



OPENFAAS

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

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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()

```

```

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 ./
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"]

```

```

routes > JS index.js > ...
1 module.exports = {
2   main: (req, res) => {
3     res.type('html')
4     res.send(`<html>
5       <h3>Hi, there!</h3>
6       <p>If you're seeing this, it means you've successfully installed the Dockerfile.
7       <p>Alex</p>
8     </html>`);
9   },
10  },
11  health: (req, res) => {
12    res.send("OK");
13  }
14 }
15
16

```

```

26
27
28 app.listen(port, () => {
29   console.log(`Server is running on port ${port}`);
30 });
31

```

information.

my GitHub Sponsor today 🙌



OpenFaaS: template system

stack.yml

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

- Memory / CPU limits
- Labels / Annotations

handler.js

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

- 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



packet



W UNIVERSITY of WASHINGTON

VIRALITY



*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

LINKERD <

Namespace > openfaas

CLUSTER

- Namespaces
- Control Plane

OPENFAAS ▾

WORKLOADS

- Daemon Sets
- Deployments

edge-auth

edge-router

gateway

faas-idler

prometheus

basic-auth-plugin

alertmanager



OpenFaaS vs. OpenFaaS Cloud



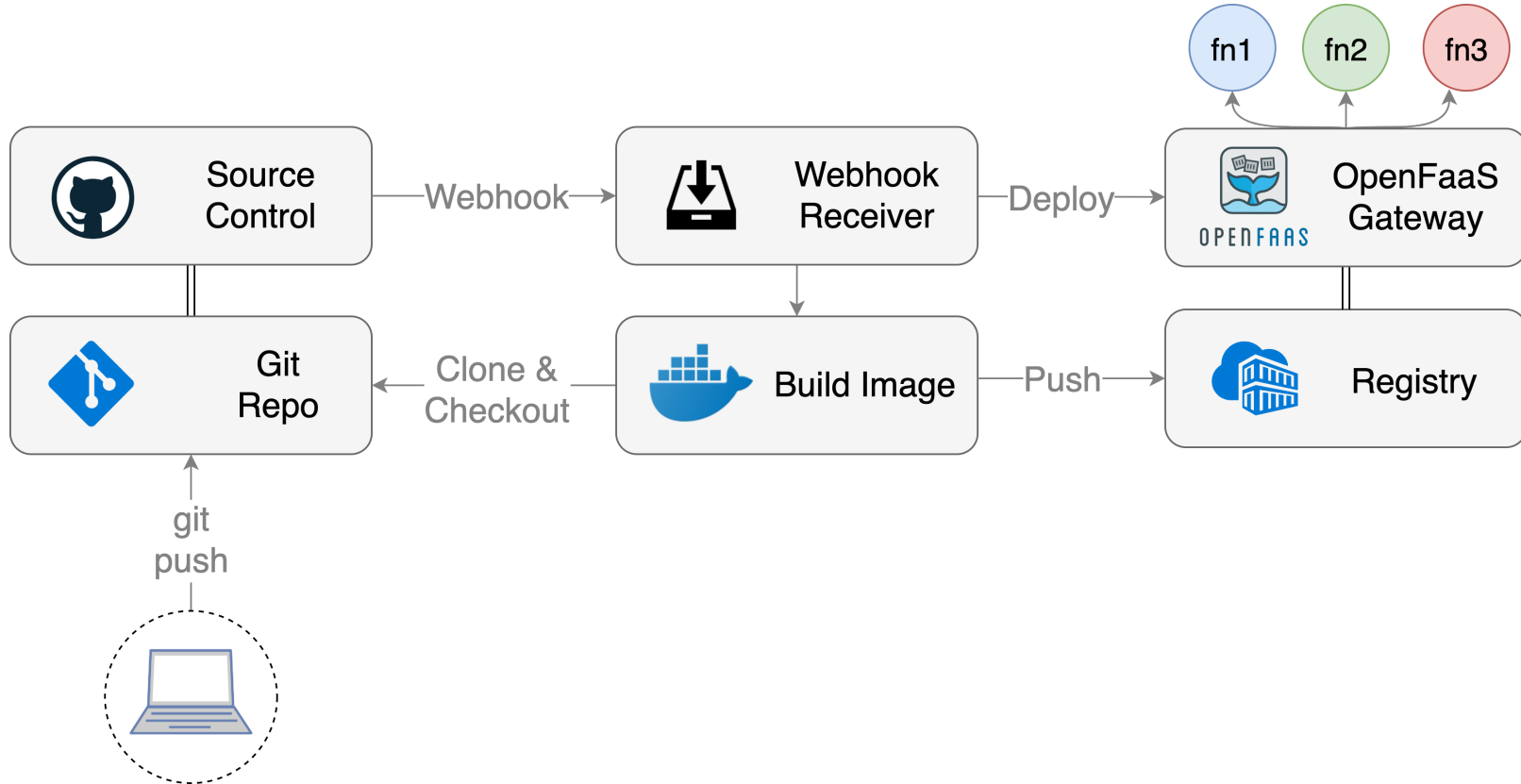
