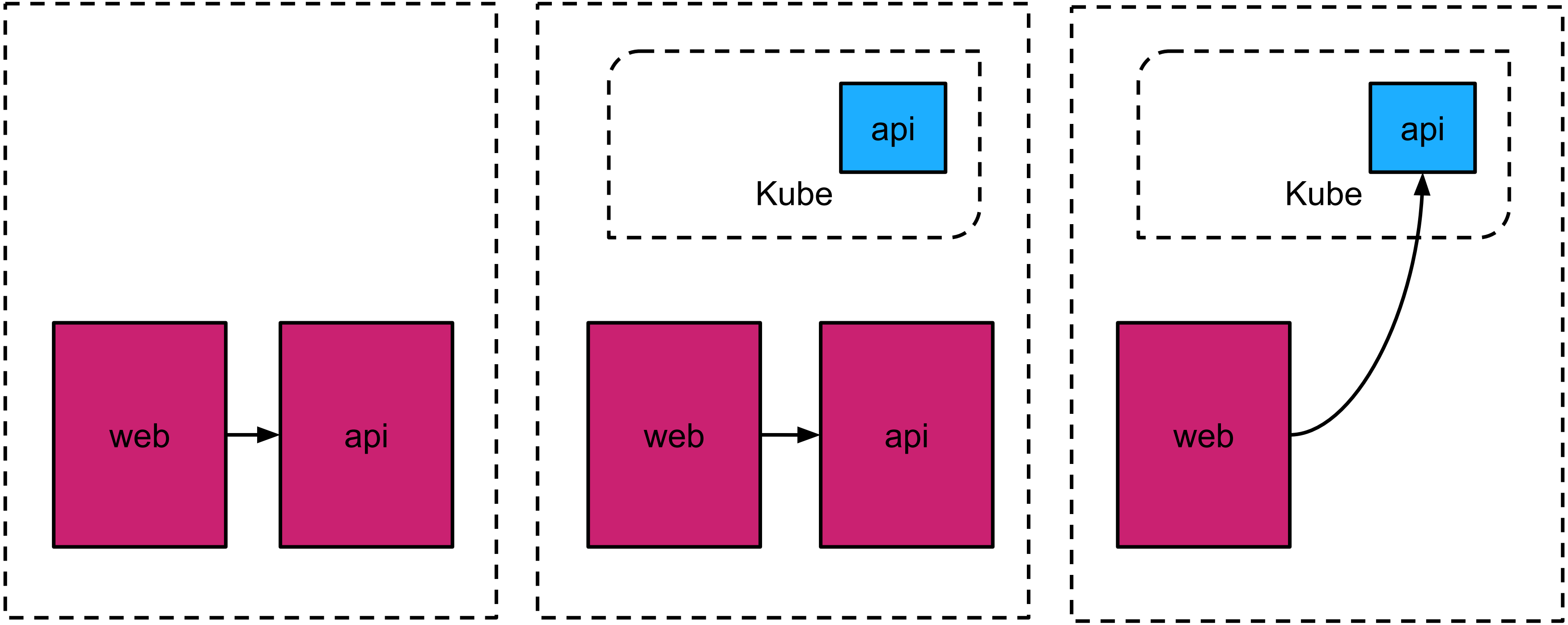
Migration 101: From VMs to Kubernetes

Iryna Shustava

Luke Kysow

The Plan



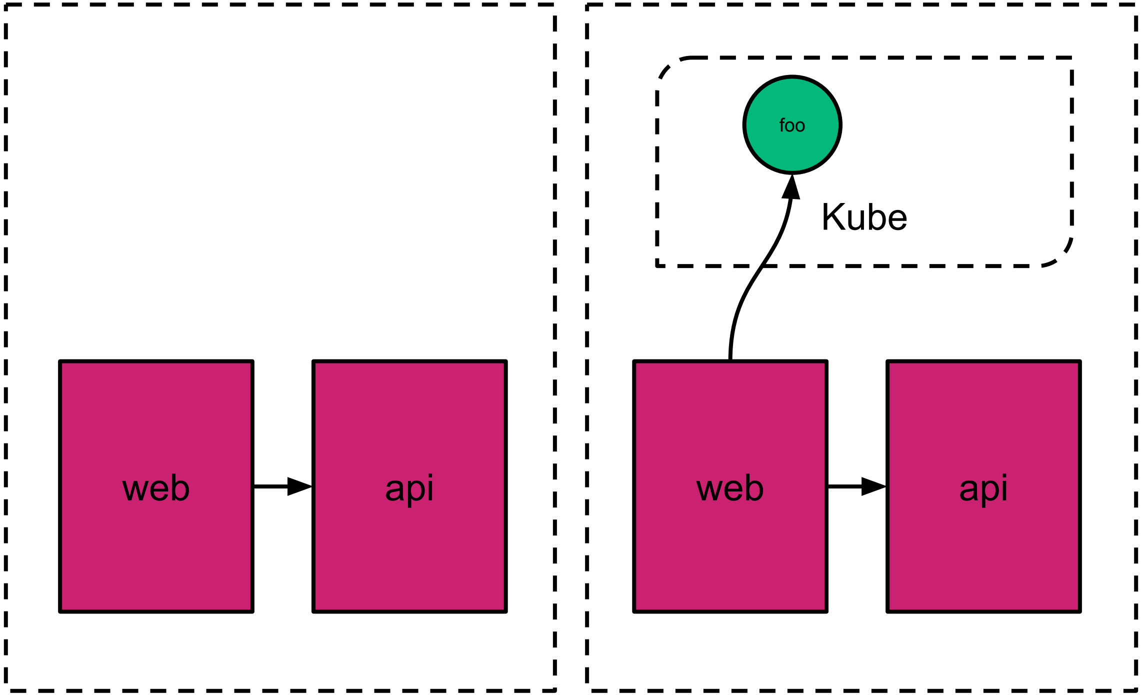
Agenda

- Introduction
- Building a Docker Image
- Deploying to Kubernetes
- Configuring Routing
- Configuring Logging and Metrics
- Performing A No Downtime Migration
- Consul Service Mesh

