



Internship proposal

Develop zero-knowledge proof-of-concept on
Hyperledger Fabric Blockchain



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1 Contact

This document describes an internship in the Innovation department of Worldline's Financial Processing & Licensing business line.

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2 Our objective

Your mission

- Explore new version of Hyperledger Fabric (optional)
- Install the blockchain on our virtualized infrastructure (Openshift/Kubernetes/Virtual Server)
- Implement and test a zero-knowledge protocol
- Setup and make performance tests

We offer the following trainings:

- Blockchain 101 training
- Hyperledger Fabric training
- Hyperledger Fabric for developers training (introduction)

3 Use Case: Blockchain and equensWorldline

Blockchain is a cutting-edge technology that allows the users to transfer value between peers, without the need of an intermediary, and instills trust by the use of cryptography. Smart Contracts adds rule-based business logic to the Blockchain which can replace time costly and error prone manual processes such as verification of certain conditions in a contract are met. Complex multi-actor business processes can be captured in the Blockchain while maintaining secrecy and privacy where needed. Blockchain and Smart Contracts enhanced with IoT harvests untapped opportunities in the payment and transaction processing industry.

As a researcher we would like you to implement and test a zero-knowledge protocol on Hyper Ledger Fabric, which is an open source permissioned blockchain (www.hyperledger.org/fabric).

“Hyperledger Fabric is a blockchain framework implementation and one of the Hyperledger projects hosted by The Linux Foundation. Intended as a foundation for developing applications or solutions with a modular architecture, Hyperledger Fabric allows components, such as consensus and membership services, to be plug-and-play. Hyperledger Fabric leverages container technology to host smart contracts called “chaincode” that comprise the application logic of the system.”

One of the deliverables of the internship will be the implementation and testing of a zero-knowledge protocol in Hyperledger Fabric. You will test and showcase the zero-knowledge protocol in Hyperledger Fabric. Finally you will prepare a Proof of Concept (PoC) of a use case in the financial industry.

Profile

- Student in the area of Computer Engineering (software or hardware) – or have some basic experience with Linux
- Coding skills: Golang, nodejs or Java (or able to quickly assimilate a new language)
- Able to perform an analysis on individual basis

4 Approach, expected time consumption & deliverables

Coaching & challenging by Jonathan Sauer, innovation FS Belux.

Day to day support from experts, working on Blockchain and payment processing platforms.

Additional input & support by R&D blockchain functional and technology experts.

- | | |
|---|----------------------|
| 1. Deepening Hyperledger Fabric knowledge | 5d (training + self) |
| a. Technology stack | |
| Output: Comprehensive summary of key values/risks | |
| 2. Defining Proof of Concept implementation to showcase the value | 5d (self + support) |
| Output: Description of conceptual implementation | |
| 3. Proof of Concept implementation | 20d (self +support) |
| Output: Deliver Proof of Concept showcase | |
| 4. Evaluation & Conclusions | 10d (self +support) |
| a. Business potential of zero-knowledge implementation | |
| b. Technology constraints & challenges | |
| Output: Deliver Proof of Concept showcase | |

Expected workload:

20d basic or 40d full (including optional PoC delivery)

Expected elapsed time:

3-6 months

Potential start time:

Asap

5 Introduction of equensWorldline

5.1 General introduction

As one of the largest and most innovative payment service providers for financial institutions and corporates in Europe, equensWorldline leads the market for future-proof payment and card solutions. We offer a complete and highly competitive portfolio, comprising cards issuing, cards acquiring and the complete payments value chain, including clearing & settlement. Our deeply rooted experience and our unique and independent position make us your most suitable and versatile partner in the European payments market.

Economies of scale

By maximizing economies of scale and scope and integrating the strengths and expertise of two leading players in the European payments industry – Equens and Worldline – equensWorldline is one of the leading and most innovative payment service providers for financial institutions and corporates in Europe. Managing approximately 100 million payment cards, processing c. 10 billion transactions, 6 billion ATM and POS transactions and employing 3,000 experts in payment, the company services over 250 banking clients throughout Europe. This allows our clients to benefit from the economies of scale, pan-European market coverage, innovative capabilities and a complete and flexible service portfolio.

Economies of scope

The European payments market calls for payment and card processors with a pan-European vision. Consequently, we have dedicated ourselves to the standardization and harmonization of European and worldwide payments. We offer full reach within the Eurozone and have a strategic partnership with the Federal Reserve Banks in the United States for the processing of intercontinental payments.

As we already work for a large number of banks and CSM-partners in Europe, our clients benefit from our economies of scale and scope. We offer European market coverage and have clients and partnerships in numerous European countries. Our strategy is geared towards further growth and economies of scale, with the aim of providing sustainable financial benefits to our clients – now and in the future.

Flexible and complete portfolio

equensWorldline has seized the arrival of SEPA as an opportunity to develop processing solutions for the whole intra-bank and inter-bank payment processing chain. Our solutions consist of a variety of service modules that together cover the whole of this chain. Our clients can outsource parts of the chain to us individually or in different combinations. On their behalf, we can take care of each of their process steps. This allows us to balance business cases more quickly, and also shorten the time to market for new services, which in turn reinforces the competitive position of our clients.

Recognizing local needs

The knowledge of local markets and the experience to respond to specific market demands is essential in enabling banks and CSMs to offer the level of service they already offer in their domestic markets. With offices in multiple European countries and clients and partners throughout

Europe, equensWorldline understands local market needs in Europe better than anyone. Our European presence, combined with our broad and varied local experience in different countries, allows us to respond efficiently to the varying local market situations and demands.

Independent partner

Processing has been equensWorldline' raison d'être for many years. We are not affiliated to one specific bank, and occupy a brand-independent position in the cards market. Our broad presence in Europe allows us to operate independently, set our own course, and define a European growth strategy that focuses on our clients.

5.2 Governance

equensWorldline is owned by Worldline and several major Dutch, German and Italian Banks. The shareholder structure of equensWorldline reinforces its position as a reliable, solid service provider.

5.3 Benefits

On several points banks can benefit from equensWorldline services and experience.

Reducing complexity and costs

- equensWorldline can reduce the bank's complexity; therefore the bank can focus on its core business and competencies.
- equensWorldline can turn the fixed costs into variable costs.
- Due to our large processing volumes, economies of scale and scope we can offer highly competitive rates.

Superior offering in the market

- equensWorldline provides even more efficient, reliable and highly innovative payment services.
- equensWorldline can deliver end-to-end, modular solutions, covering the overall value chains.
- One stop shopping: equensWorldline delivers payments and cards solutions and licensing services (realizing economies of scale and scope).
- equensWorldline is a solid company with a truly European footprint.
- equensWorldline is an expert in change management: we have dedicated teams of project/delivery managers supporting the implementation processes.

Process- and IT-capabilities

- equensWorldline has a long-term experience in payments and cards processing, we know your business processes and interdependencies, not only technology.
- equensWorldline can seamlessly integrate processes and technology.