

# Getting Started With Kubernetes











**Kubernetes is...**

**Production Grade  
Container Orchestration**



**Kubernetes is...**

**Google Infrastructure For  
Everyone Else**



# Kubernetes is...

- Open source
- Moving fast, but very stable
- Container based
- Self-healing\*
- Pretty easy to use



**Dex**  
@dexhorthy

Follow



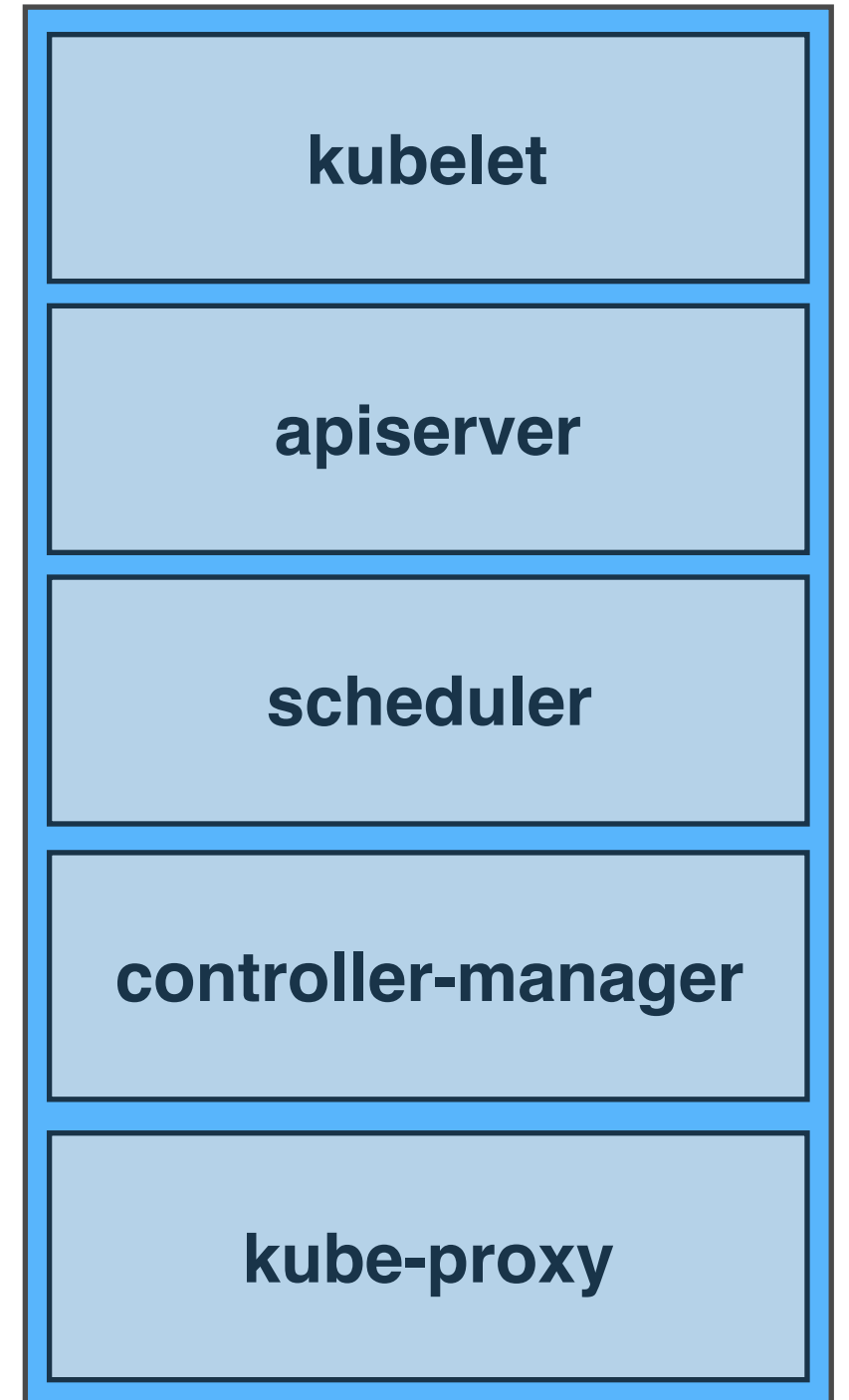
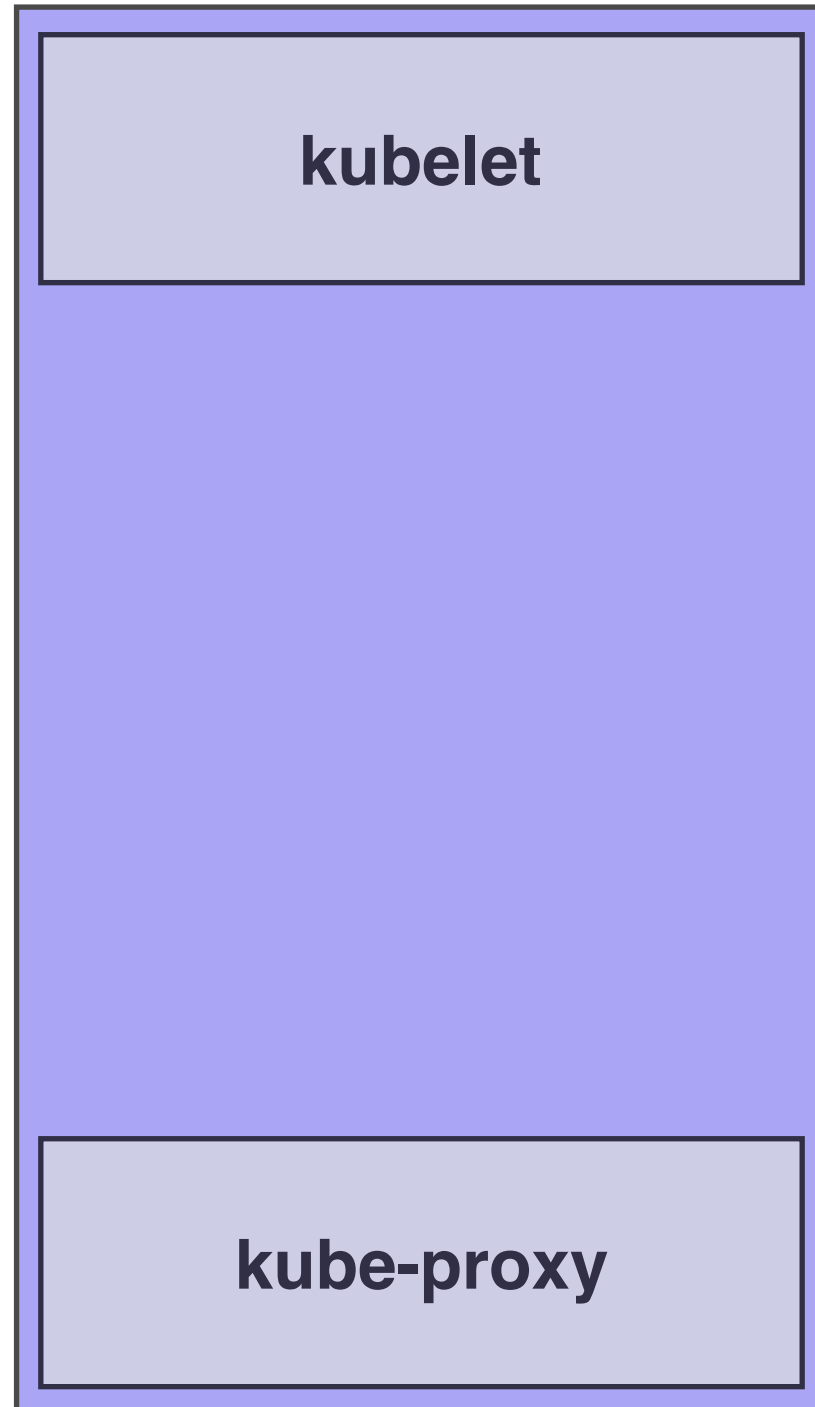
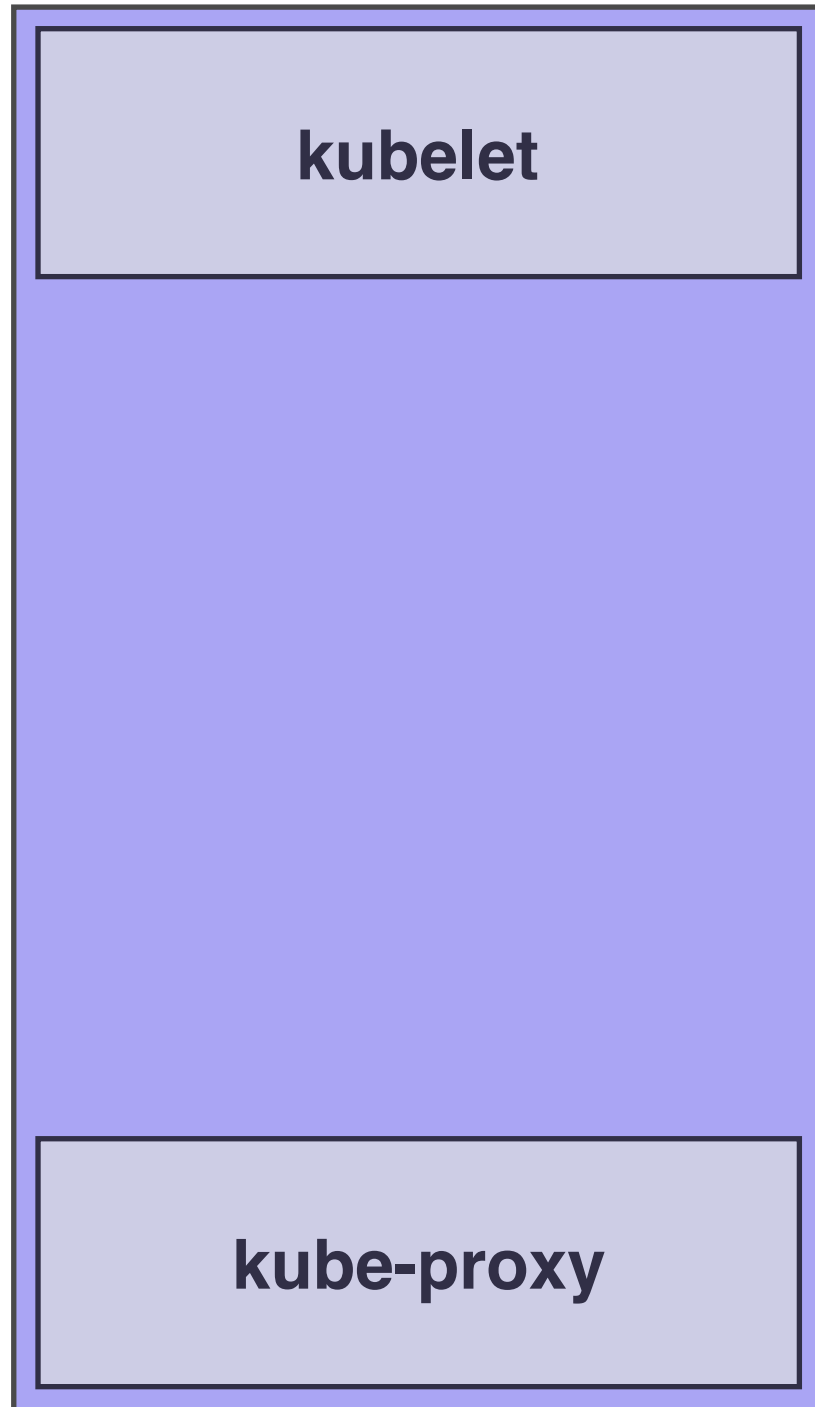
Deployed my blog on Kubernetes



