Hyperledger Mentorship Project Presentation

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Blockchain Integration for Climate Emissions Data with Fabric and Cactus

Introduction

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Hyperledger Project: hyperledger-labs/blockchain-carbon-accounting, hyperledger/cactus
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> **Project Description:**

- Blockchain Carbon Accounting is part of Climate Action SIG project. It contains
  - Utility Emissions Channel: A permissioned Hyperledger Fabric channel where an auditor calculates the emissions of a customer's electricity based on its utility bill.
  - Net Emissions Tokens Network: A Ethereum smart contract which converts emission data present in utility emissions channel into a tradable emissions token.

- HL Cactus is pluggable, decentralized blockchain integration tools which allow user to securely integrate multiple blockchains.

- **Tech Stack:** Typescript, Node.js, Express, Docker, HashiCorp Vault
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Project Objectives:

- Obj 1: Carbon accounting server should use HL cactus to integrate Utility Emissions Channel (HL Fabric) and Net Emissions Tokens Network (ethereum).
- Obj 2: Fabric client’s Private Key Management with hashicorp vault.
- Obj 3: Prevent double minting of emission token problem.
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Project Deliverables:

Deliverable 1: Replace direct dependence of carbon accounting application on fabric-node-sdk and ethers pkg with cactus packages.

Deliverable 2: Add Support for signing of HL Fabric Transactions with private key stored as transit key in vault server.

Deliverable 3: Prevent double minting of emissions token during `record audited emissions token` operation.

Deliverable 4: Vault Identity management server for the carbon accounting application.
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Project Execution & Accomplishments:

Deliverable 1: https://github.com/hyperledger-labs/blockchain-carbon-accounting/pull/289

Deliverable 2: https://github.com/hyperledger/cactus/issues/1212
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Project Execution & Accomplishments:

- https://github.com/hyperledger/cactus/pull/1243: add support for vault transit secret engine

```json
{
    "type":"Vault-X.509",
    "mspid":"----",
    "credentials":{
        "certificate":"-----BEGIN CERTIFICATE--------
--------END CERTIFICATE-----
"
    }
}
```

Fig : Data stored in certificate datastore
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› Project Execution & Accomplishments:

› Deliverable 3:
https://github.com/hyperledger-labs/blockchain-carbon-accounting/pull/290
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Project Execution & Accomplishments:


Most proud: proposal and implementation of vault identity for HL Fabric.

Most challenging:
- Understanding cactus’s architecture.
- Understanding Hashicorp vault server.
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Recommendations for future work:
1. Design and implement ethereum transactions signing with vault’s transit key.
2. Build UI for carbon accounting project which uses api server.
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› **Project Output or Results:**

› Carbon Accounting api server is now production ready with good number of test case to increase the maintainability of the codebase.

› Better fabric client’s private key management with vault transit engine.

› Double minting of token is prevented with fabric dataLock chaincode.
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Insights Gained:
› Learnt about workflow of a community driven open source projects.
› Working with peer developers from across the globe.

Advice:
› Design and plan before jumping into the coding part.
› Set daily or weekly targets.
› Document daily progress.
› Reach out to mentors, community member to seek advice and feedback.
THANK YOU!