VS.



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

The screenshot shows the GitHub repository page for `alexellis / ich-bin-ein-berliner`. The repository is on the `master` branch. The commit history shows three commits by alexellis on Nov 8, 2019, and Nov 7, 2019. A CI status overlay is displayed over the commit history, indicating that all checks have passed.

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 Verified
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](#)



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

Success

1

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

OPENFAAS

ABOUT

TEAM

BLOG

DOCS

VIDEO DEMO

SUPPORT



19.4K VIEW ON GITHUB



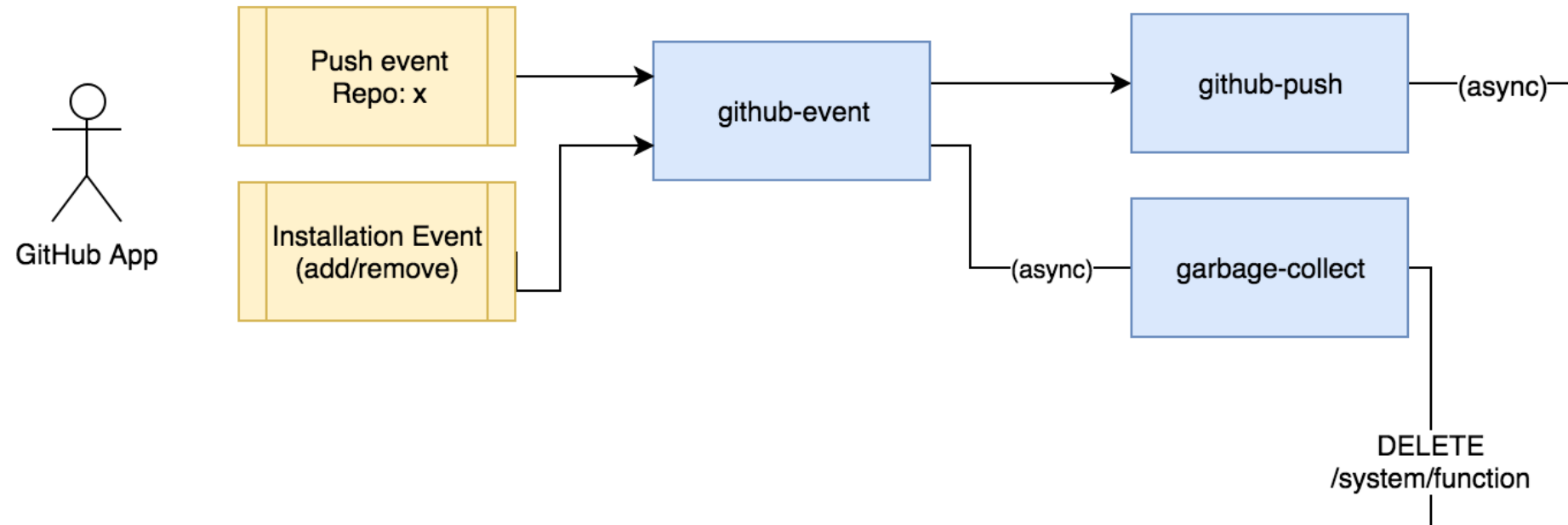
How I built Good First Issue bot with OpenFaaS Cloud

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.

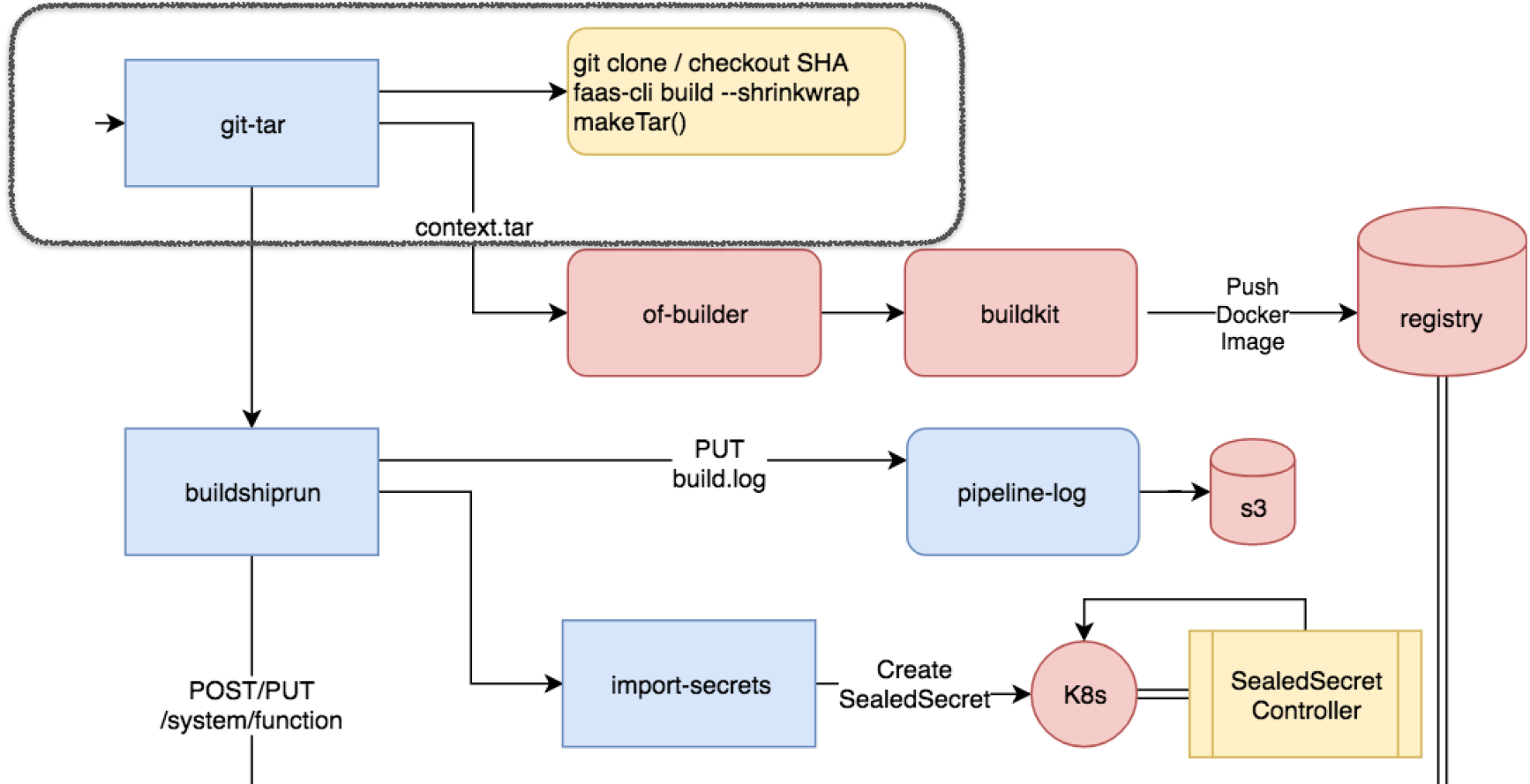
Used by:

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

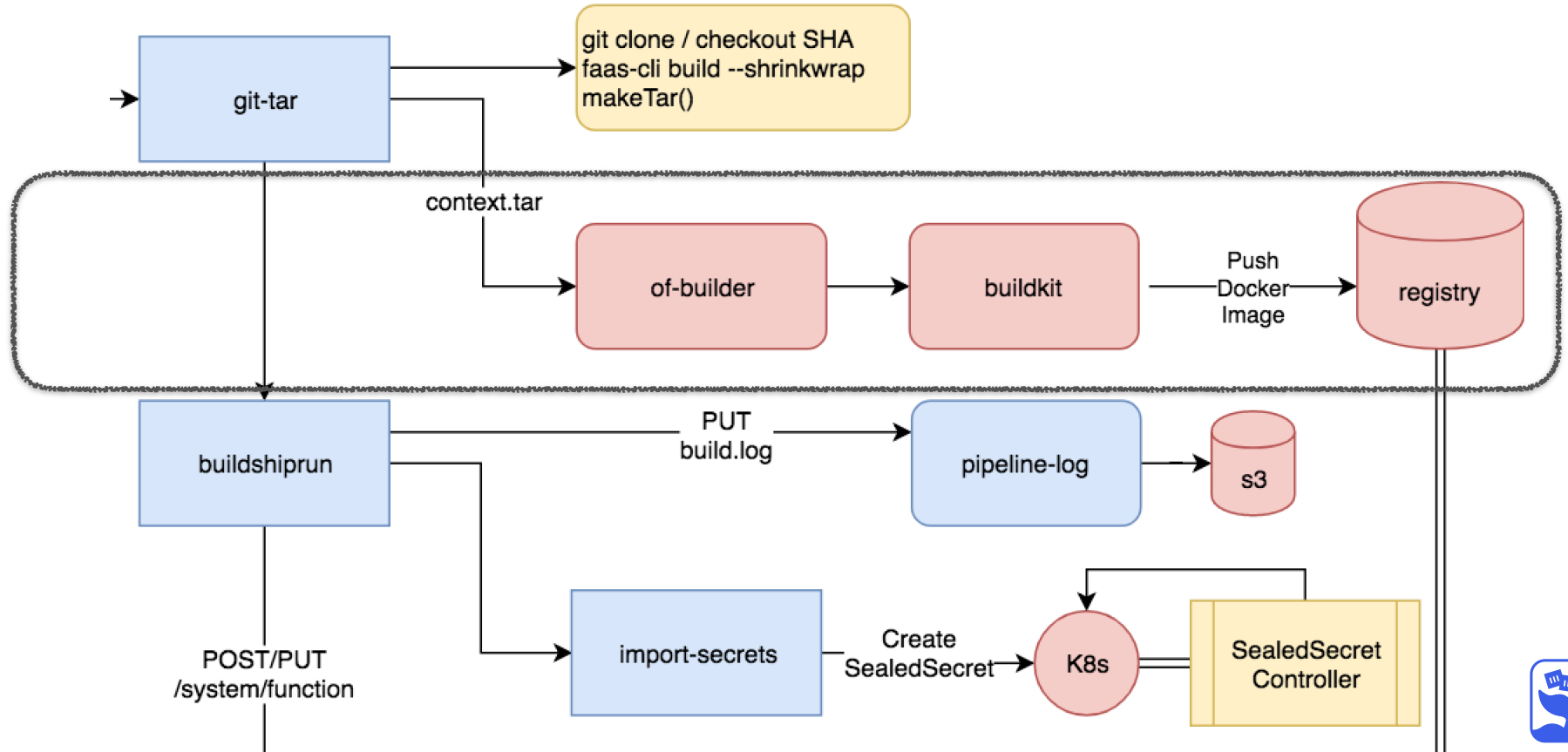
