Open APIs for Open Minds

Kong, Keyrock, Keycloak, i4Trust - Options to secure FIWARE in production

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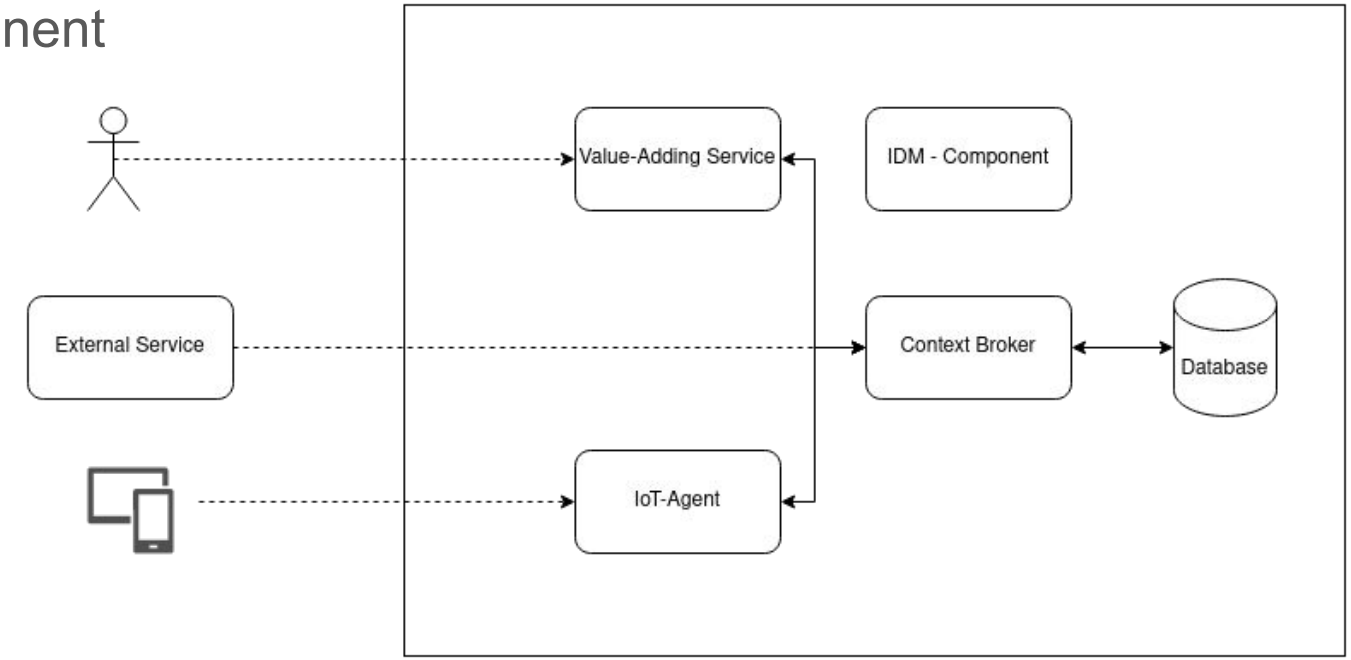
FIWARE

Role of an API-Gateway in FIWARE platforms

- Context Broker as the central component
- Contacted:
  - from different external actors
  - from different internal actors
  - with different loads
- No “self-defense” mechanism



