AquaTrustChain

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HYPERLEDGER FABRIC USE CASE

Bulk donation of water to the world's most vulnerable communities.

PROBLEM STATEMENT

Scarcity of water globally, water quality issues, and wasted water from processing fruits and vegetables poses significant challenges to millions-billions of people around the world as per UN there are 4 billion people facing severe water shortages monthly in a year. In today's increased pollution, over-extraction, and climate change, water sources are under stress.

Our use case focuses on the donation of water across NGO's and other organizations conducting donation drives. The challenge is to distribute high-quality water efficiently and ensure transparency and trust in the donation process, reducing the risk of scams and ensuring communities across different regions have access to high quality water

SOLUTION

This opens up the innovative solution from Botanical Water Technology (BWT) partnering with Fujitsu, as Botanical Water Technologies have found a way to recover wasted water from production of alcohol, juice, ketchup and sugar. BWT uses a different approach to process, extract, and purify water from plant-based resources by capturing these evaporative condensates wherein they cool and process it, creating a sustainable and high-quality water.

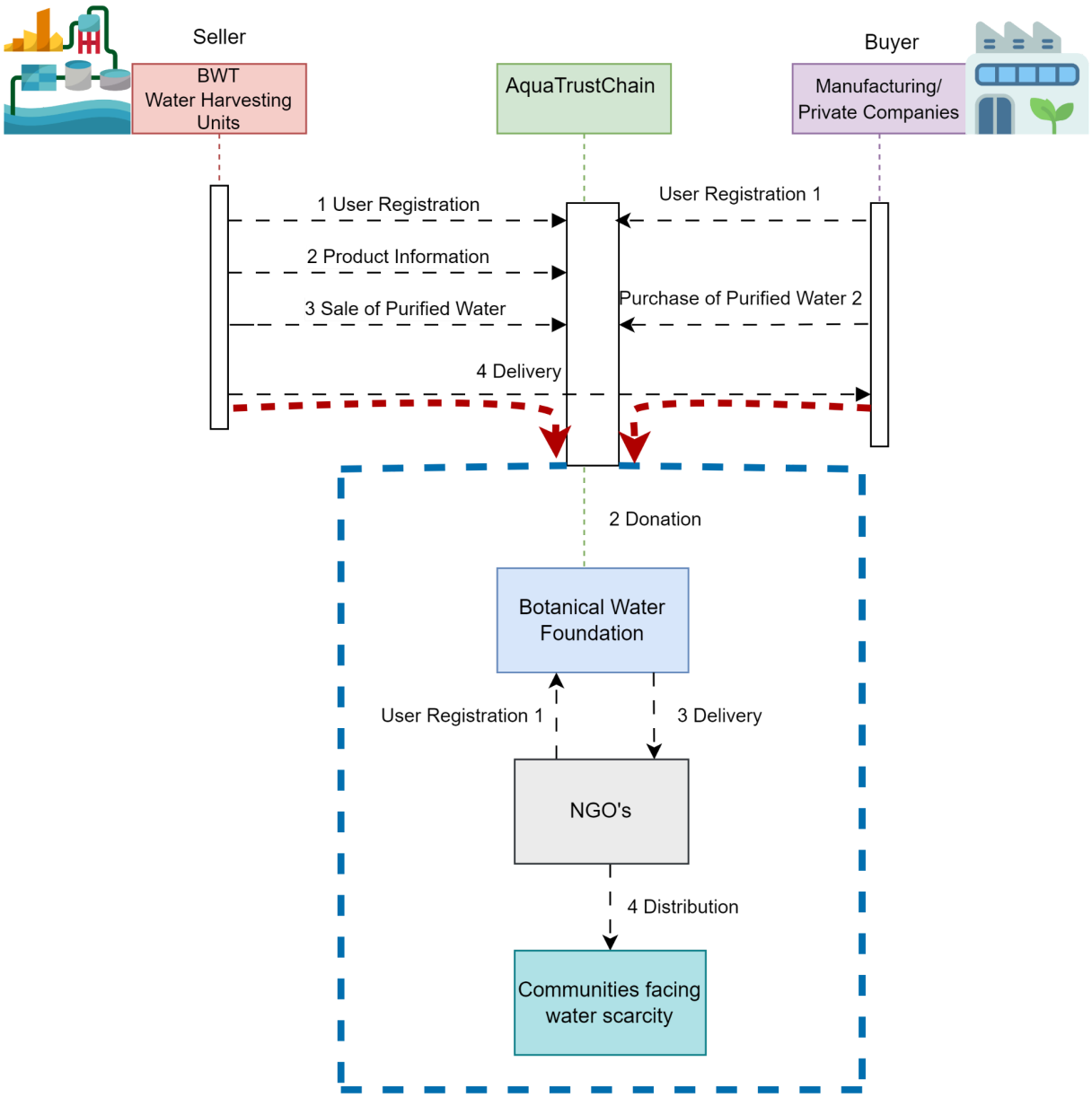
In our case AquaTrustChain is the trading platform which acts as the bridge between buyers, sellers and donations provided to the NGO's and other organizations conducting donation drives.

