



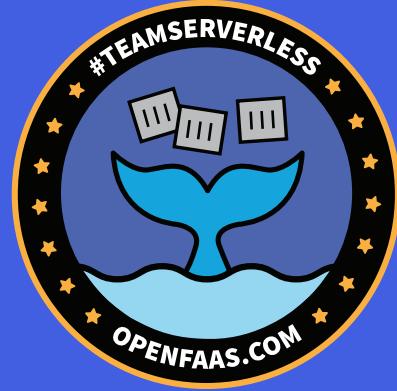
OPENFAAS

OpenFaaS Cloud with Linkerd (for a Secure Multi-user Serverless Platform)

Alex Ellis, Founder @ OpenFaaS Ltd, CNCF Ambassador
Charles Pretzer, Field Eng. @ Buoyant

Agenda ⚡

- OpenFaaS / Linkerd @ 10,000ft
- OpenFaaS Cloud (OFC)
 - Overview & demo
 - Kubernetes multi-tenancy
 - Infrastructure vs. user-level security
- Future work



@openfaas @linkerd



OpenFaaS - Secure, Simple, Serverless



- Founded 2016
- Values
 - Developers-first
 - Operator-friendly
 - Community-centric
- Hosted by OpenFaaS Ltd

19.6k stars

250 contributors

2k Slack



Serverless 1.0 (Cloud Functions/FaaS)

Workload	 Node.js Function	 Node.js Function	 Node.js Microservice
Packaging	 Zip File	 Zip File	?
Platform	 AWS Lambda	 Google Cloud Functions	?
Infrastructure	 AWS	 GCP	 Enterprise

OpenFaaS (Serverless 2.0)



Any code

Build both microservices & functions in any language.
Legacy code and binaries.



Anywhere

Avoid lock-in through the use of Docker.
Run on any public or private cloud.



Any scale

Auto-scale for demand or to zero when idle.



Add

```
JS index.js > ...
1 // Copyright (c) Alex Ellis 2019
2 // Licensed under the MIT license. See LICENSE file in the project root for full license information.
3
4 "use strict";
5
6 const express = require('express');
7 const app = express();
```

```
routes > JS index.js > ...
1 √ module.exports = {
2   √   main: (req, res) => {
3     res.type('html')
4     res.send(`<html>
5       <h3>Hi, there!
6       <p>If you like this, consider supporting my GitHub Sponsor</a> today! 🎉</p>
7       <p>Alex</p>
8     </html>
9   );
10 },
11 √   health: (req, res) => {
12   |   res.send("OK");
13 }
14 }
```

```
26
27
28 √ app.listen(port, () => {
29   |   console.log(`Listening on port ${port}`);
30 });
31
```

```
yaml > ! dep.yaml
1 apiVersion: apps/v1
2 kind: Deployment
```

Dockerfile

```
1 FROM node:10.12.0-alpine as ship
2
3 # Copyright (c) Alex Ellis 2019. All rights reserved.
4 # Licensed under the MIT license. See LICENSE file in the project root for full license information.
5
6 RUN addgroup -S app && adduser -S -g app app
7
8 RUN apk --no-cache add ca-certificates
9
10 WORKDIR /root/
11
12 # Turn down the verbosity to default level.
13 ENV NPM_CONFIG_LOGLEVEL warn
14
15 RUN mkdir -p /home/app
16
17 # Wrapper/boot-strapper
18 WORKDIR /home/app
19 COPY package.json ./
20
21 # This ordering means the npm installation is cached for the outer function handler.
22 RUN npm i
23
24 # Copy outer function handler
25 COPY index.js ./index.js
26 COPY routes routes
27
28 # Set correct permissions to use non root user
29 WORKDIR /home/app
30
31 # chmod for tmp is for a buildkit issue (@alexellis)
32 √ RUN chown app:app -R /home/app \
33   |   && chmod 777 /tmp
34
35 USER app
36
37 RUN touch /tmp/.lock
38
39 CMD ["node", "index.js"]
```



OpenFaaS: template system

stack.yml

```
functions:  
  hello-fn:  
    lang: node10-express  
    handler: ./hello-fn  
    image: hello-fn:latest
```

handler.js

```
module.exports = (event, context) => {  
  context.status(200).succeed("Hello world");  
}
```

- Memory / CPU limits
- Labels / Annotations

- Environment variables
- Secrets



OpenFaaS: Dockerfile is fair game

```
FROM ruby:2.4-alpine3.6
WORKDIR /home/app
COPY . .
RUN bundle install
RUN addgroup -S app \
  && adduser app -S -G app
RUN chown app:app -R /home/app
WORKDIR /home/app

USER app
CMD [ "ruby", "main.rb" ]
```



OpenFaaS Users



Dim Solution.



InfoTech
Partners

intility

INTRAFFIC
mastering mobility

KW COMMERCE



NEXYIAN
HOSTING
ARCHITECTURE

packet



TRANSMUTE

traversals



W
UNIVERSITY of
WASHINGTON

VIRALITY

VISION Banco



*Linkerd optional



Linkerd



- Only Service Mesh in CNCF
- <60s install - Go & Rust
- Actionable metrics
- Loved by engineers
- Deep runtime diagnostics

CNCF Incubating



Why Linkerd?

