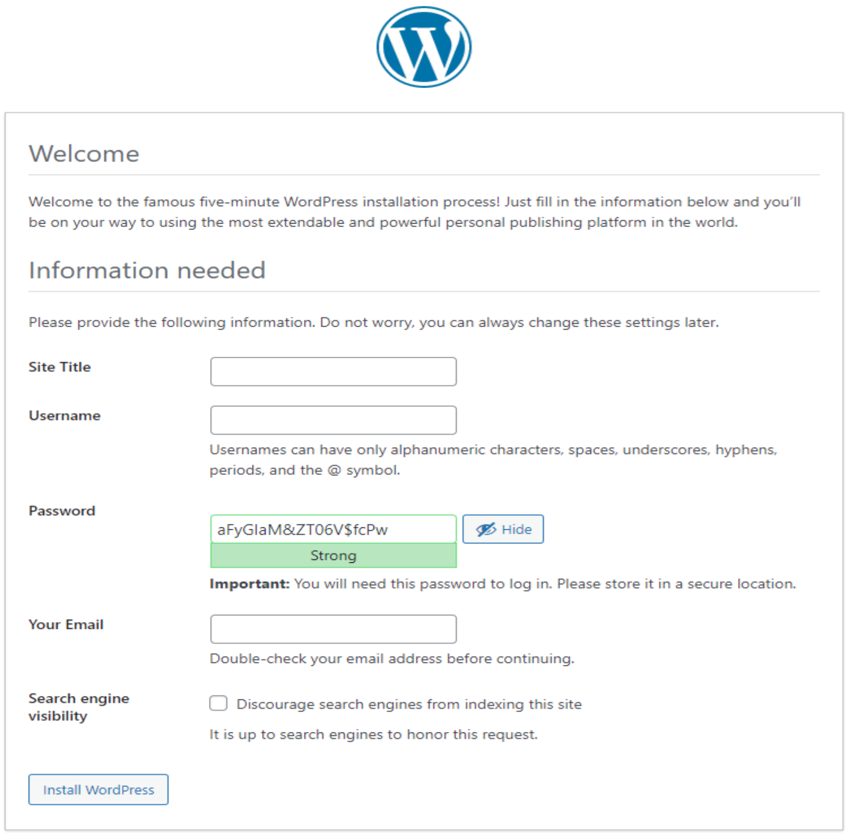
```
NAME     CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS   CLAIM
pv0001   25Gi       RWO            Retain           Bound    default/wordpress-volumeclaim
[vagrant@m1 word]$ kubectl get pvc
NAME                    STATUS   VOLUME   CAPACITY   ACCESS MODES   STORAGECLASS   AGE
wordpress-volumeclaim   Bound    pv0001   25Gi       RWO                           6m2s
```

- Kubectl apply –f ./ 로 해당 경로 yaml 파일들을 created 시켜 줍니다.

- LoadBalancer 로 구현 되어 EXTERNAL-IP 는 ConfigMap layer2 동작 방식으로 부여한 IP로 관리 되고 있습니다.

- Replicas 수에 맞게 각 노드들에게 알맞게 배포 되었고 각 노드IP는 지정 해준 172.16.0.0/16 대역으로 할당 되었습니다.

- Pvc가 사용 가능한 볼륨을 요청하여 pv에서 pv0001 공간에 볼륨 선언으로 wordpress-volumclaim을 할당 받았습니다.



Welcome

Welcome to the famous five-minute WordPress installation process! Just fill in the information below and you'll be on your way to using the most extendable and powerful personal publishing platform in the world.

Information needed

Please provide the following information. Do not worry, you can always change these settings later.

Site Title

Username

Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.

Password: aFyGlaM&ZT06V$fcPw

Strong

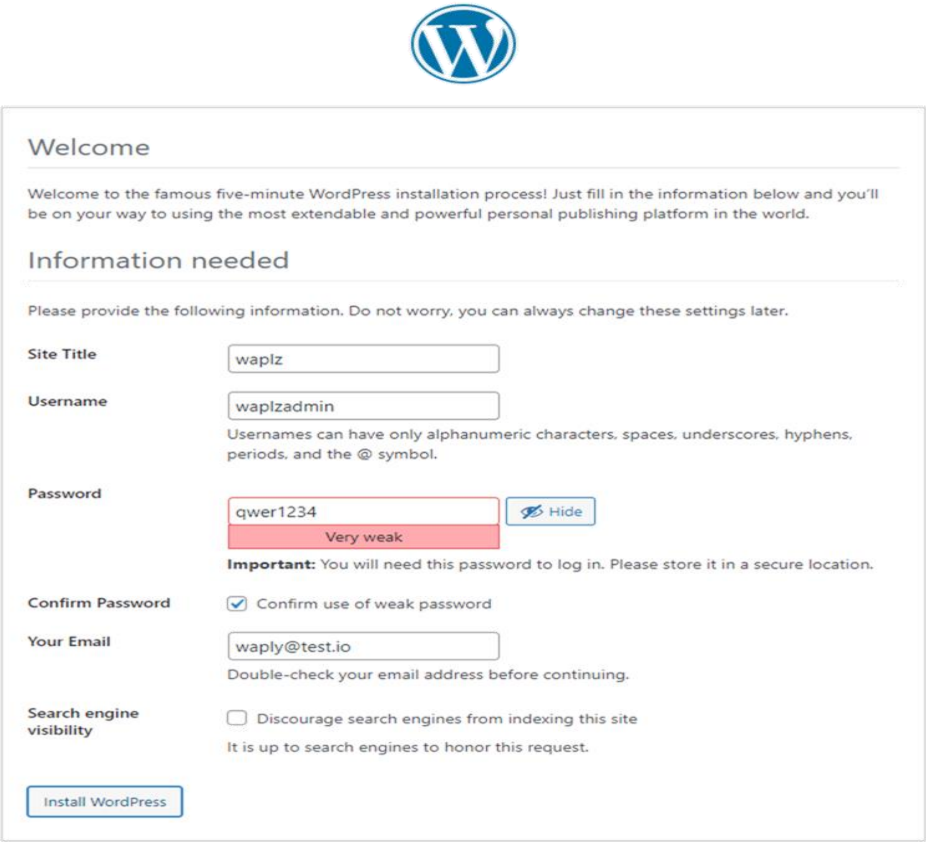
Important: You will need this password to log in. Please store it in a secure location.

Your Email

Double-check your email address before continuing.

Search engine visibility: □ Discourage search engines from indexing this site

It is up to search engines to honor this request.



Welcome

Welcome to the famous five-minute WordPress installation process! Just fill in the information below and you'll be on your way to using the most extendable and powerful personal publishing platform in the world.

Information needed

Please provide the following information. Do not worry, you can always change these settings later.

Site Title: waplz

Username: waplzadmin

Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.

Password: qwer1234

Very weak

Important: You will need this password to log in. Please store it in a secure location.

Confirm Password: ☑ Confirm use of weak password

Your Email: waply@test.io

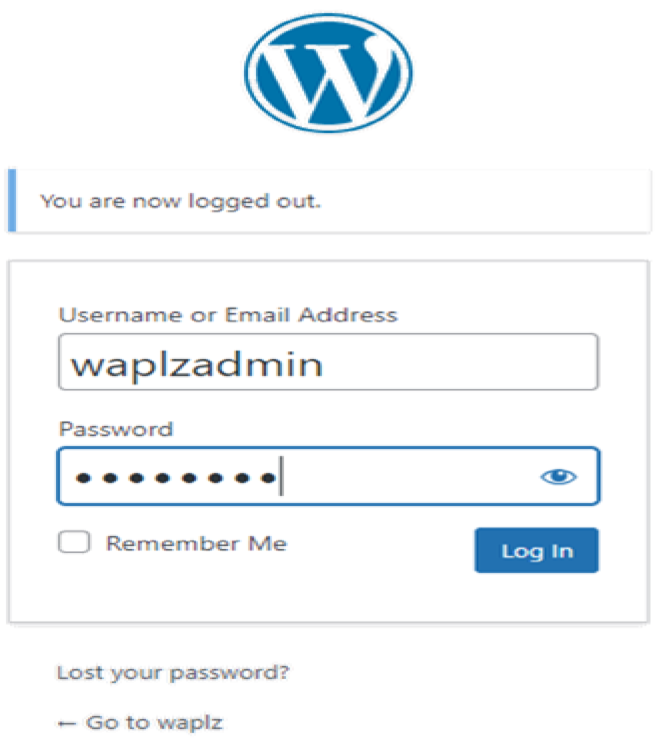
Double-check your email address before continuing.

Search engine visibility: □ Discourage search engines from indexing this site

It is up to search engines to honor this request.

Wordpress 접속

EXTERNAL-IP로 접속 한 다음 성공적으로 DB정보를 받았으면 위와 같이 임의로 관리해줄 관리자 정보를 적고 install wordpress를 눌러 줍니다.



You are now logged out.

Username or Email Address

waplzadmin

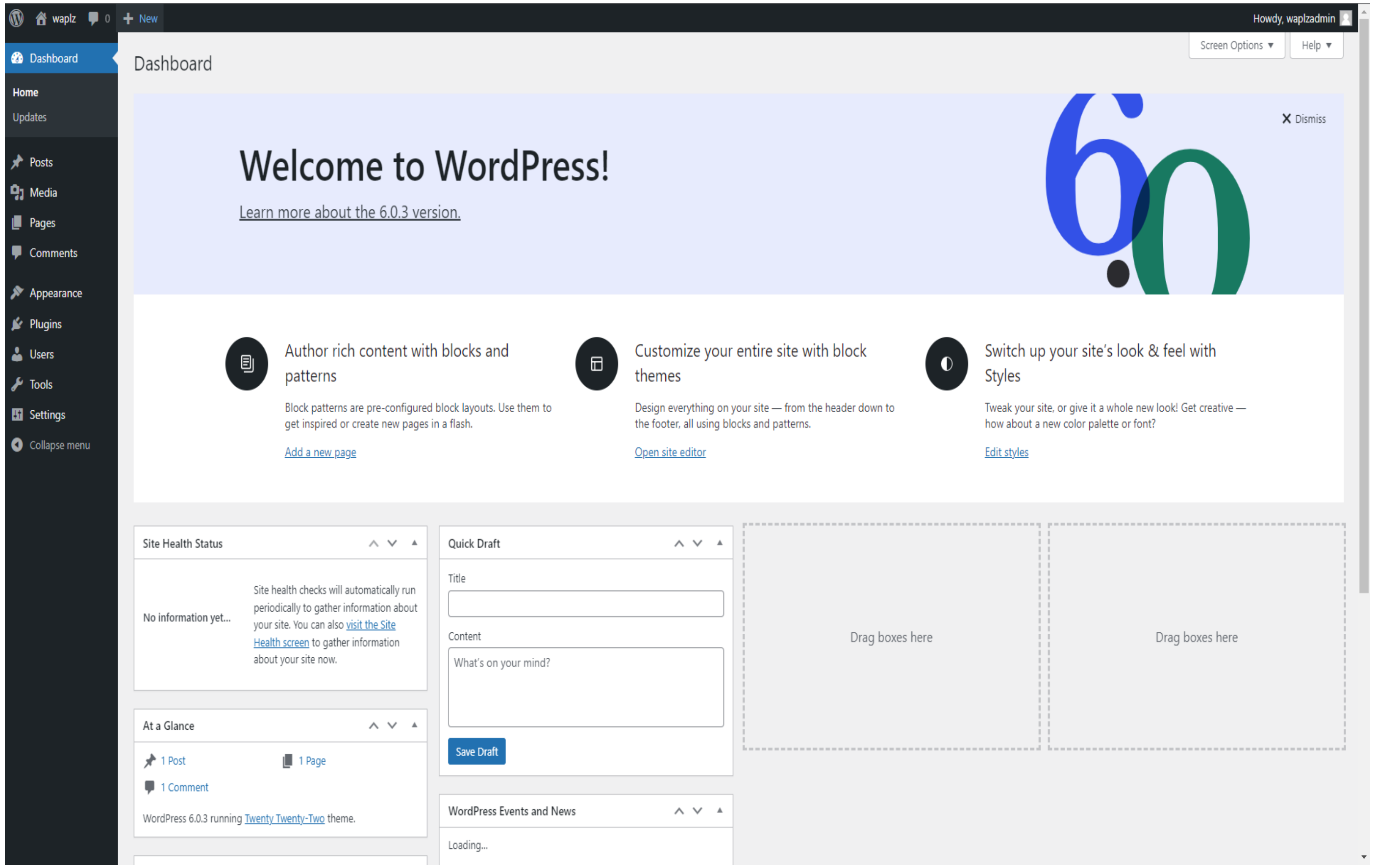
Password

••••••••

□ Remember Me

Lost your password?

← Go to waplz



Dashboard

Welcome to WordPress!

Learn more about the 6.0.3 version.

Author rich content with blocks and patterns

Block patterns are pre-configured block layouts. Use them to get inspired or create new pages in a flash.

Add a new page

Customize your entire site with block themes

Design everything on your site — from the header down to the footer, all using blocks and patterns.

Open site editor

Switch up your site's look & feel with Styles

Tweak your site, or give it a whole new look! Get creative — how about a new color palette or font?

Edit styles

Site Health Status

No information yet...

Site health checks will automatically run periodically to gather information about your site. You can also visit the Site Health screen to gather information about your site now.

At a Glance

1 Post　1 Page

1 Comment

WordPress 6.0.3 running Twenty Twenty-Two theme.

Quick Draft

Title

Content

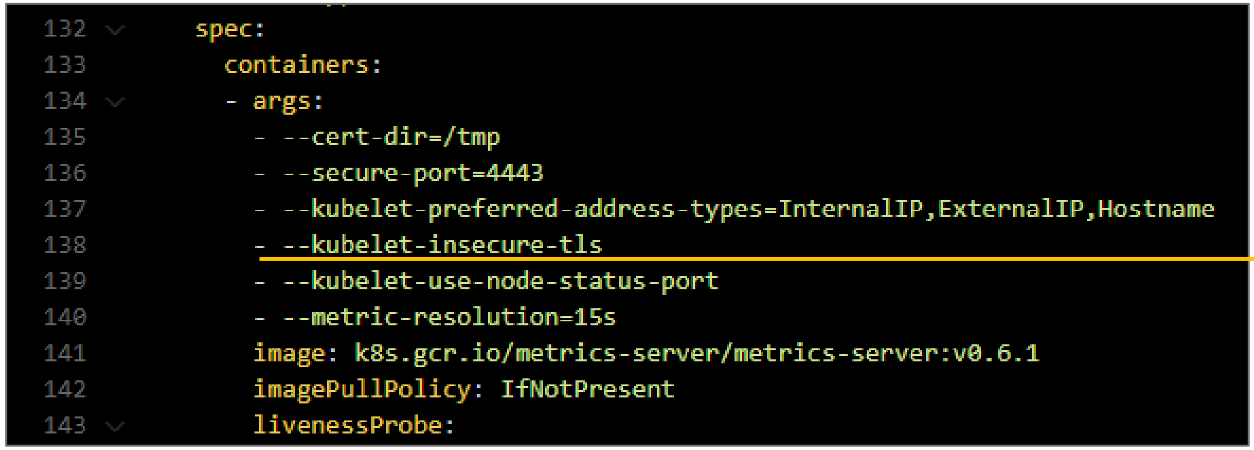
What's on your mind?

WordPress Events and News

Loading...

