



How To Create a Kubernetes 1.11 Cluster Using Kubectl on Ubuntu 18.04



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Introduction

Kubernetes is a container orchestration system that manages containers at scale. Initially developed by Google based on its experience running containers in production, Kubernetes is open source and actively developed by a community around the world.

Kubectl automates the installation and configuration of Kubernetes components such as the API server, Controller Manager, and Kube DNS. It does not, however, create users or handle the installation of operating-system-level dependencies and their configuration. For these preliminary tasks, it is possible to use a configuration management tool like Ansible or SaltStack. Using these tools makes creating additional clusters or recreating existing clusters much simpler and less error prone.

In this guide, you will set up a Kubernetes cluster from scratch using Ansible and Kubeadm, and then deploy a containerized Nginx application to it.

Goals

Your cluster will include the following physical resources:

- **One master node**

The master node (a *node* in Kubernetes refers to a server) is responsible for managing the state of the cluster. It runs Etcd, which stores cluster data among components that schedule workloads to worker nodes.

- **Two worker nodes**

Worker nodes are the servers where your *workloads* (i.e. containerized applications and services) will run. A worker will continue to run your workload once they're assigned to it, even if the master goes down once scheduling is complete. A cluster's capacity can be increased by adding workers.

After completing this guide, you will have a cluster ready to run containerized applications, provided that the servers in the cluster have sufficient CPU and RAM resources for your applications to consume. Almost any traditional Unix application including web applications, databases, daemons, and command line tools can be containerized and made to run on the cluster. The cluster itself will consume around 300-500MB of memory and 10% of CPU on each node.

Once the cluster is set up, you will deploy the web server Nginx to it to ensure that it is running workloads correctly.

Prerequisites

- An SSH key pair on your local Linux/macOS/BSD machine. If you haven't used SSH keys before, you can learn how to set them up by following this explanation of how to set up SSH keys on your local machine.
- Three servers running Ubuntu 18.04 with at least 1GB RAM. You should be able to SSH into each server as the root user with your SSH key pair.
- Ansible installed on your local machine. If you're running Ubuntu 18.04 as your OS, follow the "Step 1 - Installing Ansible" section in How to Install and Configure Ansible on Ubuntu 18.04 to install Ansible. For installation instructions on other platforms like macOS or CentOS, follow the official Ansible installation documentation.
- Familiarity with Ansible playbooks. For review, check out Configuration Management 101: Writing Ansible Playbooks.
- Knowledge of how to launch a container from a Docker image. Look at "Step 5 — Running a Docker Container" in How To Install and Use Docker on Ubuntu 18.04 if you need a refresher.

Step 1 — Setting Up the Workspace Directory and Ansible Inventory File

In this section, you will create a directory on your local machine that will serve as your workspace. You will configure Ansible locally so that it can communicate with and execute commands on your remote servers. Once that's done, you will create a `hosts` file containing inventory information such as the IP addresses of your servers and the groups that each server belongs to.

Out of your three servers, one will be the master with an IP displayed as `master_ip`. The other two servers will be workers and will have the IPs `worker_1_ip` and `worker_2_ip`.

Create a directory named `~/kube-cluster` in the home directory of your local machine and `cd` into it:

```
$ mkdir ~/kube-cluster
$ cd ~/kube-cluster
```

This directory will be your workspace for the rest of the tutorial and will contain all of your Ansible playbooks. It will also be the directory inside which you will run all local commands.

Create a file named `~/kube-cluster/hosts` using `nano` or your favorite text editor:

```
$ nano ~/kube-cluster/hosts
```

Add the following text to the file, which will specify information about the logical structure of your cluster:

```
~/kube-cluster/hosts

[masters]
master ansible_host=master_ip ansible_user=root

[workers]
worker1 ansible_host=worker_1_ip ansible_user=root
worker2 ansible_host=worker_2_ip ansible_user=root

[all:vars]
ansible_python_interpreter=/usr/bin/python3
```

You may recall that inventory files in Ansible are used to specify server information such as IP addresses, remote users, and groupings of servers to target as a single unit for executing commands. `~/kube-cluster/hosts` will be your inventory file and you've added two Ansible groups (**masters** and **workers**) to it specifying the logical structure of your cluster.

