

LINKERD

Ultralight service mesh for
Kubernetes and beyond





Web architect at Lunar Way
Bjørn Hald Sørensen



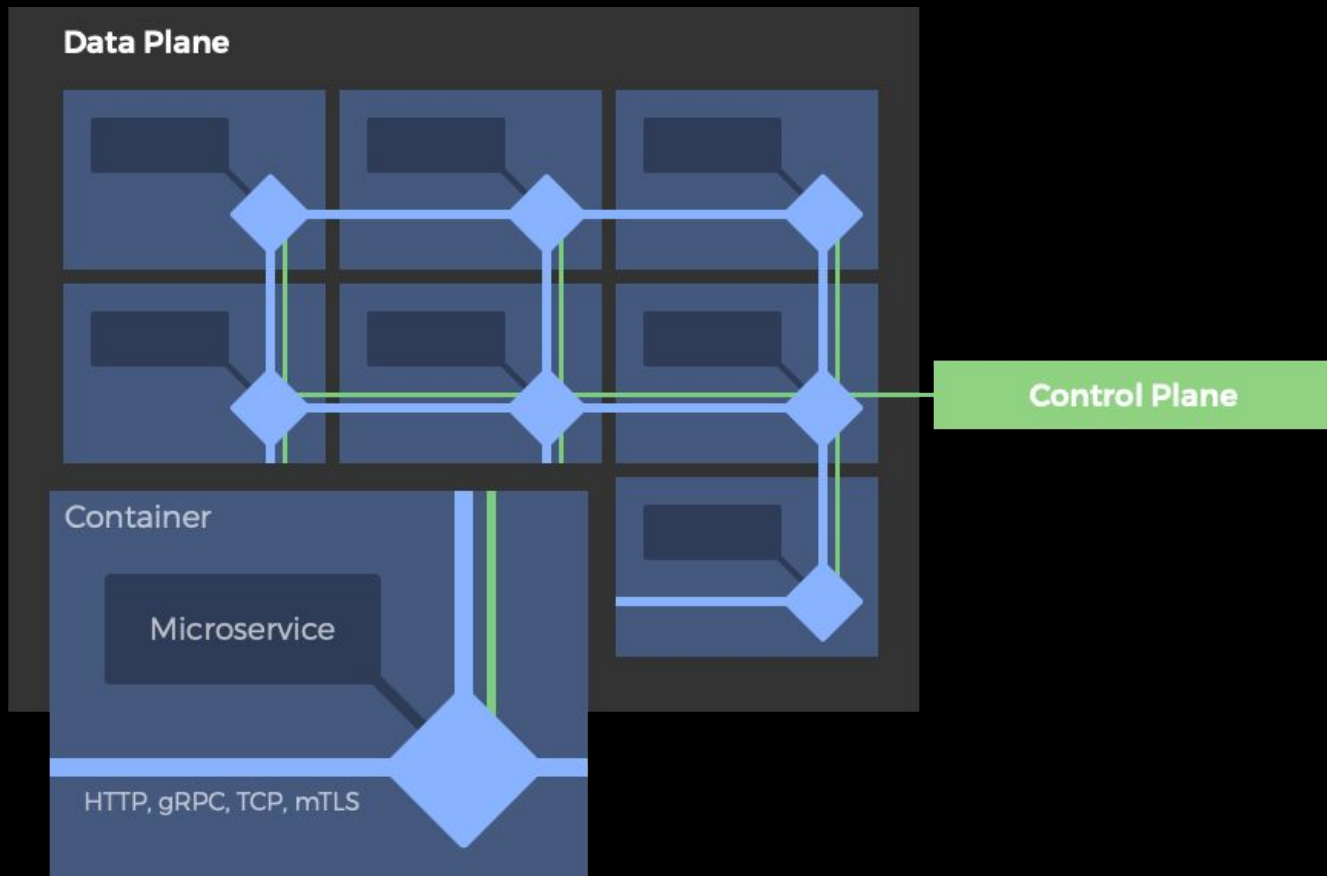
@crevil



@bjorn_sorensen

**What can proxies
be used to?**