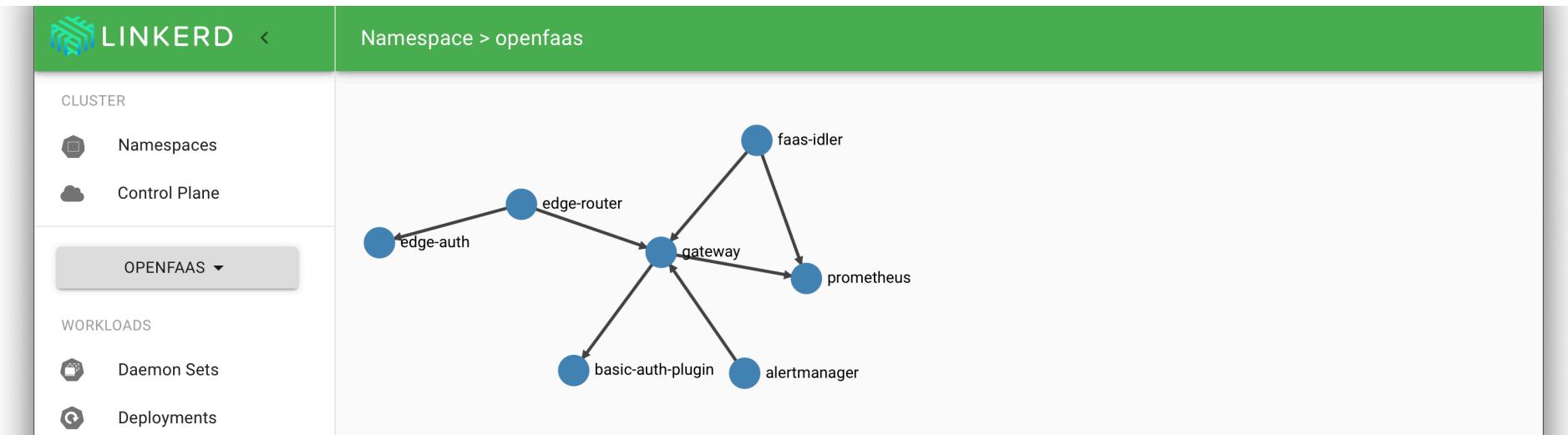
- Lightweight, easy-to-use
- Traffic-splitting
- Mutual TLS
- Dashboard



+



Linkerd's Dashboard



OpenFaaS vs. OpenFaaS Cloud



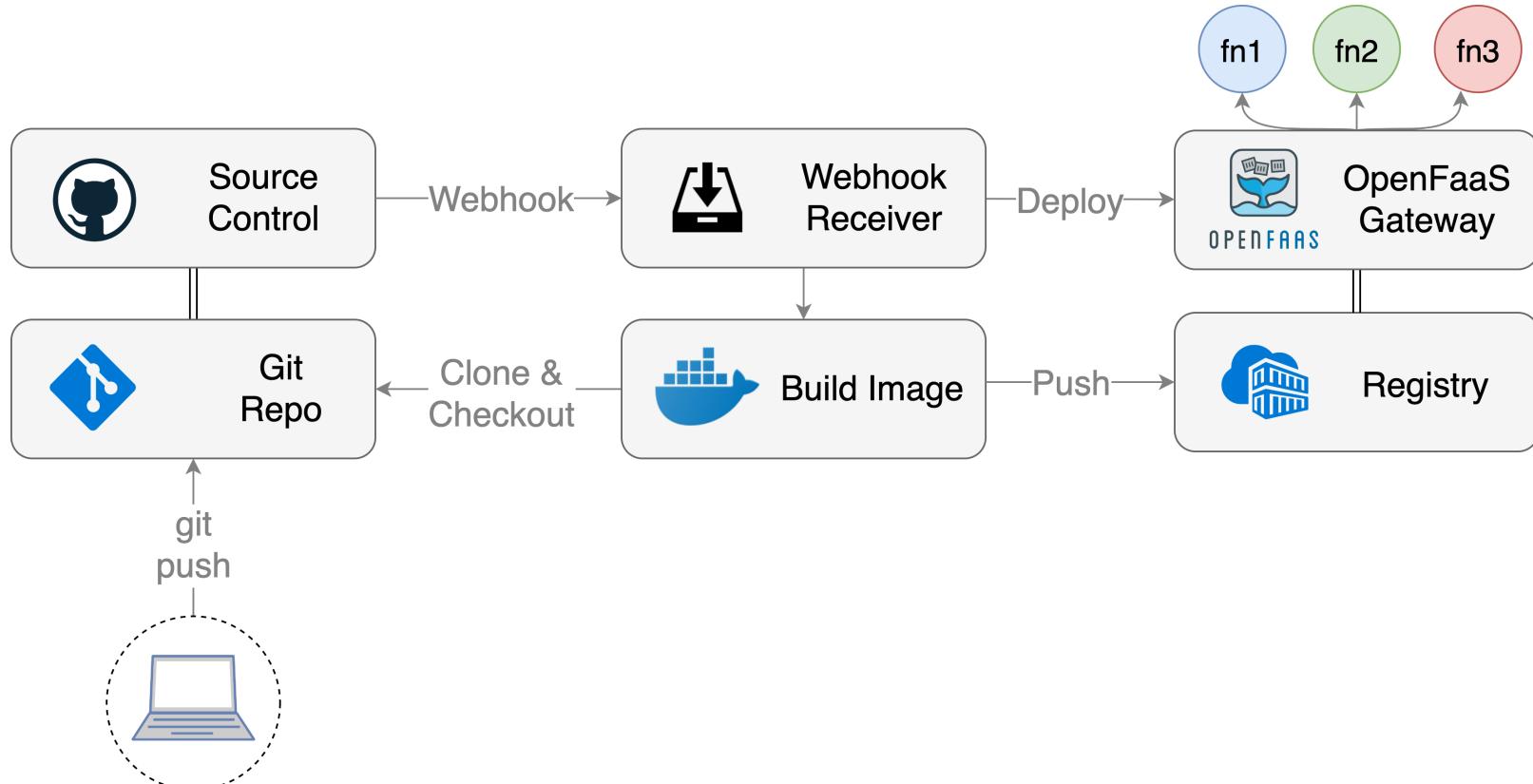
vs.



