MARCELO CAVALCANTE

tuxface

sfl[phone]
The free software enterprise-class softphone for GNU/Linux

HELM

debian

kubuntu

openSUSE

archlinux

GTA LUG

Não profissional

F13 TECNOLOGIA

OPOVO

Aspec

Pague Menos

Banco do Nordeste

PINK TRIANGLE PRESS

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Certified LINUX ADMINISTRATOR

Novell®

aws certified Solutions Architect Associate

CERTIFIED kubernetes ADMINISTRATOR

Marcelo Cavalcante Rocha

marcelo@marcelocavalcante.net

www.marcelocavalcante.net

www.linkedin.com/in/marcelocrocha

marcelokalib

marcelocavalcanterocha

facebook.com/marcelocavalcanter

kalib @ freenode.org

Kubernetes

Conceitos - Core

Arquitetura do Cluster

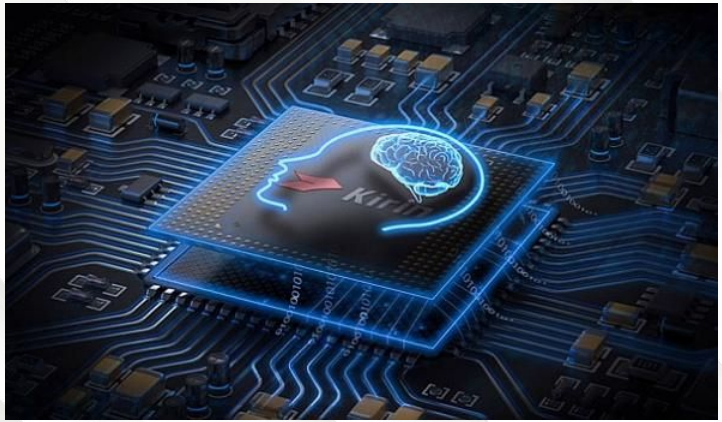
Um pouco sobre a arquitetura de um cluster Kubernetes e seus componentes básicos e fundamentais

APIs Primitivas

Introdução as APIs fundamentais do Kubernetes como pods, replicasets, deployments,. services...

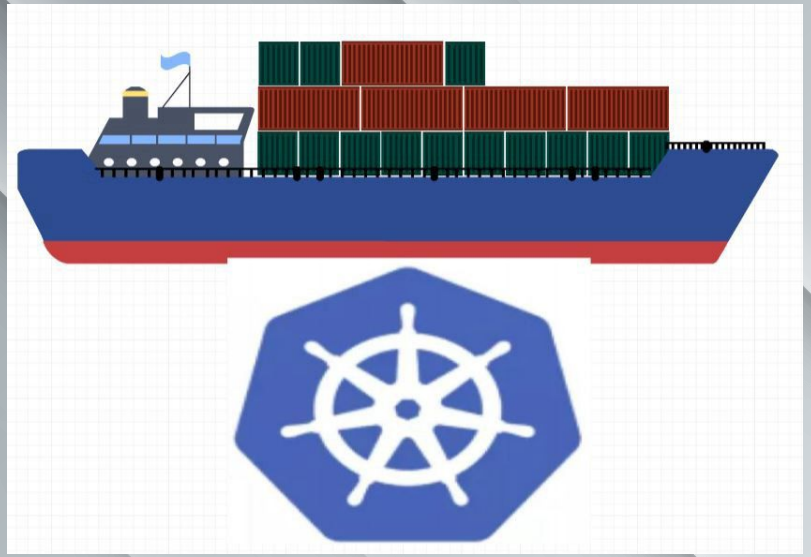
Serviços e outras primitivas de Redes

Introdução a como todos esses componentes se comunicam bem como sobre a estrutura de redes do Kubernetes

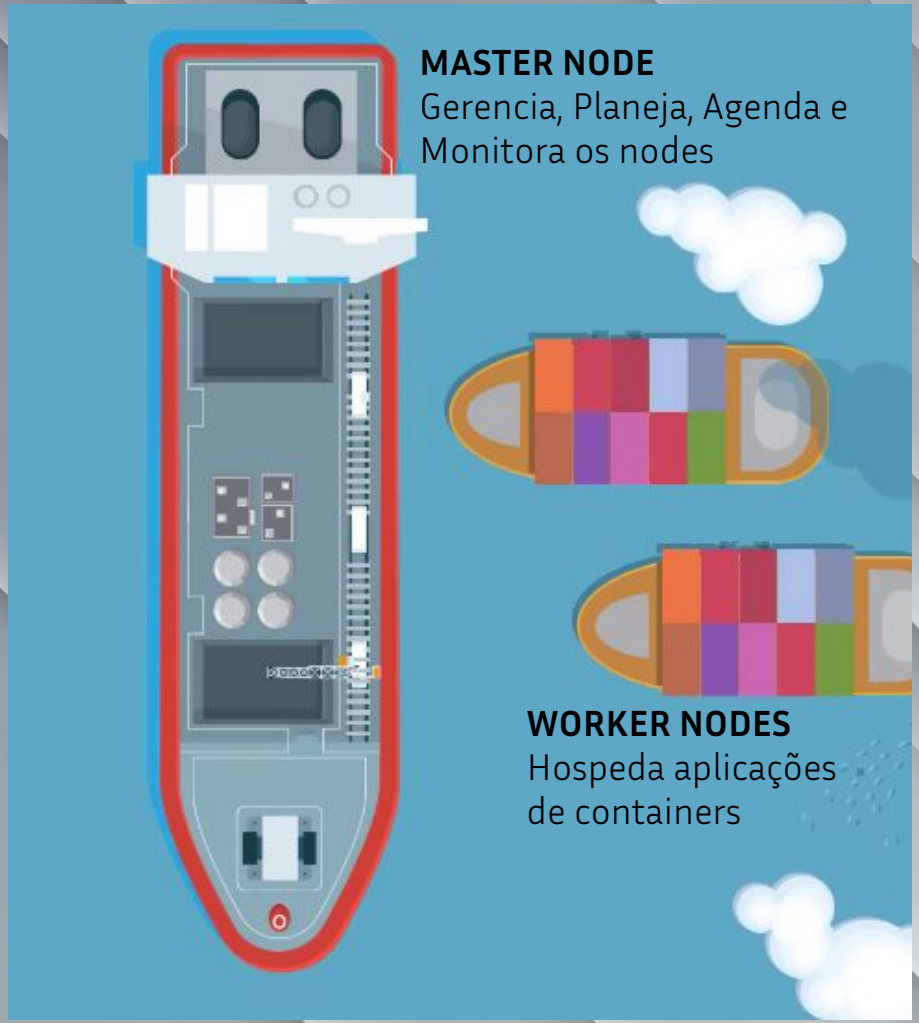


Arquitetura do Cluster

- Arquitetura
- ETCD
- Kube-API Server
- Controller Managers
- Kube Scheduler
- Kubelet
- Kube Proxy




Go! Go!



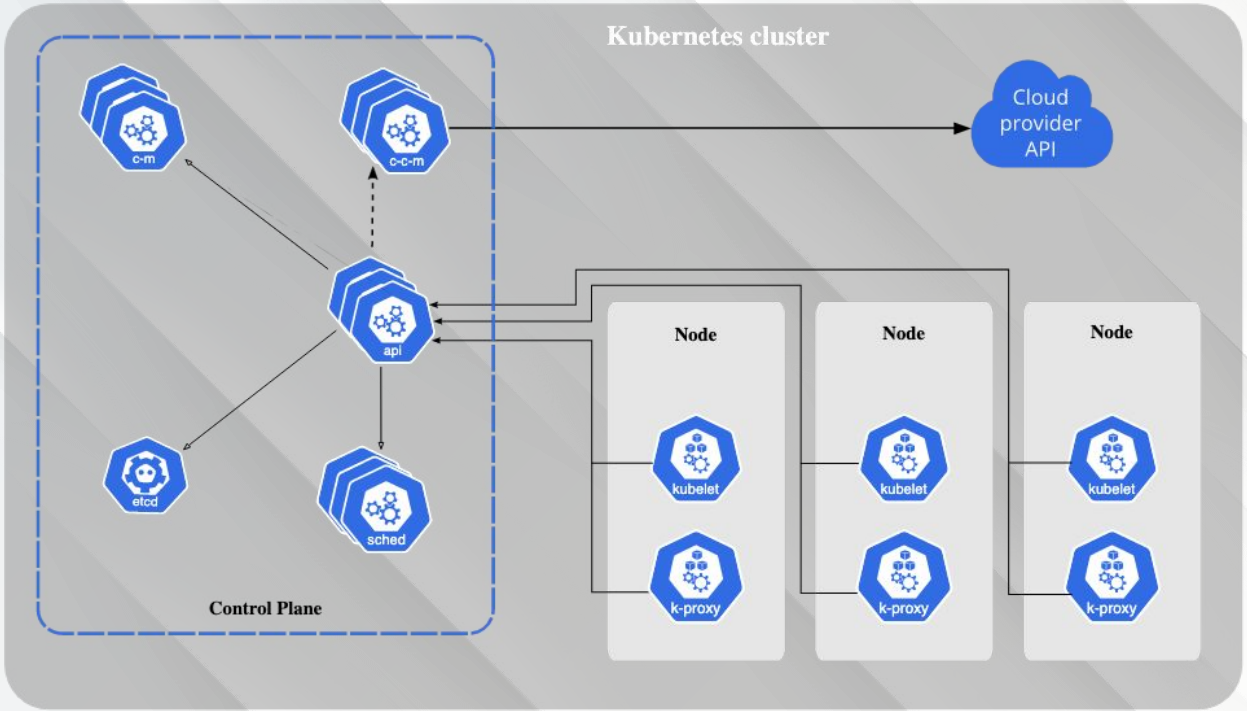
Um **cluster Kubernetes** é composto por **NODES** (ou nós), responsáveis por hospedar aplicações em formato de containers.

São como **navios de carga**, que apenas recebem os containers e os transportam. Na arquitetura de um cluster Kubernetes, chamamos estes nodes de **WORKER NODES**.

Os **navios de controle** são chamados de **MASTER NODE**. Eles são os responsáveis por monitorar e gerenciar o trabalho dos worker nodes: alocar containers, registrar informações, escolher em qual worker node vai cada container, etc.

https://kubernetes.io/docs/concepts/overview/components/

Control Plane Components



API server

Cloud controller manager *(optional)*

Controller manager

etcd (persistence store)

kubelet

kube-proxy

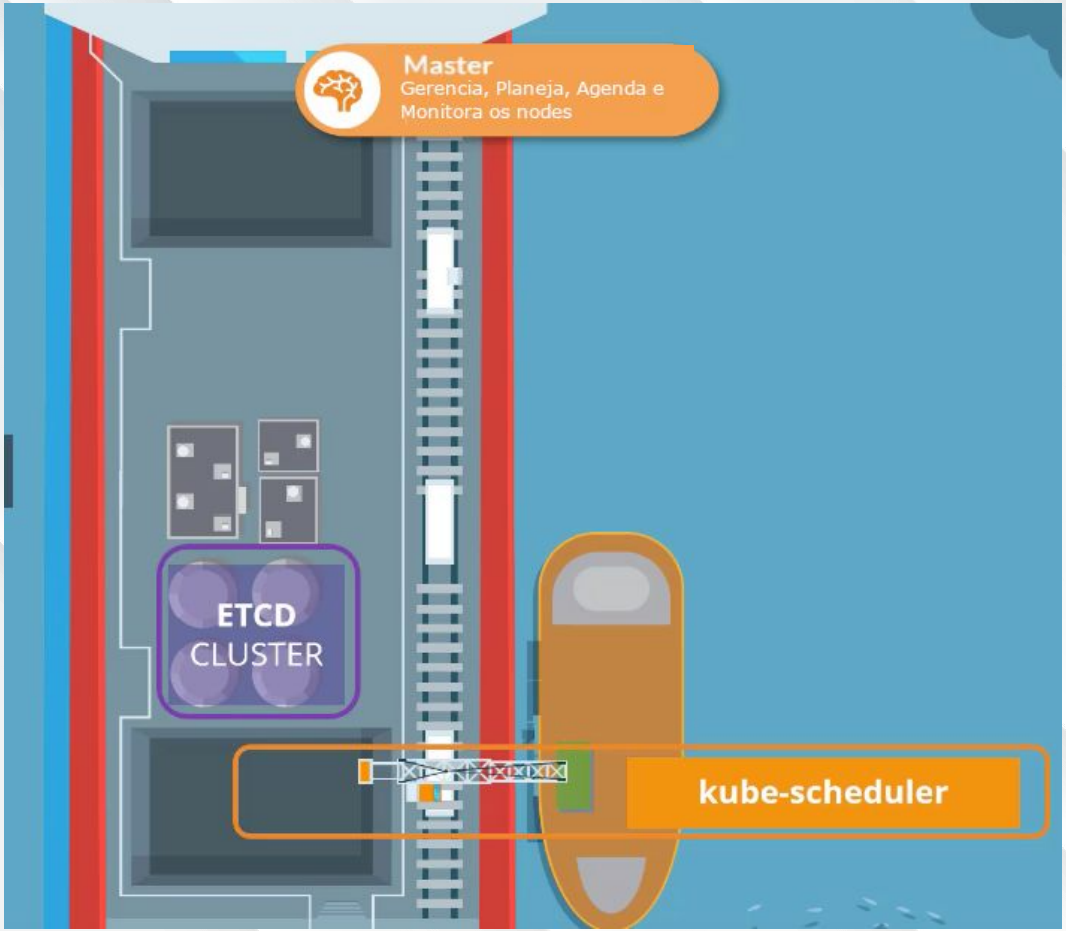
Scheduler

Control plane

Node

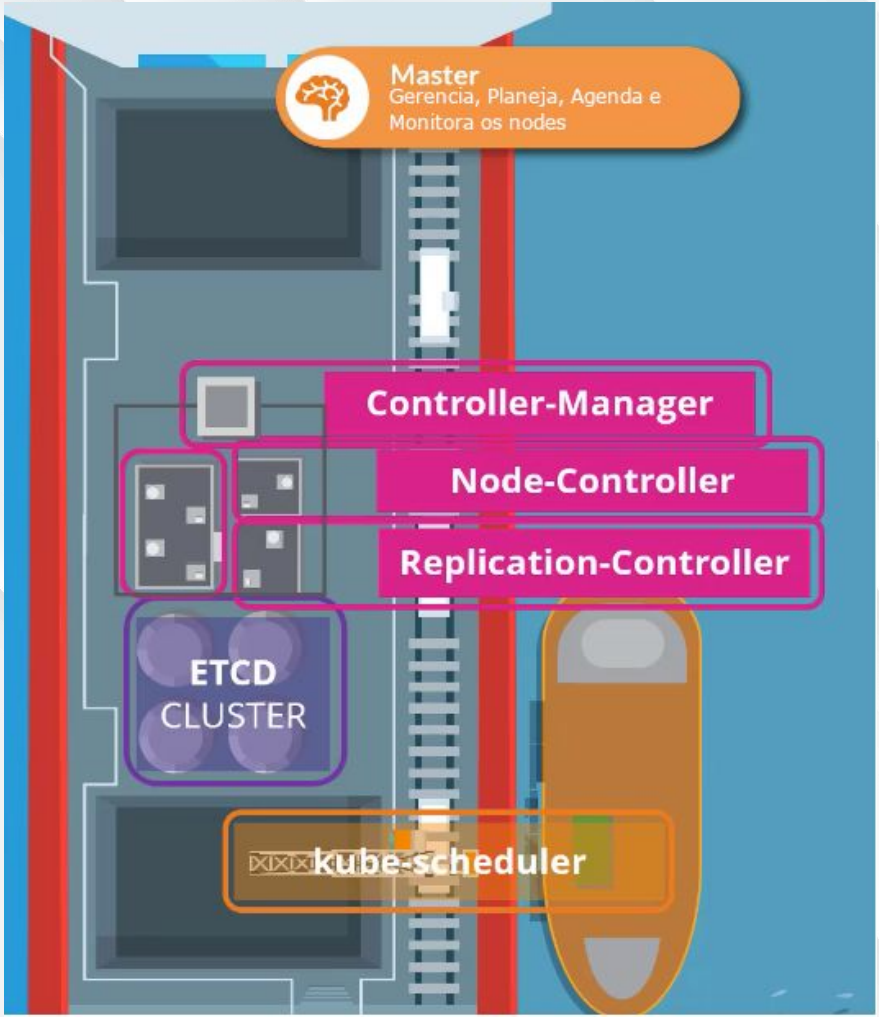
O Kubernetes utiliza-se do **ETCD** para armazenar todas as informações sobre os containers e nodes existentes no cluster.

É uma popular ferramenta de bancos de dados que armazena informações no formato **chave:valor**.



O componente **Scheduler** ou **Kube-Scheduler** é responsável por alocar os containers nos worker nodes apropriados de acordo com uma série de fatores como capacidade do worker node, tamanho do container, destino, tipo de aplicação, exigências e restrições do container ou worker node, etc.

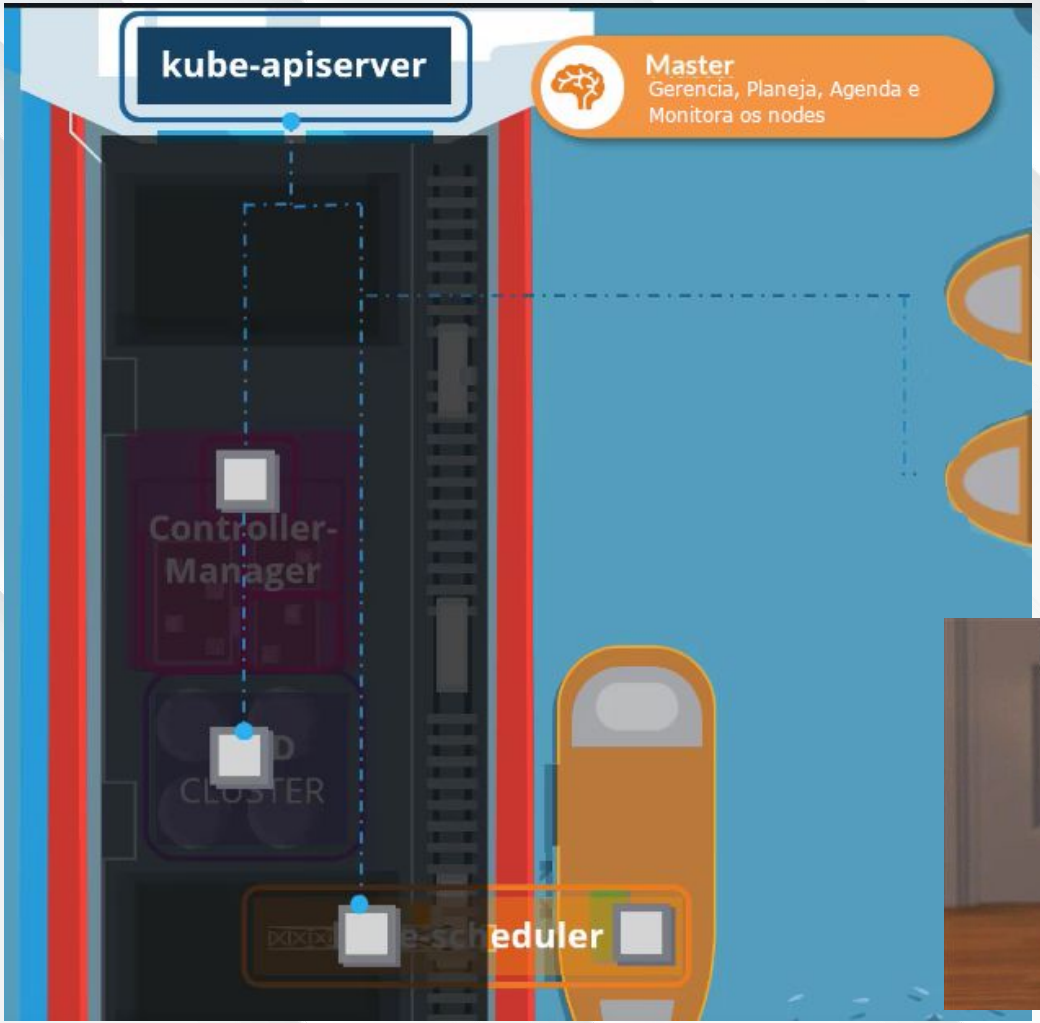
Ele é basicamente o guindaste ou escritório de guindaste, que coloca os containers em cada navio de carga.



Controller-Managers são responsáveis por controles específicos no cluster.

Exemplos de controllers são:

- **Node-Controller**: responsável pelos **nodes** em geral
- **Replication-Controller**: responsável pelas **réplicas**, ou seja o número de containers rodando em um determinado grupo de réplicas



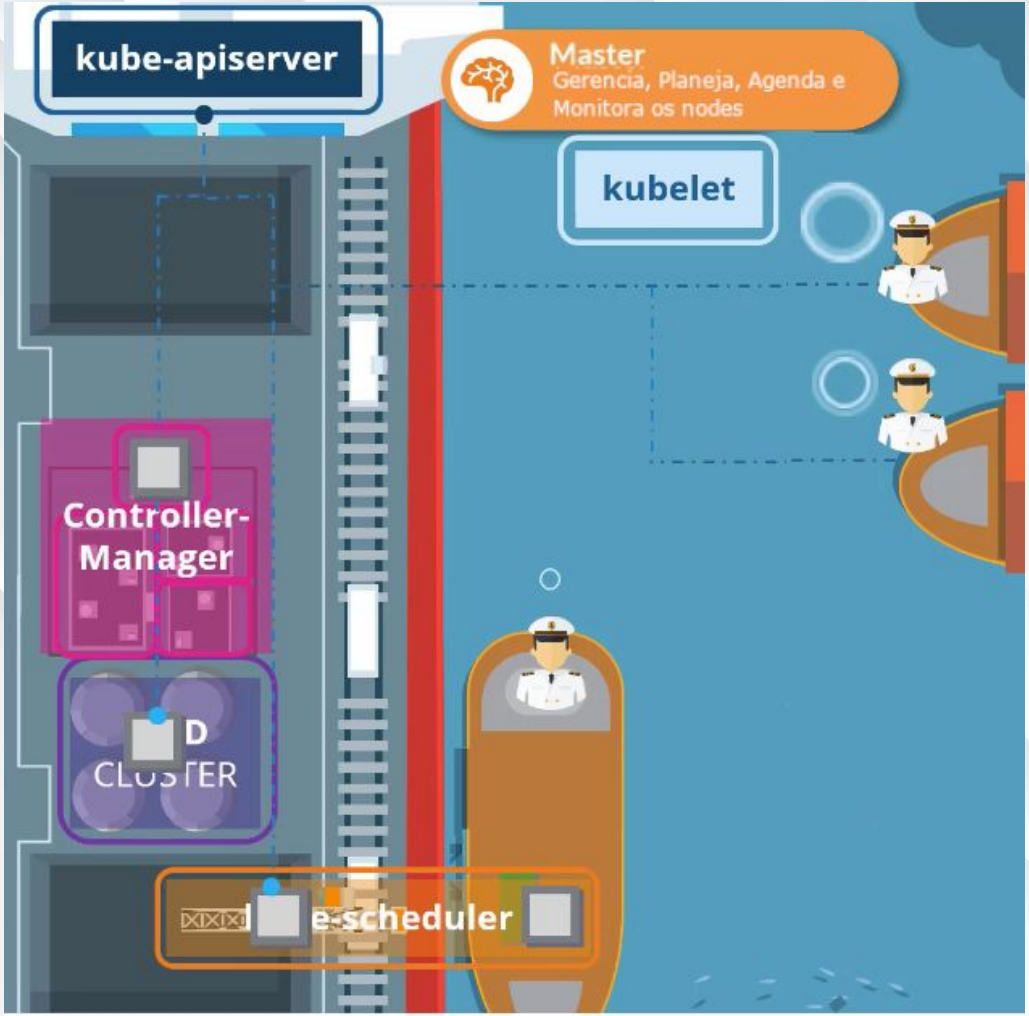
KUBE-APISERVER

O gerente entre os gerentes.