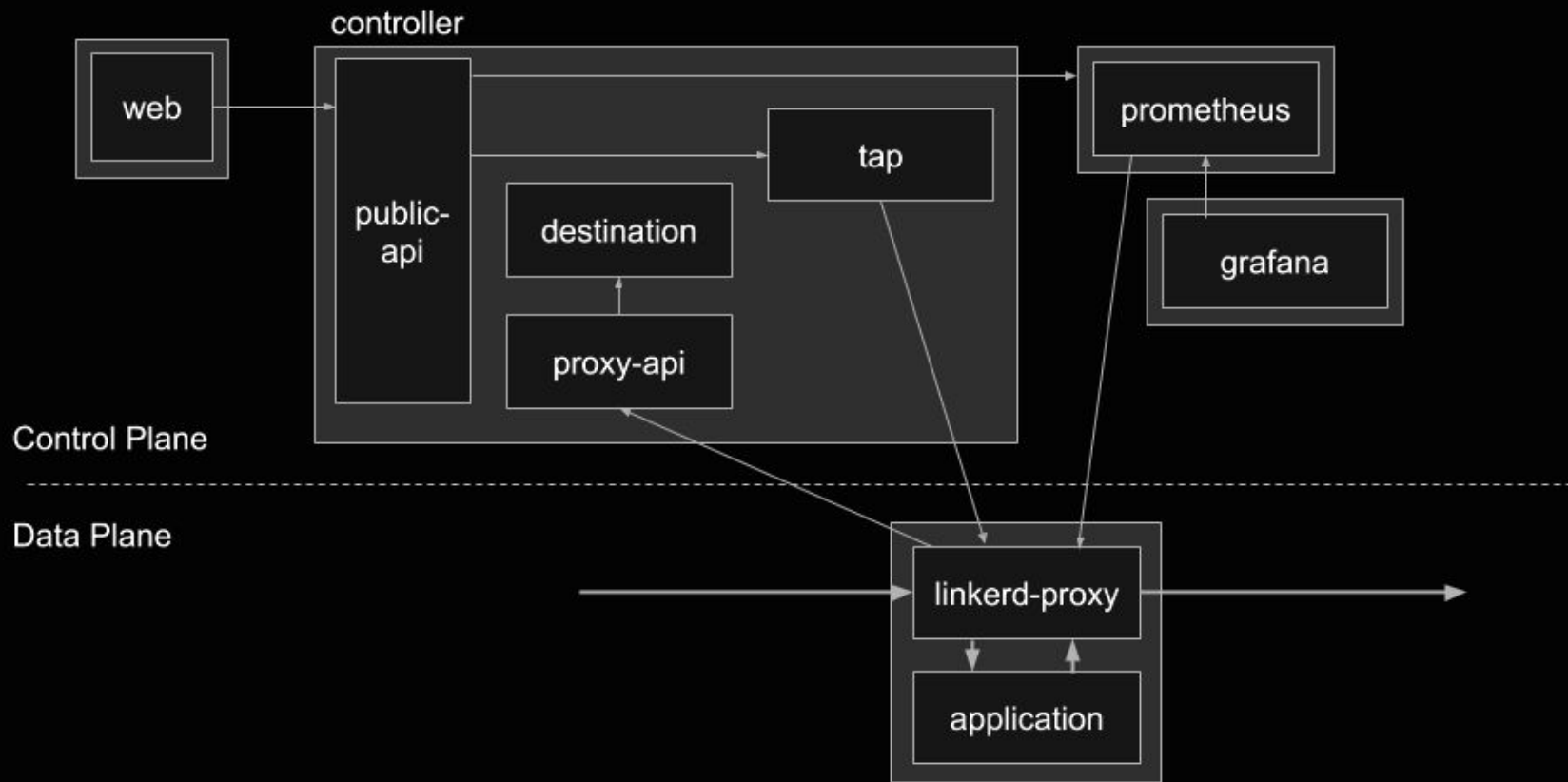
**What is a
service mesh?**



A service mesh

Adapted from <https://glasnostic.com/blog/kubernetes-service-mesh-what-is-istio>

What is Linkerd?