OpenFaaS Cloud - Webhooks



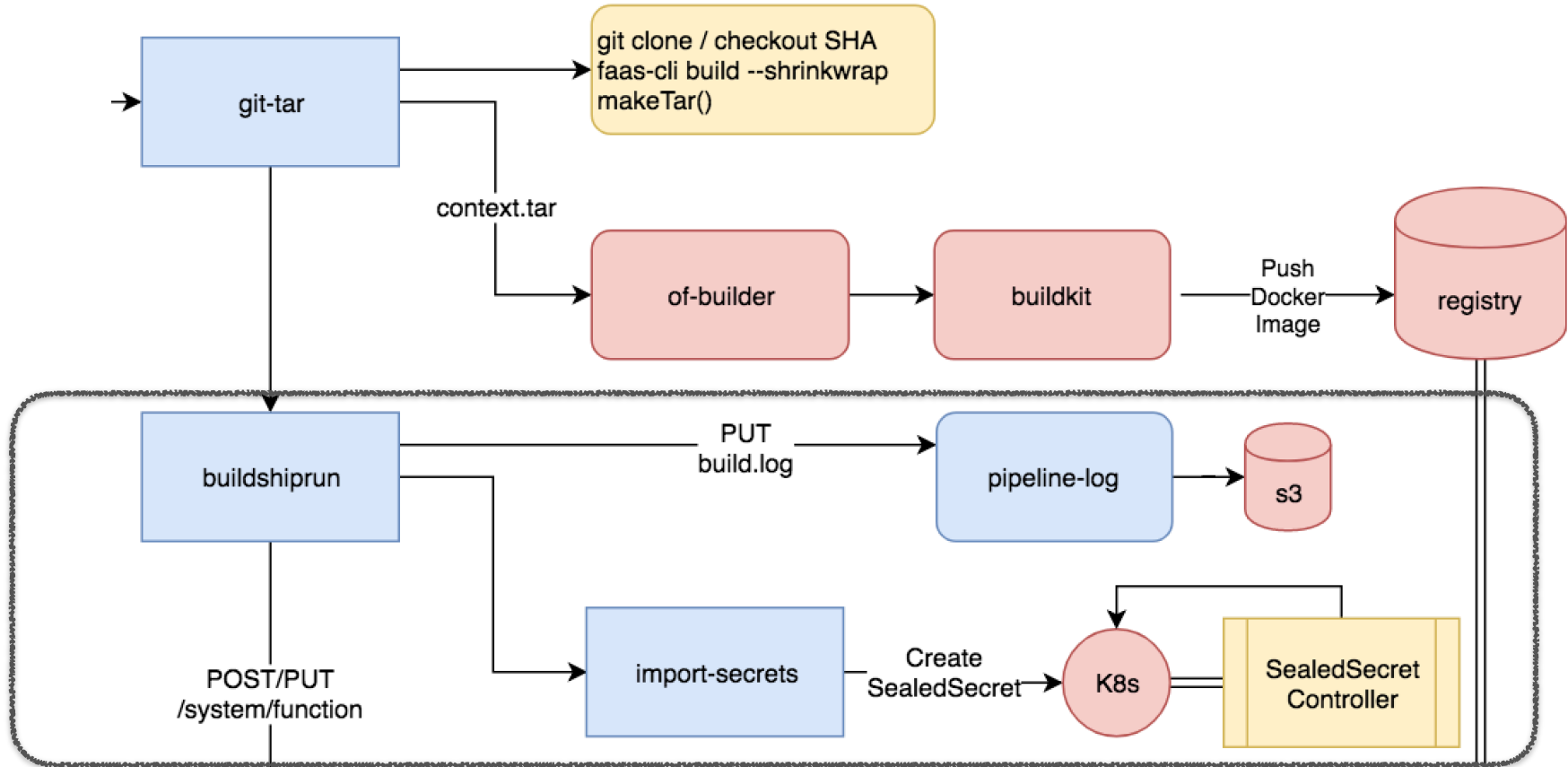
OpenFaaS Cloud - CI/CD pipeline



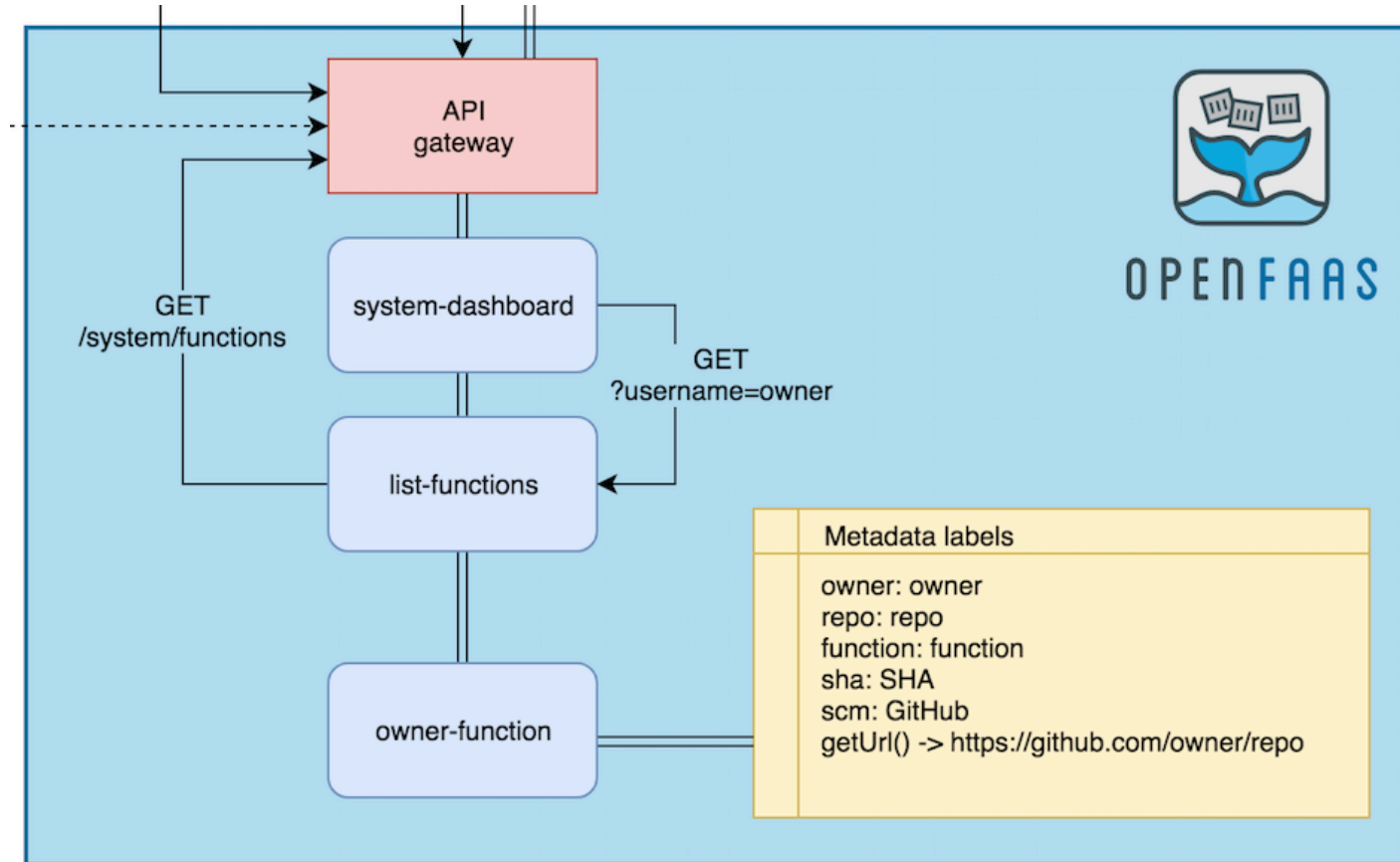
OpenFaaS Cloud - CI/CD pipeline



OpenFaaS Cloud - CI/CD pipeline



OpenFaaS Cloud - Dashboard



Confidential configuration - SealedSecrets

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

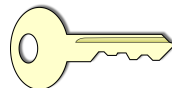
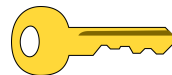
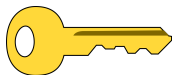
Seal()