Responsável por **orquestrar** TODAS as operações no cluster.

Expõe as **APIs do kubernetes** para que sejam utilizadas por usuários externos durante suas requisições e operações no cluster.

Assim como os demais componentes do Kubernetes, o **kube-apiserver** nada mais é do que um **container** no cluster.

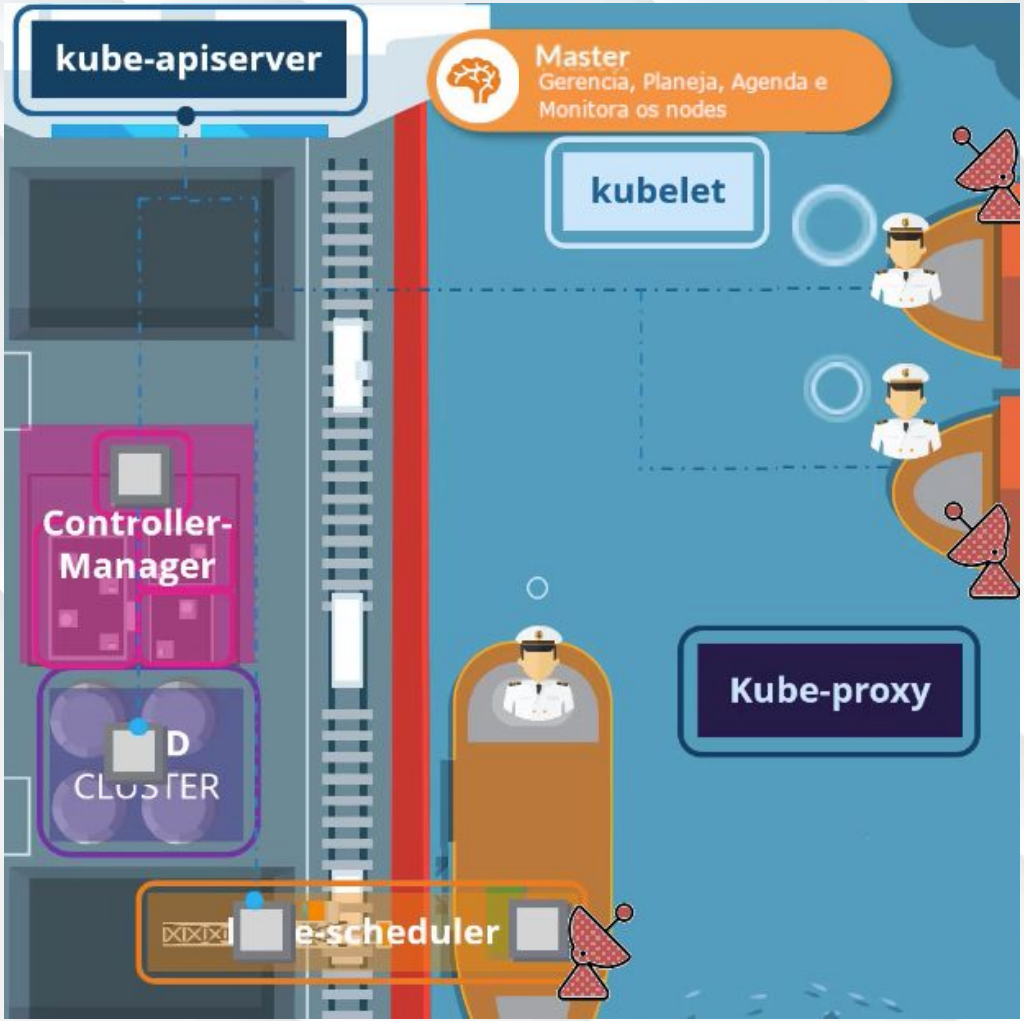


Kubelet

Todo navio precisa de um capitão e este capitão é o **Kubelet**.

Responsável pela **comunicação** entre o **worker node** e o **master**. Se **reporta** ao kube-apiserver constantemente passando informações sobre o **status** do seu node bem como dos containers que ali estão.

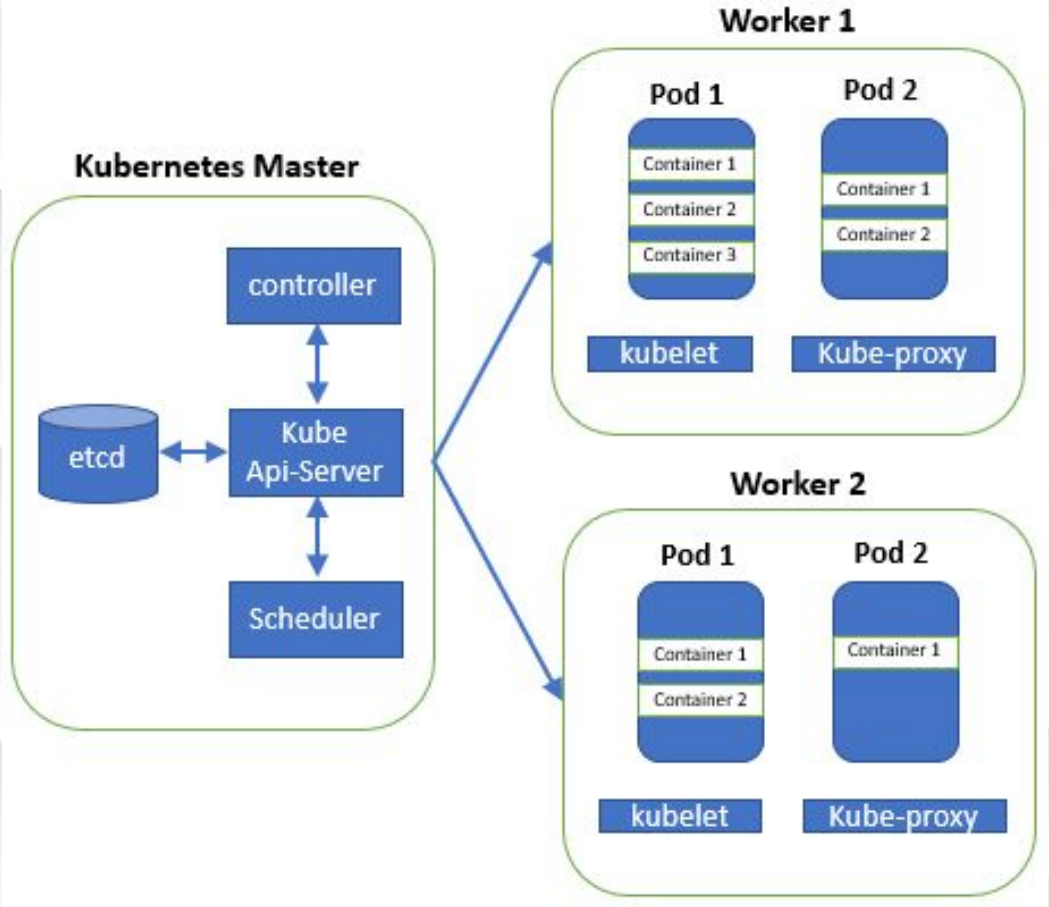
Ele é quem recebe as **instruções** do kube-apiserver sobre o que deve ser feito no seu node, containers que devem ser carregados lá, etc.



Kube-proxy

O kube-proxy é o serviço responsável por garantir a comunicação entre os containers/aplicações existentes no cluster de nodes seguindo uma série de regras para isso.

Resumão da arquitetura básica do Kubernetes



- O que é o ETCD?
- O que é um dado de formato Chave-Valor?
- Como começar?
- Como operar o ETCD?
- O que é um sistema distribuído?
- Como o ETCD opera?
- Protocolo RAFT
- Melhores práticas em números de nodes

- Armazenamento de dados no formato chave-valor confiável, distribuído, e que é simples, seguro e rápido.

Key-Value (Chave-Valor)

Chave	Valor
Nome	Clevin
Idade	78
Localização	Paris

Tabular - Bancos de Dados Relacionais

Nome	Idade	Localização
Berg	18	Sobral
Bruno	45	Cabrobró
Samuel	32	Salvador

- Armazenamento de dados no formato chave-valor confiável, distribuído, e que é simples, seguro e rápido.

Key-Value (Chave-Valor)

Chave	Valor
Nome	Clevin
Idade	78
Localização	Paris

Put Nome "Clevin"

Get Nome

"Clevin"

Tabular - Bancos de Dados Relacionais

Nome	Idade	Localização
Berg	18	Sobral
Bruno	45	Cabrobró
Samuel	32	Salvador

Patroni

Instalação do ETCD

1. Download do binário

```
curl -L https://github.com/etcd-io/etcd/releases/download/v3.3.11/etcd-v3.3.11-linux-amd64.tar.gz -o etcd-v3.3.11-linux-amd64.tar.gz
```

2. Extração

```
tar xzvf etcd-v3.3.11-linux-amd64.tar.gz
```

3. Execute o serviço ETCD

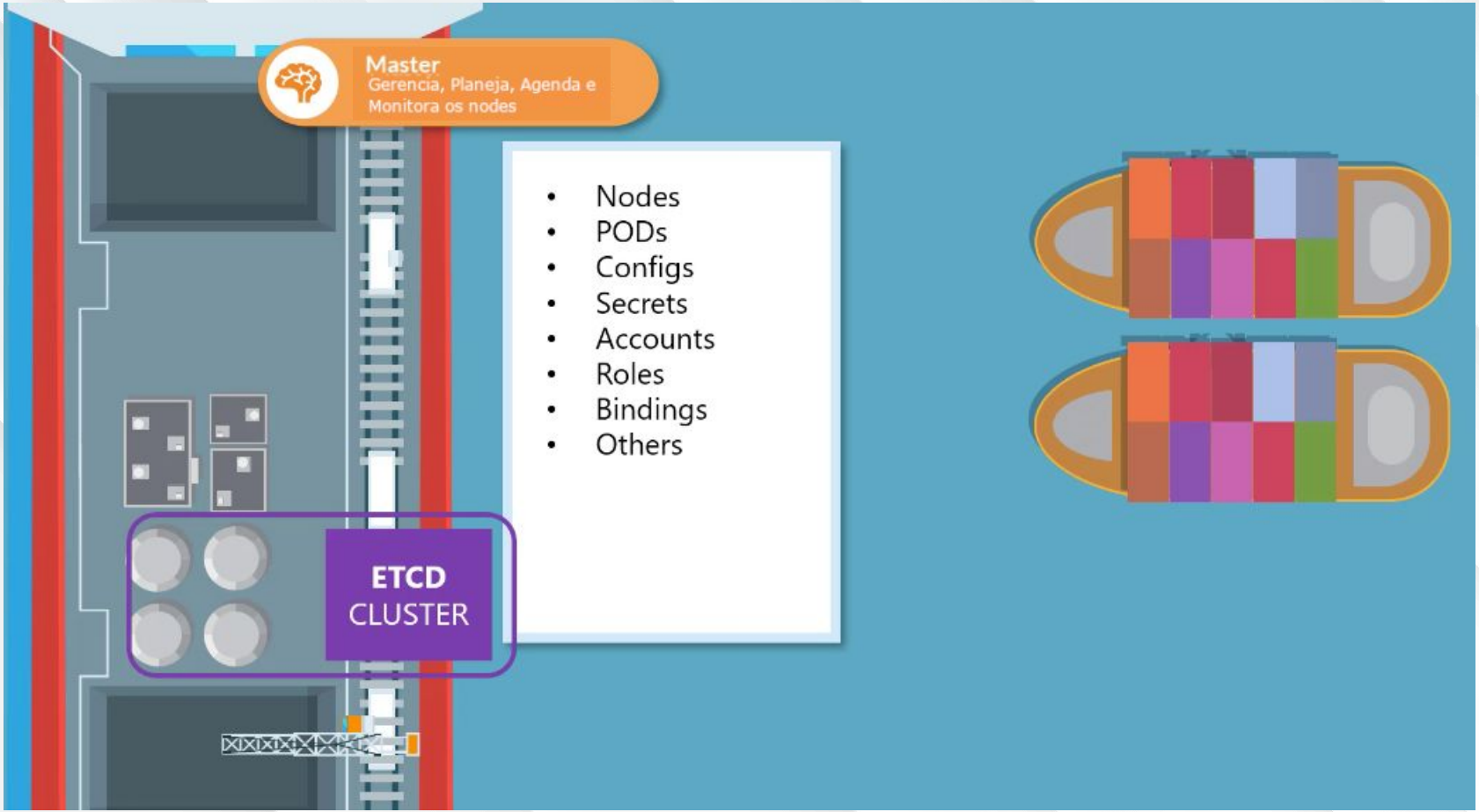
```
./etcd
```

4. Para gerenciar o ETCD, utilizamos o cliente chamado etcdctl:

```
→ etcdctl put chave1 valor1
```

```
→ etcdctl get chave1
chave1
valor1
```

ETCD no Kubernetes



Kubeadm

```
kubectl get pods -n kube-system
```

NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE
kube-system	coredns-78fcdf6894-prwvl	1/1	Running	0	1h
kube-system	coredns-78fcdf6894-vqd9w	1/1	Running	0	1h
kube-system	etcd-master	1/1	Running	0	1h
kube-system	kube-apiserver-master	1/1	Running	0	1h
kube-system	kube-controller-manager-master	1/1	Running	0	1h
kube-system	kube-proxy-f6k26	1/1	Running	0	1h
kube-system	kube-proxy-hnzsw	1/1	Running	0	1h
kube-system	kube-scheduler-master	1/1	Running	0	1h
kube-system	weave-net-924k8	2/2	Running	1	1h
kube-system	weave-net-hzfcz	2/2	Running	1	1h

```
→ kubectl get pods -n kube-system
```

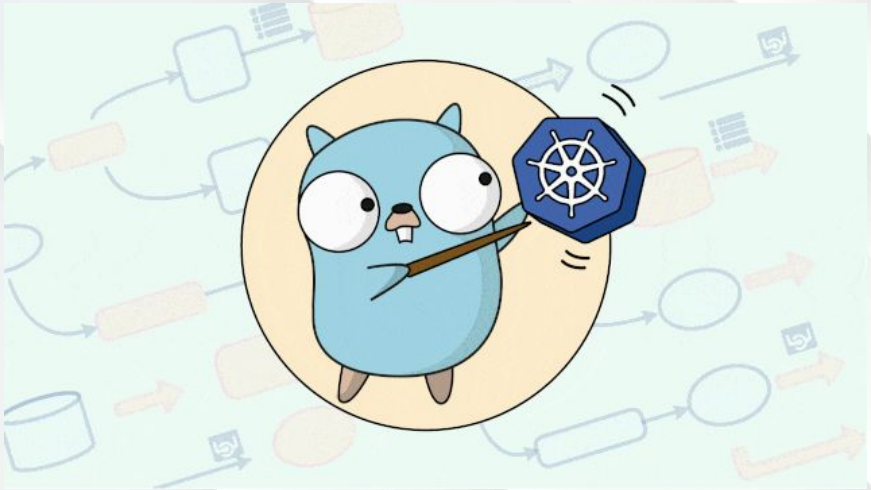
NAME	READY	STATUS	RESTARTS	AGE
coredns-5644d7b6d9-2kw9p	1/1	Running	25	209d
coredns-5644d7b6d9-gdfqh	1/1	Running	25	209d
etcd-docker-desktop	1/1	Running	48	209d
kube-apiserver-docker-desktop	1/1	Running	47	209d
kube-controller-manager-docker-desktop	1/1	Running	27	209d
kube-proxy-6b9gz	1/1	Running	25	209d
kube-scheduler-docker-desktop	1/1	Running	27	209d
storage-provisioner	1/1	Running	50	209d
vpnkit-controller	1/1	Running	26	209d

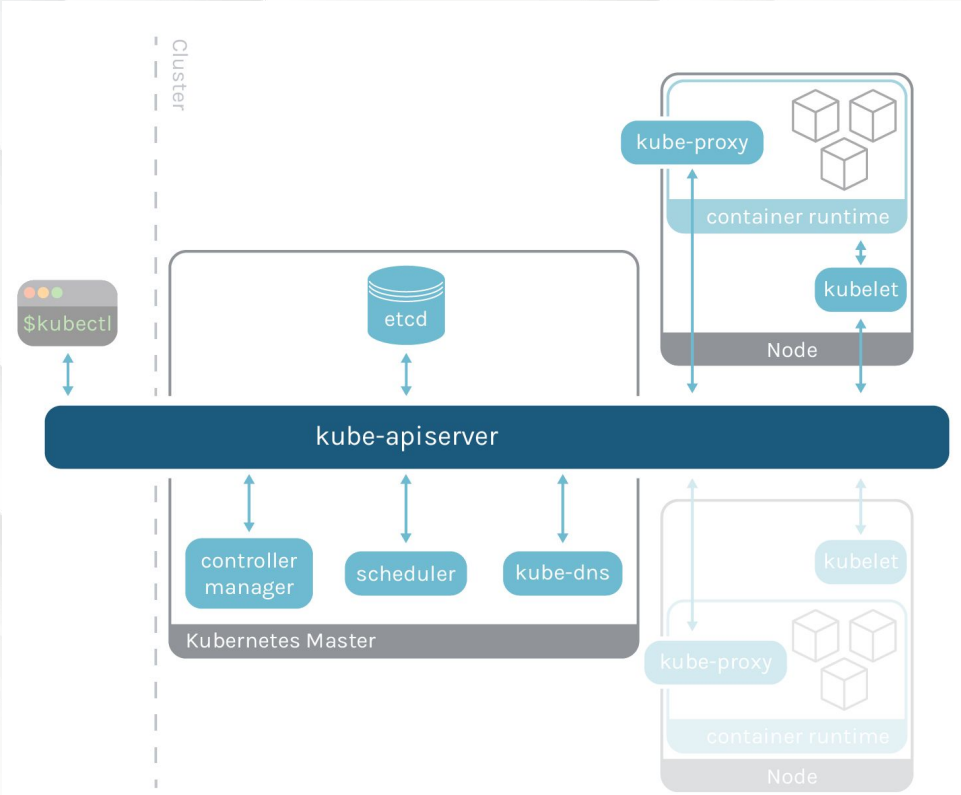
Docker

ETCD em alta disponibilidade


```
kubectl exec etcd-master -n kube-system etcdctl get / --prefix -keys-only
/registry/apiregistration.k8s.io/apiservices/v1.
/registry/apiregistration.k8s.io/apiservices/v1.apps
/registry/apiregistration.k8s.io/apiservices/v1.authentication.k8s.io
/registry/apiregistration.k8s.io/apiservices/v1.authorization.k8s.io
/registry/apiregistration.k8s.io/apiservices/v1.autoscaling
/registry/apiregistration.k8s.io/apiservices/v1.batch
/registry/apiregistration.k8s.io/apiservices/v1.networking.k8s.io
/registry/apiregistration.k8s.io/apiservices/v1.rbac.authorization.k8s.io
/registry/apiregistration.k8s.io/apiservices/v1.storage.k8s.io
/registry/apiregistration.k8s.io/apiservices/v1beta1.admissionregistration.k8s.io
```

