Le Seigneur Des Conteneurs

Un atelier de migration vers Kubernetes et Traefik

https://containous.github.io/slides/devoxx-fr-2019

How To Use These Slides?

- **Browse the slides:** Use the arrows
  - Change chapter: Left/Right arrows
  - Next or previous slide: Top and bottom arrows
- **Overview of the slides:** keyboard’s shortcut "o"
- **Speaker mode (and notes):** keyboard’s shortcut "s"

Whoami 1/2

Nicolas Mengin

- DevOps & Code Craftsman @ Containous
- Blacksmith on Traefik
- @nicomengin
- nmengin

Whoami 2/2

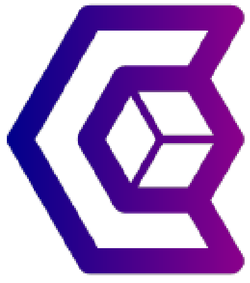
Damien DUPORTAL

- Traefik's Developer 🥑 Advocate @ Containous
- 🐦 @DamienDuportal
- dduportal

Containous

https://containo.us

- We Believe in Open Source
- We Deliver Traefik
- Commercial Support for Traefik
- 20 people, 90% tech



Forge Content

- TODO: indicate the checklist
- ....
- ....

Once Upon A Time...

An Infrastruture War

- Docker as a standard
- Orchestrators: Docker Swarm, Rancher Caddle, Mesos Marathon, Kubernetes...
- The war lasted a couple of years...

One Orchestrator To Rule Them All

- Kubernetes
- Used by the competition
- Standard in the industry
- Powerful but not easy to master

Menu

The Hobbit House: Introduction to Traefik with Docker

Break

Saruman Tower: Migrate Traefik to Kubernetes

Break

The Castle: Migrate the infrastructure to Kubernetes

The Hobbit House

The Hobbit House

We want a server in Google Cloud:

- to host our own SCM Server,
- and our own Continous Integration,
- and a static web site,
- and a "web" command line.

Infrastructure Setup

- A Google Cloud VM reachable from a public IP `35.178.178.237` and SSH access
- A domain name `lab01.ddu-workshops-1.com` pointing to `35.178.178.237`

```
$ dig +short lab01.ddu-workshops-1.com
35.178.178.237
```

- Docker and docker-compose installed on both the server and the client machines

DNS Setup

- Connect to the "Blue-Green Jenkins":
  - Link: Blue-Green Jenkins
  - Login with username `devoxx` and password `gandalf`
- Run the Job "change-dns"
  - Link: Job "change-dns"
  - Specify the `EXTERNAL_HOSTNAME` of your lab (`labXX.ddu-workshops-Y.com`)
  - Specify the `BACKEND_IP` of your Docker VM (`10.0.x.y`)

Reality Check

http://lab01.ddu-workshops-1.com/

```
Bad Gateway
```

The external loadbalancer cannot reach our VM.

Lab 1

- **Traefik**
- Web Server
- CI Server
- SCM: A Gitea Git Server
- Web CLI
- SSL for everyone

Why Traefik?

Why, Mr Anderson?

Evolution Of Software Design

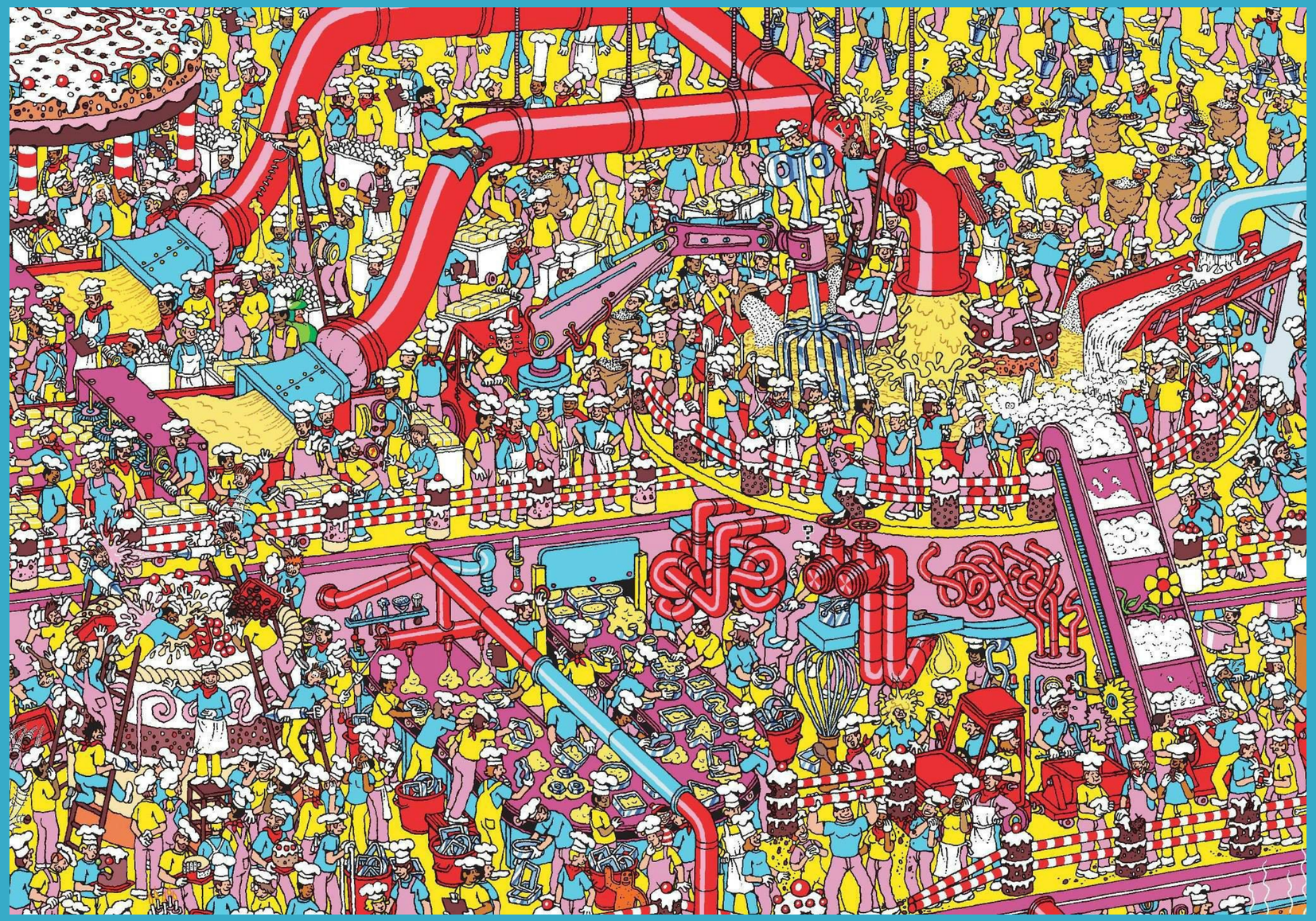
1990s and earlier	2000s	2010s
Coupling		
Pre-SOA (monolithic) Tight coupling	**Traditional SOA** Looser coupling	**Microservices** Decoupled

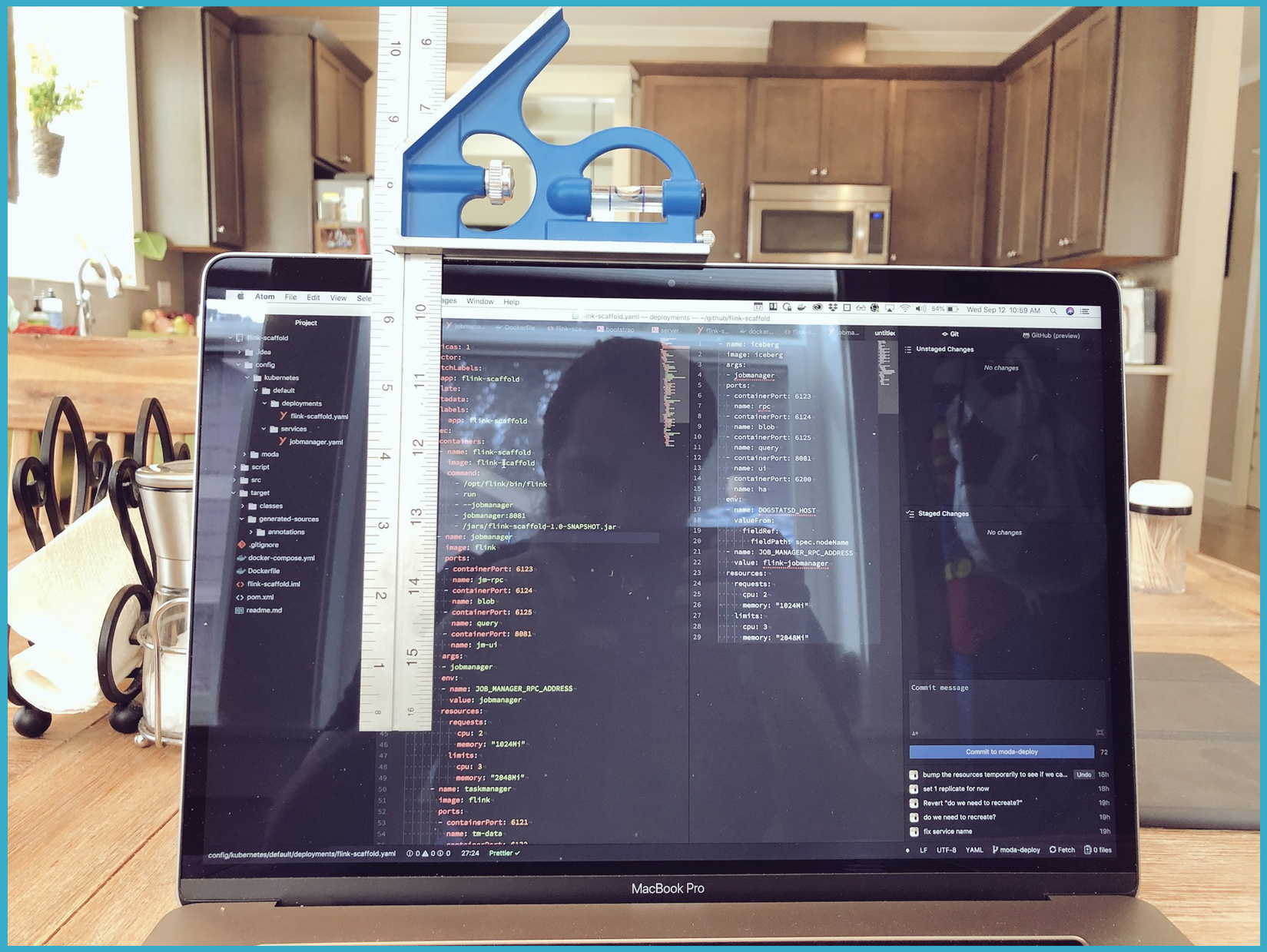
The Premise Of Microservices...

