Kubernetes

Devopshobbies

Who Am I ?

- Software and Cloud engineer
- Work at Sotoon
- Devopshobbies
- Open Source communities
- B.Sc at Amirkabir

Social Medias

- Linkedin
- Github

Introduction

What is kubernetes

- A popular container orchestration tool released by google after swarm and it's a set of APIs in container runtimes.
- It takes some nodes on the cluster (worker and master) and decide how to schedule and run containers on these nodes

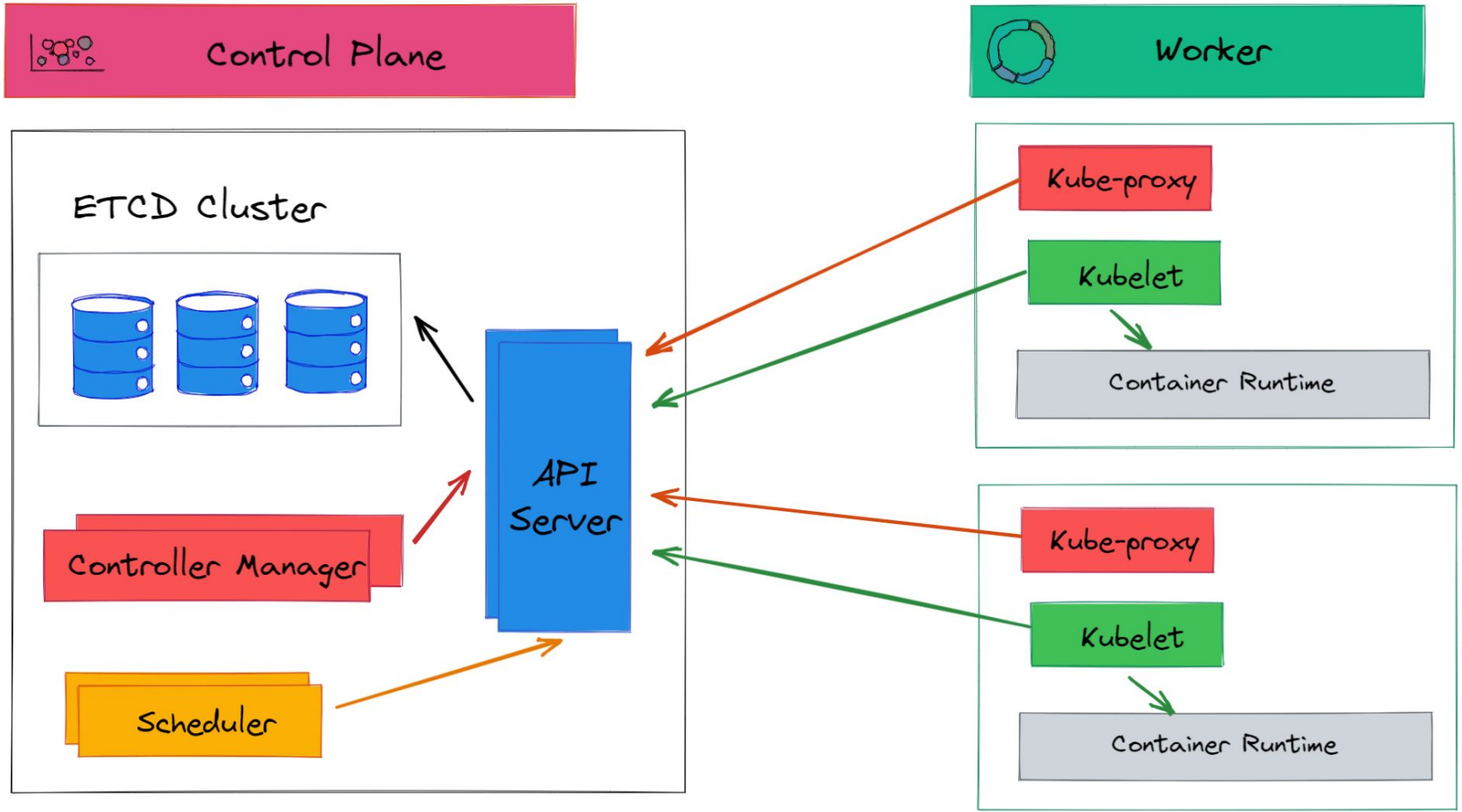
Master (Control Plane) Node(s)