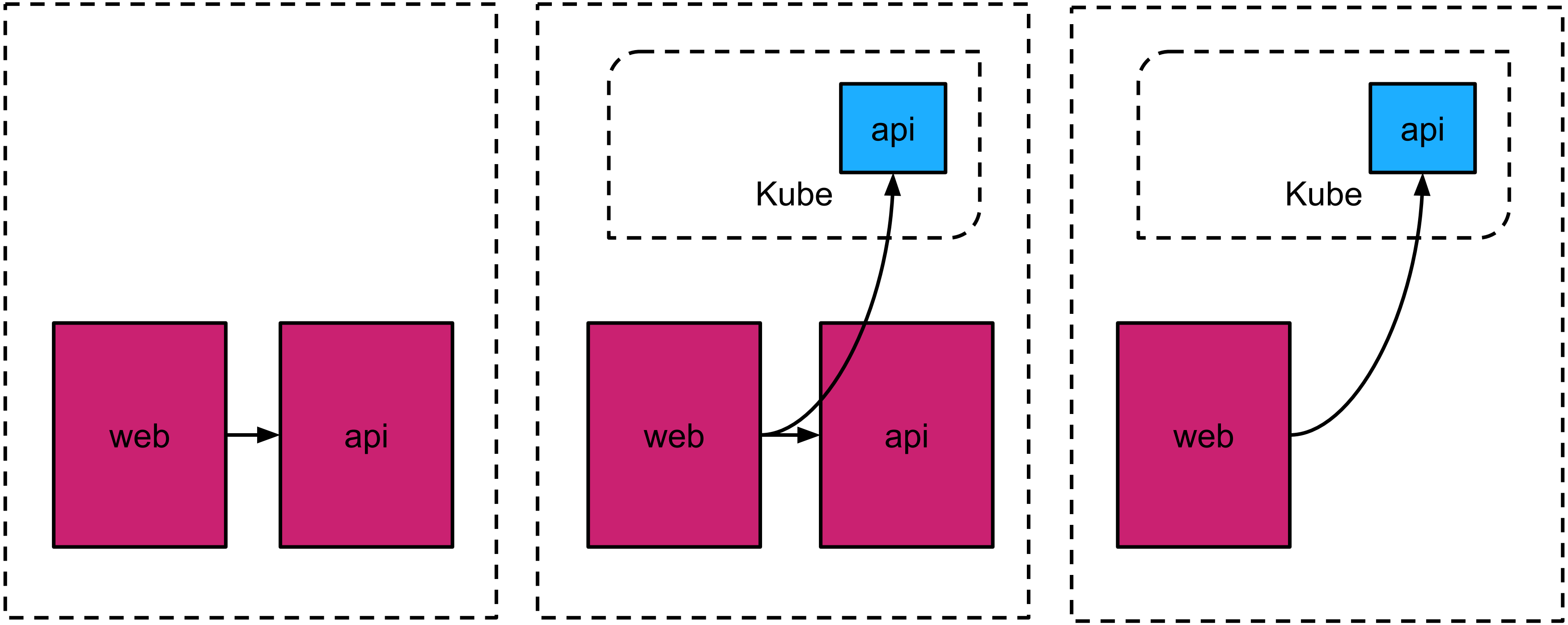
Prerequisites

`github.com/ishustava/kubecon-2020-workshop`

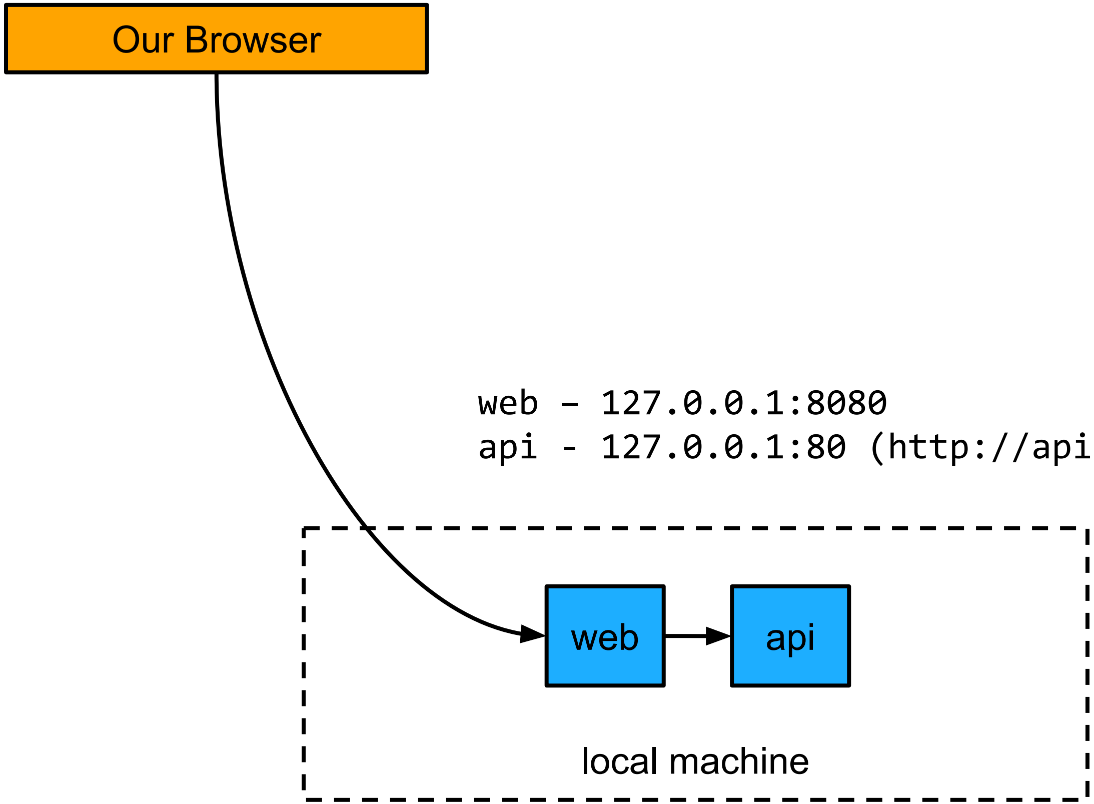
Kubernetes Adoption - New Application



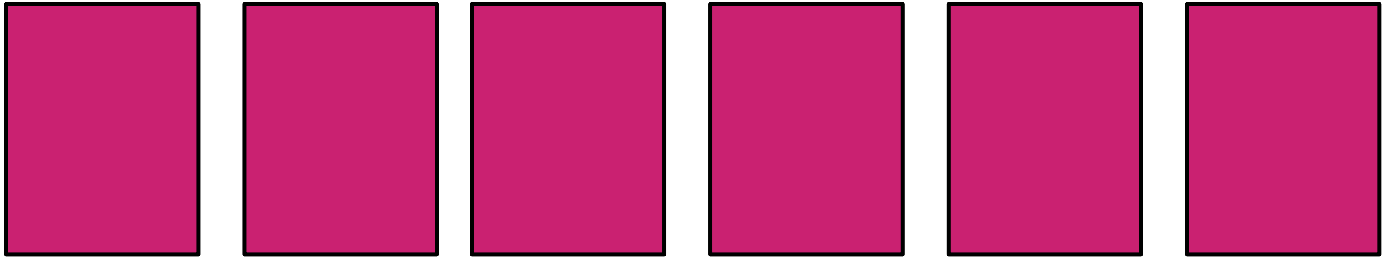
Kubernetes Adoption - Migration

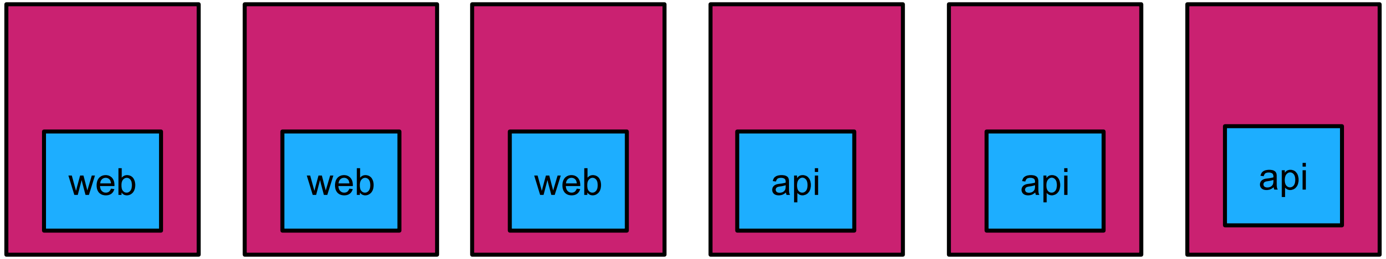


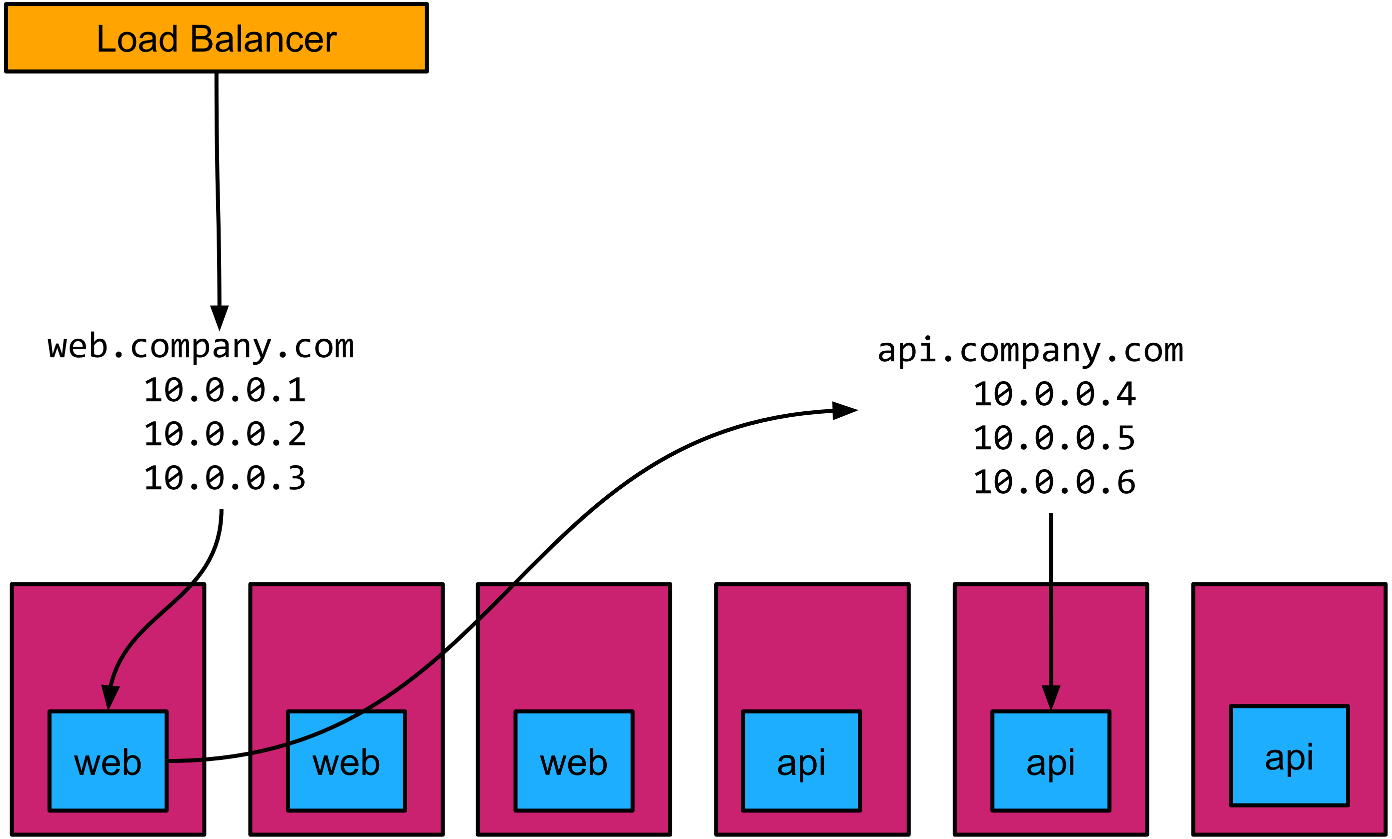
Initial Setup



```
web – 127.0.0.1:8080
api - 127.0.0.1:80 (http://api)
```