...And What Happens

Tools Of The Trade


Where's My Service?



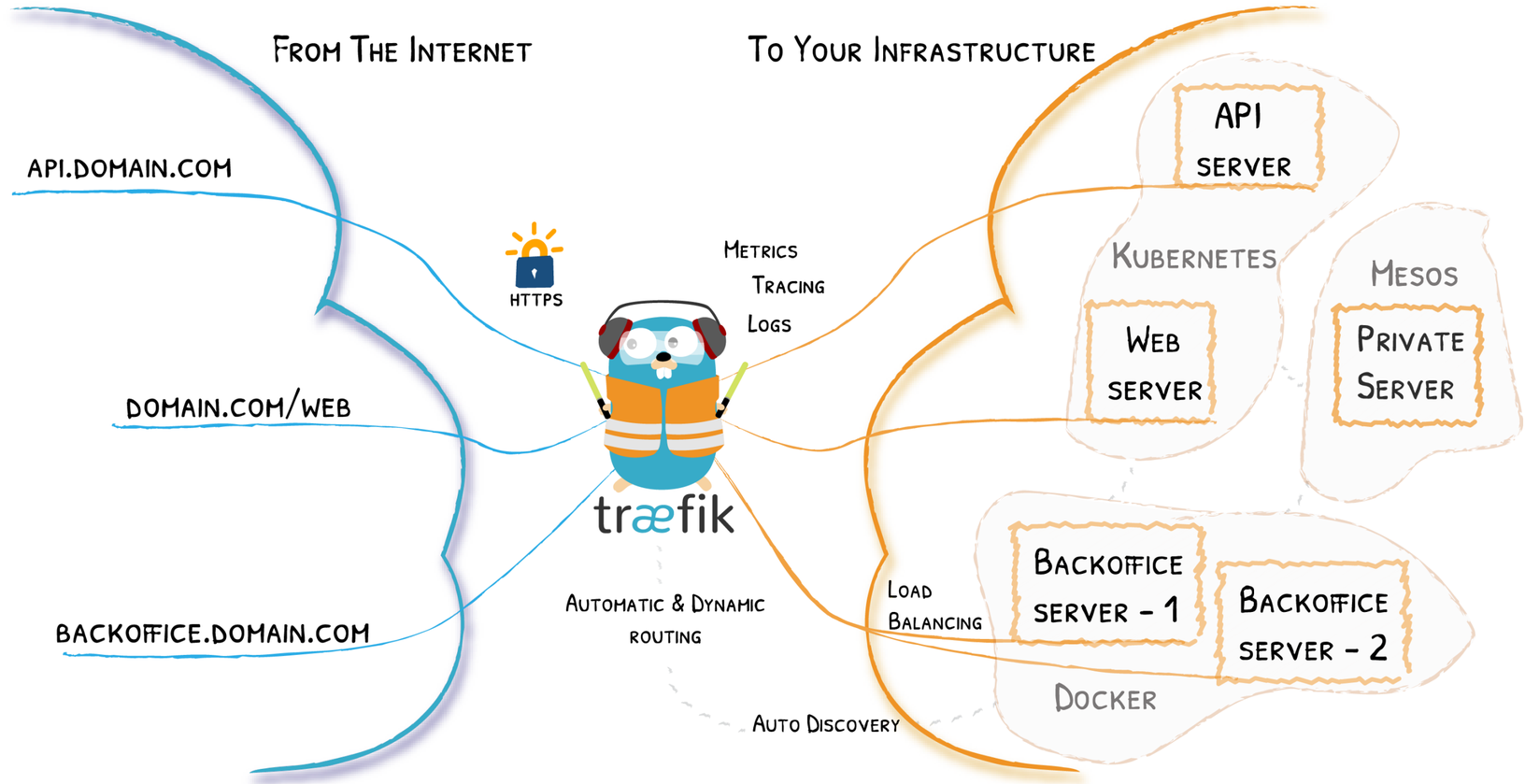


Source: https://twitter.com/Caged/status/1039937162769096704

What If I Told You?

That You Don’t Have to Write This Configuration File...?

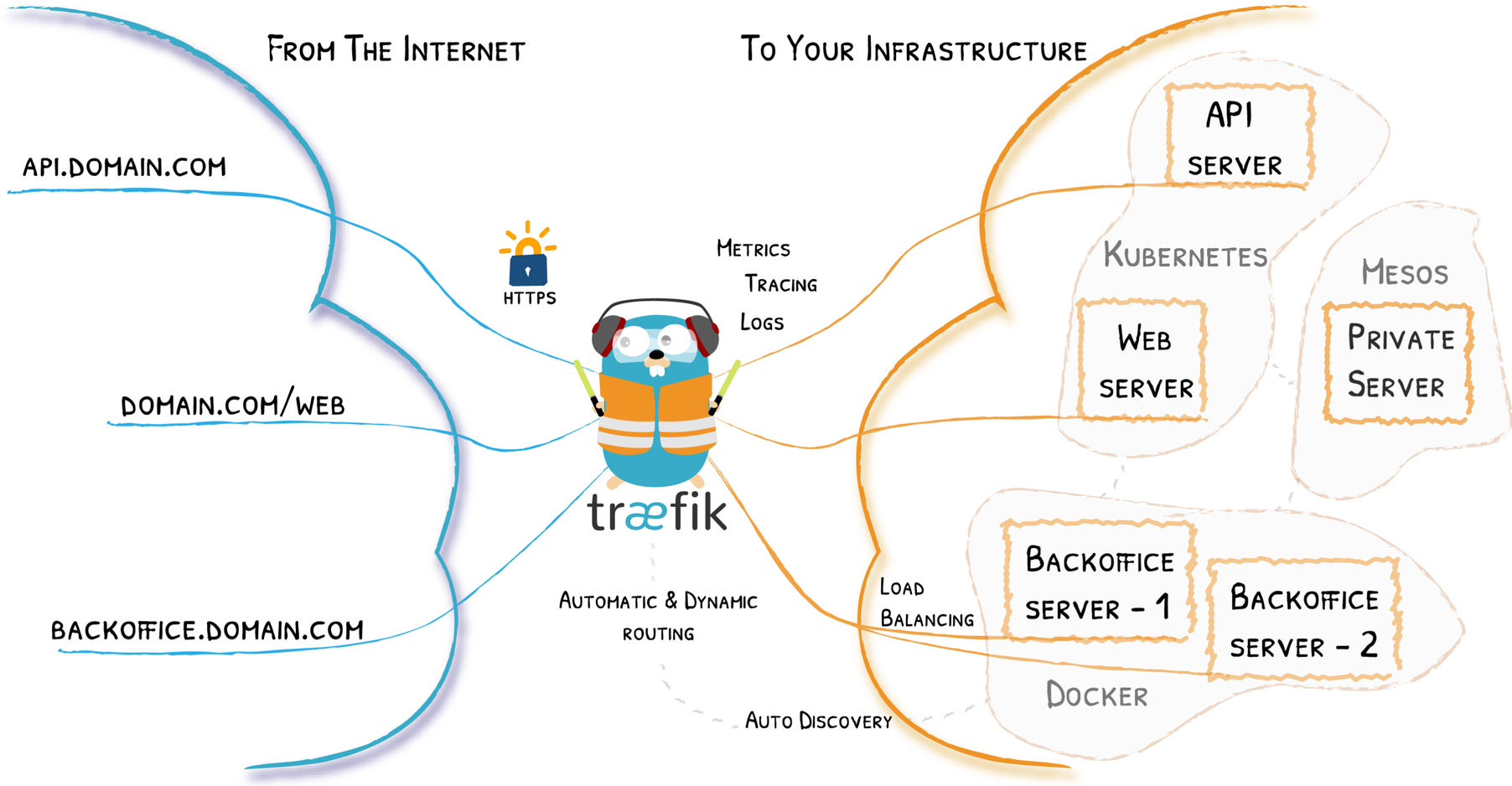
Here Comes Traefik!



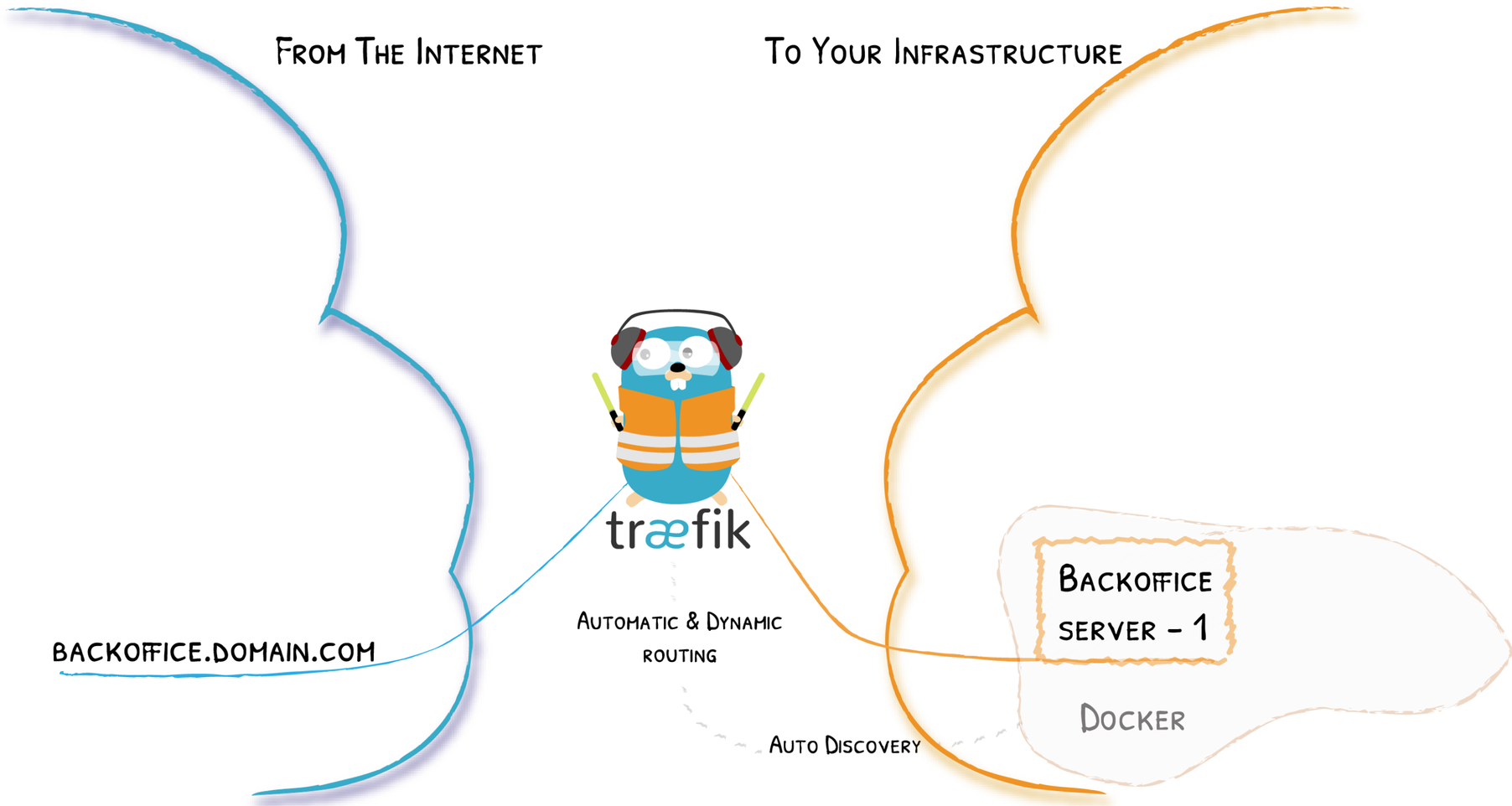
Traefik Project

- https://github.com/containous/traefik
- MIT License
- Written in Go
- 21,000+ ☆
- 600M+ ⬇
- 350+ 👷

