

Kubernetes

→ Configuration Management:

It basically means you can maintain all the changes in the infrastructure with the help of Software.

→ provides Immutability. (^{Can't make changes to the running containers})

ex: chef, puppet, Ansible.

→ It basically writing Configuration for your server that you want it to be like this & that.

→ Immutable provides reliability.

→ Let's say In a server you are running multiple services, some require python3, some python2.

→ So, using Containers we can do that (package Managers)

Managing Containers

→ Monolithic Apps

- It means bundling your entire app, deploying as 1 app in your Container
- So, the limitation of you want to change any one either DB, networking you have to deploy all the whole app again & again.
- If you want to scale frontend, you have to scale Backend also & all other apps also.
- we solve the problem using microservices.

Frontend
Backend
chat messages
Database
Networking

Microservices

→ So, if you want to change
to change @) Scale frontend here only it applies to frontend.

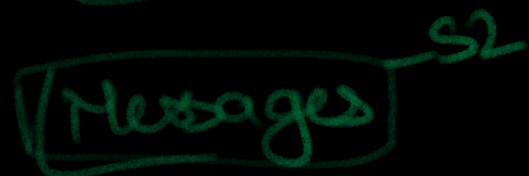
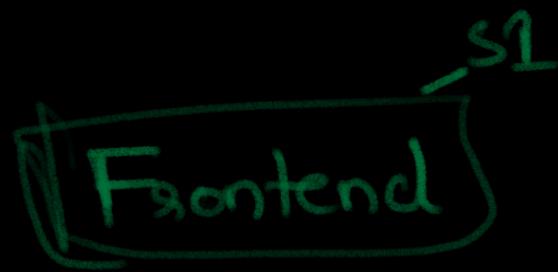
→ By Using Containers

→ Change one app without affecting other also called Fault Isolation.

How to Manage? (How do they communicate?)

Orchestrators:

→ They help us in deploying & managing applications dynamically



→ dynamically means of more people are using scale up the app, if something went down then restart it.

- Deploy
 - Zero-downtime updates
 - Scale
 - self Heal Containers (when they go down restart them)
- ↳ All features of cloud Native Apps

→ Cloud native means those apps meet the modern business demands (the 4 above) apps that follows of these & that can run on top of Kubernetes is known as cloud native apps

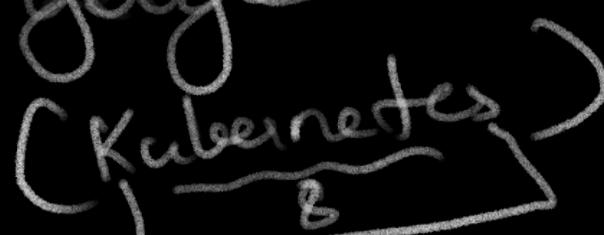
→ Cloud Computing means you are taking some resources like ram, Server etc.

→ Cloud native apps can work on your local system & cloud computing platforms as well.

→ Anywhere ,you have Kubernetes you can run cloud native apps.

→ Kubernetes provides us all the demands above, schedules & much more to manage & deploy containers also load-Balancing features as such.

→ Kubernetes provides more than just these orchestration features. Kubernetes is more than a Container Orchestrator.

- You can also migrate from one provider to another with help of Kubernetes
- AWS offered Cloud 2 dominated the market.
- openstack = opensource alt for AWS => X
didnt work out
- Before this google was running internally 1000's of containers & managing them called Borg, Omega
- google Created Kubernetes(G)(K8S)


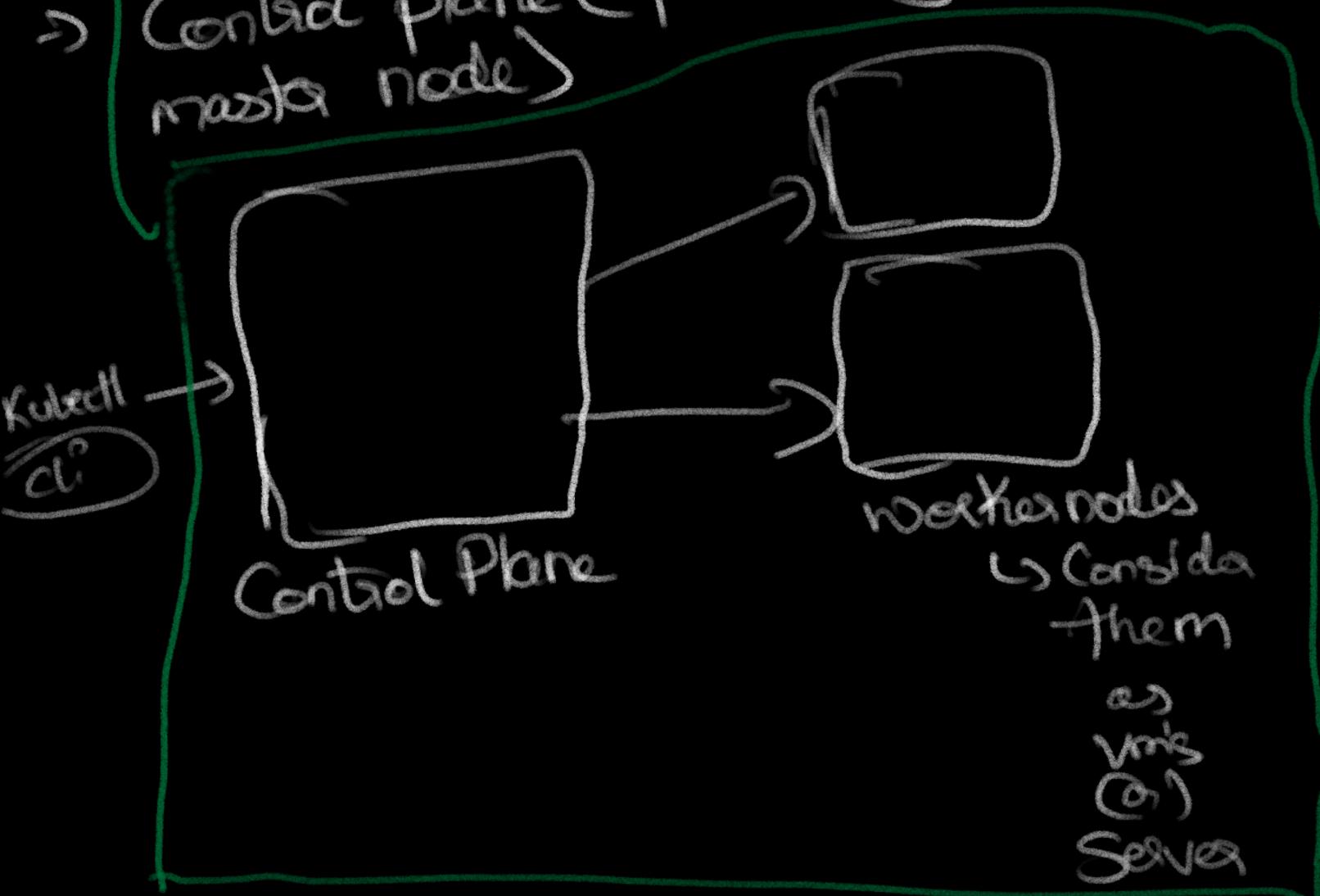
(Kubernetes)
- made it opensource in 2014 & donated to CNCF.