<https://linkerd.io/2/architecture/>

Linkerd's architecture

Overview

Tap

Top

Service mesh

Resources

All Namespaces

Deployments

Pods

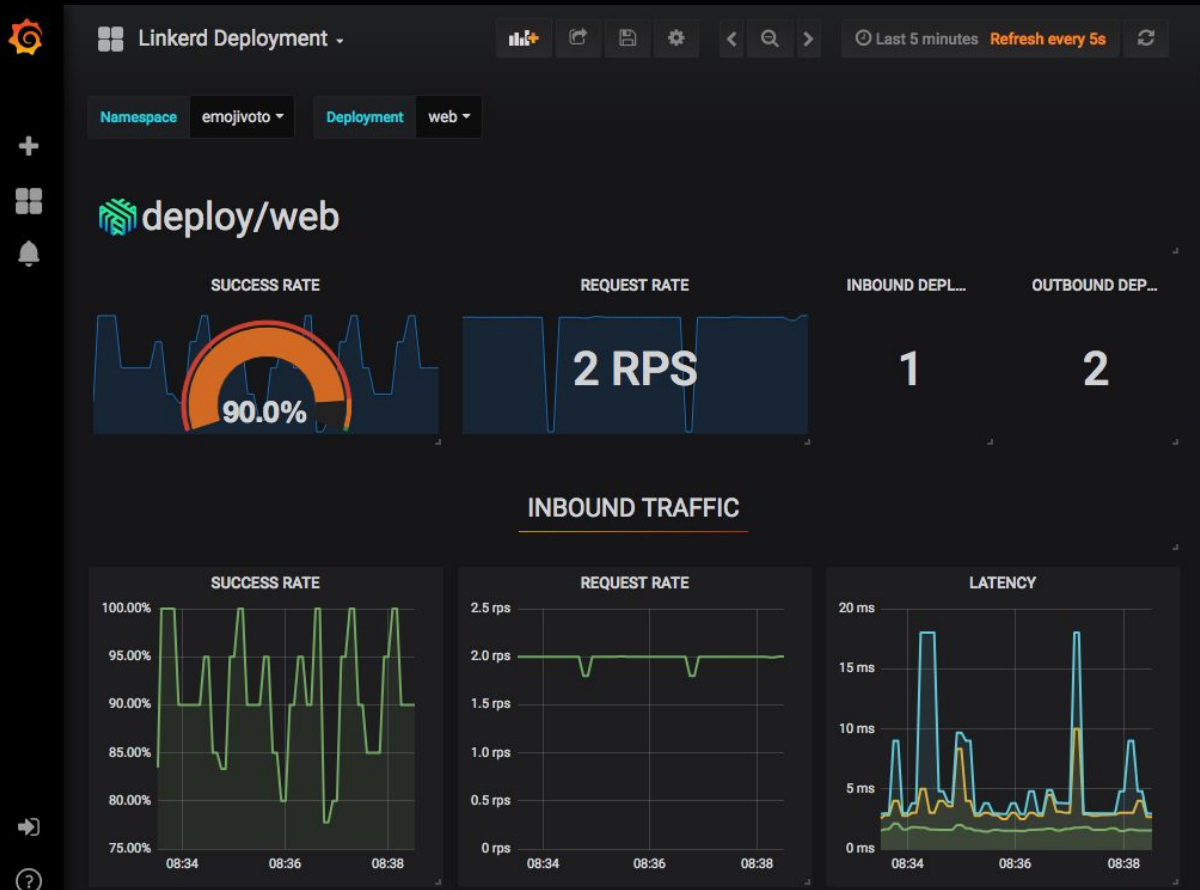
Documentation

emojivoto 

Namespace: emojivoto

Deployments

DEPLOYMENT	MESHED	SR	RPS	P50	P95	P99	TLS	DASH
emoji	1/1	100.00% 	1.25	1 ms	15 ms	19 ms	0.0%	
vote-bot	1/1	--- 	---	---	---	---	---	
voting	1/1	83.78% 	0.62	1 ms	2 ms	2 ms	0.0%	
web	1/1	92.21% 	1.28	2 ms	20 ms	28 ms	0.0%	



