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Implementation of Supply Chain Management in Agriculture using Blockchain

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Abstract: *Block chains are now firmly established as a digital technology that combines cryptographic, data management, networking, and incentive mechanisms to support the verification, execution, and recording of transactions between parties. While block chain technologies were originally intended to support new forms of digital currency for easier and secure payments, they now hold great promise as a new foundation for all forms of transactions. Agribusiness stands to become a key beneficiary of this technology as a platform to execute 'smart contracts' for transactions, particularly for high-value produce. First it is important to distinguish between private digital currencies and the distributed ledger and block chain technologies that underlie them. The distributed and cross-border nature of digital currencies like Bitcoin means that regulation of the core protocols of these systems by central banks is unlikely to be effective. Monetary authorities are focused more on understanding 'on-ramps' and 'off-ramps' that constitute the links to the traditional payments system rather than being able to monitor and regulate the currency itself. In contrast to the digital currency feature of block chain, the distributed ledger feature has the potential for widespread use in agribusiness and trade financing, especially where workflows involve many different parties with no trusted central entity.*

Keywords: Block-chain, Advanced Encryption Standard(AES).

I. INTRODUCTION

An increasing demand in society for greater information about food reflects the need for more transparency and the lack of trust. At the same time, more and more food products and beverages are branded and accompanied by a variety of certification schemes, with an increasing risk of fraud (selling unqualified product with high-quality labels or claims) and adulteration. In the current situation, much of the compliance data and information is audited by trusted third parties and stored either on paper or in a centralized database and these approaches are known to suffer from many informational problems such as the high cost and inefficiency of paper-based processes and fraud, corruption and error both on paper and in IT systems. These information problems, indicating that current transparency and trust systems have not been able to solve or at times even have exacerbated the problems of low transparency and trust in agrifood chains, pose a severe threat to food safety, food quality,and sustainability. In particular, food integrity has become a major concern. Food integrity refers to the fairness and authenticity of food in food value chains both at the physical layer and the digital layer, where the digital layer should provide reliable and trustworthy information on the origin and provenance of food products in the physical layer. Blockchain technology provides a means to ensure permanence of records and potentially to facilitate the sharing of data between disparate actors in a food value chain. This potential may lead to an exciting paradigm shift facilitating transparency and trust in food chains that ensures food integrity.

II. RELATED WORK

Blockchain-Based Soybean Traceability in Agricultural Supply Chain, Khaled Salah ; Nishara Nizamuddin ; Raja Jayaraman ; Mohammad Omar Published in: IEEE Access (Volume: 7) proposed solution eliminates the need for a trusted centralized authority, intermediaries and provides transactions records, enhancing efficiency and safety with high integrity, reliability, and security. The proposed solution focuses on the utilization of smart contracts to govern and control all interactions and transactions among all the participants involved within the supply chain ecosystem. All transactions are recorded and stored in the blockchain's immutable ledger with links to a decentralized file system (IPFS) and thus providing

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to all a high level of transparency and traceability into the supply chain ecosystem in a secure, trusted, reliable, and efficient manner.

Blockchain-based traceability in Agri-Food supply chain management: A practical implementation Miguel Pincheira Caro; Muhammad Salek Ali ; Massimo Vecchio ; Raffaele Giaffreda Published in: 2018 IoT Vertical and Topical Summit on Agriculture - Tuscany (IOT Tuscany)This paper presents AgriBlockIoT, a fully decentralized, blockchain-based traceability solution for Agri-Food supply chain management, able to seamless integrate IoT devices producing and consuming digital data along the chain. To effectively assess Agri BlockET, first, we defined a classical use-case within the given vertical domain, namely from-farm-to-fork. Then, we developed and deployed such a use-case, achieving traceability using two different blockchain implementations, namely Ethereum and Hyperledger Sawtooth. Finally, we evaluated and compared the performance of both the deployments, in terms of latency, CPU, and network usage, also highlighting their main pros and cons.