Wordpress 접속

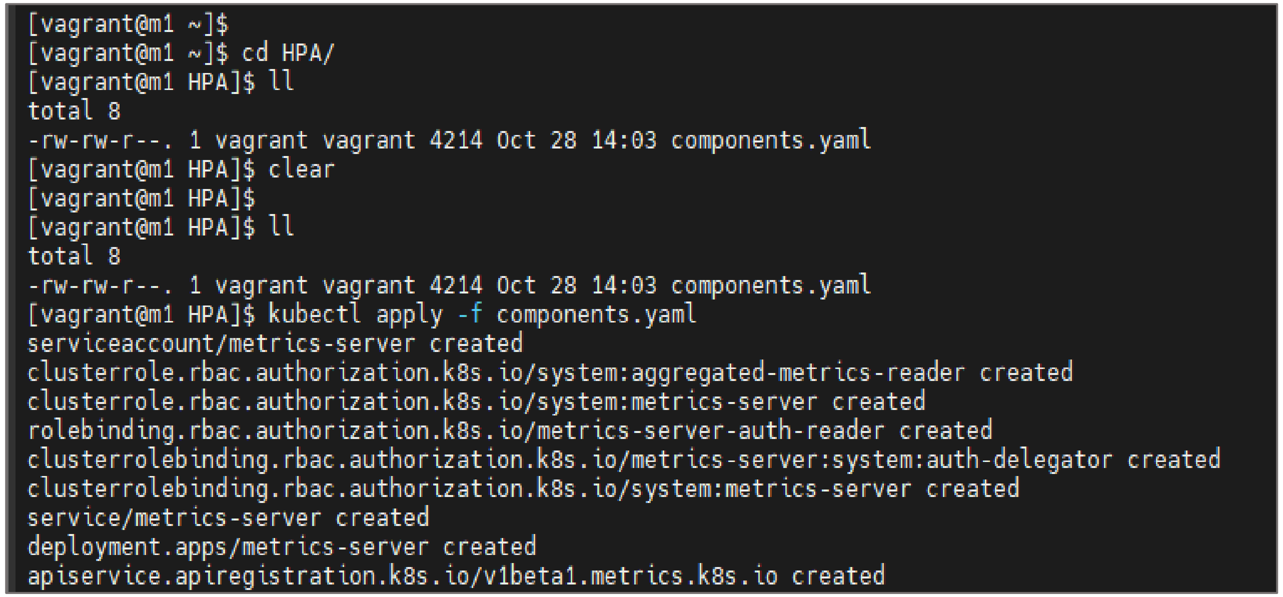
임의로 생성해준 관리자 정보를 입력 후
성공적으로 구축된 사이트를 확인 합니다.



```
spec:
  containers:
  - args:
    - --cert-dir=/tmp
    - --secure-port=4443
    - --kubelet-preferred-address-types=InternalIP,ExternalIP,Hostname
    - --kubelet-insecure-tls
    - --kubelet-use-node-status-port
    - --metric-resolution=15s
    image: k8s.gcr.io/metrics-server/metrics-server:v0.6.1
    imagePullPolicy: IfNotPresent
    livenessProbe:
```

Metric-server CA 인증서

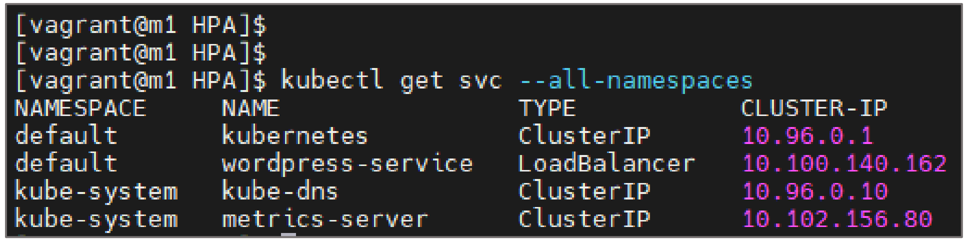
프로덕션 환경에서는 CA 인증서를 신뢰하는 과정을 수행해야 하지만 현재는 테스트 과정이므로 CA 인증서를 확인하지 않도록 추가 해줍니다.



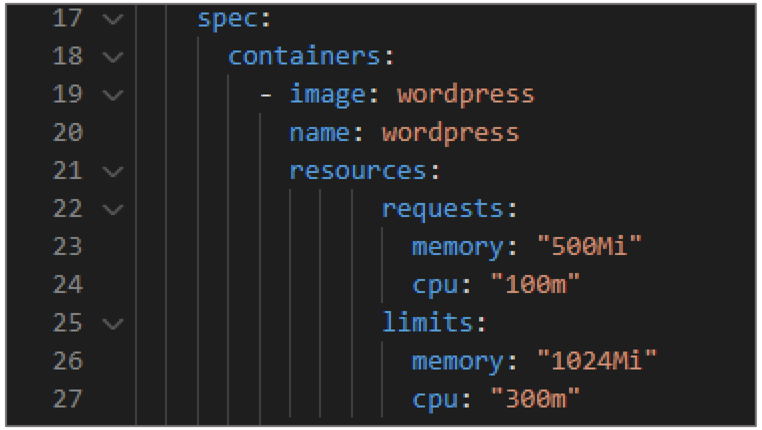
```
[vagrant@m1 ~]$
[vagrant@m1 ~]$ cd HPA/
[vagrant@m1 HPA]$ ll
total 8
-rw-rw-r--. 1 vagrant vagrant 4214 Oct 28 14:03 components.yaml
[vagrant@m1 HPA]$ clear
[vagrant@m1 HPA]$
[vagrant@m1 HPA]$ ll
total 8
-rw-rw-r--. 1 vagrant vagrant 4214 Oct 28 14:03 components.yaml
[vagrant@m1 HPA]$ kubectl apply -f components.yaml
serviceaccount/metrics-server created
clusterrole.rbac.authorization.k8s.io/system:aggregated-metrics-reader created
clusterrole.rbac.authorization.k8s.io/system:metrics-server created
rolebinding.rbac.authorization.k8s.io/metrics-server-auth-reader created
clusterrolebinding.rbac.authorization.k8s.io/metrics-server:system:auth-delegator created
clusterrolebinding.rbac.authorization.k8s.io/system:metrics-server created
service/metrics-server created
deployment.apps/metrics-server created
apiservice.apiregistration.k8s.io/v1beta1.metrics.k8s.io created
```

Metric-server 배포

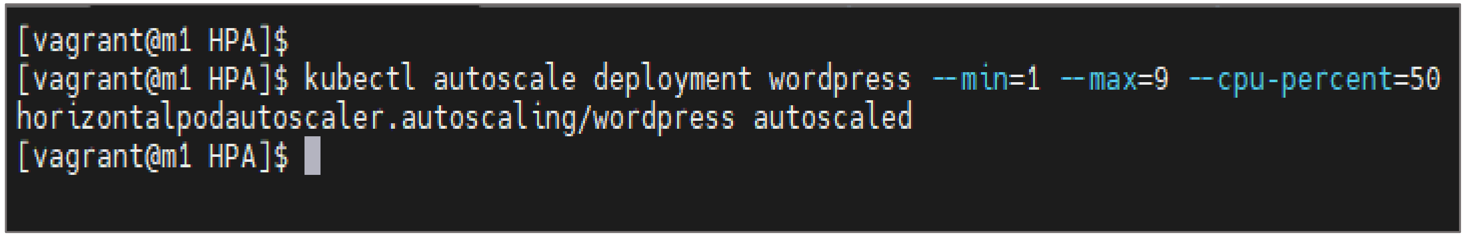
미리 받아온 HPA 디렉토리에 파라미터 값을 추가 해준 components.yaml 을 created 시켜 줍니다. 그리고 잘 배포 되었는지 명령어로 확인 합니다.



```
[vagrant@m1 HPA]$
[vagrant@m1 HPA]$
[vagrant@m1 HPA]$ kubectl get svc --all-namespaces
NAMESPACE     NAME                 TYPE           CLUSTER-IP
default       kubernetes           ClusterIP      10.96.0.1
default       wordpress-service    LoadBalancer   10.100.140.162
kube-system   kube-dns             ClusterIP      10.96.0.10
kube-system   metrics-server       ClusterIP      10.102.156.80
```



```yaml
spec:
  containers:
    - image: wordpress
      name: wordpress
      resources:
         requests:
           memory: "500Mi"
           cpu: "100m"
         limits:
           memory: "1024Mi"
           cpu: "300m"
```



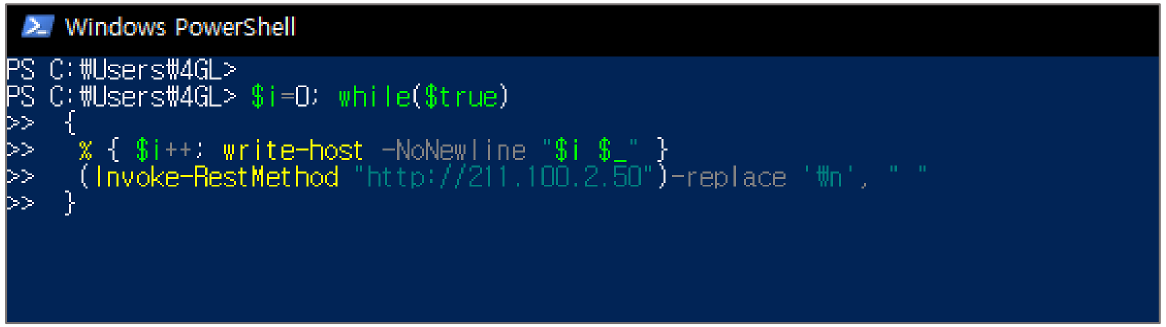
```
[vagrant@m1 HPA]$
[vagrant@m1 HPA]$ kubectl autoscale deployment wordpress --min=1 --max=9 --cpu-percent=50
horizontalpodautoscaler.autoscaling/wordpress autoscaled
[vagrant@m1 HPA]$
```

wordpress.yaml

Autoscale

Wordpress.yaml에 requests, limits 항목과 CPU, Memory 값은 파드마다 주어진 부하량을 결정하는 기준이 됩니다.

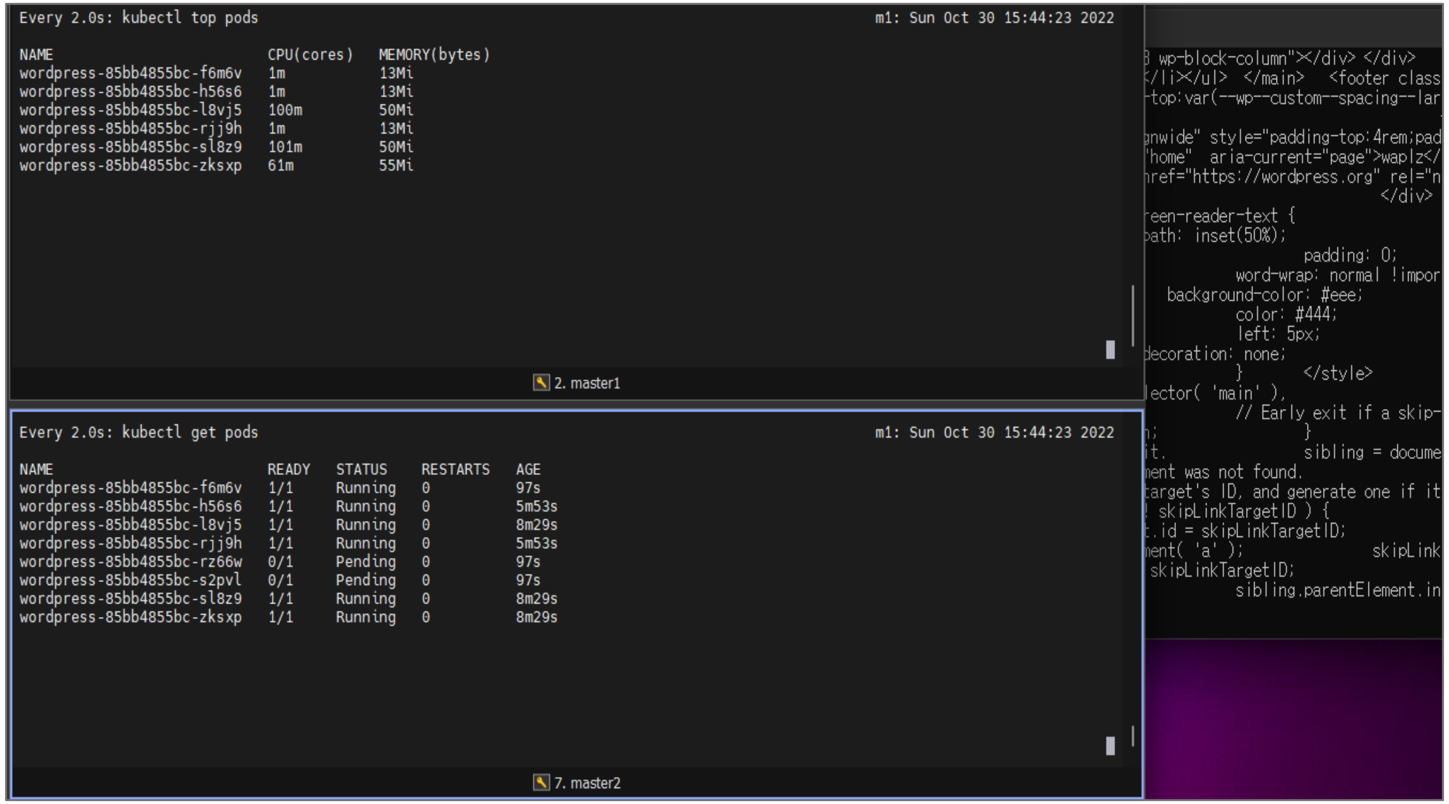
Autoscale을 설정해 특정 조건이 만족되는 경우에 자동으로 scale 명령이 수행되도록 min(최소 파드수) max(최대 파드 수) 이고 CPU 사용량이 50% 넘게 되면 autoscale하겠다는 뜻입니다.



```
PS C:₩Users₩4GL>
PS C:₩Users₩4GL> $i=0; while($true)
>>  {
>>   % { $i++; write-host -NoNewline "$i $_" }
>>   (Invoke-RestMethod "http://211.100.2.50")-replace '₩n', " "
>>  }
```

Wordpress 부하를 주는 명령어

HPA를 테스트하기 위해 왼쪽에 있는 파워셸 창에서 반복문을 실행 합니다.



```
Every 2.0s: kubectl top pods                                    m1: Sun Oct 30 15:44:23 2022

NAME                          CPU(cores)   MEMORY(bytes)
wordpress-85bb4855bc-f6m6v    1m           13Mi
wordpress-85bb4855bc-h56s6    1m           13Mi
wordpress-85bb4855bc-l8vj5    100m         50Mi
wordpress-85bb4855bc-rjj9h    1m           13Mi
wordpress-85bb4855bc-sl8z9    101m         50Mi
wordpress-85bb4855bc-zksxp    61m          55Mi
```

```
Every 2.0s: kubectl get pods                                    m1: Sun Oct 30 15:44:23 2022

NAME                          READY   STATUS    RESTARTS   AGE
wordpress-85bb4855bc-f6m6v    1/1     Running   0          97s
wordpress-85bb4855bc-h56s6    1/1     Running   0          5m53s
wordpress-85bb4855bc-l8vj5    1/1     Running   0          8m29s
wordpress-85bb4855bc-rjj9h    1/1     Running   0          5m53s
wordpress-85bb4855bc-rz66w    0/1     Pending   0          97s
wordpress-85bb4855bc-s2pvl    0/1     Pending   0          97s
wordpress-85bb4855bc-sl8z9    1/1     Running   0          8m29s
wordpress-85bb4855bc-zksxp    1/1     Running   0          8m29s
```

```
3 wp-block-column"></div> </div>
</li></ul>  </main>   <footer class
-top:var(--wp--custom--spacing--lar

gnwide" style="padding-top:4rem;pad
"home"  aria-current="page">waplz</
href="https://wordpress.org" rel="n
                              </div>
reen-reader-text {
path: inset(50%);
                    padding: 0;
           word-wrap: normal !impor
   background-color: #eee;
           color: #444;
           left: 5px;
decoration: none;
           }        </style>
lector( 'main' ),
           // Early exit if a skip-
n;                  }
it.                 sibling = docume
ment was not found.
target's ID, and generate one if it
! skipLinkTargetID ) {
t.id = skipLinkTargetID;
ment( 'a' );             skipLink
 skipLinkTargetID;
           sibling.parentElement.in
```

HPA(Horizontal Pod Autoscaler) 테스트

master node 창을 두개 띄운 후,
그 다음 watch kubectl top pods, get pods 실행 후 2초에 한 번씩 자동으로 상태를 확인 합니다.