In the **masters** group, there is a server entry named "master" that lists the master node's IP (`master_ip`) and specifies that Ansible should run remote commands as the root user.

Similarly, in the **workers** group, there are two entries for the worker servers (**worker_1_ip** and **worker_2_ip**) that also specify the `ansible_user` as `root`.

The last line of the file tells Ansible to use the remote servers' Python 3 interpreters for its management operations.

Save and close the file after you've added the text.

Having set up the server inventory with groups, let's move on to installing operating system level dependencies and creating configuration settings.

Step 2 — Creating a Non-Root User on All Remote Servers

In this section you will create a non-root user with `sudo` privileges on all servers so that you can SSH into them manually as an unprivileged user. This can be useful if, for example, you would like to see system information with commands such as `top/htop`, view a list of running containers, or change configuration files owned by `root`. These operations are routinely performed during the maintenance of a cluster, and using a non-root user for such tasks minimizes the risk of modifying or deleting important files or unintentionally performing other dangerous operations.

Create a file named `~/kube-cluster/initial.yml` in the workspace:

```
$ nano ~/kube-cluster/initial.yml
```

Next, add the following *play* to the file to create a non-root user with `sudo` privileges on all of the servers. A play in Ansible is a collection of steps to be performed that target specific servers and groups. The following play will create a non-root `sudo` user:

```
~/kube-cluster/initial.yml

- hosts: all
  become: yes
  tasks:
    - name: create the 'ubuntu' user
      user: name=ubuntu append=yes state=present createhome=yes shell=/bin/bash

    - name: allow 'ubuntu' to have passwordless sudo
      lineinfile:
        dest: /etc/sudoers
        line: 'ubuntu ALL=(ALL) NOPASSWD: ALL'
        validate: 'visudo -cf %s'

    - name: set up authorized keys for the ubuntu user
      authorized_key: user=ubuntu key="{{item}}"
      with_file:
        - ~/.ssh/id_rsa.pub
```

Here's a breakdown of what this playbook does:

- Creates the non-root user `ubuntu`.
- Configures the `sudoers` file to allow the `ubuntu` user to run `sudo` commands without a password prompt.
- Adds the public key in your local machine (usually `~/.ssh/id_rsa.pub`) to the remote `ubuntu` user's authorized key list. This will allow you to SSH into each server as the `ubuntu` user.

Save and close the file after you've added the text.

Next, execute the playbook by locally running:

```
$ ansible-playbook -i hosts ~/kube-cluster/initial.yml
```

The command will complete within two to five minutes. On completion, you will see output similar to the following:

Output

```
PLAY [all] *****
```

```
TASK [Gathering Facts] *****
```

```
ok: [master]
```

```
ok: [worker1]
```

```
ok: [worker2]
```

```
TASK [create the 'ubuntu' user] *****
```

```
changed: [master]
```

```
changed: [worker1]
```

```
changed: [worker2]
```

```
TASK [allow 'ubuntu' user to have passwordless sudo] *****
```

```
changed: [master]
```

```
changed: [worker1]
```

```
changed: [worker2]
```

```
TASK [set up authorized keys for the ubuntu user] *****
```

```
changed: [worker1] => (item=ssh-rsa AAAAB3...)
```

```
changed: [worker2] => (item=ssh-rsa AAAAB3...)
```

```
changed: [master] => (item=ssh-rsa AAAAB3...)
```

```
PLAY RECAP *****
```

master	: ok=5	changed=4	unreachable=0	failed=0
worker1	: ok=5	changed=4	unreachable=0	failed=0
worker2	: ok=5	changed=4	unreachable=0	failed=0

Now that the preliminary setup is complete, you can move on to installing Kubernetes-specific dependencies.

Step 3 — Installing Kubernetes' Dependencies

In this section, you will install the operating-system-level packages required by Kubernetes with Ubuntu's package manager. These packages are:

- Docker - a container runtime. It is the component that runs your containers. Support for other runtimes such as rkt is under active development in Kubernetes.
- kubeadm - a CLI tool that will install and configure the various components of a cluster in a standard way.
- kubelet - a system service/program that runs on all nodes and handles node-level operations.
- kubectl - a CLI tool used for issuing commands to the cluster through its API Server.