We need a component to protect the platform

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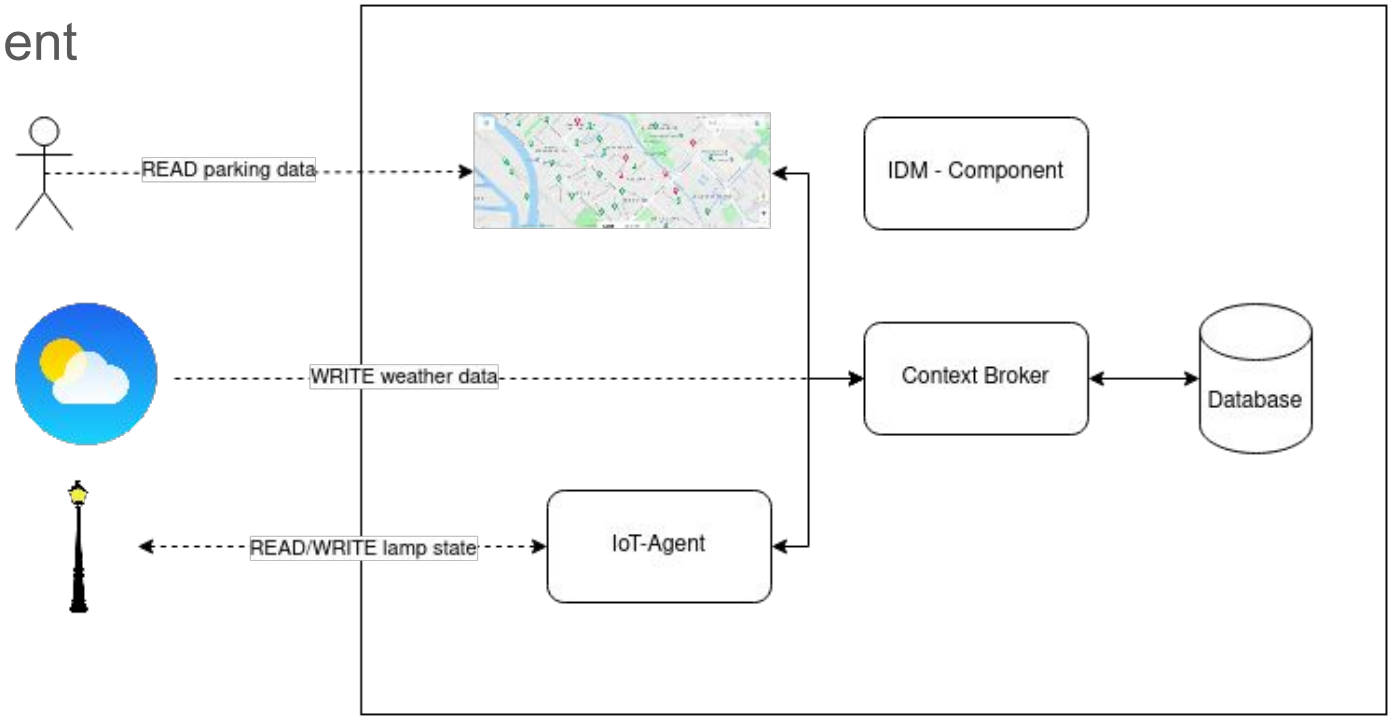