web
web
web
api
api
api



Load Balancer

web.company.com
10.0.0.1
10.0.0.2
10.0.0.3

api.company.com
10.0.0.4
10.0.0.5
10.0.0.6

web

web

web

api

api

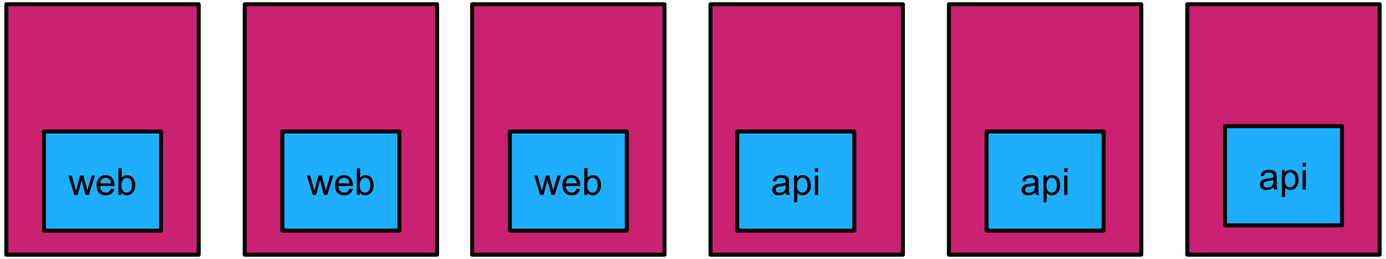
api

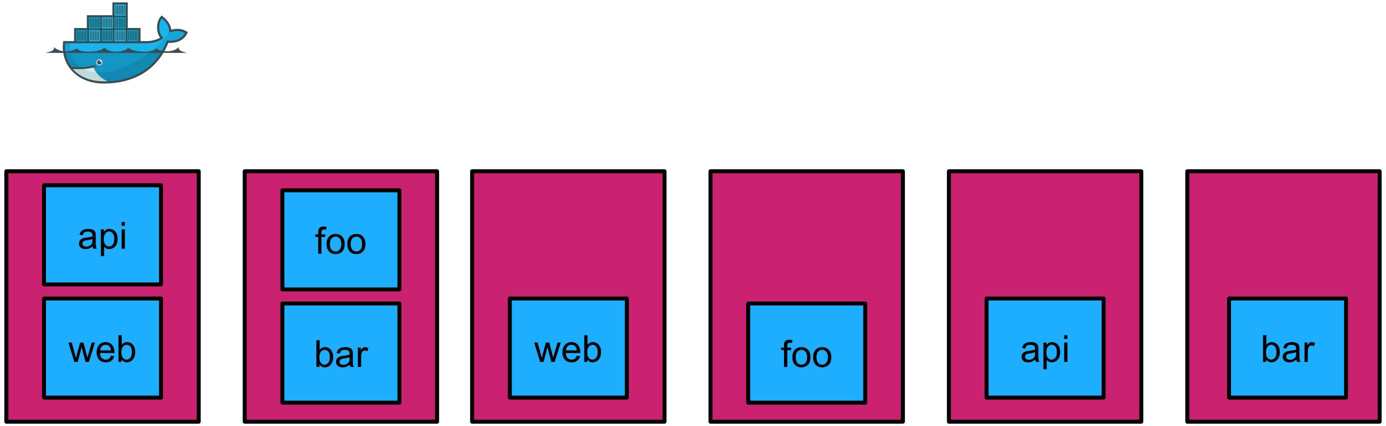
Workshop Step 1

Agenda

- Introduction
- Building a Docker Image ⇐
- Deploying to Kubernetes
- Configuring Routing
- Configuring Logging and Metrics
- Performing A No Downtime Migration
- Consul Service Mesh

Dockerizing


web
web
web
api
api
api



api
web

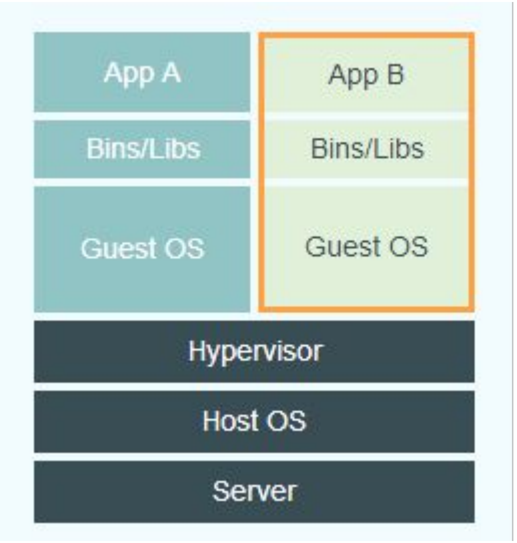
foo
bar

web

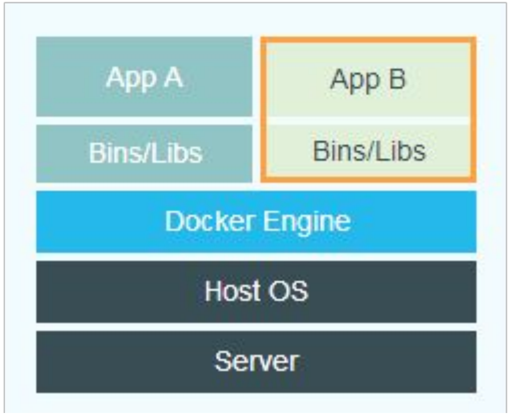
foo

api

bar



Docker



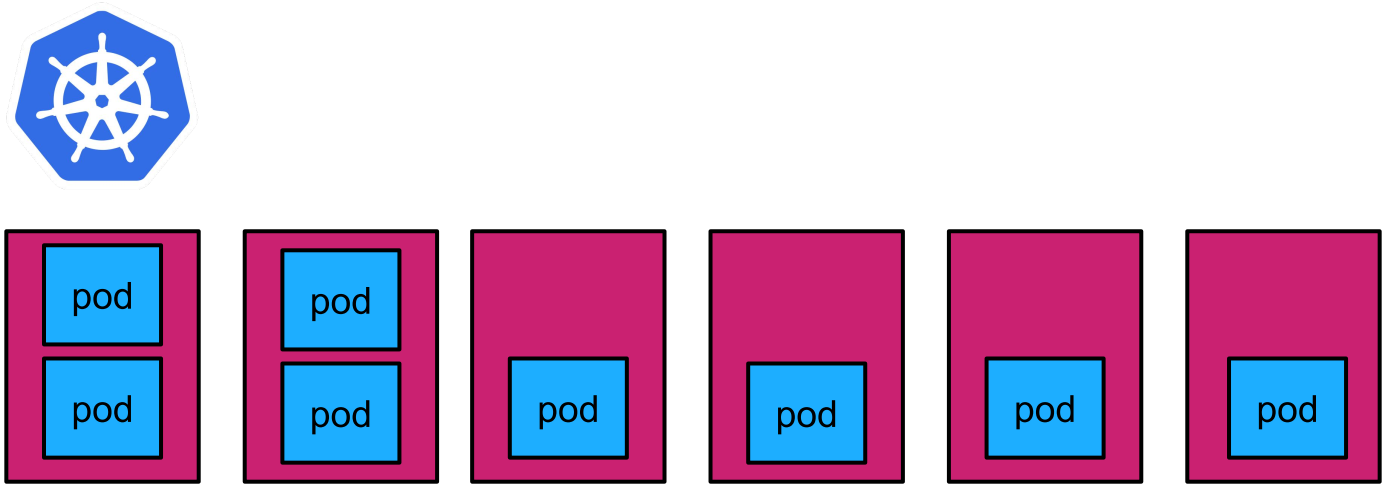
https://blog.jayway.com/2015/03/21/a-not-very-short-introduction-to-docker/