Create a file named `~/kube-cluster/kube-dependencies.yml` in the workspace:

```
$ nano ~/kube-cluster/kube-dependencies.yml
```

Add the following plays to the file to install these packages to your servers:

```
~/kube-cluster/kube-dependencies.yml

- hosts: all
  become: yes
  tasks:
    - name: install Docker
      apt:
        name: docker.io
        state: present
        update_cache: true

    - name: install APT Transport HTTPS
      apt:
        name: apt-transport-https
        state: present

    - name: add Kubernetes apt-key
      apt_key:
        url: https://packages.cloud.google.com/apt/doc/apt-key.gpg
        state: present

    - name: add Kubernetes' APT repository
      apt_repository:
        repo: deb http://apt.kubernetes.io/ kubernetes-xenial main
        state: present
        filename: 'kubernetes'

    - name: install kubelet
      apt:
```

```

    name: kubelet
    state: present
    update_cache: true

- name: install kubeadm
  apt:
    name: kubeadm
    state: present

- hosts: master
  become: yes
  tasks:
    - name: install kubect1
      apt:
        name: kubect1
        state: present

```

The first play in the playbook does the following:

- Installs Docker, the container runtime.
- Installs `apt-transport-https` , allowing you to add external HTTPS sources to your APT sources list.
- Adds the Kubernetes APT repository's apt-key for key verification.
- Adds the Kubernetes APT repository to your remote servers' APT sources list.
- Installs `kubelet` and `kubeadm`.

The second play consists of a single task that installs `kubect1` on your master node.

Save and close the file when you are finished.

Next, execute the playbook by locally running:

```
$ ansible-playbook -i hosts ~/kube-cluster/kube-dependencies.yml
```

On completion, you will see output similar to the following:

Output

```
PLAY [all] *****
```

```
TASK [Gathering Facts] *****
```

```
ok: [worker1]
```

```
ok: [worker2]
```

```
ok: [master]
```

```
TASK [install Docker] *****
```

```
changed: [master]
```

```

changed: [master]
changed: [worker1]
changed: [worker2]

TASK [install APT Transport HTTPS] *****
ok: [master]
ok: [worker1]
changed: [worker2]

TASK [add Kubernetes apt-key] *****
changed: [master]
changed: [worker1]
changed: [worker2]

TASK [add Kubernetes' APT repository] *****
changed: [master]
changed: [worker1]
changed: [worker2]

TASK [install kubelet] *****
changed: [master]
changed: [worker1]
changed: [worker2]

TASK [install kubeadm] *****
changed: [master]
changed: [worker1]
changed: [worker2]

PLAY [master] *****

TASK [Gathering Facts] *****
ok: [master]

TASK [install kubectl] *****
ok: [master]

PLAY RECAP ****
master                : ok=9    changed=5    unreachable=0    failed=0
worker1               : ok=7    changed=5    unreachable=0    failed=0
worker2               : ok=7    changed=5    unreachable=0    failed=0

```

After execution, Docker, kubeadm, and kubelet will be installed on all of the remote servers. kubectl is not a required component and is only needed for executing cluster commands. Installing it only on the master node makes sense in this context, since you will run kubectl commands only from the master. Note, however, that kubectl commands can be run from any of the worker nodes or from any machine where it can be installed and configured to point to a cluster.

All system dependencies are now installed. Let's set up the master node and initialize the cluster.

Step 4 — Setting Up the Master Node

In this section, you will set up the master node. Before creating any playbooks, however, it's worth covering a few concepts such as *Pods* and *Pod Network Plugins*, since your cluster will include both.

A pod is an atomic unit that runs one or more containers. These containers share resources such as file volumes and network interfaces in common. Pods are the basic unit of scheduling in Kubernetes: all containers in a pod are guaranteed to run on the same node that the pod is scheduled on.