```
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)

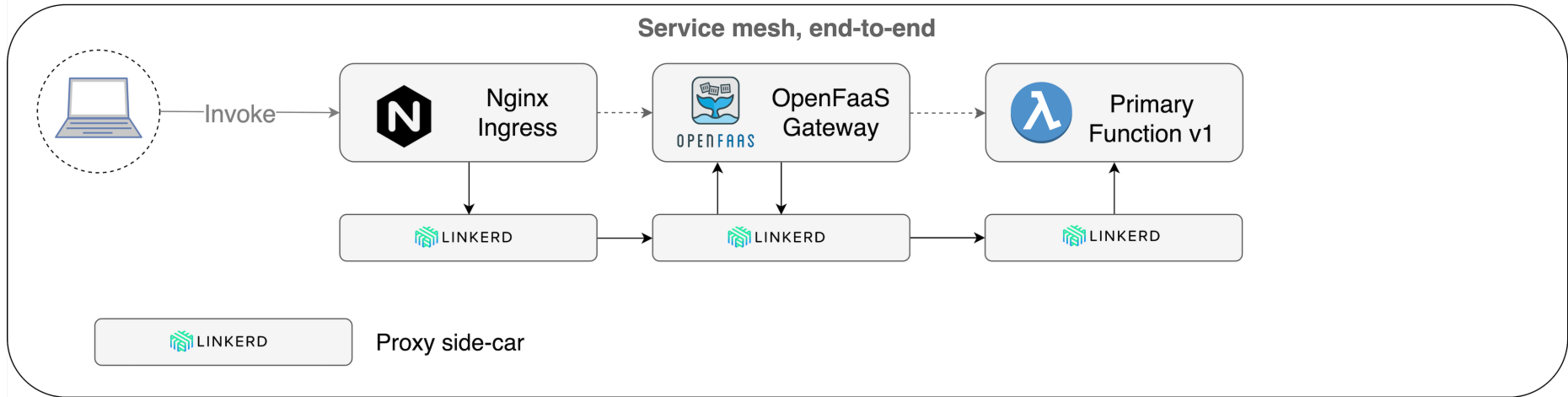


Linkerd debugging via CLI

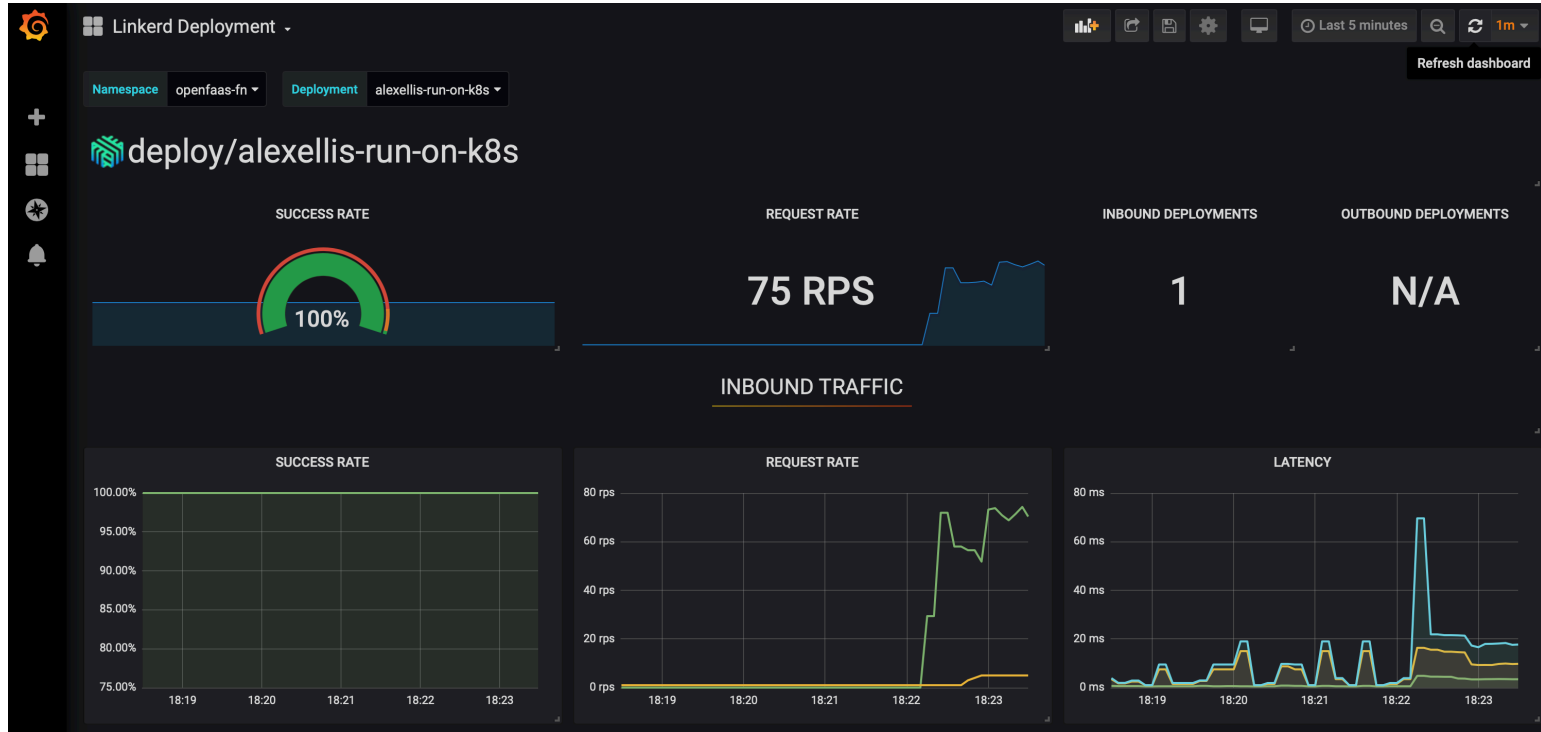
```
github.com — alex@nuc:~ — -bash
kosmos:github.com alex$ ~/.linkerd2/bin/linkerd edges deploy -A
SRC                               DST                               SRC NS   DST NS   SECURED
nginxi...nginxi...ingress-controller  edge-router  default  openfaas  ✓
linkerd-controller                linkerd-prometheus  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



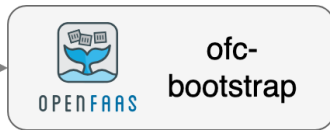
