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 go through a high scrutiny
Client’s needs

- Multiple partners need 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 manner
  - 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 enable us to create a private blockchain
- Be secure by 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 an 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?

- Check if open source
- Check the number of stars:
  - Fork 8.2k
  - Star 14k
- Check the license:
  - Apache-2.0 license
- Check documentation
- Check if used in real business cases

- Check issues and PRs
  - Issues 109
  - Pull requests 13
- Check if actively developed
  - 6 days ago
  - 14,130 commits
- 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.
Join Espeo Blockchain Academy

Your starting point as a Blockchain Developer

Whether you are an experienced developer or a newcomer to the field, this will be an excellent program dedicated to your development. Once you’ve completed the training, you will come onboard and take part in the leading blockchain projects in Europe.

APPLY TO THE ACADEMY

We are hiring!
Thank you!

Poznań / Helsinki / San Francisco
Happy to answer your questions.

David Viejo webinar

Aditya Joshi tutorial playlist