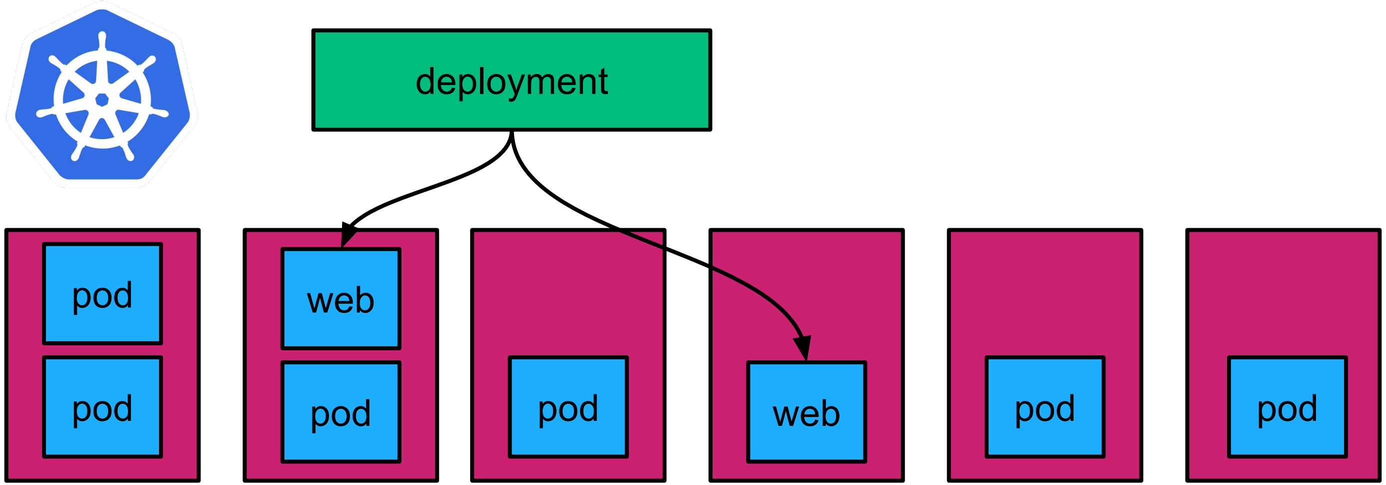
Workshop Step 2

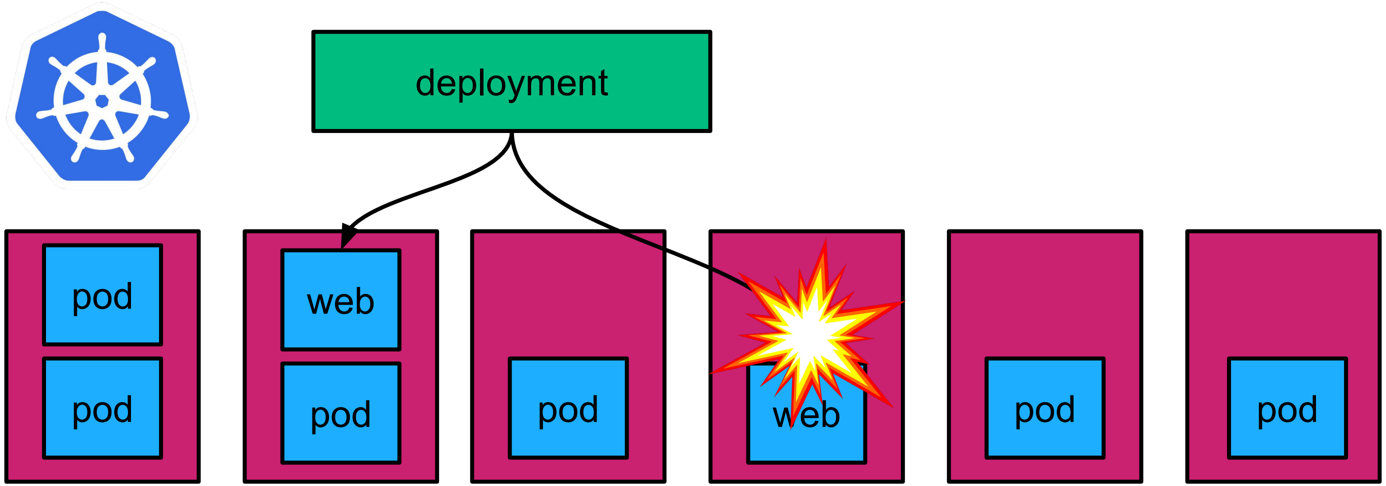
Agenda

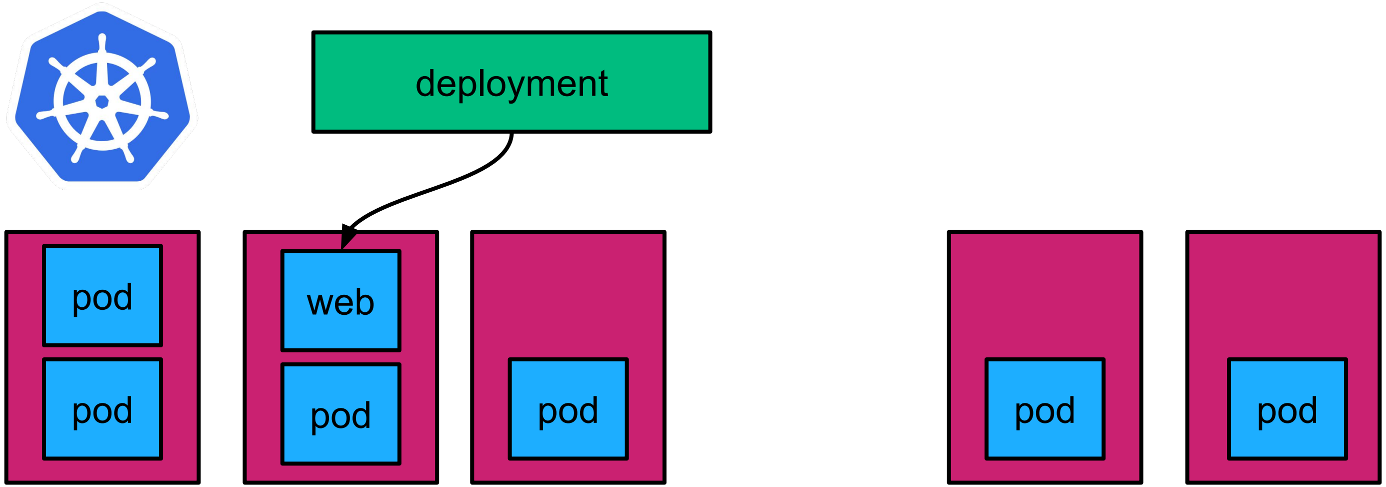
- Introduction
- Building a Docker Image
- Deploying to Kubernetes ⇐
- Configuring Routing
- Configuring Logging and Metrics
- Performing A No Downtime Migration
- Consul Service Mesh