3:40 PM - 24 Apr 2017

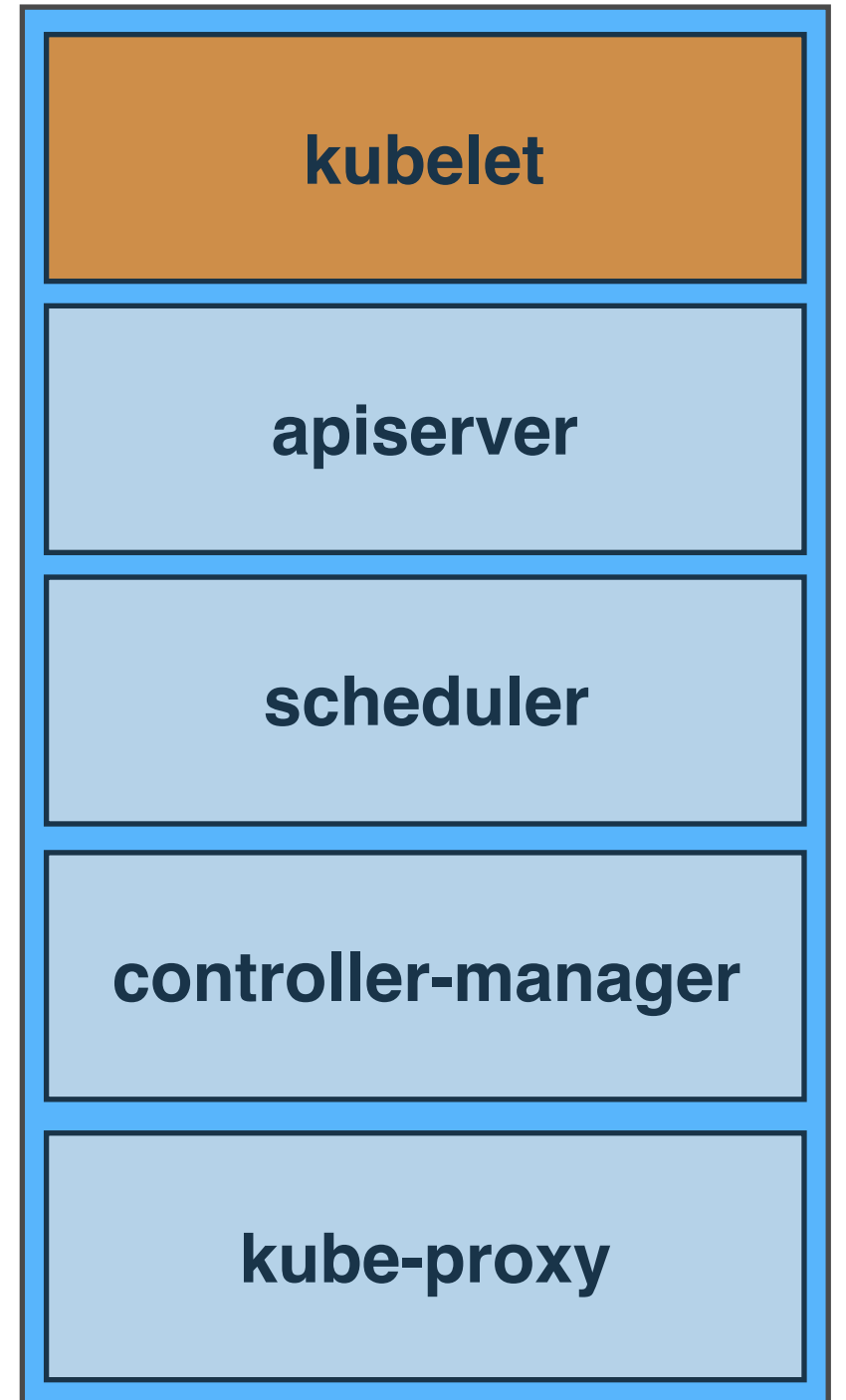
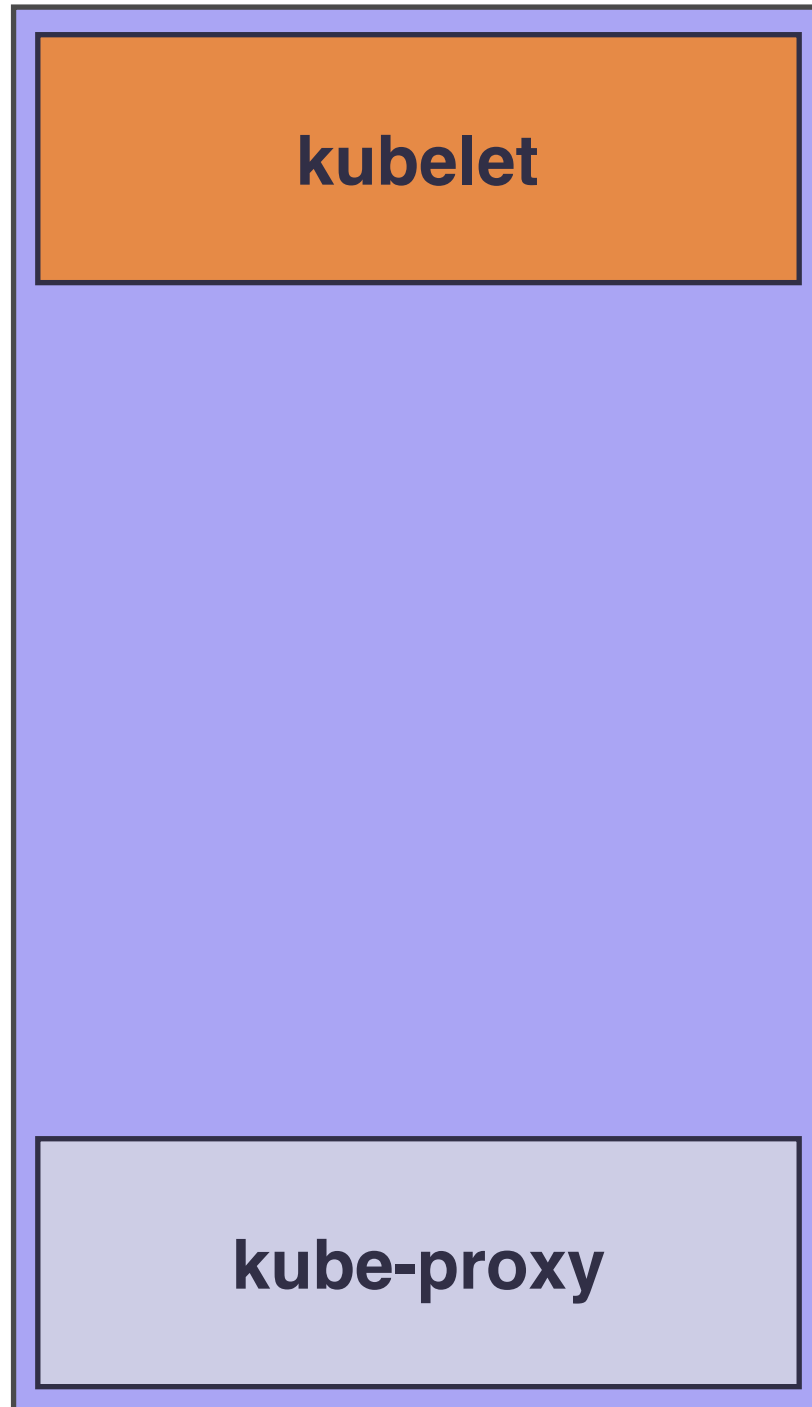
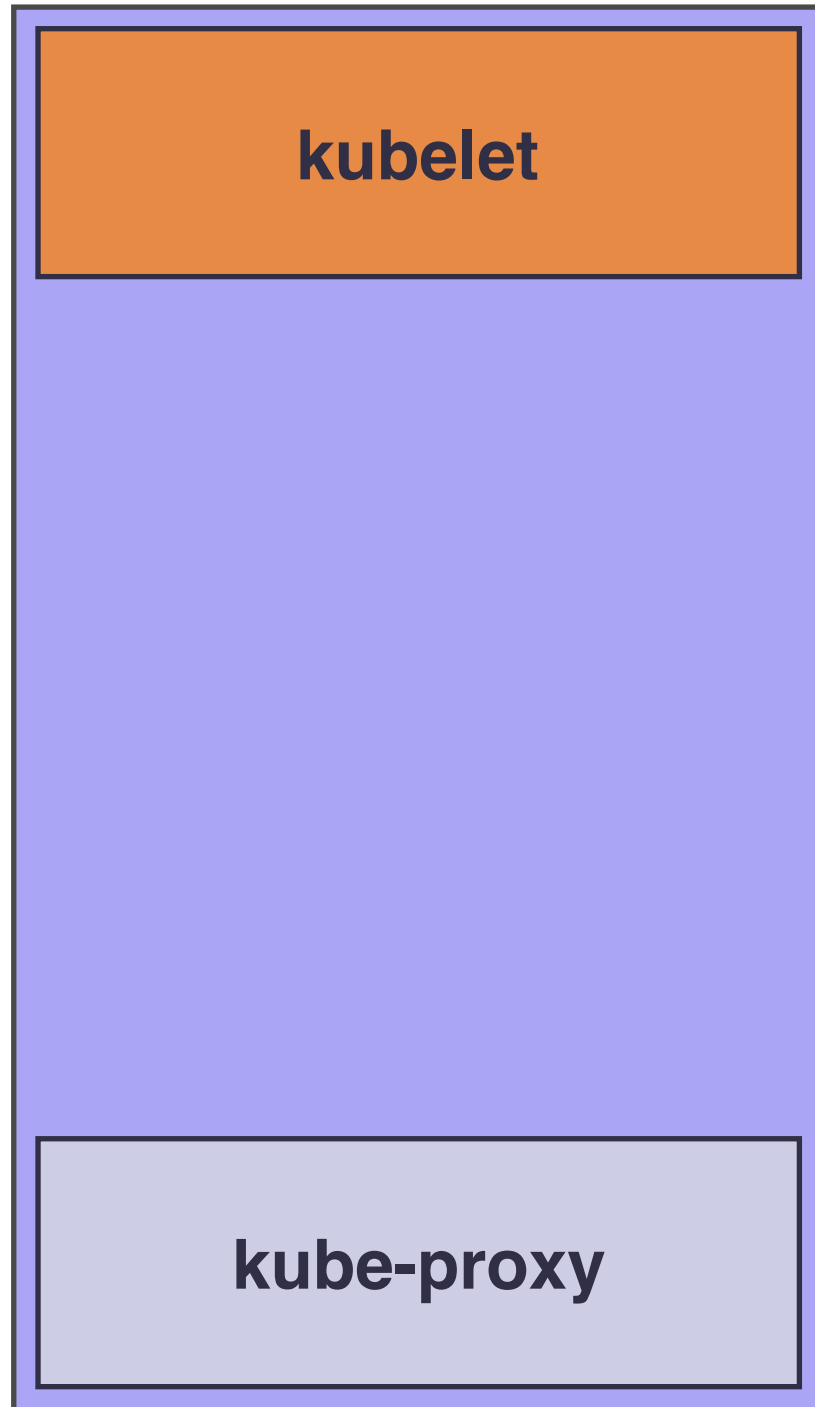