Grafana and Prometheus

<https://linkerd.io/2/architecture/>

Demo

→ cloudnative-nordic-linkerd

\$

```
watch
Every 2.0s: kubectl --namespace prod get po -l app=... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:25:27 2019

NAME                                READY    STATUS    RESTARTS   AGE
authentication-9cf54bb65-9qp25      1/1      Running   0           4h
authentication-9cf54bb65-r992c      1/1      Running   0           4h
authentication-9cf54bb65-vm77m      1/1      Running   0           4h

watch
Every 2.0s: kubectl --namespace prod get... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:25:27 2019

NAME                                READY    STATUS    RESTARTS   AGE
user-677c998789-68kzv              1/1      Running   1           4h
user-677c998789-6x5s4              1/1      Running   0           4h

watch
Every 2.0s: kubectl --namespace prod get... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:25:28 2019

NAME                                READY    STATUS    RESTARTS   AGE
localization-8679b949c4-zgnd9      1/1      Running   0           4h

watch
Every 2.0s: kubectl get po -n linkerd Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:25:29 2019

No resources found.
```

No resources in linkerd namespaces

```
zsh
→ cloudbnative-nordic-linkerd
$ linkerd install | kubectl apply -f -
namespace/linkerd created
serviceaccount/linkerd-controller created
clusterrole.rbac.authorization.k8s.io/linkerd-linkerd-controller created
clusterrolebinding.rbac.authorization.k8s.io/linkerd-linkerd-controller created
service/linkerd-prometheus created
clusterrole.rbac.authorization.k8s.io/linkerd-linkerd-prometheus created
clusterrolebinding.rbac.authorization.k8s.io/linkerd-linkerd-prometheus created
service/linkerd-controller-api created
service/linkerd-proxy-api created
deployment.extensions/linkerd-controller created
customresourcedefinition.apiextensions.k8s.io/serviceprofiles.linkerd.io created
service/linkerd-web created
deployment.extensions/linkerd-web created
service/linkerd-prometheus created
deployment.extensions/linkerd-prometheus created
configmap/linkerd-prometheus-config created
service/linkerd-grafana created
deployment.extensions/linkerd-grafana created
configmap/linkerd-grafana-config created
→ cloudbnative-nordic-linkerd
$
```

```
watch
Every 2.0s: kubectl --namespace prod get po -l app=... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:26:23 2019

NAME                                READY    STATUS    RESTARTS   AGE
authentication-9cf54bb65-9qp25      1/1      Running   0           4h
authentication-9cf54bb65-r992c      1/1      Running   0           4h
authentication-9cf54bb65-vm77m      1/1      Running   0           4h

watch
Every 2.0s: kubectl --namespace prod get... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:26:23 2019

NAME                                READY    STATUS    RESTARTS   AGE
user-677c998789-68kzv              1/1      Running   1           4h
user-677c998789-6x5s4              1/1      Running   0           4h

watch
Every 2.0s: kubectl --namespace prod get... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:26:23 2019

NAME                                READY    STATUS    RESTARTS   AGE
localization-8679b949c4-zgnd9       1/1      Running   0           4h

watch
Every 2.0s: kubectl get po -n linkerd Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:26:23 2019

NAME                                READY    STATUS    RESTARTS   AGE
linkerd-controller-55cf8bd769-ckzft  3/4      Running   0           27s
linkerd-grafana-7b7c6f55b7-bkvtt     2/2      Running   0           25s
linkerd-prometheus-85498f44fb-b7p7f  1/2      Running   0           26s
linkerd-web-f8bbc8d54-br7d8          2/2      Running   0           26s
```

```
linkerd
→ cloudfnative-nordic-linkerd
$ linkerd dashboard
Linkerd dashboard available at:
http://127.0.0.1:52649/api/v1/namespaces/linkerd/services/linkerd-web
: http://proxy/
Grafana dashboard available at:
http://127.0.0.1:52649/api/v1/namespaces/linkerd/services/linkerd-gra
fana: http://proxy/
Opening Linkerd dashboard in the default browser
```

```
watch
Every 2.0s: kubectl --namespace prod get po -l app=... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:27:05 2019
```