Kube-apiserver





```
kubectl get nodes
```

kube-apiserver

controller
-manager

ETCD
cluster

kube-scheduler

Master Node

Worker Node

kubelet

Container Runtime Engine

docker rkt

Worker Node

kubelet

Container Runtime Engine

docker rkt

```
kubectl get nodes
```

kube-apiserver

controller
-manager

ETCD
cluster

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Master Node

Worker Node

kubelet

Container Runtime Engine

docker rkt

Worker Node

kubelet

Container Runtime Engine

docker rkt

```
kubectl get nodes
NAME      STATUS    ROLES     AGE       VERSION
master    Ready     master    20m       v1.11.3
node01    Ready     <none>    20m       v1.11.3
```

kube-apiserver

controller
-manager

ETCD
cluster

kube-scheduler

Master Node

Worker Node

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Container Runtime Engine

docker rkt

Worker Node

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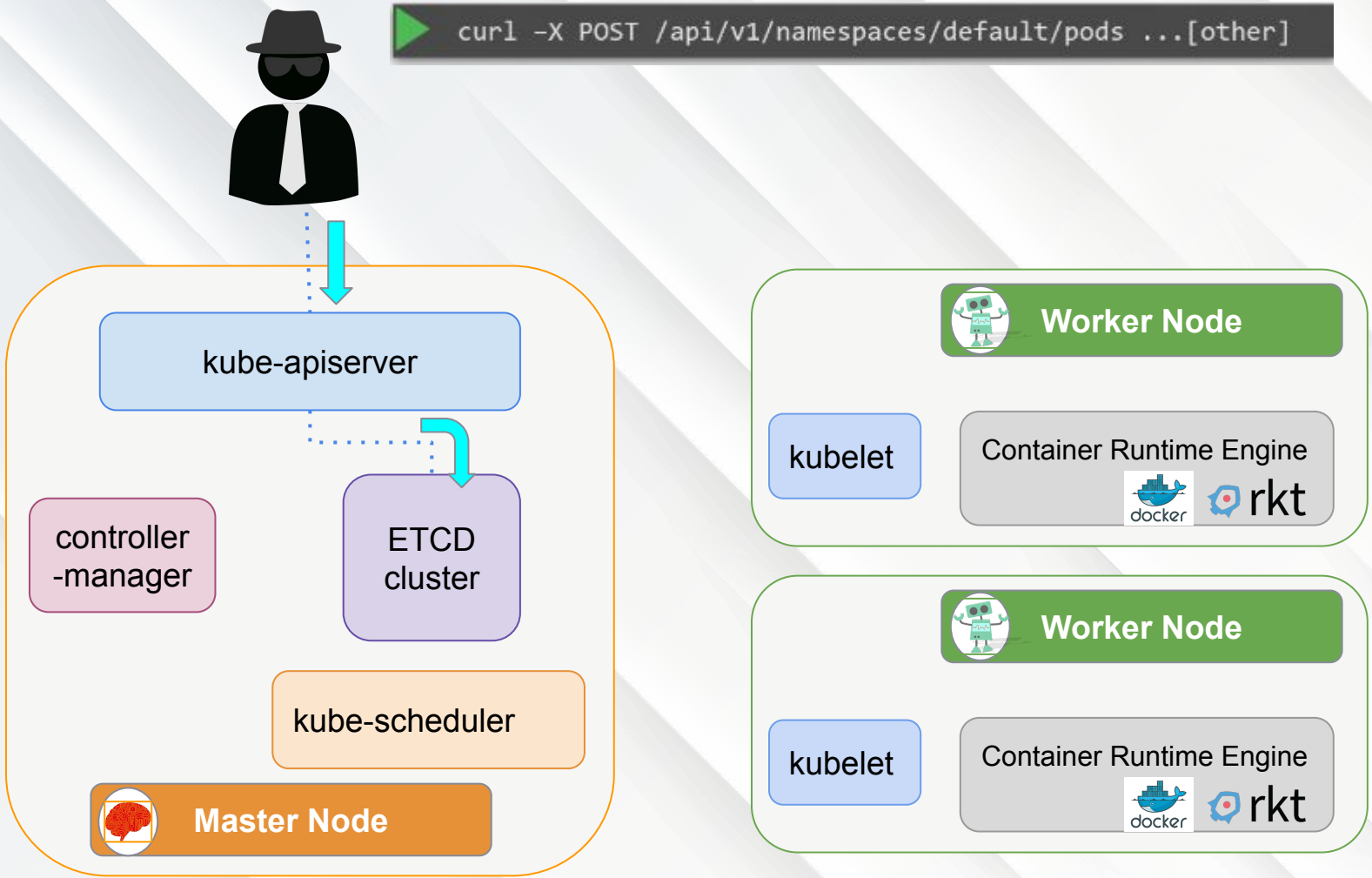
Container Runtime Engine

docker rkt


curl -X POST /api/v1/namespaces/default/pods ...[other]
kube-apiserver
controller
-manager
ETCD
cluster
kube-scheduler
Master Node
Worker Node
kubelet
Container Runtime Engine
docker
rkt
Worker Node
kubelet
Container Runtime Engine
docker
rkt

```
curl -X POST /api/v1/namespaces/default/pods ...[other]
Pod created!
```

kube-apiserver

controller
-manager

ETCD
cluster

kube-scheduler

Master Node

Worker Node

kubelet

Container Runtime Engine

docker rkt

Worker Node

kubelet

Container Runtime Engine

docker rkt

```
curl -X POST /api/v1/namespaces/default/pods ...[other]
Pod created!
```

kube-apiserver

controller -manager

ETCD cluster

kube-scheduler

Master Node

Worker Node

kubelet

Container Runtime Engine

docker rkt

Worker Node

kubelet

Container Runtime Engine

docker rkt

```
curl -X POST /api/v1/namespaces/default/pods ...[other]
Pod created!
```

kube-apiserver

controller
-manager

ETCD
cluster

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Master Node

Worker Node

kubelet

Container Runtime Engine

docker rkt

Worker Node

kubelet

Container Runtime Engine

docker rkt

Kube-apiserver

- Autenticar o usuário
- Validar as requisições
- Recuperar dados (solicitar)
- Atualizar o ETCD
- Scheduler
- Kubelet

Kube-apiserver

Kubeadm

```
kubectl get pods -n kube-system
```

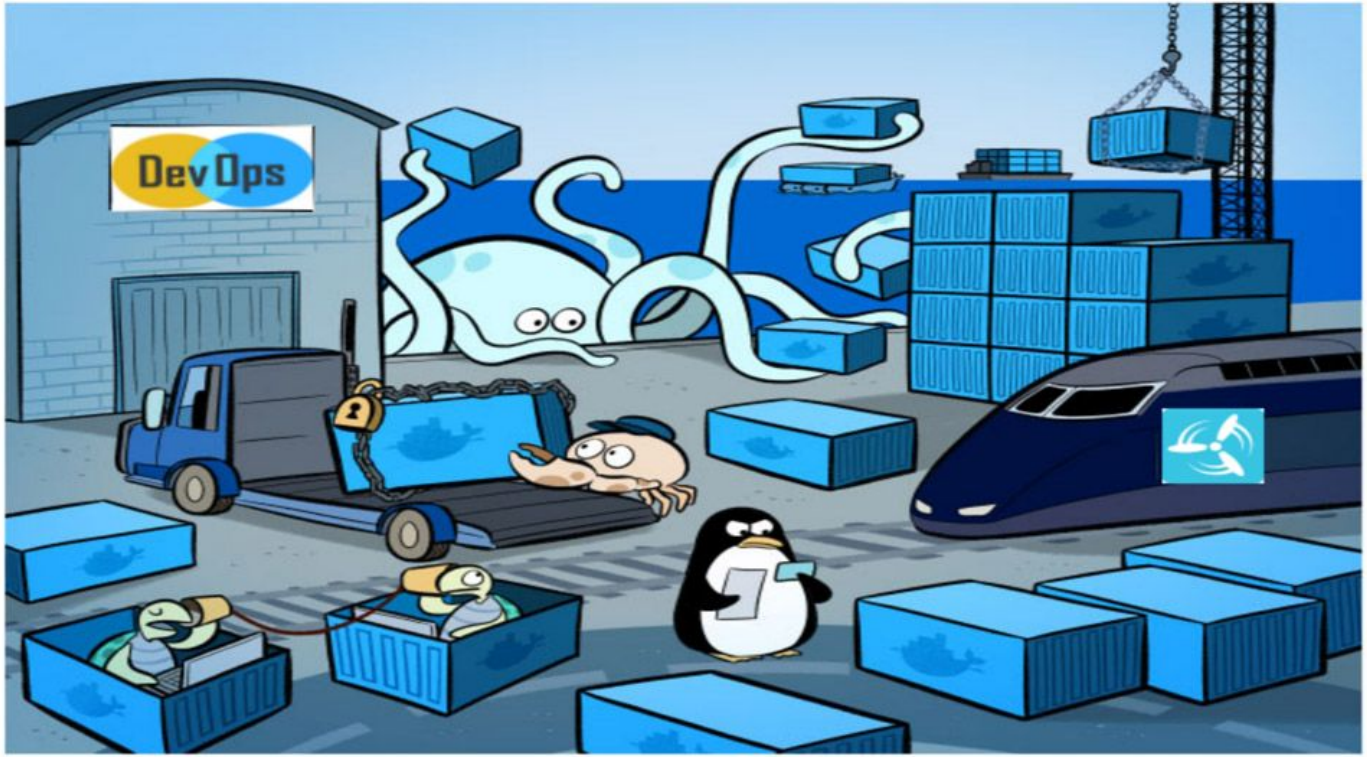
NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE
kube-system	coredns-78fcdf6894-hwrq9	1/1	Running	0	16m
kube-system	coredns-78fcdf6894-rzhjr	1/1	Running	0	16m
kube-system	etcd-master	1/1	Running	0	15m
kube-system	kube-apiserver-master	1/1	Running	0	15m
kube-system	kube-controller-manager-master	1/1	Running	0	15m
kube-system	kube-proxy-lzt6f	1/1	Running	0	16m
kube-system	kube-proxy-zm5qd	1/1	Running	0	16m
kube-system	kube-scheduler-master	1/1	Running	0	15m
kube-system	weave-net-29z42	2/2	Running	1	16m
kube-system	weave-net-snmdl				

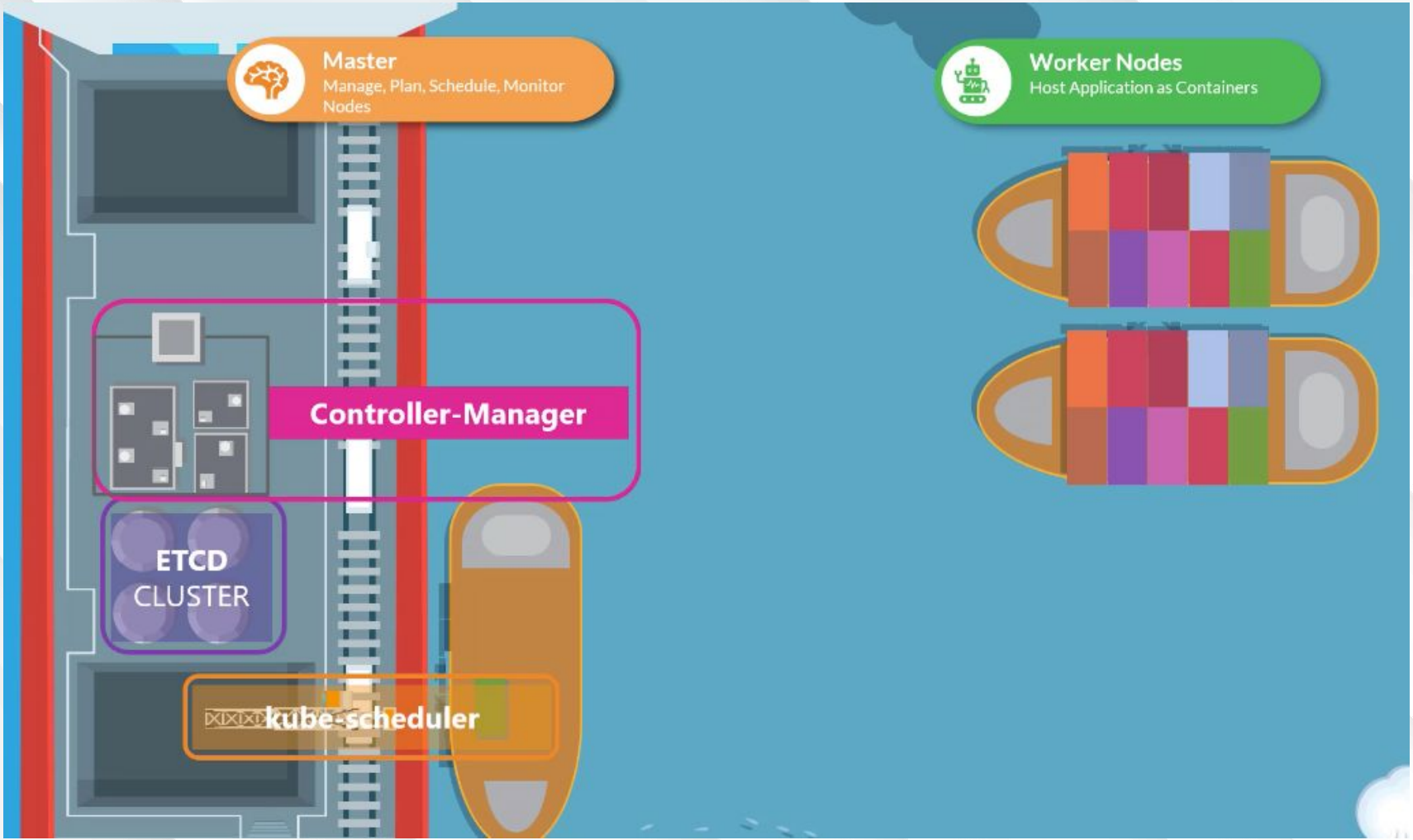
Docker

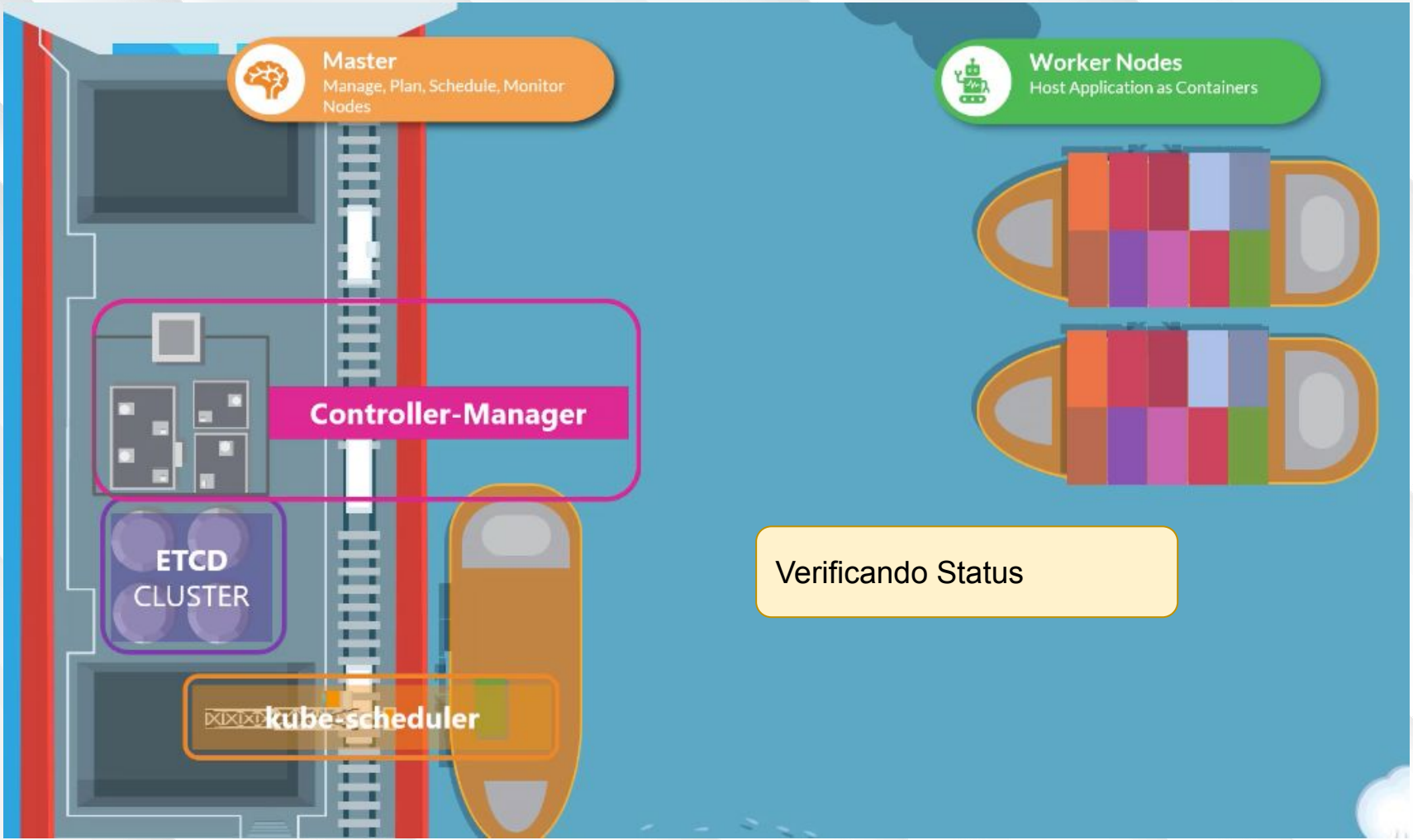
```
→ kubectl get pods -n kube-system
```

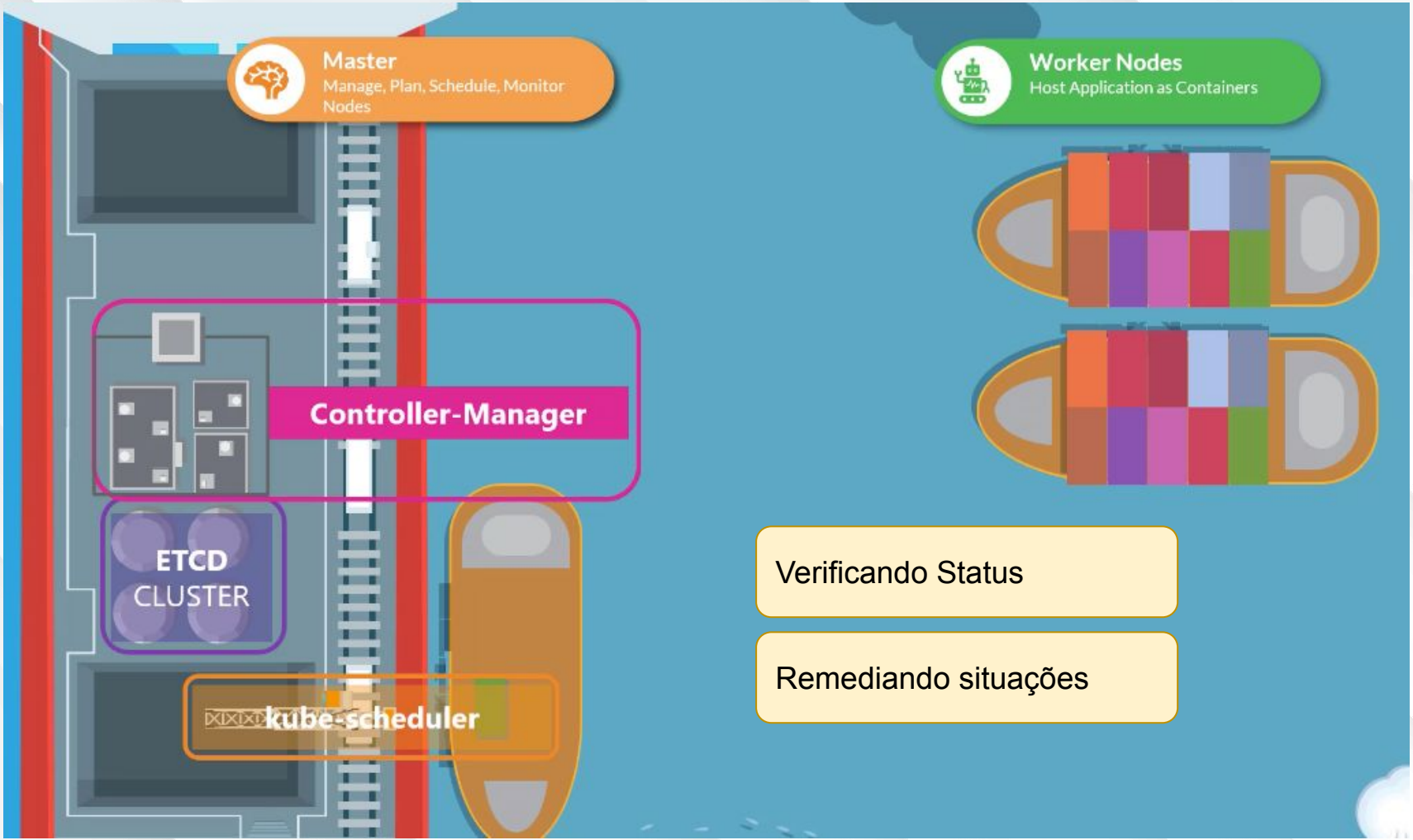
NAME	READY	STATUS	RESTARTS	AGE
coredns-5644d7b6d9-2kw9p	1/1	Running	26	209d
coredns-5644d7b6d9-gdfqh	1/1	Running	26	209d
etcd-docker-desktop	1/1	Running	49	209d
kube-apiserver-docker-desktop	1/1	Running	48	209d
kube-controller-manager-docker-desktop	1/1	Running	28	209d
kube-proxy-6b9gz	1/1	Running	26	209d
kube-scheduler-docker-desktop	1/1	Running	28	209d
storage-provisioner	1/1	Running	52	209d
vpnkit-controller	1/1	Running	27	209d

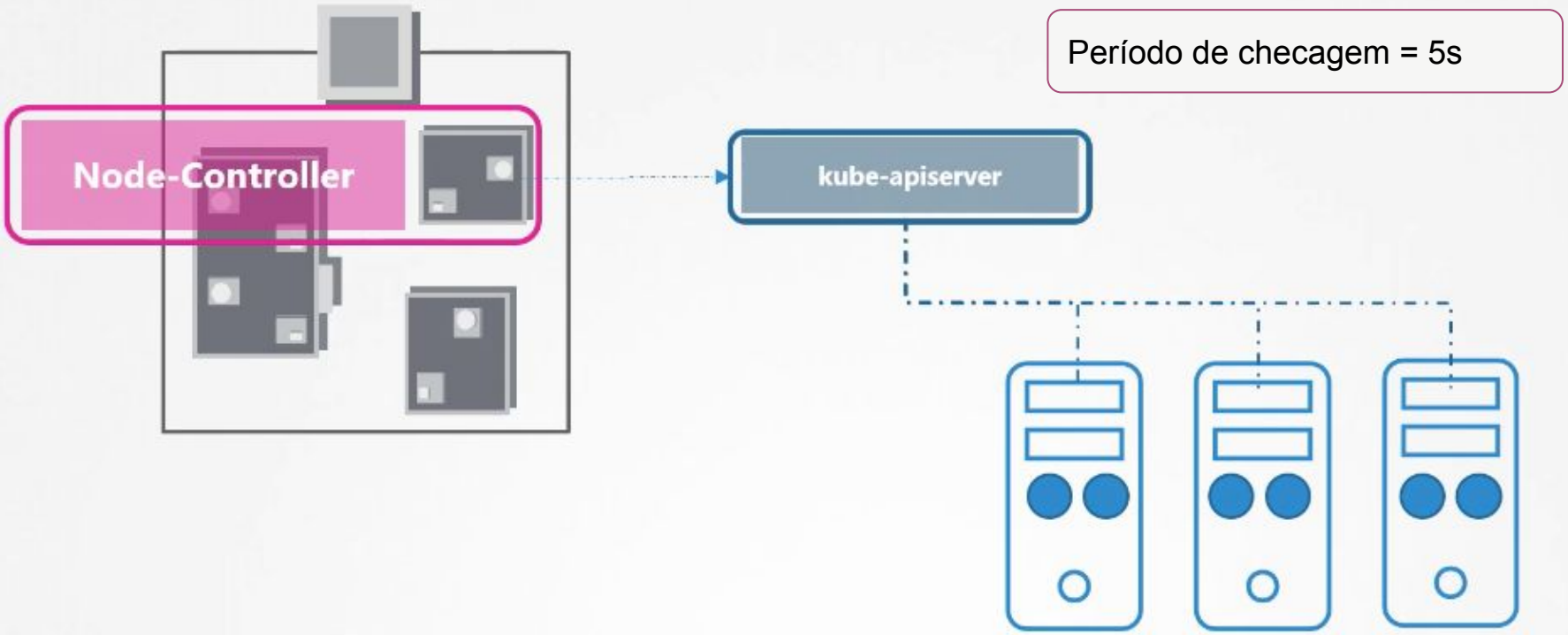
Kube Controller Manager



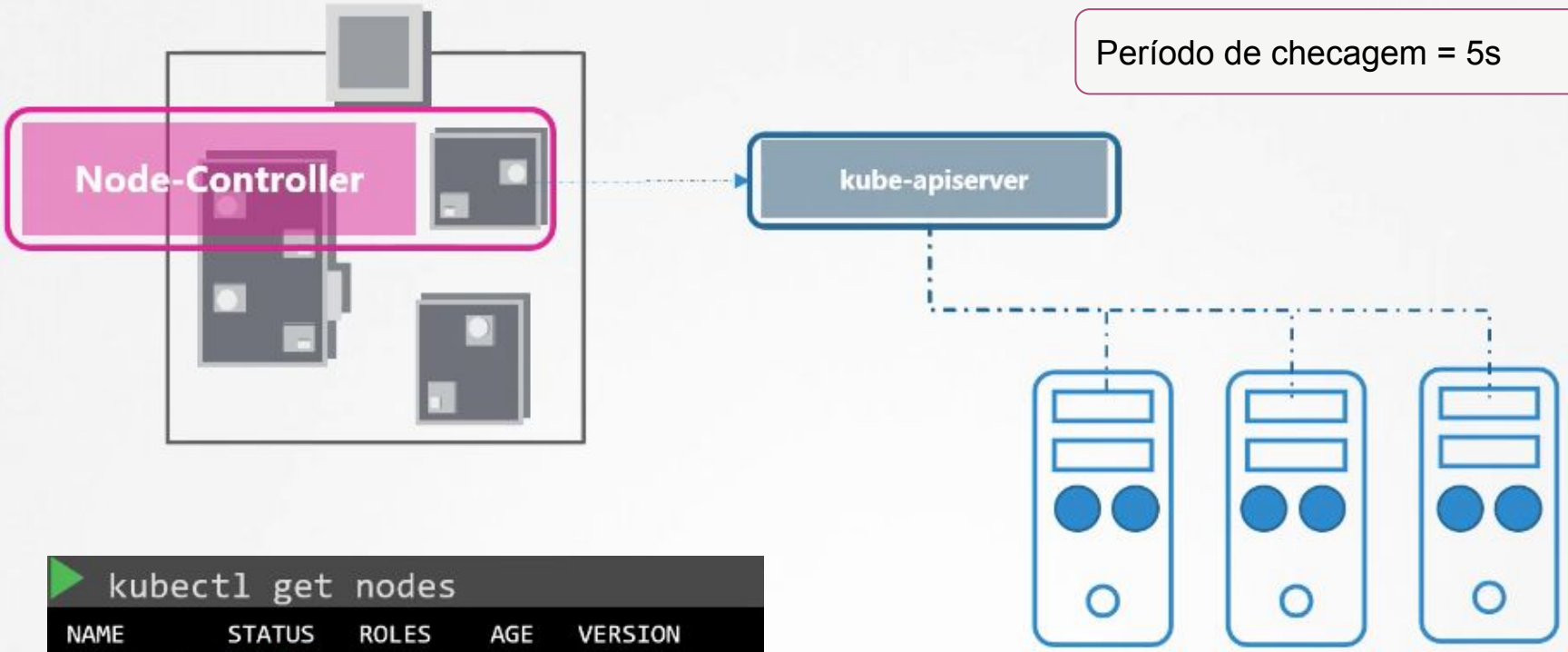

Master
Manage, Plan, Schedule, Monitor Nodes
Worker Nodes
Host Application as Containers
Controller-Manager
ETCD
CLUSTER
kube-scheduler


