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Smart Contract Based Agricultural Crop Supply Chain Traceability

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Abstract: The complexity of an inventory network makes item welfare or quality issues extremely difficult to track, especially for the critical rural food supply networks that people rely on every day. The contemporary agricultural crop supply chains present a number of important issues, including a large number of participants, cumbersome correspondence caused by long production network cycles, member information uncertainty, and the included framework. The advancement of block chain technology addresses a problem that exists in the discernibility arrangement of rural food supply networks. This paper proposes a system based on consortium and smart contracts to track and trace the workflow of agricultural food supply chains, implement trace ability and share ability of supply chains, and breakdown the information islands between enterprises as much as possible to eliminate the need for central establishments and organizations and work on the accuracy of exchange records, unwavering quality, and security. Simultaneously, ranchers keep file IPFS hashes in dazzling agreements, enhancing information security and alleviating the block chain storage blast issue. Shanwei Lv fengyuan Modern Agricultural Development Co., Ltd has used this framework. Despite the fact that there are still numerous flaws, the framework has effectively implemented functionalities such as disintermediation and tracking of farming item data via QR codes.

Keywords: should be listed. Block chain, brilliant agreement, rural food inventory network, recognizability, and sanitation are all terms that come to mind while thinking about blockchain.

I. INTRODUCTION

Inventory networks connect various entities such as suppliers, logistics providers, processors, distributors, retailers, and customers to form complex network chain structure. This confusing inventory network could go through a few or perhaps a lot of stages, requiring a lot of time and involving a lot of different places. As a result, The recognizability cycle is extremely challenging if the item has security or quality issues. The technique assures the traceability of the final items, which not only secures consumer life and health but also builds client faith in the item and endeavor, especially in agrarian food supply chains. As a result of recent widespread food handling incidents, people are paying more attention to food handling and quality. However, because current agricultural crop supply chains have a long-life cycle, numerous and complex links, and changing data, it is difficult to track difficulties in a given connection. Rural food variety are agriculturally produced foods such as sorghum, rice, peanuts, corn, and wheat that form the foundation of people's daily diets, and their importance is indisputable. As a result, laying out and developing the horticulture food inventory network discernibility framework "from ranch to fork" is critical. There are three major problems with today's agrarian food supply networks. To begin with, the production network has a large number of members, and communication between them is inefficient, resulting in a protracted pattern across the entire inventory network. The data sharing is weak, and information is not trusted among members, due to the large number of members and circulation in multiple connections.

II. LITERATURE SURVEY

Crop is the foundation of people's endurance, and Crop handling is inextricably linked to people's health: as a result, people are paying increasing attention to sanitation. Crop recognizability has recently become a source of inspiration for specialists. The Internet of Things (IoT) innovations, including standardized IDs, QR codes, and RFID innovations, are the first innovations applied to the detectability of sanitary appliances. In light of QR codes, Li et al. suggested a food recognizability architecture for the dairy production network, which increases transparency from production through distribution and creates a food detect ability stage. However, QR codes are not suitable for living organisms such as poultry and waterfowl, and they are easily contaminated. Because of its low cost and small size, RFID is the most widely used IoT innovation for recognising food recognizability. De-anetal. created a pork supply chain recognizability framework based on RFID. Yiying et al. devised a comprehensive life cycle food detectability system that use RFID technology to track the full interaction from source to consumption. Simultaneously, the RFID

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deficiency open minded tool is designed to ensure the framework's viability. To create a simple Agricultutal store network.

III. PROBLEM STATEMENT

To ensure product safety, it is important to monitor agricultural development and ensure efficient logistic management in the food and agricultural supply chain. The growing concerns about food safety and contamination risks have renewed the focus for enhanced traceability across the supply chain. In addition, agricultural products being traded across several countries require precise tracking and conformance to country specific regulations. Product traceability in the agricultural supply chain requires accurate identification of suppliers and the collection, transmission, and management of critical information through the exchange of various information within the supply chain. The dynamic nature of information in the agricultural/food supply chain where products are produced, processed and sent via several intermediaries makes it difficult to track and trace.

IV. PROPOSED FRAME WORK

We present a blockchain-based solution and framework for traceability and visibility in the crop supply chain using smart contracts. We discuss and highlight key aspects of our block chain solution in terms of the overall system design and architecture, featuring main interactions among the main participants, with entity relations and sequence diagrams. We present, implement, and test smart contract a that govern and ensure the proper interactions among key stakeholders in the supply chain.

