Cactus-samples - Business Logic Plugins for Hyperledger Cactus

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<th>Project Title</th>
<th>Cactus-samples - Business Logic Plugins for Hyperledger Cactus</th>
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<tbody>
<tr>
<td>Status</td>
<td>COMPLETED</td>
</tr>
<tr>
<td>Difficulty</td>
<td>HIGH</td>
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Motivation

Given the end of the hype cycle of Blockchain technology, the technology is now maturing: the adoption of permissioned networks has increased in the last years, with Hyperledger technologies highlighting this adoption. Exploiting the case of permissioned blockchains, e.g., Hyperledger Fabric, smart contracts (chaincode) can be leveraged to a wide range of use case scenarios, where entities need to cooperate, sharing data and/or other assets. Nonetheless, smart contracts and the respective ecosystems they support have open issues: 1) they are tied to a specific blockchain implementation, and hence hinder optimal value delivery, and 2) services they provide rely on the survivability of a particular blockchain, even from the same blockchain infrastructure. In the light of these new problems, inherent to a broad variety of blockchain solutions, the blockchain interoperability research area appears.

Description

The Hyperledger Greenhouse, powered by the Hyperledger Foundation, provides several Business Blockchain Frameworks & Tools, some of which compose the state of the art private blockchains. In particular, Hyperledger Fabric is amongst the most famous permissioned blockchains; Hyperledger Indy tackles the first big initiative to promote decentralized identity support; Hyperledger Caliper is a comprehensive blockchain-testing framework; Hyperledger Quilt enables a specific type of blockchain interoperability - enables payments across any payment network — fiat or crypto - using the Interledger protocol.

A Hyperledger Summer Internship from last year, entitled "Towards Blockchain Interoperability with Hyperledger" highlighted the importance of interoperability for the Hyperledger ecosystem, through the produced academic paper, stressing that Hyperledger Cactus (Cactus), the most recent Hyperledger project, is a solid research direction.

Cactus is a blockchain integration tool designed to allow users to securely integrate different blockchains, promoting blockchain interoperability. This way, Hyperledger Cactus aims to provide Decentralized, Secure, and Adaptable Integration between Blockchain Networks. Hyperledger Cactus is currently undergoing a major refactoring effort to enable the desired to-be architecture which will enable plug-in based collaborative development to increase the breadth of use cases & Ledgers supported.

To fully explore Cactus’ capabilities, and to promote the project’s adoption, one needs several business logic plugins that realize cross-blockchain use cases (similarly to fabric-samples). Many are proposed on the whitepaper, but few are implemented.

Additional Information

Hyperledger Cactus

https://github.com/hyperledger/cactus

Recommended papers -

A Pub-Sub Architecture to Promote Blockchain Interoperability

A Survey on Blockchain Interoperability: Past, Present, and Future Trends

Learning Objectives

This internship intends to yield a fruitful learning experience, across several dimensions:

- Open-source and teamwork: You will learn how to contribute to an open-source project, test, and also document your work; You will be aware of the main efforts of the Hyperledger technologies, and how blockchain interoperability relates to that; You will interact with the Hyperledger community.
- Technical: You will refine your understanding of blockchain technology; You will strengthen your understanding of blockchain interoperability, taking a step forward to become an expert; You will refine your programming skills, both in client-side applications and in chaincode.
- Scientific: You will learn, or perfect your knowledge, on the research of a challenging topic; You will have the opportunity to write a scientific paper that may have a high impact on academia.

Expected Outcome
The expected outcome tackles the whole Hyperledger Ecosystem. In particular, the project includes Hyperledger Cactus.

- 1) Implementation of a set of use cases in the form of business logic plugins
- 2) Testing and documenting the business logic plugins
- 3) Scientific paper (or technical report) on the achieved results, that can be used to disseminate the knowledge created on this internship

Relation to Hyperledger

Hyperledger Cactus (main), and projects Cactus connects to: Hyperledger Fabric, Hyperledger Besu, among others.

Education Level

Masters or Ph.D. level students are preferred. Experience in scientific research is recommended (but not required).

Skills

Must:

- Willing to contribute to a meaningful mission, in an open-source mentality
- Teamwork skills, as synergies and cooperations with other parts, are needed to successfully complete the project
- Solid understanding of blockchain technology
- Experience with Typescript

Nice to have:

- Research experience (if you don’t, no worries - we can help!)
- Understanding of blockchain interoperability (please refer to the recommended papers)

Future plans

The end of the internship does not need to mean an end to your collaboration. The idea is for the mentee to be connected to the Hyperledger’s ecosystem, contributing to blockchain interoperability solutions.

Preferred Hours and Length of Internship

Full-time.

Mentor(s) Names and Contact Info

Rui Cruz, Ph.D., Senior Member IEEE, Researcher at INESC-ID, Assistant Professor at Instituto Superior Técnico, Universidade de Lisboa: rui.cruz@ieee.org, rui.s.cruz@tecnico.ulisboa.pt

Rafael Belchior, Junior Researcher at INESC-ID; Teaching Assistant and Ph.D. candidate at Instituto Superior Técnico, Universidade de Lisboa: rafael.belchior@tecnico.ulisboa.pt

Peter Somogyvari, Technology Architect, Accenture: peter.somogyvari@accenture.com

Mentee

Tzu-Shen, Wang (Texas A&M University)

Project Results

https://github.com/jscode017/cactus/tree/merge

And a pending academic paper(would appear here once published)