# Architecture





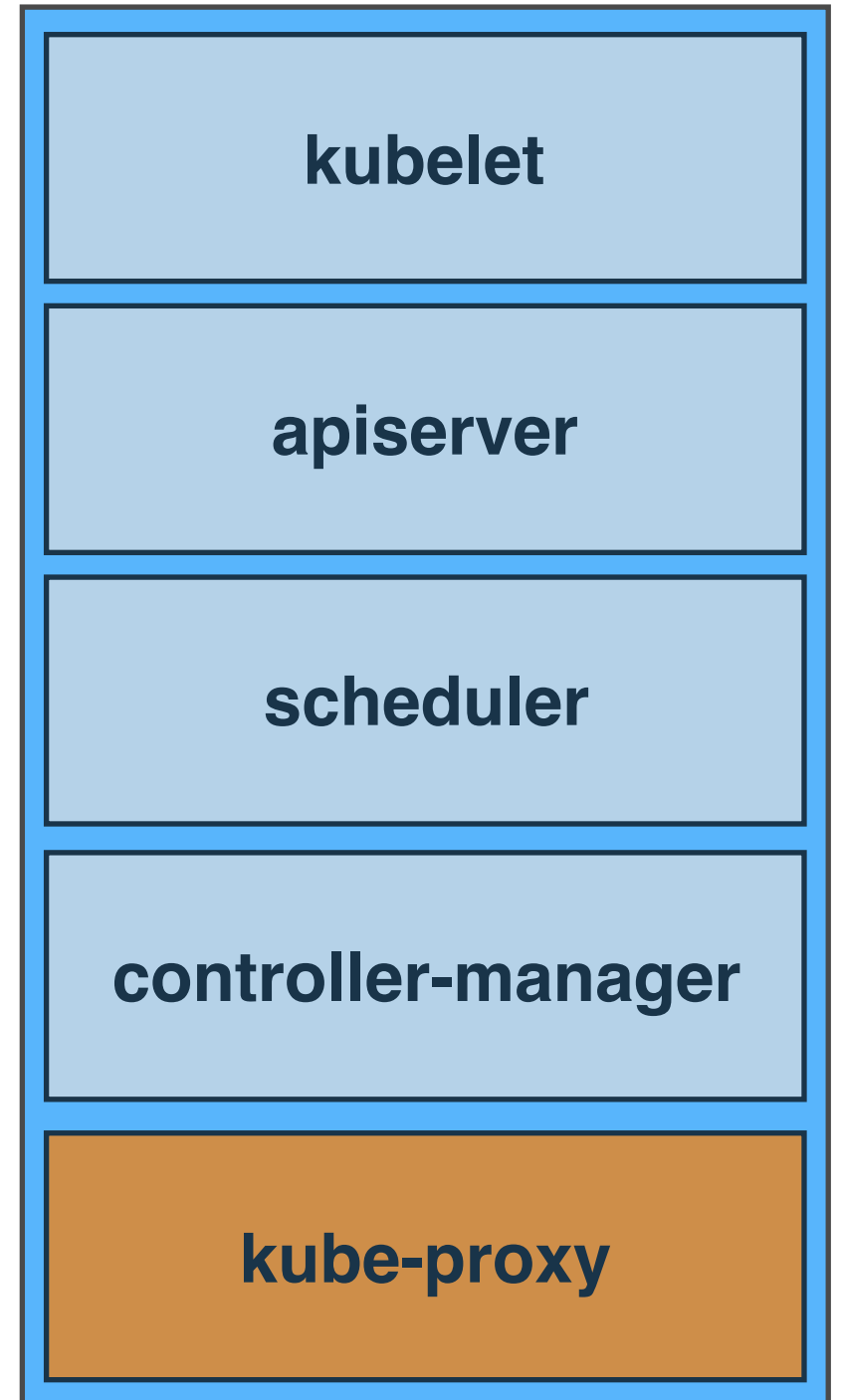
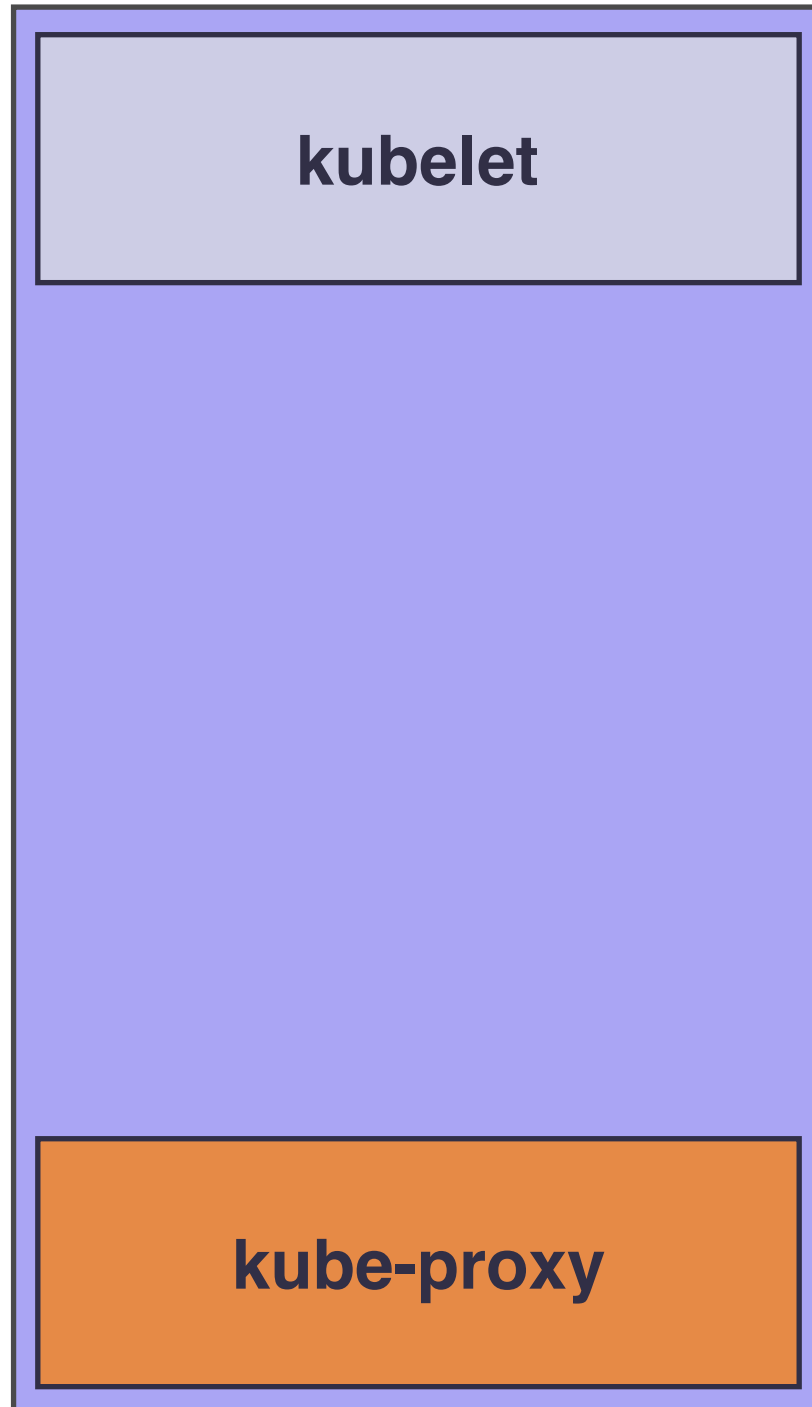
# kubelet