Fujitsu brings these technological advantages to BWT and AquaTrustChain:

- **IoT Devices**: installed in water harvesting units to detect and monitor water quality such as pH levels, temperature and dissolved oxygen levels through BWT's water treatment process.
- **AI and Machine Learning**: used to analyze data from IoT devices, identifying irregularities with water quality and verifying water quality based on potable regulations
- **Hyperledger Fabric**: creating a botanical water exchange(AquaTrustChain) ensuring transparency, traceability, and immutable records for both trading and donation transactions while recording the water quality data

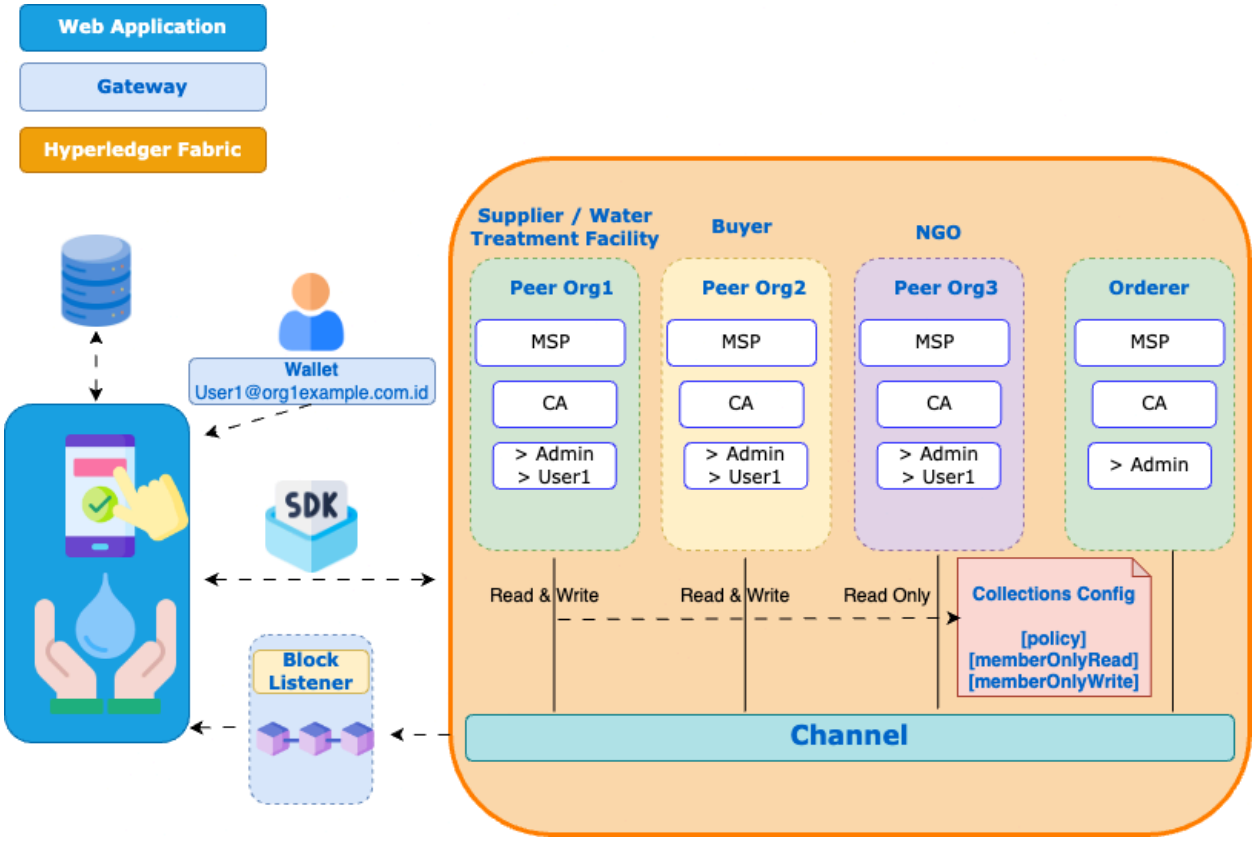
This project focuses on the bulk donation part of the Botanical Water Technology (BWT) blockchain solution.