Cloud

AWS EKS를 활용한 Wordpress 구축 및 배포

VPC

격리된 클라우드
리소스

EC2

클라우드의 가상 서버

EKS

Kubernetes를 시작,
실행 및 조정하는 가장
신뢰할 수 있는 방법

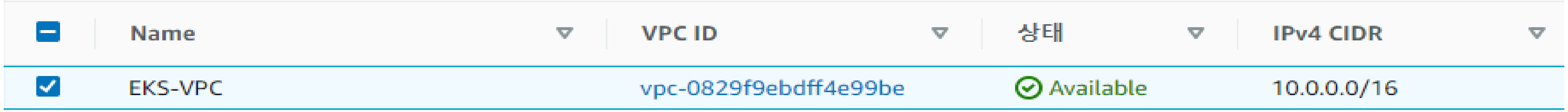
IAM

AWS 리소스에 대한
엑세스 관리

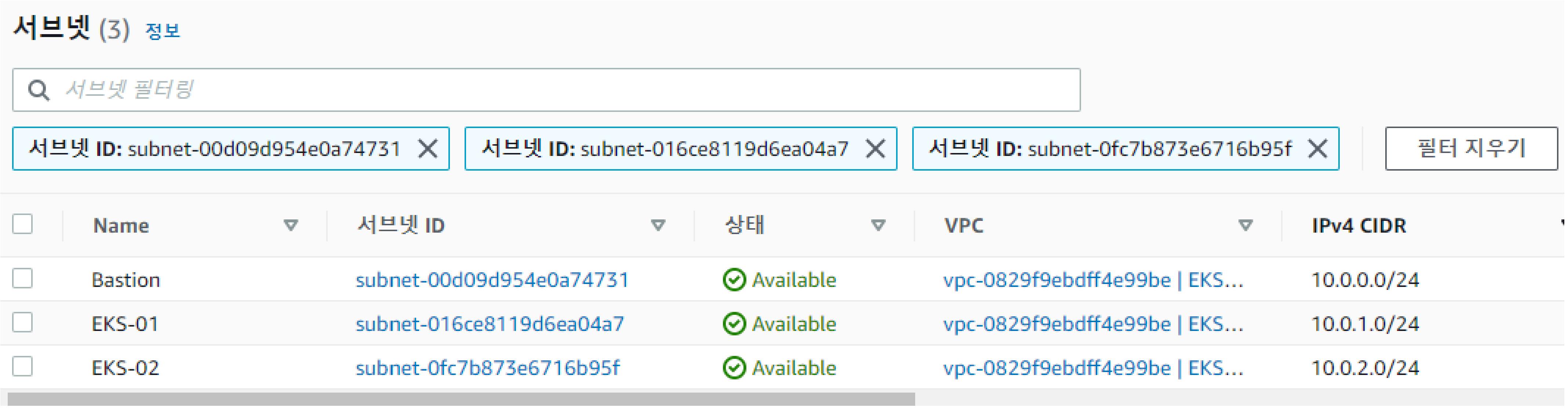
RDS

관리되는 관계형
데이터 베이스 서비스

VPC : 10.0.0.0/16
bastion : 10.0.0.0/24
EKS-01 : 10.0.1.0/24
EKS-02 : 10.0.2.0/24



	Name	VPC ID	상태	IPv4 CIDR
☑	EKS-VPC	vpc-0829f9ebdff4e99be	✓ Available	10.0.0.0/16

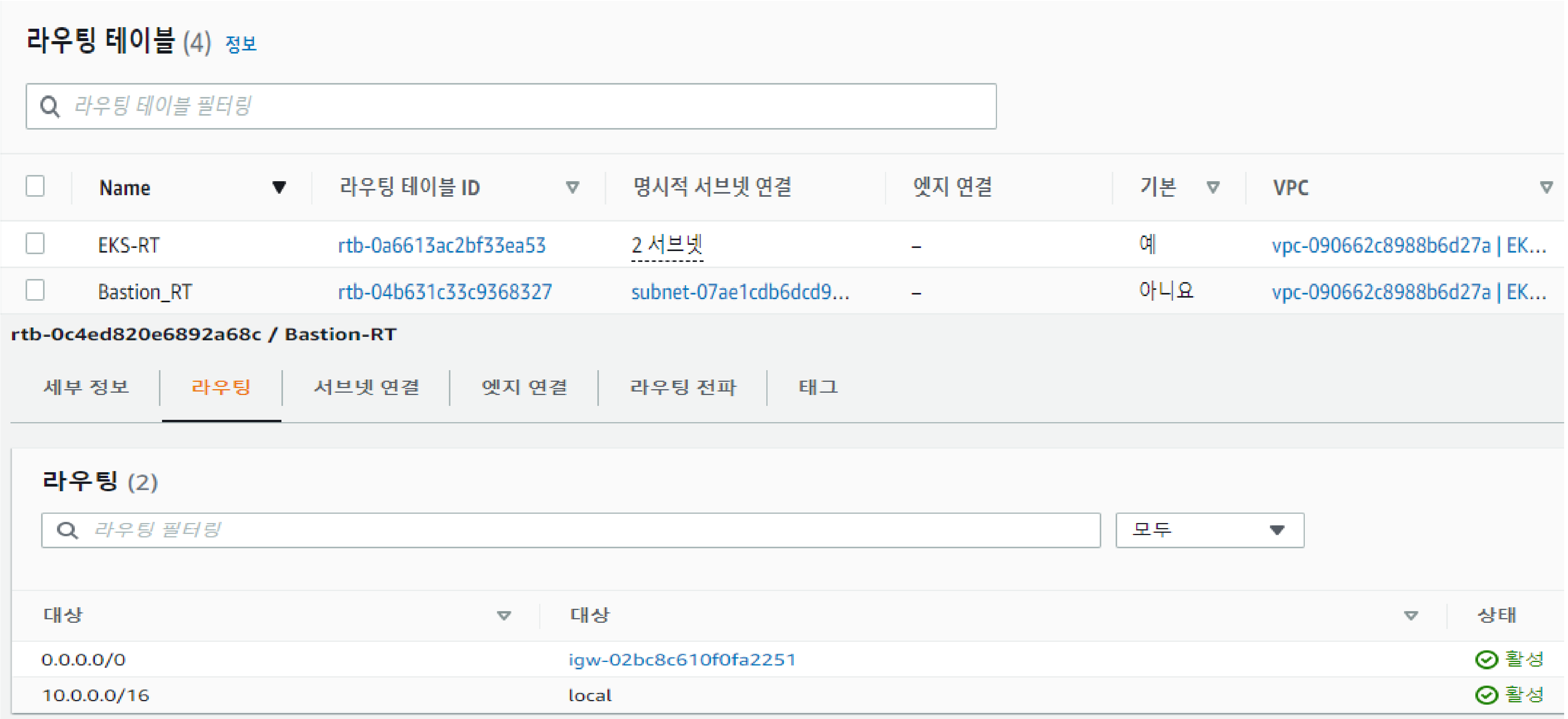


서브넷 (3) 정보

서브넷 ID: subnet-00d09d954e0a74731 ✕
서브넷 ID: subnet-016ce8119d6ea04a7 ✕
서브넷 ID: subnet-0fc7b873e6716b95f ✕

☐	Name	서브넷 ID	상태	VPC	IPv4 CIDR
☐	Bastion	subnet-00d09d954e0a74731	✓ Available	vpc-0829f9ebdff4e99be | EKS...	10.0.0.0/24
☐	EKS-01	subnet-016ce8119d6ea04a7	✓ Available	vpc-0829f9ebdff4e99be | EKS...	10.0.1.0/24
☐	EKS-02	subnet-0fc7b873e6716b95f	✓ Available	vpc-0829f9ebdff4e99be | EKS...	10.0.2.0/24

EKS Cluster를 구축할 네트워크를 구성하기 위해 VPC와 Subnet을 지정한 CIDR로 만듭니다.



라우팅 테이블 (4) 정보

라우팅 테이블 필터링

□	Name ▼	라우팅 테이블 ID ▽	명시적 서브넷 연결	엣지 연결	기본 ▽	VPC ▽
□	EKS-RT	rtb-0a6613ac2bf33ea53	2 서브넷	–	예	vpc-090662c8988b6d27a | EK...
□	Bastion_RT	rtb-04b631c33c9368327	subnet-07ae1cdb6dcd9...	–	아니요	vpc-090662c8988b6d27a | EK...

rtb-0c4ed820e6892a68c / Bastion-RT

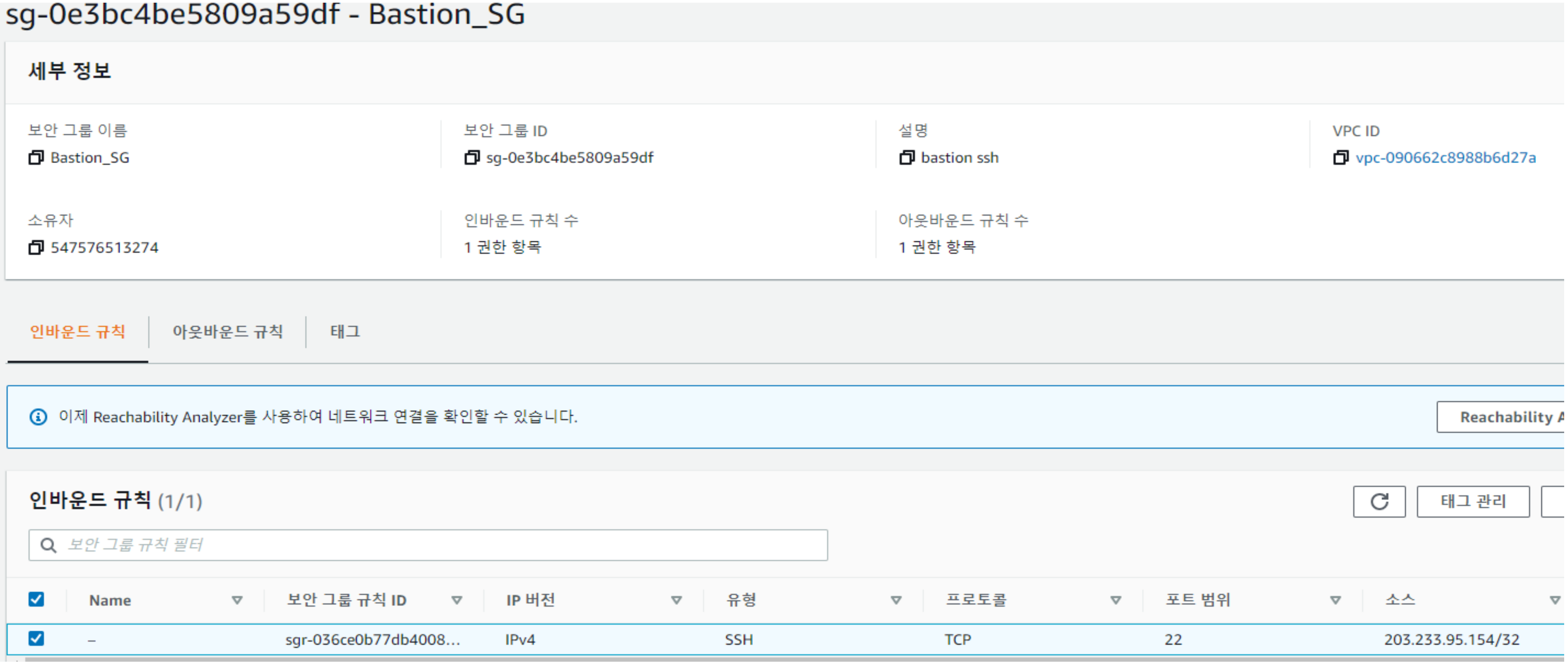
라우팅 (2)

라우팅 필터링

모두 ▼

대상 ▽	대상 ▽	상태
0.0.0.0/0	igw-02bc8c610f0fa2251	✓ 활성
10.0.0.0/16	local	✓ 활성

라우팅 테이블은 Public Subnet 이며 외부로 향하는 트래픽은 Internet Gateway를 통해 밖에 나갑니다.



sg-0e3bc4be5809a59df - Bastion_SG

세부 정보

보안 그룹 이름
Bastion_SG

보안 그룹 ID
sg-0e3bc4be5809a59df

설명
bastion ssh

VPC ID
vpc-090662c8988b6d27a

소유자
547576513274

인바운드 규칙 수
1 권한 항목

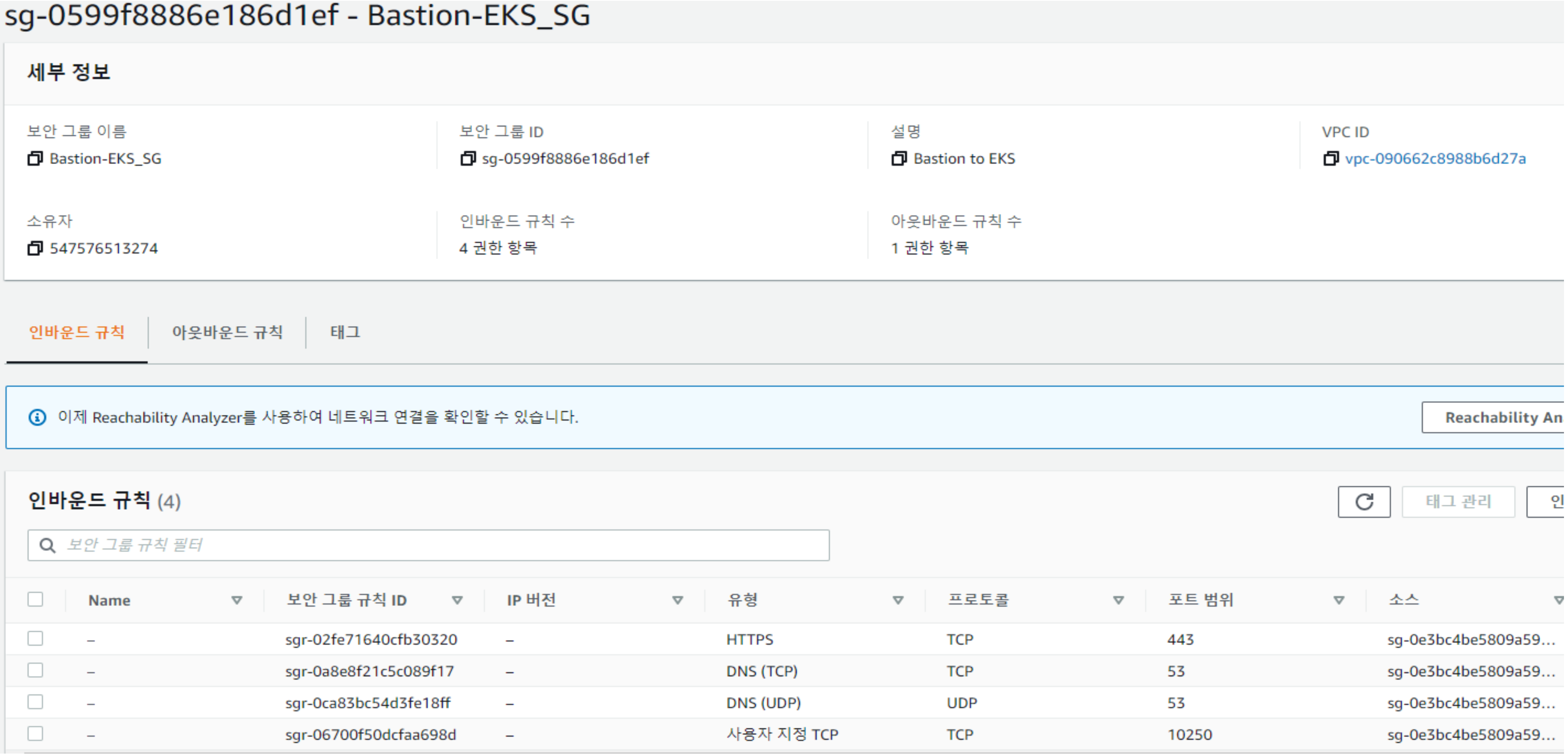
아웃바운드 규칙 수
1 권한 항목

이제 Reachability Analyzer를 사용하여 네트워크 연결을 확인할 수 있습니다.

인바운드 규칙 (1/1)

☑	Name	보안 그룹 규칙 ID	IP 버전	유형	프로토콜	포트 범위	소스
☑	–	sgr-036ce0b77db4008...	IPv4	SSH	TCP	22	203.233.95.154/32

Bastion 보안 그룹을 생성 하고 인바운드 규칙은 SSH 22번 포트에 내IP로 접근 할 수 있게 설정 합니다.



sg-0599f8886e186d1ef - Bastion-EKS_SG

세부 정보

보안 그룹 이름 Bastion-EKS_SG	보안 그룹 ID sg-0599f8886e186d1ef	설명 Bastion to EKS	VPC ID vpc-090662c8988b6d27a
소유자 547576513274	인바운드 규칙 수 4 권한 항목	아웃바운드 규칙 수 1 권한 항목	

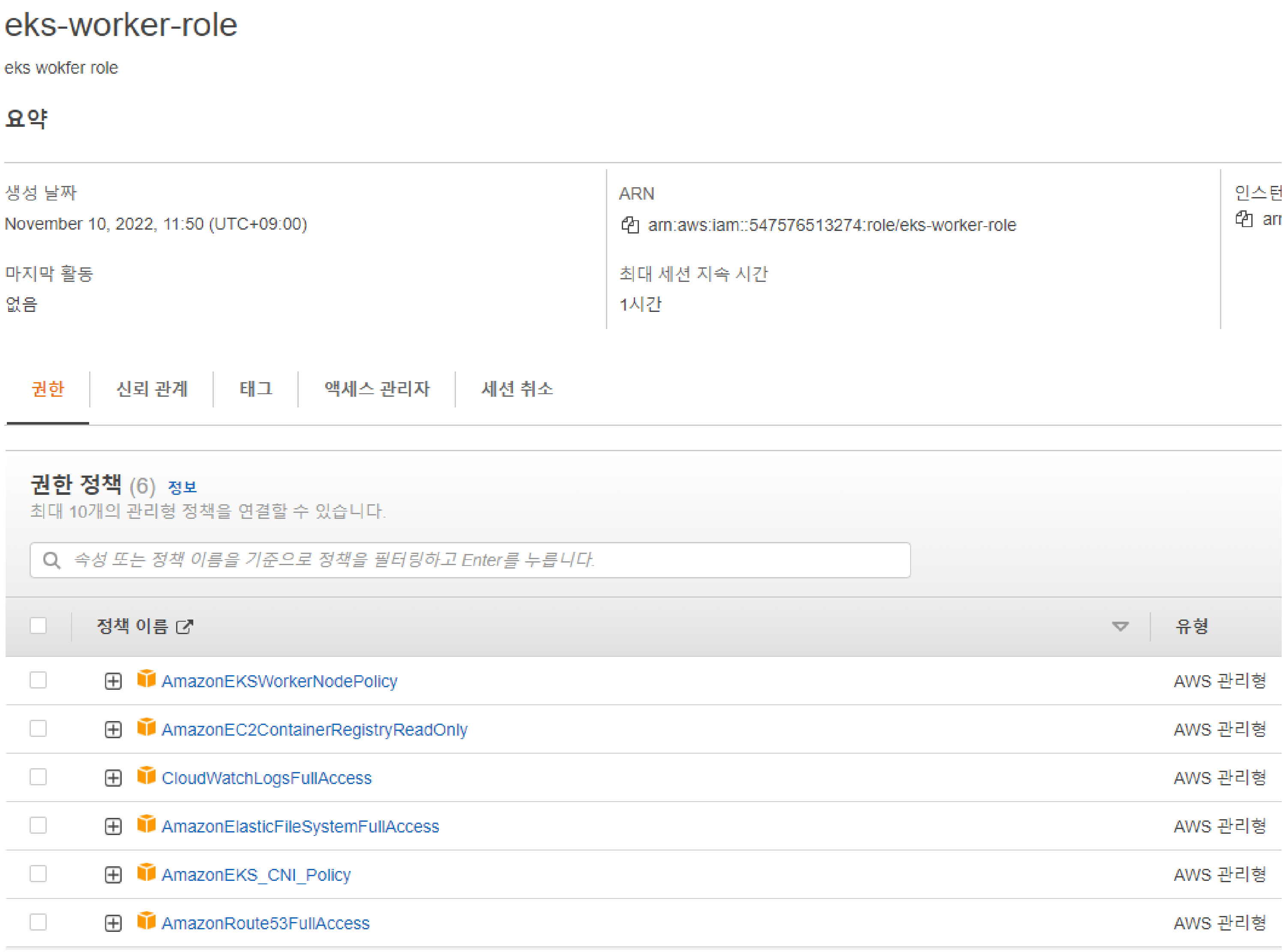
이제 Reachability Analyzer를 사용하여 네트워크 연결을 확인할 수 있습니다.