Master
Manage, Plan, Schedule, Monitor Nodes
Worker Nodes
Host Application as Containers
Controller-Manager
ETCD
CLUSTER
kube-scheduler
Verificando Status

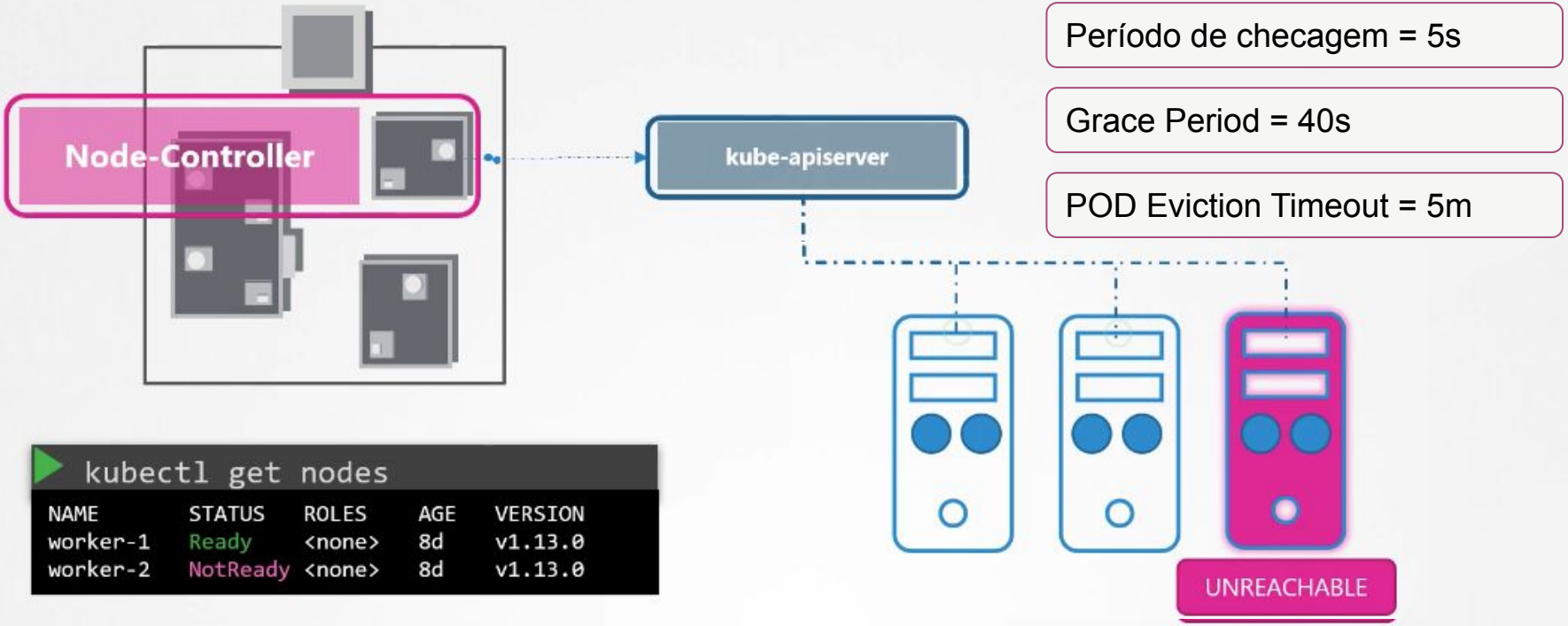

Master
Manage, Plan, Schedule, Monitor Nodes
Worker Nodes
Host Application as Containers
Controller-Manager
ETCD
CLUSTER
kube-scheduler
Verificando Status
Remediando situações

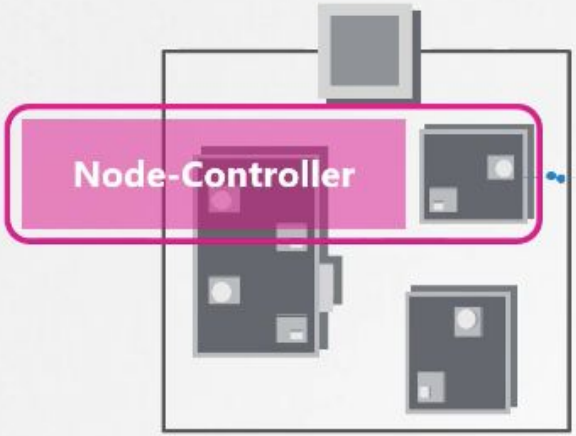

Período de checagem = 5s
Node-Controller
kube-apiserver

Período de checagem = 5s




```
kubectl get nodes
NAME       STATUS   ROLES    AGE   VERSION
worker-1   Ready    <none>   8d    v1.13.0
worker-2   Ready    <none>   8d    v1.13.0
```

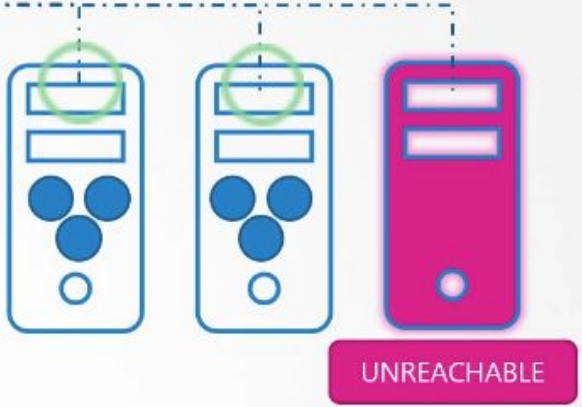

Node-Controller
kube-apiserver
Período de checagem = 5s
Grace Period = 40s
POD Eviction Timeout = 5m
kubectl get nodes
NAME STATUS ROLES AGE VERSION
worker-1 Ready <none> 8d v1.13.0
worker-2 NotReady <none> 8d v1.13.0
UNREACHABLE



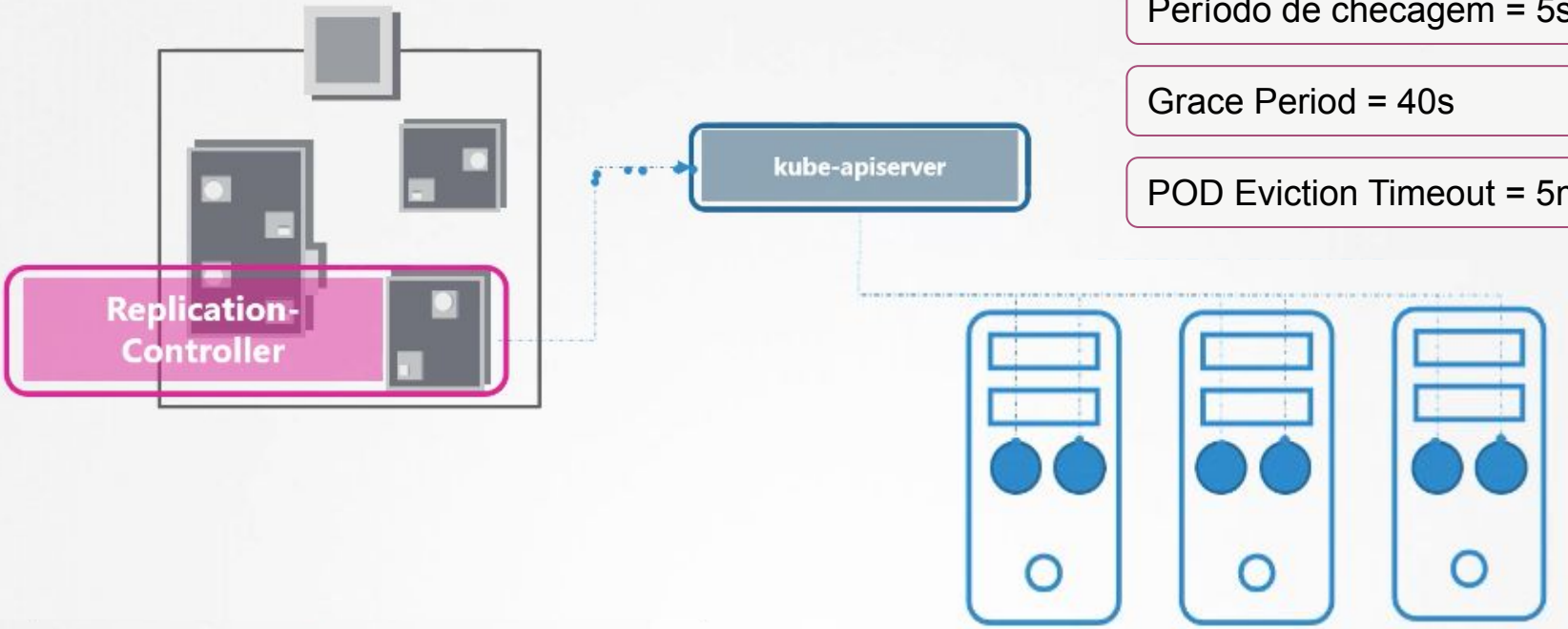
Período de checagem = 5s

Grace Period = 40s

POD Eviction Timeout = 5m



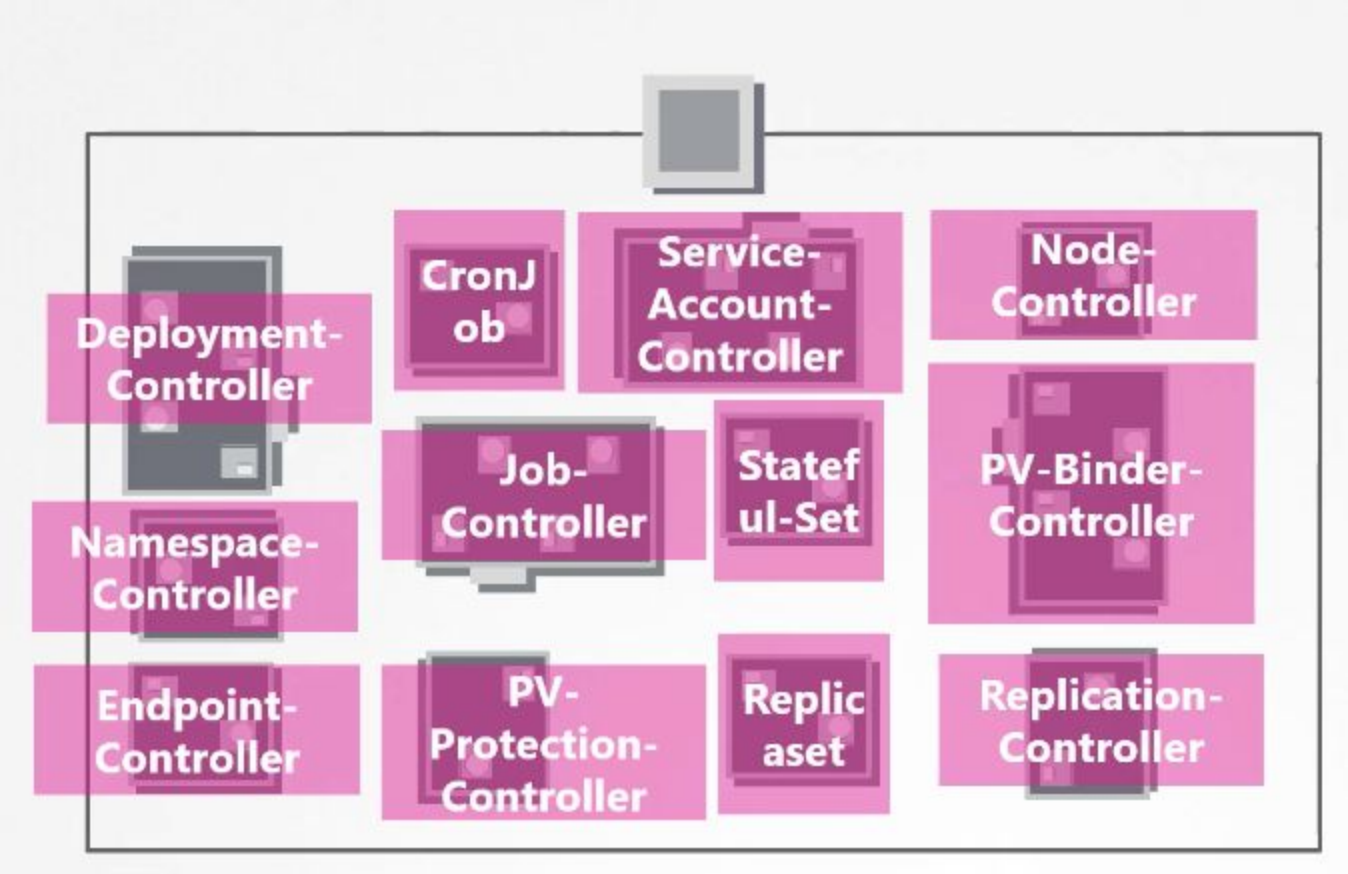

```
kubectl get nodes
NAME       STATUS     ROLES    AGE   VERSION
worker-1   Ready      <none>   8d    v1.13.0
worker-2   NotReady   <none>   8d    v1.13.0
```



Período de checagem = 5s

Grace Period = 40s

POD Eviction Timeout = 5m


Deployment-Controller
CronJob
Service-Account-Controller
Node-Controller
Job-Controller
Stateful-Set
PV-Binder-Controller
Namespace-Controller
Endpoint-Controller
PV-Protection-Controller
Replicaset
Replication-Controller


Kube-Controller-
Manager

```
kubectl get pods -n kube-system
```

NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE
kube-system	coredns-78fcdf6894-hwrq9	1/1	Running	0	16m
kube-system	coredns-78fcdf6894-rzhjr	1/1	Running	0	16m
kube-system	etcd-master	1/1	Running	0	15m
kube-system	kube-apiserver-master	1/1	Running	0	15m
kube-system	kube-controller-manager-master	1/1	Running	0	15m
kube-system	kube-proxy-lzt6f	1/1	Running	0	16m
kube-system	kube-proxy-zm5qd	1/1	Running	0	16m
kube-system	kube-scheduler-master	1/1	Running	0	15m
kube-system	weave-net-29z42	2/2	Running	1	16m
kube-system	weave-net-snmdl	2/2	Running	1	16m