- Docker is a Container tool whereas K8s act as an orchestrator.
- google StarTrek related story to Borg.

Terminologies

Cluster → Control plane + Nodes

- A node can be treated as a VM.
- Control plane (previously known as master node)



→ Cluster basically means Collection
of Control plane & Nodes.

→ Kubectl is the Kubernetes CLI

→ Kubectl will communicate with control
plane, & tell it that it want to
start to apps (or) whatever.

→ Control plane will then check
which worker nodes are empty
(a) can handle your load or not
start your containers over there.

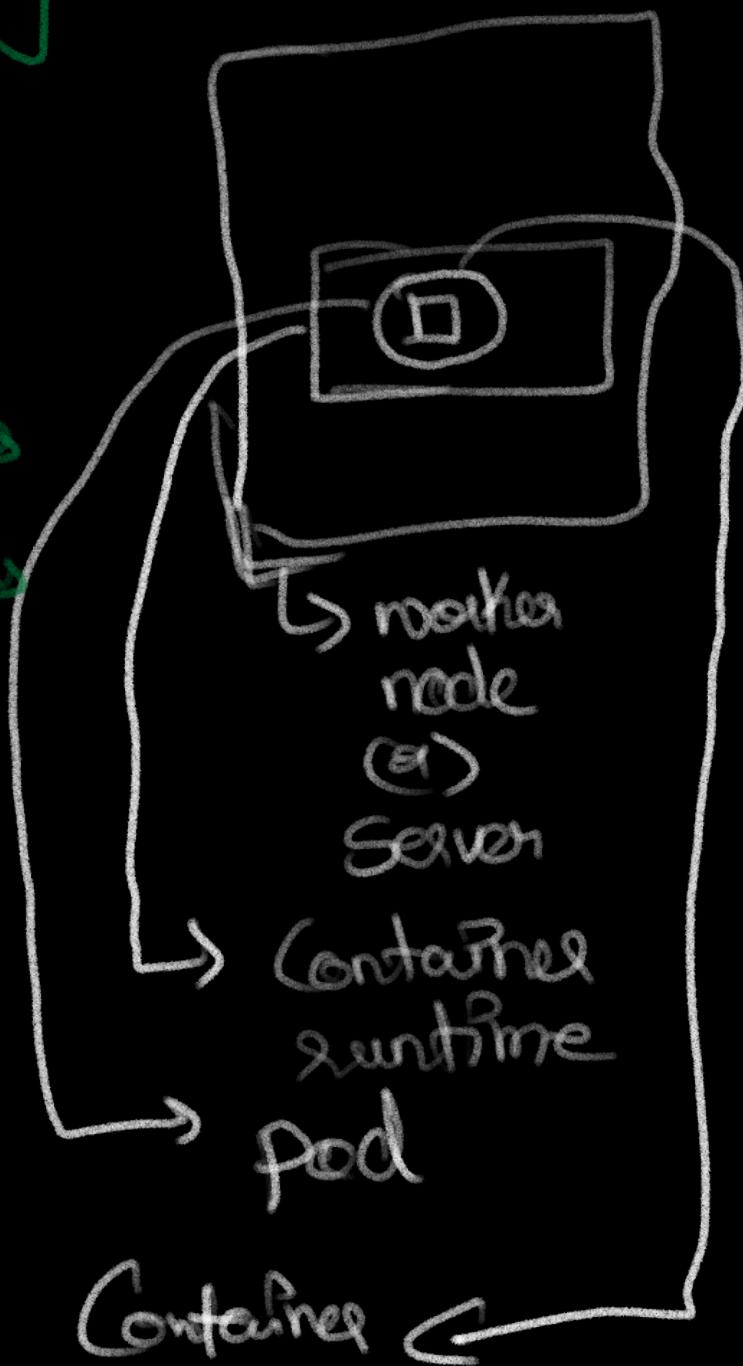
→ You can interact with 2 ways:
1. declarative: we create manifest files,
yaml files

2. Imperative: tell your cluster
for specific command.

→ ⚫ Important & Better to use declarative
way.

→ Pod → Scheduling Unit

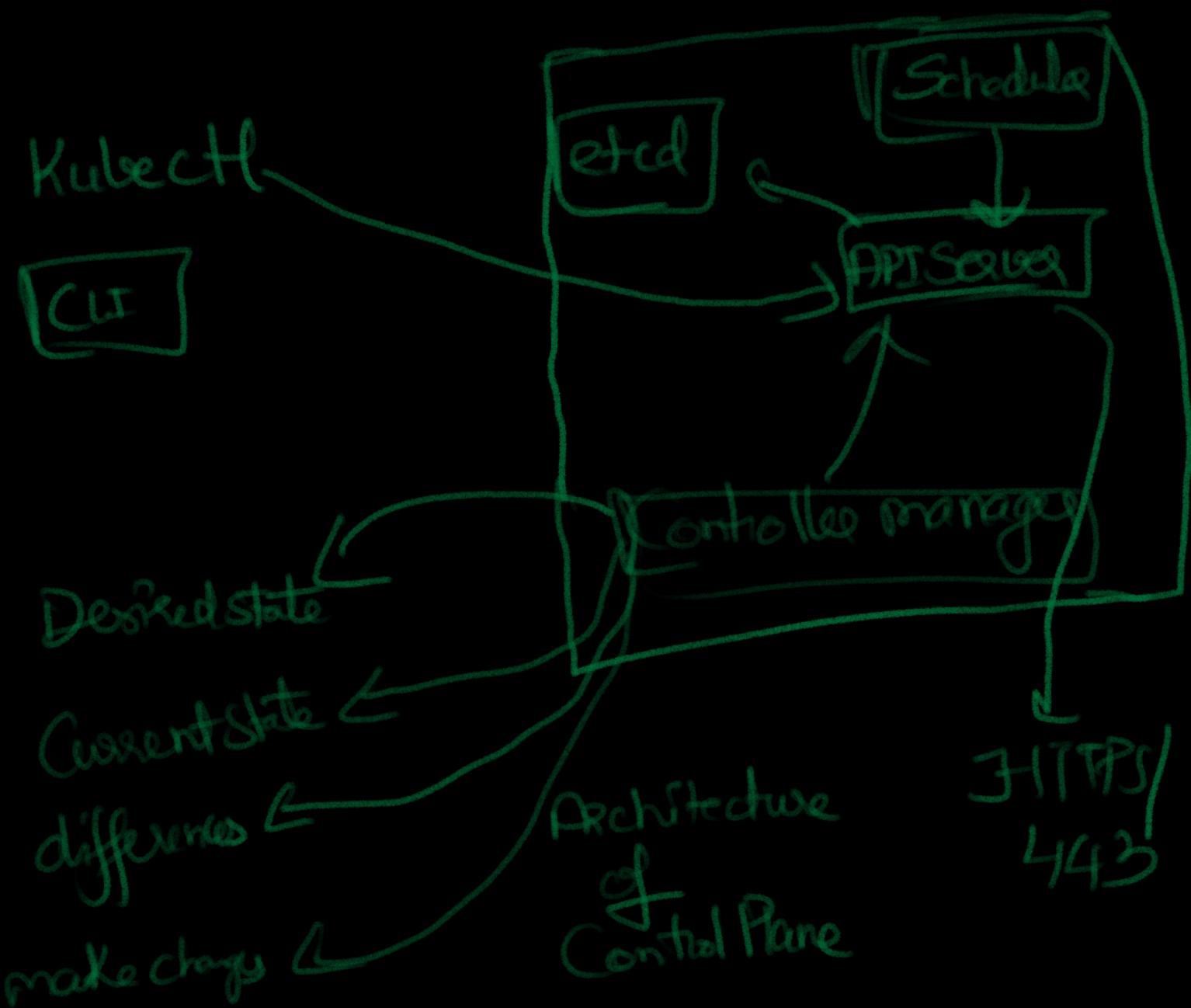
1. Create Microservice
2. Containerize it.
3. put Container in pods
4. deploy Pods to Controller