인바운드 규칙 (4)

□	Name	보안 그룹 규칙 ID	IP 버전	유형	프로토콜	포트 범위	소스
□	–	sgr-02fe71640cfb30320	–	HTTPS	TCP	443	sg-0e3bc4be5809a59...
□	–	sgr-0a8e8f21c5c089f17	–	DNS (TCP)	TCP	53	sg-0e3bc4be5809a59...
□	–	sgr-0ca83bc54d3fe18ff	–	DNS (UDP)	UDP	53	sg-0e3bc4be5809a59...
□	–	sgr-06700f50dcfaa698d	–	사용자 지정 TCP	TCP	10250	sg-0e3bc4be5809a59...

EKS 보안 그룹 생성 하고 인바운드 규칙은 443/TCP, 10250/TCP, 53/TCP, 53/UDP에 대한 접근을 허용합니다.
443/TCP는 Kube-api-server 컴포넌트가 동작할 때 사용하는 포트

IAM



eks-worker-role

eks wokfer role

요약

생성 날짜
November 10, 2022, 11:50 (UTC+09:00)

마지막 활동
없음

ARN
arn:aws:iam::547576513274:role/eks-worker-role

최대 세션 지속 시간
1시간

인스턴
ar

권한
신뢰 관계
태그
액세스 관리자
세션 취소

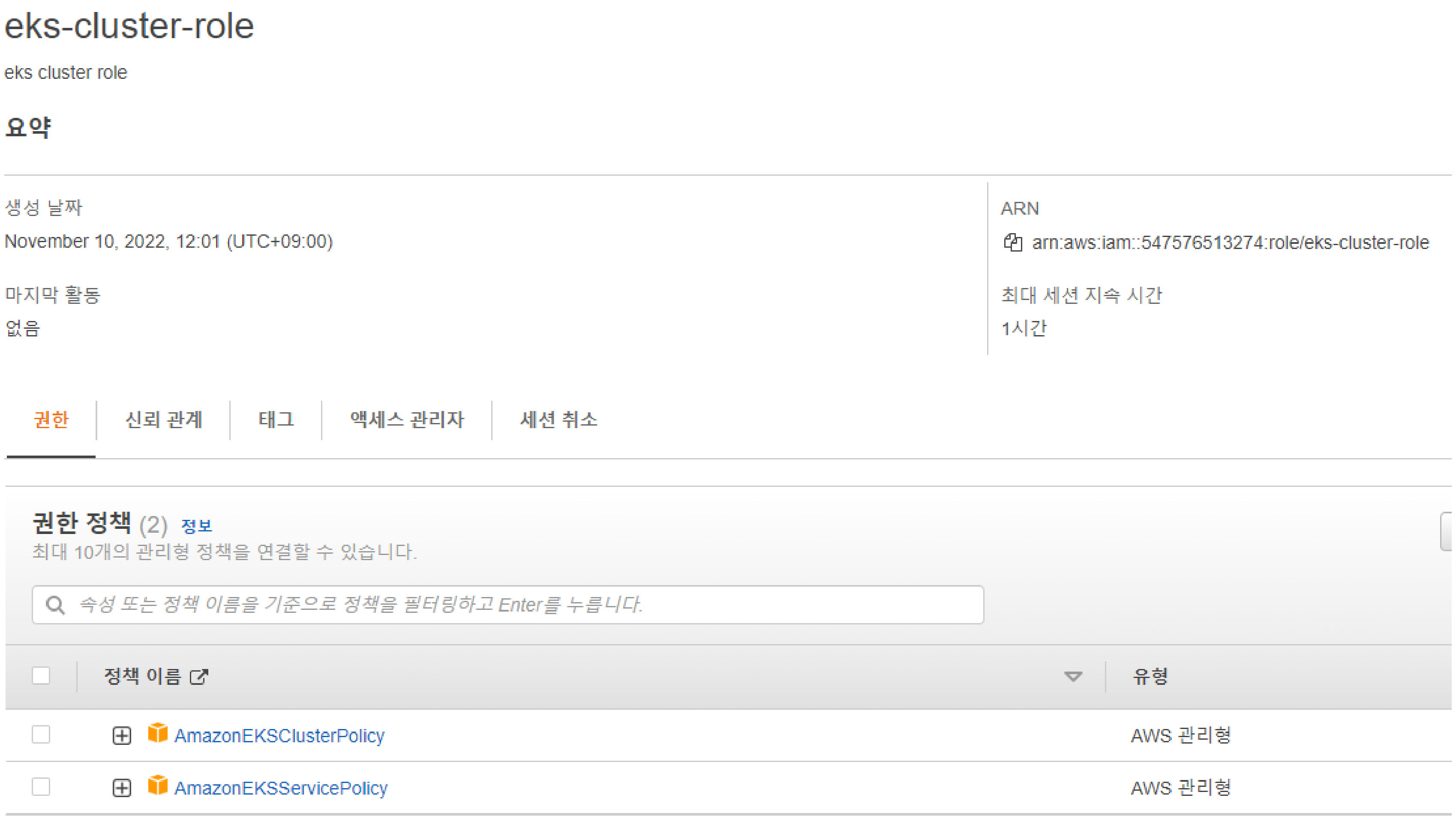
권한 정책 (6) 정보

최대 10개의 관리형 정책을 연결할 수 있습니다.

속성 또는 정책 이름을 기준으로 정책을 필터링하고 Enter를 누릅니다.

□	정책 이름	유형
□	AmazonEKSWorkerNodePolicy	AWS 관리형
□	AmazonEC2ContainerRegistryReadOnly	AWS 관리형
□	CloudWatchLogsFullAccess	AWS 관리형
□	AmazonElasticFileSystemFullAccess	AWS 관리형
□	AmazonEKS_CNI_Policy	AWS 관리형
□	AmazonRoute53FullAccess	AWS 관리형

Worker node role에 대한 권한 정책을 적용 합니다.



eks-cluster-role

eks cluster role

요약

생성 날짜

November 10, 2022, 12:01 (UTC+09:00)

마지막 활동

없음

ARN

arn:aws:iam::547576513274:role/eks-cluster-role

최대 세션 지속 시간

1시간

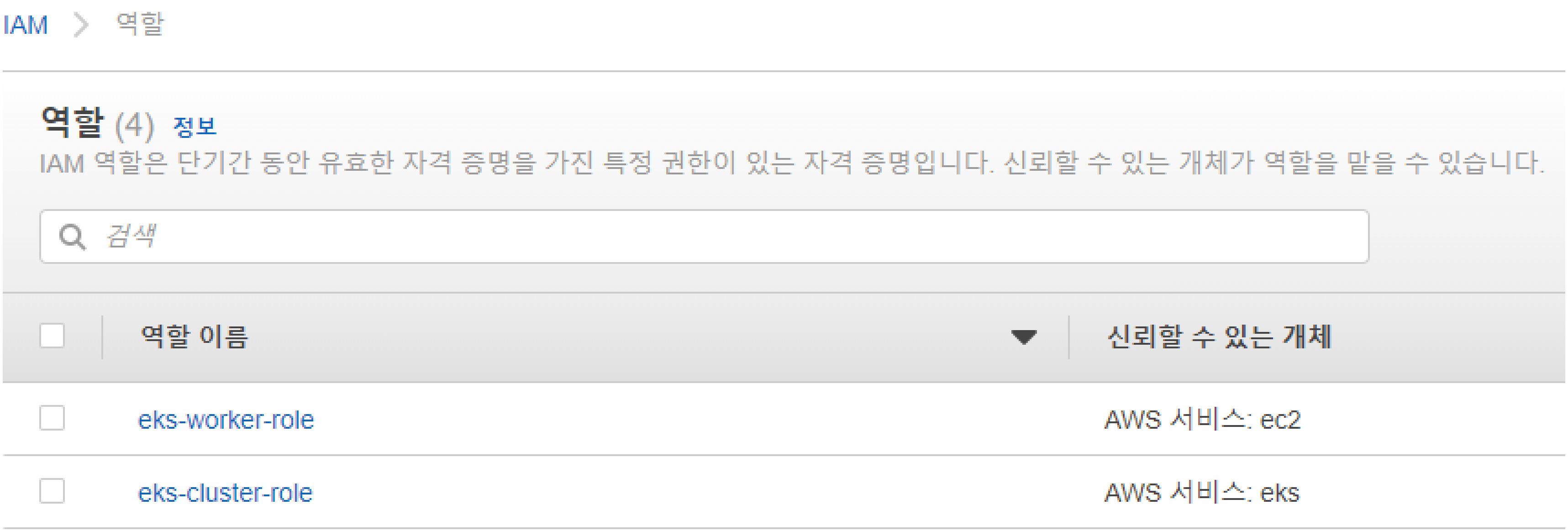
권한 정책 (2) 정보

최대 10개의 관리형 정책을 연결할 수 있습니다.

속성 또는 정책 이름을 기준으로 정책을 필터링하고 Enter를 누릅니다.

□	정책 이름	유형
□	⊞ AmazonEKSClusterPolicy	AWS 관리형
□	⊞ AmazonEKSServicePolicy	AWS 관리형

EKS Cluster role에 대한 권한 정책을 적용 합니다.



IAM > 역할

역할 (4) 정보

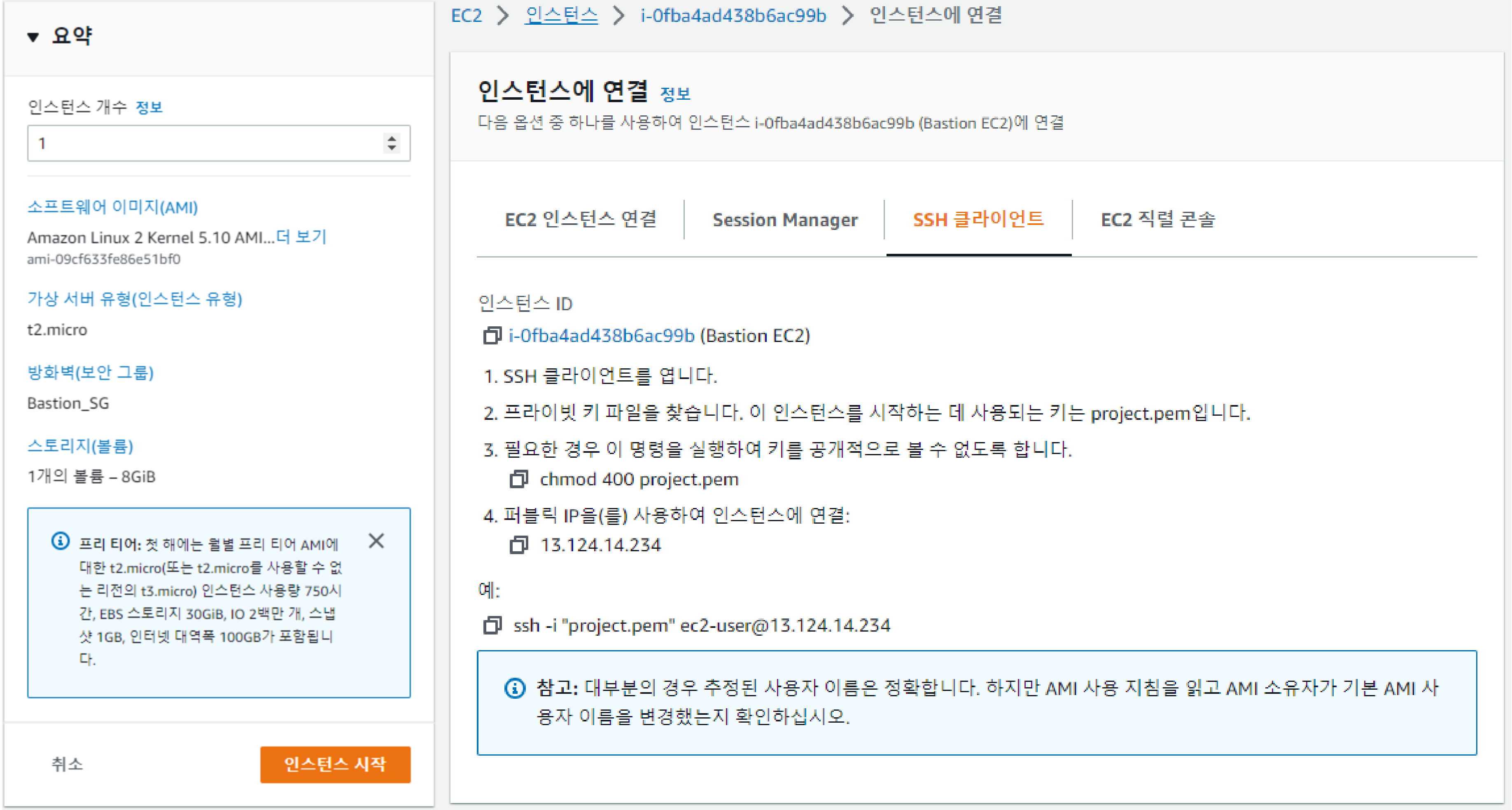
IAM 역할은 단기간 동안 유효한 자격 증명을 가진 특정 권한이 있는 자격 증명입니다. 신뢰할 수 있는 개체가 역할을 맡을 수 있습니다.

검색

□	역할 이름	신뢰할 수 있는 개체
□	eks-worker-role	AWS 서비스: ec2
□	eks-cluster-role	AWS 서비스: eks

IAM 역할 생성 완료 후 확인 합니다.

EC2



▼ 요약

인스턴스 개수 정보

1

소프트웨어 이미지(AMI)

Amazon Linux 2 Kernel 5.10 AMI...더 보기
ami-09cf633fe86e51bf0

가상 서버 유형(인스턴스 유형)

t2.micro

방화벽(보안 그룹)

Bastion_SG

스토리지(볼륨)

1개의 볼륨 – 8GiB

프리 티어: 첫 해에는 월별 프리 티어 AMI에 대한 t2.micro(또는 t2.micro를 사용할 수 없는 리전의 t3.micro) 인스턴스 사용량 750시간, EBS 스토리지 30GiB, IO 2백만 개, 스냅샷 1GB, 인터넷 대역폭 100GB가 포함됩니다.

EC2 > 인스턴스 > i-0fba4ad438b6ac99b > 인스턴스에 연결

인스턴스에 연결 정보

다음 옵션 중 하나를 사용하여 인스턴스 i-0fba4ad438b6ac99b (Bastion EC2)에 연결

인스턴스 ID

i-0fba4ad438b6ac99b (Bastion EC2)

1. SSH 클라이언트를 엽니다.
2. 프라이빗 키 파일을 찾습니다. 이 인스턴스를 시작하는 데 사용되는 키는 project.pem입니다.
3. 필요한 경우 이 명령을 실행하여 키를 공개적으로 볼 수 없도록 합니다.

```
chmod 400 project.pem
```

4. 퍼블릭 IP을(를) 사용하여 인스턴스에 연결:

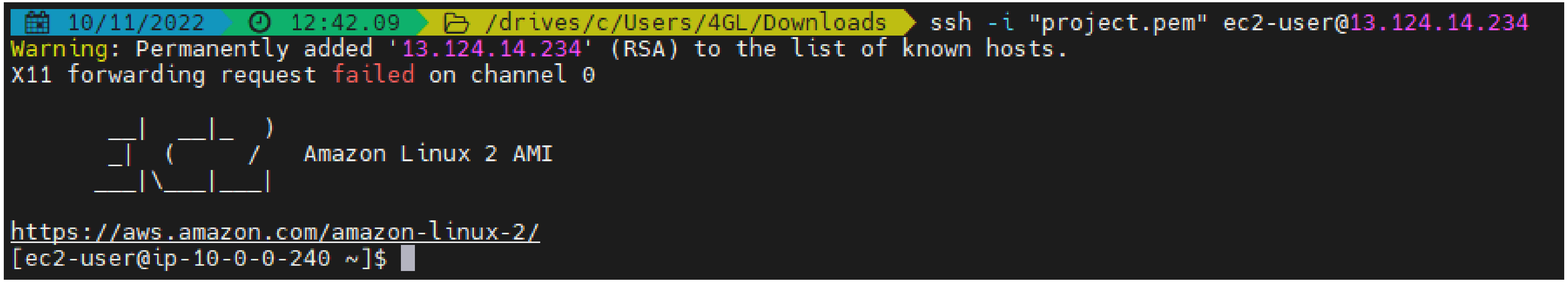
```
13.124.14.234
```

예:

```
ssh -i "project.pem" ec2-user@13.124.14.234
```

참고: 대부분의 경우 추정된 사용자 이름은 정확합니다. 하지만 AMI 사용 지침을 읽고 AMI 소유자가 기본 AMI 사용자 이름을 변경했는지 확인하십시오.