Each pod has its own IP address, and a pod on one node should be able to access a pod on another node using the pod's IP. Containers on a single node can communicate easily through a local interface. Communication between pods is more complicated, however, and requires a separate networking component that can transparently route traffic from a pod on one node to a pod on another.

This functionality is provided by pod network plugins. For this cluster, you will use Flannel, a stable and performant option.

Create an Ansible playbook named `master.yml` on your local machine:

```
$ nano ~/kube-cluster/master.yml
```

Add the following play to the file to initialize the cluster and install Flannel:

```
~/kube-cluster/master.yml

- hosts: master
  become: yes
  tasks:
    - name: initialize the cluster
      shell: kubeadm init --pod-network-cidr=10.244.0.0/16 >> cluster_initialized.txt
      args:
        chdir: $HOME
        creates: cluster_initialized.txt

    - name: create .kube directory
      become: yes
      become_user: ubuntu
      file:
        path: $HOME/.kube
        state: directory
        mode: 0755

    - name: copy admin.conf to user's kube config
      copy:
        src: /etc/kubernetes/admin.conf
        dest: /home/ubuntu/.kube/config
        remote_src: yes
        owner: ubuntu
```

```
- name: install Pod network
  become: yes
  become_user: ubuntu
  shell: kubectl apply -f https://raw.githubusercontent.com/coreos/flannel/v0.9.1/Documentation/kube-flannel.yml
  args:
    chdir: $HOME
    creates: pod_network_setup.txt
```

Here's a breakdown of this play:

- The first task initializes the cluster by running `kubeadm init`. Passing the argument `--pod-network-cidr=10.244.0.0/16` specifies the private subnet that the pod IPs will be assigned from. Flannel uses the above subnet by default; we're telling `kubeadm` to use the same subnet.
- The second task creates a `.kube` directory at `/home/ubuntu`. This directory will hold configuration information such as the admin key files, which are required to connect to the cluster, and the cluster's API address.
- The third task copies the `/etc/kubernetes/admin.conf` file that was generated from `kubeadm init` to your non-root user's home directory. This will allow you to use `kubectl` to access the newly-created cluster.
- The last task runs `kubectl apply` to install Flannel. `kubectl apply -f descriptor.[yaml|json]` is the syntax for telling `kubectl` to create the objects described in the `descriptor.[yaml|json]` file. The `kube-flannel.yaml` file contains the descriptions of objects required for setting up Flannel in the cluster.

Save and close the file when you are finished.

Execute the playbook locally by running:

```
$ ansible-playbook -i hosts ~/kube-cluster/master.yml
```

On completion, you will see output similar to the following:

Output

```
PLAY [master] *****
```

```
TASK [Gathering Facts] *****
```

```
ok: [master]
```

```
TASK [initialize the cluster] *****
```

```
changed: [master]
```

```
TASK [create .kube directory] *****
```

```
changed: [master]
```

```
TASK [copy admin.conf to user's kube config] *****
```

```
changed: [master]
```

```
TASK [install Pod network] *****
```

```
changed: [master]
```

```
PLAY RECAP ****
```

```
master                : ok=5    changed=4    unreachable=0    failed=0
```

To check the status of the master node, SSH into it with the following command:

```
$ ssh ubuntu@master_ip
```

Once inside the master node, execute:

```
$ kubectl get nodes
```

You will now see the following output:

Output

NAME	STATUS	ROLES	AGE	VERSION
master	Ready	master	1d	v1.11.1

The output states that the `master` node has completed all initialization tasks and is in a `Ready` state from which it can start accepting worker nodes and executing tasks sent to the API Server. You can now add the workers from your local machine.

Step 5 — Setting Up the Worker Nodes

Adding workers to the cluster involves executing a single command on each. This command includes the necessary cluster information, such as the IP address and port of the master's API Server, and a secure token. Only nodes that pass in the secure token will be able join the cluster.

