

Custody Transfer using Hyperledger Fabric 2.2

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Agenda

Introduction

Custody Transfer and Hyperledger Fabric

Related Work

Design and Architecture

Implementation

Conclusion

Future Scope

Motivation

- Exploration of Oil and Gas Industry!
- Characteristics of Blockchain Technology [1]
 - DECENTRALIZATION
 - IMMUTABILITY
 - TRANSPARENCY
 - EFFICIENCY
 - SECURITY

Introduction

- Stakeholders in Custody Transfer
 - Buyer
 - Seller
 - Buyer and Seller Governments
 - Transportation Companies
- Custody Transfer Process [2]
 - Production
 - Measurement Process and Metrological Data
 - Transfer Process
 - Cost and Taxation
- What is Hyperledger Fabric?

Custody Transfer Scenario

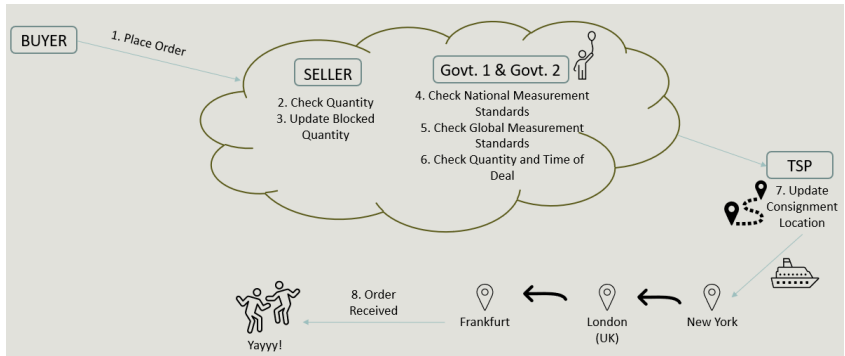


Figure: A normal process in Custody Transfer

Importance of Blockchain in Custody Transfer

- Challenges in Custody Transfer Process
- Use of Blockchain in various stages of Custody Transfer
 - Upstream
 - Midstream
 - Downstream
- Use of Blockchain in Metrology [3]
- Benefits to Governments

Related Work

- Wipro has illustrated how Blockchain is used to lower the cost and improve user experience by ensuring transparency in the provenance, ownership, quality and volume at each transfer point of a product (like, oil or gas) in the value chain. [4]
- FedEx utilizes autonomous and distributed ledger capabilities of Blockchain for all shipments effectively as a single solution. [5]
- Dior and Louis Vuitton use the same for tracking luxury goods. [6]
- The Blockchain Track and Pay solution of Accenture [7]
- Digital Evidence Handling using Blockchain [8]

Architecture

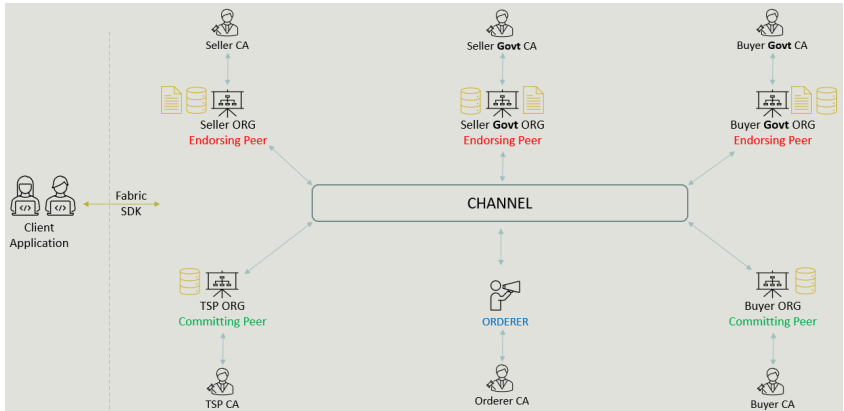


Figure: Architecture of Custody Transfer using Hyperledger Fabric

Implementation

- Network Setup
- Smart Contracts
- Client Application

Network Setup

- Prerequisites
- Creating Network using Docker and Hyperledger Fabric Framework
 - 5 Organisations, each having 1 Peer node
 - Single Channel
 - Ledger: CouchDB per Organisation
 - Certification

Smart Contracts

- A smart contract is at the heart of a Blockchain
- Ethereum Smart Contracts vs. HLF Smart Contracts
- Fabric chaincode lifecycle
- Library: fabric-contract-api
- Language: Node JS
- Asset: Crude Oil

Client Application

- Pattern: Model-View-Controller Pattern
- Language: Node JS
- Framework: express, ember







Conclusion

- Hyperledger Fabric
 - Cutting-edge Framework for Blockchain
 - Open Source
 - Free to Use
 - Supported by IBM
 - Permissioned Membership
- Blockchain Technology - Best suited for Custody Transfer
 - Transparency, visibility and streamlined transactions across stakeholders
 - Fewer disputes
 - System-driven verification and automation of payments based on commodity volume exchange
 - Availability of entire exchange history for faster resolution in case of difference of opinion

Future Scope

- Multiple Countries
- Additional Features
 - Display Buyer's Volume, Location of Asset
 - Login functionality for Governments
 - Automation of Taxation and Billing Service based on Rate, Time and Volume
 - Display Metrological parameters such as Temperature, Pressure, Level, Flow Rate

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