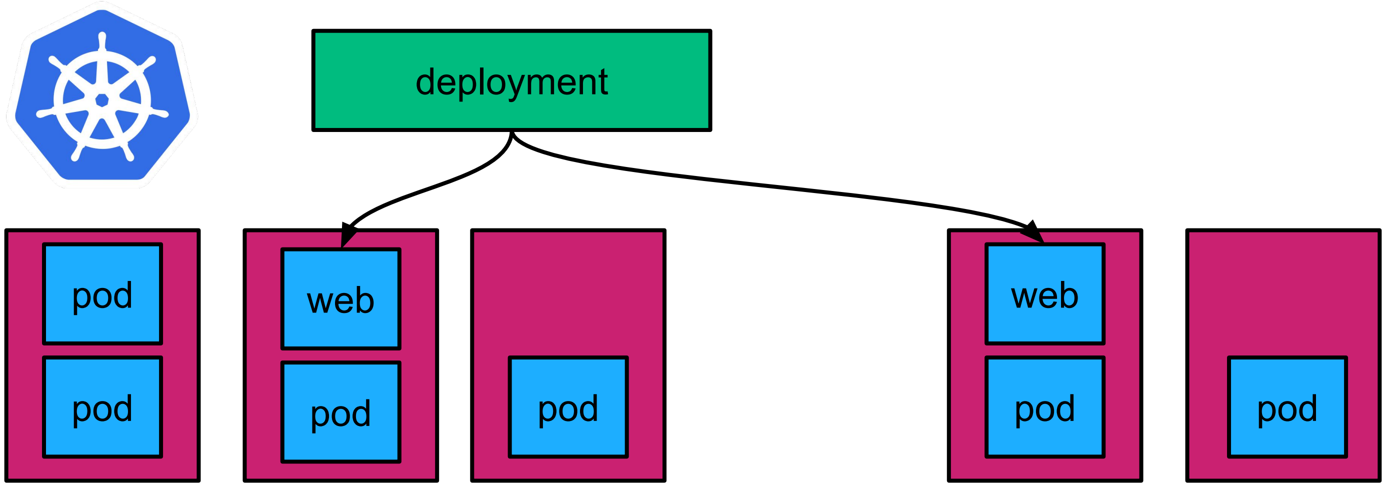
Kubernetizing


pod
pod
pod
pod
pod
pod
pod
pod

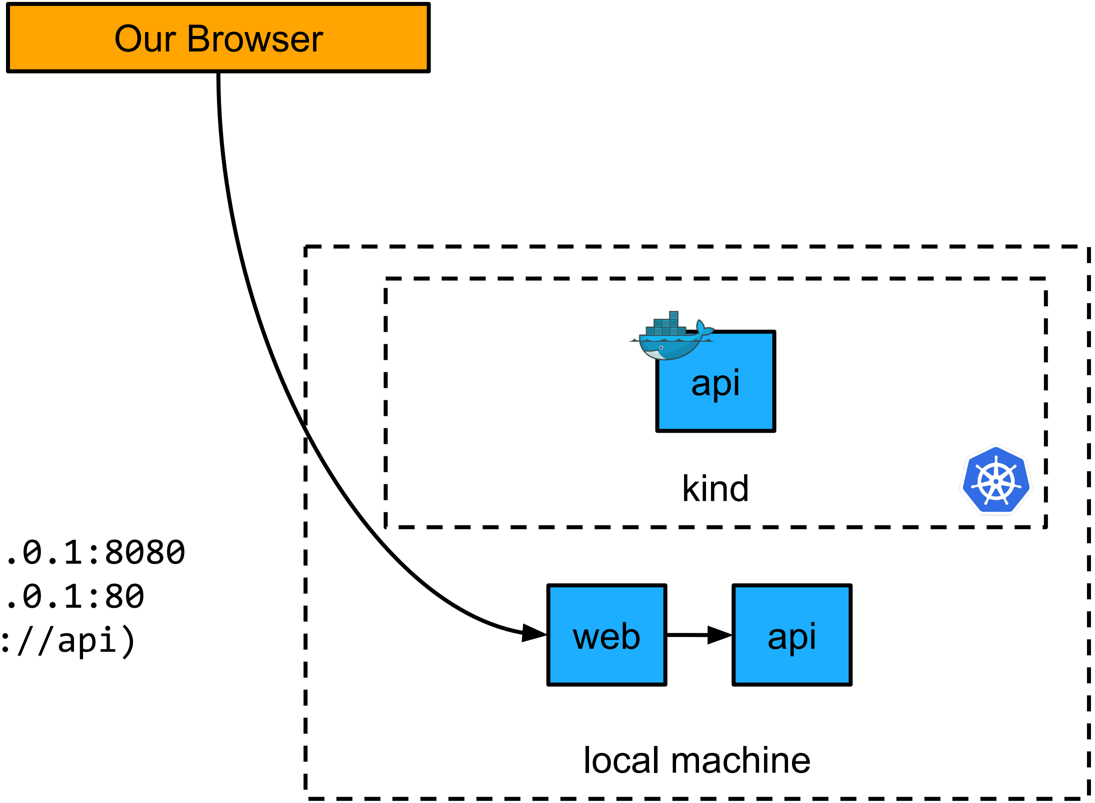

deployment
pod
pod
web
pod
pod
web
pod
pod


deployment
pod
pod
web
pod
pod
web
pod
pod

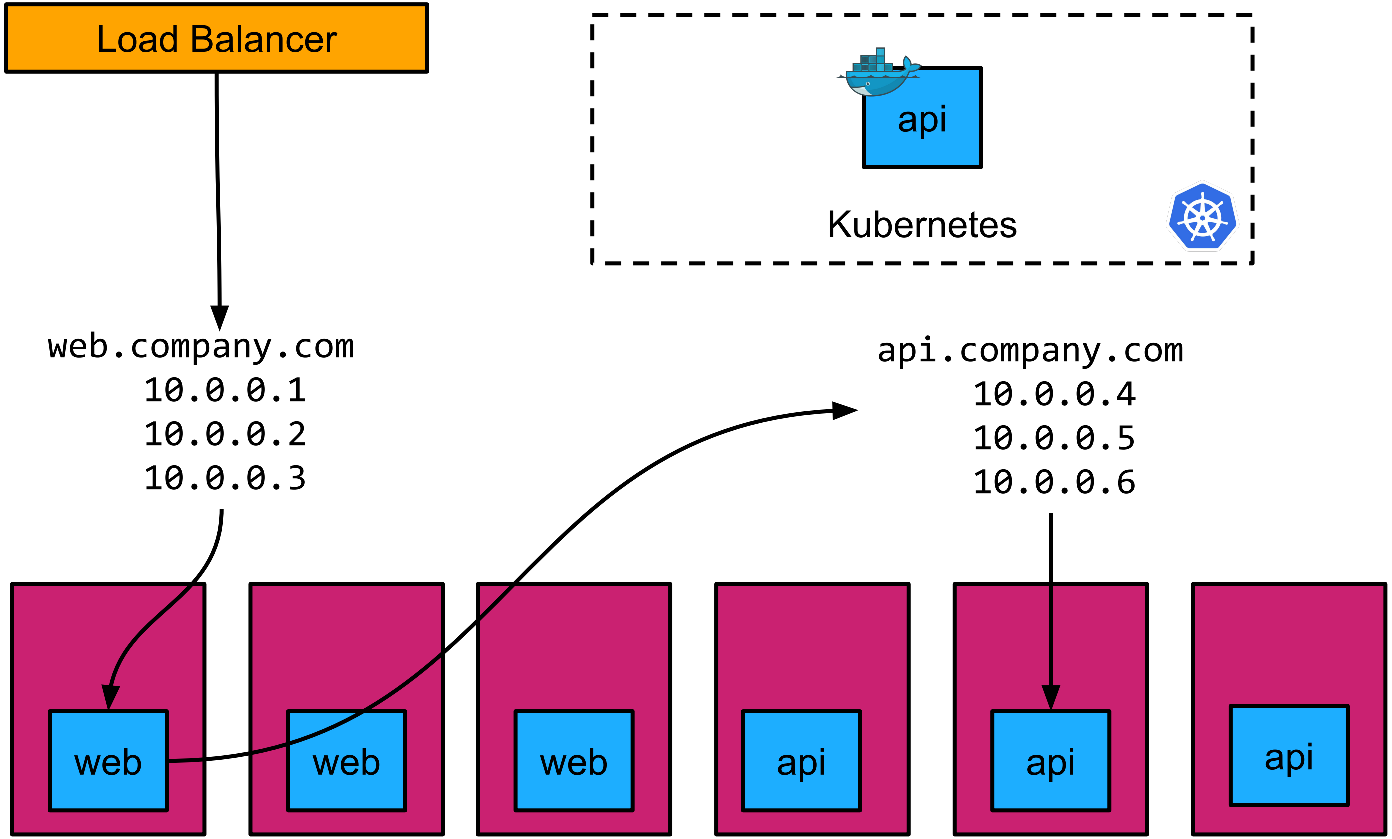

deployment
pod
pod
web
pod
pod
pod
pod


deployment
pod
pod
web
pod
pod
web
pod
pod

Workshop Step 3



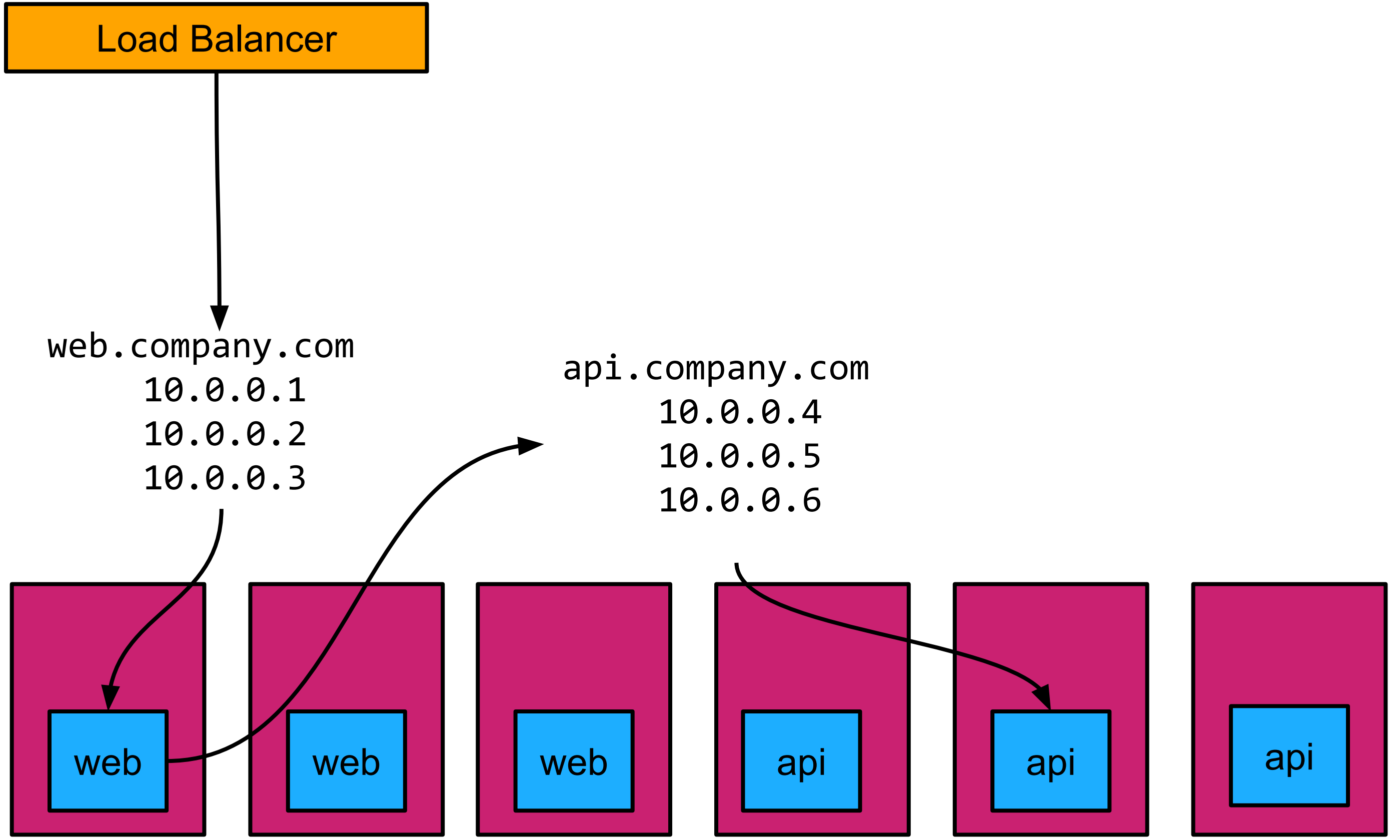
```
web – 127.0.0.1:8080
api - 127.0.0.1:80
      (http://api)
```


Load Balancer
api
Kubernetes
web.company.com
10.0.0.1
10.0.0.2
10.0.0.3
api.company.com
10.0.0.4
10.0.0.5
10.0.0.6
web
web
web
api
api
api

Agenda

- Introduction
- Building a Docker Image
- Deploying to Kubernetes
- Configuring Routing ⇐
- Configuring Logging and Metrics
- Performing A No Downtime Migration
- Consul Service Mesh