A. System Architecture

In this architecture, the seed seller sells the seeds to farmer, and farmer buys the seeds sold by the seed seller, Insurance company accepts or rejects the insurance applied from farmer. Farmer can buy the seeds sold by seed seller and also farmer can upload the details of the crop. The crop details uploaded by the farmer can be viewed from distributor and he can buy the crops. The crop transaction made by distributor can be viewed by farmer. The details uploaded by distributor can be viewed by retailer, and they can buy the crop from distributor.

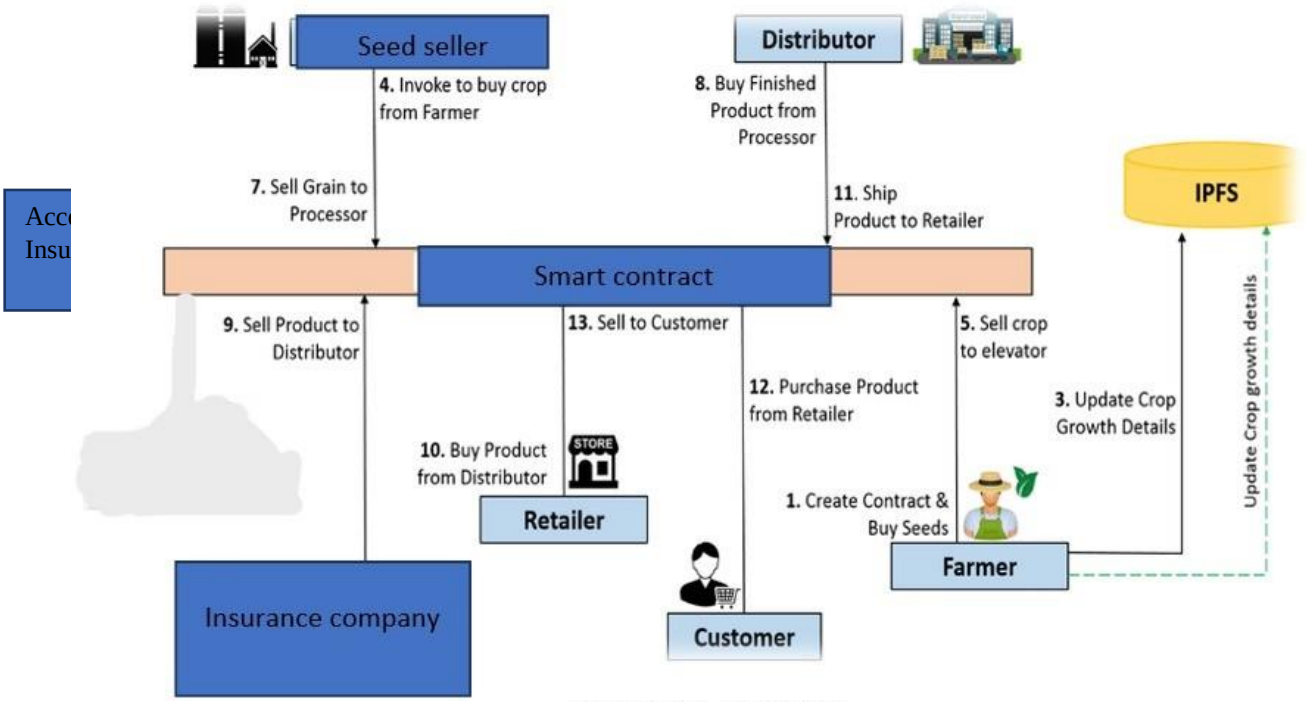

Fig 1: System Architecture

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V. IMPLEMENTATION

The program will be updated with all buyers' transactions and report will be produced. These transaction data will be saved in the application in hash format.