Blockchain Based Provenance for Agricultural Products: A Distributed Platform with Duplicated and Shared Bookkeeping Jing Hua ; Xiujuan Wang ; Mengzhen Kang;

Haoyu Wang ; Fei-Yue Wang Published in: 2018 IEEE Intelligent Vehicles Symposium (IV) In this paper, we propose an agricultural provenance system based on techniques of blockchain, which is featured by decentralization, collective maintenance, consensus trust and reliable data, in order to solve the trust crisis in product supply chain. Recorded information includes the management operations (fertilizing, irrigation, etc.) with certain data structure. Applying blockchain techniques to the provenance of agricultural products not only widens the application domain of blockchain, but also supports building a reliable community among different stakeholders around agriculture production.

An agri-food supply chain traceability system for China based on RFID & blockchain technology Feng Tian Published in: 2016 13th International Conference on Service Systems and Service Management (ICSSSM) In this paper, we study the utilization and development situation of RFID (Radio-Frequency IDentification) and blockchain technology first, and then we analyze the advantages and disadvantages of using RFID and blockchain technology in building the agri-food supply chain traceability system; finally, we demonstrate the building process of this system. It can realize the traceability with trusted information in the entire agri-food supply chain, which would effectively guarantee the food safety, by gathering, transferring and sharing the authentic data of agri-food in production, processing, warehousing, distribution and selling links.

Blockchain application in food supply information security Daniel Tse ; Bowen Zhang ; Yuchen Yang ; Chenli Cheng ; Haoran Mu Published in: 2017 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)This article introduces the concept of Blockchain technology, putting forward the application of Blockchain technology in information security of the food supply chain and comparing it with the traditional supply chain system.

III. MOTIVATION

The last three years have seen an explosion of interest in Block-chain Technology(BCT) with a great many companies and research institutions focusing on potential applications of this technology across a range of financial, industrial and social sectors. However, the technology has also been surrounded by a great deal of exaggeration and hype resulting in misplaced expectations and misunderstandings. BCT is still in an early stage of development, with considerable potential for real-life commercial applications. Innovation in block-chain architectures, applications and business concepts is happening at a fast pace; it is often characterized by decentralized, open source development, and it is perceived as being disruptive to traditional players in many industries.

IV .PROBLEM STATEMENT AND OBJECTIVES

To develop an agricultural supply chain management system with BCT using java as a programming language.

1. To implement a java based web application.
2. To implement AES.
3. To implement a block chain.
4. To implement a distributed database system using WLAN.

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V. System Architecture

System architecture is a conceptual model which specifies the overview of the whole process of the project. It describes each step in the project making with the help of a flow. It specifies each and every step descriptively. The system architecture is as follows: Whenever any transaction will occur in the system, the record of that transaction is maintained in the form of hash value in a block. Each next block will get attached to the previous block and in this way a virtual block chain will occur. The hash value of a current block is generated using the data of a current block and the hash of the previous block. In this way if any of the block is tempered the subsequent all the block's hash must be changed. Such multiple copies are maintained at different servers, which will assure the data security and confidentiality. As everything is through an application interface, it will maintain the transparency in the agricultural supply chain management.