Multi-user PaaS for Kubernetes managed by git



OpenFaaS Cloud - conceptual overview



OFC Features

- Automated CI/CD
- GitHub/GitLab
- Runtime secrets
- Dashboard
- OAuth
- Logs



Secure, free & OSS

Demo - Community Cluster

alexellis / **ich-bin-ein-berliner** Unwatch ▾ 1

Code Issues 0 Pull requests 0 Actions Projects 0 Wiki Security Insights

Branch: master ▾

Commits on Nov 8, 2019

Update stack.yml
alexellis committed 2 days ago ✓

Commits on Nov 7, 2019

Update axios ...
alexellis committed 3 days ago ✓

Update ...
alexellis committed 3 days ago ✓

All checks have passed
3 successful checks

✓  async-await — Build async-await	Details
✓  katzenhunde — Build katzenhunde	Details
✓  stack-deploy — Deploy to OpenFaaS	Details

Verified



Demo - Community Cluster

 OpenFaaS Cloud Home GitHub [Logout](#)

alexellis / goto

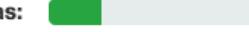
Function Overview

Deployment [Build Logs](#)

Name: goto 

Image: alexellis-goto-
goto:latest-master-
d1a3466

Endpoint: <https://alexellis.cloudnative.space/goto>

Replicas:  1/4

Git [Get Badge](#)

Repository: alexellis/goto

SHA: d1a3466fac3e1c93f1
dba92f397b2837bc3
07360

Deploy Time: 11 minutes ago

Invocations

Period: [1hr](#) [24hr](#)

 2 invocations

 1	 1
Success	Error

Powered by OpenFaaS

Case-study: DX, Norway



Cinema & venue management platform

A modern, all-in-one platform to manage ticketing, concessions, reporting and marketing for your cinema or venue.



Case-study: Good First Issue Bot



- ABOUT
- TEAM
- BLOG
- DOCS
- VIDEO DEMO
- SUPPORT

 19.4K VIEW ON GITHUB



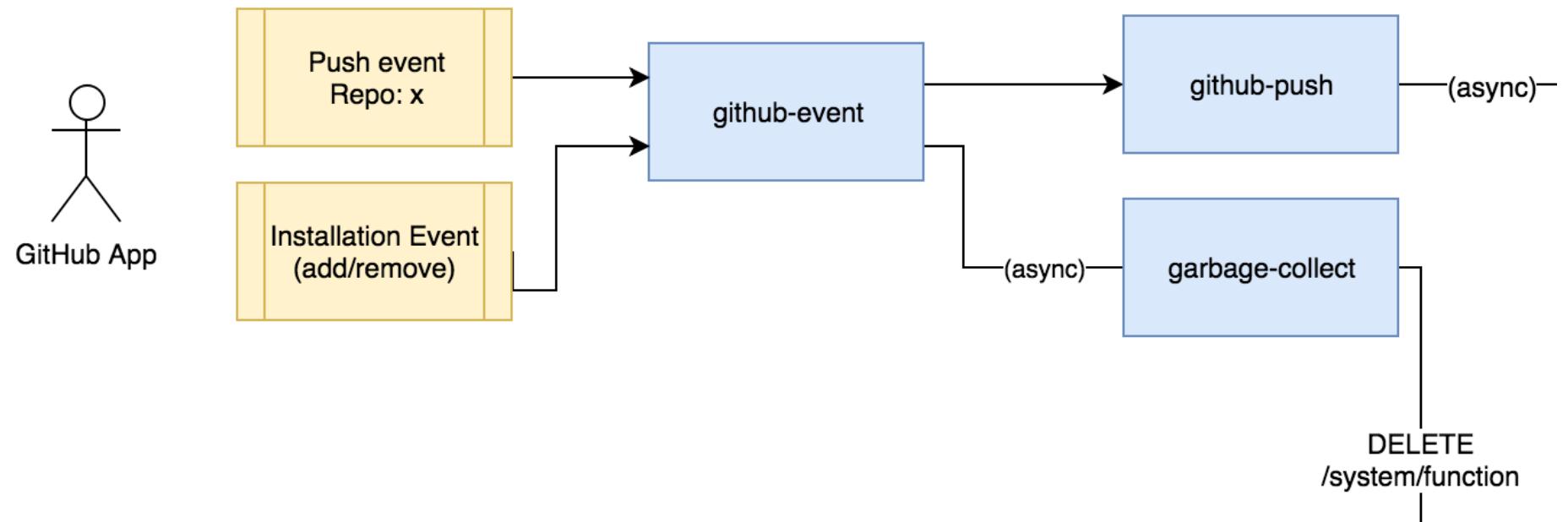
How I built Good First Issue bot with OpenFaaS Cloud

In this post Rajat will share what triggered him to write goodfirstissue bot, where was it deployed and how it was an easy decision to move it to OpenFaaS cloud.