We need a component to protect the platform

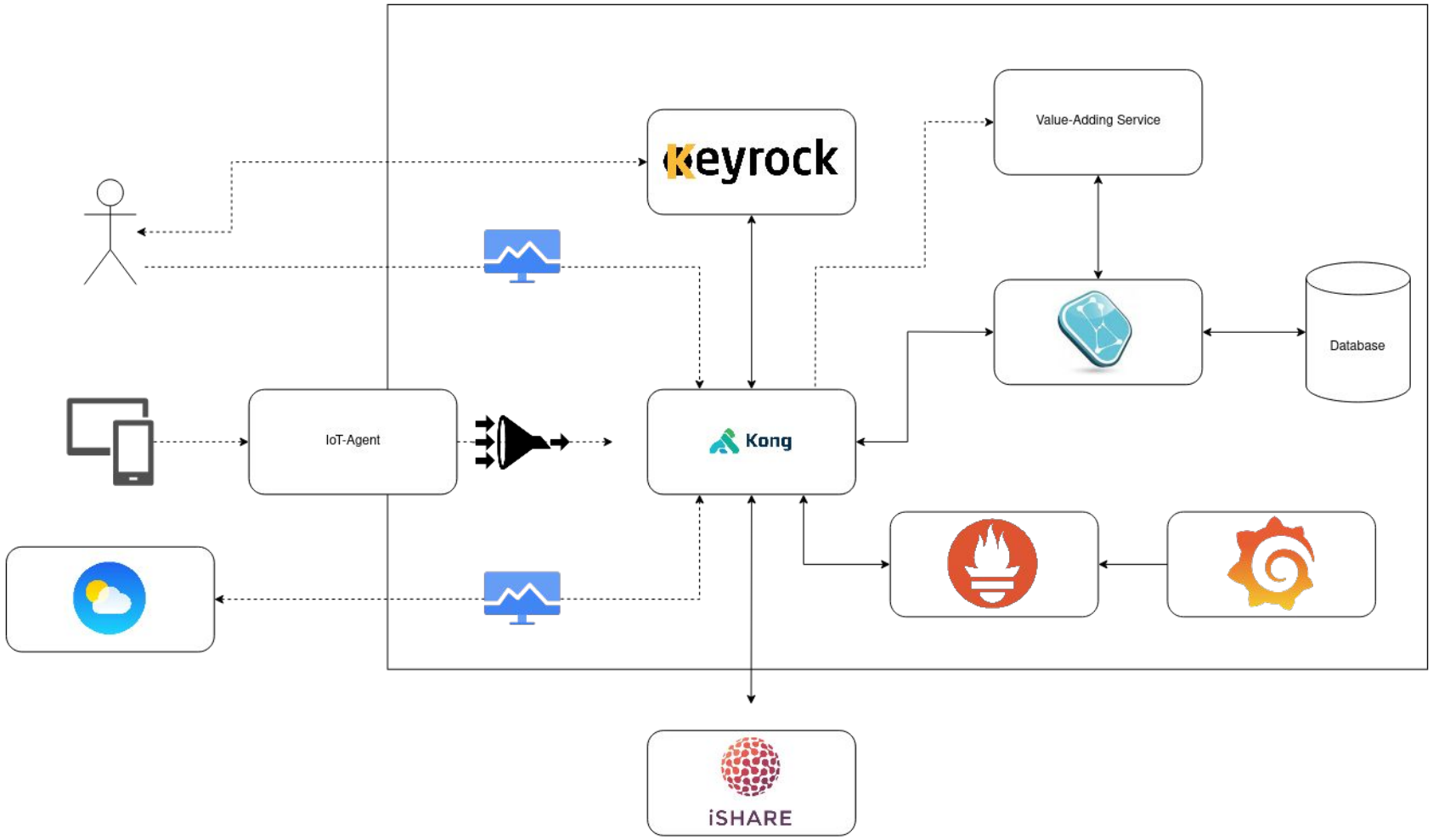
Role of an API-Gateway in FIWARE platforms

- Access control: PEP-Proxy & Policy-decision Point
  - Allow to control who can access what
- Additional requirements:
  - Rate-limiting?
  - Usage-Control?
  - Monitoring?