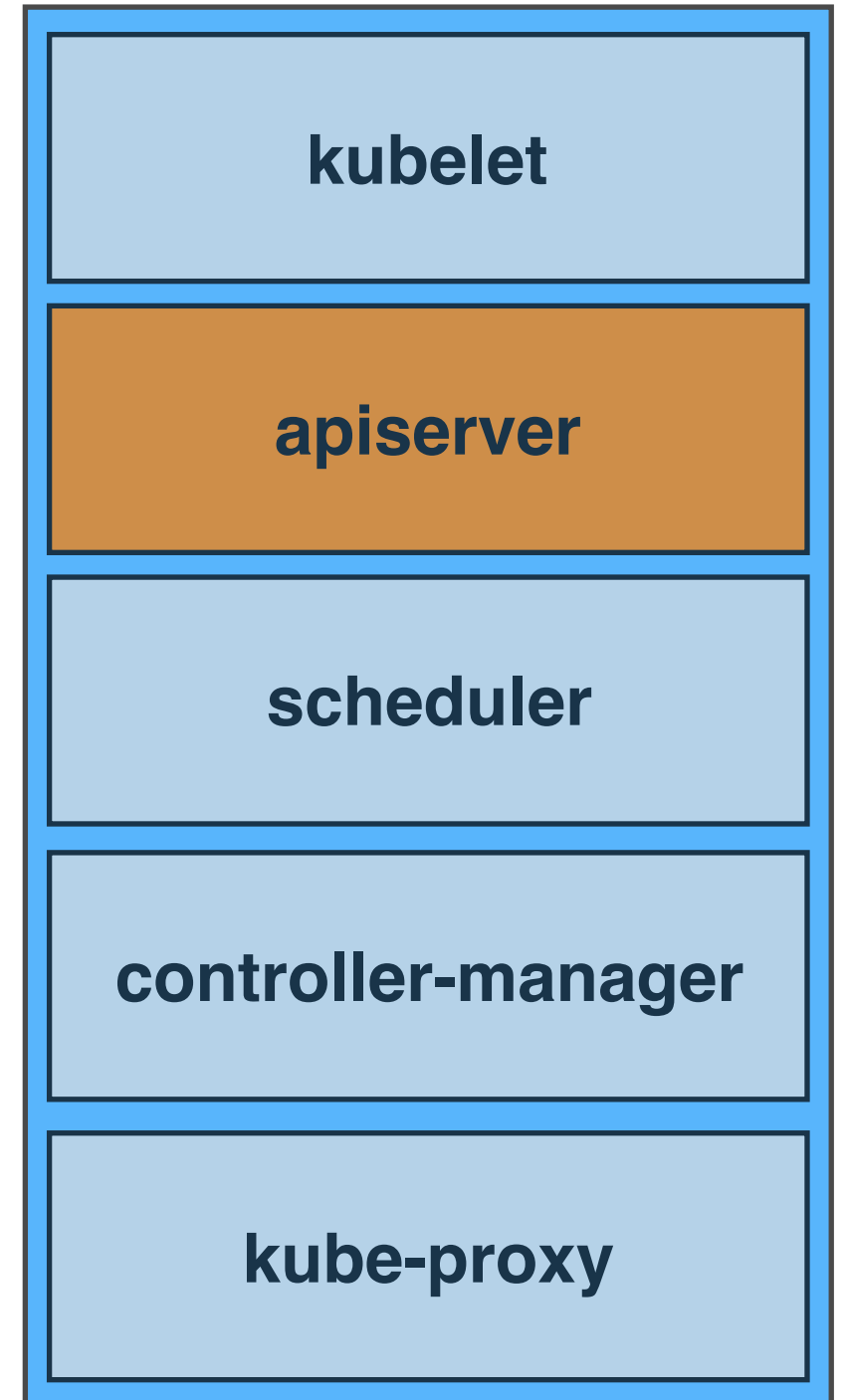
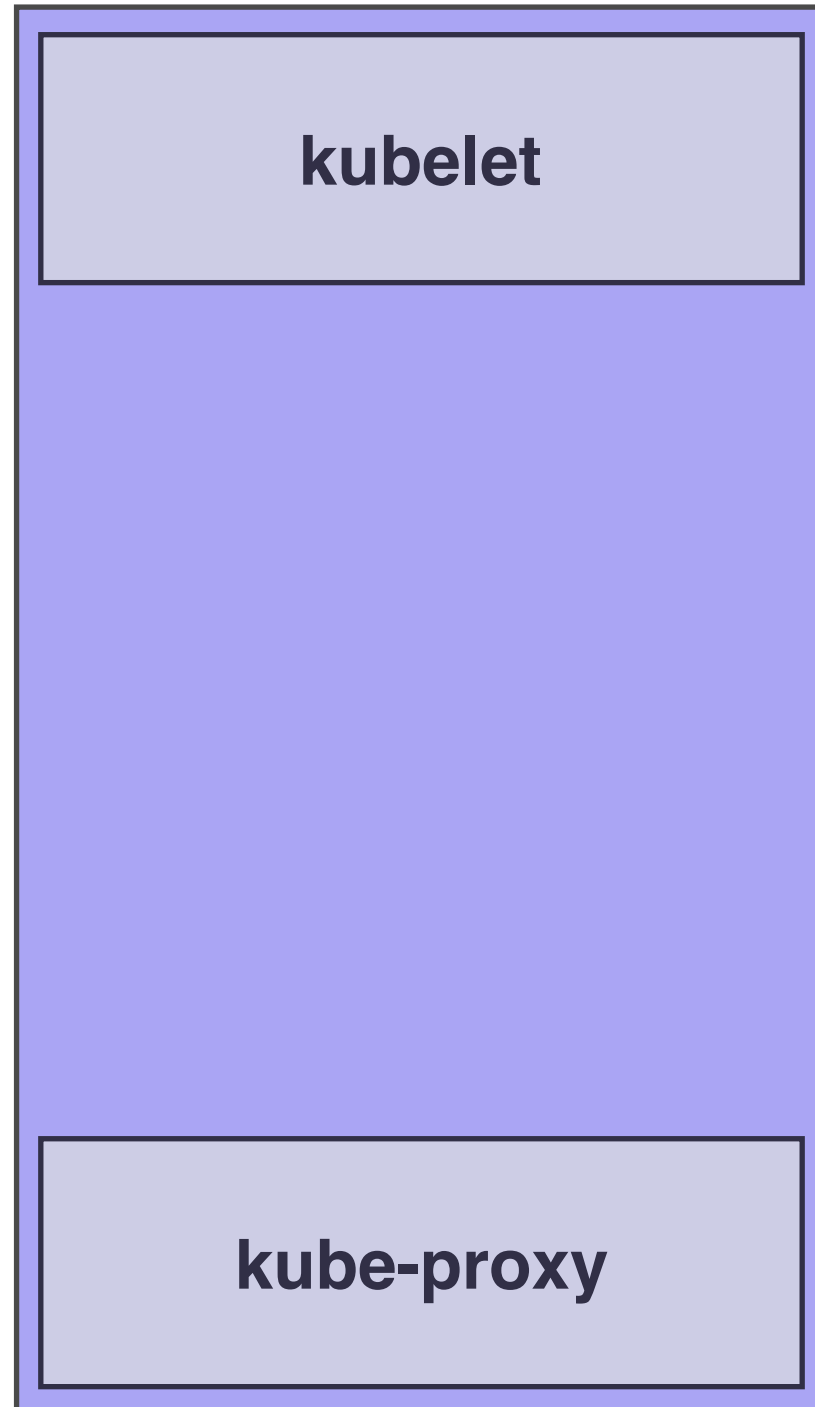
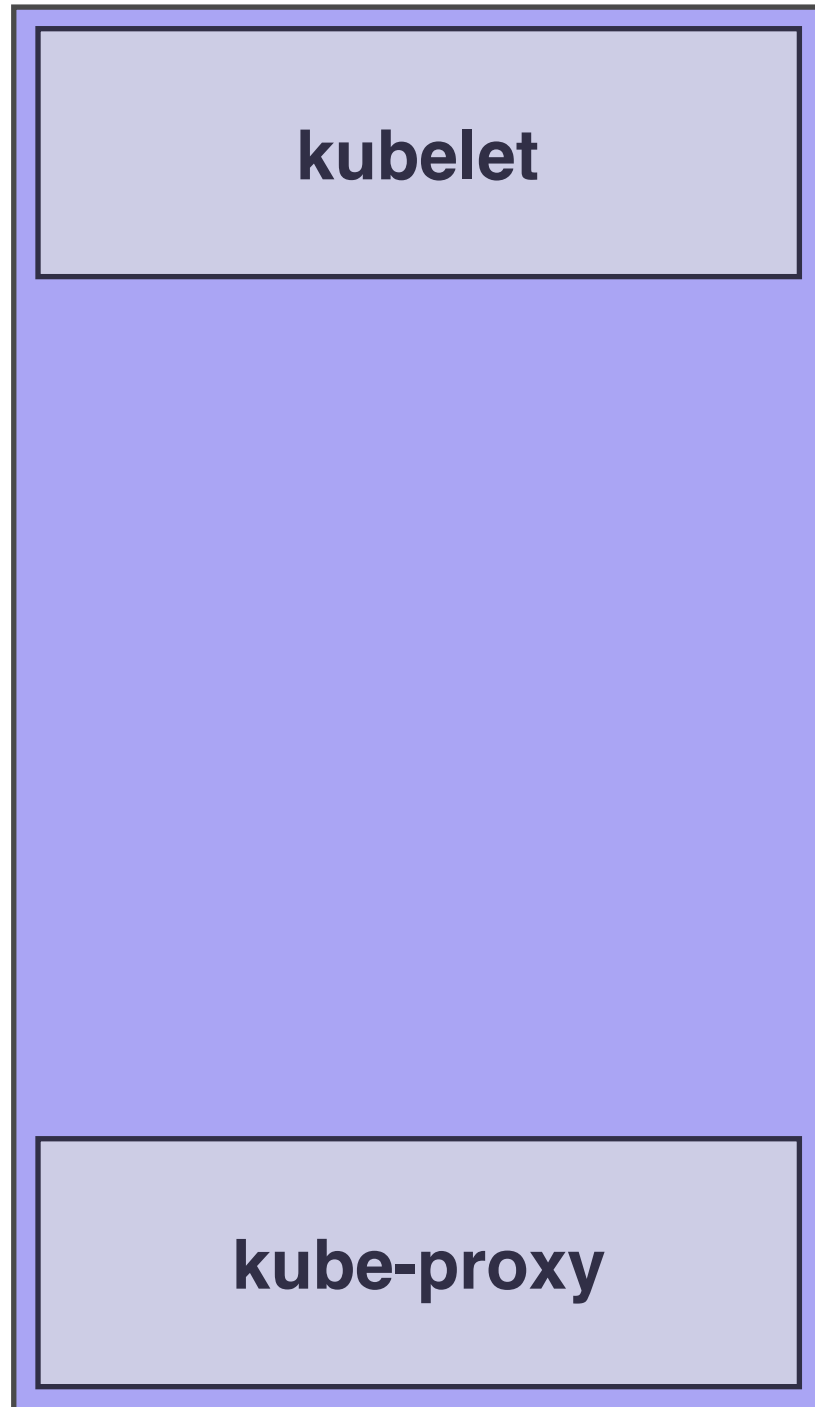