Remember The Diagram?



Let's Simplify



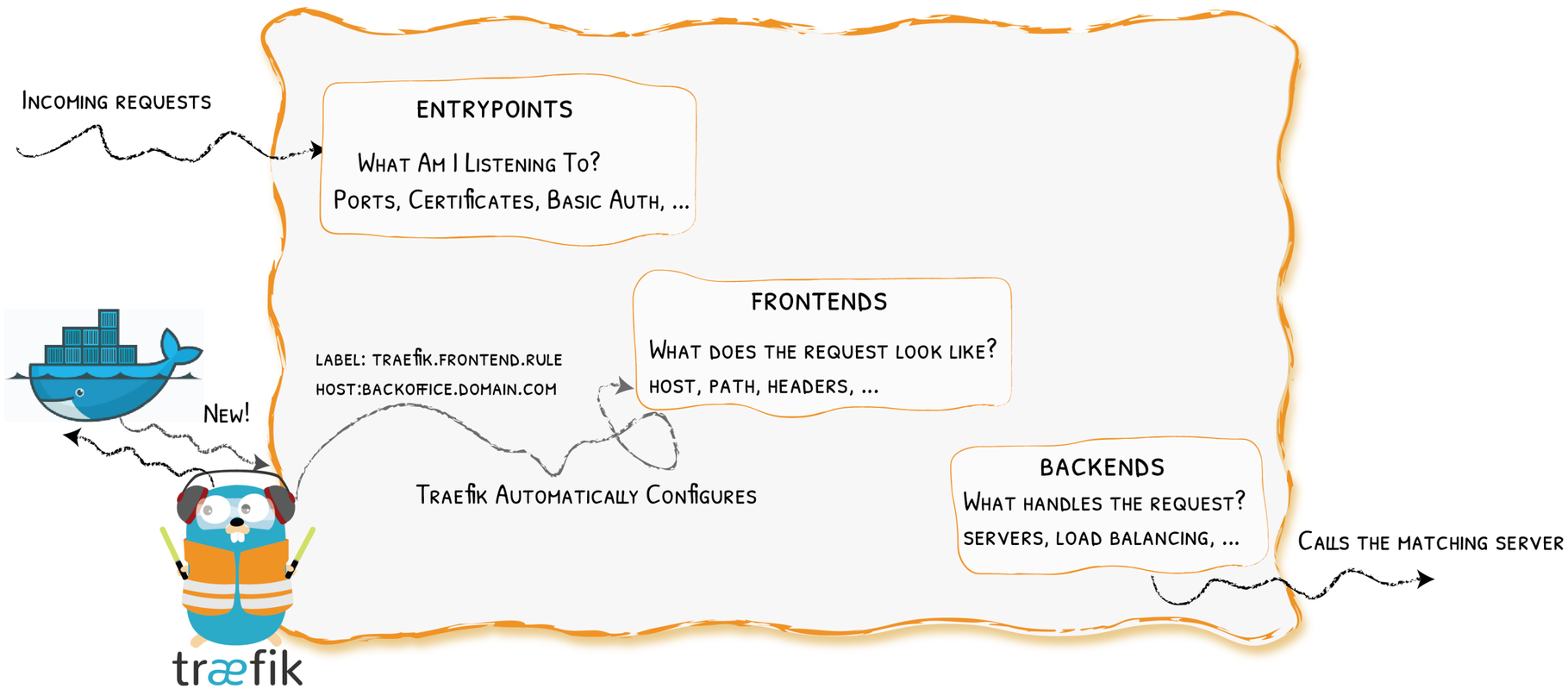
Providers

Entrypoints

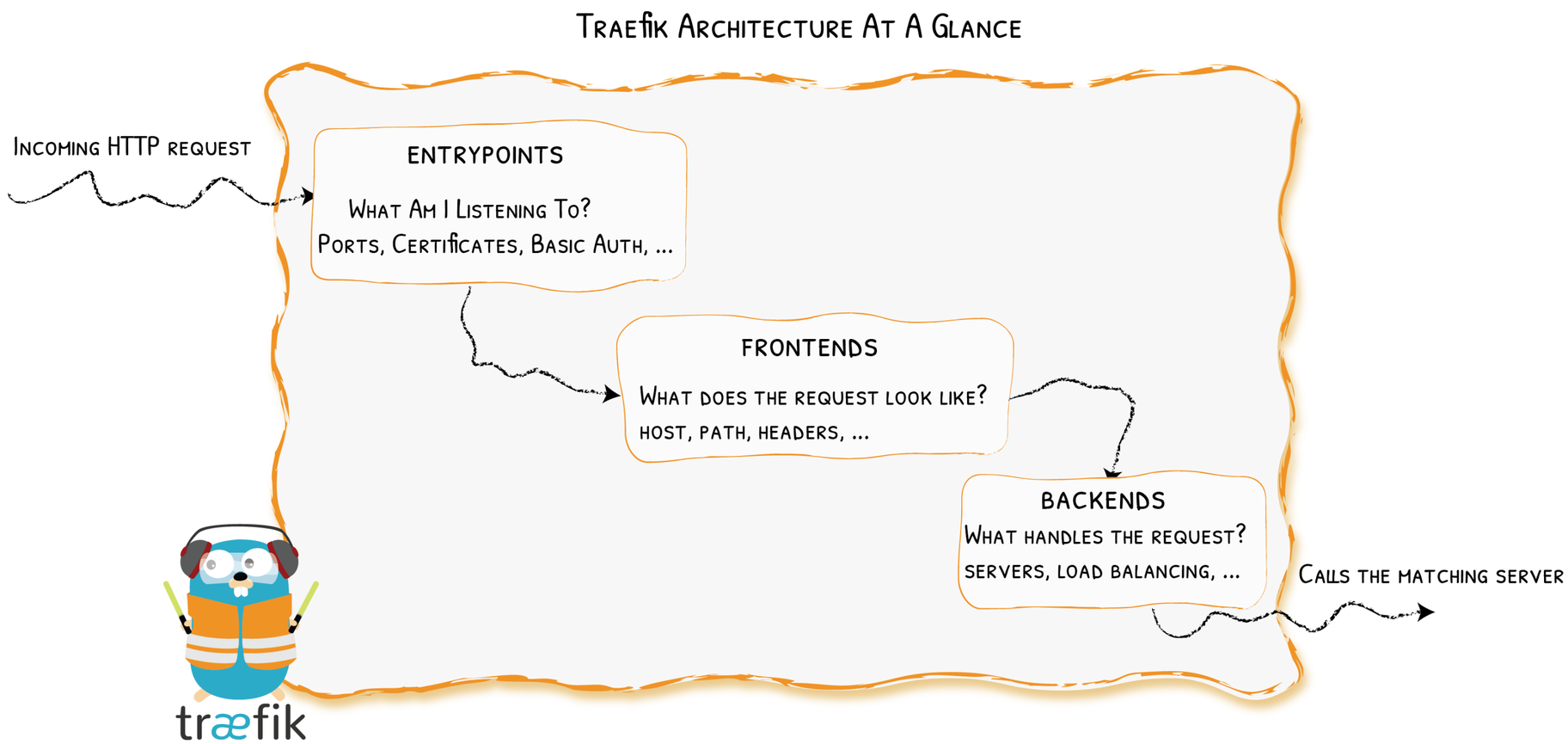
Backends


Incoming requests
ENTRYPOINTS
What Am I Listening To?
Ports, Certificates, Basic Auth, ...
New!
Traefik Automatically Configures
BACKENDS
What handles the request?
servers, load balancing, ...
Calls the matching server
træfik