API-Gateway as the central entry point can provide those capabilities

FIWARE

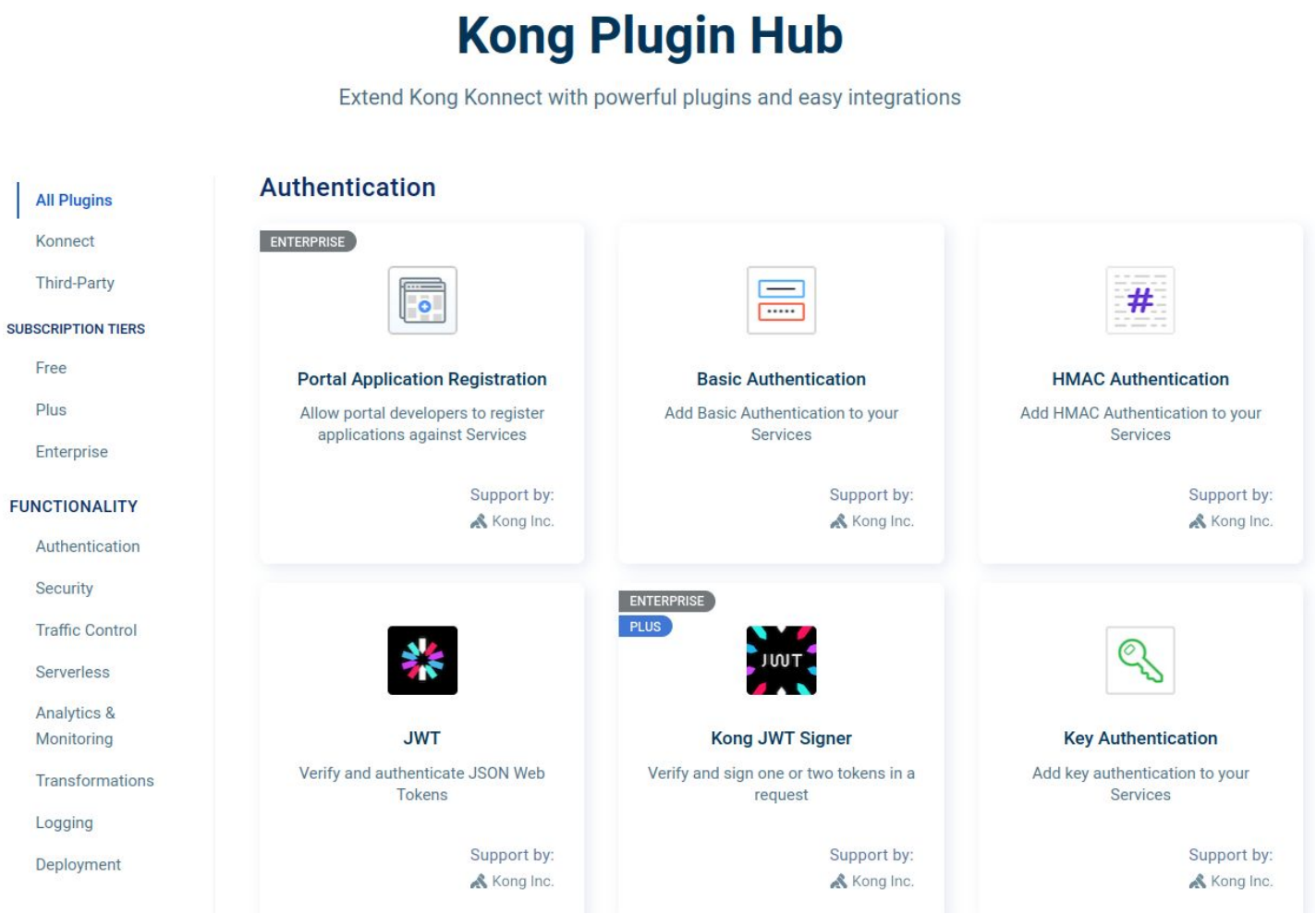
Role of an API-Gateway in FIWARE platforms



Why Kong?

- One of the most popular and adopted solutions in the market
- OpenSource(and Enterprise) Version available, maintained by a huge and active community
- Production ready deployment tools
- Plugin-support:
  - FIWARE specific functionality can be implemented as plugin
  - Supports various languages, e.g lua, go and python
- Plugins for the additional requirements available - Kong Hub:
  - Rate-limiting
  - Usage monitoring

Why Kong?