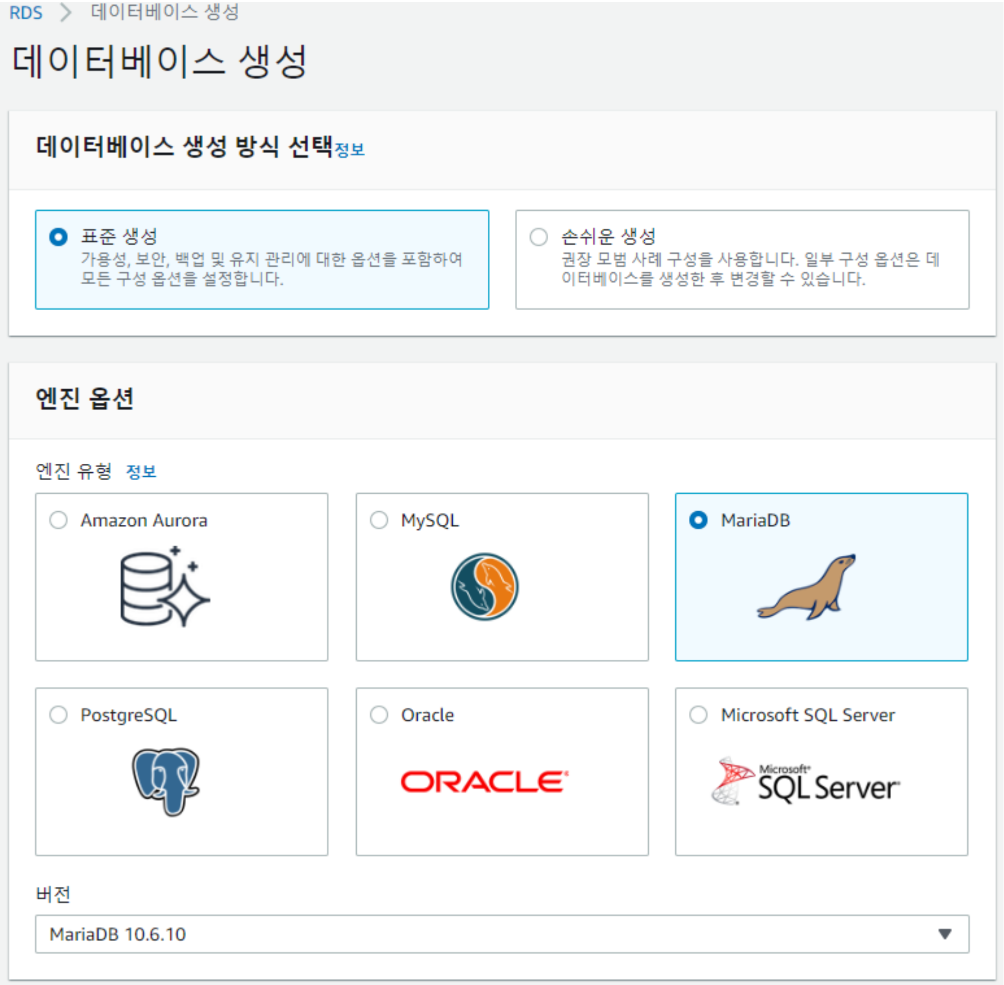
Bastion-serve로 사용할 EC2 생성 후 SSH 클라이언트에 연결할 정보를 확인 합니다.



```
 10/11/2022   12:42.09   /drives/c/Users/4GL/Downloads  ssh -i "project.pem" ec2-user@13.124.14.234
Warning: Permanently added '13.124.14.234' (RSA) to the list of known hosts.
X11 forwarding request failed on channel 0

       __|  __|_  )
       _|  (     /   Amazon Linux 2 AMI
      ___|\___|___|

https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-10-0-0-240 ~]$ 
```

SSH 인바운드 규칙을 허용 한 EC2에 원격 접속 툴을 이용하여 접속 합니다.

RDS



RDS > 데이터베이스 생성

데이터베이스 생성

데이터베이스 생성 방식 선택정보

● 표준 생성
가용성, 보안, 백업 및 유지 관리에 대한 옵션을 포함하여 모든 구성 옵션을 설정합니다.

○ 손쉬운 생성
권장 모범 사례 구성을 사용합니다. 일부 구성 옵션은 데이터베이스를 생성한 후 변경할 수 있습니다.

엔진 옵션

엔진 유형 정보

○ Amazon Aurora

○ MySQL

● MariaDB

○ PostgreSQL

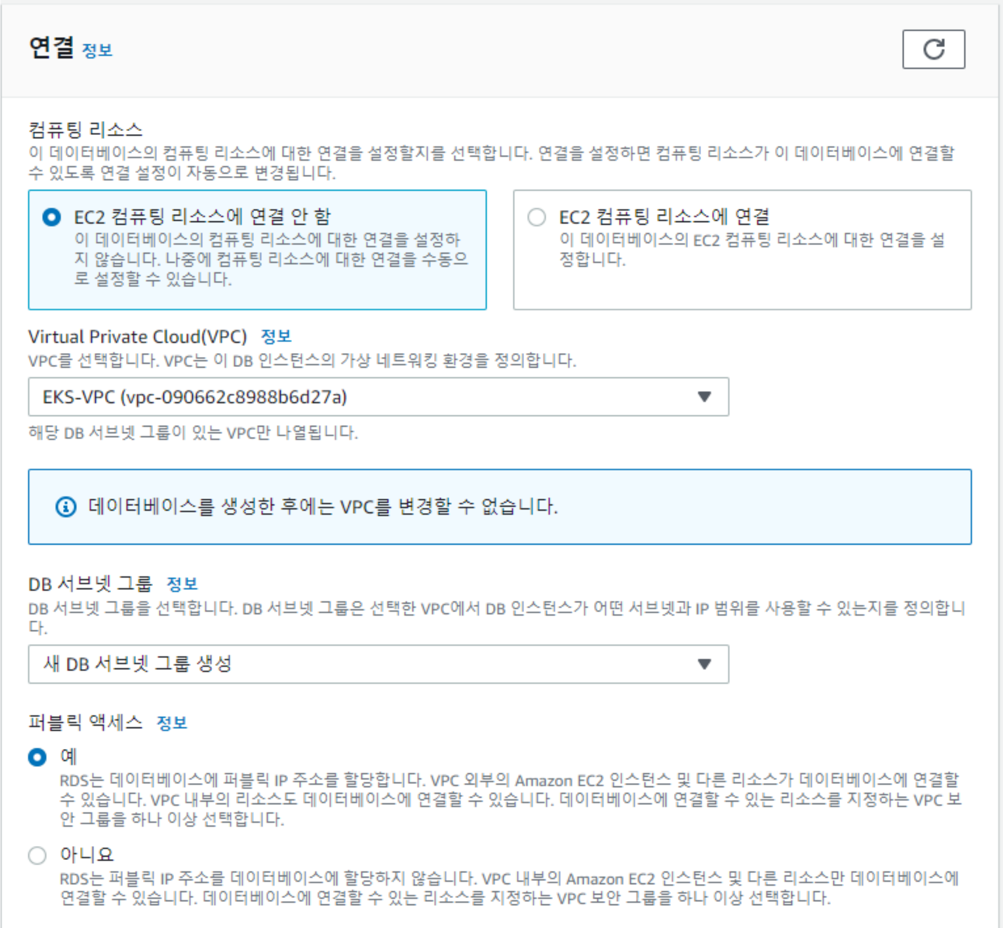
○ Oracle

○ Microsoft SQL Server

버전

MariaDB 10.6.10 ▼

CMS에 연결할 RDS를 MariaDB 엔진 옵션으로 선택 합니다.



연결 정보

컴퓨팅 리소스

이 데이터베이스의 컴퓨팅 리소스에 대한 연결을 설정할지를 선택합니다. 연결을 설정하면 컴퓨팅 리소스가 이 데이터베이스에 연결할 수 있도록 연결 설정이 자동으로 변경됩니다.

● EC2 컴퓨팅 리소스에 연결 안 함
이 데이터베이스의 컴퓨팅 리소스에 대한 연결을 설정하지 않습니다. 나중에 컴퓨팅 리소스에 대한 연결을 수동으로 설정할 수 있습니다.

○ EC2 컴퓨팅 리소스에 연결
이 데이터베이스의 EC2 컴퓨팅 리소스에 대한 연결을 설정합니다.

Virtual Private Cloud(VPC) 정보

VPC를 선택합니다. VPC는 이 DB 인스턴스의 가상 네트워킹 환경을 정의합니다.

EKS-VPC (vpc-090662c8988b6d27a) ▼

해당 DB 서브넷 그룹이 있는 VPC만 나열됩니다.

ⓘ 데이터베이스를 생성한 후에는 VPC를 변경할 수 없습니다.

DB 서브넷 그룹 정보

DB 서브넷 그룹을 선택합니다. DB 서브넷 그룹은 선택한 VPC에서 DB 인스턴스가 어떤 서브넷과 IP 범위를 사용할 수 있는지를 정의합니다.

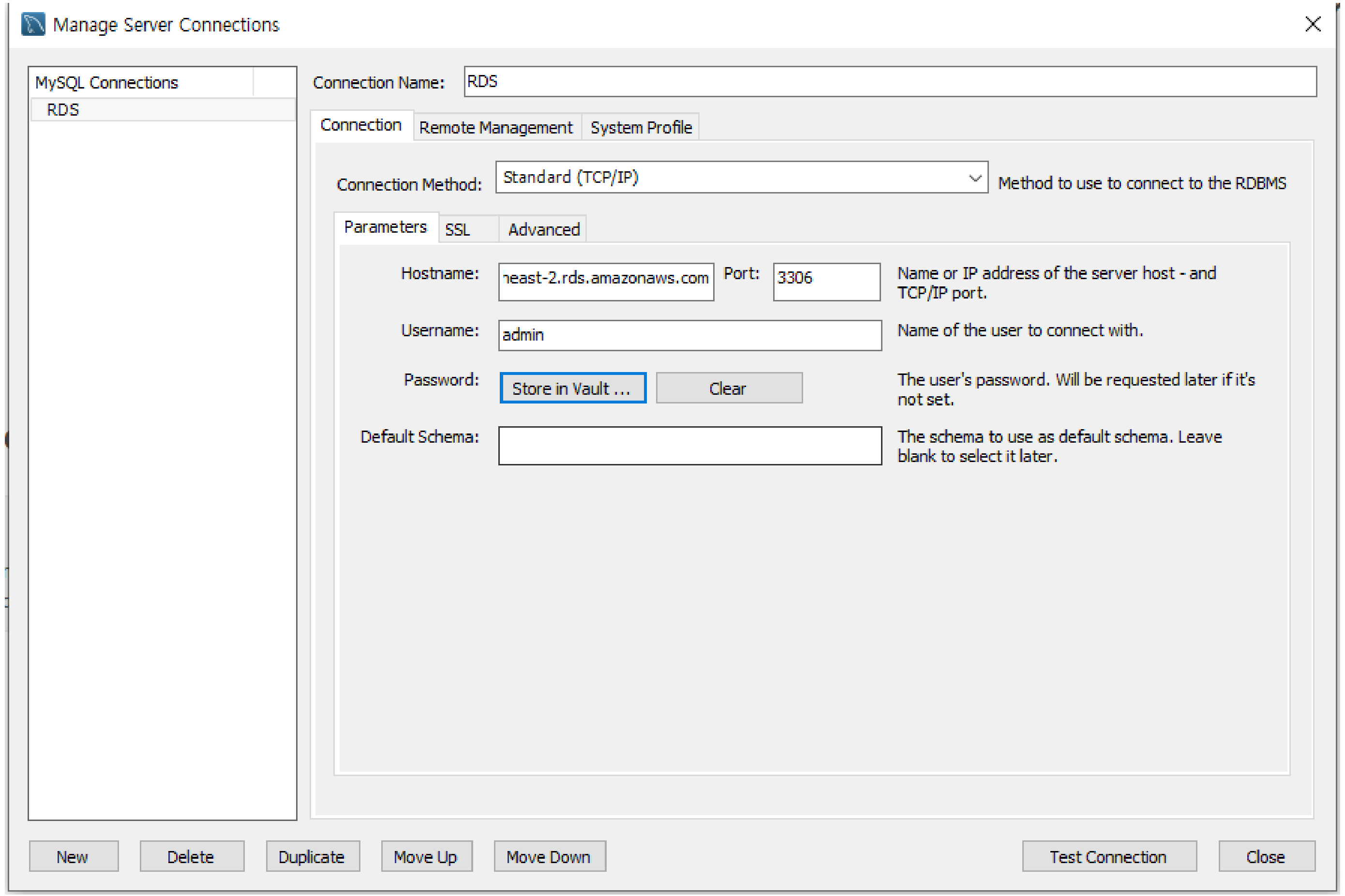
새 DB 서브넷 그룹 생성 ▼

퍼블릭 액세스 정보

● 예
RDS는 데이터베이스에 퍼블릭 IP 주소를 할당합니다. VPC 외부의 Amazon EC2 인스턴스 및 다른 리소스가 데이터베이스에 연결할 수 있습니다. VPC 내부의 리소스도 데이터베이스에 연결할 수 있습니다. 데이터베이스에 연결할 수 있는 리소스를 지정하는 VPC 보안 그룹을 하나 이상 선택합니다.

○ 아니요
RDS는 퍼블릭 IP 주소를 데이터베이스에 할당하지 않습니다. VPC 내부의 Amazon EC2 인스턴스 및 다른 리소스만 데이터베이스에 연결할 수 있습니다. 데이터베이스에 연결할 수 있는 리소스를 지정하는 VPC 보안 그룹을 하나 이상 선택합니다.

RDS를 EKS-VPC에 연결 후 새 서브넷 그룹을 생성하고, 퍼블릭 액세스를 허용 후 생성 합니다.



Connection Name: RDS

Connection Method: Standard (TCP/IP) — Method to use to connect to the RDBMS

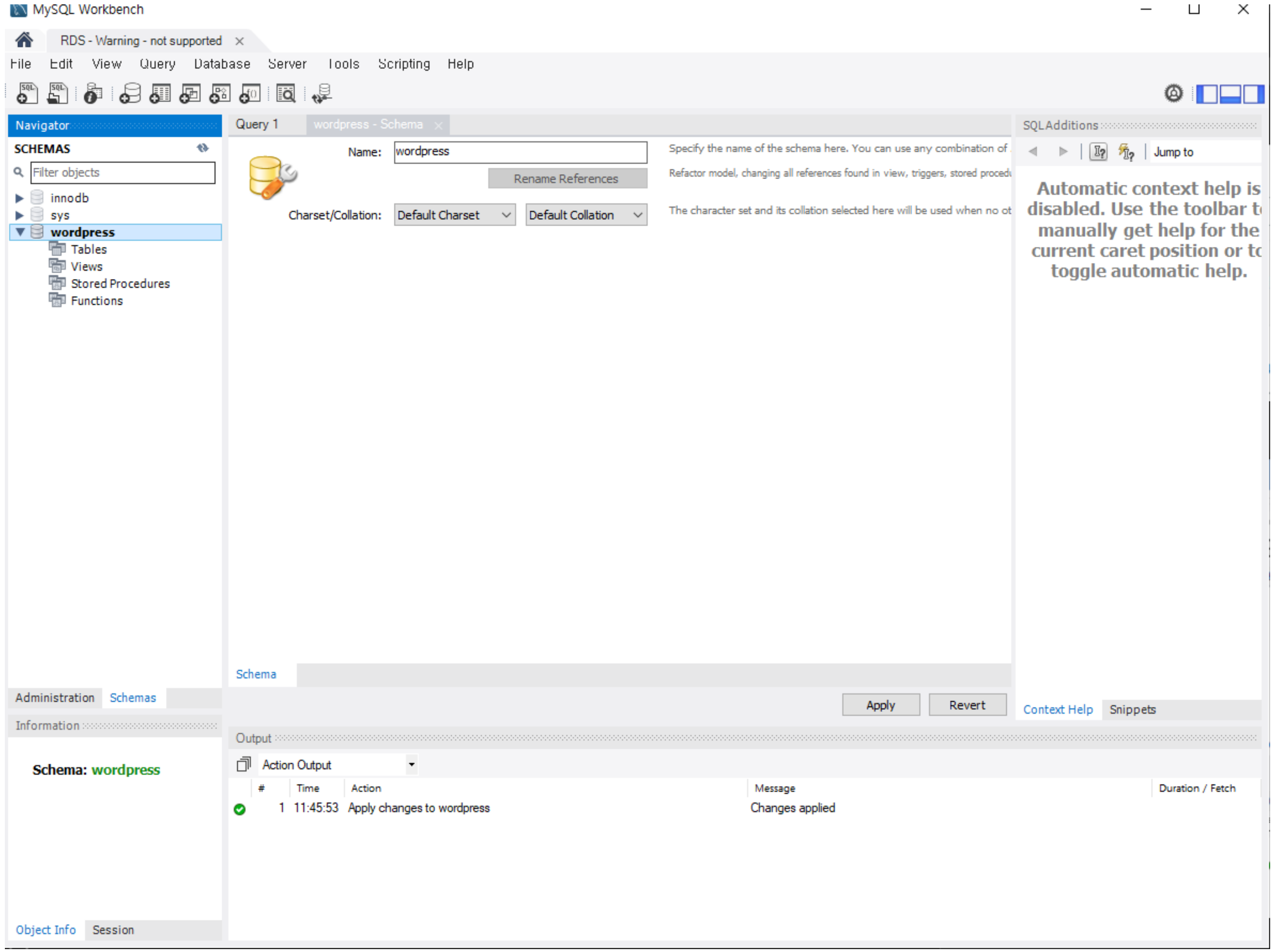
Hostname: ıeast-2.rds.amazonaws.com Port: 3306 — Name or IP address of the server host - and TCP/IP port.