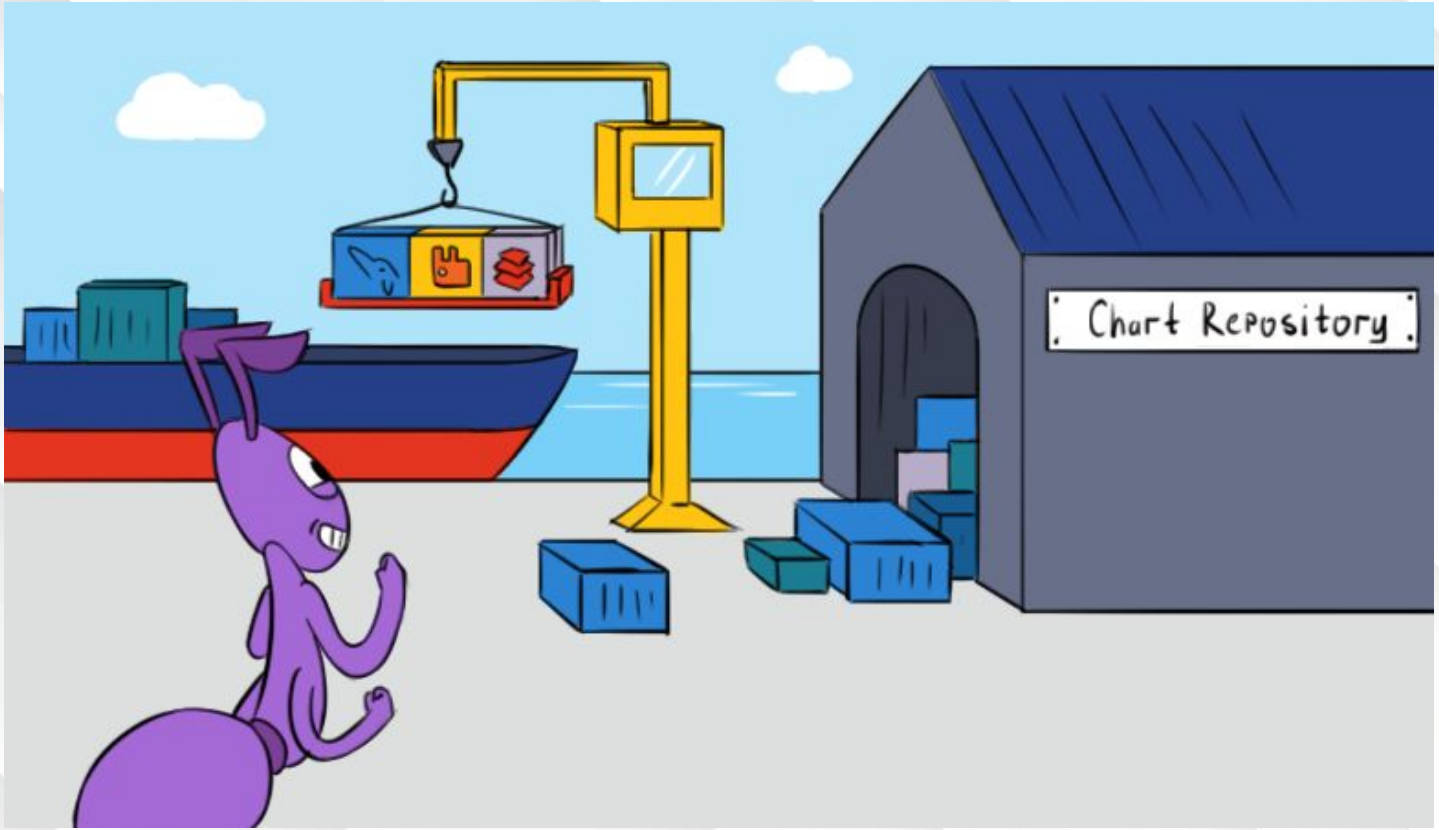
Kubeadm

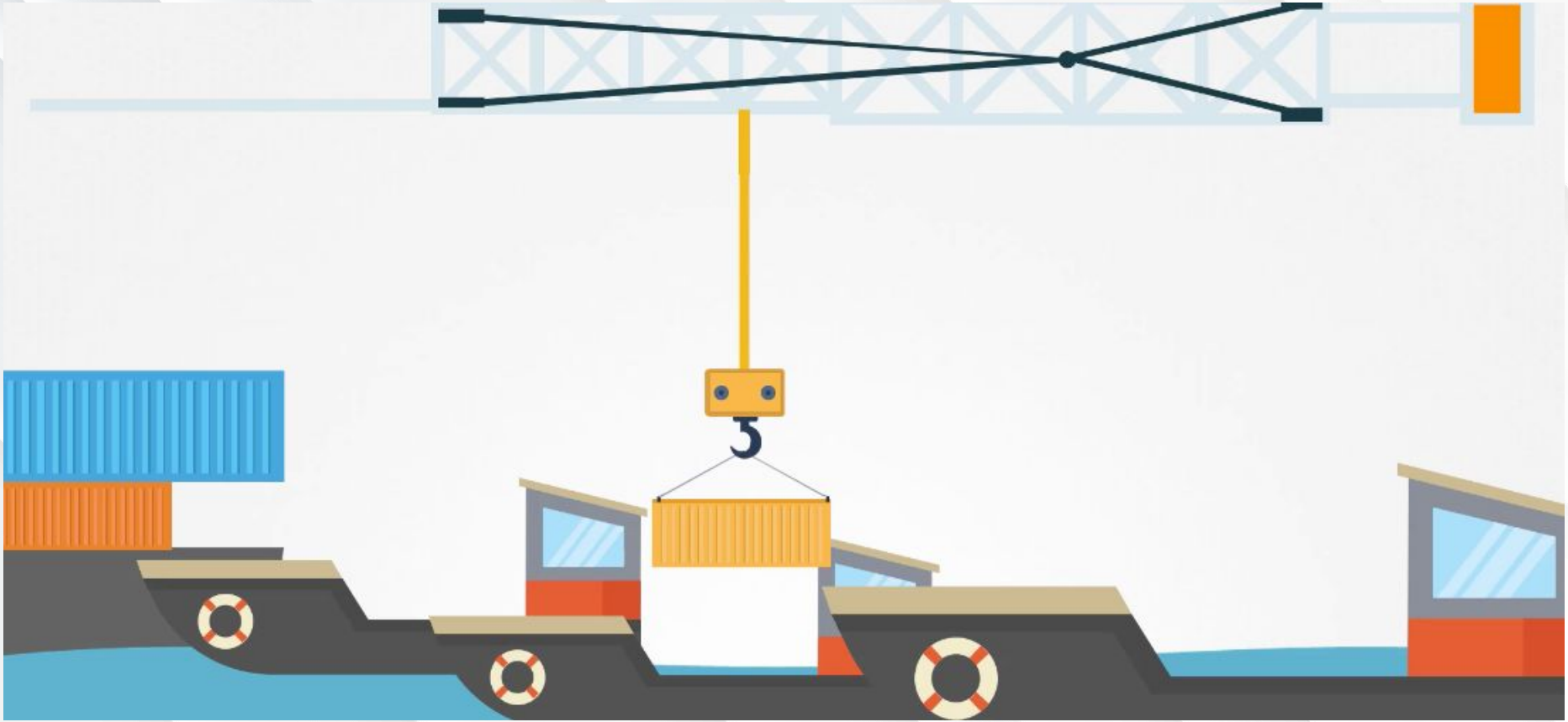
Docker

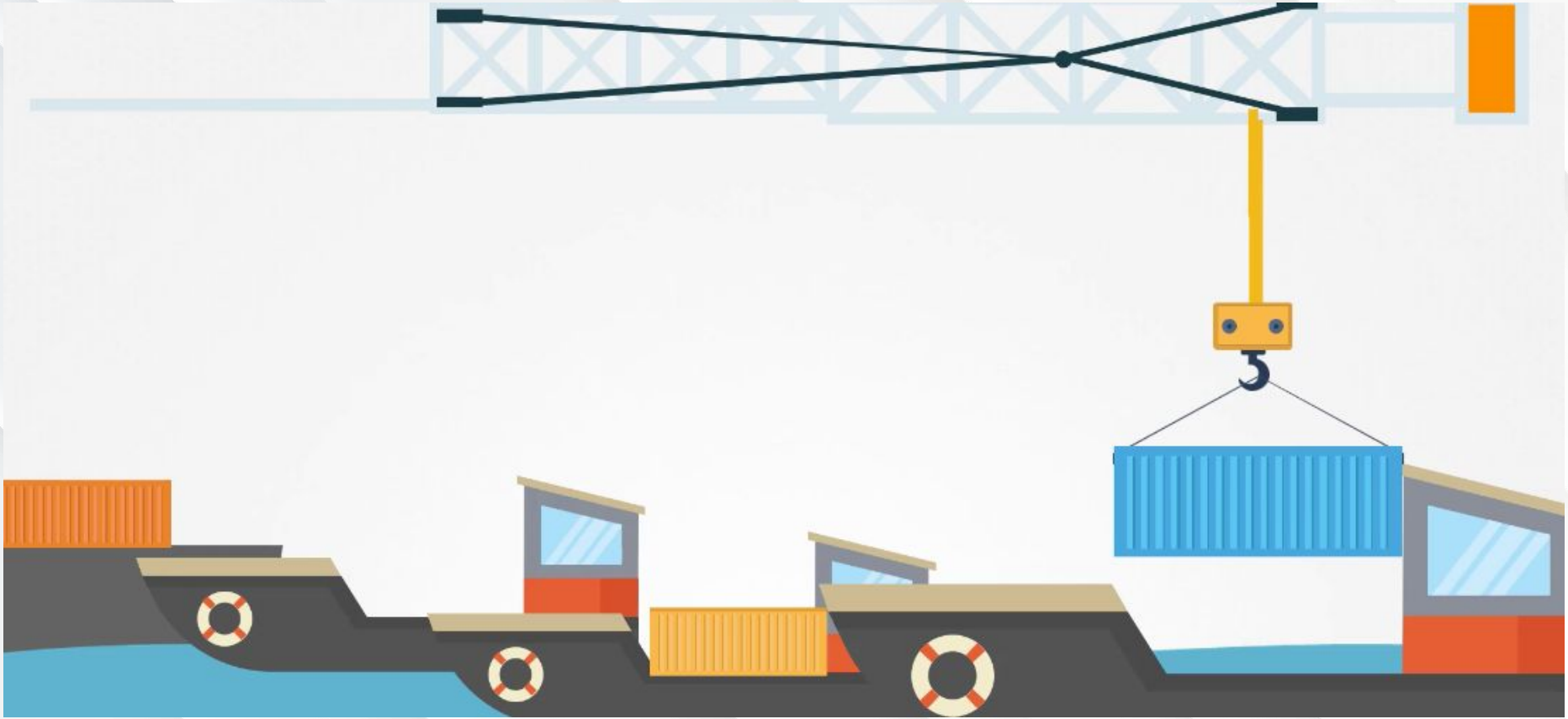
```
→ kubectl get pods -n kube-system
```

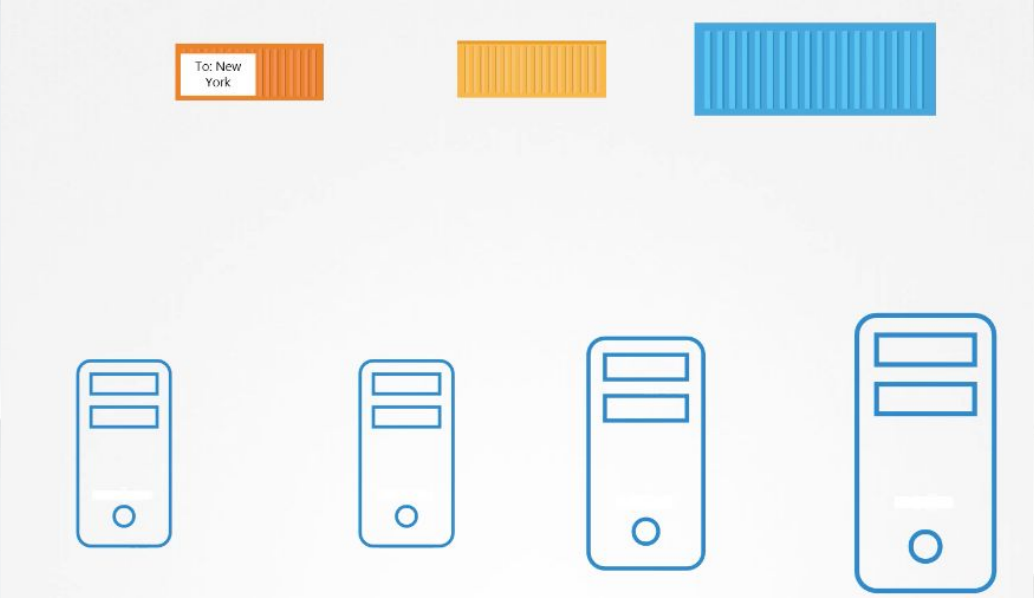
NAME	READY	STATUS	RESTARTS	AGE
coredns-5644d7b6d9-2kw9p	1/1	Running	26	209d
coredns-5644d7b6d9-gdfqh	1/1	Running	26	209d
etcd-docker-desktop	1/1	Running	49	209d
kube-apiserver-docker-desktop	1/1	Running	48	209d
kube-controller-manager-docker-desktop	1/1	Running	28	209d
kube-proxy-6b9gz	1/1	Running	26	209d
kube-scheduler-docker-desktop	1/1	Running	28	209d
storage-provisioner	1/1	Running	52	209d
vpnkit-controller	1/1	Running	27	209d

Kube Scheduler





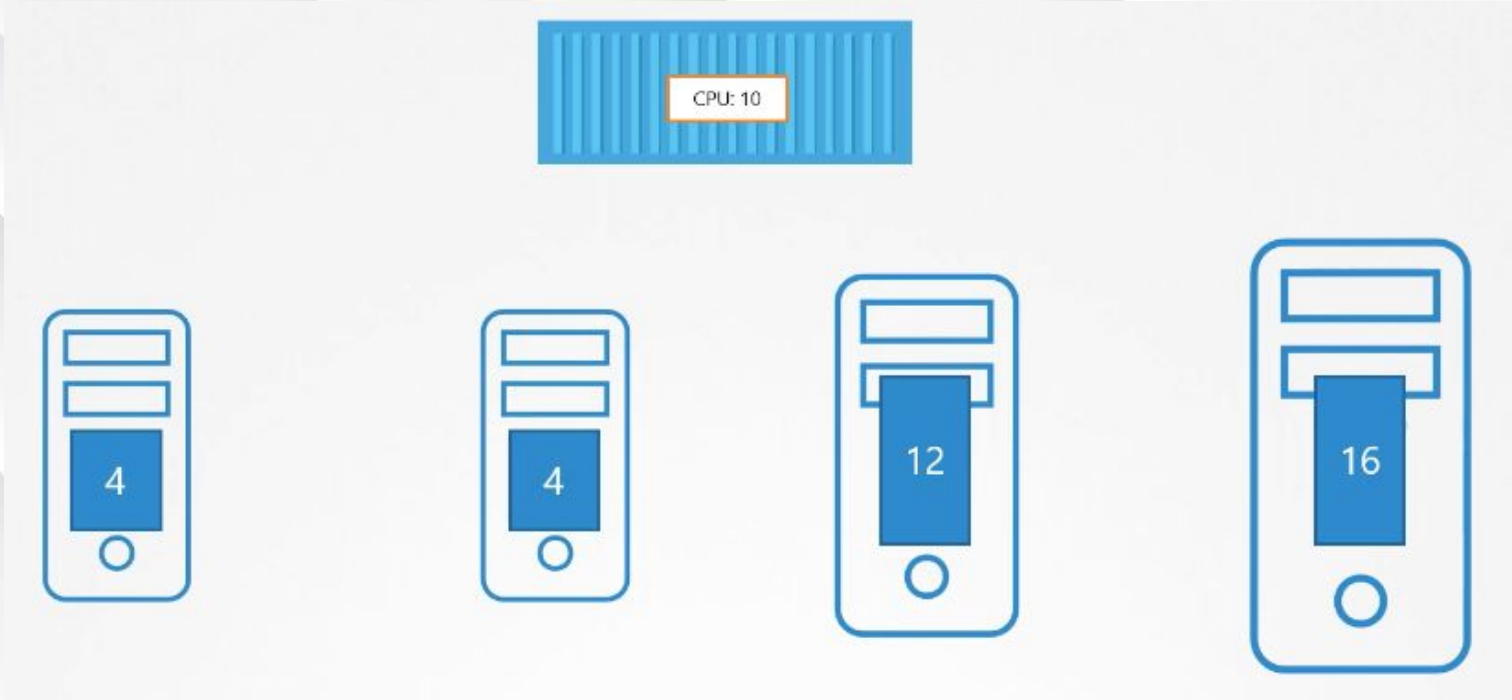




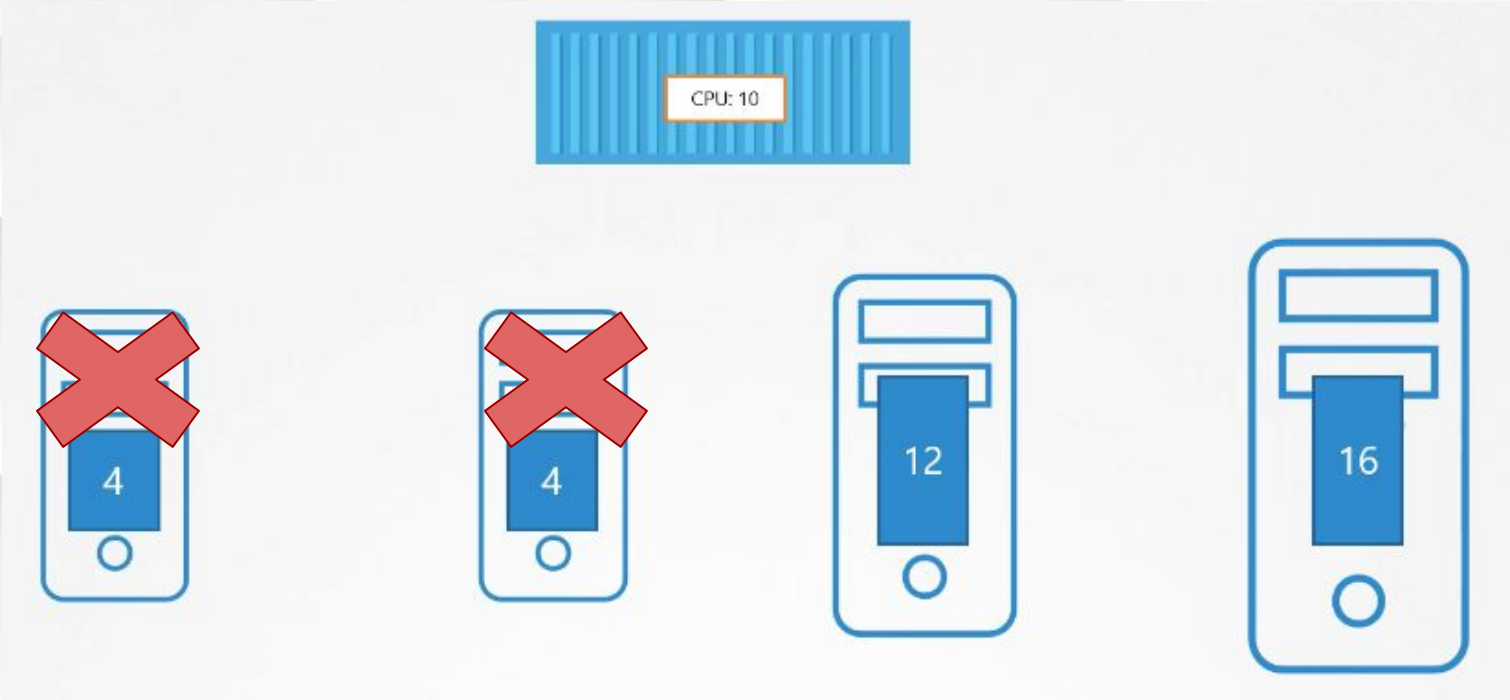
Scheduler verifica o tempo todo os pods que precisam ser alocados e os nodes existentes.

Compara os requisitos e toma as decisões adequadas.