Kong Plugin Hub
Extend Kong Konnect with powerful plugins and easy integrations
All Plugins
Konnect
Third-Party
SUBSCRIPTION TIERS
Free
Plus
Enterprise
FUNCTIONALITY
Authentication
Security
Traffic Control
Serverless
Analytics & Monitoring
Transformations
Logging
Deployment
Authentication
ENTERPRISE
Portal Application Registration
Allow portal developers to register applications against Services
Support by: Kong Inc.
Basic Authentication
Add Basic Authentication to your Services
Support by: Kong Inc.
HMAC Authentication
Add HMAC Authentication to your Services
Support by: Kong Inc.
JWT
Verify and authenticate JSON Web Tokens
Support by: Kong Inc.
ENTERPRISE
PLUS
Kong JWT Signer
Verify and sign one or two tokens in a request
Support by: Kong Inc.
Key Authentication
Add key authentication to your Services
Support by: Kong Inc.

Running Kong

- Multiple solutions available: Kong - Install and run
- Running with Helm on OpenShift:
  - Kong in the FIWARE demo environment
- Some details about the demo environment:
  - Uses the official Kong Helm-Chart
  - Extended with support for OpenShift routes
  - Pre-built image from FIWARE, already including the plugins
  - Declarative configuration via ConfigMap
  - Applied via GitOps - ArgoCD

Kong as PEP-Proxy

- Plugins for using Kong as a PEP in FIWARE:
  - ngsi-ishare-policies to enforce iTrust compliant authz/n
  - Keyrock as PDP - delegate role-based decisions to Keyrock
  - Keycloak as PDP - delegate decisions to Keycloak
  - External-Authz - delegate decisions to a compliant endpoint, for example the DSBA-PDP to support Verifiable Credentials

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General plugin configuration

```
kong:
     …
     env:
          …
          plugins: bundled,pep-plugin,ngsi-ishare-policies
          pluginserver_names: pep-plugin
          pluginserver_pep_plugin_start_cmd: "/go-plugins/pep-plugin"
          pluginserver_pep_plugin_query_cmd: "/go-plugins/pep-plugin -dump"
         …
     dblessConfig:
        configMap: kong-configmap
```


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General plugin configuration

```
services:
  -   host: “fiware-orion-ld”
      name: “orion-keyrock”
      port: 1026
      protocol: http

      routes:
        -   name: orion-keyrock
            paths:
              -   /keyrock
            strip_path: true

      plugins:
        -   name: pep-plugin
            config:
                <PLUGIN_SPECIFIC_CONFIGURATION>
```

Examples:

- i4Trust configuration
- Keyrock configuration

Keyrock configuration

```
# keyrock example
- host: "fiware-orion-ld"
  name: "orion-keyrock"
  port: 1026
  protocol: http

  routes:
    - name: orion-keyrock
      paths:
        - /keyrock
      strip_path: true

  plugins:

    - name: pep-plugin
      config:
        authorizationendpointtype: Keyrock
        authorizationendpointaddress: https://keyrock.fiware.dev/user
        keyrockappid: 7c902139-d4d0-461a-bb14-7fa29aa143fe

    - name: request-transformer
      config:
        remove:
          headers:
            - Authorization
            - authorization
```


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i4Trust configuration

```
 # i4Trust example
- host: "fiware-orion-ld"
  name: "orion-i4trust"
  port: 1026
  protocol: http

  routes:
    - name: orion-i4trust
      paths:
        - /i4trust
      strip_path: true

  plugins:

    - name: ngsi-ishare-policies
      config:
        access_token:
          header_names:
            - "authorization"
            - "Authorization"
       ar:
          identifier: "EU.EORI.NL000000004"
          host: "https://ar.isharetest.net"
          token_endpoint: "https://ar.isharetest.net/connect/token"
          delegation_endpoint: "https://ar.isharetest.net/delegation"
        satellite:
          identifier: "EU.EORI.NL000000000"
          host: "https://scheme.isharetest.net"
          token_endpoint: "https://scheme.isharetest.net/connect/token"
          trusted_list_endpoint: "https://scheme.isharetest.net/trusted_list"
        jws:
         identifier: …
          private_key: …
          x5c: …
```