Linkerd - During auto-scaling



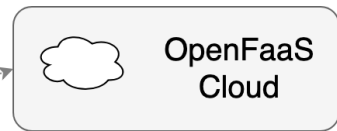
0 to OFC in < 100s



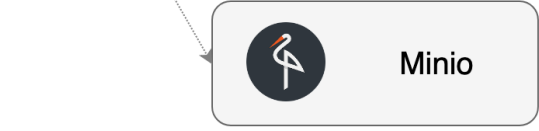
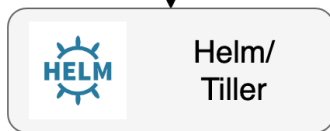
init.yaml



faas-cli



kubectl



```
$ 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

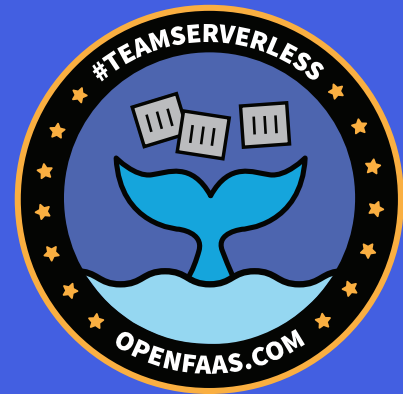


Connect & Learn

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

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

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



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Thank You!

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