NAME	READY	STATUS	RESTARTS	AGE
authentication-9cf54bb65-9qp25	1/1	Running	0	4h
authentication-9cf54bb65-r992c	1/1	Running	0	4h
authentication-9cf54bb65-vm77m	1/1	Running	0	4h

```
aws_iam_authenti
Every 2.0s: kubectl --namespace prod get... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:27:05 2019
```

NAME	READY	STATUS	RESTARTS	AGE
user-677c998789-68kzv	1/1	Running	1	4h
user-677c998789-6x5s4	1/1	Running	0	4h

```
aws_iam_authenti
Every 2.0s: kubectl --namespace prod get... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:27:05 2019
```

NAME	READY	STATUS	RESTARTS	AGE
localization-8679b949c4-zgnd9	1/1	Running	0	4h

```
kubectll
Every 2.0s: kubectl get po -n linkerd Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:27:02 2019
```

NAME	READY	STATUS	RESTARTS	AGE
linkerd-controller-55cf8bd769-ckzft	4/4	Running	0	1m
linkerd-grafana-7b7c6f55b7-bkvtt	2/2	Running	0	1m
linkerd-prometheus-85498f44fb-b7p7f	2/2	Running	0	1m
linkerd-web-f8bbc8d54-br7d8	2/2	Running	0	1m

datascience

default

heptio-ark

internal-networking

kube-public

kube-system

linkerd

meshed

Namespace: linkerd

Deployments

Deployment ↑	↑ Meshed	↑ Success Rate	↑ RPS	↑ P50 Latency	↑ P95 Latency	↑ P99 Latency	↑ TLS	Grafana
linkerd-controller	1/1	100.00% ●	1.8	116 ms	192 ms	198 ms	0.0%	🔧
linkerd-grafana	1/1	100.00% ●	0.3	1 ms	9 ms	10 ms	0.0%	🔧
linkerd-prometheus	1/1	100.00% ●	18.25	51 ms	152 ms	190 ms	0.0%	🔧
linkerd-web	1/1	100.00% ●	0.3	1 ms	4 ms	4 ms	0.0%	🔧

Pods

Pod ↑	↑ Meshed	↑ Success Rate	↑ RPS	↑ P50 Latency	↑ P95 Latency	↑ P99 Latency	↑ TLS	Grafana
	1/1	100.00% ●	1.8	116 ms	192 ms	198 ms	0.0%	🔧

prod



Namespace: prod

Deployments

Deployment	Meshed	Success Rate	RPS	P50 Latency	P95 Latency	P99 Latency	TLS	Grafana
api	0/6	---	---	---	---	---	---	
appsync	0/2	---	---	---	---	---	---	
authentication	0/3	---	---	---	---	---	---	
balancing	0/1	---	---	---	---	---	---	
bankidse	0/2	---	---	---	---	---	---	
bec-bank-nk	0/3	---	---	---	---	---	---	
billys-billing	0/2	---	---	---	---	---	---	
brand	0/2	---	---	---	---	---	---	
braze-sync	0/1	---	---	---	---	---	---	
cert-checker	0/1	---	---	---	---	---	---	
credit	0/2	---	---	---	---	---	---	
currency	0/3	---	---	---	---	---	---	
cvr	0/2	---	---	---	---	---	---	
default-http-backend	0/1	---	---	---	---	---	---	
dinero	0/2	---	---	---	---	---	---	
		---	---	---	---	---	---	