Keycloak configuration

```
# keycloak example
- host: "fiware-orion-ld"
  name: "orion-keycloak"
  port: 1026
  protocol: http

  routes:
    - name: orion-keycloak
      paths:
        - /keycloak
      strip_path: true

  plugins:
    - name: pep-plugin
      config:
        authorizationendpointtype: Keycloak
        authorizationendpointaddress: http://fiware-keycloak:80
        keycloakrealm: fiware-server
        keycloakclientid: orion-pep
        keycloakclientsecret: 978ad148-d99b-406d-83fc-578597290a79

    - name: request-transformer
      config:
        remove:
          headers:
            - Authorization
            - authorization
```

Keycloak Realm:
https://github.com/FIWARE-Ops/fiware-gitops/blob/master/aws/fiware/keycloak/templates/realmConfigMap.yaml

FIWARE

Rate-limiting

- Rate-limiting plugin:
  - https://docs.konghq.com/hub/kong-inc/rate-limiting/
  - Configure per route

```
- host: "fiware-orion-ld"
  name: "orion-limited"
  port: 1026
  protocol: http

  routes:
  - name: orion-limited
    paths:
      - /limited
        strip_path: true

    plugins:
      - name: rate-limiting
        config:
           minute: 3
```


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Monitoring

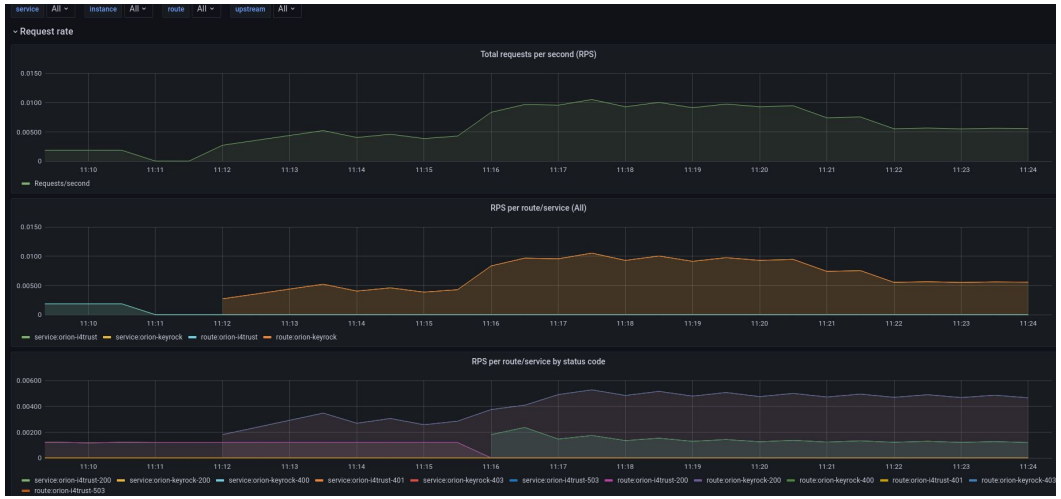
- Prometheus integration:
  - https://docs.konghq.com/hub/kong-inc/prometheus/
  - Configure per route and enable scraping

```
- host: "fiware-orion-ld"
  name: "orion-keyrock"
  port: 1026
  protocol: http

  routes:
  - name: orion-keyrock
    paths:
      - /keyrock
        strip_path: true

    plugins:
      - name: prometheus
```

```
kong:
  podAnnotations:
    prometheus.io/scrape: 'true'
    prometheus.io/port: '9102'
```



Further reading

- i4Trust-tutorials: https://github.com/i4Trust/tutorials
- UI: https://github.com/pantsel/konga
- Plugin development:
  - Lua
  - Go
- Slides: https://github.com/wistefan/presentations

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Thank you!

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