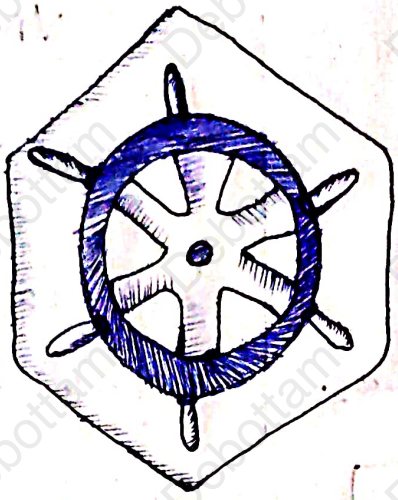


Kubernetes (K8s)

Nodes

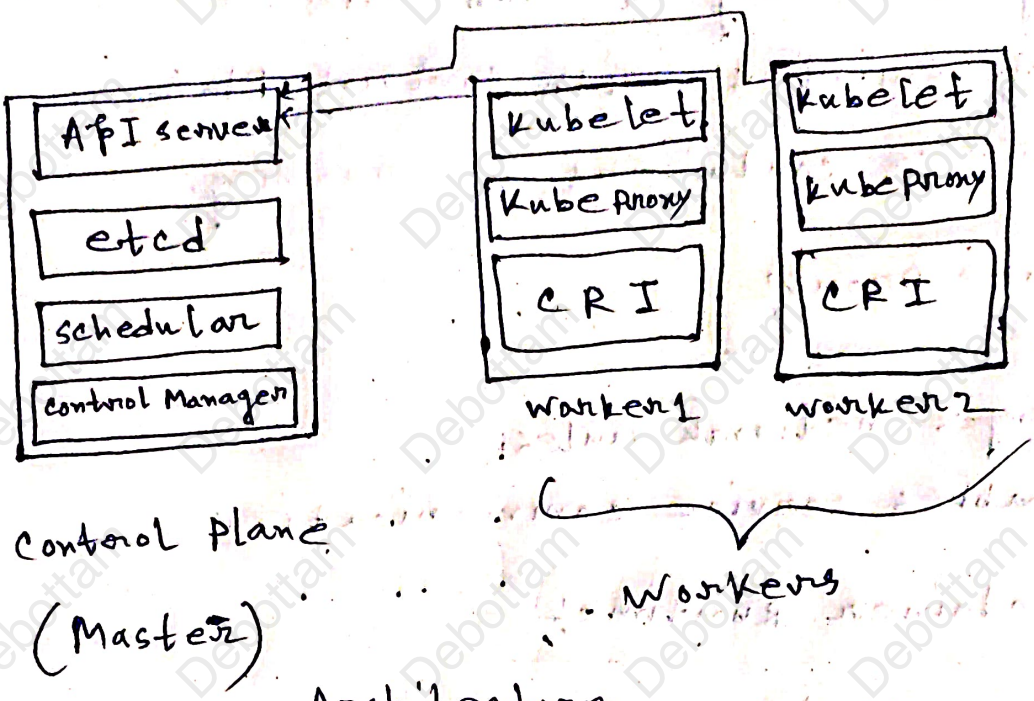
- Master (Control Plane)
- Worker

* The entire explanation will be based on 1 master 3 workers architecture but there is no rule in this but in dev environment 1 master multiple workers but in production master needs some backup replicas.

(i) control Plane
  (a) schedular
  (b) etcd
  (c) Api server
  (d) control Manager
  (e) Kubeproxy
  (f) kubelet

(g) CRI (container Runtime Interface)

Kubernetes is a container orchestration distributed software, works using pods.



Architecture

1. **API server:-**

Entry Point to the cluster.

All communication goes through it.

Handles REST requests (kubectl uses this)

2. **etcd:-**

Distributed key-value store

Stores cluster configuration and state.

3. **schedular:-**

Assigns Pods to worker nodes.

Decides where workloads run.

4. **Control Manager:-**

Ensures desired state matches actual state

Handles replication, node health etc.

5. Kubelet:-

Agent running on each node
Communicates with control plane
Ensures containers are running.

6. Kube Proxy:-

Manages network rules.
Enables service communication.

7. Container Runtime:-

Runs container (e.g. Docker, containerd)

Core Application concepts

(i) Pod:-

Smallest deployable unit in Kubernetes.
can contain one or multiple containers.
Shares:
- Network
- storage
- IP address

Pods are ephemeral (temporary)

(ii) Deployment:-

Manages Replicasets
Enables rolling updates
Ensures desired number of pods are running.

(iii) Service :-

Exposes Pods to Network

provides stable IP & DNS name.

Types :-

(i) ClusterIP

(ii) NodePort

(iii) LoadBalancer

(iv) External Name.