- Controllers are loops that watch the state of your cluster, then make request changes where needed.
- Deployment is 1 type of Controller

Control Plane

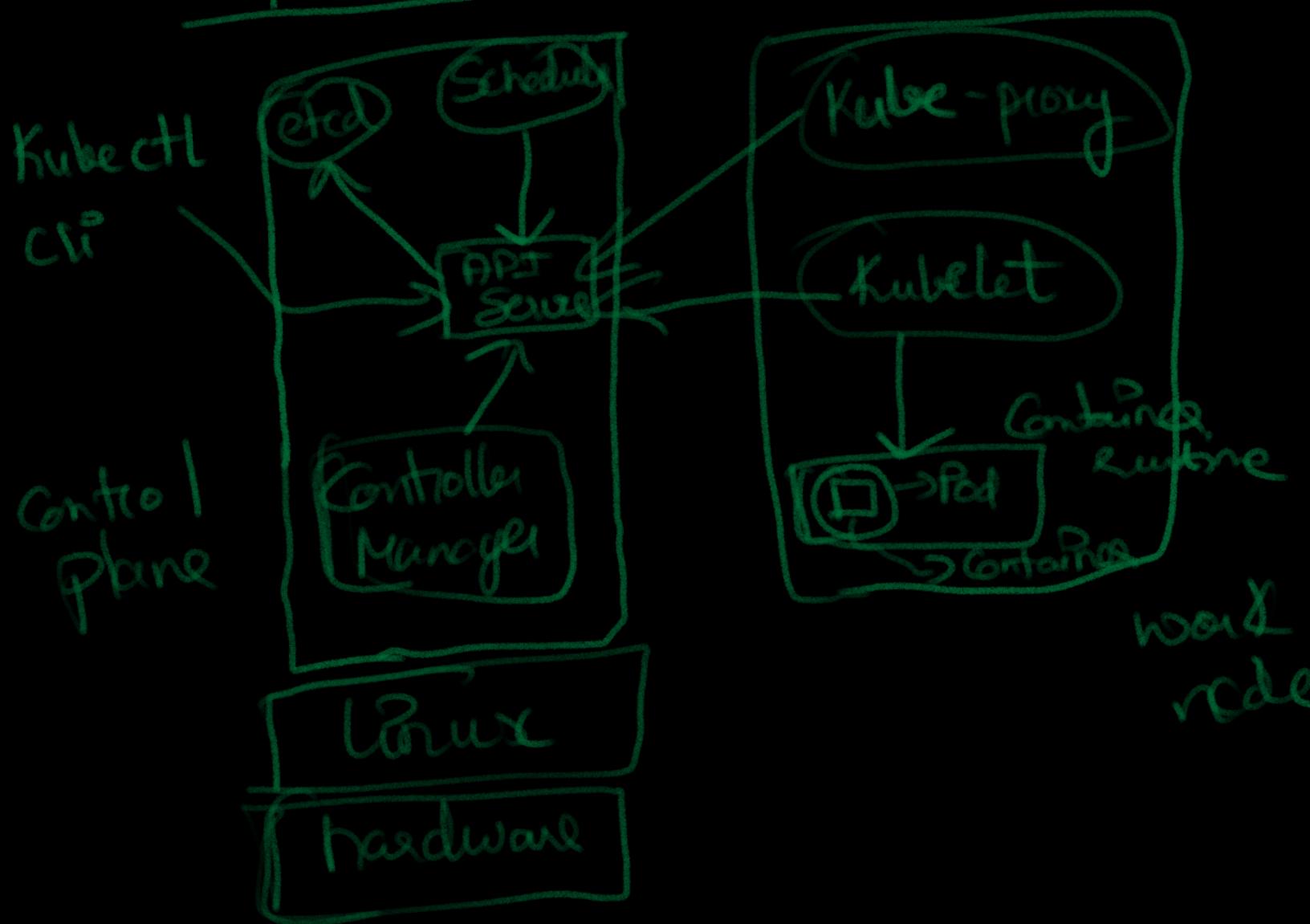
- It's a collection of various components that helps up managing the cluster
 - want to create a pod, Scale them, expose them all of this & more will be managed by Control.



- Kubectl comm with apiserver.
ex: create 5 pods, create this deployment.
- All the Comm that will happen via Apiserver, it exposes a RESTful API, so, over https you can give some yaml like create a pod also known as Kubernetes manifest files.
- etcd is a DB, it stores the info about the cluster. (open source)
- Controllers will take care of desired state like: 2: running pods. Controller manager will take care of controllers.
- Controller Manager will look after desired state, current state, check differences & deployment, & make the changes

→ Scheduler role is to check which worker node is empty (or) can handle load balance.