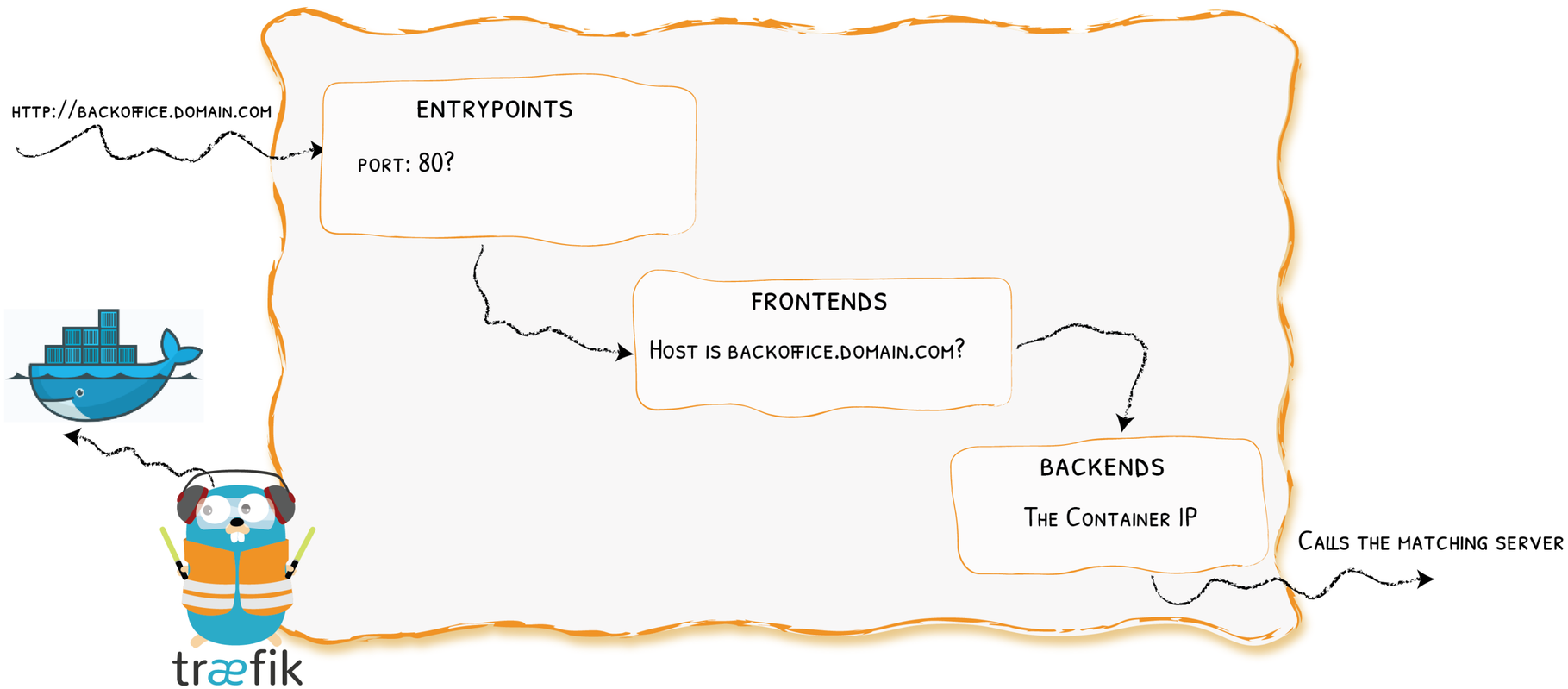
Frontends


Incoming requests
ENTRYPOINTS
What Am I Listening To?
Ports, Certificates, Basic Auth, ...
FRONTENDS
What does the request look like?
host, path, headers, ...
BACKENDS
What handles the request?
servers, load balancing, ...
Calls the matching server
New!
label: traefik.frontend.rule
host:backoffice.domain.com
Traefik Automatically Configures
træfik

At A Glance


Traefik Architecture At A Glance
Incoming HTTP request
ENTRYPOINTS
What Am I Listening To?
Ports, Certificates, Basic Auth, ...
FRONTENDS
What does the request look like?
host, path, headers, ...
BACKENDS
What handles the request?
servers, load balancing, ...
Calls the matching server
træfik

In Practice


HTTP://BACKOFFICE.DOMAIN.COM
ENTRYPOINTS
PORT: 80?
FRONTENDS
HOST IS BACKOFFICE.DOMAIN.COM?
BACKENDS
THE CONTAINER IP
CALLS THE MATCHING SERVER
træfik

Let's Go

Traefik Setup

- Step 1: Compose file in `/home/devoxx/lab-docker-k8s/01-docker/docker-compose.yml`:

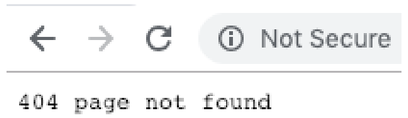
```
version: '2.4'

services:
  edge:
    image: traefik:1.7.10
    command:
      - "--docker.domain=lab01.ddu-workshops-1.com"
    ports:
      - "80:80"
      - "443:443"
    volumes:
      # To communicate with the Docker Engine
      - /var/run/docker.sock:/var/run/docker.sock
```

- Step 2: Start the stack:

```
docker-compose up -d
```

Reality Check

http://lab01.ddu-workshops-1.com/



It’s good: we have an HTTP answer!

Lab 1

- Traefik
- **Web Server**
- CI Server
- SCM: A Gitea Git Server
- Web CLI
- SSL for everyone

Goal

We want to host a static webserver behind Traefik.

Problem

How to tell Traefik to route requests to the web server?

```
http://lab01.ddu-workshops-1.com/index.html
  -> Traefik
    -> http://<Webserver Private IP>/index.html
```

The Web Server Setup

- Step 1: web server in Compose. Check the `labels`:

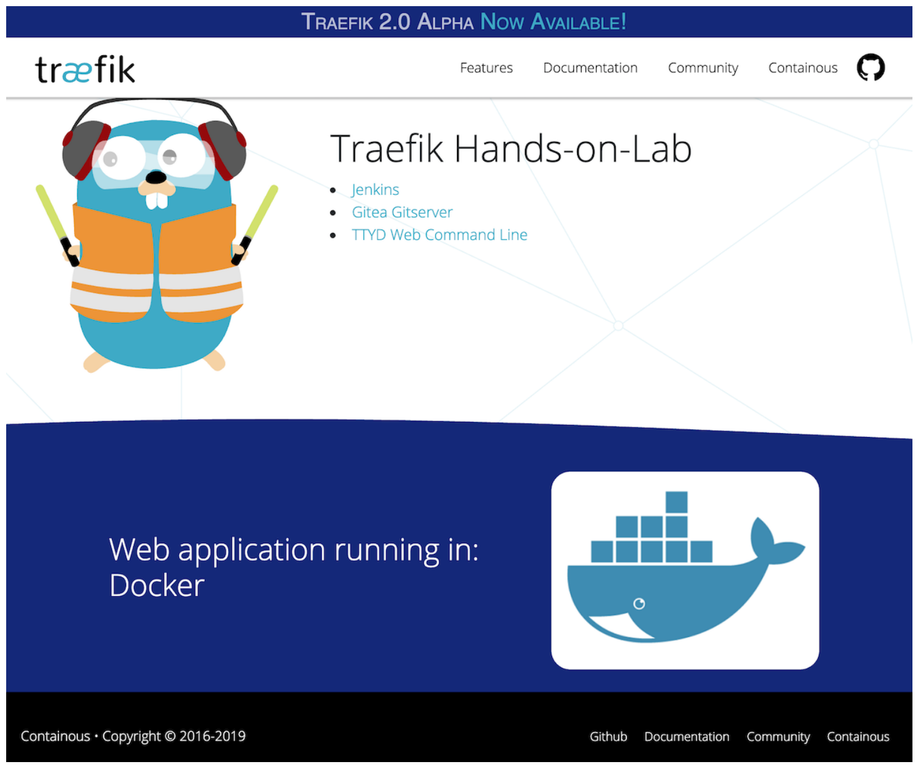
```
web:
  image: nmengin/web:devoxx-v1
  labels:
    - "traefik.frontend.rule=PathPrefix:/"
```

- Step 2: Start the Web Server:

```
docker-compose up -d web
```

Reality Check

http://lab01.ddu-workshops-1.com/



It’s good: we have a web page!

Lab 1

- Traefik
- Web Server
- **CI Server**
- SCM: A Gitea Git Server
- Web CLI
- SSL for everyone

Goal

- We want to host our own automation system for Continuous Integration
  - Let’s use Jenkins

Challenge 1/3

- **Problem**: Jenkins exposes 2 ports: `8080` and `50000`. How to let Traefik know to only use `8080`?
- **Solution:** Select the port with the label `traefik.port`.

```
- "traefik.port=8080"
```

Challenge 2/3

- **Problem:** How to let Traefik know when to send requests to the Jenkins backend instead of the webserver?

```
http://lab01.ddu-workshops-1.com/jenkins/configuration
  -> Traefik
    -> http://<Jenkins Private IP>:8080/jenkins/configuration
```

- **Solution:** Change the frontend rule to use `PathPrefix`.

```
- "traefik.frontend.rule=PathPrefix:/jenkins"
```

Challenge 3/3

- **Problem**: How to tell Jenkins to accept requests under `/jenkins`?
- **Solution:** Use the Jenkins flag `--prefix=/jenkins` with the variable `JENKINS_OPTS`.

```
environment:
  - JENKINS_OPTS=--prefix=/jenkins
```

Jenkins Setup

- Step 1: Edit Compose file:

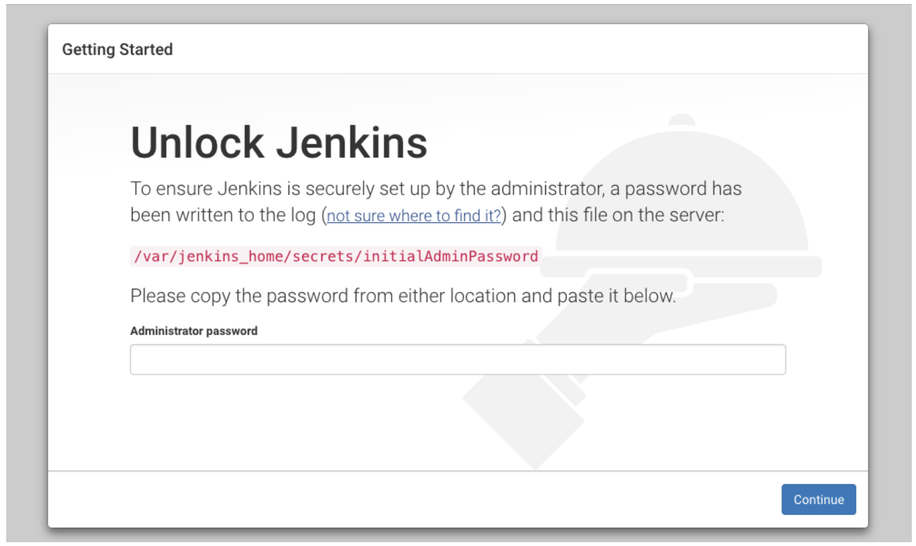
```
jenkins:
  image: jenkins/jenkins:2.164.2-alpine
  expose:
    - 8080
    - 50000
  environment:
    - JENKINS_OPTS=--prefix=/jenkins
  labels:
    - "traefik.port=8080"
    - "traefik.frontend.rule=PathPrefix:/jenkins"
```

- Step 2: start the service:

```
docker-compose up -d jenkins
```

Reality Check

http://lab01.ddu-workshops-1.com/jenkins



It’s good: we can setup Jenkins!

Lab 1

- Traefik
- Web Server
- CI Server
- **SCM: A Gitea Git Server**
- Web CLI
- SSL for everyone

Goal

- We want to host our own git server
  - Let’s use Gitea, a painless self-hosted Git service.