Navigate back to your workspace and create a playbook named `workers.yml`:

```
$ nano ~/kube-cluster/workers.yml
```

Add the following text to the file to add the workers to the cluster:

```
~/kube-cluster/workers.yml
```

```
- hosts: master
  become: yes
  gather_facts: false
```

```

tasks:
  - name: get join command
    shell: kubeadm token create --print-join-command
    register: join_command_raw

  - name: set join command
    set_fact:
      join_command: "{{ join_command_raw.stdout_lines[0] }}"

- hosts: workers
  become: yes
  tasks:
    - name: join cluster
      shell: "{{ hostvars['master'].join_command }}" >> node_joined.txt
      args:
        chdir: $HOME
        creates: node_joined.txt

```

Here's what the playbook does:

- The first play gets the join command that needs to be run on the worker nodes. This command will be in the following format: `kubeadm join --token <token> <master-ip>:<master-port> --discovery-token-ca-cert-hash sha256:<hash>`. Once it gets the actual command with the proper **token** and **hash** values, the task sets it as a fact so that the next play will be able to access that info.
- The second play has a single task that runs the join command on all worker nodes. On completion of this task, the two worker nodes will be part of the cluster.

Save and close the file when you are finished.

Execute the playbook by locally running:

```
$ ansible-playbook -i hosts ~/kube-cluster/workers.yml
```

On completion, you will see output similar to the following:

Output

```

PLAY [master] ****

TASK [get join command] ****
changed: [master]

TASK [set join command] *****
ok: [master]

PLAY [workers] *****

```

TASK [Gathering Facts] *****

ok: [worker1]
ok: [worker2]

TASK [join cluster] *****

changed: [worker1]
changed: [worker2]

PLAY RECAP *****

master	: ok=2	changed=1	unreachable=0	failed=0
worker1	: ok=2	changed=1	unreachable=0	failed=0
worker2	: ok=2	changed=1	unreachable=0	failed=0

With the addition of the worker nodes, your cluster is now fully set up and functional, with workers ready to run workloads. Before scheduling applications, let's verify that the cluster is working as intended.

Step 6 — Verifying the Cluster

A cluster can sometimes fail during setup because a node is down or network connectivity between the master and worker is not working correctly. Let's verify the cluster and ensure that the nodes are operating correctly.

You will need to check the current state of the cluster from the master node to ensure that the nodes are ready. If you disconnected from the master node, you can SSH back into it with the following command:

```
$ ssh ubuntu@master_ip
```

Then execute the following command to get the status of the cluster:

```
$ kubectl get nodes
```

You will see output similar to the following:

Output

NAME	STATUS	ROLES	AGE	VERSION
master	Ready	master	1d	v1.11.1
worker1	Ready	<none>	1d	v1.11.1
worker2	Ready	<none>	1d	v1.11.1

If all of your nodes have the value `Ready` for `STATUS`, it means that they're part of the cluster and ready to run workloads.

If, however, a few of the nodes have `NotReady` as the `STATUS`, it could mean that the worker nodes haven't finished their setup yet. Wait for around five to ten minutes before re-running `kubectl get nodes` and

inspecting the new output. If a few nodes still have `NotReady` as the status, you might have to verify and re-run the commands in the previous steps.

Now that your cluster is verified successfully, let's schedule an example Nginx application on the cluster.

Step 7 — Running An Application on the Cluster

You can now deploy any containerized application to your cluster. To keep things familiar, let's deploy Nginx using *Deployments* and *Services* to see how this application can be deployed to the cluster. You can use the commands below for other containerized applications as well, provided you change the Docker image name and any relevant flags (such as `ports` and `volumes`).

Still within the master node, execute the following command to create a deployment named `nginx`:

```
$ kubectl run nginx --image=nginx --port 80
```

A deployment is a type of Kubernetes object that ensures there's always a specified number of pods running based on a defined template, even if the pod crashes during the cluster's lifetime. The above deployment will create a pod with one container from the Docker registry's Nginx Docker Image.

Next, run the following command to create a service named `nginx` that will expose the app publicly. It will do so through a *NodePort*, a scheme that will make the pod accessible through an arbitrary port opened on each node of the cluster:

```
$ kubectl expose deploy nginx --port 80 --target-port 80 --type NodePort
```

Services are another type of Kubernetes object that expose cluster internal services to clients, both internal and external. They are also capable of load balancing requests to multiple pods, and are an integral component in Kubernetes, frequently interacting with other components.