# kube-proxy



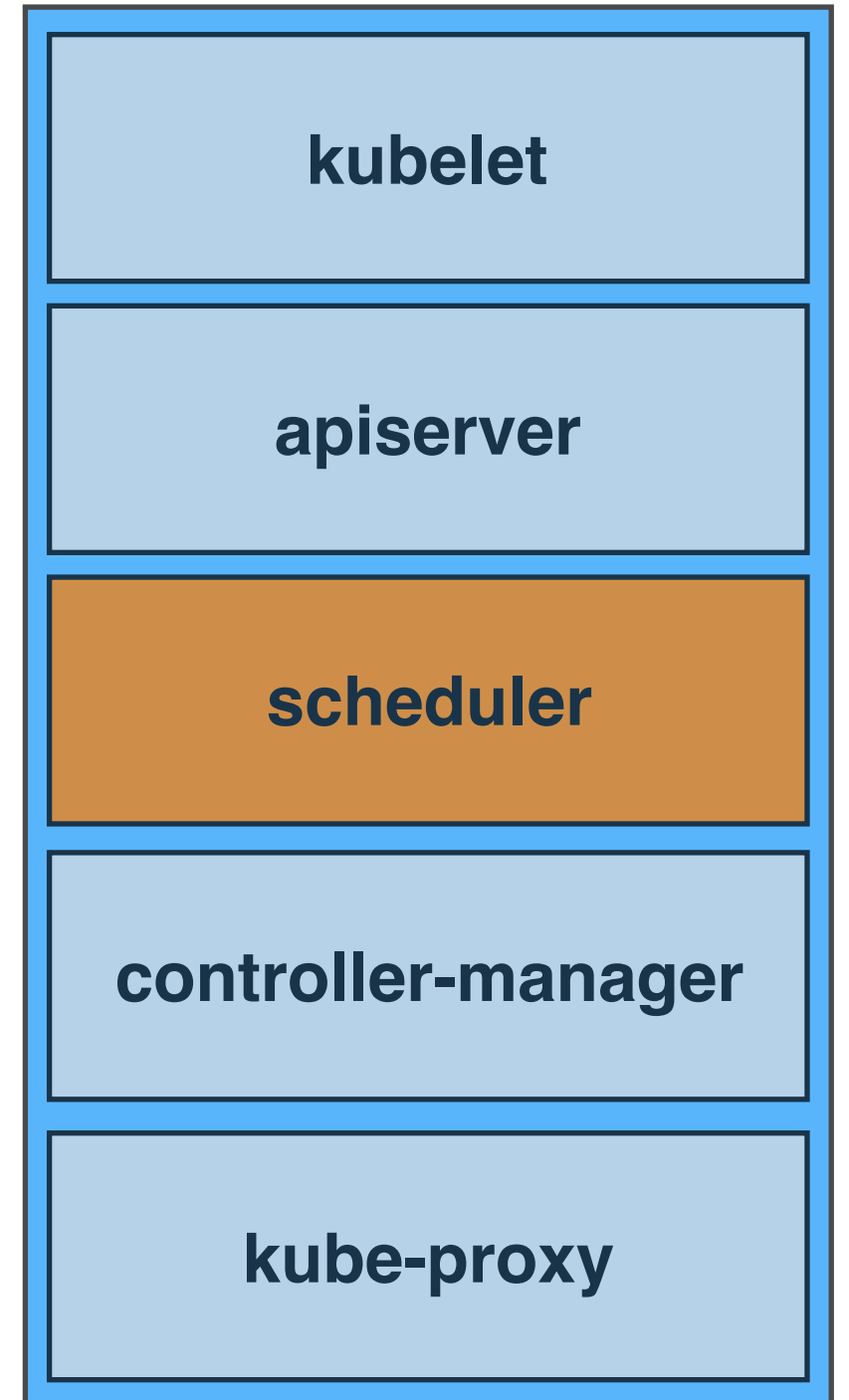
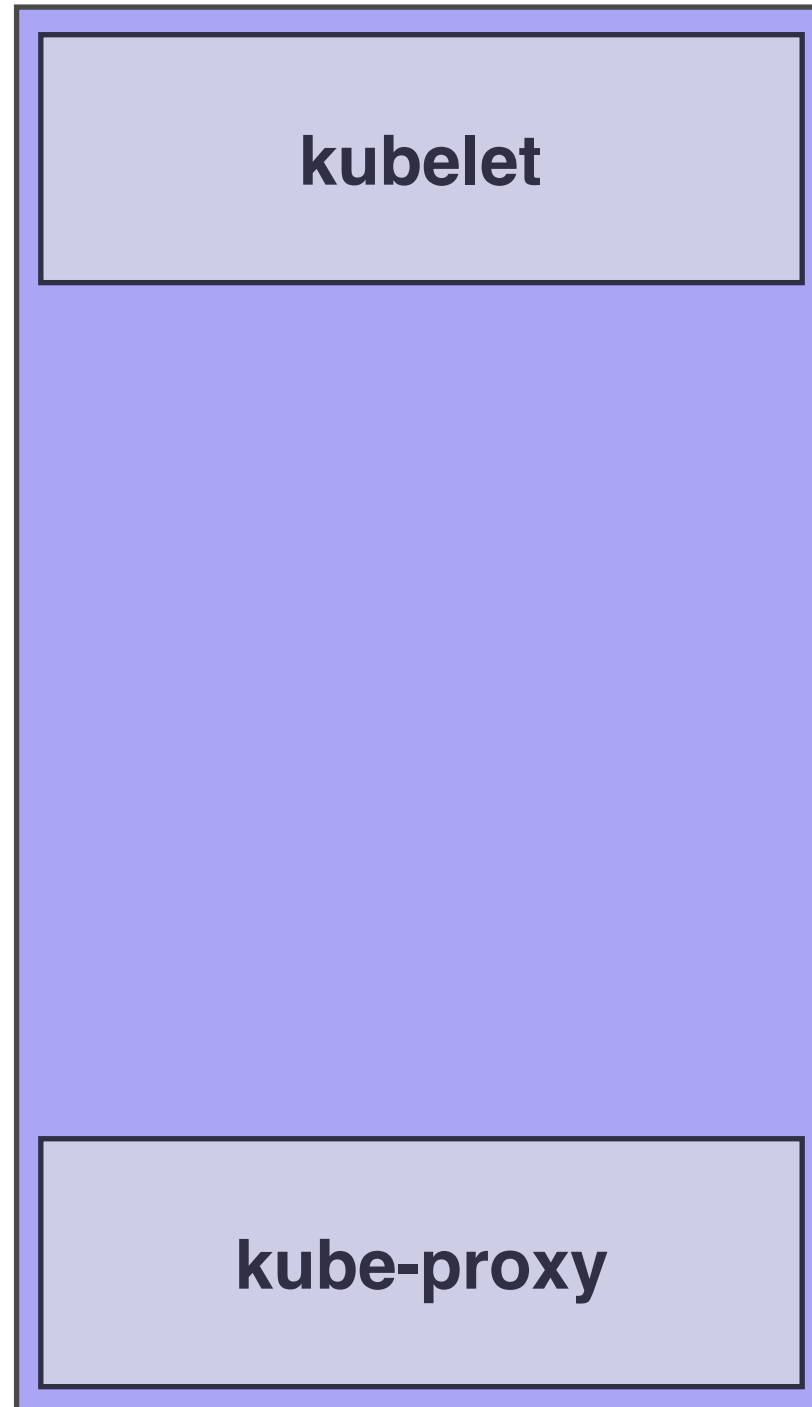
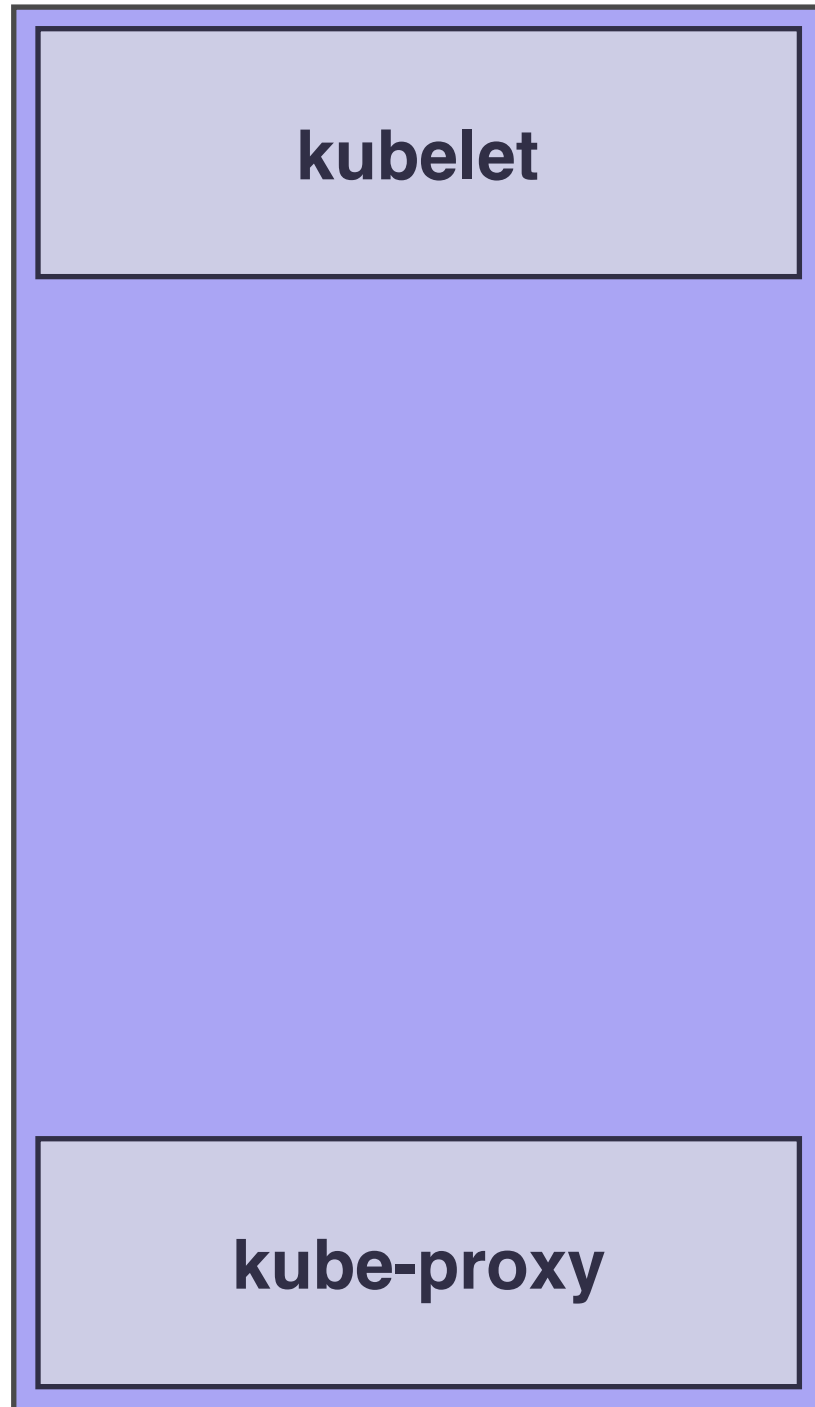