Challenge

- **Problem:**
  - Gitea only serves requests under `/`:
  - How to remove the prefix `/gitserver`?

```
http://lab01.ddu-workshops-1.com/gitserver/index.html
  -> Traefik
    -> http://<Gitea private IP>:3000/index.html
```

- **Solution:** Use the Traefik Frontend Rule `PathPrefixStrip`.

```
- "traefik.frontend.rule=PathPrefixStrip:/gitserver"
```

Gitea Setup

- Step 1: Edit Compose file:

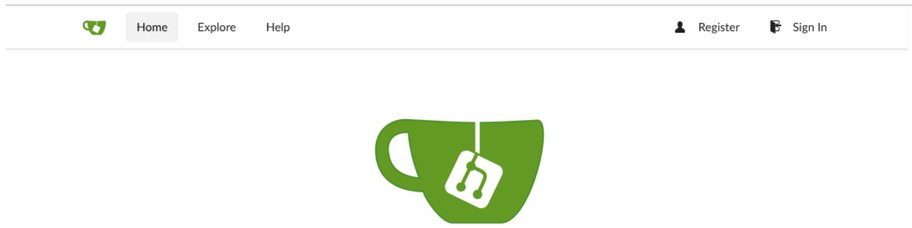
```
gitserver:
  image: gitea/gitea:latest
  expose:
    - "3000"
    - "22"
  environment:
    - ROOT_URL=/gitserver
  labels:
    - "traefik.port=3000"
    - "traefik.frontend.rule=PathPrefixStrip:/gitserver"
```

- Step 2: Create the service:

```
docker-compose up -d gitserver
```

Reality Check

http://lab01.ddu-workshops-1.com/gitserver



Gitea: Git with a cup of tea

A painless, self-hosted Git service

It’s good: we can setup Gitea!

Lab 1

- Traefik
- Web Server
- CI Server
- SCM: A Gitea Git Server
- **Web CLI**
- SSL for everyone

Goal

- We want to host our own Web Command Line.
  - Let’s use TTYD, Share your terminal over the web.

Challenge

- **Problem:** TTYD requires Websockets.
- **Solution:** It’s not even a problem with Traefik!

Easy Peasy!

- Step 1: Edit Compose file:

```
ttyd:
  image: tsl0922/ttyd
  labels:
    - "traefik.frontend.rule=PathPrefixStrip:/ttyd"
```

- Step 2: Create the service:

```
docker-compose up -d ttyd
```

Reality Check

http://lab01.ddu-workshops-1.com/ttyd

It’s good: we have our own "web CLI" in a web browser!

Lab 1

- Traefik
- Web Server
- CI Server
- SCM: A Gitea Git Server
- Web CLI
- **SSL for everyone**

Goals

- Use HTTPS instead of HTTP
- Do NOT care about certificates and renewal
- Use a TOML configuration file

Let's Encrypt is a free, automated, and open Certificate Authority.

It uses the "ACME" protocol to verify that you control a given domain name and to issue a certificate.

Problem 1/3

- **Problem:** How to tell Traefik to listen on port `443` for HTTPS requests?
- **Solution:**
  - Create a new entrypoint
  - Add it to the default entrypoints list

```
# TOML sample
defaultEntryPoints = ["http", "https"]

[entryPoints]
  [entryPoints.https]
  address = ":443"
    [entryPoints.https.tls]
```

Problem 2/3

- **Problem:** How to tell Traefik to use Let's Encrypt for HTTPS?
- **Solution:**
  - Configure the ACME/Let's Encrypt provider:

```
# TOML sample
[acme]
email = "{acme_email}"
storage = "/acme/acme.json"
entryPoint = "https"
[acme.tlsChallenge]
# caServer = "https://acme-staging-v02.api.letsencrypt.org/directory"
[[acme.domains]]
main = "{lab-domain}"
```

Problem 3/3

- **Problem:**
  - Traefik detects itself as a docker container with a port
  - It tries to request a 2nd certificate for `edge.lab01.ddu-workshops-1.com`.
- **Solution:** Exclude Traefik's container with the label `traefik.enable=false`.

Traefik Setup 1/2

- Step 1: Create the configuration file `traefik.toml`:

```
defaultEntryPoints = ["http", "https"]

[entryPoints]
  [entryPoints.https]
  address = ":443"
    [entryPoints.https.tls]
  [entryPoints.http]
  address = ":80"

[acme]
email = "noreply@lab.org"
storage = "/acme/acme.json"
entryPoint = "https"
[acme.tlsChallenge]
# caServer = "https://acme-staging-v02.api.letsencrypt.org/directory"
[[acme.domains]]
main = "lab01.ddu-workshops-1.com"

[docker]
domain = "lab01.ddu-workshops-1.com"
watch = true
```

Traefik Setup 2/2

- Step 2: Adapt the Compose file:

```
edge:
  image: traefik:1.7.10
  labels: # Replace "command" by labels
    - "traefik.enable=false"
  ports:
    - "80:80"
    - "443:443"
  volumes:
    - /var/run/docker.sock:/var/run/docker.sock
    # Add the TOML configuration file in the root directory
    - ./traefik.toml:/traefik.toml
    # We declare the folder "/acme" as a data volume
    - /acme
```

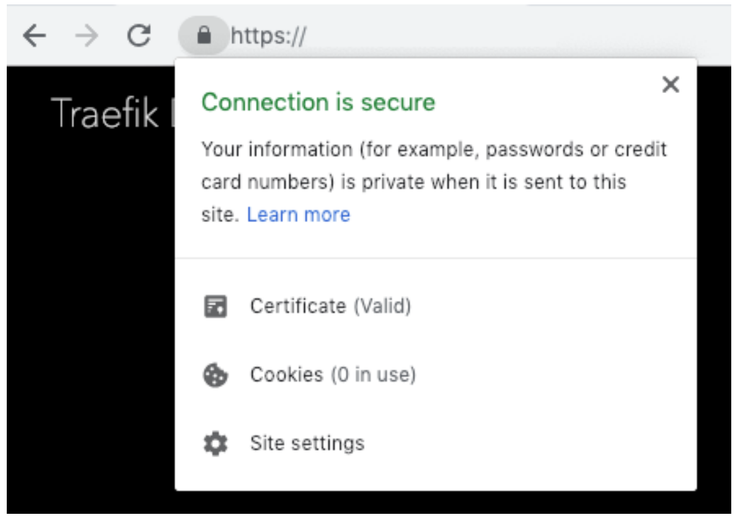
- Step 3: Update the `edge` service:

```
docker-compose up -d edge
```

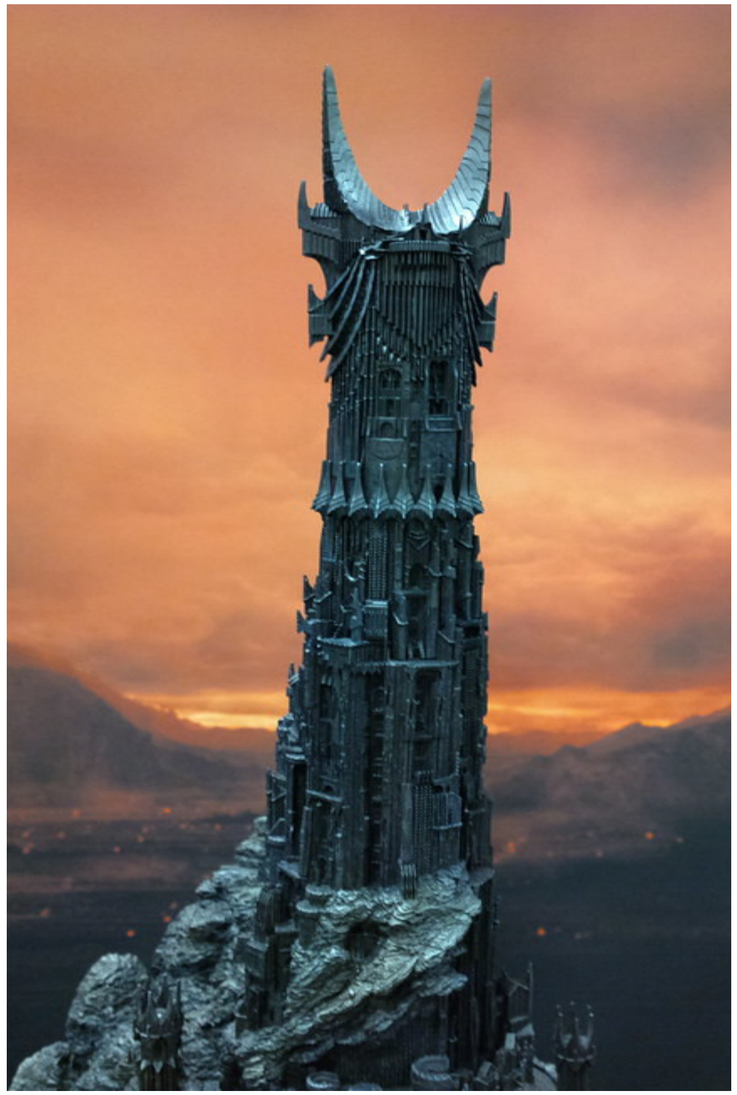
Reality Check

Wait a few seconds (time to get the certificate from Let's Encrypt) and reload the main page:

https://lab01.ddu-workshops-1.com



Saruman Tower: Migrate Traefik To Kubernetes



Saruman Tower

We want to begin the migration of our services from the our VM to a Kubernetes cluster:

- keep the Docker services
- migrate Traefik to Kubernetes
- migrate the Let's Encrypt certificates
- access to the Docker services through Traefik in Kubernetes

Infrastructure Setup

- A K3S cluster on a VM reachable from a public IP
  `35.178.178.237`
- `kubectl` and `helm` installed on the client machines

Lab 2

- **Traefik**
- Web Server
- CI Server
- SCM: A Gitea Git Server
- Web CLI

North-South Connection In Kubernetes

Internet

|

[Ingress]