Routing



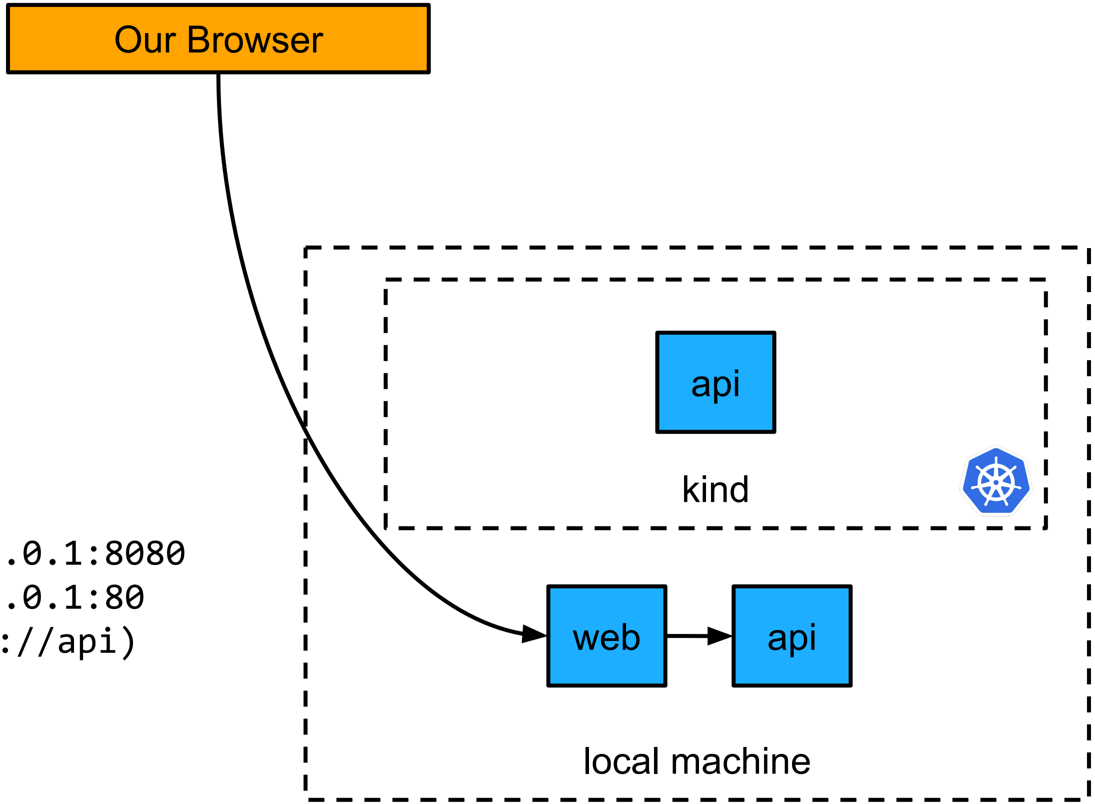
Load Balancer

web.company.com
10.0.0.1
10.0.0.2
10.0.0.3

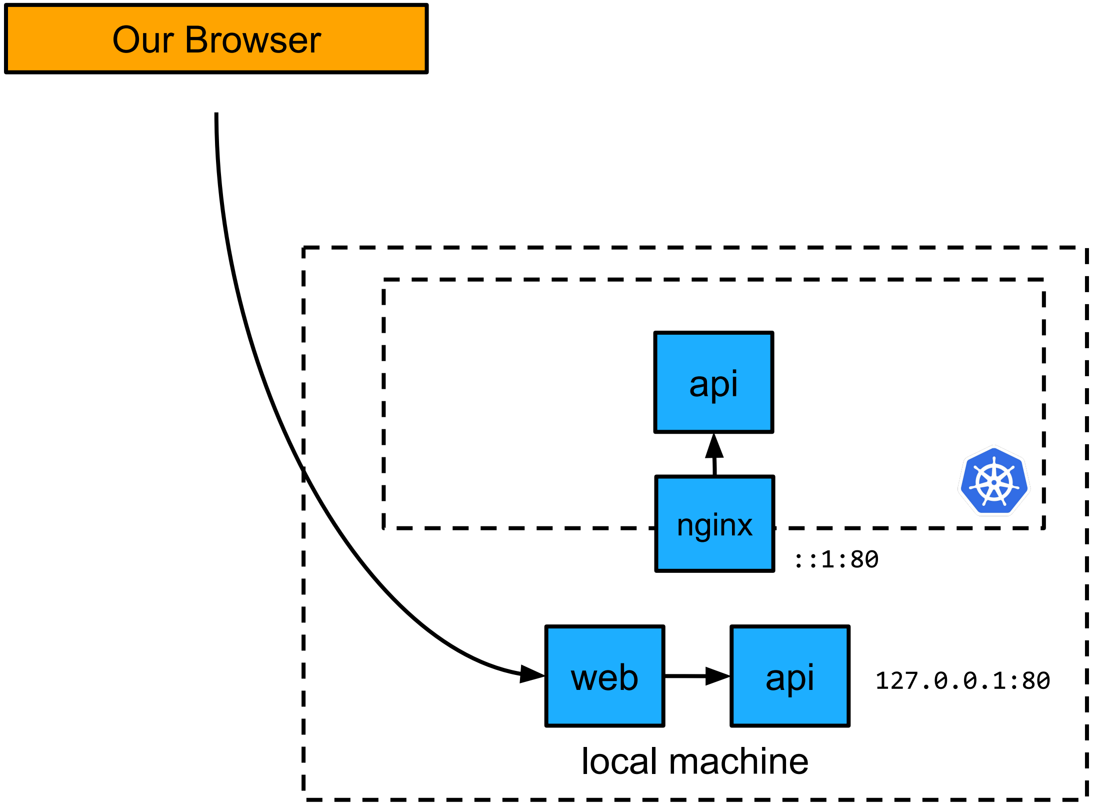
api.company.com
10.0.0.4
10.0.0.5
10.0.0.6

Exposing a Service Externally In Kubernetes

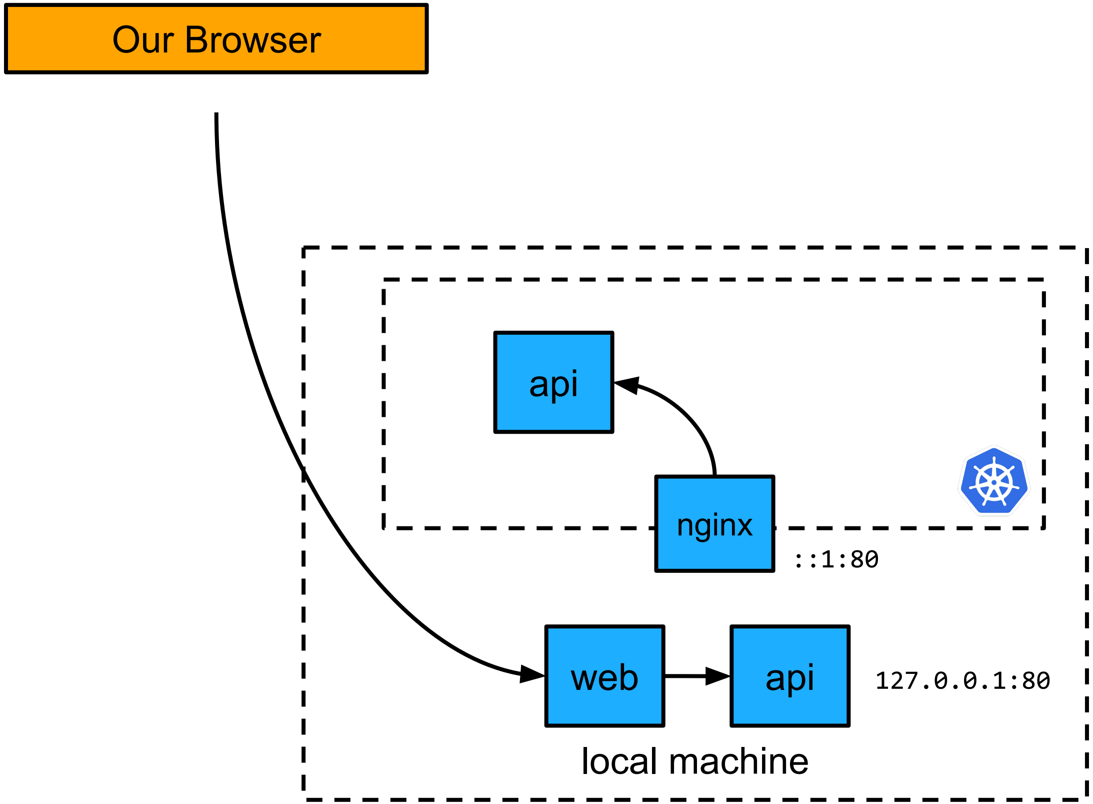
- Services
  - ClusterIP: works only inside the cluster
  - NodePort: works only if your can reach Kubernetes nodes externally
  - LoadBalancer: depends on your cloud provider
- Ingress
  - Can expose HTTP routes outside the cluster
  - A single load balancer for many services



```
web – 127.0.0.1:8080
api - 127.0.0.1:80
      (http://api)
```


Our Browser
api
nginx
::1:80
web
api
127.0.0.1:80
local machine

Workshop Step 4

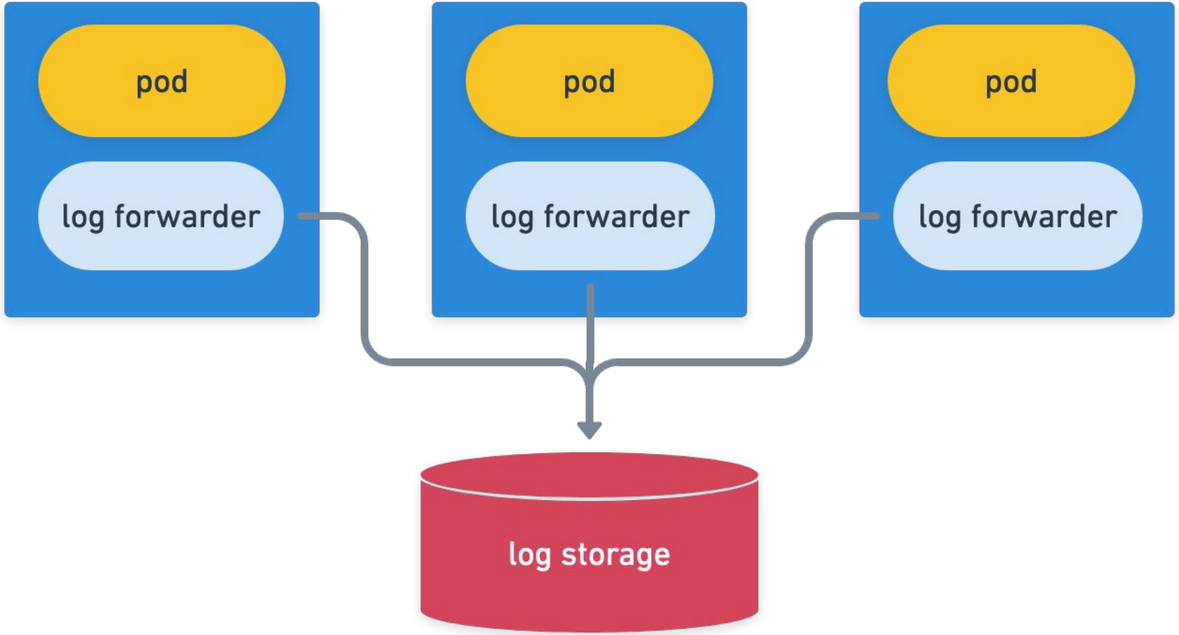

Our Browser
api
nginx
::1:80
web
api
127.0.0.1:80
local machine

Agenda

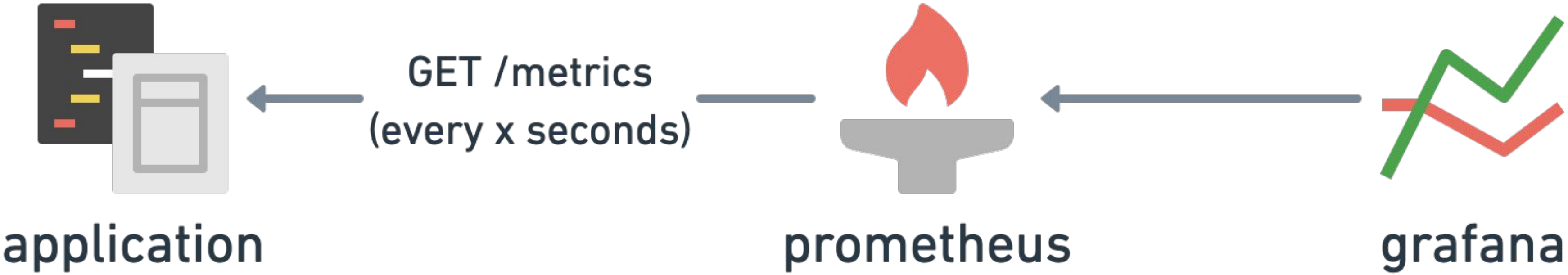
- Introduction
- Building a Docker Image
- Deploying to Kubernetes
- Configuring Routing
- Configuring Logging and Metrics ⇐
- Performing A No Downtime Migration
- Consul Service Mesh