Username: admin — Name of the user to connect with.

Password: — The user's password. Will be requested later if it's not set.

Default Schema: — The schema to use as default schema. Leave blank to select it later.

Mysql Workbench를 통해 생성한 RDS에 접속 합니다.



Name: wordpress

Charset/Collation: Default Charset | Default Collation

Specify the name of the schema here. You can use any combination of

Refactor model, changing all references found in view, triggers, stored procedu

The character set and its collation selected here will be used when no ot

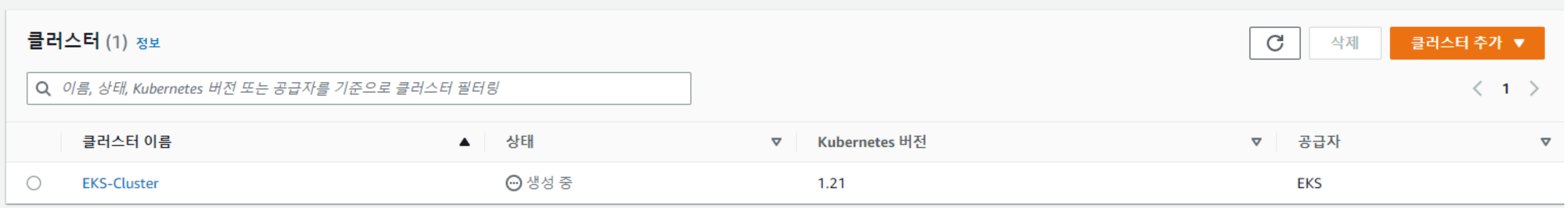
Automatic context help is disabled. Use the toolbar t manually get help for the current caret position or tc toggle automatic help.

Schema: wordpress

```
   #   Time      Action                        Message           Duration / Fetch
✓  1   11:45:53  Apply changes to wordpress    Changes applied
```

Wordpress 사용을 위한 스키마를 생성 합니다.

EKS

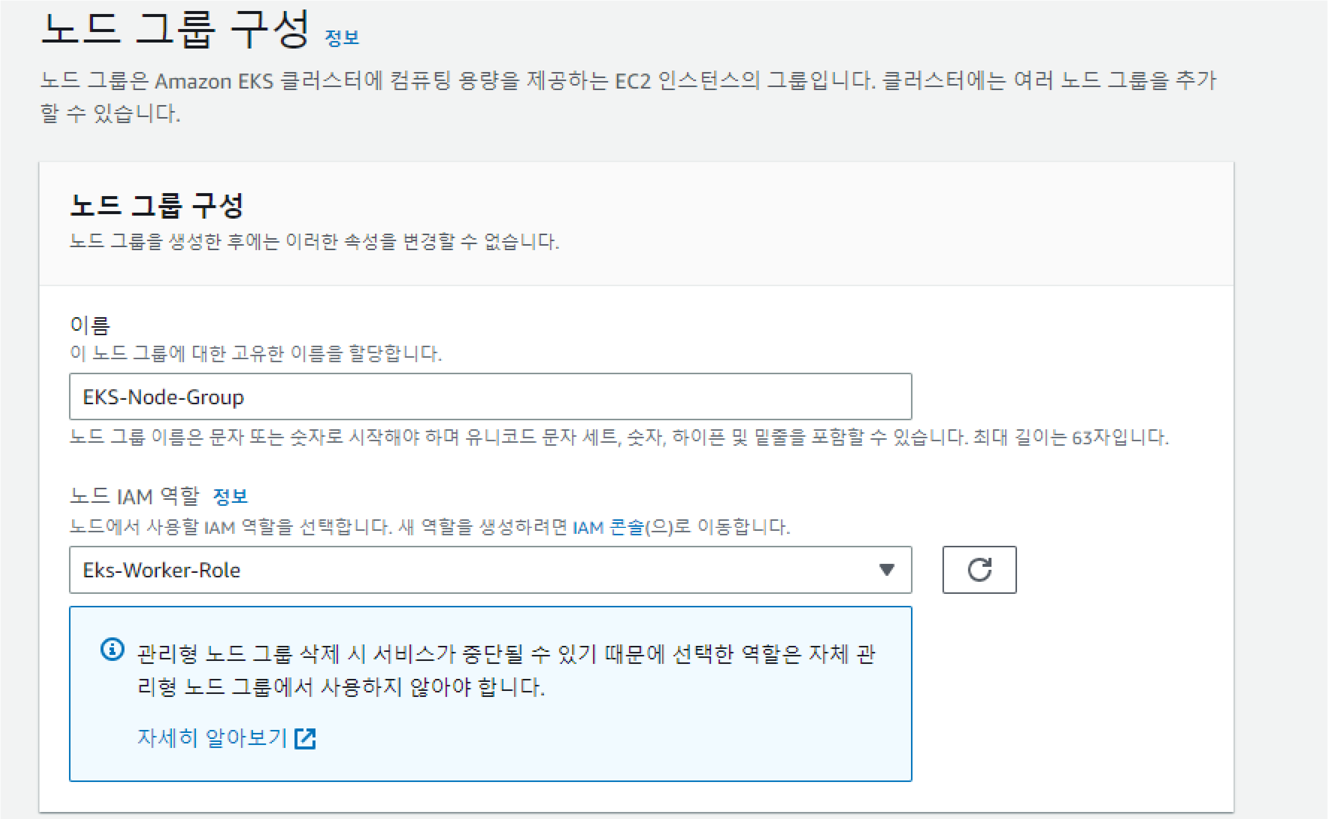


삭제
클러스터 추가 ▼
이름, 상태, Kubernetes 버전 또는 공급자를 기준으로 클러스터 필터링
< 1 >

클러스터 (1) 정보

	클러스터 이름	상태	Kubernetes 버전	공급자
○	EKS-Cluster	생성 중	1.21	EKS

k8s를 사용하기 위해 EKS Cluster를 생성 합니다.



노드 그룹 구성 정보

노드 그룹은 Amazon EKS 클러스터에 컴퓨팅 용량을 제공하는 EC2 인스턴스의 그룹입니다. 클러스터에는 여러 노드 그룹을 추가할 수 있습니다.

노드 그룹 구성

노드 그룹을 생성한 후에는 이러한 속성을 변경할 수 없습니다.

이름

이 노드 그룹에 대한 고유한 이름을 할당합니다.

EKS-Node-Group

노드 그룹 이름은 문자 또는 숫자로 시작해야 하며 유니코드 문자 세트, 숫자, 하이픈 및 밑줄을 포함할 수 있습니다. 최대 길이는 63자입니다.

노드 IAM 역할 정보

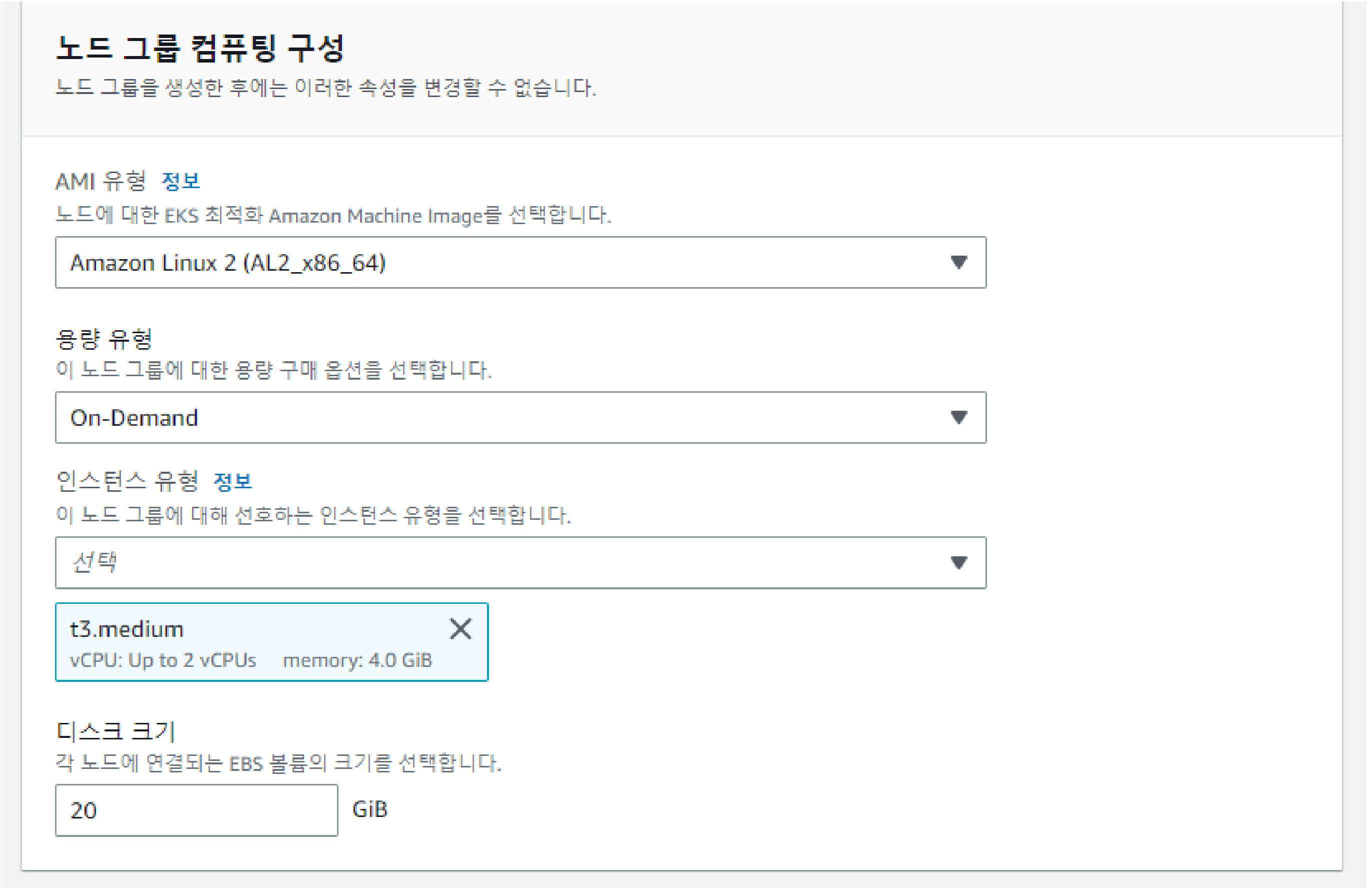
노드에서 사용할 IAM 역할을 선택합니다. 새 역할을 생성하려면 IAM 콘솔(으)로 이동합니다.

Eks-Worker-Role ▼

ⓘ 관리형 노드 그룹 삭제 시 서비스가 중단될 수 있기 때문에 선택한 역할은 자체 관리형 노드 그룹에서 사용하지 않아야 합니다.

자세히 알아보기

EKS Node Group에 생성해 두었던 EKS-Worker-Role를 노드 IAM 역할로 설정 합니다.



노드 그룹 컴퓨팅 구성

노드 그룹을 생성한 후에는 이러한 속성을 변경할 수 없습니다.

AMI 유형 정보

노드에 대한 EKS 최적화 Amazon Machine Image를 선택합니다.

Amazon Linux 2 (AL2_x86_64) ▼

용량 유형

이 노드 그룹에 대한 용량 구매 옵션을 선택합니다.

On-Demand ▼

인스턴스 유형 정보

이 노드 그룹에 대해 선호하는 인스턴스 유형을 선택합니다.

선택 ▼

t3.medium ✕

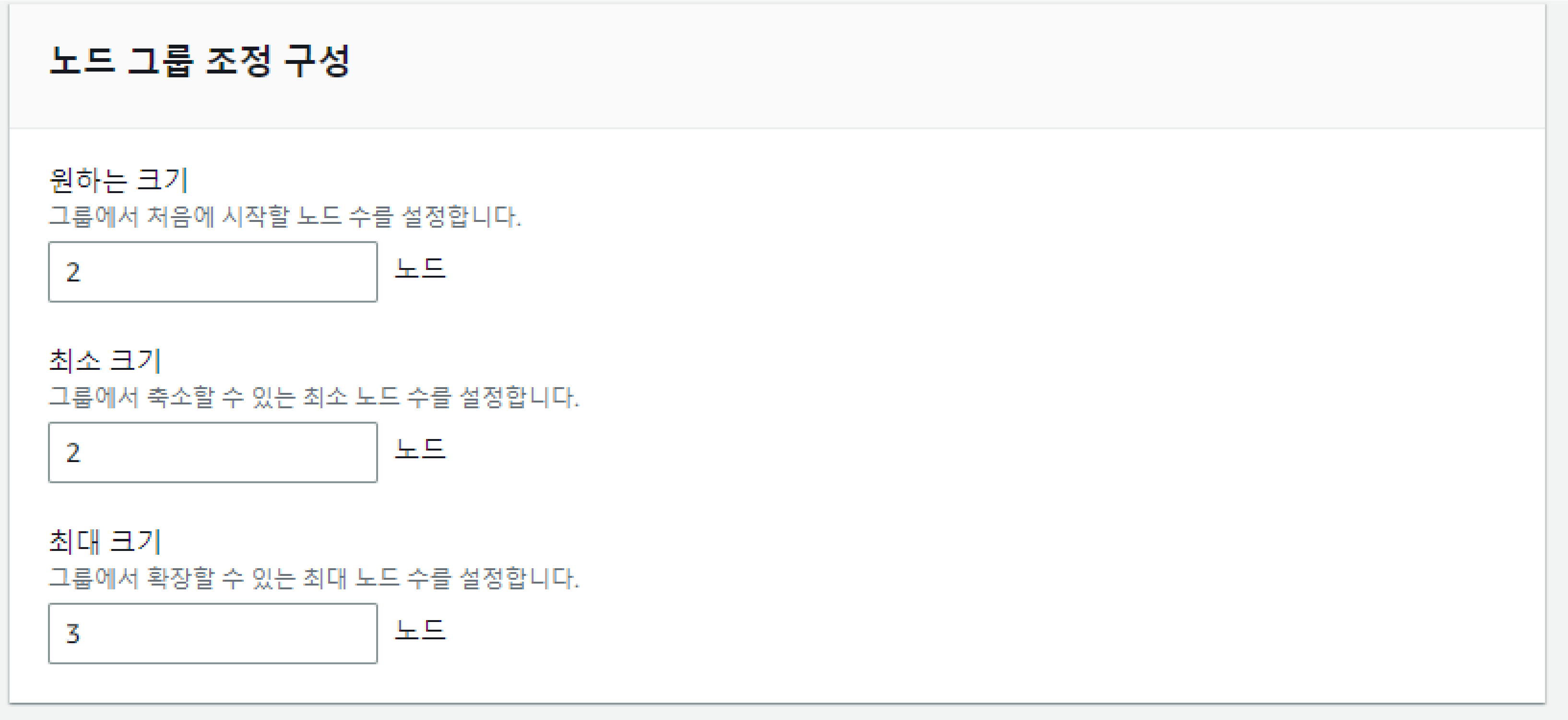
vCPU: Up to 2 vCPUs memory: 4.0 GiB

디스크 크기

각 노드에 연결되는 EBS 볼륨의 크기를 선택합니다.

20 GiB

Node Group Computing 구성 입니다.