Production namespace with non-meshed deployments

Deployment	Pods	Pod Status
Grafana	0	
Prometheus	0	
Proxy API	0	
Public API	0	
Tap	0	
Web UI	0	

Namespace	Meshed pods	Meshed Status
datascience	0/1	<div></div>
default	0/0	<div></div>
heptio-ark	0/1	<div></div>
internal-networking	0/8	<div></div>
kube-public	0/0	<div></div>
kube-system	0/54	<div></div>
linkerd	4/4	<div></div>
logging	0/14	<div></div>
monitoring	0/27	<div></div>
networking	0/9	<div></div>
prod	0/168	<div></div>

Name	Value
Linkerd version	stable-2.1.0
Linkerd namespace	linkerd
Control plane components	6
Data plane proxies	0

10 namespaces have no meshed resources.
Add one or more resources to the k8s.yml file

Then run `linkerd inject k8s.yml | kubectl apply -f -`
to add them to the service mesh


```

linkerd
→ cloudnative-nordic-linkerd
$ linkerd dashboard
Linkerd dashboard available at:
http://127.0.0.1:52649/api/v1/namespaces/linkerd/services/linkerd-web
:http/proxy/
Grafana dashboard available at:
http://127.0.0.1:52649/api/v1/namespaces/linkerd/services/linkerd-gra
fana:http/proxy/
Opening Linkerd dashboard in the default browser
[]

x zsh
→ cloudnative-nordic-linkerd
$ kubectl -n prod get deploy -oyaml -lapp=authentication | link
erd inject - | kubectl -n prod apply -f -

hostNetwork: pods do not use host networking.....
.....[ok]
sidecar: pods do not have a proxy or initContainer already inje
cted.....[ok]
supported: at least one resource injected.....
.....[ok]
udp: pod specs do not include UDP ports.....
.....[ok]

Summary: 1 of 1 YAML document(s) injected
      deployment/authentication

deployment.extensions/authentication configured
→ cloudnative-nordic-linkerd
$ 

```

```

x kubectl
Every 2.0s: kubectl --namespace prod get po -l app=... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:36:44 2019

NAME                                READY    STATUS    RESTARTS   AGE
authentication-88b48f87d-cl6jz      0/2      Running   0           7s
authentication-9cf54bb65-9qp25      1/1      Running   0           4h
authentication-9cf54bb65-r992c      1/1      Running   0           4h
authentication-9cf54bb65-vm77m      1/1      Running   0           4h
[]

x watch
Every 2.0s: kubectl --namespace prod get... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:36:44 2019

NAME                                READY    STATUS    RESTARTS   AGE
user-677c998789-68kzv              1/1      Running   1           4h
user-677c998789-6x5s4              1/1      Running   0           4h
[]

x watch
Every 2.0s: kubectl --namespace prod get... Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:36:44 2019

NAME                                READY    STATUS    RESTARTS   AGE
localization-8679b949c4-zgnd9       1/1      Running   0           4h
[]

x watch
Every 2.0s: kubectl get po -n linkerd Bjrns-MacBook-Pro-2.local: Mon Feb 11 20:36:44 2019

NAME                                READY    STATUS    RESTARTS   AGE
linkerd-controller-55cf8bd769-ckzft 4/4      Running   0           10m
linkerd-grafana-7b7c6f55b7-bkvtt    2/2      Running   0           10m
linkerd-prometheus-85498f44fb-b7p7f 2/2      Running   0           10m
linkerd-web-f8bbc8d54-br7d8          2/2      Running   0           10m

```

Inject linkerd proxy into authentication deployment

Deployment	Pods	Pod Status
Grafana	0	
Prometheus	0	
Proxy API	0	
Public API	0	
Tap	0	
Web UI	0	