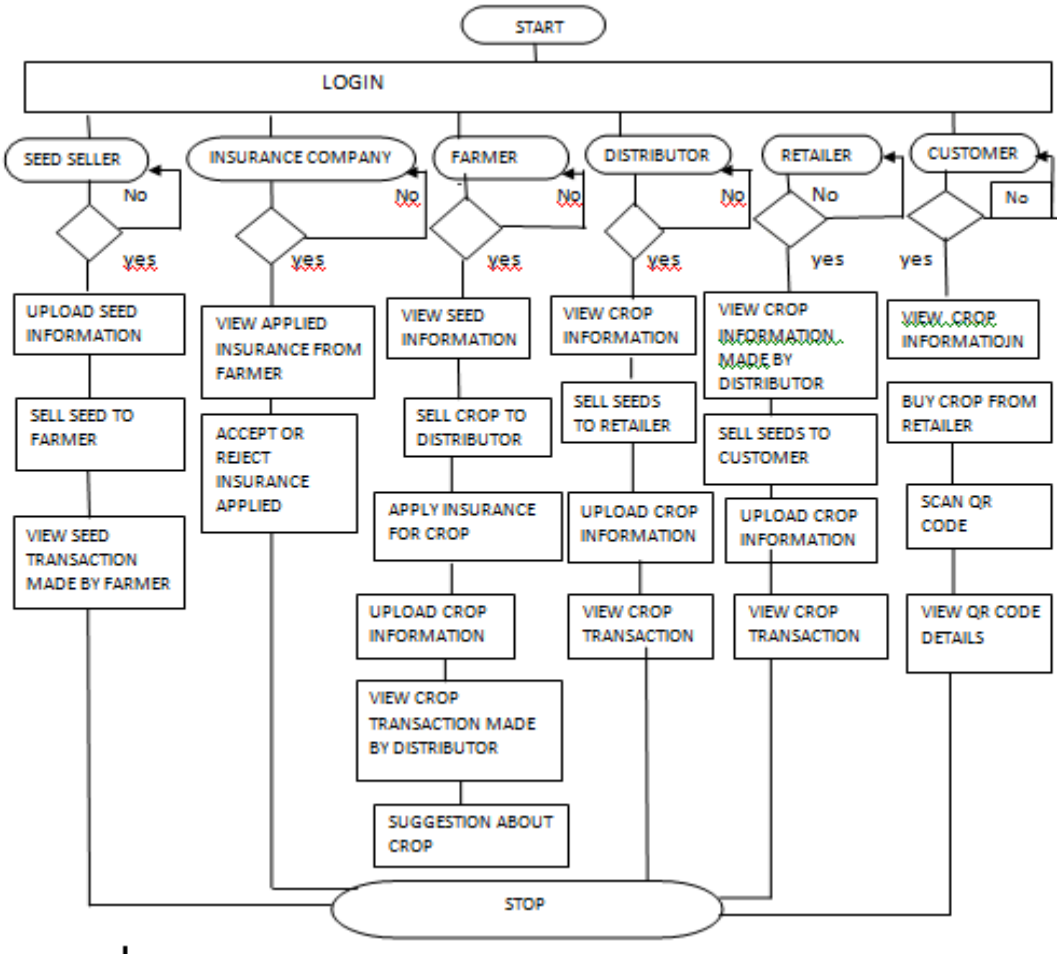

Fig 2: Flow Chart

VI. BACKGROUND TECHNOLOGIES

A. Blockchain

As previously said, block chain is a distributed record system made up of one-by-one blocks with timestamps in the form of a decentralized database in a peer-to-peer network. Blockchain technology has gradually gained widespread notice as the foundational invention of Bitcoin. Although this new concept has just become a fiercely disputed topic, the truth is that several of the inventions it relies on, such as halter kilter encryption and P2P network architecture, have been around for quite some time. Regardless, blockchain is a good combination of encryption technology, consensus algorithms, timestamp innovation, and clever agreements, defining a dispersed framework where clients can be anonymous and information can be trusted. Decentralization, immutability, anti-tampering, and traceability are just a few of the advantages. Clinical treatment, training, credit, and production network recognizability have all seen extensive. The association between blocks is produced by the hash value of the previous block, which is the exceptional identifier of each block, as can be seen from the diagram. Along these lines, the association between the block furthest down the line and the first block is generated by the sequence of each block to its parent hash value, resulting in a data structure-like form. The block is made up of a header and a body The difficulty of mining is determined by the block difficulty. The previous block hash is used to associate the prior block, and the nonce is the solution to the numerical statement the miners are seeking for. The timestamp represents the age of each block, which corresponds to the authentication of each transaction record, ensuring the transaction record's authenticity. The body is primarily made up of sharing information. There are three types of blockchains: public chain, private chain, and consortium chain. Anyone can send transactions and participate in the agreement cycle on the public chain. "Complete decentralization" describes

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the entire organization, which is open, without approval. The confidential chain is, for the most part, the blockchain within the organization, whose authority is totally in the hands of an association or an individual, with the least amount of decentralization possible.