Run the following command:

```
$ kubectl get services
```

This will output text similar to the following:

Output

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	1d
nginx	NodePort	10.109.228.209	<none>	80:nginx_port/TCP	40m

From the third line of the above output, you can retrieve the port that Nginx is running on. Kubernetes will assign a random port that is greater than 30000 automatically, while ensuring that the port is not already bound by another service.

To test that everything is working, visit `http://worker_1_ip:nginx_port` or `http://worker_2_ip:nginx_port` through a browser on your local machine. You will see Nginx's familiar welcome page.

If you would like to remove the Nginx application, first delete the `nginx` service from the master node:

```
$ kubectl delete service nginx
```

Run the following to ensure that the service has been deleted:

```
$ kubectl get services
```

You will see the following output:

Output

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	1d

Then delete the deployment:

```
$ kubectl delete deployment nginx
```

Run the following to confirm that this worked:

```
$ kubectl get deployments
```

Output

No resources found.

Conclusion

In this guide, you've successfully set up a Kubernetes cluster on Ubuntu 18.04 using Kubeadm and Ansible for automation.

If you're wondering what to do with the cluster now that it's set up, a good next step would be to get comfortable deploying your own applications and services onto the cluster. Here's a list of links with further information that can guide you in the process:

- [Dockerizing applications](#) - lists examples that detail how to containerize applications using Docker.
- [Pod Overview](#) - describes in detail how Pods work and their relationship with other Kubernetes objects. Pods are ubiquitous in Kubernetes, so understanding them will facilitate your work.
- [Deployments Overview](#) - provides an overview of deployments. It is useful to understand how controllers such as deployments work since they are used frequently in stateless applications for scaling and the automated healing of unhealthy applications.
- [Services Overview](#) - covers services, another frequently used object in Kubernetes clusters. Understanding the types of services and the options they have is essential for running both stateless and stateful applications.

Other important concepts that you can look into are [Volumes](#), [Ingresses](#) and [Secrets](#), all of which come in handy when deploying production applications.

Kubernetes has a lot of functionality and features to offer. [The Kubernetes Official Documentation](#) is the best place to learn about concepts, find task-specific guides, and look up API references for various objects.

By: bsder

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18 Comments

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^ reivajfh August 3, 2018

0 Hello,

First of all thanks for so good and interesting tutorial.

I have found some obstacles along the way, which I have managed to solve, but at the moment I am totally stuck. So I would like to ask for your help.

I am trying to run the “master.yml” playbook, but there I get an error when trying to copy the admin.conf to user’s kube config.

The error I get is the following:

```
*TASK [copy admin.conf to user's kube config] *****
fatal: [master]: FAILED! => {"changed": false, "msg": "Source /etc/kubernetes/admin.conf not
```



So it seems as if it was never initialized and hence the admin.conf was never created.

Do you have any tips or advice?

About the errors which I found, they were small things as for example the installation of the docker.io, which failed, but I managed to modify the playbook and install docker-ce which I assume would be similar for the purposes of the tutorial.

Also found some problems with the permissions, but managed to overcome those by modifying the calls to

execute the playbooks. Basically I modified the host file to not running them as root user, but appending "--ask-become-pass" into the calls.

I am happy to provide more info if you tell me how :)

^ bsder August 4, 2018

o Hi, can you check if the playbook in Step 4 succeeded? If it did not, can you post the entire output you got. That should help in diagnosing the issue.

^ reivajfh August 6, 2018

o Hi there,
no, it wont work.
I have tried in another machine, this time going exactly as described and it fails in the same place.
Please find here the output from the playbook:

```
~/kube-cluster$ ansible-playbook -i hosts ~/kube-cluster/master.yml

PLAY [k8smaster] *****

TASK [Gathering Facts] *****
ok: [k8smaster]

TASK [initialize the cluster] *****
ok: [k8smaster]

TASK [create .kube directory] *****
[WARNING]: Module remote_tmp /home/ubuntu/.ansible/tmp did not exist and was
created with a mode of 0700, this may cause issues when running as another
user. To avoid this, create the remote_tmp dir with the correct permissions
manually

changed: [k8smaster]

TASK [copy admin.conf to user's kube config] *****
fatal: [k8smaster]: FAILED! => {"changed": false, "msg": "Source /etc/kubernetes/admin.cc
to retry, use: --limit @/home/javier/kube-cluster/master.retry

PLAY RECAP *****
k8smaster          : ok=3    changed=1    unreachable=0    failed=1
```

I have tried to login into the master as a root, and there I can see the file cluster_initialized.txt and its content:

```
root@k8smaster:~# cat cluster_initialized.txt
[init] using Kubernetes version: v1.11.1
```

[preflight] running pre-flight checks

Any idea what could be wrong?

