Get your APIs Secured with Otoroshi !

Pass The SALT 2019

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Disclaimer

We are not security experts ! We are here to share our experience about securing APIs, the problems we've been facing and the solutions we've been providing.

2016 : We had to move … Quick

https://maif.github.io/

MAIF

French mutual insurance company
Est. in 1934

In 2016 we needed to move :

- Connected cars
- Connected homes
- Connected …

Connected *whatever* == Less Risk == Less Insurance

Our Strategy : diversification

Let's build a new platform !

https://maif.github.io/cards/

One goal : get focused on business value

We believe we need a good technical basis to make good business

https://maif.github.io/

Making developers' life easy (and get as close as possible to the state of the art) :

- (Clever) Cloud hosting
  - Scalability
  - Resiliency
  - ...
- Automation (CI/CD)
- Metrics
- Monitoring
- ...

One of our first thoughts :

“How to manage APIs ?”

Let’s build our own stuff !!

Here comes ... Otoroshi

API management on top of a reverse proxy

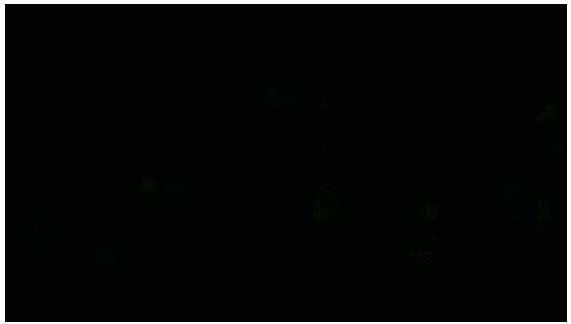
https://maif.github.io/

Typical Features

Exposing APIs

Quotas and throttling

Resiliency

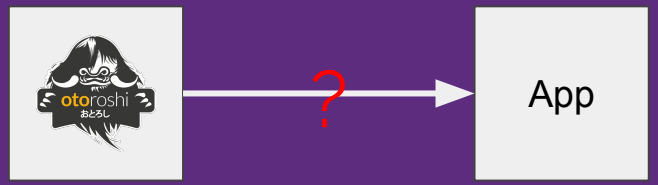


Monitoring

And, of course ...

Security

Exchange protocol



Otoroshi is a reverse proxy :

- Apps need to make sure that requests actually come from Otoroshi
- Otoroshi needs to know if apps are proxied despite themselves

Descending exchange protocol

Otoroshi -> Apps

Otoroshi sends a header containing a signed random state with a short TTL is sent with the request to the proxied app which validates signature

```
curl -H 'Otoroshi-State:
eyJhbGciOiJIUzUxMiIsInR5cCI6IkpXVCJ9.eyJzdGF0ZSI6I
jEyMzQ1Njc4OTAiLCJpYXQiOjE1NjE2NDA1MTEsImV4cCI6MTU
2MTY0MDUyMX0.1-ky2uu1FRQwSyxAL_VZH9Ju_98gbl9uR41xF
3aEnSNaSrvovpY_cY7ekoWKUdThJnbVlcCC7VaUBVF8UvQE8w'
  https://api-backend.foo.bar:8443 --include
```

Ascending exchange protocol

Otoroshi <- Apps

https://maif.github.io/

Application sends back a header containing the original random state, signed and with a short TTL in the response to Otoroshi

```
HTTP/1.1 200 OK
Date: Thu, 27 Jun 2019 13:05:01 GMT
Otoroshi-State-Resp:
eyJhbGciOiJIUzUxMiIsInR5cCI6IkpXVCJ9.eyJzdGF0ZS1yZ
XNwIjoiMTIzNDU2Nzg5MCIsImlhdCI6MTU2MTY0MDUxNSwiZXh
wIjoxNTYxNjQwNTI1fQ.4kRPy01tybeMamMdoGGkQjLC-4k0-o
j_EdOPItmYEE_YW4OD1N9LfdStO2hMC4-VqohrrMvQlRtlycR3
Ss0qWg
Content-Type: application/json
Content-Length: 20


{"msg":"Hello World!"}
```

TLS

https://maif.github.io/

Otoroshi handles TLS dynamically

- Server-side
  - may be enforced
- Client-side
  - may be enforced
- End-to-end (m)TLS
  - from client to otoroshi, from otoroshi to app
  - no passthrough
    - at least for HTTP routing
- Authority Validation
  - Local Authority
    - Trust Store
  - External Authority
    - check if the service is authorised for the current user with the the current certificate chain

JWT tokens

https://maif.github.io/

JWT tokens are a very common way to provide contextual or authn / authz informations in APIs world

JWT tokens validation :

- shared secret (HMAC)
- pub/priv keys (RSA, ECDSA)

JWT tokens remediation

- fields value validation
- token location changes
- fields transformation
- sign with another secret / keypair

Webapps security

Otoroshi provides login as a service for any proxied web app that can integrate with authn services :

- OAuth, OIDC, LDAP, Local, etc.

Can add security headers :

- Strict-Transport-Security, Public-Key-Pins, X-Permitted-Cross-Domain-Policies, X-XSS-Protection, Referrer-Policy, Content-Security-Policy, X-Content-Type-Options, X-Frame-Option, etc.

APIs Security

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Api Keys for Machine to Machine calls

- Classical
  - Client ID + Client Secret
  - Basic Auth
- Token
  - Signed
  - Request parts
- Third party Api Key validation
  - for instance OIDC
  - using an external IAM

Api Keys can be constrained

- Token TTL
- Routing based on metadata

Misc.

A few more security features :

- Headers validation
- IP addresses blacklist / whitelist
- Auditing
- FIDO U2F support for backoffice

Nice UI
API-drivable

https://maif.github.io/

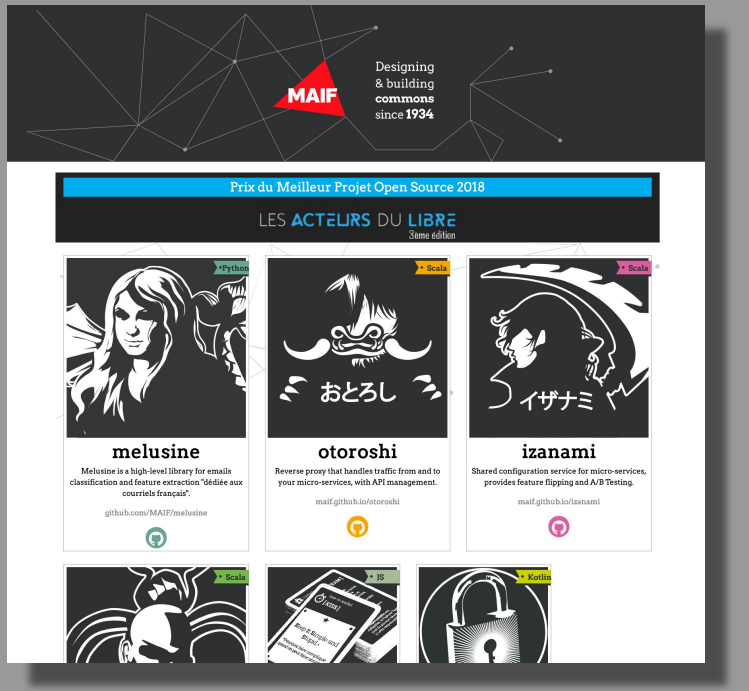
#OSSbyMAIF

Made with love

Otoroshi is Open Source since Jan. 2018

5 minutes tutorial : http://bit.ly/try-otoroshi

We have more and more to come ...



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Thank you !