Complete Architecture of Kubernetes



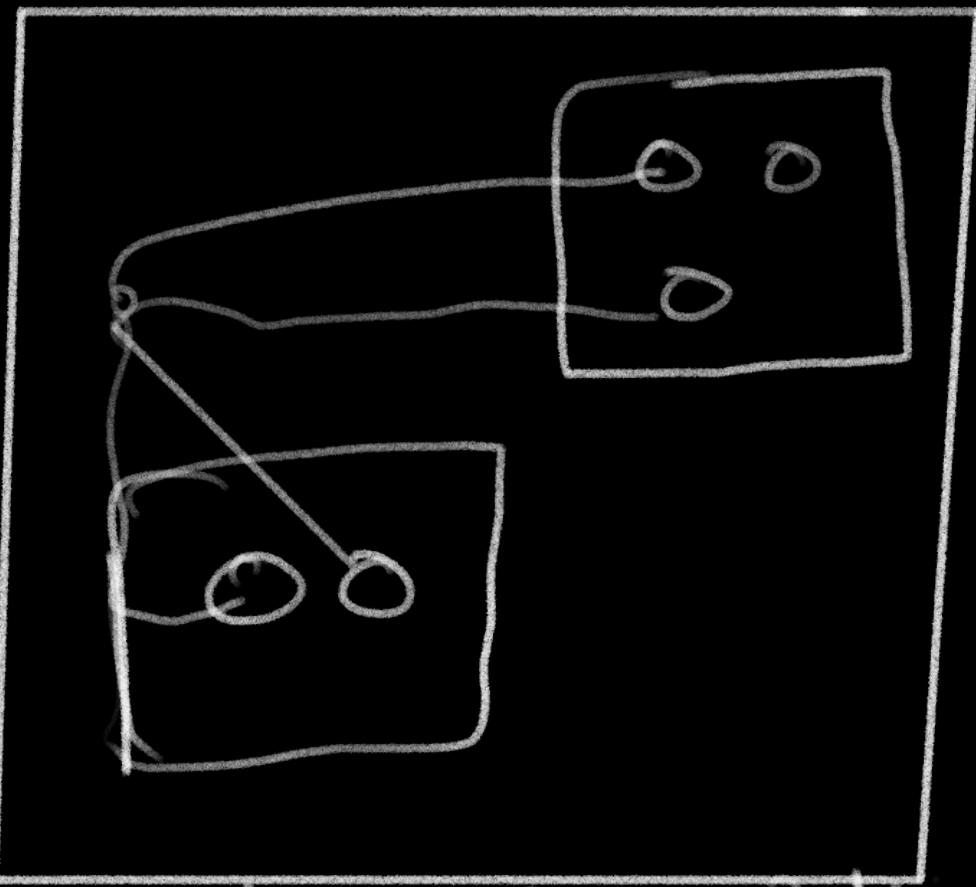
→ Kubelet will always listen to API server & tell okay you requesting something I'll allocate on my own.

→ It will always listen to API, & tell if it can do it or not, if it can't it will repeat control plane I can't schedule it please do something else.

→ Then API Server will work with Schedule, Controller Manager & do something about it.

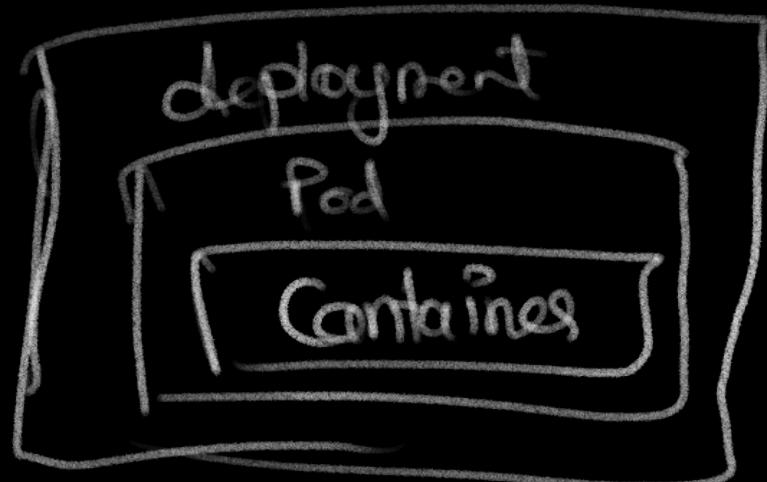
→ Kube-proxy is responsible for networking, if your worker node(s) cluster want to communicate with outside network Kube proxy will help in that.

→ It will provide unique IP address to every worker node



Internal pod Communication

- Kubernetes has Internal DNS Service
called Core DNS → K8s DNS
- Every pod has an IP address &
they know to comm with
each other



Installing

```
base ~ (24.338s)
brew install kubectl

==> Auto-updating Homebrew...
Adjust how often this is run with HOMEBREW_AUTO_UPDATE_SECS or disable with
HOMEBREW_NO_AUTO_UPDATE. Hide these hints with HOMEBREW_NO_ENV_HINTS (see `man brew`).
==> Auto-updated Homebrew!
Updated 2 taps (hashicorp/tap and homebrew/cask).
==> New Casks
ball                 orka-desktop           productive
ea                  plugdata@nightly        retroarch-metal@nightly
inkdown              positron                wd-security

You have 73 outdated formulae and 1 outdated cask installed.

==> Downloading https://ghcr.io/v2/homebrew/core/kubernetes-cli/manifests/1.30.2
#####
==> Fetching kubernetes-cli
==> Downloading https://ghcr.io/v2/homebrew/core/kubernetes-cli/blobs/sha256:eb883c00bc96fbac7a08f
#####
==> Pouring kubernetes-cli--1.30.2.arm64_sonoma.bottle.tar.gz
==> Caveats
zsh completions have been installed to:
  /opt/homebrew/share/zsh/site-functions
==> Summary
  /opt/homebrew/Cellar/kubernetes-cli/1.30.2: 236 files, 54.3MB
==> Running `brew cleanup kubernetes-cli`...
Disable this behaviour by setting HOMEBREW_NO_INSTALL_CLEANUP.
Hide these hints with HOMEBREW_NO_ENV_HINTS (see `man brew`).

base ~ * docker-desktop (0.147s)
kubectl version --client
Client Version: v1.29.2
Kustomize Version: v5.0.4-0.20230601165947-6ce@bf390ce3
```

1. ↳ Kubectl

2. ↳ Minikube

3. ↳ Kube adm

4. ↳ Cloud provider → GVK
low level

→ Minikube ↳ 1 node cluster for
testing purposes & learning it's
good.

```
base ~ (2m 30.11s)
minikube start

😄 minikube v1.33.1 on Darwin 14.5 (arm64)
⭐ Automatically selected the docker driver
📌 Using Docker Desktop driver with root privileges
👍 Starting "minikube" primary control-plane node in "minikube" cluster
Pulling base image v0.0.44 ...
⬇️ Downloading Kubernetes v1.30.0 preload ...
  > preloaded-images-k8s-v18-v1...: 319.81 MiB / 319.81 MiB 100.00% 6.74 Mi
  > gcr.io/k8s-minikube/kicbase...: 435.76 MiB / 435.76 MiB 100.00% 6.13 Mi
🔥 Creating docker container (CPUs=2, Memory=2200MB) ...
💡 Preparing Kubernetes v1.30.0 on Docker 26.1.1 ...
  └─ Generating certificates and keys ...
  └─ Booting up control plane ...
  └─ Configuring RBAC rules ...
🔧 Configuring bridge CNI (Container Networking Interface) ...
🌐 Verifying Kubernetes components...
  └─ Using image gcr.io/k8s-minikube/storage-provisioner:v5
🌟 Enabled addons: default-storageclass, storage-provisioner
👉 Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
```

→ Start minikube

```
base ~ (0.353s)
minikube status

minikube
type: Control Plane
host: Running
kubelite: Running
apiserver: Running
kubeconfig: Configured
```

→ Status

```
base ~ * minikube (0.246s)
kubectl get pods
No resources found in default namespace.
```



```
base ~ * minikube (0.266s)
kubectl get nodes
NAME     STATUS    ROLES      AGE      VERSION
minikube  Ready     control-plane  7m47s   v1.30.0
```