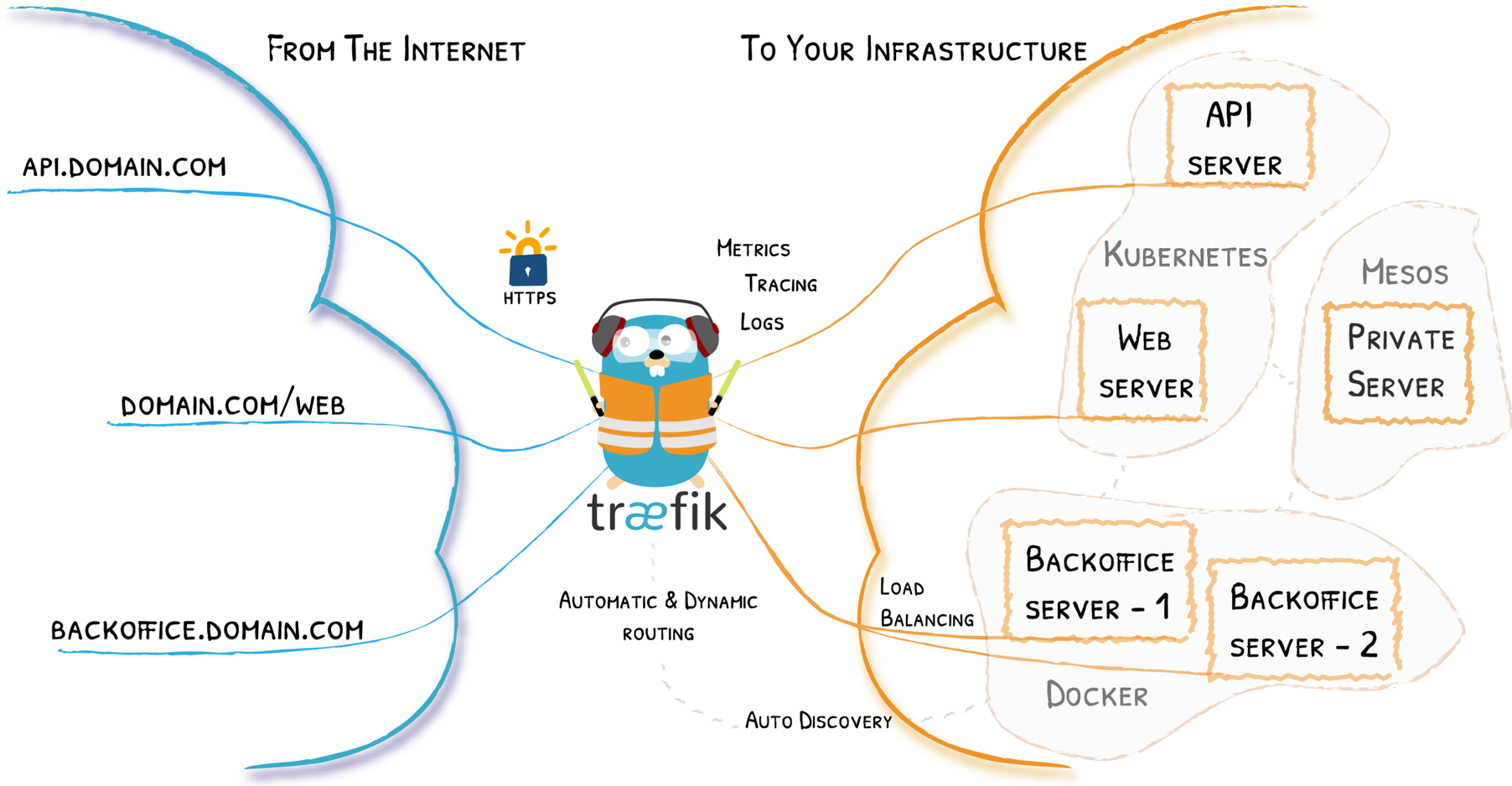
--|-----|--

[Services]

--|-----|--

[Pods]

Remember The Diagram?



In Kubernetes

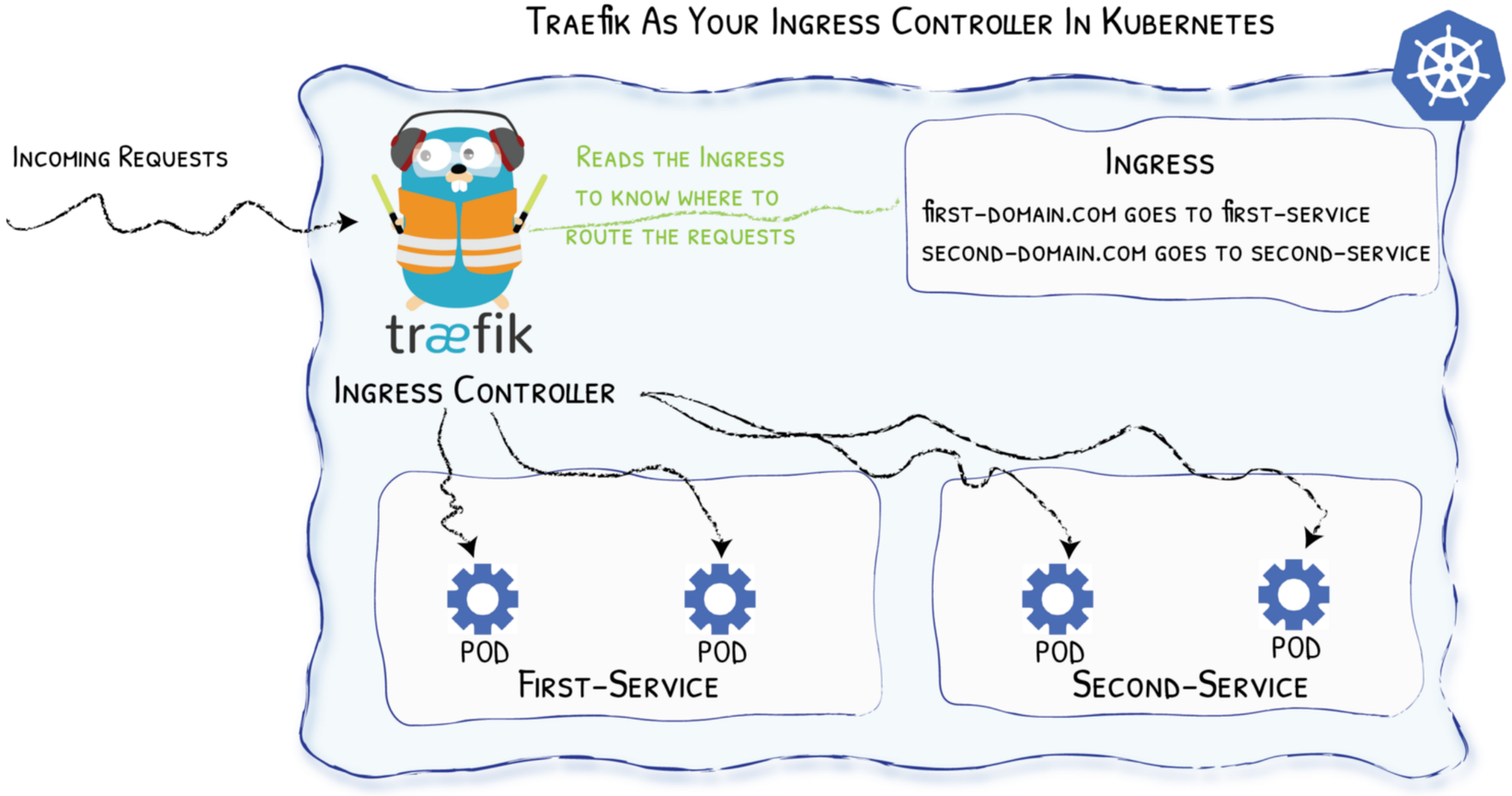


Diagram from https://medium.com/@geraldcroes

Let's Go

- Let's start by migrating the Let's Encrypt Certificates
- Then, we install Traefik as Ingress Controller

Goal

- We want to use our generated Let’s Encrypt certificates.
  - We do not want to exceed the ACME Rate Limits..

Retrieve Certificates From Docker

- Step 1: From the "Legacy" (Docker) VM:

```
# Get Traefik Container ID
TRAEFIK_CONTAINER_ID="$(docker ps | grep traefik | grep edge | awk '{print $1}')"

# Generate a file "certs.b64" in the user home
docker run --rm --volumes-from="${TRAEFIK_CONTAINER_ID}" -t \
    alpine cat /acme/acme.json | base64 > ~/certs.b64
```

- Step 2: From the "bastion", copy the certificates to the new VM

```
ssh {docker_ip} cat certs.b64 | ssh 10.0.n.p "cat > certs.b64"
```

Import Certificates Into Kubernetes

Idea:

- On the "Kube" VM, we'll create a pod with a PVC ("Persistent Volume Claim").
- Then, using this pod, we'll populate the persistent volume with the `acme.json` data.
- After that, we'll be able to install the Traefik Ingress configured to use this PVC.

Prepare PVC In Kubernetes

- Step 1: Create the PVC ("Persistent Volume Claim") manifest file `acme-pvc.yml`:

```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: acme-data-pvc
  namespace: devoxx
spec:
  accessModes:
    - ReadWriteOnce
  storageClassName: local-path
  resources:
    requests:
      storage: 200Mi
```

- Step 2: create namespace and PVC:

```
kubectl create namespace devoxx
kubectl apply -f acme-pvc.yml
```

Prepare The "Acme-Loader" Deployment

- Step 1: Create the manifest file `acme-deploy.yml`:

```
apiVersion: v1
kind: Pod
metadata:
  name: acme-loader
  namespace: devoxx
spec:
  containers:
  - name: acme-loader
    image: traefik:alpine
    imagePullPolicy: IfNotPresent
    volumeMounts:
    - name: acme
      mountPath: /acme
  volumes:
  - name: acme
    persistentVolumeClaim:
      claimName: acme-data-pvc
```

- Step 2: create the deployment:

```
kubectl apply -f acme-pod.yml
```

Load ACME Data In Kubernetes

- Step 1: Wait for the pod and pvc to be created:

```
# Expecting the pod "acme-loader" to be in state "Running"
watch kubectl get pod,pv,pvc --namespace=devoxx
# Then hit CTRL-C
```

- Step 2: Decode ACME data and copy it:

```
base64 --decode certs.b64 > ~/acme.json
chmod 0600 ~/acme.json
kubectl --namespace=devoxx cp ~/acme.json acme-loader:/acme/
kubectl exec --namespace=devoxx acme-loader -- ls -l /acme
# the file "acme.json" MUST be in 600 (-rw-------)
```

- Step 3: Remove the "acme-loader" deployment:

```
kubectl delete -f acme-pod.yml
```

Install Traefik Ingress

Create A `values.yml` File

- Step 1: Add rights on namespace:

```
# Allow creating the needed Role and Service Account
rbac:
  enabled: true
```

- Step 2: Set SSL EntryPoint with redirection:

```
ssl:
  enabled: true
  enforced: true
```

- Step 3: Add Let’s Encrypt:

```
acme:
  enabled: true
  email: noreply@lab.org
  onHostRule: true
  #staging: true
  challengeType: tls-alpn-01
  persistence:
    enabled: true
    existingClaim: acme-data-pvc
```

Deploy Traefik

```
helm install stable/traefik \
 --name traefik-devoxx \
 --namespace devoxx \
 --set imageTag=1.7.10 \
 --values values.yml
```

Access To Traefik

- Step 1: Run the command:

```
kubectl --namespace=devoxx get services
```

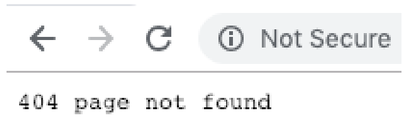
- Step 2: Once the column `EXTERNAL-IP` show an IP in `172...`, then the LoadBalancer can be reached at your VM's IP address:

```
VM_IP="$(/sbin/ifconfig eth0 | grep 'inet ' | awk '{print $2}')"
echo "${VM_IP}" # the Kube VM IP 10.0.n.p
```

- Step 3: Use the Blue-Green Jenkins job to switch:
  - Your domain name (`labXX.ddu-workshops-Y.com`)
  - To this `VM_IP` (`10.0.n.p`)

Reality Check

http://lab01.ddu-workshops-1.com/



It’s good: we have an HTTP answer!