^ reivajfh August 8, 2018

o Any ideas on how can I check where it failed?

I am stuck here and cant understand what went wrong. Is there any way to check some logs?

^ reivajfh August 8, 2018

o UPDATE:

for some reason, in step 4, this line doesn't seem to work or at least nothing happened.

```
shell: kubeadm init --pod-network-cidr=10.244.0.0/16 >> cluster_initialized.txt
```

So what I did was to run it manually in the master node using sudo.

```
sudo kubeadm init --pod-network-cidr=10.244.0.0/16 >> cluster_initialized.txt
```

and that seemed to do the trick and generated the admin.conf which unlocked the next step.

But now in the last step when trying to create the network I get a very mysterious error:

```
fatal: [master]: FAILED! => {"changed": true, "cmd": "kubectl apply -f https://raw  
to retry, use: --limit @/home/javier/kube-cluster/master.retry
```

And trying to understand what the error was, I noticed it create a new file "podnetworksetup.txt".
Its content is the following:

```
clusterrole.rbac.authorization.k8s.io/flannel created  
clusterrolebinding.rbac.authorization.k8s.io/flannel created  
serviceaccount/flannel created
```

Any idea what could be the problem now? with the previous error I was guessing that something didn't finish (in this case I guess it never started) because it couldn't find the admin.conf, but now when that went through, I don't understand what can be wrong.

^ bsder August 8, 2018

◦ I haven't encountered this error before but I'm guessing it has something to do with a timeout when installing Flannel. I would suggest that you run the kubectl command manually and see it installs again. Also, if you delete "podnetworksetup.txt", ansible will re-run that command.

^  reivajfh August 9, 2018

◦ UPDATE: One or two steps further :)

Yes, running the kubectl command manually did the trick.

Also I had to disable swap, with swapoff -a in order to get verify that the master was working by running kubectl get nodes. Otherwise I will get some sort of timeout...weird.

Now I am in step 6 but step 5 didn't finish properly. I see that the workers have not done any modification nor created the node_joined.txt, so they have not joined the cluster.

I have the feeling that the offending part is this:

```
shell: "{{ hostvars['master'].join_command }}" >> node_joined.txt"
```

So any idea how could I debug why the joining is not happening?

Do you have any idea how to expand that line into individual kubernetes join commands to be run on the worker nodes?

Sorry for being a pain :) , but I really want to get this deployment done, so I can start playing/learning Kubernetes which is my real goal, but without the deployment not much can be done.

^  reivajfh August 8, 2018

◦ [deleted]

^  rnmkr August 9, 2018

◦ Hi, first of all thanks for the tutorial.

On Step 5, when I run this command

```
ansible-playbook -i hosts ~/kube-cluster/workers.yml
```

it hangs like this. I'm waiting like 20-30 minutes now, no information on console.
How to resolve this step?

```
ansible-playbook -i hosts ~/kube-cluster/workers.yml
```

```
PLAY [master] *****
```

```
TASK [get join command] *****
changed: [master]
```

```
TASK [set join command] *****
ok: [master]

PLAY [workers] *****

TASK [Gathering Facts] *****
ok: [worker2]
ok: [worker1]

TASK [join cluster] *****
```



 [torgeir](#) October 23, 2018

- o I experienced something similar. My issue was caused by TCP port 6443 on master being unreachable from the workers, and solved by adjusting the security group rules for my servers.