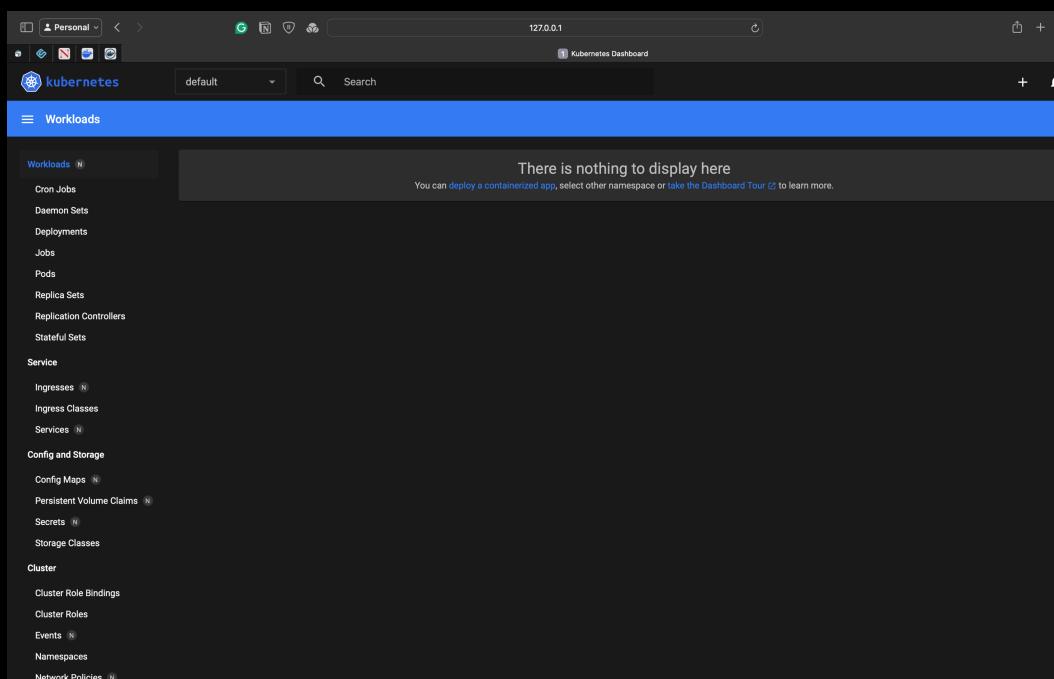
→ checking pods

→ --> nodes

```
base ~
minikube dashboard
⚡ Enabling dashboard ...
  └─ Using image docker.io/kubernetesui/dashboard:v2.7.0
  └─ Using image docker.io/kubernetesui/metrics-scraper:v1.0.8
💡 Some dashboard features require the metrics-server addon. To enable all features please run:
  minikube addons enable metrics-server

😊 Verifying dashboard health ...
💡 Launching proxy ...
💡 Verifying proxy health ...
💡 Opening http://127.0.0.1:61469/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard:/proxy/ in your default browser...
```

→ dashboard



→ Empty because nothing deployed

```
base ~ (0.641s)
minikube docker-env

export DOCKER_TLS_VERIFY="1"
export DOCKER_HOST="tcp://127.0.0.1:61405"
export DOCKER_CERT_PATH="/Users/akashvarun/.minikube/certs"
export MINIKUBE_ACTIVE_DOCKERD="minikube"

# To point your shell to minikube's docker-daemon, run:
# eval $(minikube -p minikube docker-env)
```

- ```
eval $(minikube -p minikube docker-env)
```

  - ↳ It's going give some env variables
  - ↳ These are variables required by Docker client locally to communicate with remote servers.

```
base ~ (0..116s)
docker container ls
CONTAINER ID IMAGE NAMES COMMAND CREATED STATUS PORTS
c20eb5bcc60 gcr.io/k8s-minikube/kicbase:v0.44 "/usr/local/bin/entr..." 18 minutes ago Up 11 minutes 127.0.0.1:61404->22/tcp, 127.0.0.1:61405->2376/tcp, 127.0.0.1:61407->5000/tcp, 127.0.0.1:61408->8443/tcp, 127.0.0.1:61406->32443/tcp minikube
```

- ↳ So, these are containers that are required by Kubernetes.

