Espeo
Blockchain

Multi-cluster deployment of Hyperledger Fabric network

Using Hyperledger Fabric operator

Who we are and what will you learn

Agenda

- Brief introduction of the presenters and our the company
- The business problem
  - How did we find the client needs?
  - What problems were discovered?
- The programming solution
  - About HLF Operator
  - What did we achieve
- Demo
- Take home messages

After this meeting

- You will learn how we are discovering requirements
- How to evaluate if tools are meeting them
- How we have combined Hyperledger Fabric with Kubernetes
- What problems will you face if you want to implement a similar combination
- What are our take away lessons from the whole project

Espeo Blockchain: Who we are?

- We are **Hyperledger Fabric Certified Service Provider**
  - One of **17** worldwide!
  - With over **5 years of experience** in delivering a top quality products
  - We can help you with:
    - Blockchain **consulting**
    - Blockchain **development**

Who we are: Marcin

- Blockchain / Backend developer at Espeo
- Industries
  - Telecommunication
  - E-commerce
  - Fintech
  - Blockchain
- Current main technologies
  - Nest.js
  - Hyperledger Fabric

Who we are: Szymon

- Scientific background
  - Studied human brain architecture using neuroimaging
- Then engaged in creating IT solutions for Clients from fields like:
  - Finance
  - Data science
  - Marketing
  - HR
- Active on both: front and back-end
- Main language: JavaScript

Our method.
Understand Client’s needs

Client’s profile

- **Client** was from the business consulting sector
  - **With multiple independent branches**
    - At both levels, namely:
      - Technical
      - Organizational
  - **Strict security policy** of the data flow
    - The data coming **in** and **out** of the branch IT environment had to gone through a high scrutiny

Client’s needs

- Multiple partners needs to exchange information in **auditable form**
  - Each data **change needs to be registered**
  - Based on the changes the flow history needs to be possible to check
  - Changes need to be authenticated
- The possible solution needs to **scale** well
- The possible solution needed to enable:
  - **Monitoring**
  - **Admin administration** for in and out data flows

Our solution #1
Get right tools for Client’s needs

Why use blockchain?

- Why during the initial phase of the project opted for a blockchain?
  - There were **multiple parties** involved
  - That needed to reach a **consensus** on some record
  - In a **secure**
  - And **trustworthy manner**

Sounds like a perfect requirements for a **blockchain**!

Why Hyperledger Fabric network?

- To secure access to the data the chosen protocol needed to enables us to create a **private blockchain**
- Be **secure** be default
- Have **configurable administration options** on the spot
- The chosen tool should be easy to **monitor**
- Store data in **auditable format**
- Be **actively developed** and have **engaged community**

Hyperledger Fabric network check all the boxes!

Why Kubernetes?

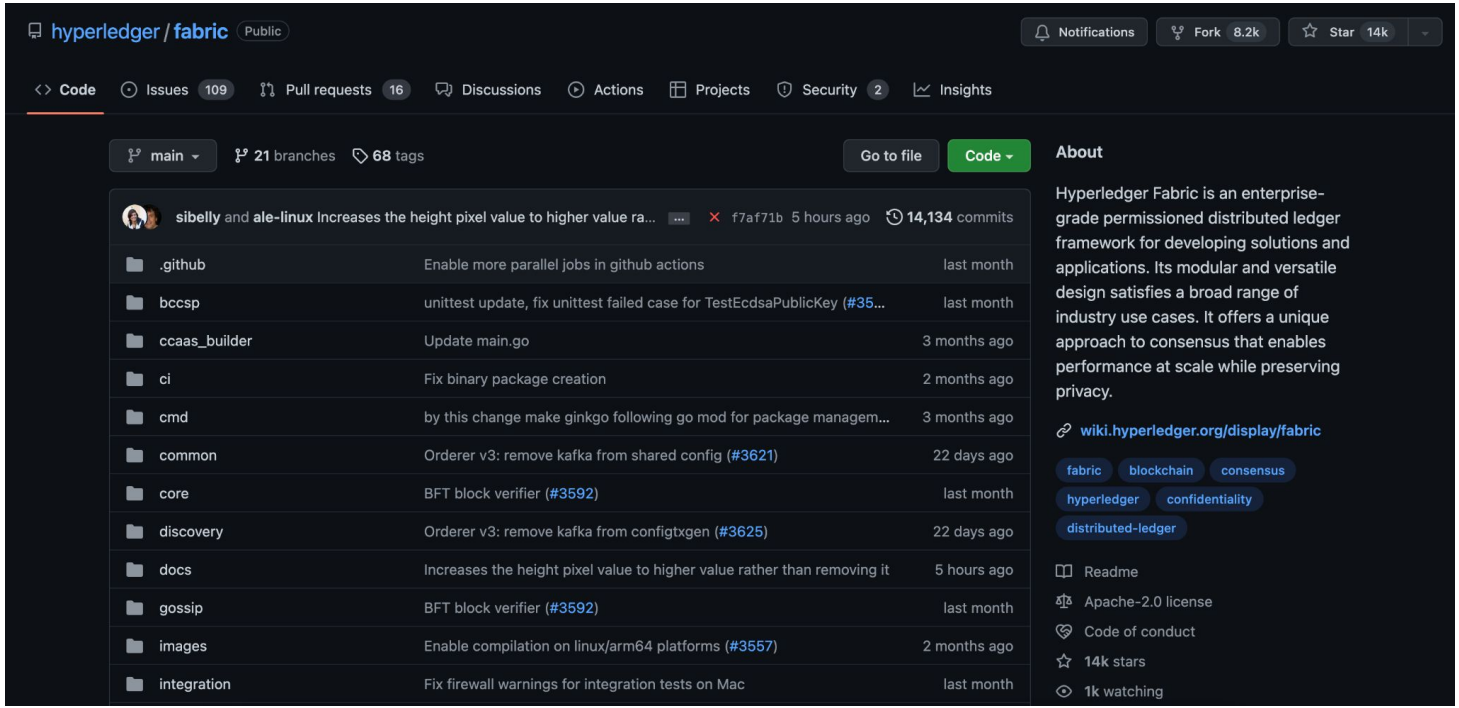
- Requirements:
  - Our solution needed to **scale well** as our Client grow
  - Yet, be also **cost effective**
- **Kubernetes (K8)** is a tool that helps in **running complex application** that are consisted of many containers.
  - Thus, it fits well within the realm our task requirements