Lab 2

- Traefik
- **Web Server**
- CI Server
- SCM: A Gitea Git Server
- Web CLI

Goal

We want access to the webserver hosted in Docker through Traefik in Kubernetes.

Challenge 1/2

Problem: How to tell to Traefik to route requests to the web server which is not deployed in Kubernetes?

```
https://lab01.ddu-workshops-1.com/index.html
  -> Traefik Kubernetes
    -> Traefik Docker
      -> https://<Webserver Private IP>/index.html
```

Headless Service

Solution: Use a service linked to an external address.

```yaml
---
apiVersion: v1
kind: Service
metadata:
  name: web-service
  namespace: devoxx
  labels:
    guilde: web
spec:
  ports:
  # Define the port to contact on the external Host
  # Here contact Traefik defined in lab1
  - port: 80
    name: traefik-http
  # Indicate to Kubernetes that the service will redirect
  # to a backend which is not managed in the Kubernets network
  type: ExternalName
  # IP of the VM in the lab1
  externalName: 10.0.x.y
```

Challenge 2/2

Problem: How to detect the HTTPS requests to catch?

Ingress Rule

Solution: Catch all the incoming resquests for the `Path: /`.

```
---
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: web-ingress
  namespace: devoxx
  labels:
    guilde: web
  annotations:
    kubernetes.io/ingress.class: 'traefik'
    traefik.frontend.passHostHeader: "false"
    traefik.frontend.rule.type: PathPrefix
spec:
  rules:
  - host: lab01.ddu-workshops-1.com
    http:
      paths:
      - path: /
        backend:
          serviceName: web-service
          servicePort: traefik-http
```

Apply The Configuration

```
kubectl apply -f ./web/svc-ingress.yml
```

Reality Check

https://lab01.ddu-workshops-1.com/

It’s good: we have a web page!

Lab 2

- Traefik
- Web Server
- **CI Server**
- SCM: A Gitea Git Server
- Web CLI

Goal

We want access to the CI hosted in Docker through Traefik in Kubernetes

Challenge 1/2

Problem: How to tell to Traefik to route requests to the CI which is not deployed in Kubernetes?

```
https://lab01.ddu-workshops-1.com/jenkins
  -> Traefik Kubernetes
    -> Traefik Docker
      -> https://<Jenkins Private IP>/jenkins
```

Headless Service

Solution: Use (once again) a service linked to an external address.

```yaml
---
apiVersion: v1
kind: Service
metadata:
  name: jenkins-service
  namespace: devoxx
  labels:
    guilde: ci
spec:
  ports:
  - port: 80
    name: traefik-http
  type: ExternalName
  externalName: 10.0.x.y
```

Challenge 2/2

Problem: How to detect the HTTPS requests to catch?

Ingress Rule

Solution: Catch the requests for the `PathPrefix:/jenkins`.

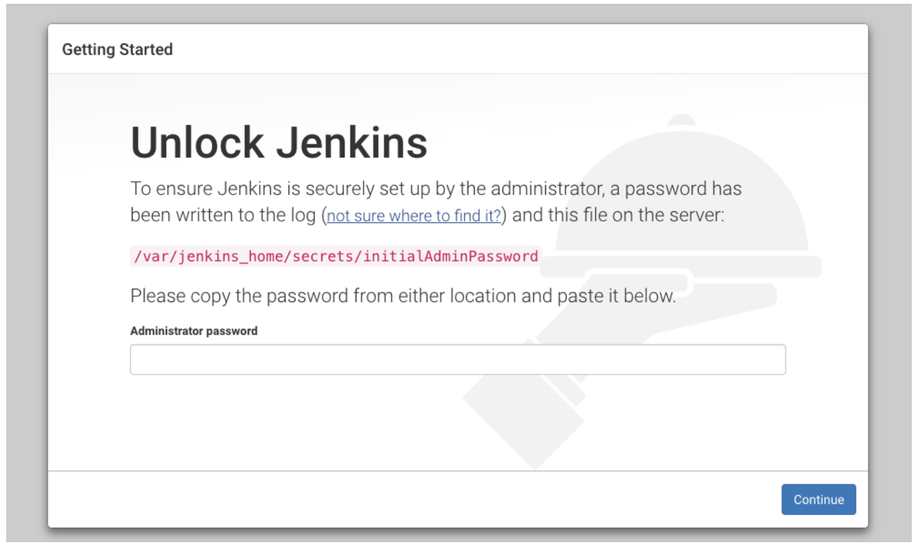
```
---
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: jenkins-ingress
  namespace: devoxx
  labels:
    guilde: ci
  annotations:
    kubernetes.io/ingress.class: 'traefik'
    traefik.frontend.passHostHeader: "false"
    traefik.frontend.rule.type: PathPrefix
spec:
  rules:
  - host:
    http:
      paths:
      - path: /jenkins
        backend:
          serviceName: jenkins-service
          servicePort: traefik-http
```

Apply The Configuration

```
kubectl apply -f ./jenkins/svc-ingress.yml
```

Reality Check

https://lab01.ddu-workshops-1.com/jenkins



It’s good: we still can setup Jenkins!

Lab 2

- Traefik
- Web Server
- CI Server
- **SCM: A Gitea Git Server**
- Web CLI

Goal

We want access to the Git server hosted in Docker through Traefik in Kubernetes.

Challenge 1/2

- **Problem:**
  - Gitea only serves requests under `/`
  - Traefik in Docker already removes the prefix `/gitserver`

```
http://lab01.ddu-workshops-1.com/gitserver/index.html
  -> Traefik Kubernetes
    -> Traefik Docker
      -> http://<Gitea private IP>:3000/index.html
```

Use A PathPrefix Rule

Solution: Do not remove the prefix (Thanks Captain Obvious!).

```yaml
---
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: gitea-ingress
  namespace: devoxx
  labels:
    guilde: git
  annotations:
    kubernetes.io/ingress.class: 'traefik'
    traefik.frontend.passHostHeader: "false"
    # Only Path Prefix to let the other Traefik Strip it
    traefik.frontend.rule.type: PathPrefix
spec:
  rules:
  - host:
    http:
      paths:
      - path: /gitserver
        backend:
          serviceName: gitea-server
          servicePort: traefik-http
```

Challenge 2/2

Problem: How to tell to Traefik to route requests to the SCM which is not deployed in Kubernetes?

Headless Service

Solution: Use (once again again) a service linked to an external address.

```yaml
---
apiVersion: v1
kind: Service
metadata:
  name: gitea-server
  namespace: devoxx
  labels:
    guilde: git
spec:
  ports:
  - port: 80
    name: traefik-http
  type: ExternalName
  externalName: 10.0.x.y
```

Reality Check

https://lab01.ddu-workshops-1.com/gitserver

It’s good: Gitea is still available!

Lab 2

- Traefik
- Web Server
- CI Server
- SCM: A Gitea Git Server
- **Web CLI**

Goal

We want to access to TTYD deployed in Docker through Traefik in Kubernetes.

Challenges

- **Problem 1:** How to tell to Traefik to route requests to TTYD which is not deployed in Kubernetes?

```
https://lab01.ddu-workshops-1.com/ttyd
  -> Traefik Kubernetes
    -> Traefik Docker
      -> https://<WebCLI Private IP>/
```

- **Problem 2:** How to detect the HTTPS requests to catch ?

Solution 1

- Use a Headless Service:

```yaml
---
apiVersion: v1
kind: Service
metadata:
  name: ttyd-service
  namespace: devoxx
  labels:
    guilde: console
spec:
  ports:
  - port: 80
    name: traefik-http
  type: ExternalName
  externalName: 10.0.x.y
```

Solution 2

- Ingress Rule with `PathPrefix:/ttyd`:

```
---
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: ttyd-ingress
  namespace: devoxx
  annotations:
    kubernetes.io/ingress.class: 'traefik'
    traefik.frontend.passHostHeader: "false"
    traefik.frontend.rule.type: PathPrefix
spec:
  rules:
  - host:
    http:
      paths:
      - path: /ttyd
        backend:
          serviceName: ttyd-service
          servicePort: traefik-http
```

Reality Check

https://lab01.ddu-workshops-1.com/ttyd

It’s good: we can continue to develop in a web browser!

The Castle

The Castle

We want to terminate the migration of our services to the Kubernetes cluster.

Infrastructure Setup

- A K3S cluster on a VM reachable from a public IP
  `35.178.178.237`
- `kubectl` and `helm` installed on the client machines

Lab 3

- CI Server
- SCM: A Gitea Git Server
- Web CLI
- Web Server

Goal

We want to host the CI in Kubernetes and access it through Traefik

Challenge 1/3

Problem: How to host the CI in Kubernetes?