# apiserver



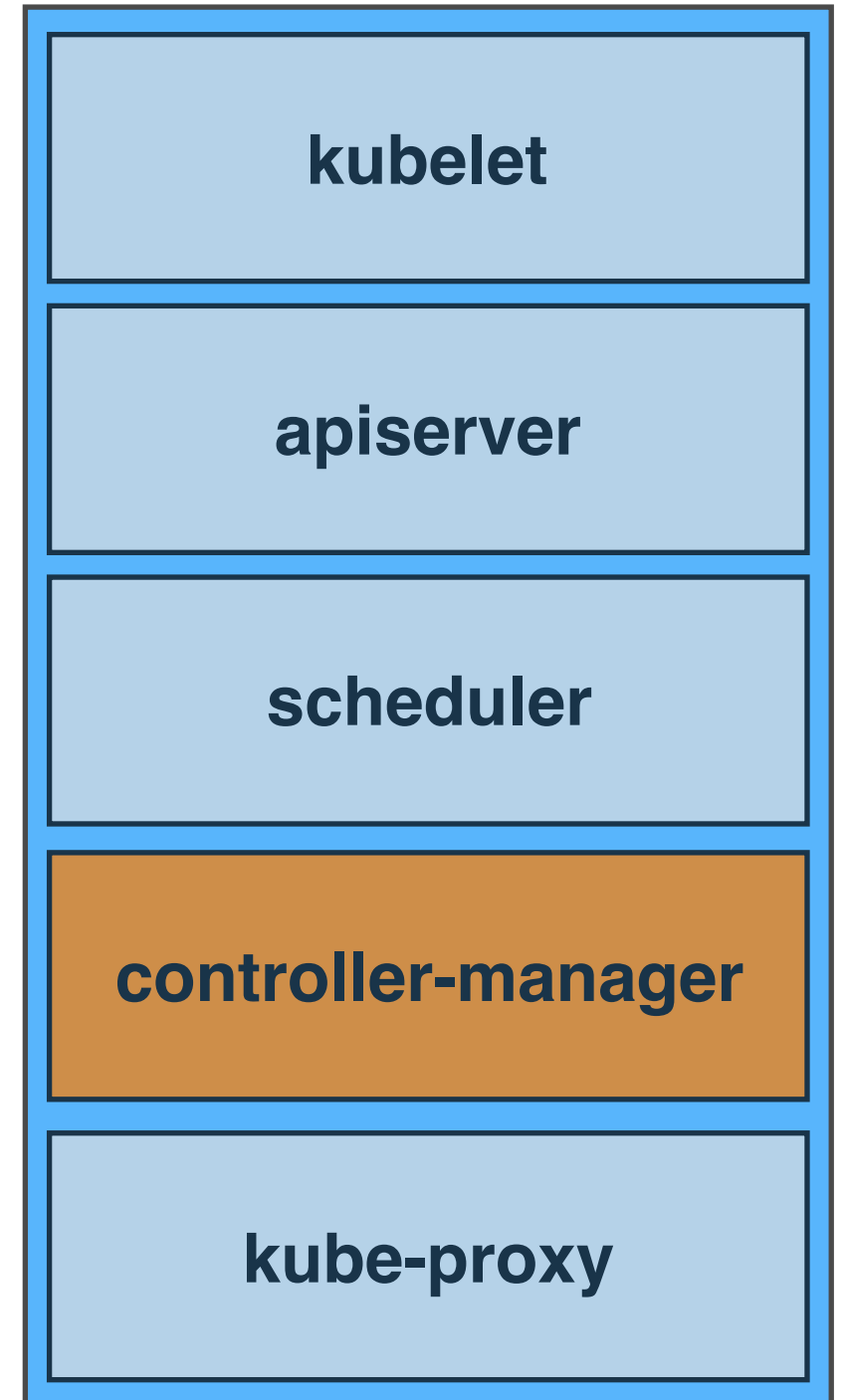
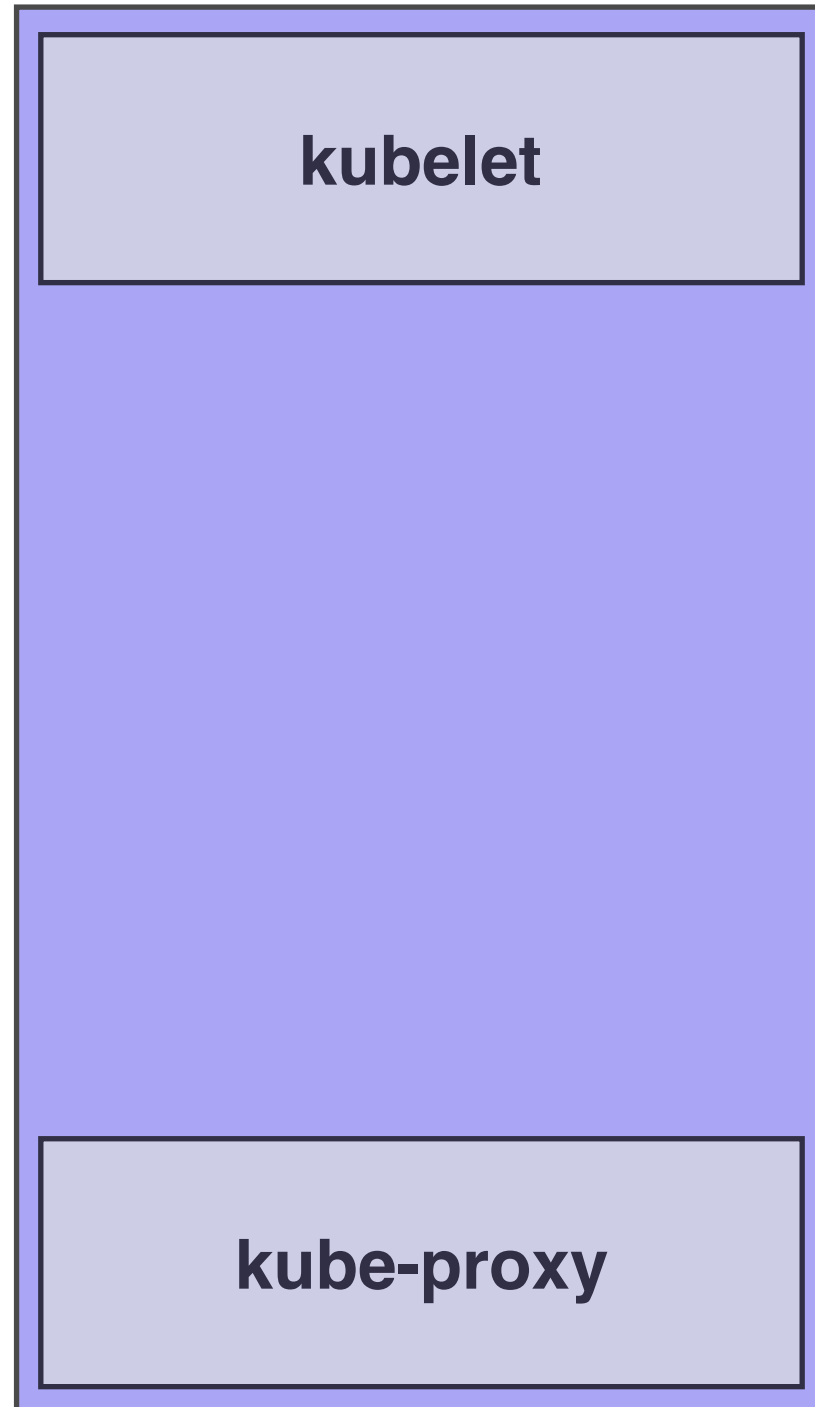
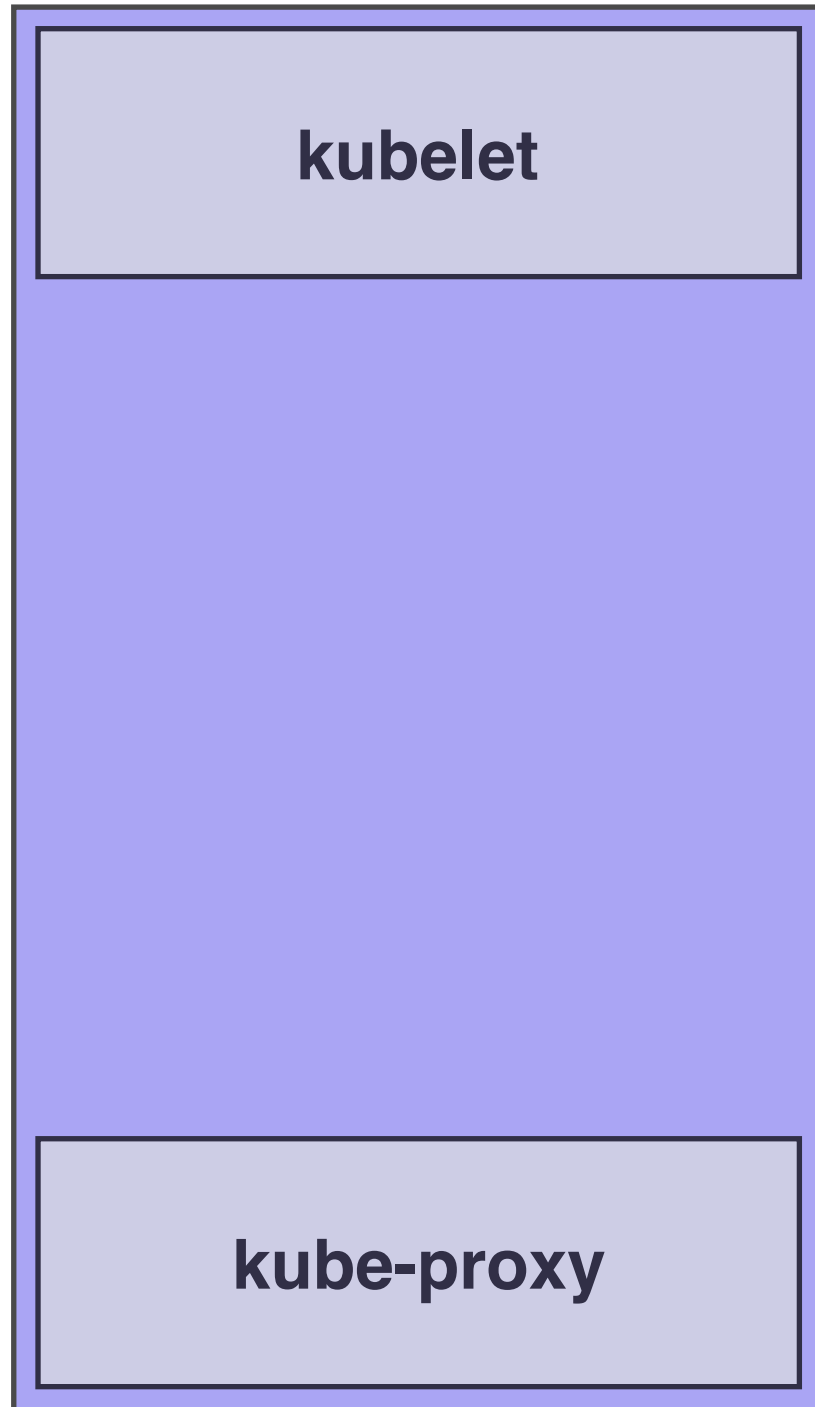