| base ~                                         | minikube ssh                                                                                    |                          |                |            |  |
|------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------|----------------|------------|--|
| docker0@minikube:~\$ docker ts                 |                                                                                                 |                          |                |            |  |
| docker: 'ts' is not a docker command.          |                                                                                                 |                          |                |            |  |
| See 'docker --help'                            |                                                                                                 |                          |                |            |  |
| CONTAINER ID                                   | IMAGE                                                                                           | COMMAND                  | CREATED        | STATUS     |  |
| PORTS                                          | NAMES                                                                                           |                          |                |            |  |
| 0b0862cab620                                   | kubernetesui/metrics-scraper                                                                    | "/metrics-sidecar"       | 12 minutes ago | Up 12 minu |  |
| tes                                            | k8s_dashboard-metrics-scraper-kubernetesui-dashboard-metrics-scraper-b5fc48f67-pc55g_kubernetes |                          |                |            |  |
| -dashboard_246a02_b937-4049-8ad0-c45d0f61a02_0 |                                                                                                 |                          |                |            |  |
| 5ae4171a3eed                                   | kubernetesui/dashboard                                                                          | "/dashboard--insecure"   | 13 minutes ago | Up 13 minu |  |
|                                                | k8s_kubernetes-dashbaord_kubernetes-dashbaord-779776cb65-49rtz_kubernetes-dashbaord             |                          |                |            |  |
| c8fe6c78c83                                    | registry.k8s.io/pause:3.9                                                                       | "/pause"                 | 13 minutes ago | Up 13 minu |  |
|                                                | k8s_POD_dashboard-metrics-scraper-05fc48f67-pc55g_kubernetes-dashbaord_246b50a82-89             |                          |                |            |  |
| 3f0-4049-8ad0-c450d461a02_0                    |                                                                                                 |                          |                |            |  |
| tes                                            | k8s_POD_kubernetes-dashbaord-779776cb65-49rtz_kubernetes-dashbaord_db2e28b-7b6e-4               |                          |                |            |  |
| 040-bb14-dc17f9ef7a31_0                        |                                                                                                 |                          |                |            |  |
| 49205f144ff4b                                  | ba04bb24b957                                                                                    | "/storage-provisioner"   | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_STORAGE-provisioner_kube-system_422b1a42-94e9-491c-8ac6-14                                  |                          |                |            |  |
| 4de4ff8818_1                                   |                                                                                                 |                          |                |            |  |
| 71e4443a3617                                   | 2437cf762177                                                                                    | "/coredns -conf /etc.."  | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_coredns_coredns-7db6d8ff4d-h7wbm_kube-system_cf8f6a2c-a1ea-4ab4-a83f-2937ebfb5              |                          |                |            |  |
| ees_1                                          |                                                                                                 |                          |                |            |  |
| 8816161f422b                                   | cb7ac0b42c2c                                                                                    | "/usr/local/bin/kubeadm" | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_kube-proxy_kube-proxy-bbr95_kube-system_98513c13-b389-4318-89c6-5c153a5d0za_1               |                          |                |            |  |
| bf0d3966d262d                                  | registry.k8s.io/pause:3.9                                                                       | "/pause"                 | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_POD_coredns-7db6d8ff4d-h7wbm_kube-system_cf8f6a2c-a1ea-4ab4-a83f-2937ebfb5ec                |                          |                |            |  |
| 1                                              |                                                                                                 |                          |                |            |  |
| 8666f350b163                                   | registry.k8s.io/pause:3.9                                                                       | "/pause"                 | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_POD_kube-proxy-bbr95_kube-system_98513c13-b389-4318-89c6-5c153a5d0za_1                      |                          |                |            |  |
| 0a48cb15684f                                   | registry.k8s.io/pause:3.9                                                                       | "/pause"                 | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_POD_storage-provisioner_kube-system_422b1a42-94e9-491c-8ac6-14de4ff988d18_1                 |                          |                |            |  |
| 2724b80b712a                                   | 72745fd73c0b                                                                                    | "kube-apiserver --ad..." | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_kube-apiserver_kube-apiserver-minikube_kube-system_3c55f82840969009beeb39fd8bed             |                          |                |            |  |
| ad_1                                           |                                                                                                 |                          |                |            |  |
| 425e891bc184                                   | 014fa467e29                                                                                     | "etcd --advertise-cl..." | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_etcd etcd-minikube_kube-system_063d6b9688992760f152f9d180d305c_1                            |                          |                |            |  |
| fa82090173f6                                   | 68faec521c0f                                                                                    | "kube-controller-man..." | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_kube-controller-manager_kube-controller-manager-minikube_kube-system_7fd44e8d1              |                          |                |            |  |
| 1c3e0ffefb1825e2a1f2270_1                      |                                                                                                 |                          |                |            |  |
| 18fe6b4ac184                                   | 547ada3e34140                                                                                   | "kube-scheduler --au..." | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_kube-scheduler_kube-scheduler-minikube_kube-system_f9c8e0d1d704b1727abd4b4a31d              |                          |                |            |  |
| tes                                            |                                                                                                 |                          |                |            |  |
| 3a7c_1                                         |                                                                                                 |                          |                |            |  |
| c13495c8e858                                   | registry.k8s.io/pause:3.9                                                                       | "/pause"                 | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_POD_kube-controller-manager-minikube_kube-system_7fd44e8d1c3e0fffe6b1825e2a1f2              |                          |                |            |  |
| 270_1                                          |                                                                                                 |                          |                |            |  |
| a25b8ab4b78d                                   | registry.k8s.io/pause:3.9                                                                       | "/pause"                 | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_POD_kube-apiserver-minikube_kube-system_3c55f82840969009beeb39fd8bedfc                      |                          |                |            |  |
| tes                                            |                                                                                                 |                          |                |            |  |
| e4dc438cf009                                   | registry.k8s.io/pause:3.9                                                                       | "/pause"                 | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_POD_kube-scheduler-minikube_kube-system_f9c8e0d1d704b1727abd4b4a31d3d7c_1                   |                          |                |            |  |
| ad44c297f9fe                                   | registry.k8s.io/pause:3.9                                                                       | "/pause"                 | 14 minutes ago | Up 14 minu |  |
|                                                | k8s_POD_etcd-minikube_kube-system_063d6b968892760f152f9d180d305c_1                              |                          |                |            |  |
| tes                                            |                                                                                                 |                          |                |            |  |

- To check Containers running provide minikube
  - Use Minikube SSH then RT} Go to docker hub you can use docker

```
base ~ * minikube (0.238s)
kubectl config view
apiVersion: v1
clusters:
- cluster:
 certificate-authority-data: DATA+OMITTED
 server: https://kubernetes.docker.internal:6443
 name: docker-desktop
- cluster:
 certificate-authority: /Users/akashvarun/.minikube/ca.crt
 extensions:
 - extension:
 last-update: Wed, 03 Jul 2024 12:01:55
IST
 provider: minikube.sigs.k8s.io
 version: v1.33.1
 name: cluster_info
 server: https://127.0.0.1:61408
 name: minikube
contexts:
- context:
 cluster: docker-desktop
 user: docker-desktop
 name: docker-desktop
- context:
 cluster: minikube
 extensions:
 - extension:
 last-update: Wed, 03 Jul 2024 12:01:55
IST
 provider: minikube.sigs.k8s.io
 version: v1.33.1
 name: context_info
 namespace: default
 user: minikube
 name: minikube
current-context: minikube
kind: Config
preferences: {}
users:
- name: docker-desktop
 user:
 client-certificate-data: DATA+OMITTED
 client-key-data: DATA+OMITTED
- name: minikube
 user:
 client-certificate: /Users/akashvarun/.minikube/profiles/minikube/client.crt
 client-key: /Users/akashvarun/.minikube/profiles/minikube/client.key
```

→ This is my kubeconfig  
→ It has info about my cluster.

```
base ~ * minikube (0.247s)
kubectl config current-context
minikube
```

→ You can also get the current context in profile

| NAME                                  | READY | STATUS           | RESTARTS | AGE   |
|---------------------------------------|-------|------------------|----------|-------|
| pod/for-minikube-65c6c88978-cdn5f     | 1/1   | Running          | 2        | 14d   |
| pod/for-minikube-65c6c88978-jj29v     | 1/1   | Running          | 2        | 14d   |
| pod/for-minikube-65c6c88978-whnqk     | 1/1   | Running          | 0        | 7m48s |
| pod/for-minikube-65c6c88978-zkqq5     | 1/1   | Running          | 2        | 14d   |
| pod/nginx-deployment-66b6c48dd5-6gpbp | 1/1   | Running          | 2        | 15d   |
| pod/nginx-deployment-66b6c48dd5-8m58d | 1/1   | Running          | 2        | 15d   |
| pod/nginx-deployment-66b6c48dd5-g977t | 1/1   | Running          | 2        | 15d   |
| pod/nginx-deployment-66b6c48dd5-jp4jw | 1/1   | Running          | 2        | 15d   |
| pod/quote-65c6c88978-5phzw            | 1/1   | Running          | 2        | 14d   |
| pod/quote-65c6c88978-6m65f            | 1/1   | Running          | 2        | 14d   |
| pod/quote-65c6c88978-fwvrx            | 1/1   | Running          | 2        | 14d   |
| pod/quote-65c6c88978-vnchl            | 1/1   | Running          | 2        | 14d   |
| pod/service-catalog-apiserver         | 0/2   | ImagePullBackOff | 71       | 14d   |
| pod/static-web                        | 1/1   | Running          | 2        | 15d   |

| NAME               | TYPE      | CLUSTER-IP | EXTERNAL-IP | PORT(S) | AGE |
|--------------------|-----------|------------|-------------|---------|-----|
| service/kubernetes | ClusterIP | 10.96.0.1  | <none>      | 443/TCP | 19d |

| NAME                             | READY | UP-TO-DATE | AVAILABLE | AGE |
|----------------------------------|-------|------------|-----------|-----|
| deployment.apps/for-minikube     | 4/4   | 4          | 4         | 14d |
| deployment.apps/nginx-deployment | 4/4   | 4          | 4         | 15d |
| deployment.apps/quote            | 4/4   | 4          | 4         | 14d |

| NAME                                        | DESIRED | CURRENT | READY | AGE |
|---------------------------------------------|---------|---------|-------|-----|
| replicaset.apps/for-minikube-65c6c88978     | 4       | 4       | 4     | 14d |
| replicaset.apps/nginx-deployment-66b6c48dd5 | 4       | 4       | 4     | 15d |