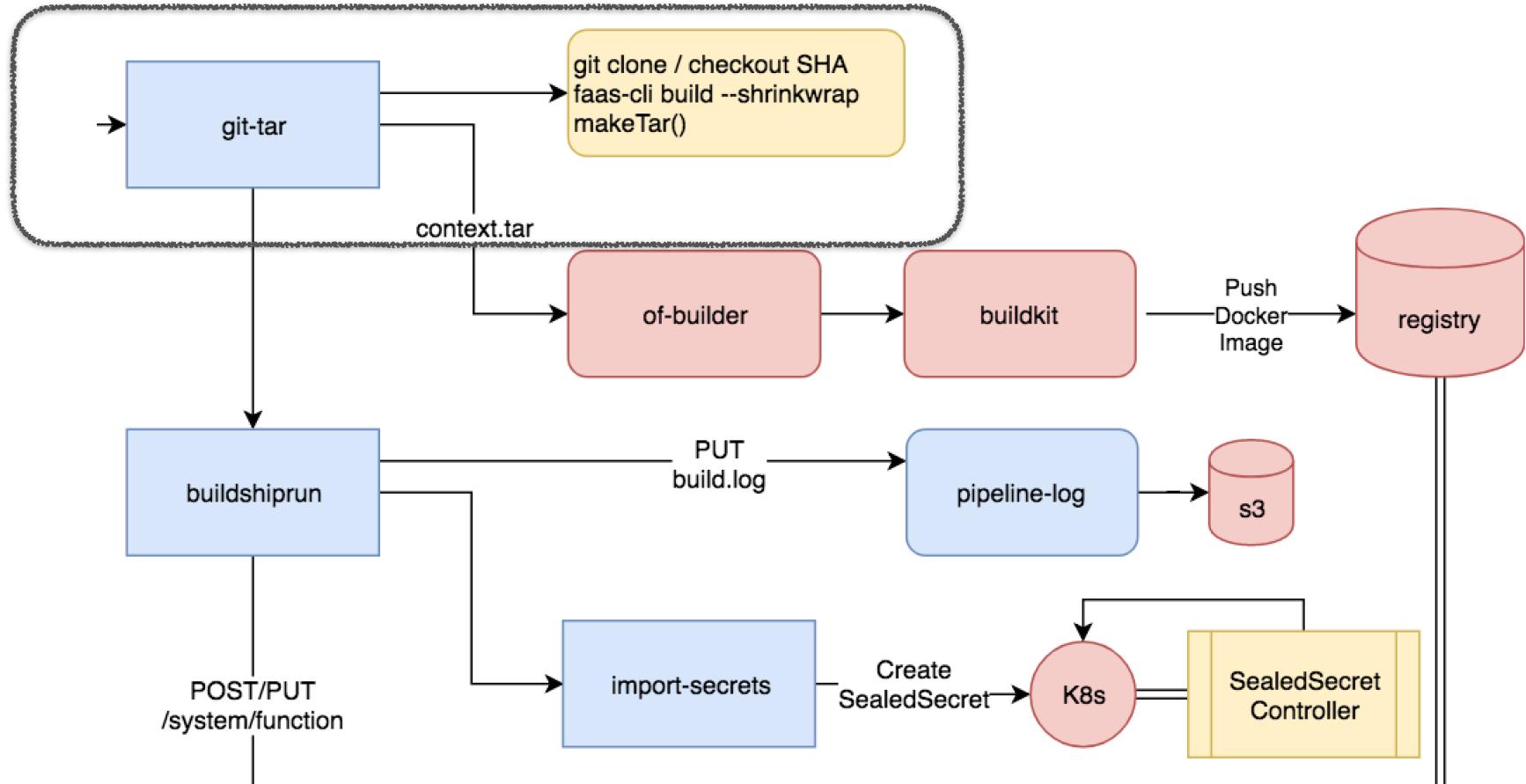
Used by:

- Google
- Docker
- JetStack
- CDF
- Microsoft
- OpenFaaS

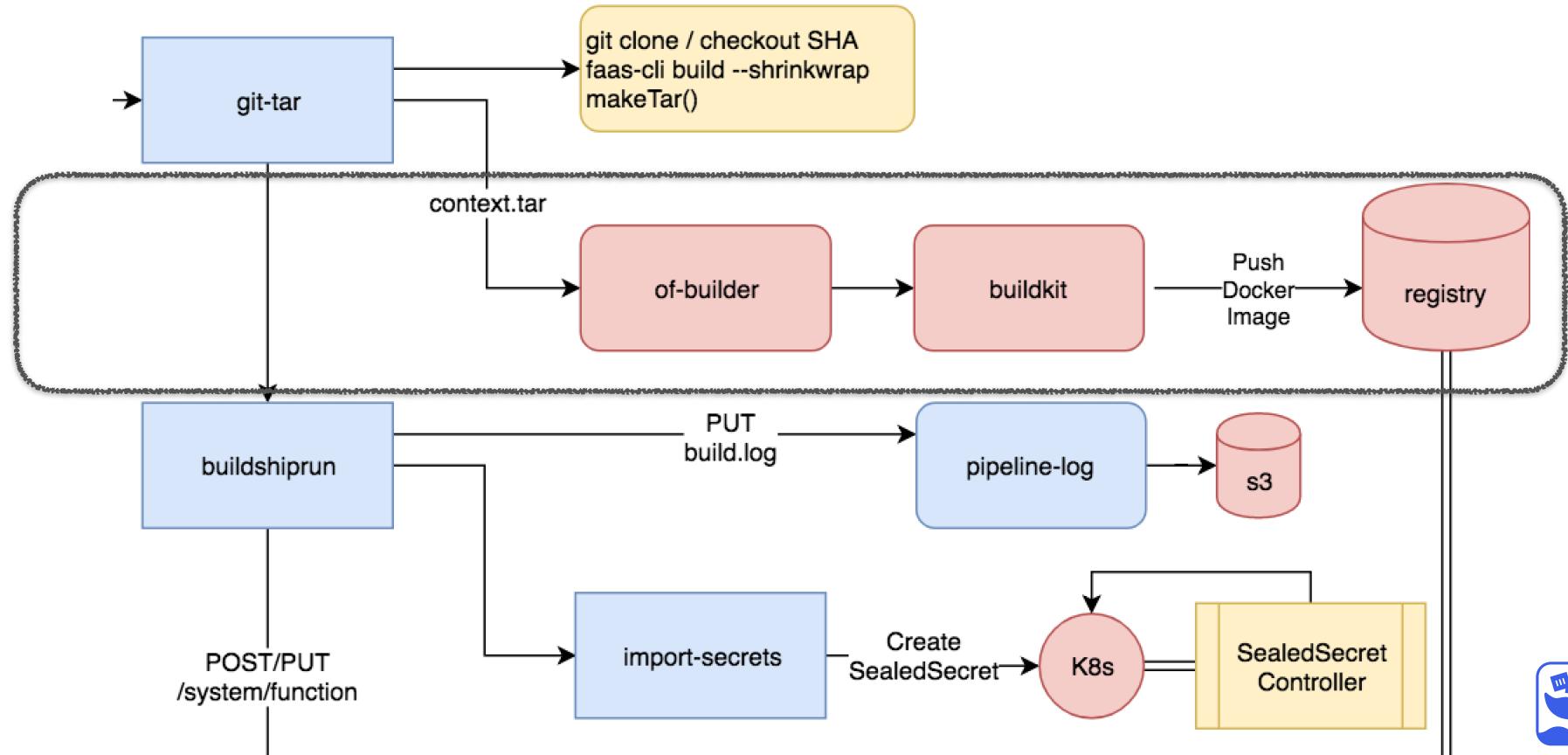
OpenFaaS Cloud - Webhooks



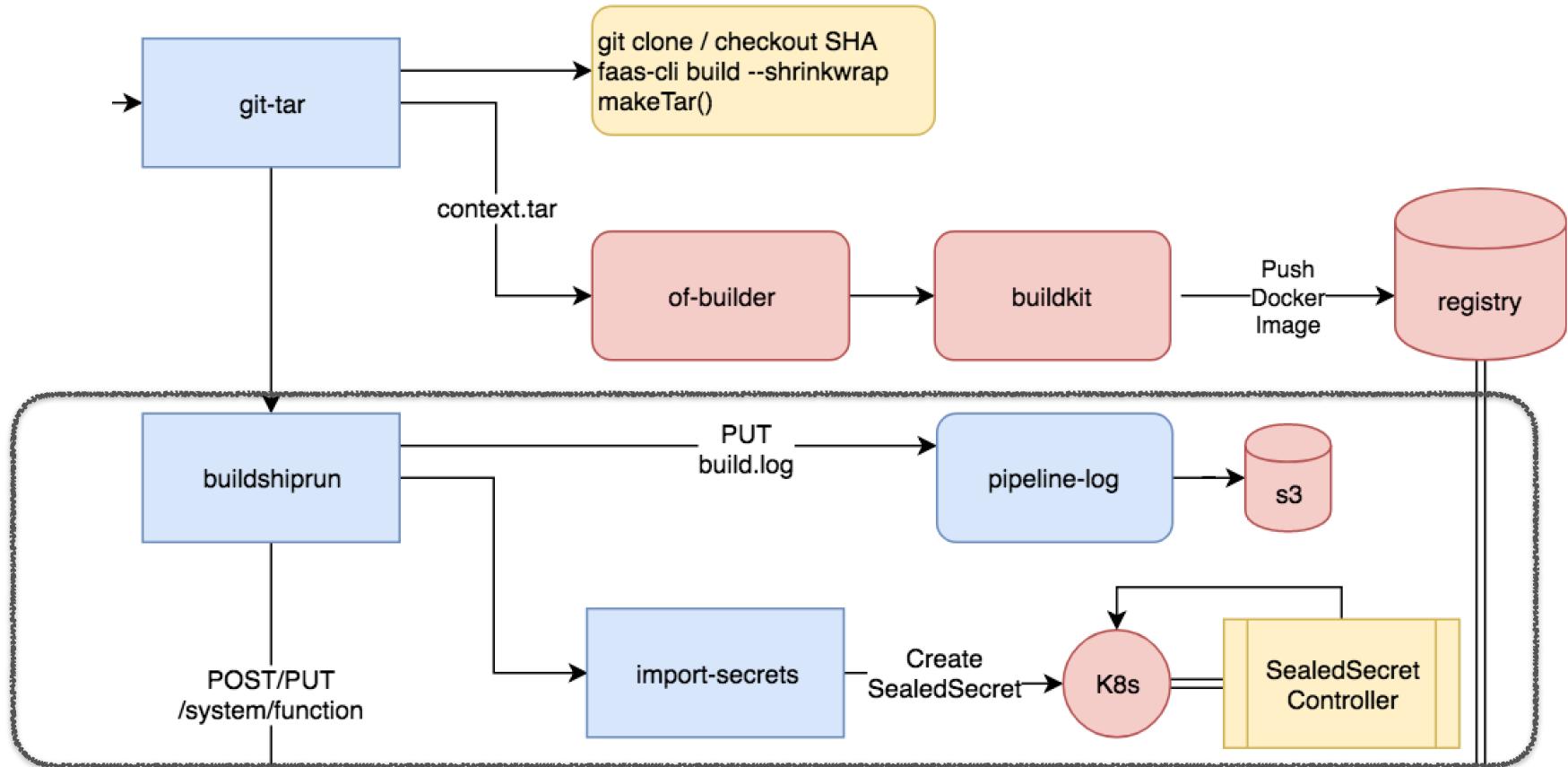
OpenFaaS Cloud - CI/CD pipeline



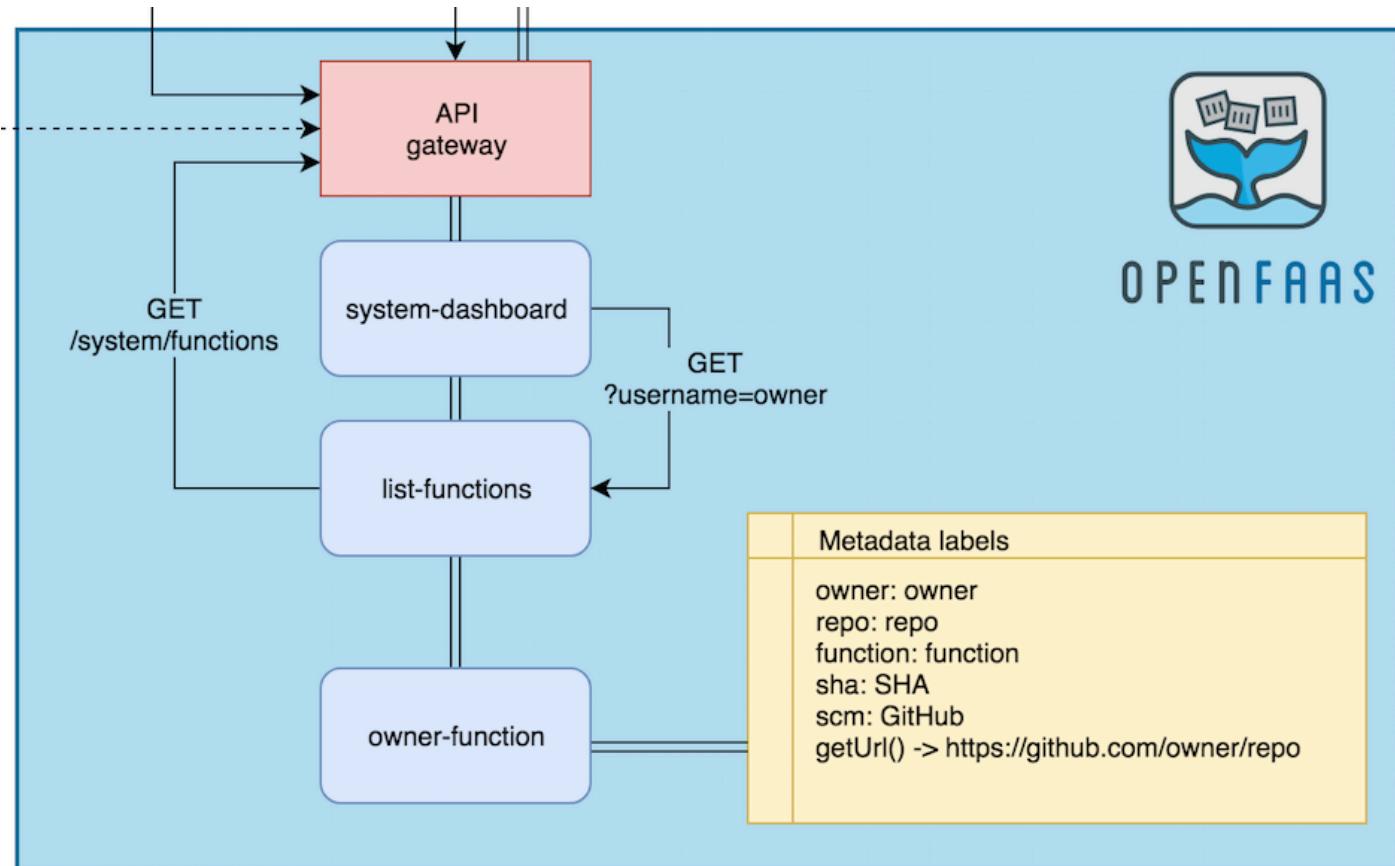
OpenFaaS Cloud - CI/CD pipeline



OpenFaaS Cloud - CI/CD pipeline



OpenFaaS Cloud - Dashboard



Confidential configuration - SealedSecrets

```
access_key=1234  
secret_key=abcd
```

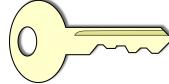
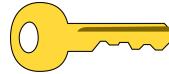
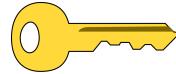
Seal()

```
secrets.yml  
access_key=Ydx==  
secret_key=E2Dvv==
```

Unseal()

```
access_key=1234
```

```
secret_key=abcd
```



Public/private key



Kubernetes isolation

- CPU/memory limits
- Namespaces
 - Quotas*
- Network Policy
- Pod Security Policy*
- Open Policy Agent*
- CRI

Security in OFC

- Read-only FS
- Non-root
- OAuth
- HMAC for webhooks
- Public TLS
- SealedSecrets
- Rate-limiting
- mTLS (Linkerd)