# scheduler





# controller-manager





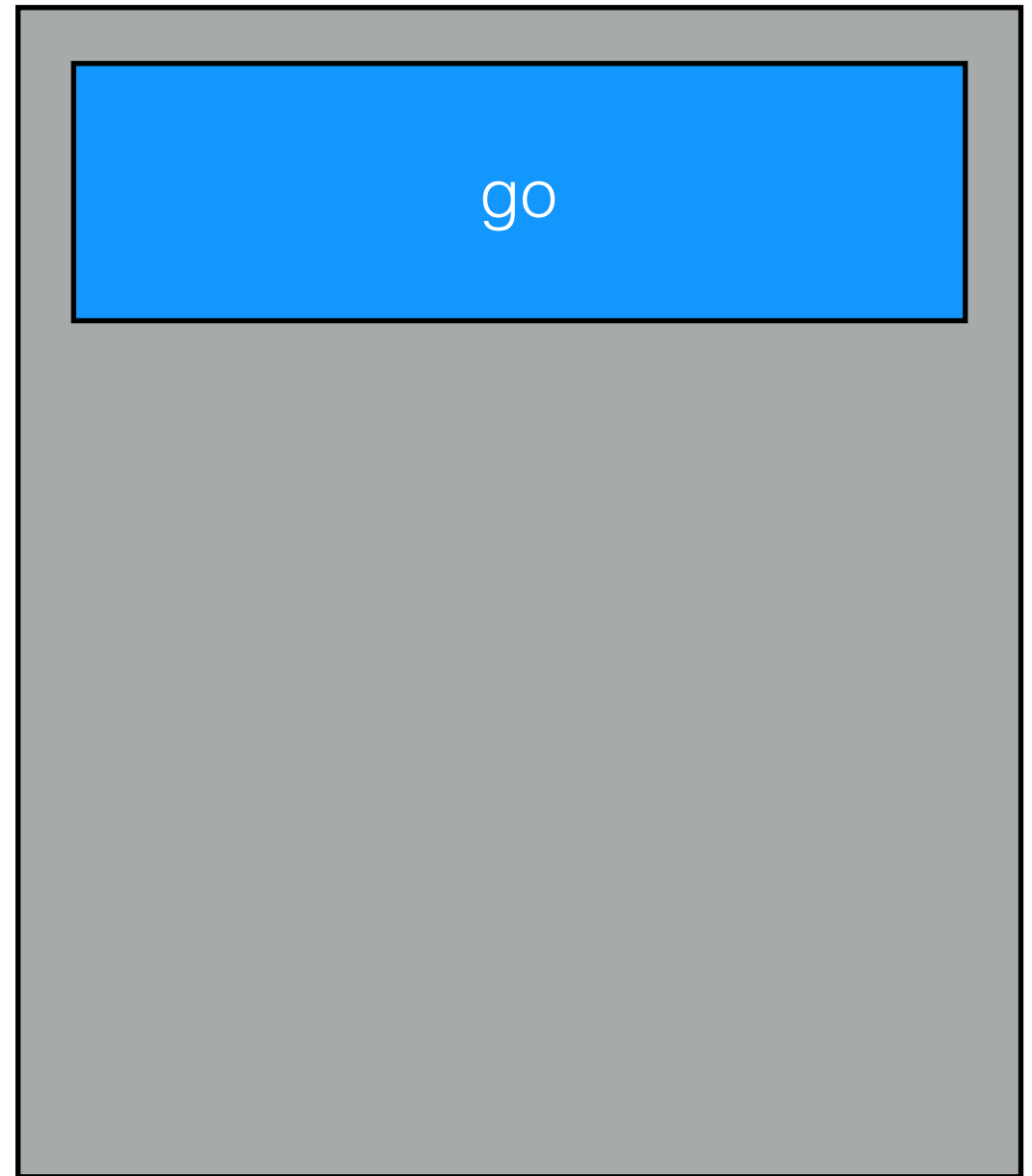
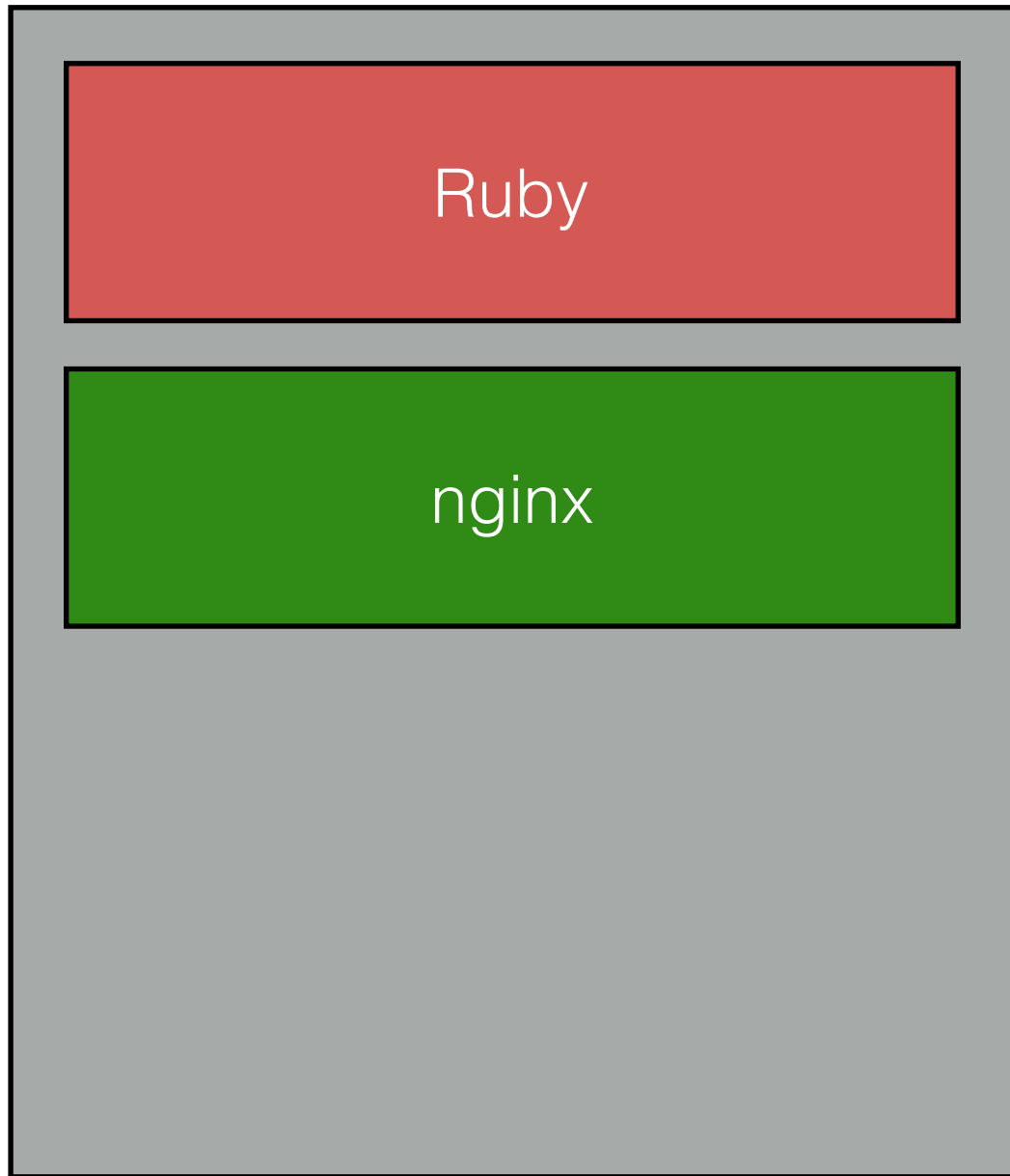


# Addons

- DNS
- Overlay network
- Log aggregation and export
- Kubernetes Dashboard
- Monitoring and alerts
- Network policy
- Autoscalers



# Pods





# Pods

```
apiVersion: v1
kind: Pod
metadata:
  name: frontend
spec:
  containers:
  - name: sinatra
    image: jmhobbs/my-sinatra-app:latest
  - name: nginx
    image: nginx:latest
```



# Pod Resources

```
apiVersion: v1
kind: Pod
metadata:
  name: frontend
spec:
  containers:
  - name: sinatra
    image: jmhobbs/cats-for-gold:latest
    resources:
      requests:
        memory: "64Mi"
        cpu: "250m"
      limits:
        memory: "128Mi"
        cpu: "500m"
```