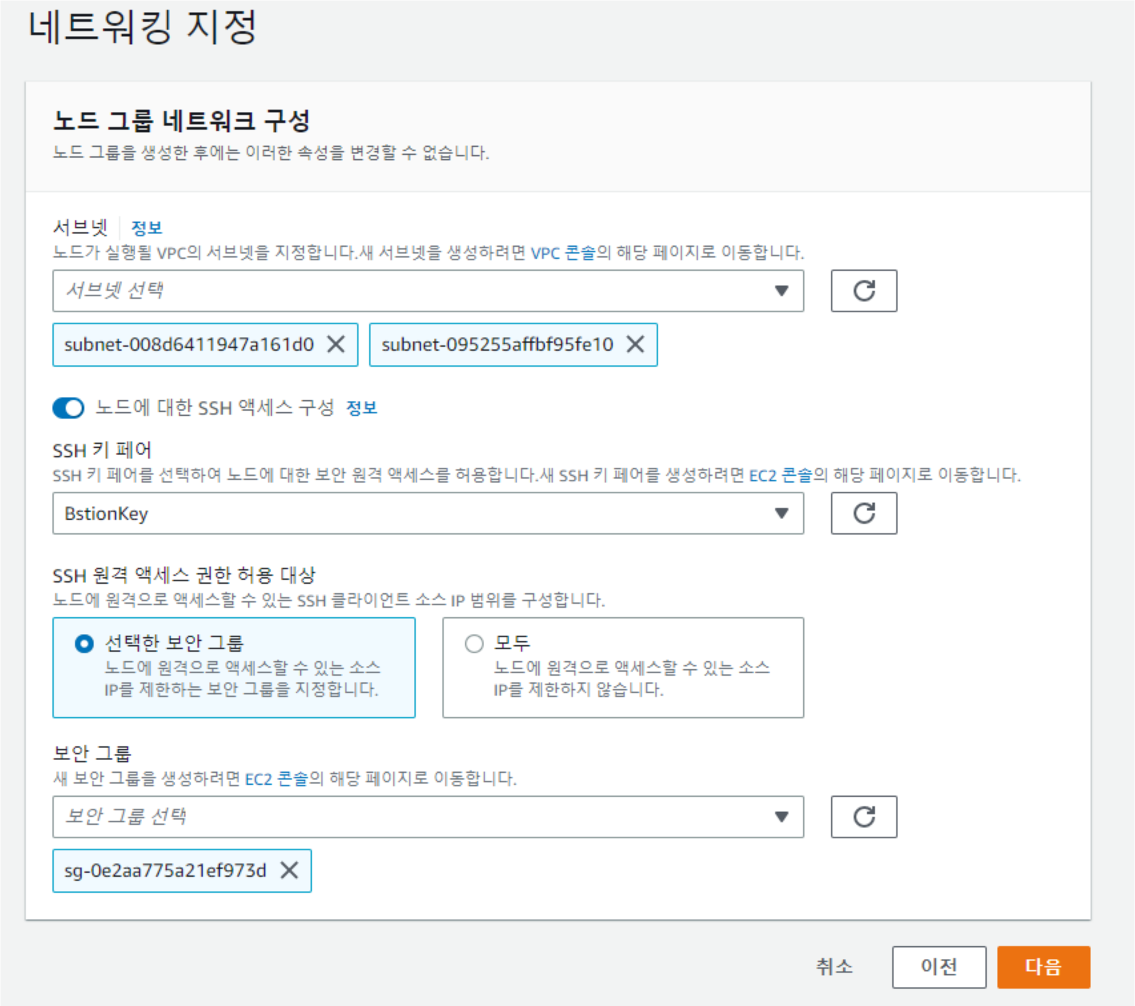
노드 그룹 조정 구성

원하는 크기
그룹에서 처음에 시작할 노드 수를 설정합니다.
2 노드

최소 크기
그룹에서 축소할 수 있는 최소 노드 수를 설정합니다.
2 노드

최대 크기
그룹에서 확장할 수 있는 최대 노드 수를 설정합니다.
3 노드

Node Group 조정 구성에 노드는 원하는 크기 2개, 최소 크기 2개, 최대 크기 3개로 설정 합니다.



네트워킹 지정

노드 그룹 네트워크 구성

노드 그룹을 생성한 후에는 이러한 속성을 변경할 수 없습니다.

서브넷 정보

노드가 실행될 VPC의 서브넷을 지정합니다.새 서브넷을 생성하려면 VPC 콘솔의 해당 페이지로 이동합니다.

서브넷 선택 ▼

subnet-008d6411947a161d0 ✕ subnet-095255affbf95fe10 ✕

● 노드에 대한 SSH 액세스 구성 정보

SSH 키 페어

SSH 키 페어를 선택하여 노드에 대한 보안 원격 액세스를 허용합니다.새 SSH 키 페어를 생성하려면 EC2 콘솔의 해당 페이지로 이동합니다.

BstionKey ▼

SSH 원격 액세스 권한 허용 대상

노드에 원격으로 액세스할 수 있는 SSH 클라이언트 소스 IP 범위를 구성합니다.

● 선택한 보안 그룹
노드에 원격으로 액세스할 수 있는 소스 IP를 제한하는 보안 그룹을 지정합니다.

○ 모두
노드에 원격으로 액세스할 수 있는 소스 IP를 제한하지 않습니다.

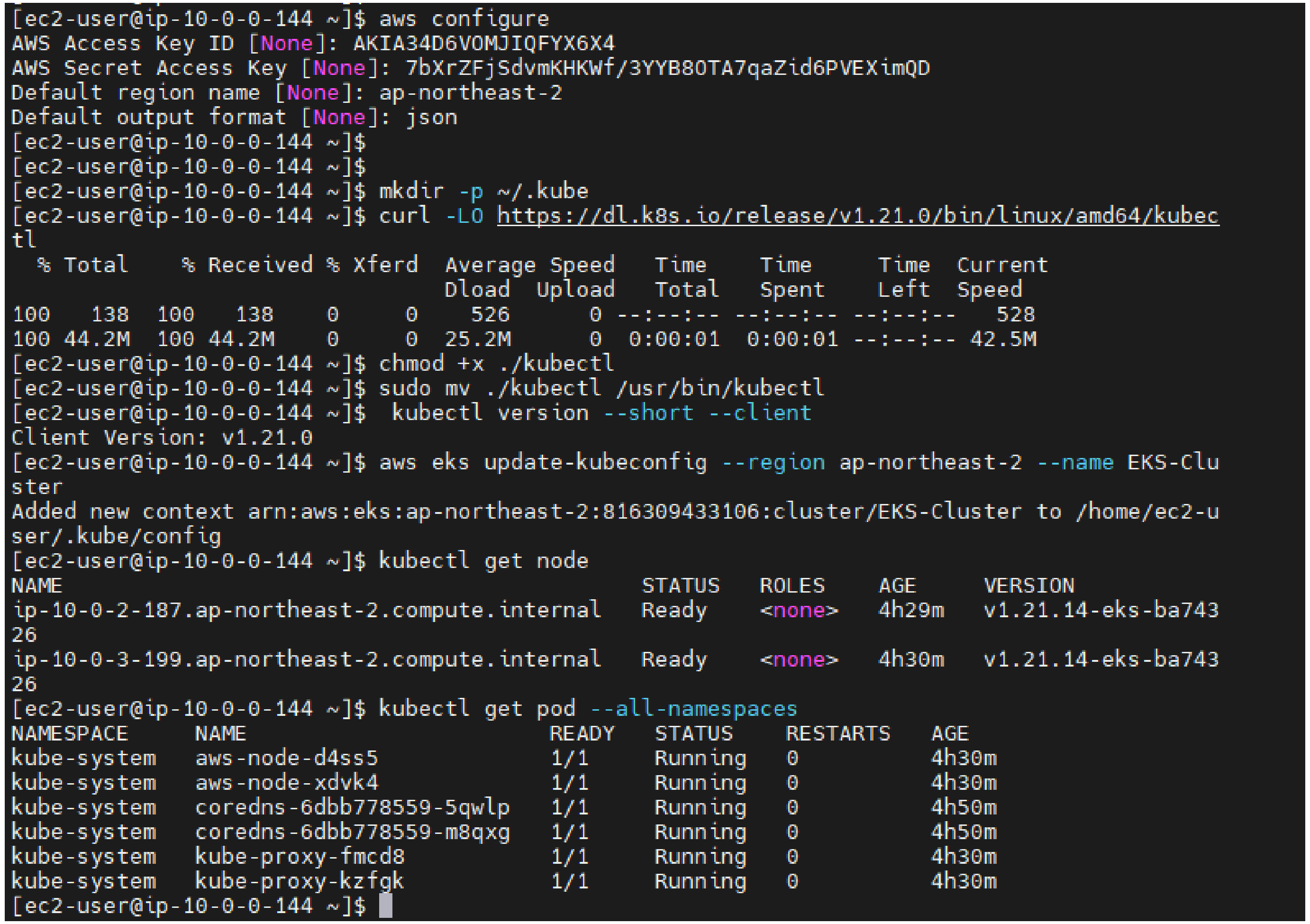
보안 그룹

새 보안 그룹을 생성하려면 EC2 콘솔의 해당 페이지로 이동합니다.

보안 그룹 선택 ▼

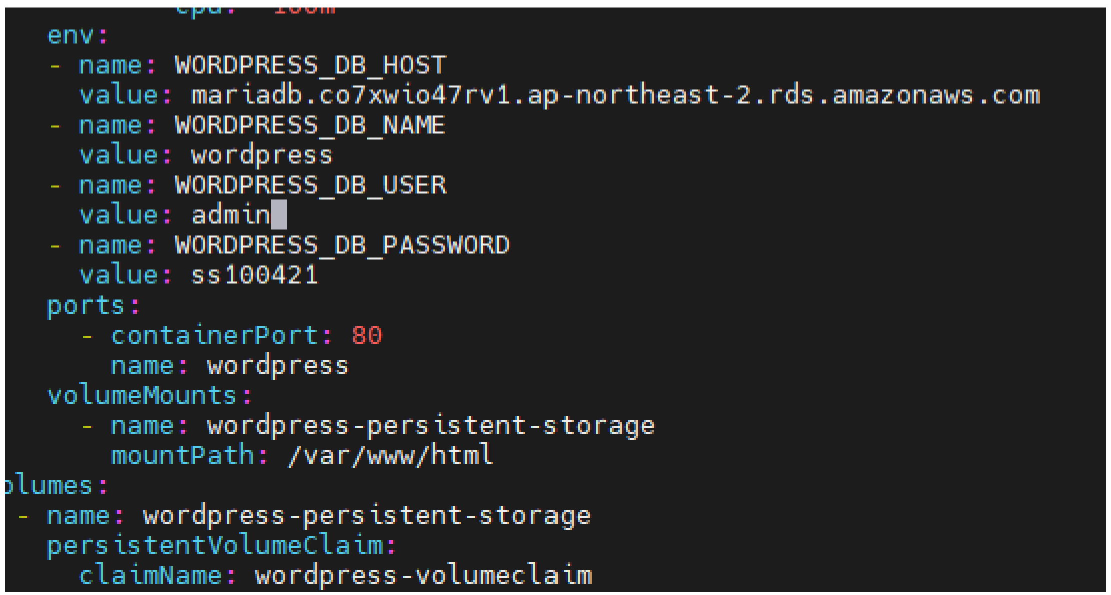
sg-0e2aa775a21ef973d ✕

Node Group에 서브넷과 보안 그룹을 설정 합니다.

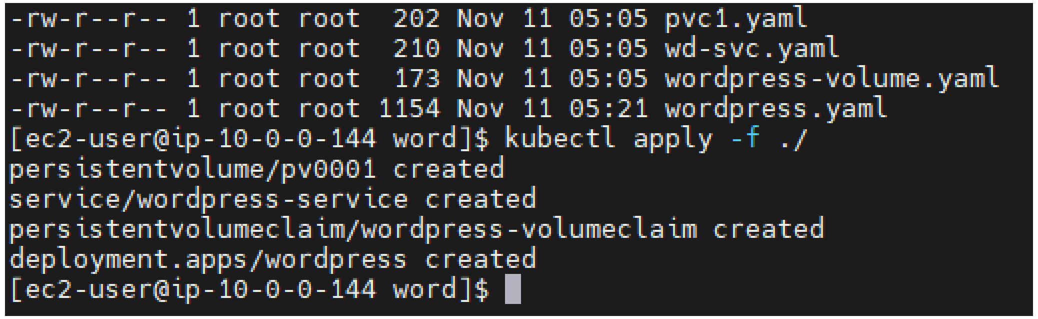


```
[ec2-user@ip-10-0-0-144 ~]$ aws configure
AWS Access Key ID [None]: AKIA34D6VOMJIQFYX6X4
AWS Secret Access Key [None]: 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
Default region name [None]: ap-northeast-2
Default output format [None]: json
[ec2-user@ip-10-0-0-144 ~]$
[ec2-user@ip-10-0-0-144 ~]$
[ec2-user@ip-10-0-0-144 ~]$ mkdir -p ~/.kube
[ec2-user@ip-10-0-0-144 ~]$ curl -LO https://dl.k8s.io/release/v1.21.0/bin/linux/amd64/kubec
tl
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0    526      0 --:--:-- --:--:-- --:--:--   528
100 44.2M  100 44.2M    0     0  25.2M      0  0:00:01  0:00:01 --:--:-- 42.5M
[ec2-user@ip-10-0-0-144 ~]$ chmod +x ./kubectl
[ec2-user@ip-10-0-0-144 ~]$ sudo mv ./kubectl /usr/bin/kubectl
[ec2-user@ip-10-0-0-144 ~]$  kubectl version --short --client
Client Version: v1.21.0
[ec2-user@ip-10-0-0-144 ~]$ aws eks update-kubeconfig --region ap-northeast-2 --name EKS-Clu
ster
Added new context arn:aws:eks:ap-northeast-2:816309433106:cluster/EKS-Cluster to /home/ec2-u
ser/.kube/config
[ec2-user@ip-10-0-0-144 ~]$ kubectl get node
NAME                                            STATUS   ROLES    AGE     VERSION
ip-10-0-2-187.ap-northeast-2.compute.internal   Ready    <none>   4h29m   v1.21.14-eks-ba743
26
ip-10-0-3-199.ap-northeast-2.compute.internal   Ready    <none>   4h30m   v1.21.14-eks-ba743
26
[ec2-user@ip-10-0-0-144 ~]$ kubectl get pod --all-namespaces
NAMESPACE     NAME                           READY   STATUS    RESTARTS   AGE
kube-system   aws-node-d4ss5                 1/1     Running   0          4h30m
kube-system   aws-node-xdvk4                 1/1     Running   0          4h30m
kube-system   coredns-6dbb778559-5qwlp       1/1     Running   0          4h50m
kube-system   coredns-6dbb778559-m8qxg       1/1     Running   0          4h50m
kube-system   kube-proxy-fmcd8               1/1     Running   0          4h30m
kube-system   kube-proxy-kzfgk               1/1     Running   0          4h30m
[ec2-user@ip-10-0-0-144 ~]$
```

configure를 통해 IAM 계정을 연결 후 EKS를 활용하기 위한 도구들을 설치하고
EKS를 통해 설치된 Node들의 연결을 확인 합니다

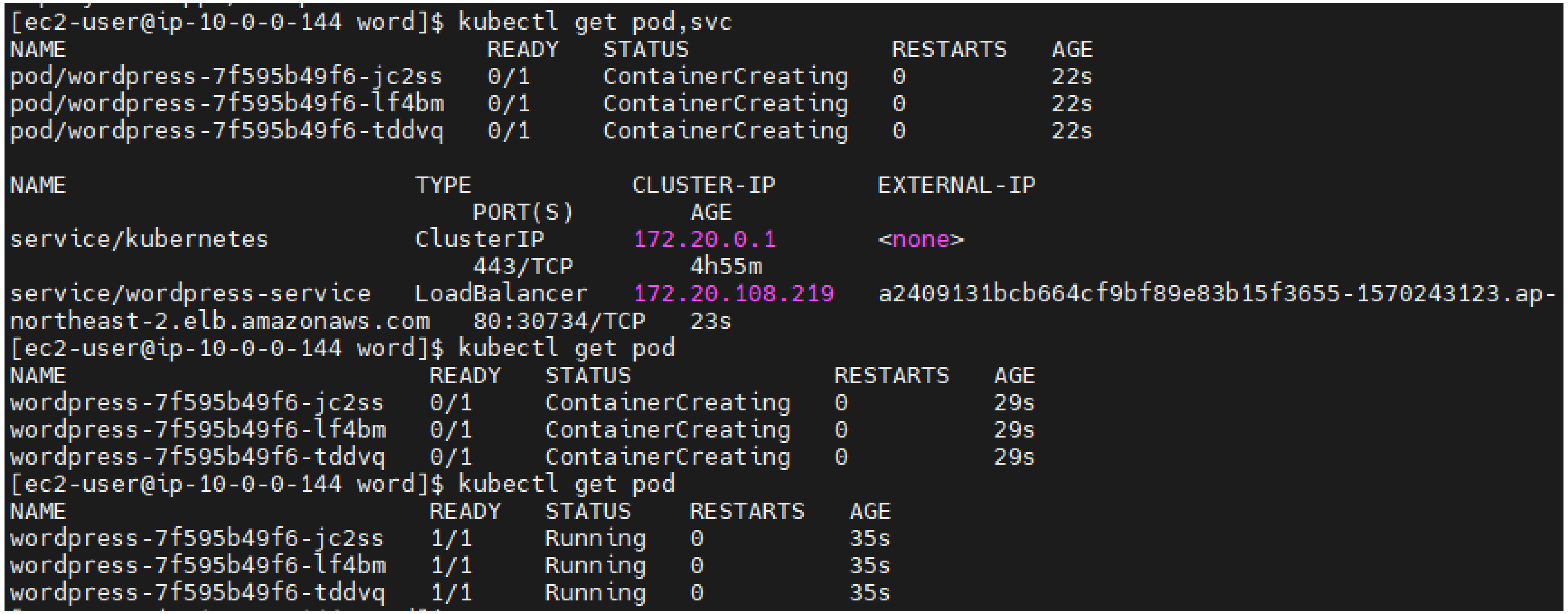


```
            cpu: "100m"
    env:
    - name: WORDPRESS_DB_HOST
      value: mariadb.co7xwio47rv1.ap-northeast-2.rds.amazonaws.com
    - name: WORDPRESS_DB_NAME
      value: wordpress
    - name: WORDPRESS_DB_USER
      value: admin
    - name: WORDPRESS_DB_PASSWORD
      value: ss100421
    ports:
      - containerPort: 80
        name: wordpress
    volumeMounts:
      - name: wordpress-persistent-storage
        mountPath: /var/www/html
olumes:
  - name: wordpress-persistent-storage
    persistentVolumeClaim:
      claimName: wordpress-volumeclaim
```