Namespace	Meshed pods	Meshed Status
datascience	0/1	
default	0/0	
heptio-ark	0/1	
internal-networking	0/8	
kube-public	0/0	
kube-system	0/54	
linkerd	4/4	
logging	0/14	
monitoring	0/27	
networking	0/9	
prod	3/168	

Name	Value
Linkerd version	stable-2.1.0
Linkerd namespace	linkerd
Control plane components	6
Data plane proxies	3

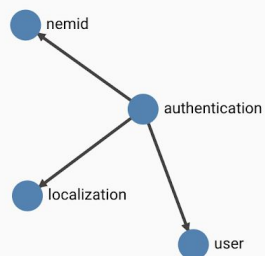
9 namespaces have no meshed resources.
Add one or more resources to the k8s.yml file

Then run `linkerd inject k8s.yml | kubectl apply -f -`
to add them to the service mesh

Prod namespace are now part of the mesh

- Overview
- Tap
- Top
- Top Routes
- Service Mesh
- Resources
- Documentation
- Help

Running Linkerd 2.1.0 (stable).
Linkerd is up to date.



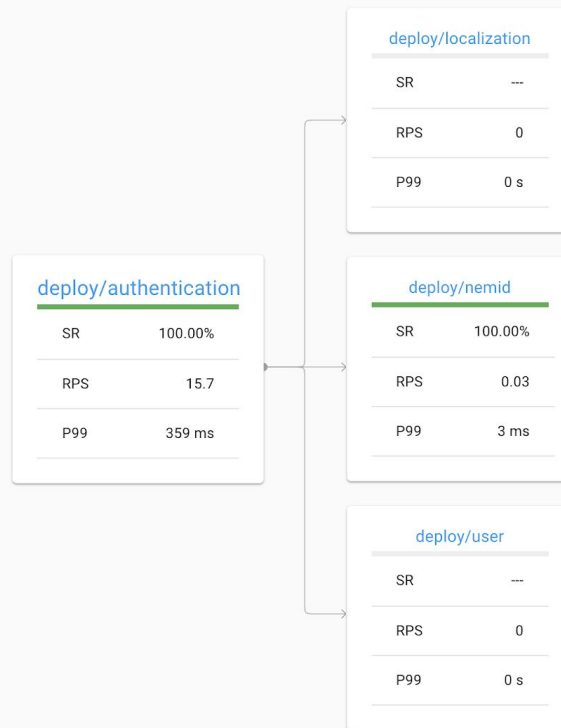
Deployments

Deployment ↑	↑ Meshed	↑ Success Rate	↑ RPS	↑ P50 Latency	↑ P95 Latency	↑ P99 Latency	↑ TLS	Grafana
api	0/6	---	---	---	---	---	---	
appsync	0/2	---	---	---	---	---	---	
authentication	3/3	100.00% ●	12.12	1 ms	9 ms	311 ms	0.0%	🔧
balancing	0/1	---	---	---	---	---	---	
bankidse	0/2	---	---	---	---	---	---	
bec-bank-nk	0/3	---	---	---	---	---	---	
billys-billing	0/2	---	---	---	---	---	---	
brand	0/2	---	---	---	---	---	---	
brazo-sync	0/1	---	---	---	---	---	---	
cert-checker	0/1	---	---	---	---	---	---	

Dependency graph of deployments in the prod namespace

- Overview
- Tap
- Top
- Top Routes
- Service Mesh
- Resources ▾
- Documentation
- Help ▾

Running Linkerd 2.1.0 (stable).
Linkerd is up to date.



LIVE CALLS								ROUTE METRICS	
Name	Method ↑	Path ↑	↓ Count	↑ Best	↓ Worst	↑ Last	↑ Success Rate	Tap	
FROM deployment/tracking	POST	/authentication.Authentication/AuthorizeHttp	9	642 μs	6 ms	837 μs	100.00% ●	b	
		authentication.Authentication/AuthorizeHttp	8	649 μs	7 ms	2 ms	100.00% ●	b	

Dependencies of specific deployments.
The downstream services are not part of the mesh.



***lunar
way®***