You can edit the workers playbook to check if the port is available before the join cluster task:

```
- hosts: master
  become: yes
  #gather_facts: false
  tasks:
    - name: get join command
      shell: kubectl token create --print-join-command
      register: join_command_raw

    - name: set join command
      set_fact:
        join_command: "{{ join_command_raw.stdout_lines[0] }}"

- hosts: workers
  become: yes
  tasks:
    - name: TCP port 6443 on master is reachable from worker
      wait_for: "host={{ hostvars['master']['ansible_default_ipv4']['address'] }} port=6443"

    - name: join cluster
      shell: "{{ hostvars['master'].join_command }} >> node_joined.txt"
      args:
        chdir: $HOME
        creates: node_joined.txt
```



^ Jaisuff August 9, 2018

0 Thanks for the unique tips, I am going use it on site.rrb

^ borove August 12, 2018

0 Hello, I have a trouble.

Master node is on Ubuntu-18.04.1-live-server-amd64

kub@kub-master:~\$ docker -v

Docker version 18.06.0-ce, build 0ffa825

kub@kub-master:~\$ kubectl cluster-info

Kubernetes master is running at http://localhost:8080

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.

The connection to the server localhost:8080 was refused - did you specify the right host or port?

Please see the error:

kub@kub-master:~\$ kubectl get nodes

The connection to the server localhost:8080 was refused - did you specify the right host or port?

^ infortechgroup August 25, 2018

0 Great article, Good effort,

I failed to pass the step 05 when i run the command

acmarket

^ VVSrinivas August 27, 2018

0 Hi,

In step 2 while trying to play the .yaml I am getting the below error.

:/kube-cluster\$ ansible-playbook -i hosts ~/kube-cluster/initial.yaml

PLAY [all] *****

TASK [Gathering Facts] *****

fatal: [worker2]: FAILED! => {"changed": false, "module_stderr": "Shared connection to xx.xx.xx.xx closed.\n", "module_stdout": "sudo: a password is required\n", "msg": "MODULE FAILURE", "rc": 1}

fatal: [master]: FAILED! => {"changed": false, "module_stderr": "Shared connection to xx.xx.xx.xx closed.\n", "module_stdout": "sudo: a password is required\n", "msg": "MODULE FAILURE", "rc": 1}

fatal: [worker1]: FAILED! => {"changed": false, "module_stderr": "Shared connection to xx.xx.xx.xx closed.\n", "module_stdout": "sudo: a password is required\n", "msg": "MODULE FAILURE", "rc": 1}

to retry, use: --limit @/home/ubuntu/test/kube-cluster/initial.retry

PLAY RECAP *****

master : ok=0 changed=0 unreachable=0 failed=1

worker1 : ok=0 changed=0 unreachable=0 failed=1

worker2 : ok=0 changed=0 unreachable=0 failed=1

Please let me know what needs to be done.

^ [karlatlujan](#) August 27, 2018

0 could you please check playbook in Step 4 is ok if it is not could you post the output which you came up with.it will be very helpful.

best regards Leo Playcard Team

^ [carlajiji](#) September 1, 2018

0 To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
The connection to the server localhost:8080 was refused - did you specify the right host or port?

^ [ResearchITEng](#) October 11, 2018

0 Hello,

For anyone interested, here is a fully fledged ansible project for Kubernetes cluster installation, which includes options like ingress, multi-master, dashboard, PVs (e.g. vsphere) etc -> all in one shot.

It supports from k8s 1.7 to latest 1.12.

It's actively tested on CentOS/RHEL, Ubuntu is also supported.

<https://github.com/ReSearchITEng/kubeadm-playbook>

PRs are welcome :)

^ [elliotpea](#) December 5, 2018

0 Deploying latest k8s (v1.13.0) required flannel from master:

kubectl apply -f <https://raw.githubusercontent.com/coreos/flannel/master/Documentation/kube-flannel.yml>

^ [xinmeng](#) December 11, 2018

0 Basically, by using newest Ubuntu 18.04, I faced two issues and the solutions as follows:

1. for master yaml **initialize the cluster** error, need to disable swapoff: run thie command on every node: **sudo swapoff -a**
2. the docker permission issue: run this command on every machine and logoff and login: **sudo usermod -a -G docker \$USER**



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