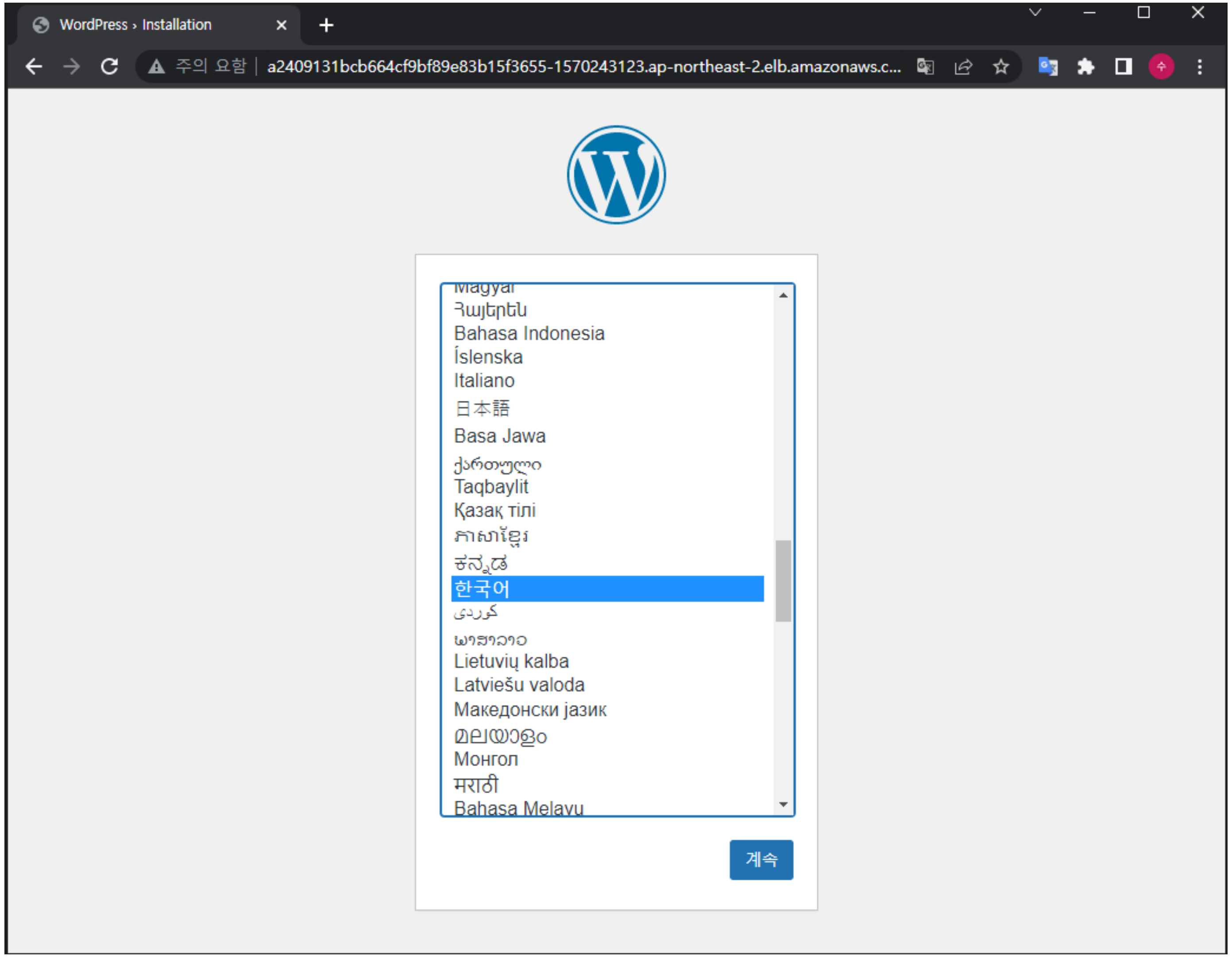
```
-rw-r--r-- 1 root root  202 Nov 11 05:05 pvc1.yaml
-rw-r--r-- 1 root root  210 Nov 11 05:05 wd-svc.yaml
-rw-r--r-- 1 root root  173 Nov 11 05:05 wordpress-volume.yaml
-rw-r--r-- 1 root root 1154 Nov 11 05:21 wordpress.yaml
[ec2-user@ip-10-0-0-144 word]$ kubectl apply -f ./
persistentvolume/pv0001 created
service/wordpress-service created
persistentvolumeclaim/wordpress-volumeclaim created
deployment.apps/wordpress created
[ec2-user@ip-10-0-0-144 word]$
```

Git을 통해 코드 다운로드 후 wordpress.yaml 코드에 RDS에 대한 정보를 기입 후
다운로드 한 디렉토리에 있는 yaml 코드 들을 apply 합니다.

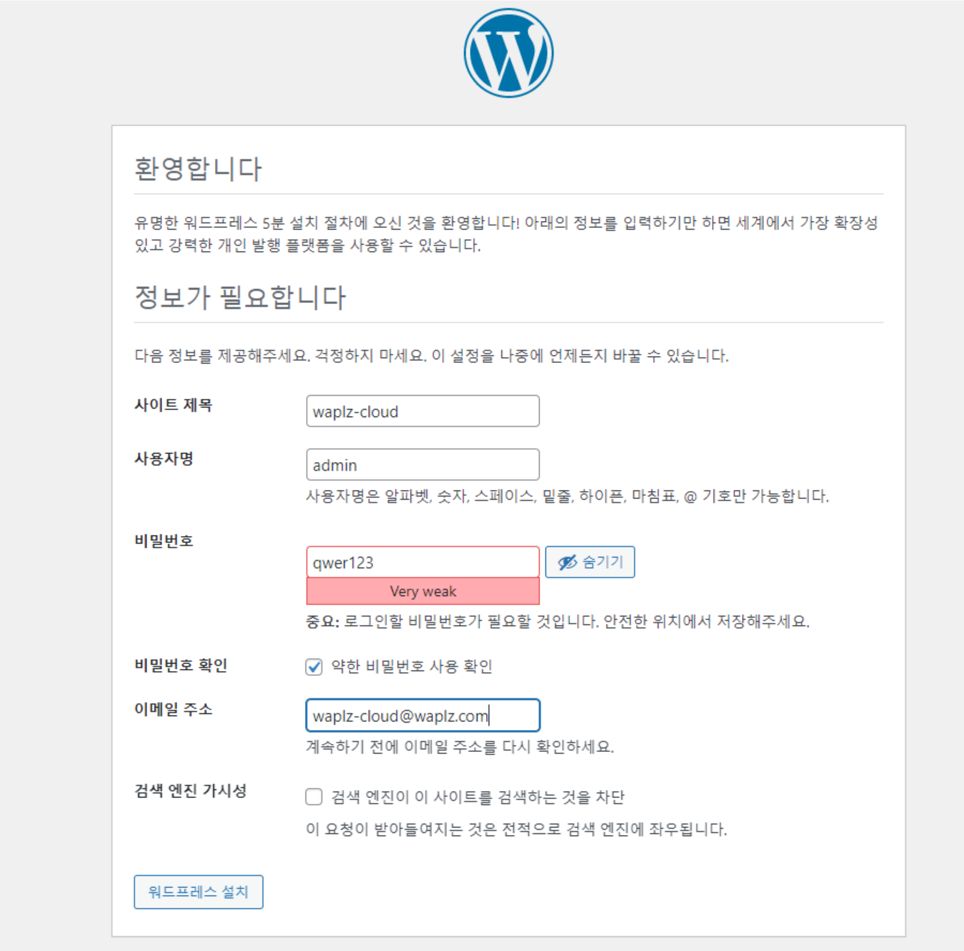


```
[ec2-user@ip-10-0-0-144 word]$ kubectl get pod,svc
NAME                                 READY   STATUS              RESTARTS   AGE
pod/wordpress-7f595b49f6-jc2ss   0/1     ContainerCreating   0          22s
pod/wordpress-7f595b49f6-lf4bm   0/1     ContainerCreating   0          22s
pod/wordpress-7f595b49f6-tddvq   0/1     ContainerCreating   0          22s

NAME                         TYPE           CLUSTER-IP       EXTERNAL-IP
    PORT(S)        AGE
service/kubernetes           ClusterIP      172.20.0.1       <none>
    443/TCP        4h55m
service/wordpress-service    LoadBalancer   172.20.108.219   a2409131bcb664cf9bf89e83b15f3655-1570243123.ap-
northeast-2.elb.amazonaws.com    80:30734/TCP   23s
[ec2-user@ip-10-0-0-144 word]$ kubectl get pod
NAME                             READY   STATUS              RESTARTS   AGE
wordpress-7f595b49f6-jc2ss   0/1     ContainerCreating   0          29s
wordpress-7f595b49f6-lf4bm   0/1     ContainerCreating   0          29s
wordpress-7f595b49f6-tddvq   0/1     ContainerCreating   0          29s
[ec2-user@ip-10-0-0-144 word]$ kubectl get pod
NAME                             READY   STATUS    RESTARTS   AGE
wordpress-7f595b49f6-jc2ss   1/1     Running   0          35s
wordpress-7f595b49f6-lf4bm   1/1     Running   0          35s
wordpress-7f595b49f6-tddvq   1/1     Running   0          35s
```

배포 된 wordpress pod와 service를 확인 합니다.



EXTERNAL-IP 를 통해 접속하여 정상 가동이 되는지 확인 합니다.



환영합니다

유명한 워드프레스 5분 설치 절차에 오신 것을 환영합니다! 아래의 정보를 입력하기만 하면 세계에서 가장 확장성 있고 강력한 개인 발행 플랫폼을 사용할 수 있습니다.

정보가 필요합니다

다음 정보를 제공해주세요. 걱정하지 마세요. 이 설정을 나중에 언제든지 바꿀 수 있습니다.

사이트 제목 waplz-cloud

사용자명 admin

사용자명은 알파벳, 숫자, 스페이스, 밑줄, 하이픈, 마침표, @ 기호만 가능합니다.

비밀번호 qwer123

Very weak

중요: 로그인할 비밀번호가 필요할 것입니다. 안전한 위치에서 저장해주세요.

비밀번호 확인 ☑ 약한 비밀번호 사용 확인

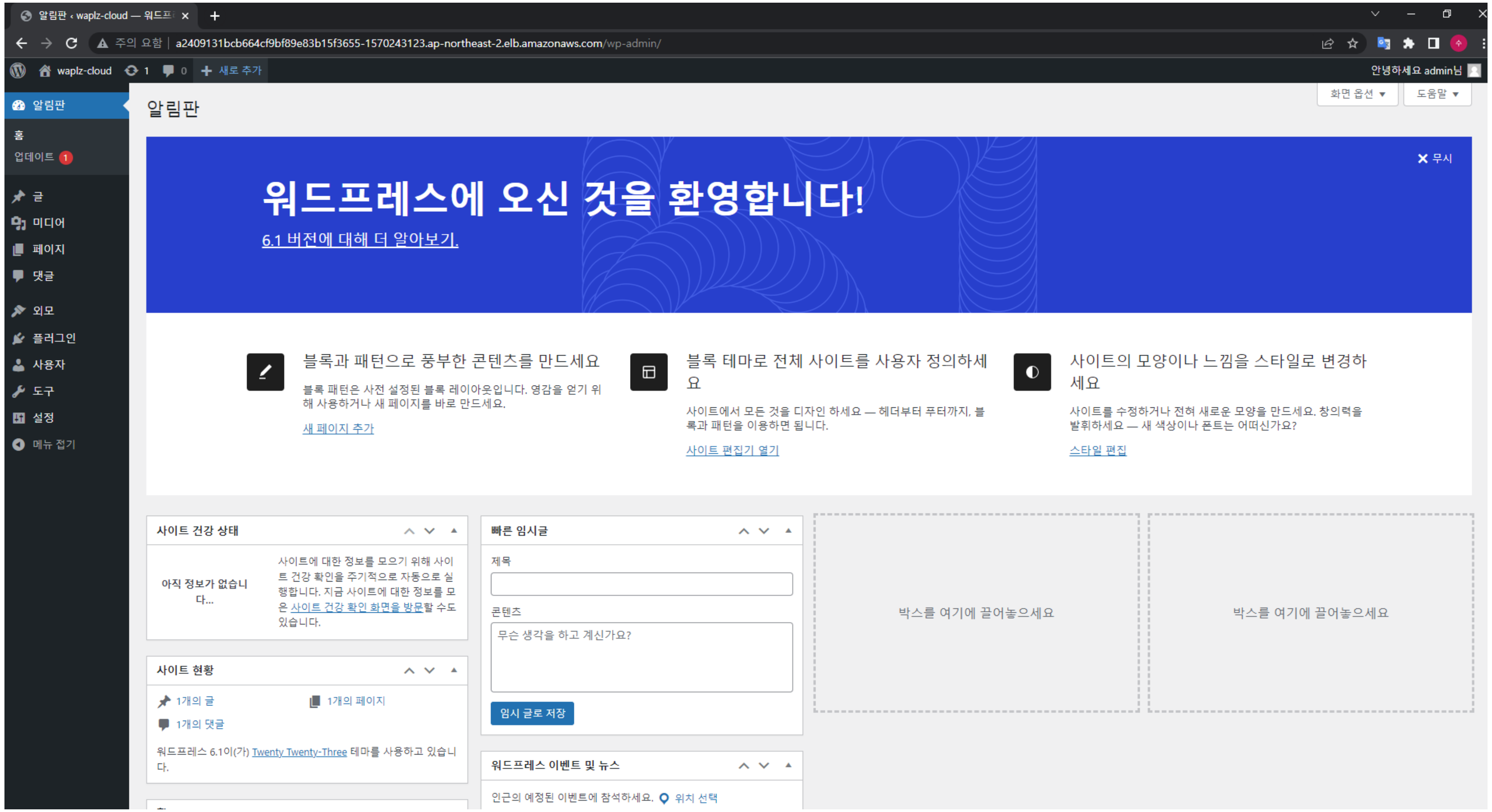
이메일 주소 waplz-cloud@waplz.com

계속하기 전에 이메일 주소를 다시 확인하세요.

검색 엔진 가시성 □ 검색 엔진이 이 사이트를 검색하는 것을 차단

이 요청이 받아들여지는 것은 전적으로 검색 엔진에 좌우됩니다.

웹 페이지 정보 임의로 설정 합니다.



알림판

워드프레스에 오신 것을 환영합니다!

6.1 버전에 대해 더 알아보기.

블록과 패턴으로 풍부한 콘텐츠를 만드세요

블록 패턴은 사전 설정된 블록 레이아웃입니다. 영감을 얻기 위해 사용하거나 새 페이지를 바로 만드세요.

새 페이지 추가

블록 테마로 전체 사이트를 사용자 정의하세요

사이트에서 모든 것을 디자인 하세요 — 헤더부터 푸터까지, 블록과 패턴을 이용하면 됩니다.

사이트 편집기 열기

사이트의 모양이나 느낌을 스타일로 변경하세요

사이트를 수정하거나 전혀 새로운 모양을 만드세요. 창의력을 발휘하세요 — 새 색상이나 폰트는 어떠신가요?

스타일 편집

사이트 건강 상태

아직 정보가 없습니다...

사이트에 대한 정보를 모으기 위해 사이트 건강 확인을 주기적으로 자동으로 실행합니다. 지금 사이트에 대한 정보를 모은 사이트 건강 확인 화면을 방문할 수도 있습니다.

사이트 현황

1개의 글
1개의 페이지
1개의 댓글

워드프레스 6.1이(가) Twenty Twenty-Three 테마를 사용하고 있습니다.

빠른 임시글

제목

콘텐츠

무슨 생각을 하고 계신가요?

박스를 여기에 끌어놓으세요

박스를 여기에 끌어놓으세요

워드프레스 이벤트 및 뉴스

인근의 예정된 이벤트에 참석하세요.

EKS를 활용한 Wordpress 구축 완료.