Workshop Step 5

Logging


pod
pod
pod
log forwarder
log forwarder
log forwarder
log storage

Metrics

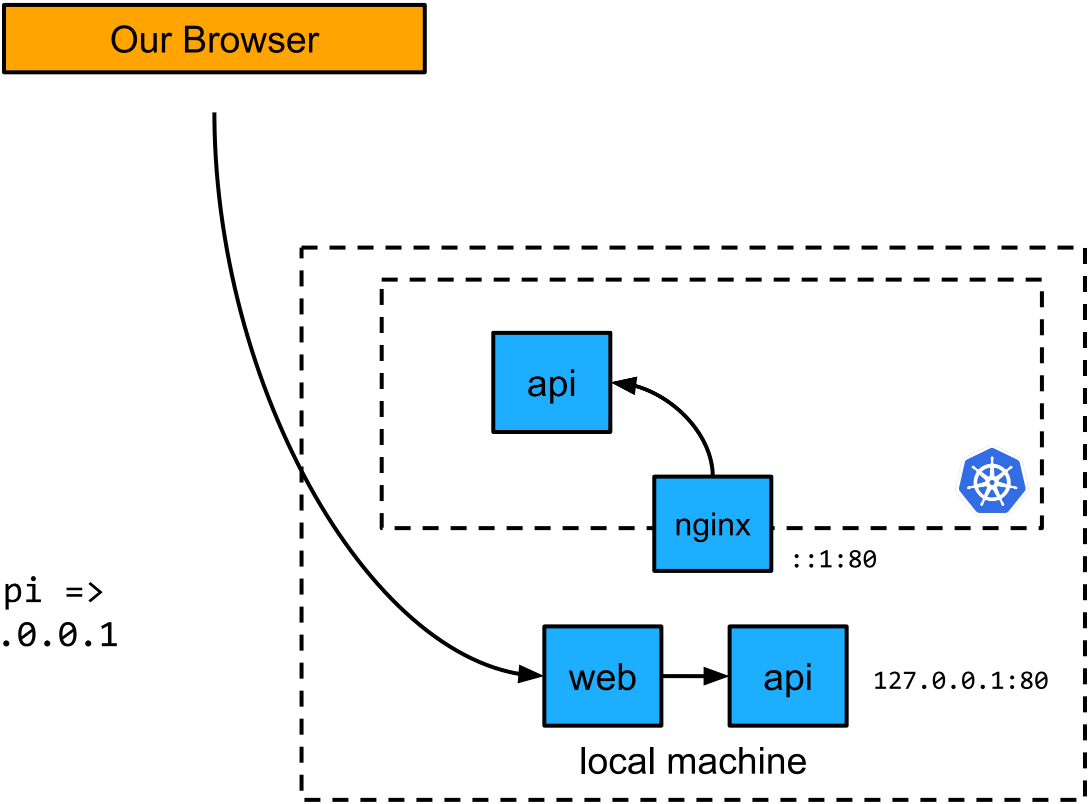

GET /metrics
(every x seconds)
application
prometheus
grafana

Workshop Step 6

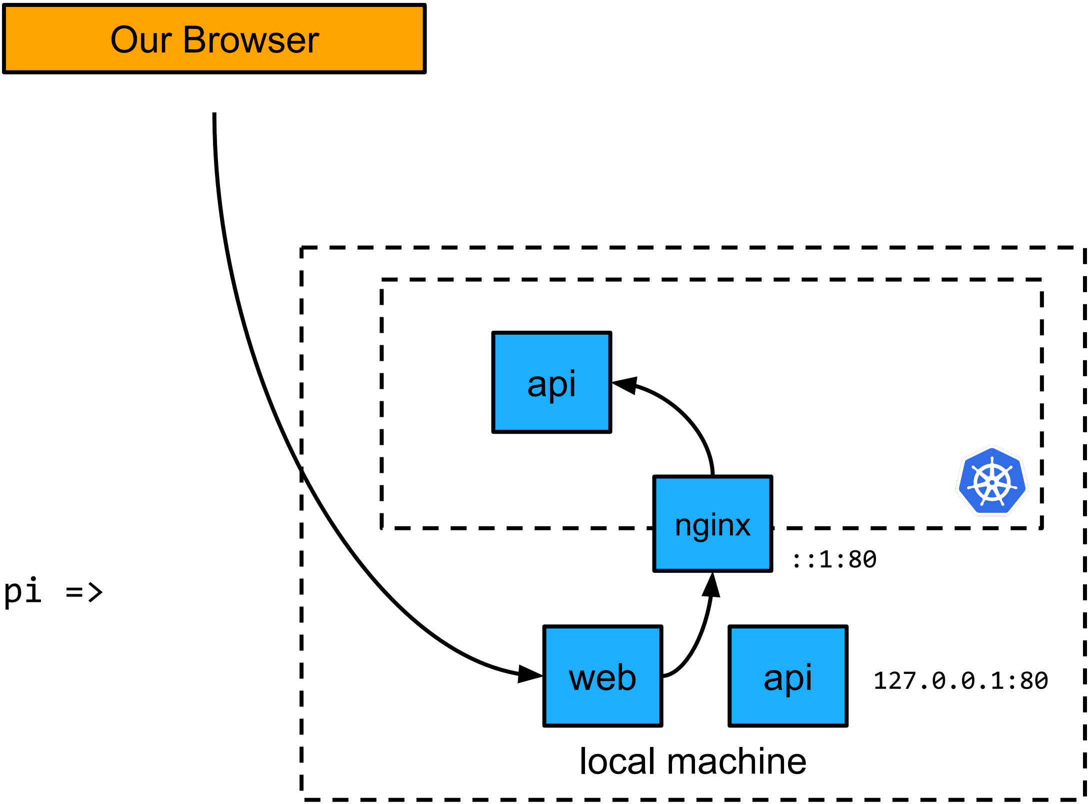
Agenda

- Introduction
- Building a Docker Image
- Deploying to Kubernetes
- Configuring Routing
- Configuring Logging and Metrics
- Performing A No Downtime Migration ⇐
- Consul Service Mesh