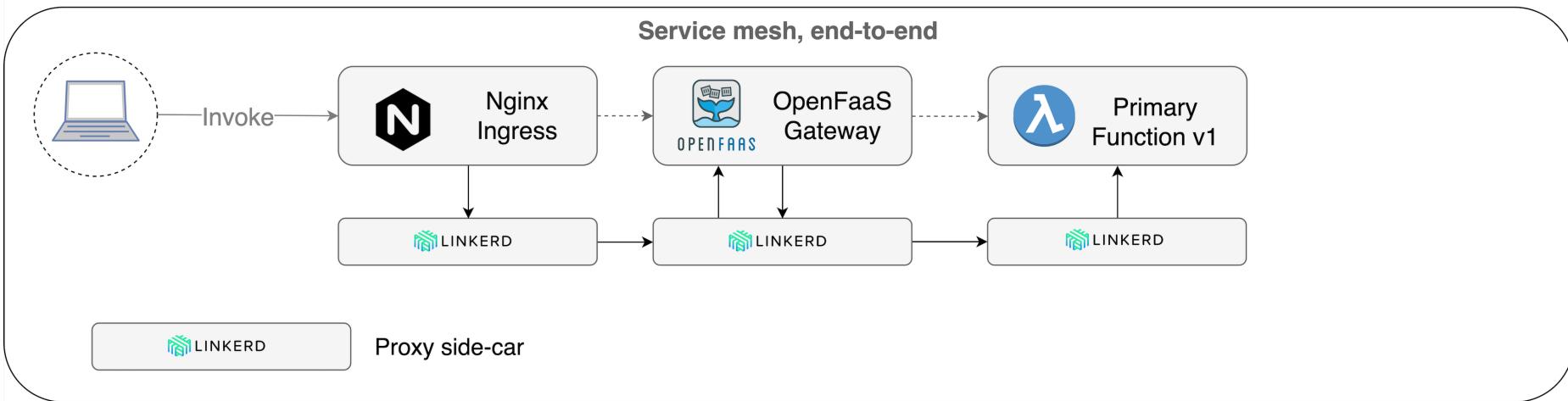


Linkerd debugging via CLI

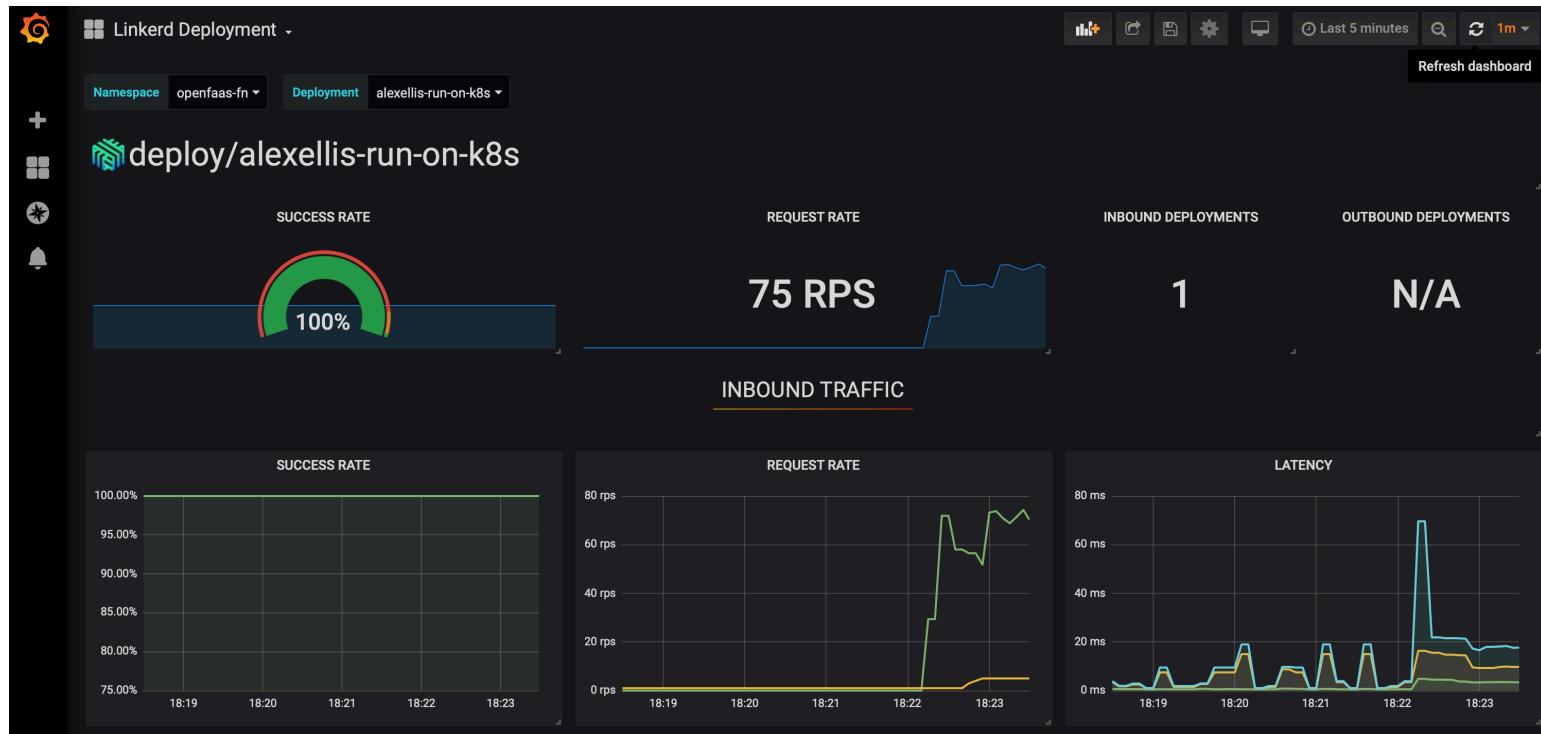
```
[kosmos:github.com alex$ ~/linkerd2/bin/linkerd edges deploy -A
  SRC          DST      SRC_NS    DST_NS    SECURED
nginx-ingress-nginx-ingress-controller edge-router default    openfaas   ✓
linkerd-controller                      linkerd-prometheus linkerd    linkerd   ✓
linkerd-grafana                         linkerd-prometheus linkerd    linkerd   ✓
audit-event                             gateway     openfaas-fn  openfaas   ✓
buildshiprun                           gateway     openfaas-fn  openfaas   ✓
buildshiprun                           of-builder  openfaas-fn  openfaas   ✓
garbage-collect                         gateway     openfaas-fn  openfaas   ✓
git-tar                                  gateway     openfaas-fn  openfaas   ✓
github-push                             gateway     openfaas-fn  openfaas   ✓
list-functions                          gateway     openfaas-fn  openfaas   ✓
pipeline-log                            cloud-minio  openfaas-fn  openfaas   ✓
system-dashboard                        gateway     openfaas-fn  openfaas   ✓
system-github-event                     gateway     openfaas-fn  openfaas   ✓
gateway                                 alexellis-run-on-k8s openfaas   openfaas-fn  ✓
gateway                                 list-functions  openfaas   openfaas-fn  ✓
gateway                                 system-dashboard  openfaas   openfaas-fn  ✓
alertmanager                           gateway     openfaas   openfaas   ✓
edge-router                            edge-auth   openfaas   openfaas   ✓
edge-router                            gateway     openfaas   openfaas   ✓
faas-idler                             gateway     openfaas   openfaas   ✓
faas-idler                             prometheus  openfaas   openfaas   Not Provided By Service Discovery
gateway                                basic-auth-plugin  openfaas   openfaas   ✓
gateway                                prometheus  openfaas   openfaas   Not Provided By Service Discovery
kosmos:github.com alex$ |
```