- Set of servers and VMs to manage, plan, schedule and observe the whole cluster.
- Main Components:
  - API Server: users and other components communicate with
  - Scheduler: scheduler pods on appropriate nodes
  - Controller Manager: control the state of resources have been deployed on the cluster and ensure the current state matches the desired state
  - ETCD: HA data store to store configurations and state of the resources

```
> k get nodes -owide
NAME                                STATUS   ROLES                  AGE   VERSION    INTERNAL-IP   EXTERNAL-IP   OS-IMAGE             KERNEL-VERSION      CONTAINER-RUNTIME
mentorship-control-plane-2nsxc      Ready    control-plane,master   13d   v1.23.17   10.0.0.73     <none>        Ubuntu 20.04.6 LTS   5.4.0-149-generic   docker://20.10.24
mentorship-control-plane-72bpx      Ready    control-plane,master   13d   v1.23.17   10.0.0.156    <none>        Ubuntu 20.04.6 LTS   5.4.0-149-generic   docker://20.10.24
mentorship-control-plane-7nlk4      Ready    control-plane,master   13d   v1.23.17   10.0.0.127    <none>        Ubuntu 20.04.6 LTS   5.4.0-149-generic   docker://20.10.24
mentorship-workers-pool1-hmglh-72dpr   Ready    <none>                 13d   v1.23.17   10.0.0.227    <none>        Ubuntu 20.04.6 LTS   5.4.0-149-generic   docker://20.10.24
mentorship-workers-pool1-hmglh-g9992   Ready    <none>                 13d   v1.23.17   10.0.0.2      <none>        Ubuntu 20.04.6 LTS   5.4.0-149-generic   docker://20.10.24
> k get componentstatus
Warning: v1 ComponentStatus is deprecated in v1.19+
NAME                 STATUS    MESSAGE                         ERROR
controller-manager   Healthy   ok
scheduler            Healthy   ok
etcd-0               Healthy   {"health":"true","reason":""}
```

Worker Node(s)

- Set of servers and VMs to run the workloads
- Main Components:
  - Kube Proxy: control the networking between pods and nodes
  - Kubelet: manage pods and containers via container runtimes, also sending reports back to the master about the status of the node and containers.

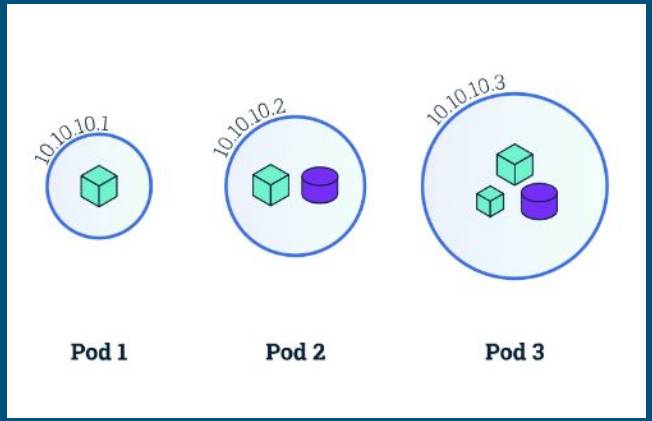

Control Plane
Worker
ETCD Cluster
API Server
Controller Manager
Scheduler
Kube-proxy
Kubelet
Container Runtime
Kube-proxy
Kubelet
Container Runtime

Main Resources

Pod

- Atomic unit of kubernetes
- Scheduled by the scheduler on appropriate node
- Contains one or more containers in it
- Pause Containers
- Pods can be replicated by ReplicaSet or ReplicationController (deprecated)
- Networking
    - Between containers
    - Between Pods
        - Same Node
        - Different Nodes