USE CASE SEQUENCE DIAGRAM



Within the platform's AquaTrustChain underneath is a Botanical Water Foundation which covers the donation portion of the platform, where each trade on AquaTrustChain allocates a minimum of 1% for donation purposes. In addition, both Supplier and Buyer can donate. NGO's are required to register within the platform to be accredited within the foundation enabling them to receive donations from BWT and AquaTrustChain. The NGO's can now conduct the donation drives to the vulnerable communities facing water scarcity.

ARCHITECTURE



The AquatrustChain solution is composed of a web application, gateway, chaincode and the Hyperledger network with 3 organizations as peer nodes and 1 orderer which is owned by the water treatment facility who initiated the project. MSP contains a list of permissioned identities. It has a set of folders that are added to the network configuration and are used to define an organization. CAs generate the certificates that represent identities. MSP also turns an identity into a role by identifying specific privileges an actor has on a node or channel which are Admin and Peer. The orderer receives transaction proposals from peer nodes, orders them into a block and does transaction batching before distributing the blocks back to the peers in the network. The peer nodes simulate and endorse transactions based on predefined endorsement policies at configtx.yaml. In addition, it ensures that transactions are valid according to application-specific rules and that the required endorsements are met before submitting transactions to the ordering service. When a user sends a donation, the user identities are retrieved from the wallet that are used along with the connection profile, a JSON object that specifies the network configuration for a specific organization, to connect to the Fabric network. This gateway used in connecting to the network to invoke and query the chaincode uses the fabric-network SDK. The collections config sets up rules for managing private data on the network, ensuring secure and controlled access according to defined organizational policies. Org1 and Org2 have both read and write access; whereas, Org3 has read-only access. A block listener has been added to listen to block events. In this flow, the block number created from

the transaction is retrieved from the block event emitted.

SUMMARY

Water scarcity caused by climate change and water quality issues due to over extraction poses significant challenges worldwide. On top of that wasted water from food and beverage production strains global water resources. In addition to these challenges is the transparency and trustworthiness during these donation drives which are often compromised by scams.

AquaTrustChain, which is powered by Botanical Water Technology and Fujitsu, is an innovative exchange platform that solves these problems. Leveraging Hyperledger Fabric which becomes the source of all truth, AquaTrustChain ensures transparency, traceability, immutability of records from trading to donation transactions, water quality data, and user data. Facilitating efficient and secure transactions between the buyers, sellers, and the organizations that conduct donation drives, this platform does not only optimize the distribution of high-quality water but also mitigates the risk of fraud. Bringing trust in an untrusted situation.

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