Deployment Object

Solution: Deploy it as a `Deployment` object.

```yaml
---
kind: Deployment
apiVersion: extensions/v1beta1
metadata:
  name: jenkins-full-deployment
  namespace: devoxx
spec:
  replicas: 1
  template:
    metadata:
      labels:
        guilde: ci
        faction: jenkins
    spec:
      containers:
        - name: jenkins-full-container
          image: jenkins/jenkins:2.150.3-alpine
          imagePullPolicy: IfNotPresent
          env:
          - name: JENKINS_OPTS
            value: "--prefix=/jenkins"
```

Challenge 2/2

Problem: How to access to the CI?

```
https://lab01.ddu-workshops-1.com/jenkins
  -> Traefik
    -> https://<Jenkins Private IP>/jenkins
```

Service

```yaml
---
apiVersion: v1
kind: Service
metadata:
  name: jenkins-full-service
  namespace: devoxx
  labels:
    guilde: ci
spec:
  type: ClusterIP
  ports:
    - port: 8080
      name: jenkins-http
    - port: 50000
      name: jenkins-agent
  selector:
    guilde: ci
    faction: jenkins
```

Ingress Rule

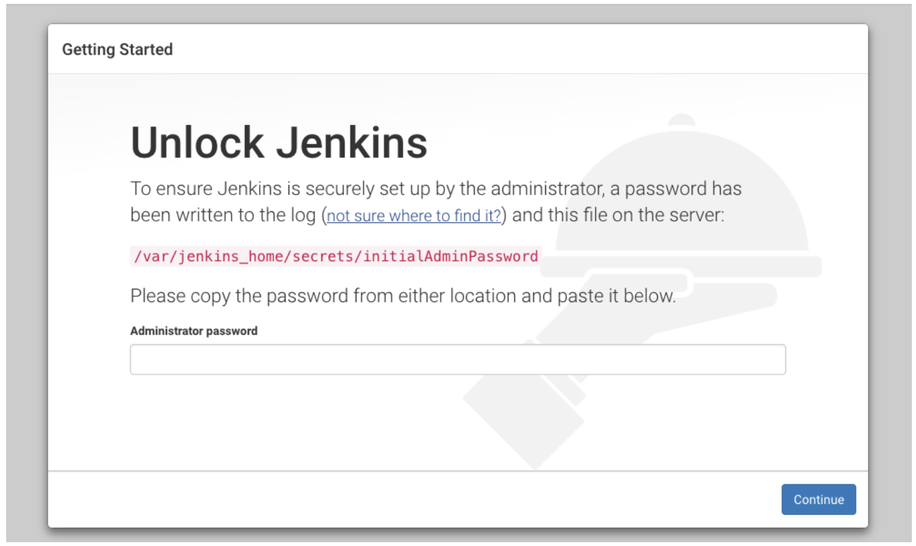
```yaml
---
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: jenkins-full-ingress
  namespace: devoxx
  labels:
    guilde: ci
  annotations:
    kubernetes.io/ingress.class: 'traefik'
    traefik.frontend.rule.type: PathPrefix
spec:
  rules:
  - host:
    http:
      paths:
      - path: /jenkins
        backend:
          serviceName: jenkins-full-service
          servicePort: jenkins-http
```

Apply The Configuration

```
# Add the new objects
kubectl apply -f ./03-k8s-apps/jenkins/deployment-svc-ingress.yml
# Delete the headless service and its ingress rule (blue-green)
kubectl delete -f ./02-k8s-traefik/jenkins/svc-ingress.yml
```

Reality Check

https://lab01.ddu-workshops-1.com/jenkins



It’s good: we can setup Jenkins in Kubernetes!

Lab 3

- CI Server
- **SCM: A Gitea Git Server**
- Web CLI
- Web Server

Goal

We want to host the Git server in Kubernetes and access it through Traefik.

Challenges

- **Problem 1:**
  - How to host the Git server in Kubernetes?
- **Problem 2:**
  - Gitea only serves requests under `/`
  - Traefik in Docker already removes the prefix `/gitserver`

```
http://lab01.ddu-workshops-1.com/gitserver/index.html
  -> Traefik
      -> http://<Gitea private IP>:3000/index.html
```

Deployment Object

```yaml
---
kind: Deployment
apiVersion: extensions/v1beta1
metadata:
  name: gitea-full-deployment
  namespace: devoxx
spec:
  replicas: 1
  template:
    metadata:
      labels:
        guilde: git
        faction: server
    spec:
      containers:
        - name: gitea-full-container
          image: gitea/gitea:latest
          imagePullPolicy: IfNotPresent
          env:
          - name: ROOT_URL
            value: "/gitserver"
```

Service

```yaml
---
apiVersion: v1
kind: Service
metadata:
  name: gitea-full-server
  namespace: devoxx
  labels:
    guilde: git
spec:
  type: ClusterIP
  ports:
    - port: 3000
      name: gitea-http
    - port: 22
      name: gitea-ssh
  selector:
    guilde: git
    faction: server
```

Ingress Rule

```yaml
---
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: gitea-full-ingress
  namespace: devoxx
  labels:
    guilde: git
  annotations:
    kubernetes.io/ingress.class: 'traefik'
    traefik.frontend.rule.type: PathPrefixStrip
spec:
  rules:
  - host:
    http:
      paths:
      - path: /gitserver
        backend:
          serviceName: gitea-full-server
          servicePort: gitea-http
```

Apply The Configuration

```
# Add the new objects
kubectl apply -f ./03-k8s-apps/gitea/deployment-svc-ingress.yml
# Delete the headless service and its ingress rule (blue-green)
kubectl delete -f ./02-k8s-traefik/gitea/svc-ingress.yml
```

Reality Check

https://lab01.ddu-workshops-1.com/gitserver

Gitea: Git with a cup of tea

A painless, self-hosted Git service

It’s good: we can setup Gitea in Kubernetes!

Lab 3

- CI Server
- SCM: A Gitea Git Server
- **Web CLI**
- Web Server

Goal

We want to host TTYD in Kubernetes and access it through Traefik.

Challenges

- **Problem 1:** How to host the TTYD in Kubernetes?
- **Problem 2:** How to access to TTYD?

```
http://lab01.ddu-workshops-1.com/ttyd/
  -> Traefik
      -> http://<WebCLI private IP>/
```

Deployment Object

```yaml
---
kind: Deployment
apiVersion: extensions/v1beta1
metadata:
  name: ttyd-full-deployment
  namespace: devoxx
spec:
  replicas: 1
  template:
    metadata:
      labels:
        guilde: console
        faction: tty
    spec:
      containers:
        - name: ttyd-full-container
          image: tsl0922/ttyd:latest
          imagePullPolicy: IfNotPresent
```

Service

```yaml
---
apiVersion: v1
kind: Service
metadata:
  name: ttyd-full-service
  namespace: devoxx
  labels:
    guilde: console
spec:
  type: ClusterIP
  ports:
    - port: 7681
      name: ttyd-ws
  selector:
    guilde: console
    faction: tty
```

Ingress Rule

```
---
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: ttyd-full-ingress
  namespace: devoxx
  annotations:
    kubernetes.io/ingress.class: 'traefik'
    traefik.frontend.rule.type: PathPrefixStrip
spec:
  rules:
  - host:
    http:
      paths:
      - path: /ttyd
        backend:
          serviceName: ttyd-full-service
```

Apply The Configuration

```
# Add the new objects
kubectl apply -f ./03-k8s-apps/ttyd/deployment-svc-ingress.yml
# Delete the headless service and its ingress rule (blue-green)
kubectl delete -f ./02-k8s-traefik/ttyd/svc-ingress.yml
```

Reality Check

https://lab01.ddu-workshops-1.com/ttyd

It’s good: we have our own "Dev Box" in a web browser hosted in Kubernetes!

Lab 3

- CI Server
- SCM: A Gitea Git Server
- Web CLI
- **Web Server**

Goal

- We want to deploy a new version of the webserver:
  - hosted in Kubernetes and accessed through Traefik
  - continue to access to the old version for the main part of the traffic

Challenge 1/3

Problem: How to host the new version of the webserver in Kubernetes?

Deployment Object

```yaml
---
kind: Deployment
apiVersion: extensions/v1beta1
metadata:
  name: web-full-deployment
  namespace: devoxx
spec:
  replicas: 1
  template:
    metadata:
      labels:
        guilde: web
        faction: server
    spec:
      containers:
        - name: web-full-container
          image: nmengin/web:devoxx-v2
          imagePullPolicy: IfNotPresent
```

Challenge 2/2

Problem: How to access to both the old and new version at the same time with a traffic repartition?

```
https://lab01.ddu-workshops-1.com/
  -> Traefik Kubernetes
    -> 80% of traffic:
      -> Traefik Docker
      -> https://<Webserver Docker Private IP>/
    -> 20% of traffic:
      -> https://<Webserver kubernetes Private IP>/
```

Follow The Yellow Bird!

Solution: Use the Traffic splitting feature in Traefik.

```
traefik.ingress.kubernetes.io/service-weights: |
  web-service: 80%
  web-full-service: 20%
```

Service

```yaml
---
apiVersion: v1
kind: Service
metadata:
  name: web-full-service
  namespace: devoxx
  labels:
    guilde: web
spec:
  type: ClusterIP
  ports:
    - port: 80
      name: web-http
  selector:
    labels:
      guilde: web
      faction: server
```

Ingress Rule

```yaml
---
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: web-full-ingress
  namespace: devoxx
  labels:
    guilde: web
  annotations:
    kubernetes.io/ingress.class: 'traefik'
    traefik.frontend.passHostHeader: "false"
    traefik.frontend.rule.type: PathPrefix
    traefik.ingress.kubernetes.io/service-weights: |
      web-service: 80%
      web-full-service: 20%
spec:
  rules:
  - host:
    http:
      paths:
      - path: /
        backend:
          serviceName: web-full-service
      - path: /
        backend:
          serviceName: web-service
```

Apply The Configuration

```
# Add the new objects
kubectl apply -f ./03-k8s-apps/jenkins/deployment-svc-ingress.yml
# Delete only the old ingress rule: the service will be reachable from the new one
kubectl --namespace delete ingress web-ingress
```

Switch All Traffic To The New Version

```
# Edit the ingress
kubectl --namespace devoxx edit ingress web-full-ingress
####
# Delete the following lines
    traefik.frontend.passHostHeader: "false"
    traefik.frontend.rule.type: PathPrefix
    traefik.ingress.kubernetes.io/service-weights: |
      web-service: 80%
      web-full-service: 20%
...
      - path: /
        backend:
          serviceName: web-service
# Exit and save
###
```

Reality Check

https://lab01.ddu-workshops-1.com/

It’s good: we have a web page in the 2 versions!

We Did Not Talk About...

Traefik V2

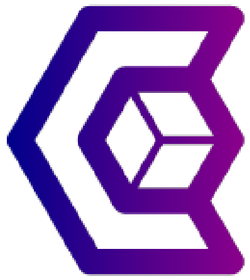
- Used during all the workshop
- Alpha version for a month
- Main features:
  - TCP
  - CRD
  - ...
- Documentation

High Availability

- TraefikEE
- Split responsabilities
  - Control Plane
  - Data Plane
- Let’s Encrypt Distributed Support
- 1.0.0 GA since… Today!
- Documentation


We Have
Stickers!
træfik

We Are Hiring!



```
docker run -it containous/jobs
```

Thank You!

@nicomengin nmengin

@DamienDuportal dduportal

- Slides (HTML): https://containous.github.io/slides/devoxx-fr-2019
- Slides (PDF): https://containous.github.io/slides/devoxx-fr-2019/slides.pdf
- Source on : https://github.com/containous/slides/tree/devoxx-fr-2019