Encryption end-to-end

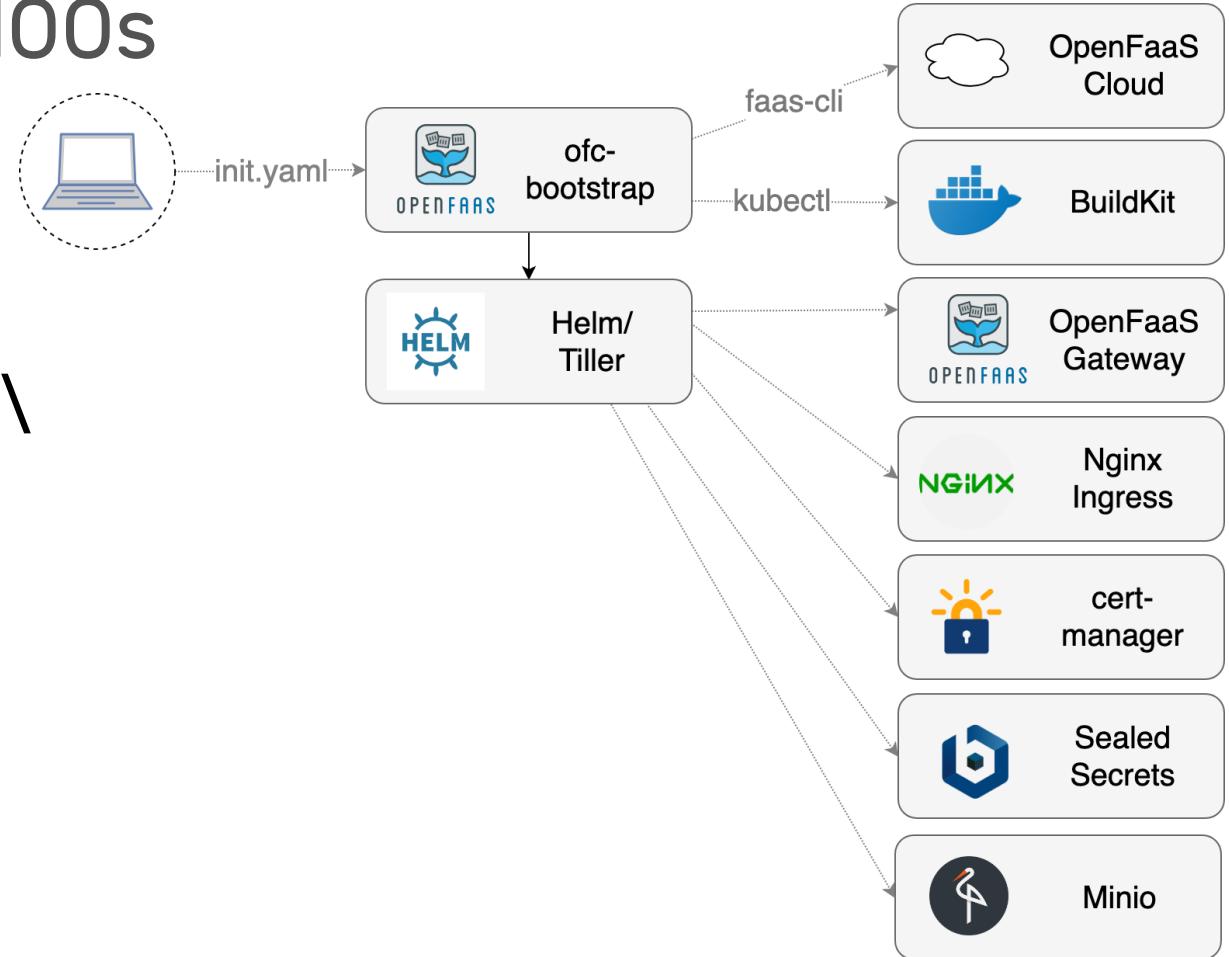


Linkerd - During auto-scaling



0 to OFC in < 100s

```
$ ofc-bootstrap \
-yaml=init.yaml
```



Future work

- Preview branches
- Build secrets
- Quotas
- Static analysis

With Linkerd

- mTLS for TCP
- Canaries w/ SMI
- Chargeback
- Retry budget



Summing up: OpenFaaS Cloud w/ Linkerd

Automated:

- Builds
- Security
- Management



Connect & Learn



- Get started
 - <https://github.com/openfaas/openfaas-cloud>
 - <https://github.com/openfaas-incubator/openfaas-linkerd2>

<https://slack.openfaas.io/>

<https://slack.linkerd.io/>

@openfaas





OPENFAAS

Thank You!

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