Since I said always 4 pods

|                                   |     |                  |    |     |
|-----------------------------------|-----|------------------|----|-----|
| nginx-deployment-66b6c48dd5-8m58d | 1/1 | Running          | 2  | 15d |
| nginx-deployment-66b6c48dd5-g977t | 1/1 | Running          | 2  | 15d |
| nginx-deployment-66b6c48dd5-jp4jw | 1/1 | Running          | 2  | 15d |
| quote-65c6c88978-5phzw            | 1/1 | Running          | 2  | 14d |
| quote-65c6c88978-6m65f            | 1/1 | Running          | 2  | 14d |
| quote-65c6c88978-fwvrx            | 1/1 | Running          | 2  | 14d |
| quote-65c6c88978-vnchl            | 1/1 | Running          | 2  | 14d |
| service-catalog-apiserver         | 0/2 | ImagePullBackOff | 71 | 14d |
| static-web                        | 1/1 | Running          | 2  | 15d |

→ ~ kubectl delete pod nginx-deployment-66b6c48dd5-6gpbp  
pod "nginx-deployment-66b6c48dd5-6gpbp" deleted  
→ ~ kubectl get pods

| NAME                              | READY | STATUS           | RESTARTS | AGE   |
|-----------------------------------|-------|------------------|----------|-------|
| for-minikube-65c6c88978-cdn5f     | 1/1   | Running          | 2        | 14d   |
| for-minikube-65c6c88978-jj29v     | 1/1   | Running          | 2        | 14d   |
| for-minikube-65c6c88978-whnqk     | 1/1   | Running          | 0        | 9m46s |
| for-minikube-65c6c88978-zkqq5     | 1/1   | Running          | 2        | 14d   |
| nginx-deployment-66b6c48dd5-8m58d | 1/1   | Running          | 2        | 15d   |
| nginx-deployment-66b6c48dd5-g977t | 1/1   | Running          | 2        | 15d   |
| nginx-deployment-66b6c48dd5-jp4jw | 1/1   | Running          | 2        | 15d   |
| nginx-deployment-66b6c48dd5-mhhbn | 1/1   | Running          | 0        | 4s    |
| quote-65c6c88978-5phzw            | 1/1   | Running          | 2        | 14d   |
| quote-65c6c88978-6m65f            | 1/1   | Running          | 2        | 14d   |
| quote-65c6c88978-fwvrx            | 1/1   | Running          | 2        | 14d   |
| quote-65c6c88978-vnchl            | 1/1   | Running          | 2        | 14d   |
| service-catalog-apiserver         | 0/2   | ImagePullBackOff | 71       | 14d   |
| static-web                        | 1/1   | Running          | 2        | 15d   |

→ ~

→ Here even & delete a pod & to check

I used get pods (it started again)

All pt has 4.

→ Control Manager always listening  
Since we learnt above.

→ ~ kubectl get deployments

| NAME             | READY | UP-TO-DATE | AVAILABLE | AGE |
|------------------|-------|------------|-----------|-----|
| for-minikube     | 4/4   | 4          | 4         | 14d |
| nginx-deployment | 4/4   | 4          | 4         | 15d |
| quote            | 4/4   | 4          | 4         | 14d |

→ ~ kubectl delete deployments nginx-deployment

deployment.apps "nginx-deployment" deleted

→ ~ kubectl get pod

| NAME                              | READY | STATUS           | RESTARTS | AGE |
|-----------------------------------|-------|------------------|----------|-----|
| for-minikube-65c6c88978-cdn5f     | 1/1   | Running          | 2        | 14d |
| for-minikube-65c6c88978-jj29v     | 1/1   | Running          | 2        | 14d |
| for-minikube-65c6c88978-wnhpk     | 1/1   | Running          | 0        | 10m |
| for-minikube-65c6c88978-zkqq5     | 1/1   | Running          | 2        | 14d |
| nginx-deployment-66b6c48dd5-8m58d | 0/1   | Terminating      | 2        | 15d |
| nginx-deployment-66b6c48dd5-g977t | 0/1   | Terminating      | 2        | 15d |
| nginx-deployment-66b6c48dd5-jp4jw | 0/1   | Terminating      | 2        | 15d |
| nginx-deployment-66b6c48dd5-mhhbn | 0/1   | Terminating      | 0        | 73s |
| quote-65c6c88978-5phzw            | 1/1   | Running          | 2        | 14d |
| quote-65c6c88978-6m65f            | 1/1   | Running          | 2        | 14d |
| quote-65c6c88978-fwvrx            | 1/1   | Running          | 2        | 14d |
| quote-65c6c88978-vnchl            | 1/1   | Running          | 2        | 14d |
| service-catalog-apiserver         | 0/2   | ImagePullBackOff | 72       | 14d |
| static-web                        | 1/1   | Running          | 2        | 15d |

→ ~

↳ Command to view existing  
deployments

↳ Command to delete deployment

↳ Pods are also now terminating  
since deployment is deleted

```

→ ~ kubectl get all
NAME READY STATUS RESTARTS AGE
pod/for-minikube-65c6c88978-cdn5f 1/1 Running 2 14d
pod/for-minikube-65c6c88978-jj29v 1/1 Running 2 14d
pod/for-minikube-65c6c88978-wnhqk 1/1 Running 0 11m
pod/for-minikube-65c6c88978-zkqq5 1/1 Running 2 14d
pod/quote-65c6c88978-5phzw 1/1 Running 2 14d
pod/quote-65c6c88978-6m65f 1/1 Running 2 14d
pod/quote-65c6c88978-fwvrx 1/1 Running 2 14d
pod/quote-65c6c88978-vnchl 1/1 Running 2 14d
pod/service-catalog-apiserver 0/2 ImagePullBackOff 72 14d
pod/static-web 1/1 Running 2 15d

NAME TYPE CLUSTER-IP EXTERNAL-IP PORT(S) AGE
service/kubernetes ClusterIP 10.96.0.1 <none> 443/TCP 19d

NAME READY UP-TO-DATE AVAILABLE AGE
deployment.apps/for-minikube 4/4 4 4 14d
deployment.apps/quote 4/4 4 4 14d

NAME DESIRED CURRENT READY AGE
replicaset.apps/for-minikube-65c6c88978 4 4 4 14d
replicaset.apps/quote-65c6c88978 4 4 4 14d

```

- As you can see nginx deployment is gone
- Kubernetes as you can see runs on port 443 as we learned above.