# Replica Sets

```
apiVersion: extensions/v1beta1
kind: ReplicaSet
metadata:
  name: frontend
spec:
  replicas: 1
```

Ruby

nginx



# Replica Sets

```
apiVersion: extensions/v1beta1
kind: ReplicaSet
metadata:
  name: frontend
spec:
  replicas: 3
```

Ruby

nginx

Ruby

nginx

Ruby

nginx

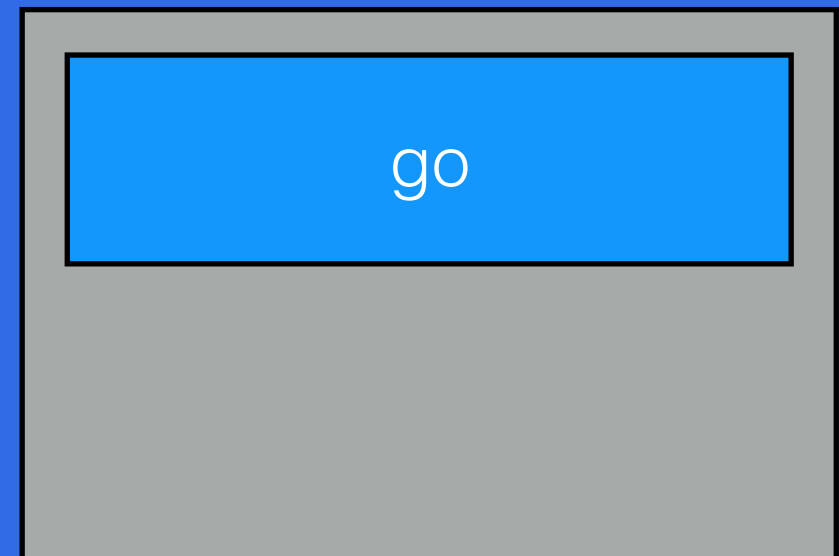
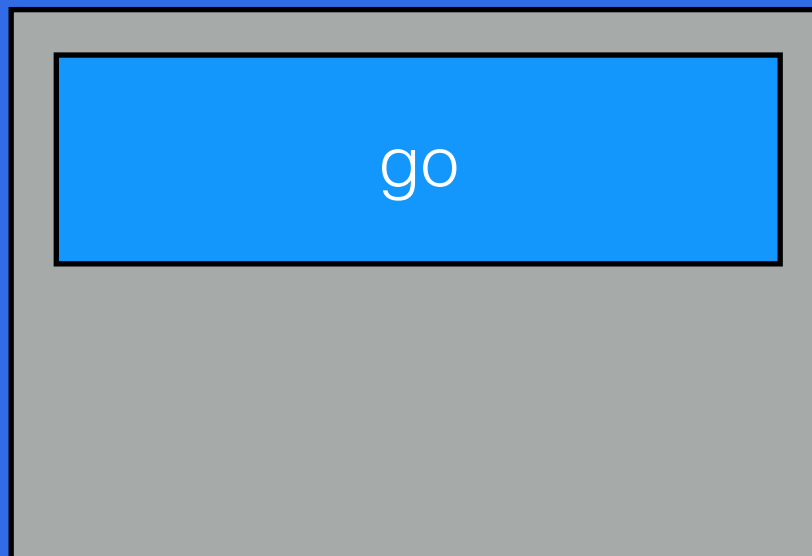
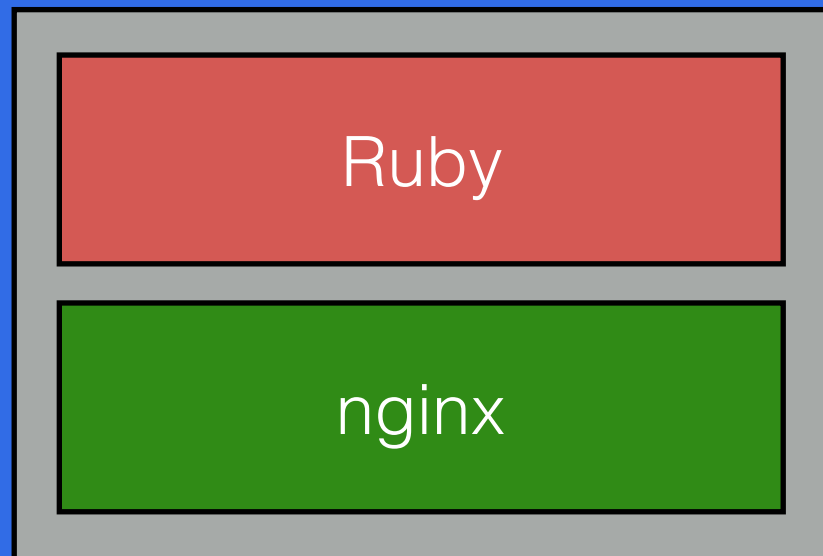


# Deployments

```
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: cats-for-gold
spec:
  replicas: 2
  revisionHistoryLimit: 3
  template:
    spec:
      containers:
      - name: sinatra
        image: jmhobbs/cats-for-gold:v1
```



# Services







# Services

```
apiVersion: v1
kind: Service
metadata:
  name: auth-service
spec:
  ports:
  - port: 8080
    targetPort: 80
  selector:
    app: cats-for-gold
    component: authentication
```



# (Public) Services

**Frontend Service, 80**

*frontend-service*

Ruby

nginx

go

go

**Auth Service, 8080**

*auth-service*



# LoadBalancer

```
apiVersion: v1
kind: Service
metadata:
  name: frontend-service
spec:
  type: LoadBalancer
  ports:
  - port: 80
  selector:
    app: cats-for-gold
    component: frontend
```



# NodePort

```
apiVersion: v1
kind: Service
metadata:
  name: frontend-service
spec:
  type: NodePort
  ports:
  - port: 80
    nodePort: 30001
  selector:
    app: cats-for-gold
    component: frontend
```





**Demo!**



# Secrets

```
apiVersion: v1
kind: Secret
metadata:
  name: top-secret-stuff
type: Opaque
data:
  username.txt: YWRtaW4=
  password.txt: MWYyZDFlMmU2N2Rm
```

```
$ echo -n "admin" > ./username.txt
$ echo -n "1f2d1e2e67df" > ./password.txt
$ kubectl create secret generic top-secret-stuff --from-
file=./username.txt --from-file=./password.txt
```



# Secrets

```
apiVersion: v1
kind: Pod
metadata:
  name: secret-example
spec:
  containers:
  - name: secret-consumer
    image: jmhobbs/blabbermouth:latest
    env:
    - name: SECRET_USERNAME
      valueFrom:
        secretKeyRef:
          name: top-secret-stuff
          key: username.txt
```



# ConfigMap

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: doge-config
data:
  much: wow
  very: doge
  such: kubernetes
```



# Volumes

- emptyDir
- hostPath
- gcePersistentDisk
- awsElasticBlockStore
- nfs
- iscsi
- fc (fibre channel)
- flocker
- glusterfs
- rbd
- cephfs
- gitRepo
- secret
- persistentVolumeClaim
- downwardAPI
- projected
- azureFileVolume
- azureDisk
- vsphereVolume
- Quobyte
- PortworxVolume
- ScaleIO
- StorageOS
- local





# Volumes

```
apiVersion: v1
kind: Pod
metadata:
  name: volume-example
spec:
  containers:
  - image: jmhobbs/caching-proxy:latest
    name: proxy
    volumeMounts:
    - mountPath: /cache
      name: cache-volume
  volumes:
  - name: cache-volume
    emptyDir: {}
```



# Volumes

```
apiVersion: v1
kind: Pod
metadata:
  name: volume-example
spec:
  containers:
  - image: jmhobbs/doge:latest
    name: doge
    volumeMounts:
    - mountPath: /etc/config
      name: doge-config
  volumes:
  - name: doge-config
    configMap:
      name: doge-config
```



# Volumes

```
apiVersion: v1
kind: Pod
metadata:
  name: volume-example
spec:
  containers:
  - image: jmhobbs/webserver:latest
    name: static-webserver
    volumeMounts:
    - mountPath: /var/www
      name: www-data
  volumes:
  - name: www-data
    gcePersistentDisk:
      pdName: my-website
      fsType: ext4
```



# Persistent Volumes

```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: pv-100-001
spec:
  capacity:
    storage: 100Gi
  accessModes:
    - ReadWriteOnce
  gcePersistentDisk:
    pdName: gce-pv-100-001
    fsType: ext4
```



# Persistent Volumes

```
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
  name: example-pvc
spec:
  accessModes:
    - ReadWriteOnce
resources:
  requests:
    storage: 50Gi
```



# Persistent Volumes

```
kind: Pod
apiVersion: v1
metadata:
  name: cats-for-gold
spec:
  containers:
    - name: frontend
      image: jmhobbs/cats-for-gold:v1
      volumeMounts:
        - mountPath: "/var/www/html"
          name: pvc
  volumes:
    - name: pvc
      persistentVolumeClaim:
        claimName: example-pvc
```





# StatefulSet

- Unique network identifiers.
- Persistent storage.
- Ordered deployment and scaling.
- Ordered deletion and termination.
- Ordered automated rolling updates.



# DaemonSet

```
apiVersion: extensions/v1beta1
kind: DaemonSet
metadata:
  name: fluentd-elasticsearch
spec:
  template:
    metadata:
      name: fluentd-elasticsearch
    spec:
      containers:
      - name: fluentd-elasticsearch
        image: jmhobbs/fluentd-elasticsearch:latest
        env:
        - name: CLUSTER_ENDPOINT_URL
          value: https://some-elasticsearch-cluster:9200/
        volumeMounts:
        - mountPath: /var/log
          name: varlog
```

...

- Jobs
- Cron Jobs
- Network Policies
- Custom Resource Types
- Federation
- Ingress Controllers
- Scheduling Affinity
- Advanced Authentication Schemes
- Service Accounts

## **Kubernetes**

<http://kubernetes.io/>

## **Kubernetes the Hard Way**

<https://github.com/kelseyhightower/kubernetes-the-hard-way>

## **Minikube**

<https://github.com/kubernetes/minikube>

## **Kubernetes Bootcamp**

<https://kubernetesbootcamp.github.io/kubernetes-bootcamp/>

# Thanks!

[twitter.com/jmhobbs](https://twitter.com/jmhobbs) | [github.com/jmhobbs](https://github.com/jmhobbs) | [velvetcache.org](https://velvetcache.org)