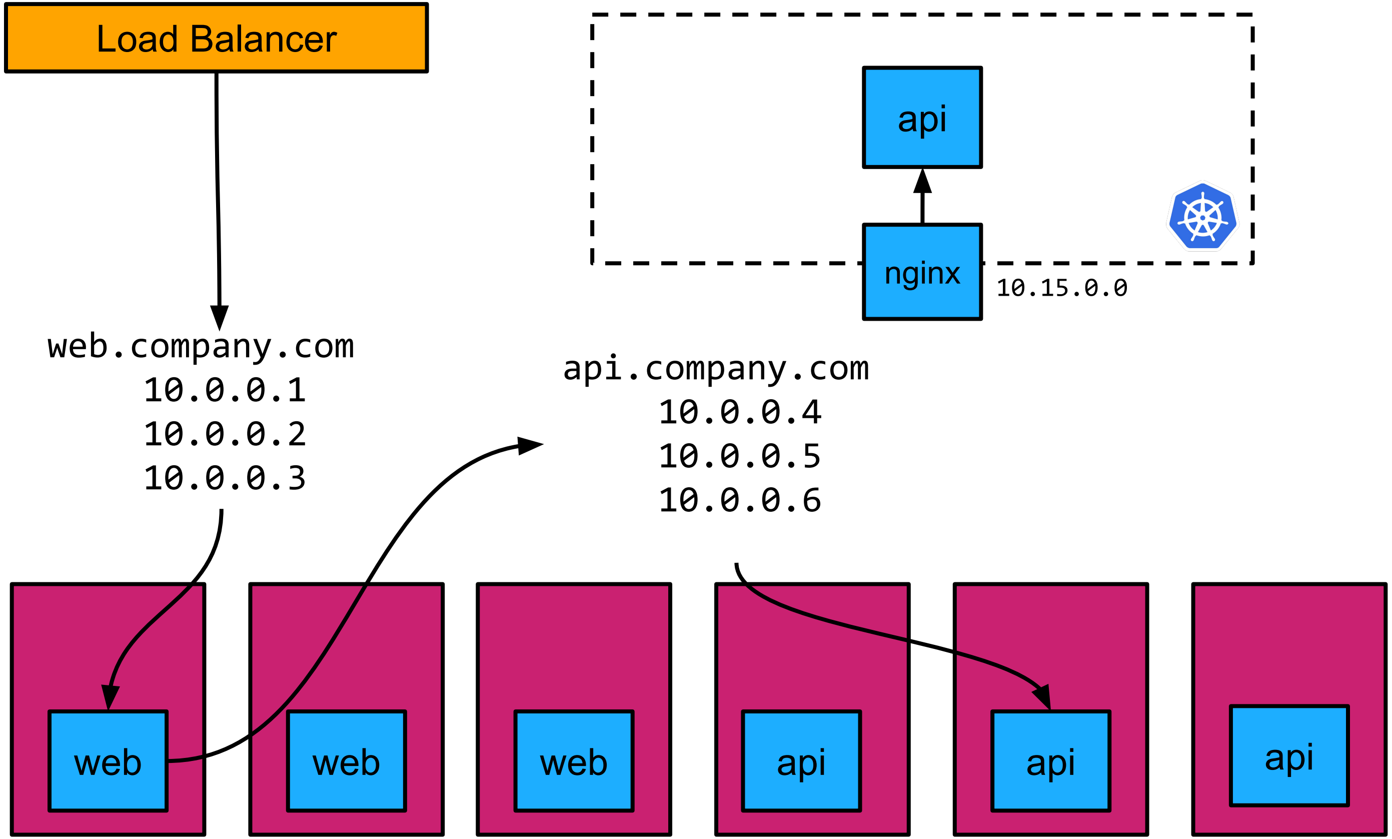
No Downtime Migration



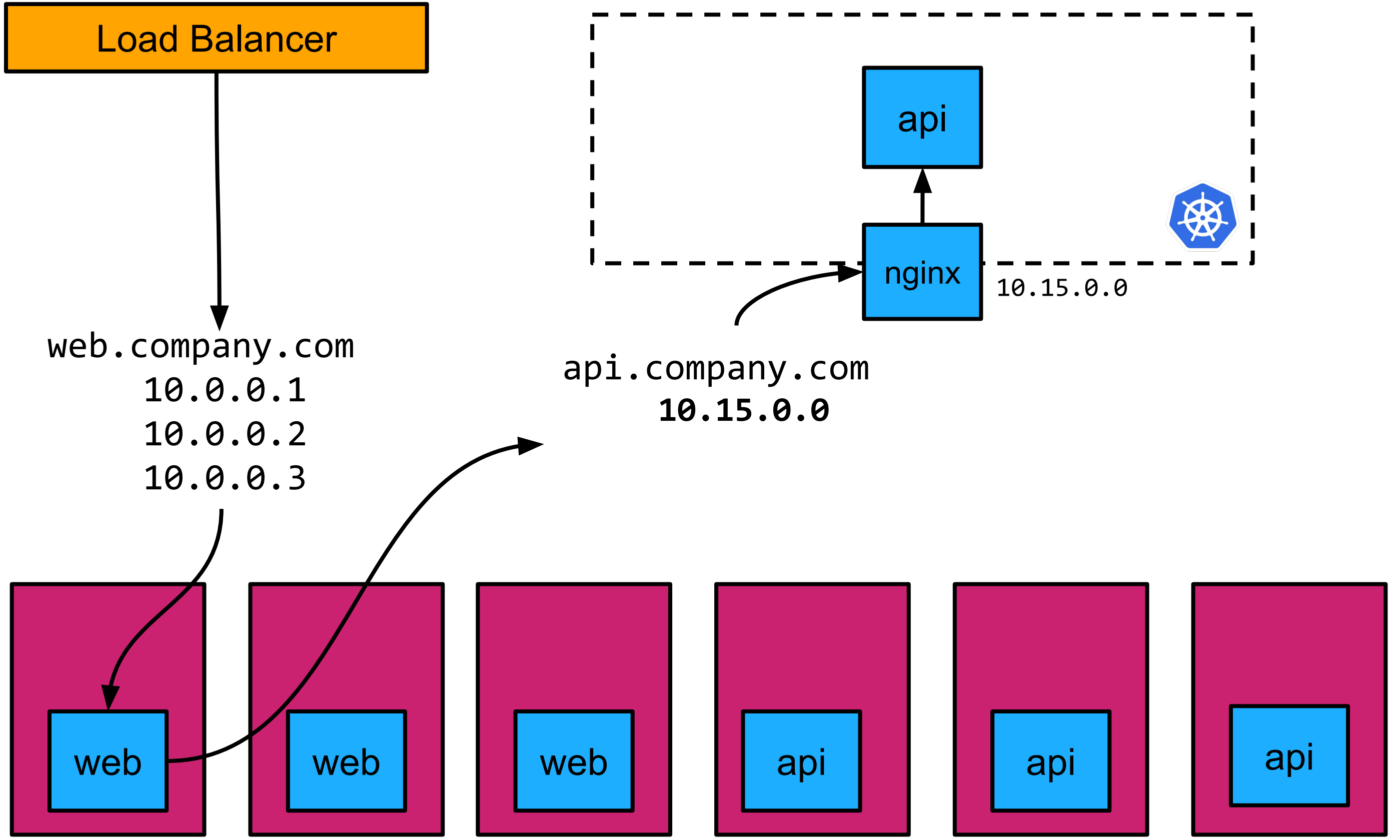
```
http://api =>
    127.0.0.1
```



```
http://api =>
     ::1
```



Load Balancer
api
nginx
10.15.0.0
web.company.com
10.0.0.1
10.0.0.2
10.0.0.3
api.company.com
10.0.0.4
10.0.0.5
10.0.0.6
web
web
web
api
api
api


Load Balancer
web.company.com
10.0.0.1
10.0.0.2
10.0.0.3
api
nginx
10.15.0.0
api.company.com
10.15.0.0
web
web
web
api
api
api

Workshop Step 7

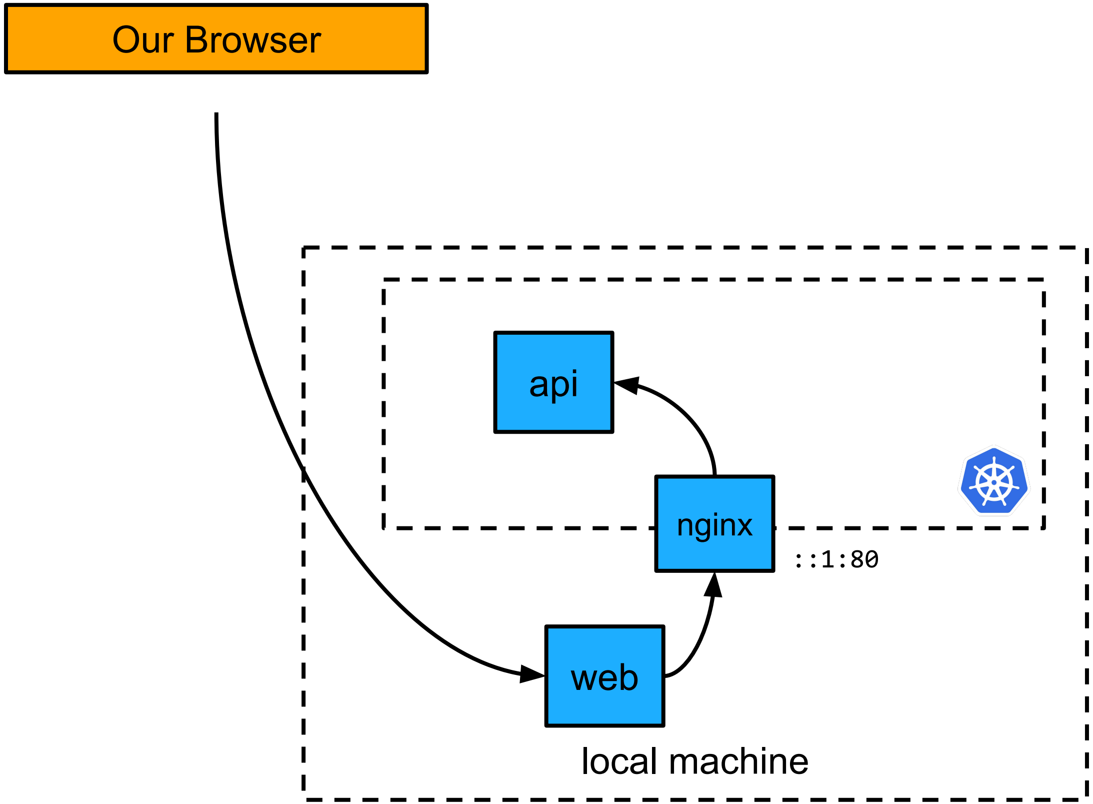
Recap

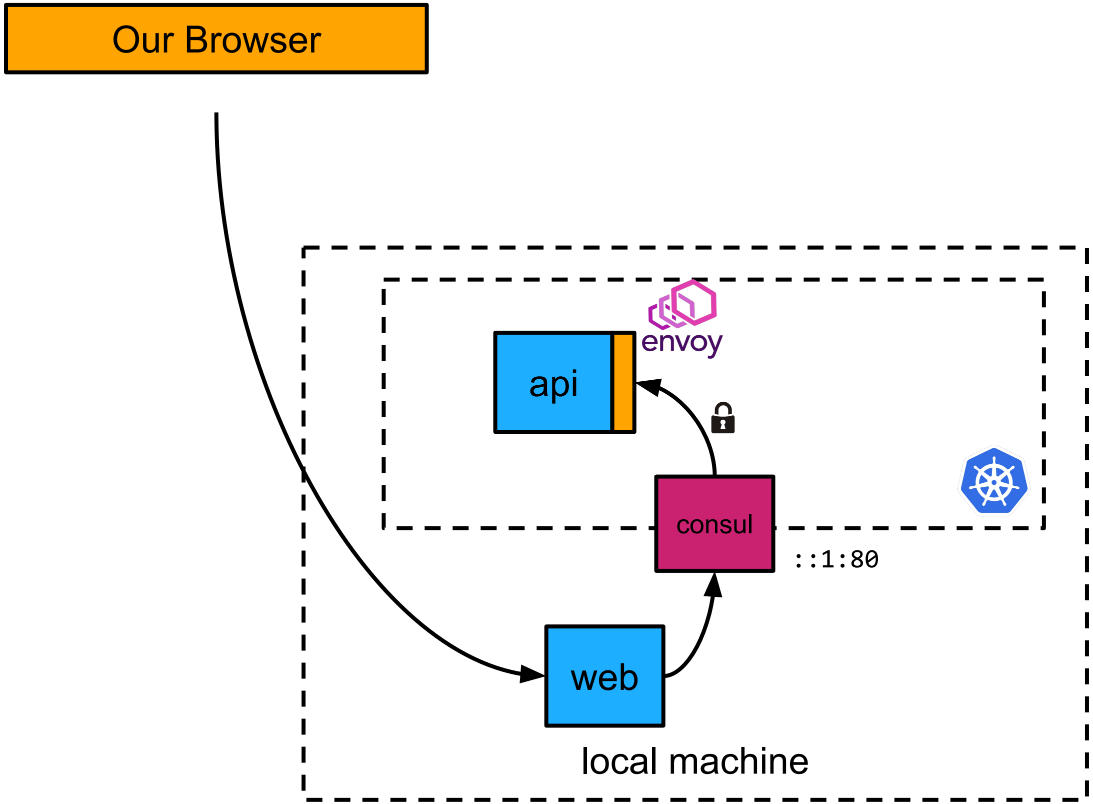
- Introduction
- Building a Docker Image
- Deploying to Kubernetes
- Configuring Routing
- Configuring Logging and Metrics
- Performing A No Downtime Migration
- Consul Service Mesh

Things To Think About

- Keep it simple
- Kubernetes Ecosystem Tooling
- Security

Consul Service Mesh


Our Browser
api
nginx
::1:80
web
local machine


Our Browser
envoy
api
consul
::1:80
web
local machine

Workshop Step 8

~~👋~~

@shustava

@lkysow