Fase 1: Filtrar os nodes

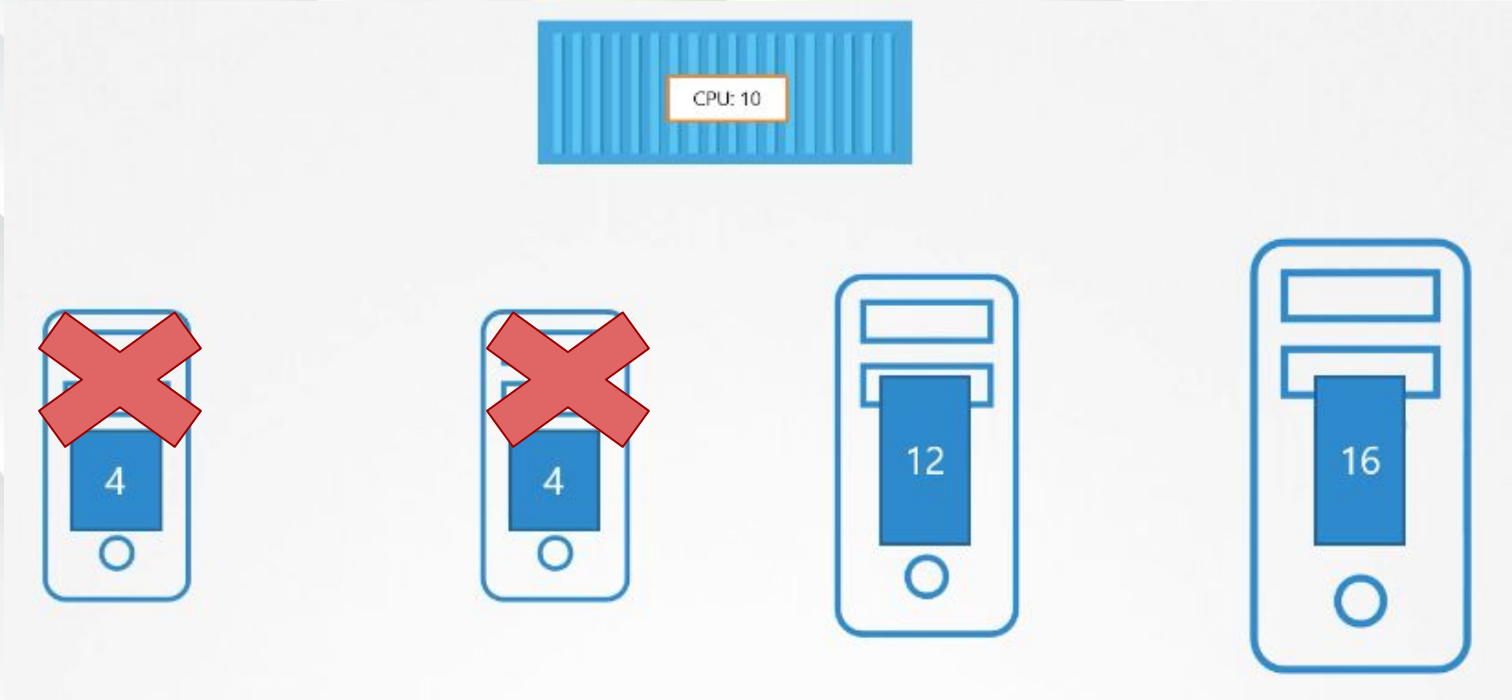


Fase 1: Filtrar os nodes



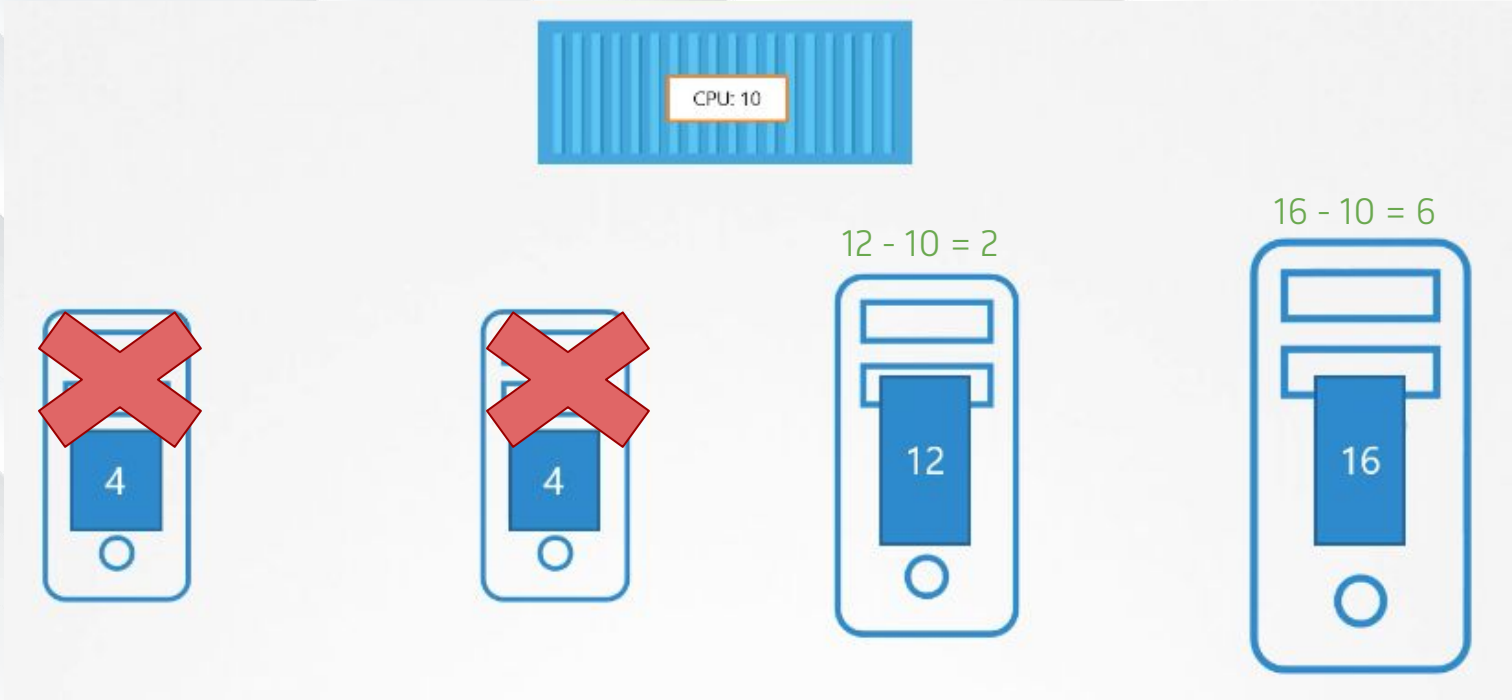
Fase 1: Filtrar os nodes

Fase 2: Ranking dos nodes



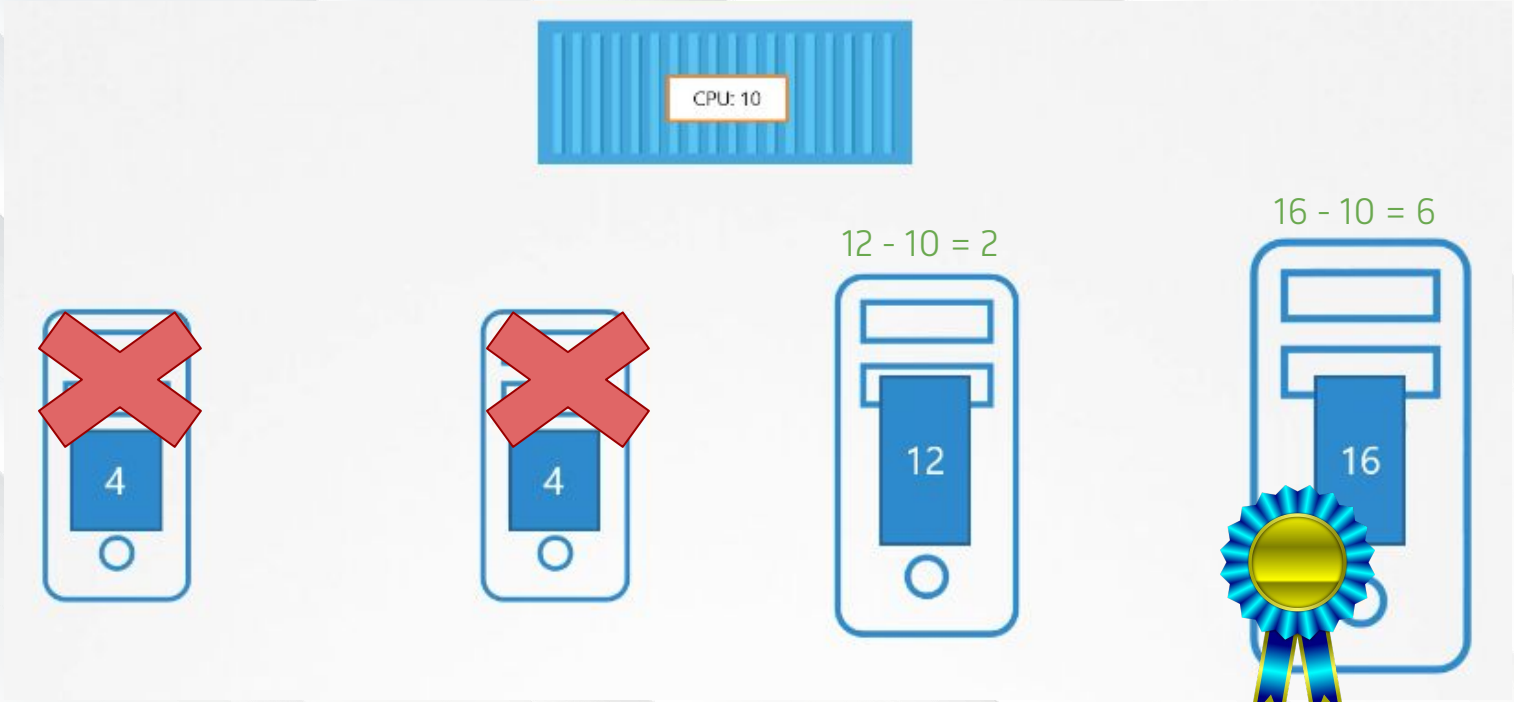
Fase 1: Filtrar os nodes

Fase 2: Ranking dos nodes



Fase 1: Filtrar os nodes

Fase 2: Ranking dos nodes



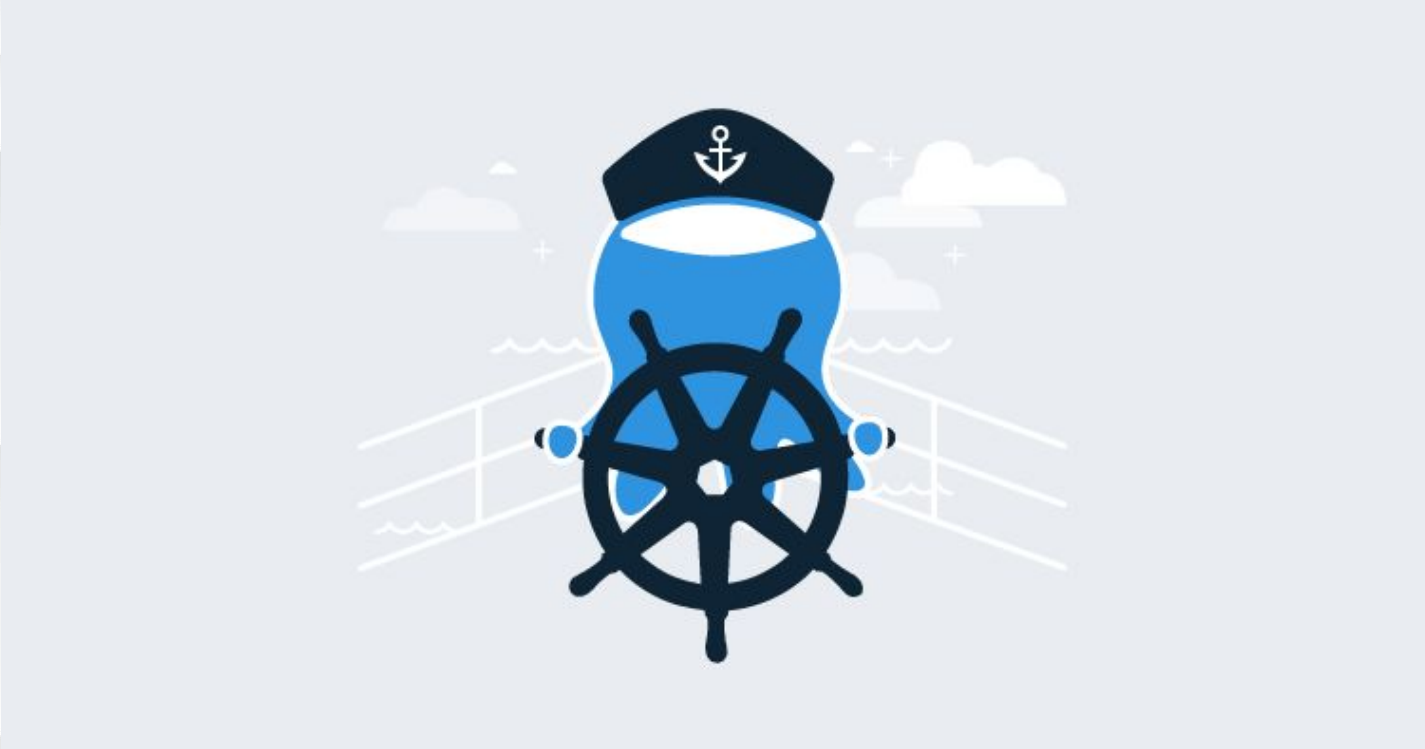
Adiante:

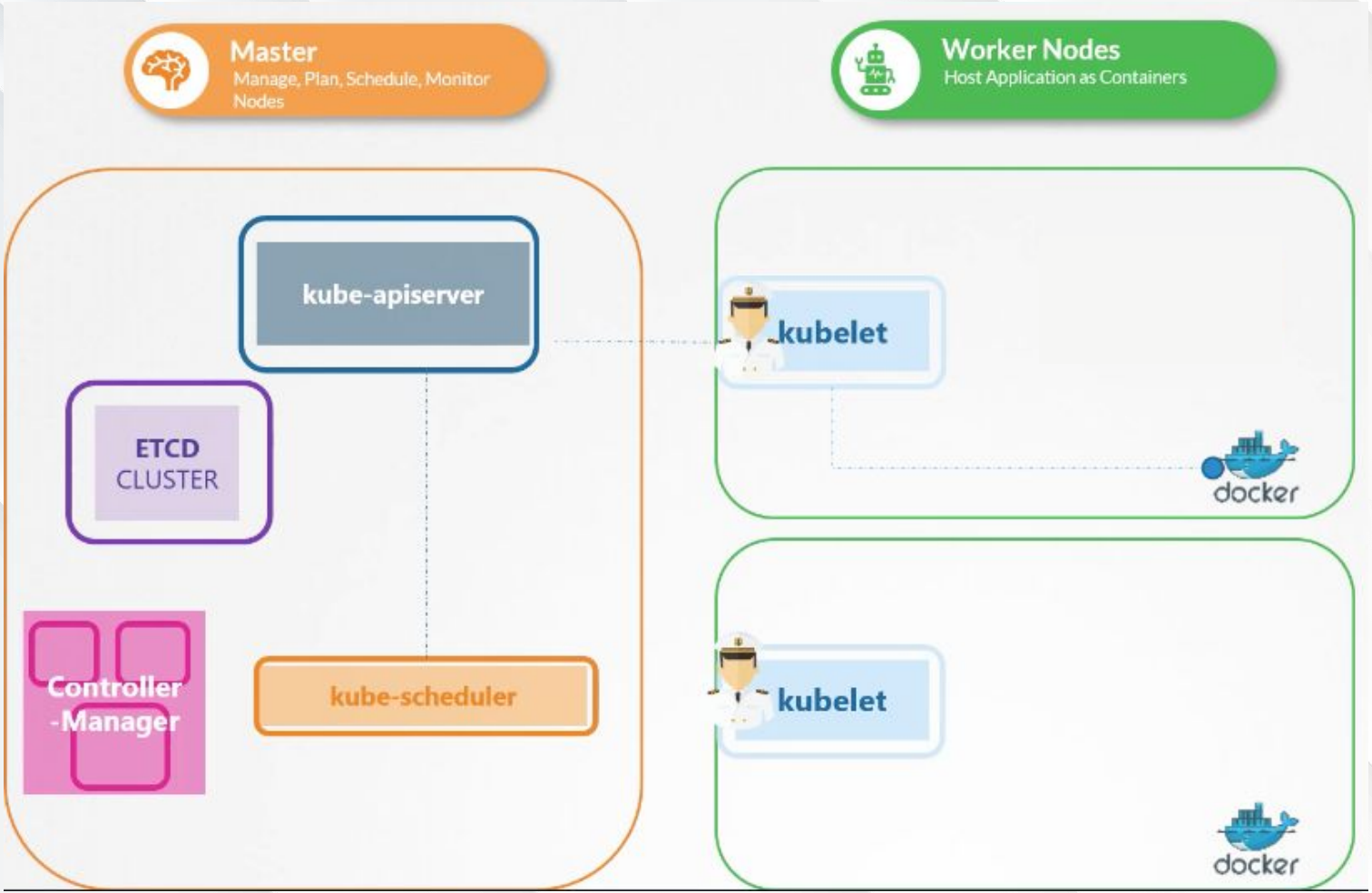
- Taints
- Tolerations
- Node Selectors
- Affinity

```
→ kubectl get pods -n kube-system
NAME                                     READY   STATUS    RESTARTS   AGE
coredns-5644d7b6d9-2kw9p                 1/1     Running   26         209d
coredns-5644d7b6d9-gdfqh                 1/1     Running   26         209d
etcd-docker-desktop                      1/1     Running   49         209d
kube-apiserver-docker-desktop            1/1     Running   48         209d
kube-controller-manager-docker-desktop   1/1     Running   28         209d
kube-proxy-6b9gz                         1/1     Running   26         209d
kube-scheduler-docker-desktop            1/1     Running   28         209d
storage-provisioner                      1/1     Running   52         209d
vpnkit-controller                        1/1     Running   27         209d
```

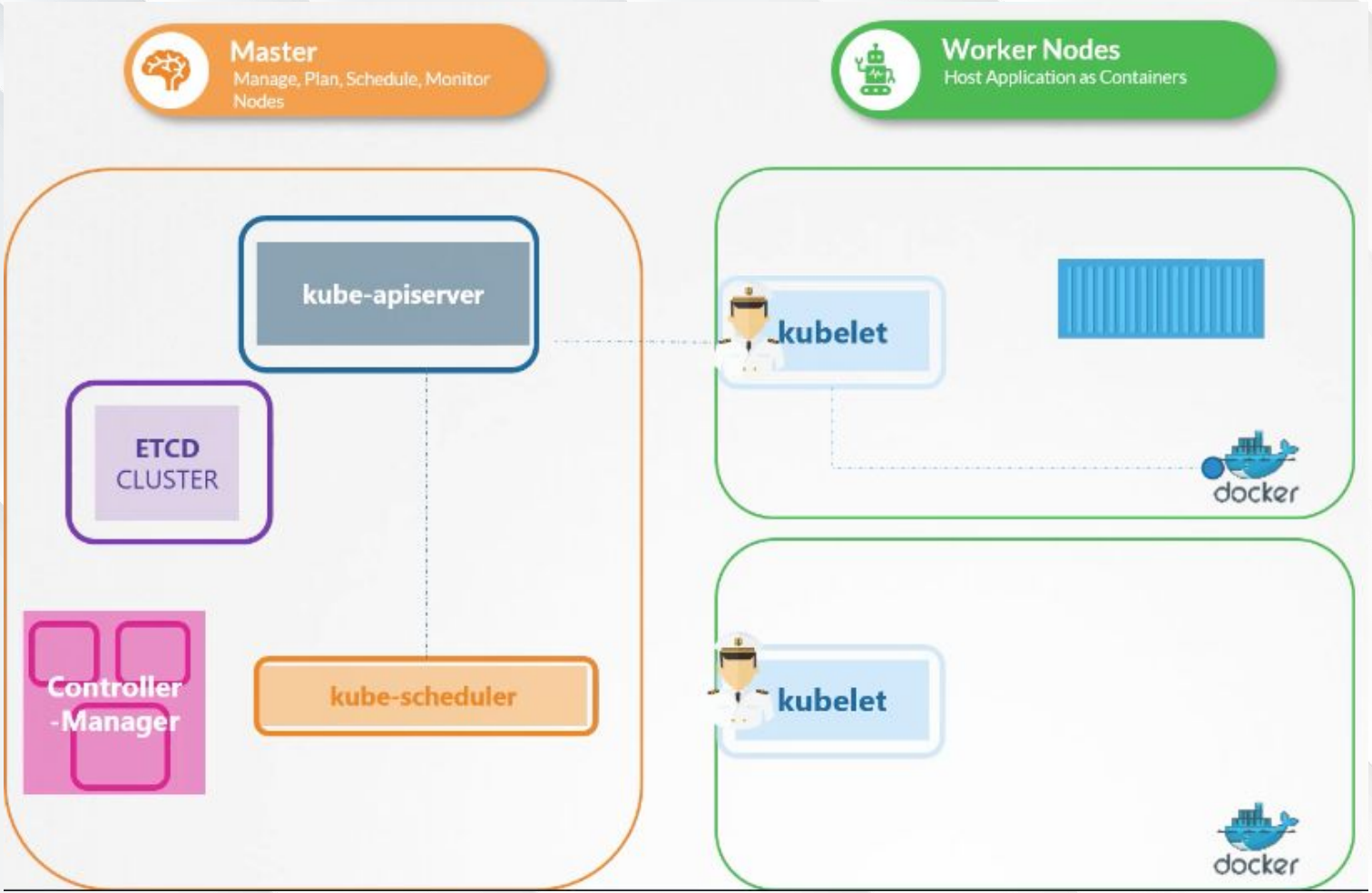
Docker

Kubelet





Registrar um node



Registrar um node

Criar PODs

Instalação do Kubelet

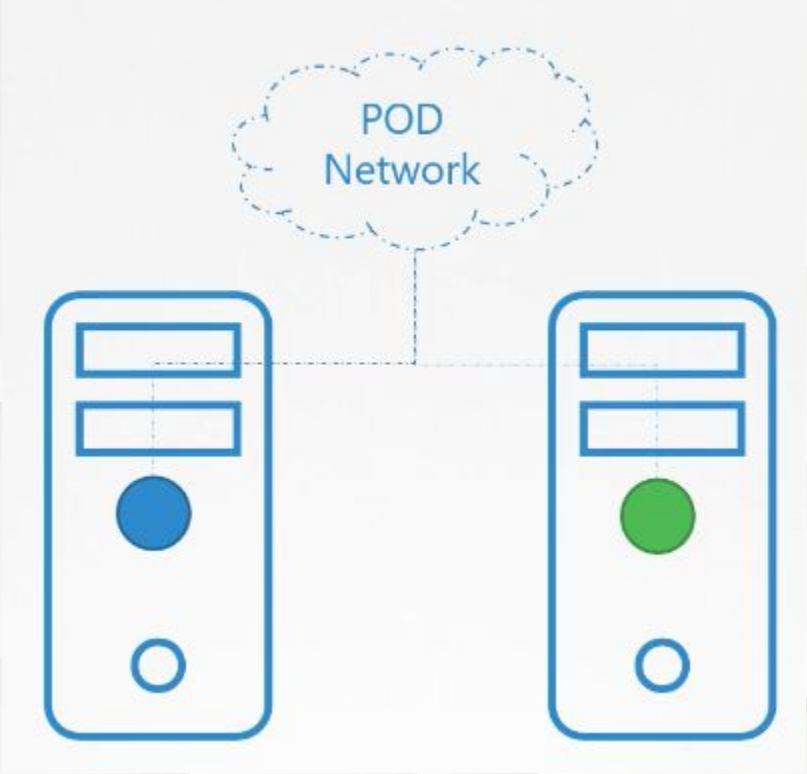
```
wget https://storage.googleapis.com/kubernetes-release/release/v1.13.0/bin/linux/amd64/kubelet
```

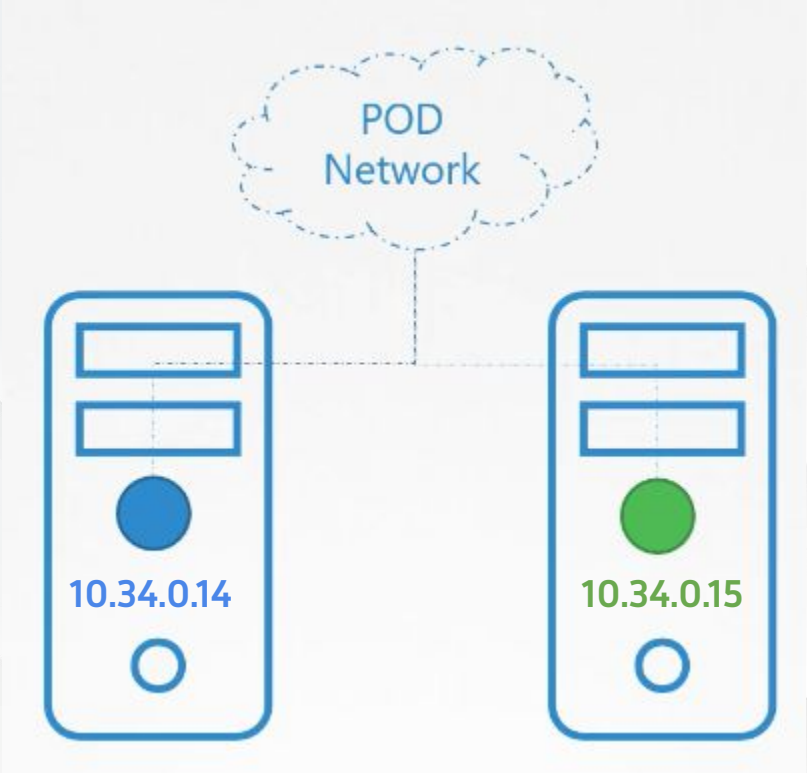
kubelet.service

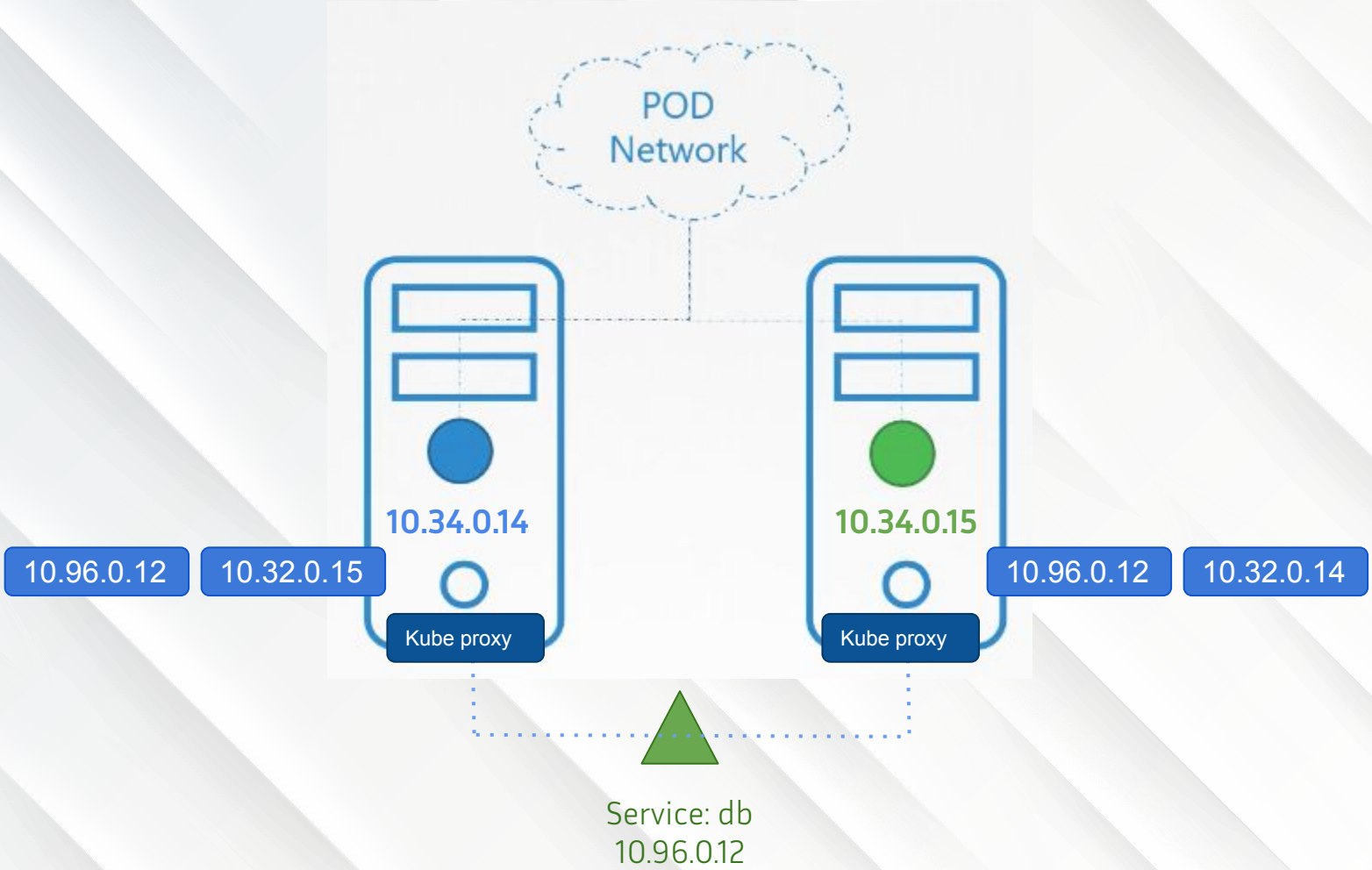
```
ExecStart=/usr/local/bin/kubelet \\
  --config=/var/lib/kubelet/kubelet-config.yaml \\
  --container-runtime=remote \\
  --container-runtime-endpoint=unix:///var/run/containerd/containerd.sock \\
  --image-pull-progress-deadline=2m \\
  --kubeconfig=/var/lib/kubelet/kubeconfig \\
  --network-plugin=cni \\
  --register-node=true \\
  --v=2
```

- **Docker** não possui (não precisa) do kubelet pois possui apenas um node que é o master.
- **Kubeadm** requer que você instale manualmente cada kubelet
- **Provedores** cloud automatizam para você

Kube Proxy


POD
Network


POD
Network
10.34.0.14
10.34.0.15


POD
Network
10.34.0.14
10.34.0.15
10.96.0.12
10.32.0.15
10.96.0.12
10.32.0.14
Kube proxy
Kube proxy
Service: db
10.96.0.12