The consortium chain is a unique blockchain that requires enrollment and consent: it is only open to specific organizations or institutions, so it can keep up with the disseminated structure, limit the number of members, and must be verified in the blockchain through pre-set hubs, thereby improving security. The agreement calculation is done by approving information and blocks through pre-selected hubs rather than all hubs in the network, which speeds up block generation and reduces the time it takes to reach agreement and approve information. As a result, the consortium chain has characteristics such as few agreement hubs, high framework activity efficiency, and swift transaction speed. Agricultural food traceability systems have high security, exchange speed, and internal management requirements: assuming that each member joins the consortium chain, these frameworks, combined with the clever agreements method, can truly resolve the issue that existing agricultural food trace ability system sare established based on a single venture development, thus upsetting data islands between ventures to make the reception of consortium chains in a timely manner. Hyperledger is a collaborative open-source project created by the Linux Foundation in 2015 to enhance blockchain technology innovation and exchange verification. It is the first widely distributed record stage for large-scale corporate applications, including innovation and financial behemoths such as IBM, Intel, Cisco, and R3. Hyperledger is divided into three categories: distributed record innovation, libraries, and instruments. Texture is Hyperledger's major application venture, which is a general permit blockchain with sequestered and expandable attributes that follows the execution-grouping approval worldview and deviates from the request execution model on a very basic level. Texture is divided into four sections:

1. Describing the jobs between framework hubs;
2. Executing clever agreements;
3. Configurable consensus;
4. Membership services, whose architecture provides a high level of confidentiality, flexibility, and extensibility applicable to any business.

Hyper Ledger creates a consortium chain using a channel and a membership service provider (MSP) to manage node permissions. Channel, as an important communication system, is an autonomous communication channel between members where transactions are only visible to those who have a position with the channel. Different directs may exist within the organization, and each channel maintains its own record channel.

B. Farming Crop Traceability Based on Blockchain

We use the Hyperledger structure to build consortium chains and brilliant agreements called chain code to follow and execute transactions in the agricultural crop supply chain in this segment. This method eliminates the need for a central authority, acknowledges decentralization, and provides total, dependable, and secure transaction records for the management and security of the rural food production network, ensuring the accuracy and consistency of the farming crop data that eventually reaches the customer.

CONCLUSION

Smart Agreement can combine agriculture and rural hygiene with a logically linked framework to ensure the quality and safety of horticultural crops and the safety of buyers. On the Hyper-Ledger platform, this study proposes a structure for using computerized brilliant agreements. When the conditions are reached, the clever agreement naturally sends the preset information values, including the occurrence of the trigger condition specified in the agreed contract. This is a system of transaction handling modules and state instruments that do not create or update smart contracts, but rather enable a complex set of digital commitments with trigger conditions to be implemented appropriately based on the participants' wishes. Smart contracts are the result of an agreement and are carried out by a large number of hubs spread across the globe. Hubs are one of the components of the blockchain network, and they play a role in the farmed crop production network. These hubs may collect, approve, and execute trades, as well as record the data and results of these trades in a ledger that will be reproduced and synced by all nodes. As a result, all nodes share the same ledger information. As previously stated, smart contracts receive transactions and trigger events in the form of function calls, allowing participants to constantly check, track, and receive appropriate warnings when infringement occurs. To achieve detectability of horticulture crop, data is recorded using Hyperledger bright agreements, and all members of the agricultural crop supply chain are included in the process, Rancher data among other things are recorded. Timestamps deal with the whole and verifiable information that already exists at a certain moment in time, giving Heuser electronic proof of when a portion of the client's data was created. The IPFS hash of a file is saved in clever agreements (1) Anti-altering: Once you've marked anything, make sure you don't change it.

The horticulture crop store network completes the entire presentation and transportation procedure "from ranch to fork," incorporating several partaking elements and molding long and intricate attributes that make tracking the entire

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cycle extremely difficult. The hash of the information is stored in the Hyperledger, to solve the block chain data explosion and IPFS restrictions. To limit blockchain peruses and composes, an access control technique is implemented, ensuring that exchanges are carried out by authorized clients and enhancing information security. Furthermore, clever contracts only allow specific substances to execute. QR code is used to track the crop supply details in a single way.

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