85%

of IT managers see Kubernetes as a key element in their cloud architecture

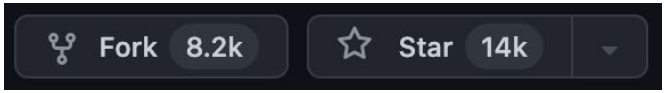
Source: 2021 State of Enterprise Open Source

How we are evaluating tools?



How we are evaluating tools?

- Check if open source
- Check the number of stars:



- Check the license:

- Check documentation
- Check if used in real business cases
- Check issues and PRs

- Check if actively developed

- Check if backed by some organization
  - Linux Foundation!

Our solution #2
Resolve problems

Problem #1: The need of server separation

- Independent branches of a company spread worldwide
- Keep the same/very similar pipeline for all branches
- Demanding security policy

Solution #1: Separate clusters for each organization

- One cluster per branch (and an additional CA server)
- The same network structure on all clusters
- Each branch is responsible for keeping the cluster running

Problem #2: Complexity of Kubernetes

- Tricky concept to understand
- Much more difficult than docker compose
- Huge amount of configurations
- Big yaml files to manage

Solution #2: Use HLF Operator

- Kubernetes deployments made easy
- Minimal knowledge of Kubernetes required
- Command line kubectl plugin
- Cryptographic material generated by operator

About HLF Operator

- Open source solution for deploying HLF network on Kubernetes
- Currently not very popular
- Vast documentation
- Backed by Hyperledger Labs