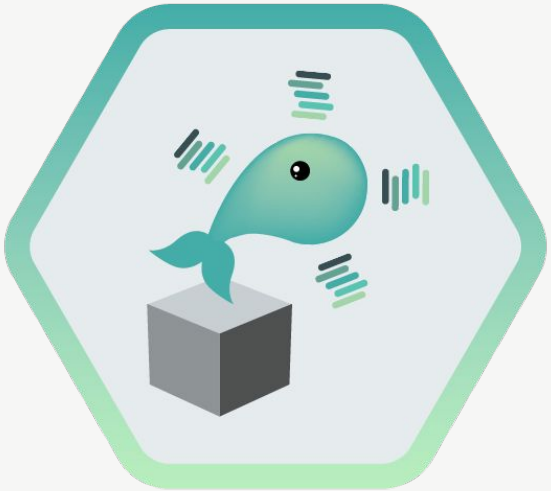
Instalação

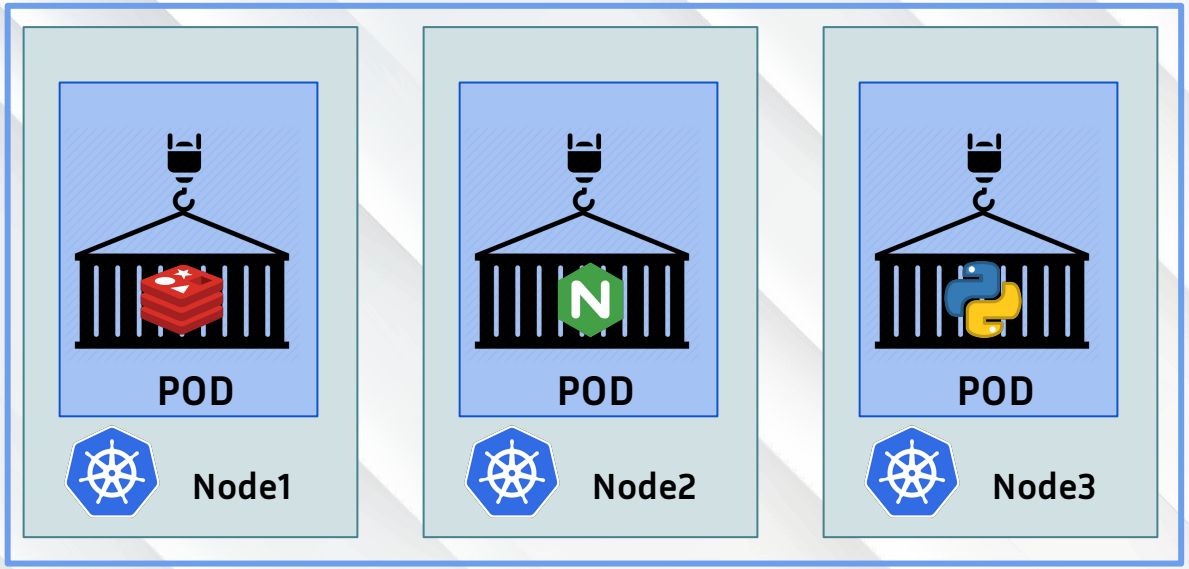
```
→ kubectl get pods -n kube-system
NAME                                  READY   STATUS    RESTARTS   AGE
coredns-5644d7b6d9-2kw9p              1/1     Running   27         211d
coredns-5644d7b6d9-gdfqh              1/1     Running   27         211d
etcd-docker-desktop                   1/1     Running   50         211d
kube-apiserver-docker-desktop         1/1     Running   49         211d
kube-controller-manager-docker-desktop 1/1    Running   29         211d
kube-proxy-6b9gz                      1/1     Running   27         211d
kube-scheduler-docker-desktop         1/1     Running   29         211d
storage-provisioner                   1/1     Running   53         211d
vpnkit-controller                     1/1     Running   28         211d

~ took 2s
→ kubectl get daemonset -n kube-system
NAME         DESIRED   CURRENT   READY   UP-TO-DATE   AVAILABLE   NODE SELECTOR
       AGE
kube-proxy   1         1         1       1            1           beta.kubernetes.io/os=
linux   211d
```

```
     AGE
54   1h
```

Docker

Pods

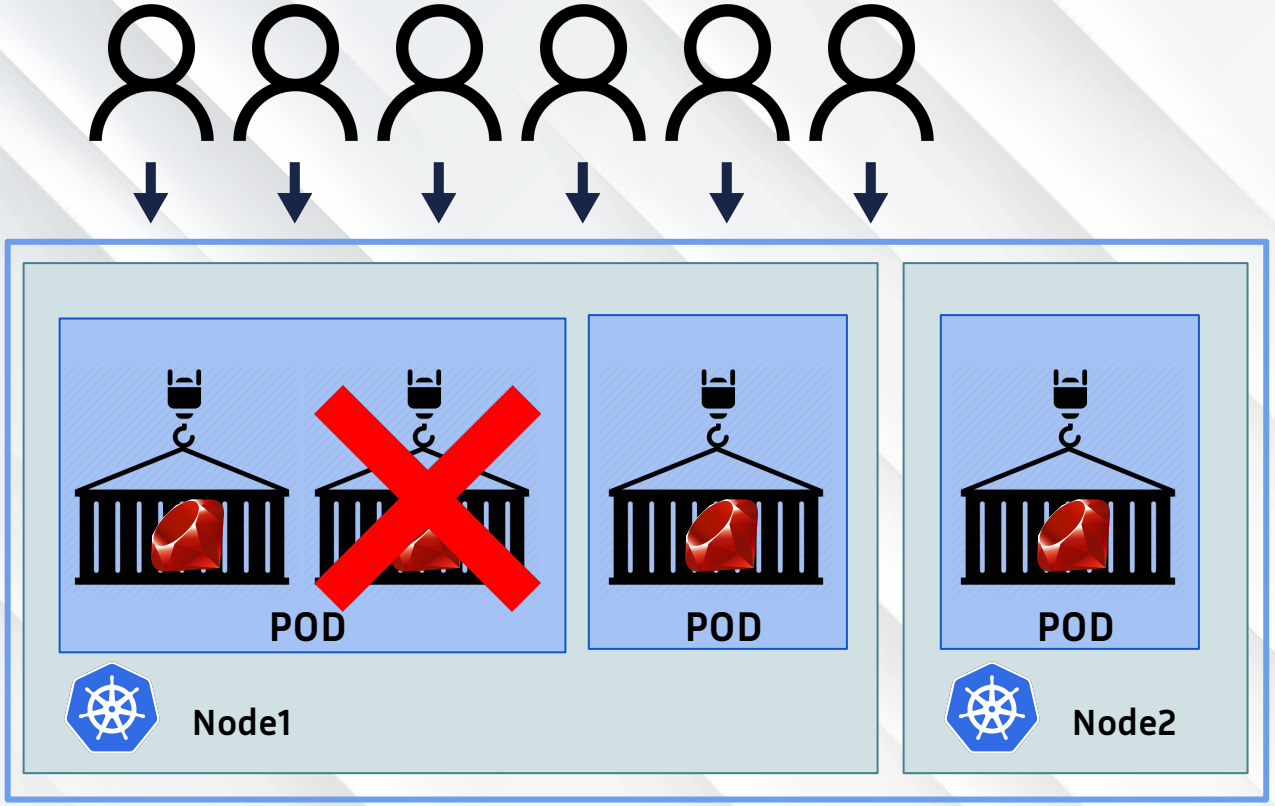



POD
POD
POD
Node1
Node2
Node3

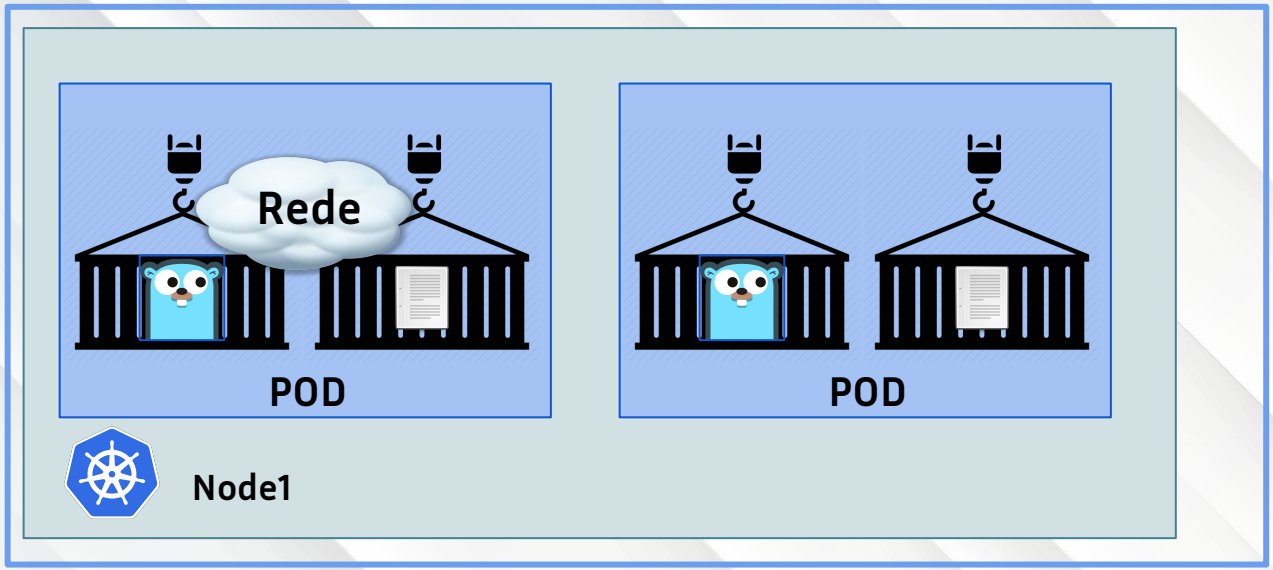

O QUE VAMOS FAZER HOJE À NOITE, CÉREBRO?
A MESMA COISA DE TODAS AS NOITES PINK. DEPLOYMENT DE CONTAINERS EM UM CLUSTER DE NODES.

Pods

Pods



Pods - Multi-Container



Pods - kubectl

```
kubectl run nginx --image nginx
```

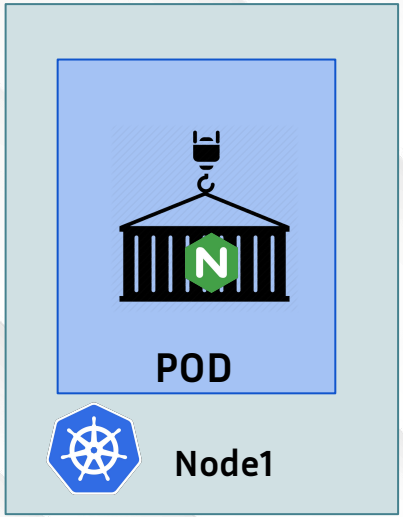
OU --image=nginx

```
kubectl get pods
```

```
NAME    READY   STATUS              RESTARTS   AGE
nginx   0/1     ContainerCreating   0          1s
```

```
NAME    READY   STATUS    RESTARTS   AGE
nginx   1/1     Running   0          20s
```

```
kubectl delete pod nginx
```



Pods - kubectl - Demo & Prática

https://www.katacoda.com/courses/kubernetes/playground

Pods - Com YAML

```
- name: create users
  hosts: all
  tasks:
    - user:
      name: "{{ item
      state: present
      groups: "{{ it
    with_items:
      - { name: 'lin
      - { name: 'lis
```

Pods - Com YAML

pod-nginx.yml

```
apiVersion: v1
kind: Pod
metadata:
  name: meuapp-pod
  labels:
    app: meuapp
    tipo: front-end
spec:
  containers:
    - name: nginx-container
      image: nginx
```

String

String

Dicionário

Lista/Array

Dicionário

Tipo de Objeto	Versão de API
POD	v1
Service	v1
ReplicaSet	apps/v1
Deployment	apps/v1

```
kubectl create -f pod-nginx.yml
```

```
kubectl get pods
```

```
kubectl describe pod meuapp-pod
```

Pods - Com YAML

```
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from default-token-v5v8t (ro)
Conditions:
  Type              Status
  Initialized       True
  Ready             True
  ContainersReady   True
  PodScheduled      True
Volumes:
  default-token-v5v8t:
    Type:        Secret (a volume populated by a Secret)
    SecretName:  default-token-v5v8t
    Optional:    false
QoS Class:       BestEffort
Node-Selectors:  <none>
Tolerations:     node.kubernetes.io/not-ready:NoExecute for 300s
                 node.kubernetes.io/unreachable:NoExecute for 300s
Events:
  Type    Reason     Age   From               Message
  ----    ------     ----  ----               -------
  Normal  Scheduled  54s   default-scheduler  Successfully assigned default/nginx to node01
  Normal  Pulling    54s   kubelet, node01    Pulling image "nginx"
  Normal  Pulled     48s   kubelet, node01    Successfully pulled image "nginx"
  Normal  Created    47s   kubelet, node01    Created container nginx
  Normal  Started    46s   kubelet, node01    Started container nginx
```

Pods (com yml)- kubectl - Demo & Prática

https://www.katacoda.com/courses/kubernetes/playground

kubectl run nginxsemyml --image=nginx

kubectl get pods

```
apiVersion: v1
kind: Pod
metadata:
  name: nginxcomyml
  labels:
    app: meunginx
    tipo: servidorweb
    autor: <seu nome>
spec:
  containers:
    - name: nginxcomyml
      image: nginx
```

kubectl describe pod <nome_do_pod>

kubectl describe pod <nome_do_pod> -o wide

kubectl delete pod <nome_do_pod>

Pods (com yml)- kubectl - Demo & Prática

https://www.katacoda.com/courses/kubernetes/playground

redispod.yml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: rediscomyml
  labels:
    app: meuredis
    tipo: banco
    autor: <seu nome>
spec:
  containers:
    - name: rediscomyml
      image: redis
```

apachepod.yml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: apachecomyml
  labels:
    app: meuapache
    tipo: servidorweb
    autor: <seu nome>
spec:
  containers:
    - name: apachecomyml
      image: httpd
```

```
kubectl create -f <nome_do_arquivo>
```

ou

```
kubectl create -f nginxpod.yml -f apachepod.yml
-f redispod.yml
```

```
kubectl delete pods -l tipo=servidorweb
```

Pods (com yml)- kubectl - Demo & Prática

https://www.katacoda.com/courses/kubernetes/playground

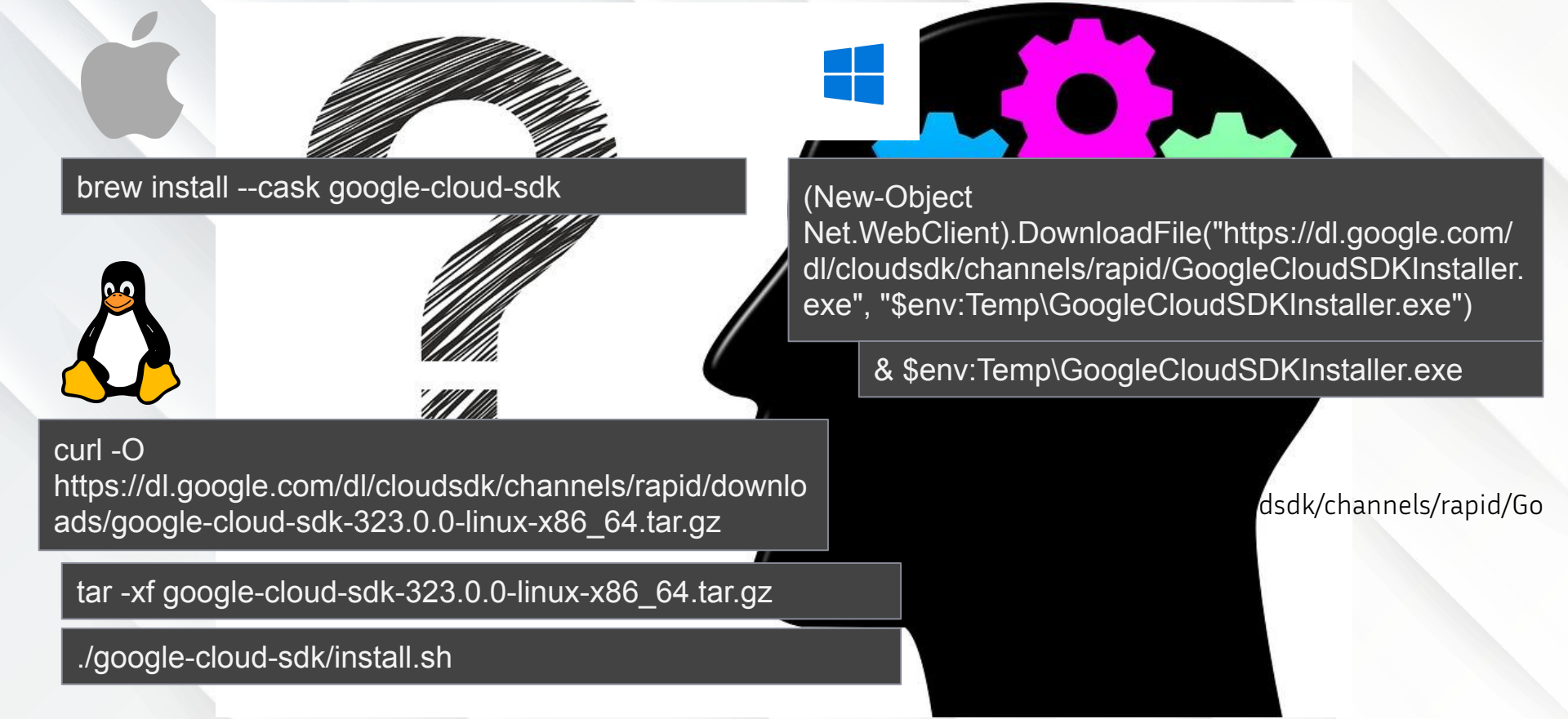
Arquivo: pod2containers.yml

Contaier 1:
- **Image: nginx**

Container 2:
- **Image: fluentd**

```
apiVersion: v1
kind: Pod
metadata:
  name: rediscomyml
  labels:
    app: meuredis
    tipo: banco
    autor: <seu nome>
spec:
  containers:
    - name: rediscomyml
      image: redis
    - name: algum-nome
      Image: alguma-imagem
```

Pods - Quizzzzzzz



brew install --cask google-cloud-sdk

(New-Object Net.WebClient).DownloadFile("https://dl.google.com/dl/cloudsdk/channels/rapid/GoogleCloudSDKInstaller.exe", "$env:Temp\GoogleCloudSDKInstaller.exe")

& $env:Temp\GoogleCloudSDKInstaller.exe

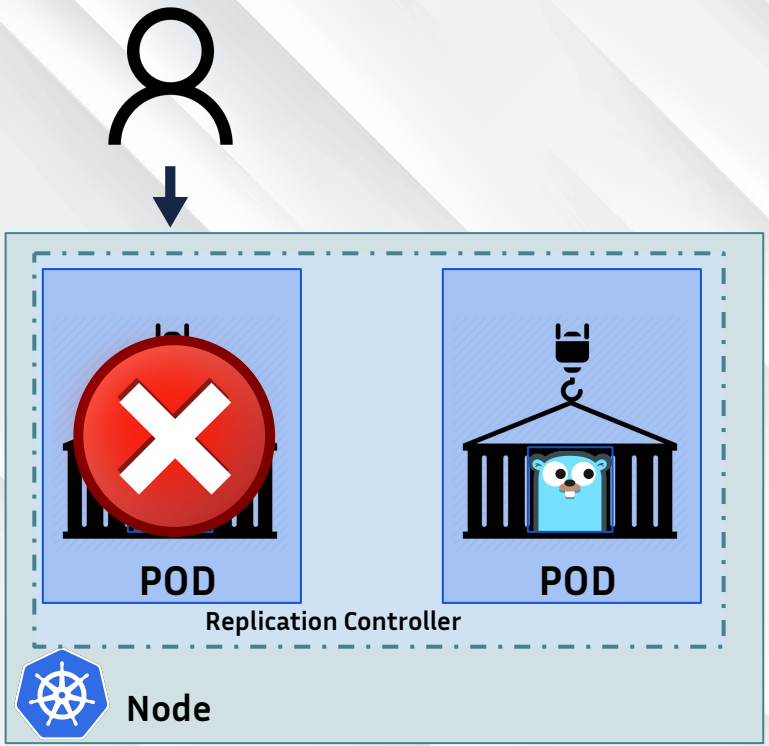
curl -O https://dl.google.com/dl/cloudsdk/channels/rapid/downloads/google-cloud-sdk-323.0.0-linux-x86_64.tar.gz

