

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 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?

hyperledger / fabricPublic

NotificationsFork8.2kStar14k

<> CodeIssues109Pull requests16DiscussionsActionsProjectsSecurity2Insights

main21 branches68 tagsGo to fileCode

sibelly and ale-linux

Increases the height pixel value to higher value ra...f7af71b5 hours ago14,134 commits

.github	Enable more parallel jobs in github actions	last month
bccsp	unittest update, fix unittest failed case for TestEcdsaPublicKey (#35...	last month
ccaas_builder	Update main.go	3 months ago
ci	Fix binary package creation	2 months ago
cmd	by this change make ginkgo following go mod for package managem...	3 months ago
common	Orderer v3: remove kafka from shared config (#3621)	22 days ago
core	BFT block verifier (#3592)	last month
discovery	Orderer v3: remove kafka from configtxgen (#3625)	22 days ago
docs	Increases the height pixel value to higher value rather than removing it	5 hours ago
gossip	BFT block verifier (#3592)	last month
images	Enable compilation on linux/arm64 platforms (#3557)	2 months ago
integration	Fix firewall warnings for integration tests on Mac	last month

About

Hyperledger Fabric is an enterprise-grade permissioned distributed ledger framework for developing solutions and applications. Its modular and versatile design satisfies a broad range of industry use cases. It offers a unique approach to consensus that enables performance at scale while preserving privacy.

wiki.hyperledger.org/display/fabric

fabricblockchainconsensus

hyperledgerconfidentiality

distributed-ledger

Readme

Apache-2.0 license

Code of conduct

14k stars

1k watching

Problem & Solution

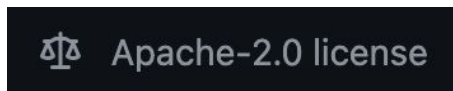


How we are evaluating tools?

- 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

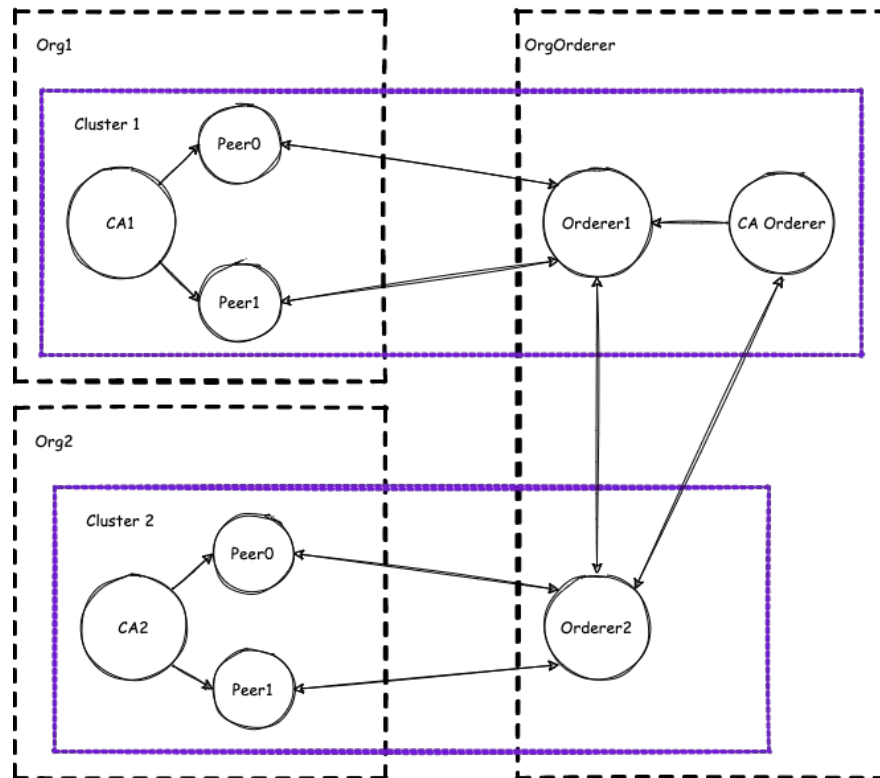
- K8s clusters - DigitalOcean
- DNS - Freenom





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!

Senior Blockchain Developer

[See job offer →](#)

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!



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!



How to contact us?

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



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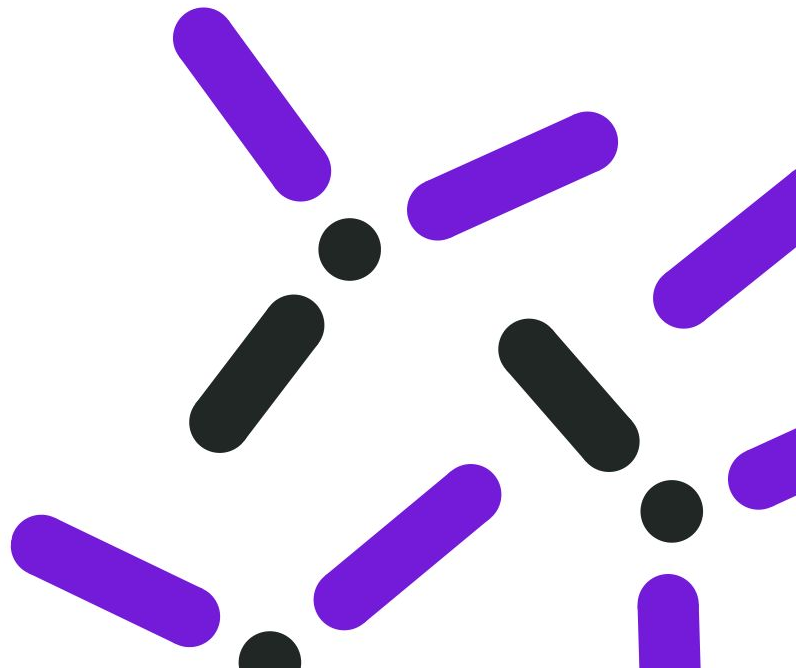
+48 880 266 070 

Or: hi@espeo.eu

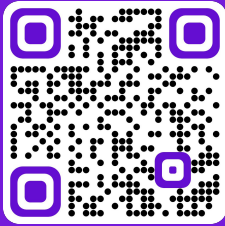
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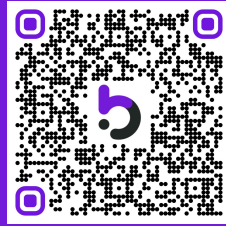
Poznań / Helsinki / San Francisco



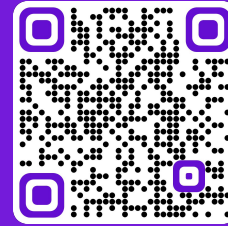
Happy to answer your questions.



David Viejo webinar



My article on Espeo Blockchain



Aditya Joshi tutorial playlist