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: my-pod
  namespace: my-namespace
  labels:
    app: my-app
  annotations:
    description: "This is my application"
spec:
  containers:
  - name: my-container
    image: my-image:1.0
```

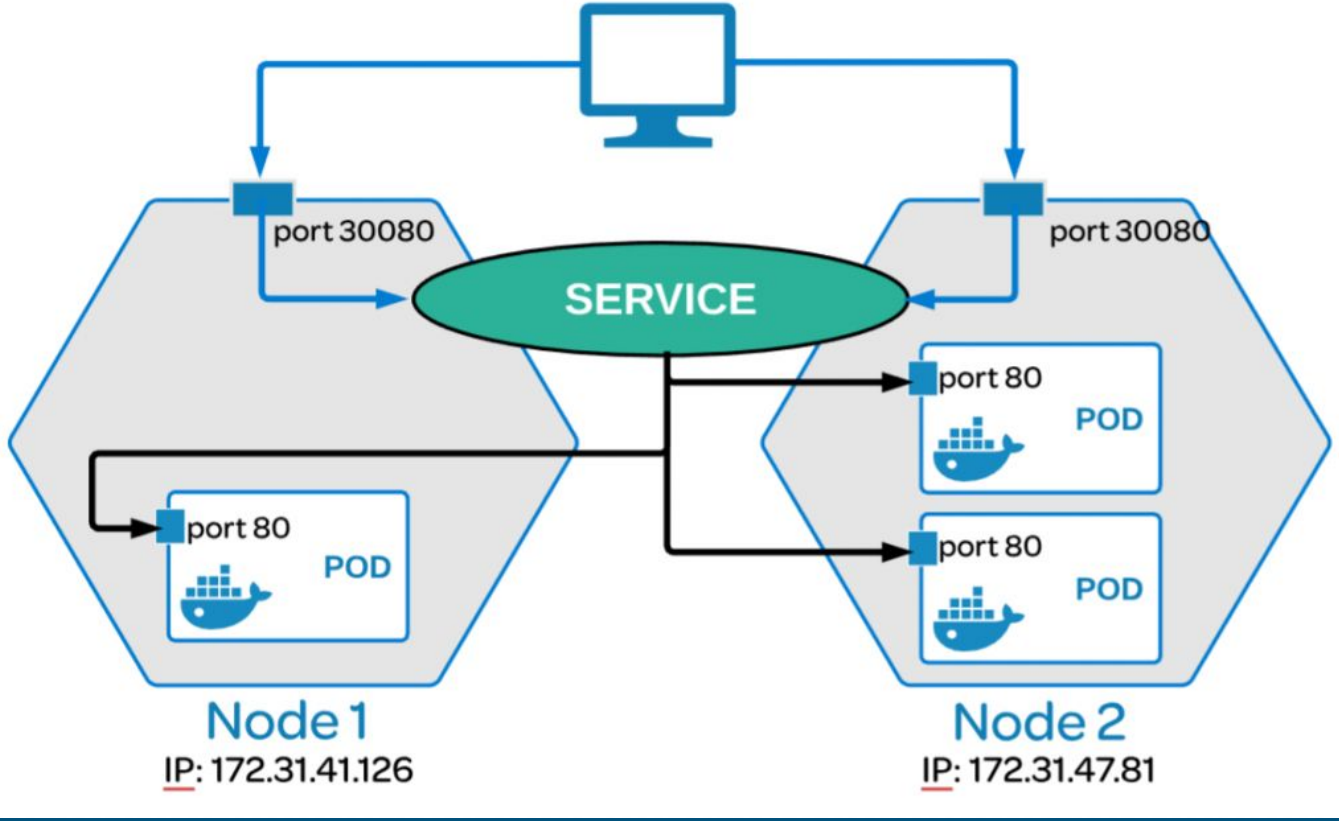


Service

- Pods are ephemeral resources, they can move and replicated, Services are a way to access the Pods.
- Service Types:
  - ClusterIP
  - NodePort
  - LoadBalancer
- The CoreDNS will resolve dns name of services to the IP address of the Service
- The traffic for the IP of a service will be redirected to Pod Endpoints by the IP-table rules configured on each node (by the kube-proxy)

Kubernetes Service

A service allows you to dynamically access a group of replica pods.



Other Resources

- Namespace
- Deployment
- StatefulSet
- DeamonSet
- ConfigMap
- Secret
- Volume (PVC, PV, StorageClass)
- Ingress
- RBAC (ServiceAccount, Roles, RoleBindings)
- CRDs !!!