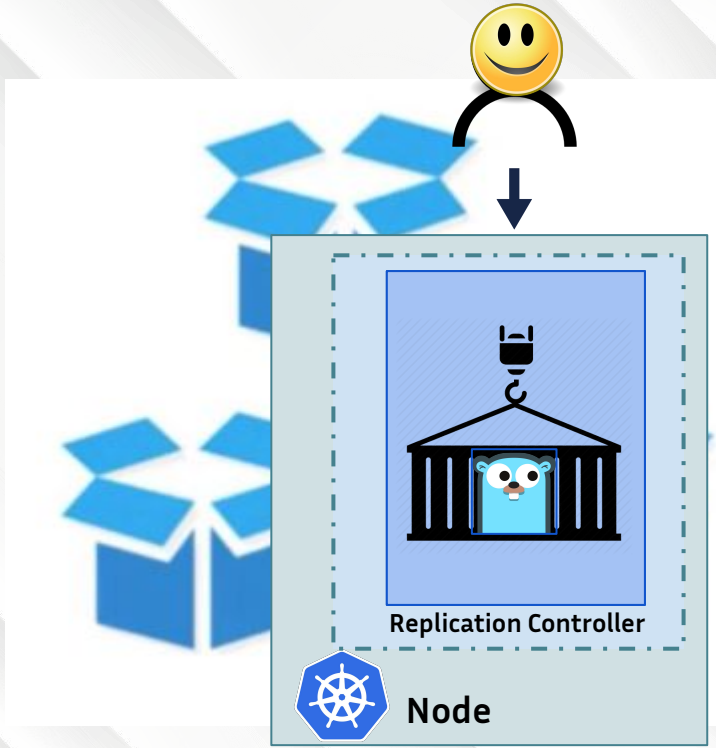
dsdk/channels/rapid/Go

tar -xf google-cloud-sdk-323.0.0-linux-x86_64.tar.gz

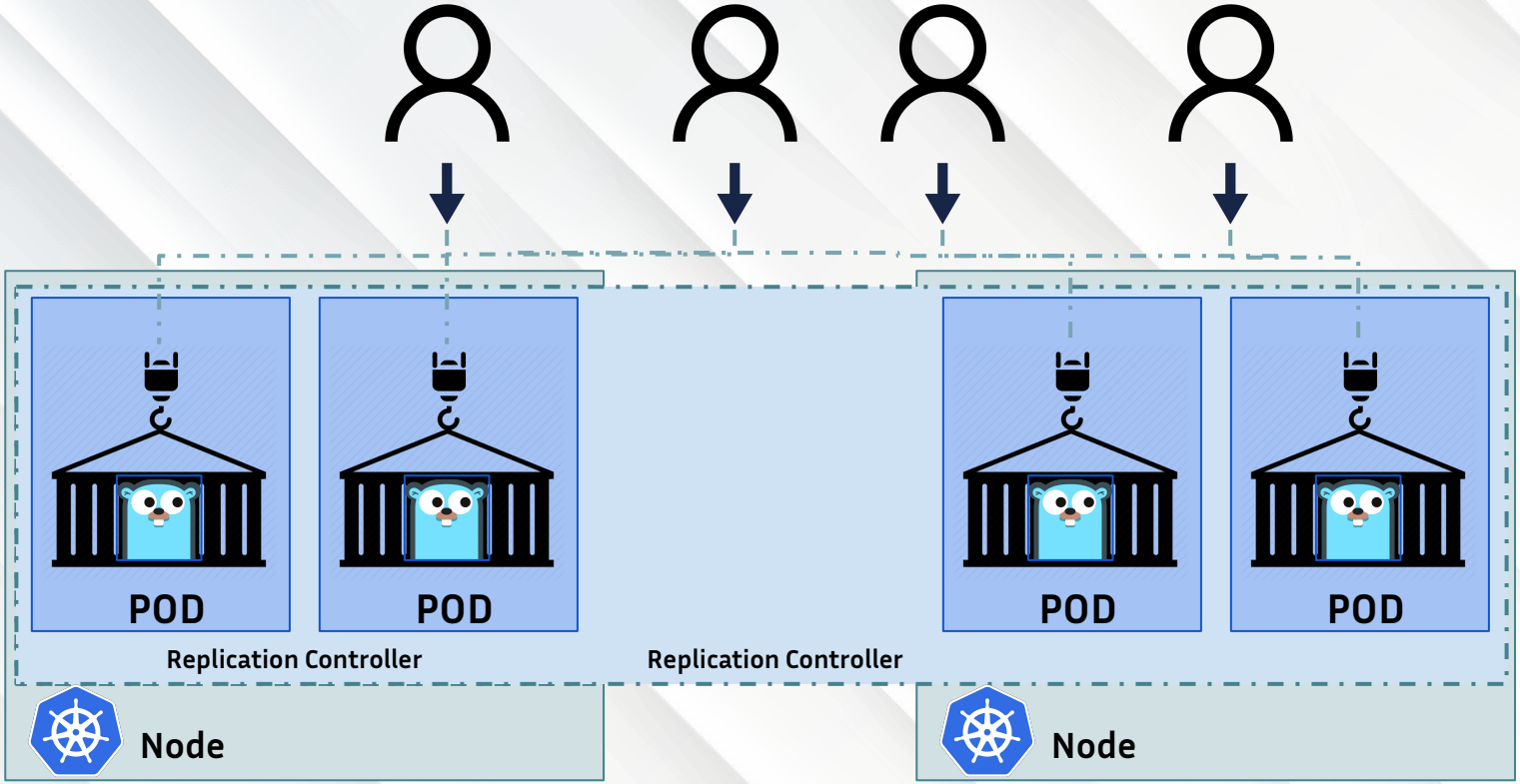
./google-cloud-sdk/install.sh

Kubernetes Controllers - Replication Controller





Load Balancing & Scaling



Replication Controller & Replica Set

Replication Controller

Replica Set

Replication Controller

rc-teste.yml

```yaml
apiVersion: v1
kind: ReplicationController
metadata:
    name: meuapp-rc
    labels:
        app: meuapp
        tipo: front-end
spec:
    template:
        metadata:
            name: meuapp-pod
            labels:
                app: meuapp
                tipo: front-end
        spec:
            containers:
            - name: nginx-container
              image: nginx
    replicas: 3
```

pod-teste.yml

```yaml
apiVersion: v1
kind: Pod
```

```
> kubectl create -f rc-teste.yml
```

```
Replicationcontroller "meuapp-rc" created
```

Replication Controller

```
> kubectl get replicationcontroller
NAME        DESIRED   CURRENT   READY   AGE
Meuapp-rc   3         3         3       19s
```

```
> kubectl get pods
NAME              DESIRED   CURRENT   READY   AGE
Meuapp-rc-41vk9   3         3         3       19s
Meuapp-rc-23y4h   3         3         3       19s
Meuapp-rc-4hgv7   3         3         3       19s
```

Replication Controller - Prática

```
> gcloud container clusters get-credentials possible-sun-222819-gke --region us-central1
```

<seunome>-app-rc.yml

```yaml
apiVersion: v1
kind: ReplicationController
metadata:
    name: <nome>-app-rc
    labels:
        app: <nome>-app
        tipo: web
spec:
    template:
        metadata:
            name: <nome>-app-pod
            labels:
                app: <nome>-app
                tipo: web
        spec:
            containers:
            - name: <nome>-nginx-container
              image: nginx
    replicas: 3
```

```
> kubectl create -f <seunome>-app-rc.yml
```

```
> kubectl get replicationcontroller
```

ReplicaSet

meuapp-replicaset.yml

```yaml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
    name: meuapp-replicaset
    labels:
        app: meuapp
        tipo: front-end
spec:
    template:
        metadata:
            name: meuapp-pod
            labels:
                app: meuapp
                tipo: front-end
        spec:
            containers:
            - name: nginx-container
              image: nginx
    replicas: 4
```

meupod.yml

```yaml
apiVersion: v1
kind: Pod
```

ReplicaSet

```
> kubectl create -f
meuapp-replicaset.yml
```

```
Replicaset "meuapp-replicaset" created
```

```
> kubectl get replicaset
```

```
NAME        DESIRED   CURRENT   READY   AGE
replicaset  3         3         3       19s
```

```
> kubectl get pods
```

```
NAME          DESIRED   CURRENT   READY   AGE
replset-41v9  3         3         3       19s
repaset-234h  3         3         3       19s
recaset-4hv7  3         3         3       19s
```

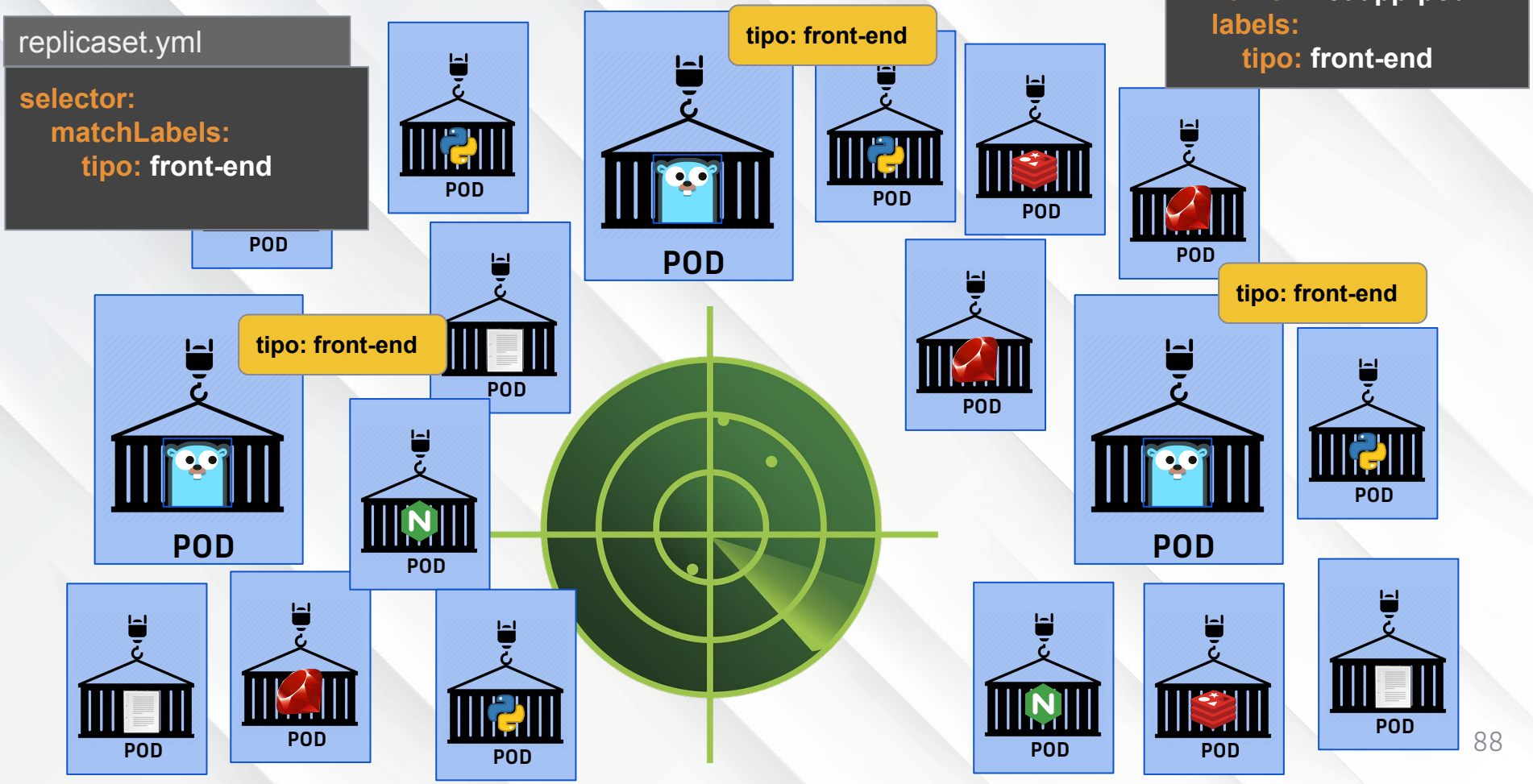
```yaml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
    name: meuapp-replicaset
    labels:
        app: meuapp
        tipo: front-end
spec:
    template:
        metadata:
            name: meuapp-pod
            labels:
                app: meuapp
                tipo: front-end
        spec:
            containers:
            - name: nginx-container
              image: nginx
    replicas: 3
    selector:
        matchLabels:
            type: front-end
```

Labels and Selectors

replicaset.yml

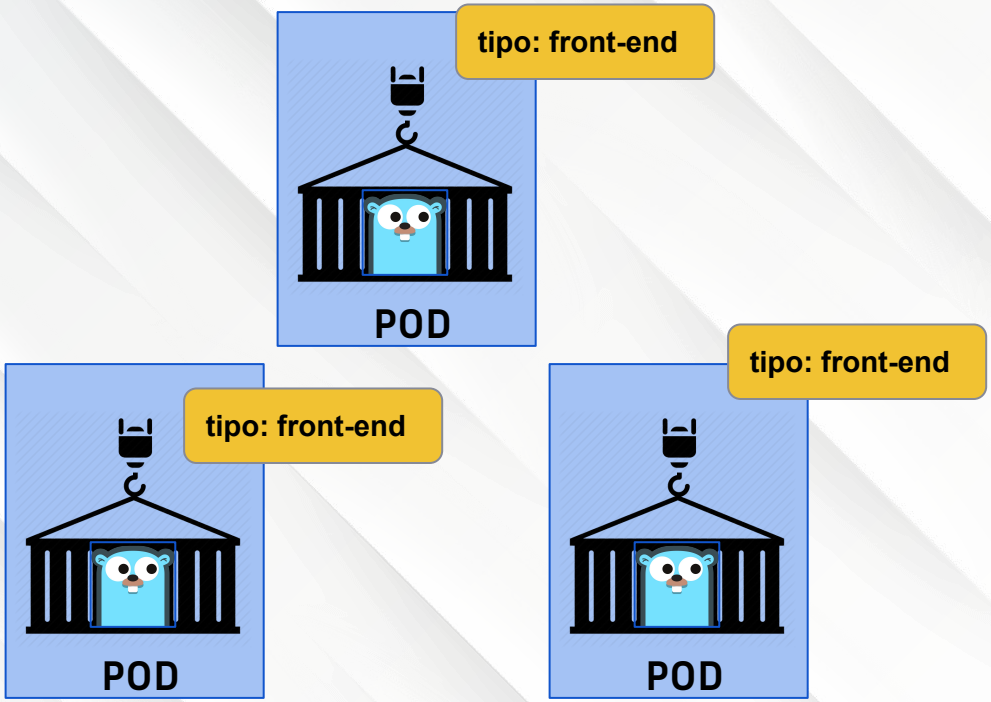
```
selector:
  matchLabels:
    tipo: front-end
```

```
metadata:
  name: meuapp-pod
  labels:
    tipo: front-end
```



replicaset.yml

```yaml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: meuapp-replicaset
  labels:
    app: meuapp
    type: front-end
spec:
  template:
    metadata:
      name: meu-app-pod
      labels:
        app: meu-app
        tipo: front-end
    spec:
      containers:
      - name: nginx-container
        image: nginx
  replicas: 3
  selector:
    matchLabels:
      tipo: front-end
```



Scale

```
> kubectl replace -f replicaset.yml
```

```
> kubectl scale --replicas=6 -f replicaset.yml
```

```
> kubectl scale --replicas=6 replicaset replicaset
```

TIPO NOME

replicaset.yml

```yaml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: meuapp-replicaset
  labels:
    app: meuapp
    type: front-end
spec:
  template:
    metadata:
      name: meu-app-pod
      labels:
        app: meu-app
        tipo: front-end
    spec:
      containers:
      - name: nginx-container
        image: nginx
  replicas: 6
  selector:
    matchLabels:
      tipo: front-end
```

ReplicaSet - Prática

Conectando-se ao cluster:

```
> gcloud container clusters get-credentials possible-sun-222819-gke --region us-central1
```

Testando o cluster:

```
> kubectl get nodes
```

ReplicaSet - Prática

<nome>-replicaset.yml

```yaml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: <nome>-replicaset
  labels:
    app: <nome>-meuapp
    type: <nome>-web
spec:
  template:
    metadata:
      name: <nome>-app-pod
      labels:
        app: <nome>-app
        tipo: <nome>-web
    spec:
      containers:
      - name: nginx-container
        image: nginx
  replicas: 3
  selector:
    matchLabels:
      tipo: <nome>-web
```

Criando o replica set:

```
> kubectl create -f <nome>-replicaset.yml
```

Listando replicaset:

```
> kubectl get replicaset
```

Listando pods:

```
> kubectl get pods
```

Listando tudo:

```
> kubectl get all
```

Outra opção:

```
> kubectl get rs
```

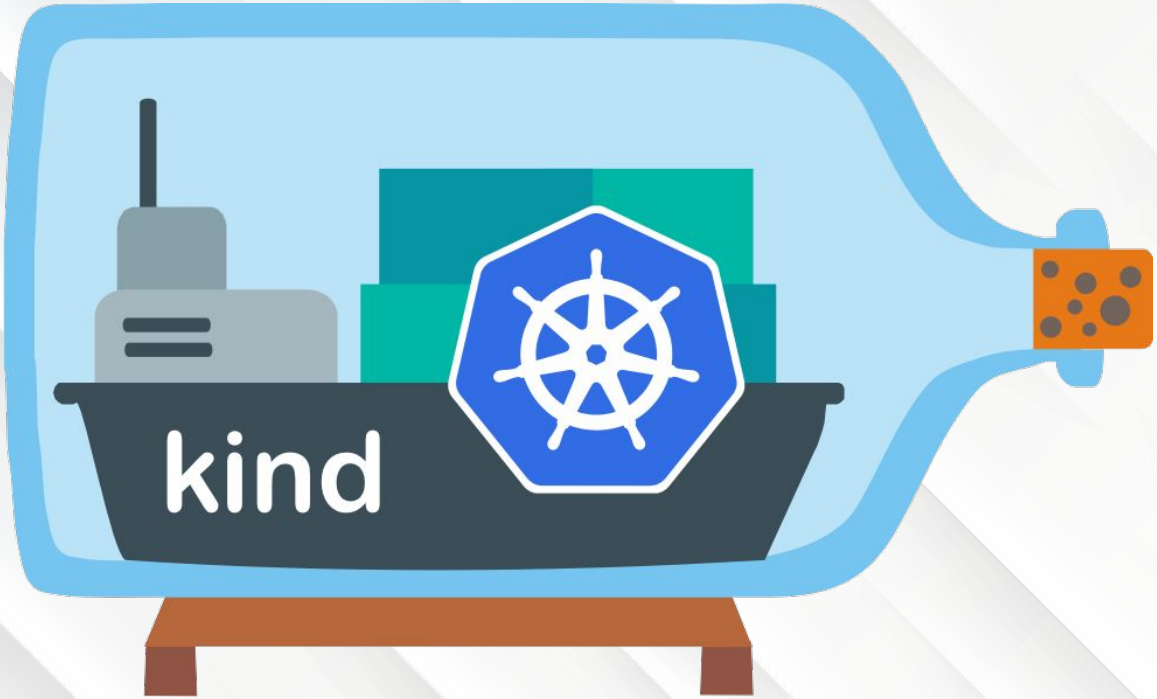
```
> kubectl replace -f <nome>-replicaset.yml
```

```
> kubectl scale --replicas=6 -f <nome>-replicaset.yml
```

```
> kubectl scale --replicas=6 replicaset <noem>-replicaset.yml
```

<nome>-pod.yml

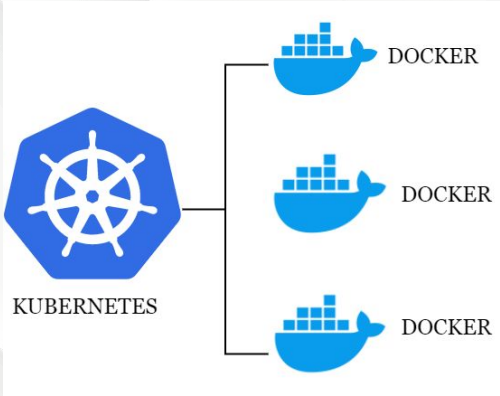
```yaml
apiVersion: v1
kind: Pod
metadata:
  name: <nome>-app-pod
  labels:
    app: <nome>-app
    tipo: <nome>-web
    autor: <seu nome>
spec:
  containers:
    - name: nginx-container
      image: nginx
```


kind

Kind - Instalação

shorturl.at/avMZ3

Kubernetes in Docker



Kind - Setup

Listar containers rodando no sistema:

```
> docker ps
```

Criando o cluster:

```
> kind create cluster --name teste
```

Verifiquem informações do cluster:

```
> kubectl cluster-info --context kind-teste
```

Verifiquem se estão no contexto correto:

```
> kubectl config get-contexts
```

Listar clusters:

```
> kind get clusters
```

Deletar clusters:

```
> kind delete cluster --name teste
```

Kind - Setup

Definições do cluster:

> cluster-teste.yml

```
kind: Cluster
apiVersion: kind.x-k8s.io/v1alpha4
nodes:
- role: control-plane
- role: worker
- role: worker
```

```
$ kind create cluster --name teste --config cluster-teste.yml
Creating cluster "teste" ...
 ✓ Ensuring node image (kindest/node:v1.19.1) 🖼
 ✓ Preparing nodes 📦📦📦
 ✓ Writing configuration 📜
 ✓ Starting control-plane 🕹️
 ✓ Installing CNI 🔌
 ✓ Installing StorageClass 💾
 ✓ Joining worker nodes 🚜
Set kubectl context to "kind-teste"
You can now use your cluster with:

kubectl cluster-info --context kind-teste

Have a nice day! 👋
```

Criando o cluster:

> kind create cluster --name teste --config cluster-teste.yml

Listar containers rodando no sistema:

> docker ps

Listar clusters:

> kind get clusters

Verifiquem informações do cluster:

> kubectl cluster-info --context kind-teste

Kind - Prática

nginx-deployment.yml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
    name: nginx-deployment
spec:
    selector:
        matchLabels:
            app: nginx
    replicas: 2
    template:
        metadata:
            labels:
                app: nginx
        spec:
            containers:
            - name: nginx
              image: nginx:1.16.1
              ports:
              - containerPort: 80
```

nginx-service.yml

```yaml
apiVersion: v1
kind: Service
metadata:
    name: nginx-service
    labels:
        app: nginx
spec:
    type: NodePort
    ports:
    - port: 80
      nodePort: 30225
    selector:
        app: nginx
```

Kind - Prática

Criando o deployment:

```
> kubectl create -f nginx-deployment.yml
```

Criando o service:

```
> kubectl create -f nginx-service.yml
```

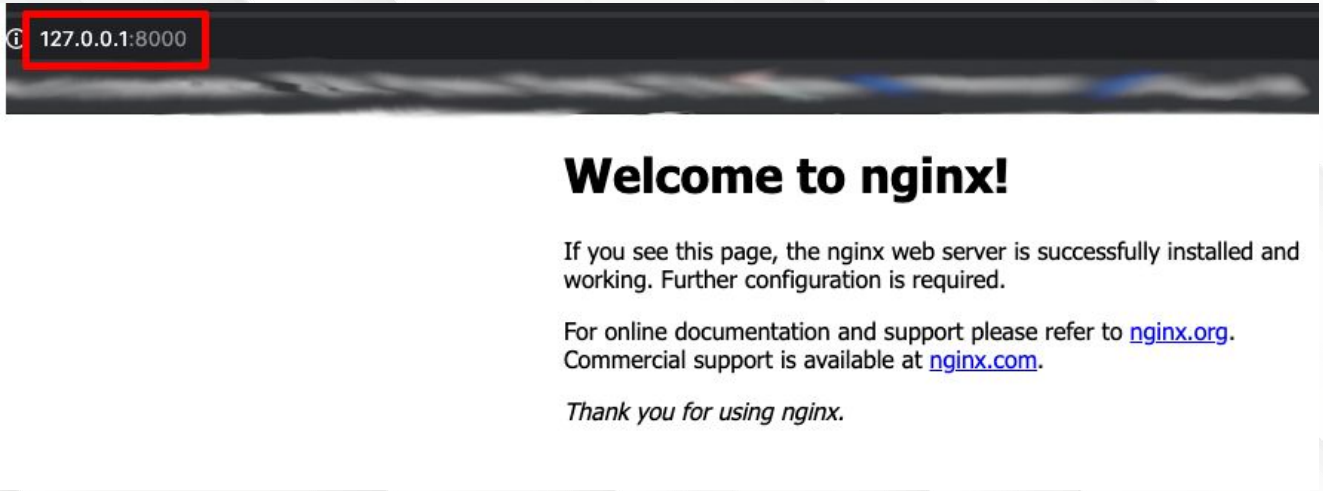
Vendo tudo:

```
> kubectl get all
```

Mapeando porta:

```
> kubectl port-forward service/nginx-service 8000:80
```

```
Forwarding from 127.0.0.1:8000 -> 80
Forwarding from [::1]:8000 -> 80
Handling connection for 8000
Handling connection for 8000
```



Deployments