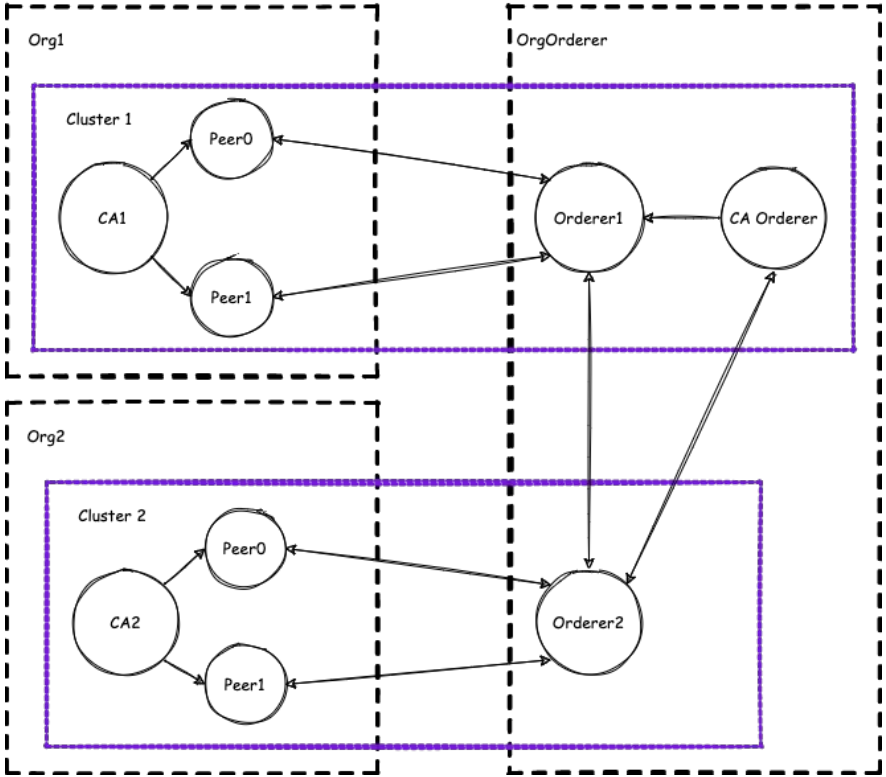
Our solution #3
Proof of Concept

PoC technologies

- K8s clusters - DigitalOcean
- DNS - Freenom

Architecture

- Easily expandable, just add another organization and cluster block
- CA Orderer can be moved to another cluster



Our solution #4
Demo!

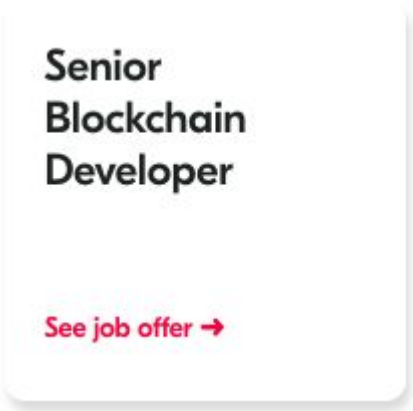
Take home messages

What we have learnt?

- Hyperledger Fabric network could be deployed even in **complex scenarios**
- There are **sophisticated tools** like: Kubernetes or HLF Operator which take away most of the burden during the work
- It is possible to create a **distributed network** that helps in monitoring and registering the flow of information between different parties
- Even if you are implementing a novel scenario:
    - There are **many tools** that could help you
    - Created by the **active community**
- Hyperledger Fabric could be implemented in the **cloud environment** with relative ease

We are hiring!

We are hiring!



REQUIREMENTS

Here's a (not exclusive) set of skills we would appreciate you own:

- **Blockchain expertise:** (1) An excellent knowledge of Blockchain (2) At least 2 years of commercial experience (3) Will to develop within that technology,
- **Technical knowledge**: Node.js, GO, Hyperledger or Solidity,
- **Team Spirit:** (1) Leadership attitude (2) Willingness to cooperate with others and to share both experience & knowledge within the team (3) Drive for technical excellence towards yourself and the team,
- **Communicative and proactive attitude:** (1) challenge orientation (2) good communication skills,
- Excellent spoken and written English.

Sounds like you? **Don't wait & apply!** We are waiting for you to join EspeoCrew.

We are hiring!

How to contact us?

- We could help you with your blockchain project by:
  - **Consultancy**
  - **Development service**

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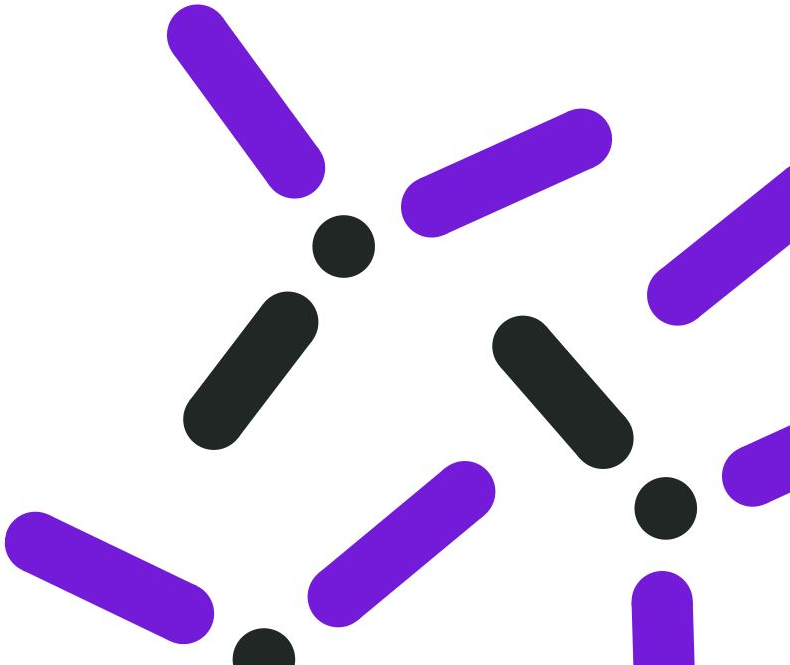
Espeo
Blockchain

Thank you!

Poznań / Helsinki / San Francisco



Happy to answer your questions.

David Viejo webinar

My article on Espeo Blockchain

Aditya Joshi tutorial playlist