→ To create an object out of a file

```

base ~/Northeastern/DevOps-Networks/Kubernetes git:(main)±2 * minikube (0.388s)
kubectl create -f pod.yaml
pod/nginx-pod created

```

```

base ~/Northeastern/DevOps-Networks/Kubernetes git:(main)±2 * minikube (0.106s)
kubectl get pods
NAME READY STATUS RESTARTS AGE
nginx-pod 0/1 ContainerCreating 0 4s

```

```
base ~/Northeastern/DevOps-Networks/Kubernetes git:(main)±2 * minikube (0.266s)
kubectl get pods
```

| NAME      | READY | STATUS  | RESTARTS | AGE |
|-----------|-------|---------|----------|-----|
| nginx-pod | 1/1   | Running | 0        | 55s |

↳ now it is ready & running

Using output wide command  
you can get more info like

IP & stuff

```
base ~/Northeastern/DevOps-Networks/Kubernetes git:(main)±2 * minikube (0.258s)
kubectl get pod nginx-pod -o wide
```

| NAME      | READY | STATUS  | RESTARTS | AGE | IP         | NODE     | NOMINATED NODE | READINESS GATES |
|-----------|-------|---------|----------|-----|------------|----------|----------------|-----------------|
| nginx-pod | 1/1   | Running | 0        | 19m | 10.244.0.9 | minikube | <none>         | <none>          |

```
base ~/Northeastern/DevOps-Networks/Kubernetes git:(main)±2 * minikube (0.255s)
kubectl get pod nginx-pod
```

| NAME      | READY | STATUS  | RESTARTS | AGE |
|-----------|-------|---------|----------|-----|
| nginx-pod | 1/1   | Running | 0        | 20m |

```
base ~/Northeastern/DevOps-Networks/Kubernetes git:(main)±2 * minikube (0.251s
kubectl get pod nginx-pod -o yaml
apiVersion: v1
kind: Pod
metadata:
 creationTimestamp: "2024-07-03T07:45:13Z"
 labels:
 app: nginx
 tier: dev
 name: nginx-pod
 namespace: default
 resourceVersion: "4192"
 uid: 338561c9-2f85-47c7-8903-02910cec61e2
spec:
 containers:
 - image: nginx
 imagePullPolicy: Always
 name: nginx-container
 resources: {}
 terminationMessagePath: /dev/termination-log
 terminationMessagePolicy: File
 volumeMounts:
 - mountPath: /var/run/secrets/kubernetes.io/serviceaccount
 name: kube-api-access-2pnrp
 readOnly: true
 dnsPolicy: ClusterFirst
 enableServiceLinks: true
 nodeName: minikube
 preemptionPolicy: PreemptLowerPriority
 priority: 0
 restartPolicy: Always
 schedulerName: default-scheduler
 securityContext: {}
 serviceAccount: default
 serviceAccountName: default
 terminationGracePeriodSeconds: 30
 tolerations:
 - effect: NoExecute
 key: node.kubernetes.io/not-ready
 operator: Exists
 tolerationSeconds: 300
 - effect: NoExecute
 key: node.kubernetes.io/unreachable
 operator: Exists
 tolerationSeconds: 300
 volumes:
 - name: kube-api-access-2pnrp
 projected:
 defaultMode: 420
 sources:
 - serviceAccountToken:
 expirationSeconds: 3607
 path: token
 type: Token
```

```

base ~/Northeastern/DevOps-Networks/Kubernetes git:(main)± 2 * minikube (0.245s)
kubectl get pod nginx-pod
Name: nginx-pod
Namespace: default
Priority: 0
Service Account: default
Node: minikube/192.168.49.2
Start Time: Wed, 03 Jul 2024 13:15:13 +0530
Labels: app=nginx
 tier=dev
Annotations: <none>
Status: Running
IP: 10.244.0.9
IPs:
 IP: 10.244.0.9
Containers:
 nginx-container:
 Container ID: docker://d91e2bbcd5b47fc7aa513bc90cb6727fcaefc0997f67693145b9bdaa557a51dc
 Image: nginx
 Image ID: docker-pullable://nginx@sha256:67682bda769fae1ccf5183192b8daf37b64cae99c6c3302650f6f8bf5f0f9
 Port: <none>
 Host Port: <none>
 State: Running
 Started: Wed, 03 Jul 2024 13:15:33 +0530
 Ready: True
 Restart Count: 0
 Environment: <none>
 Mounts:
 /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-2pnrp (ro)
Conditions:
 Type Status
 PodReadyToStartContainers True
 Initialized True
 Ready True
 ContainersReady True
 PodScheduled True
Volumes:
 kube-api-access-2pnrp:
 Type: Projected (a volume that contains injected data from multiple sources)
 TokenExpirationSeconds: 3607
 ConfigMapName: kube-root-ca.crt
 ConfigMapOptional: <nil>
 DownwardAPI: true
 QoS Class: BestEffort
 Node-Selectors: <none>
 Tolerations: node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
 node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
 Type Reason Age From Message
 ---- ---- -- -- -----
 Normal Scheduled 25m default-scheduler Successfully assigned default/nginx-pod to minikube
 Normal Pulling 25m kubelet Pulling image "nginx"
 Normal Pulled 24m kubelet Successfully pulled image "nginx" in 18.614s (18.614s including wait)
 Normal Created 24m kubelet Created container nginx-container
 Normal Started 24m kubelet Started container nginx-container

```

↳ which includes list of all events from the pod is sent to node All current states of pod

```
base ~/Northeastern/DevOps-Networks/Kubernetes git:(main)±2 (23m 2.36s)
minikube ssh
docker@minikube:~$ ping 10.244.0.9
PING 10.244.0.9 (10.244.0.9) 56(84) bytes of data.
64 bytes from 10.244.0.9: icmp_seq=1 ttl=64 time=1.55 ms
64 bytes from 10.244.0.9: icmp_seq=2 ttl=64 time=0.101 ms
64 bytes from 10.244.0.9: icmp_seq=3 ttl=64 time=0.193 ms
64 bytes from 10.244.0.9: icmp_seq=4 ttl=64 time=0.156 ms
64 bytes from 10.244.0.9: icmp_seq=5 ttl=64 time=0.125 ms
64 bytes from 10.244.0.9: icmp_seq=6 ttl=64 time=0.277 ms
64 bytes from 10.244.0.9: icmp_seq=7 ttl=64 time=0.084 ms
64 bytes from 10.244.0.9: icmp_seq=8 ttl=64 time=0.306 ms
^C
--- 10.244.0.9 ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7126ms
rtt min/avg/max/mdev = 0.084/0.349/1.550/0.460 ms
docker@minikube:~$ exit
logout
```

→ Inside my cluster  
I can access &  
checked using  
ping IP address  
of the node

```
base ~/Northeastern/DevOps-Networks/Kubernetes git:(main)±2 * minikube
kubectl port-forward nginx-pod 8080:80
Forwarding from 127.0.0.1:8080 -> 80
Forwarding from [::1]:8080 -> 80
Handling connection for 8080
```

↳ To check on our local machine outside minikube

