Introduction

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Hyperledger Project: Visualization and Analysis of Cross-chain Transactions
Visualization and Analysis of Cross-chain Transactions

Project Description:

- creating a framework to assess the performance of a BI solution
- analyzing and visualizing cross-chain transactions can help stakeholders understand bottlenecks, identify processes, discover security issues, and provide more control over a blockchain interoperability solution
- the two main research questions explored: i) How to visualize cross-chain rules?, and ii) What are the relevant metrics to assess cross-chain transactions and solutions?
- working with: Hyperledger Cactus, Fabric and Besu
- using: Typescript, Node.js
Visualization and Analysis of Cross-chain Transactions

Project Objectives:

- **Obj 1:** Understand the architecture of Hyperledger Cactus
- **Obj 2:** Conducting a User Study
- **Obj 3:** Implementation of the solution (CC-TX-VIZ plugin)
- **Obj 4:** Writing of the Technical Report of the project
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Project Deliverables:

- **Deliverable 1:** User Study Plan & User Survey
- **Deliverable 2:** Github branch/ the code for the new plugin
- **Deliverable 3:** Technical Report
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Project Execution:
<User Study>

Experience with blockchain technology (in years):
26 responses

- 0-1: 5 (19.2%)
- 2-3: 6 (23.1%)
- 3-5: 10 (38.5%)
- more than 5: 5 (19.2%)

Job title:
26 responses

- Software Developer: 9 (34.6%)
- Business Analyst: 1 (3.8%)
- Project Manager: 1 (3.8%)
- Blockchain Architect: 9 (34.6%)
- Academic (e.g. Professor, Researcher): 4 (15.4%)
- UX Designer: 0 (0%)
- C-level (e.g. CEO, CTO): 3 (11.5%)
- Investor: 3 (11.5%)
- Data Scientist: 1 (3.8%)
- Content writer: 1 (3.8%)
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**Project Execution:** <User Study - metrics>

<table>
<thead>
<tr>
<th>Metrics</th>
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<tbody>
<tr>
<td>END TO END latency</td>
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<tr>
<td>END TO END throughput</td>
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<tr>
<td>Parties endorsing transactions</td>
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<tr>
<td>Cross-chain logic</td>
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<td>Total transactions fees</td>
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<td>Carbon footprint</td>
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<td>Energetic consumption</td>
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</table>
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› Project Execution: <Cactus Carbon Emissions Use Case>

- **Tx1** - converting the energy into emissions
- **Tx2** - tokenizing the emissions

**Rule1** - Fabric gathering the energy used and converting it to emissions
**Rule2** - emissions are tokenized as emission tokens on the Ethereum network
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› Project Execution: <CC-TX-VIZ plugin architecture>
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› Project Execution: <CC-TX-VIZ plugin architecture>
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Most challenging:
- keeping up with the Hyperledger Cactus main branch and merging
- finding a proper way to visualize the cross-chain logic (because there are no references)
- getting as many responses as possible to the survey; conducting a user study in summer (as it’s even harder to reach people because they are on vacation)
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Recommendations for future work:
- formalizing the cross-chain logic and cross-chain state concepts;
- working towards creating an interface that allows us to visualize the most important metrics according to the respondents: end-to-end latency and throughput, total transaction fees, and visualization of cross-chain rules.
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› Project Output or Results:
  › https://github.com/hyperledger/cactus/issues/1214
  › https://github.com/hyperledger/cactus/issues/1216
  › Code here: https://github.com/maramih/cactus/tree/cctxviz
  › Technical report (to be finished)
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Insights Gained:
- The process of open source project development
- Learned how to build a plugin and write code with better readability
- In research you need to have a lot of patience (a lot of iterations are needed to get something right)

Advice:
- Take your time to learn and understand the things
- Keep up with the main branch
- Ask more specific questions and don’t be afraid to try new things
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› A big THANK YOU to my mentors (Rafael & Sabrina) and also to the members of the community.
THANK YOU!