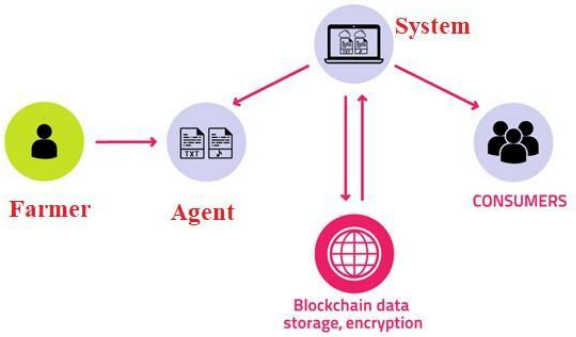

Figure 5.1: System Architecture

VI. Implementation

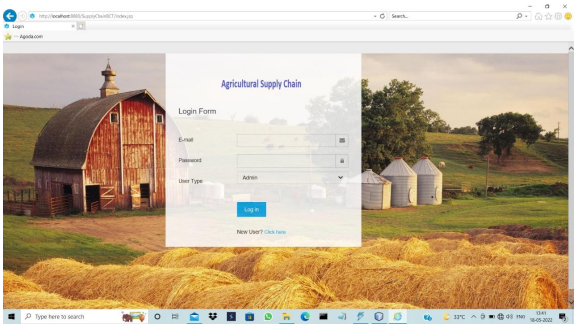

Figure: Login Page

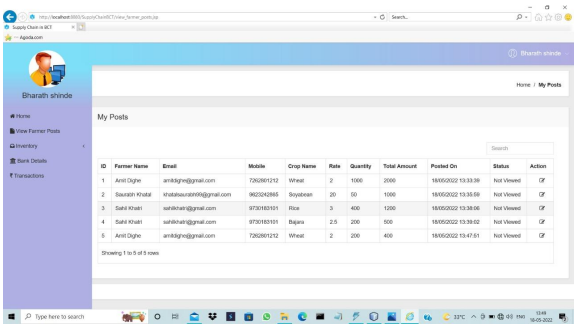

Figure: Agents UI

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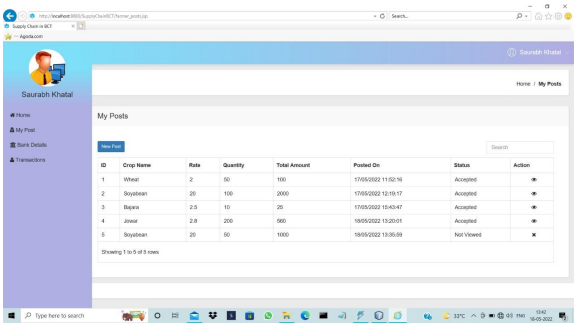

Figure: Farmers Post

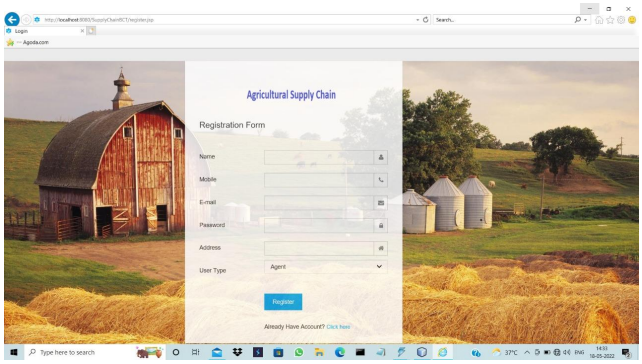

Figure: Registration

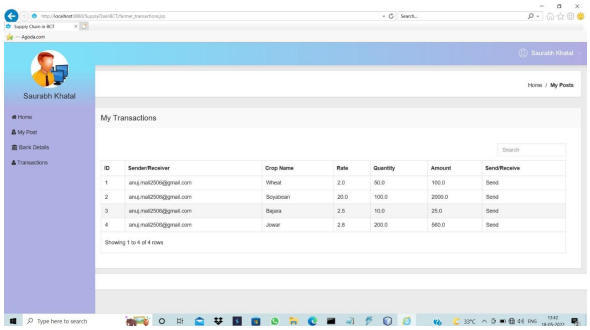

Figure: Personal Transactions

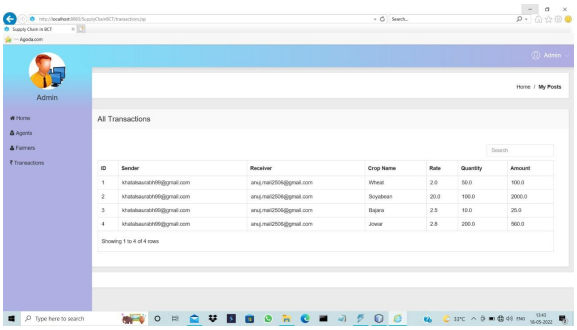

Figure: All transactions

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VI. Future Work

Figure: In future we will try for sponsorship from the government and will implement a project on a large scale with some domain and hosting space online.

VII. Conclusion

Thus we are going to implement a prototype web based software application in Java for application of BCT in supply chain management. We will implement block chain features such as:

1. Decentralization
2. Hash Algorithm
3. Encrypted Database.

Thus it is possible to track the agricultural supply chain and to give a minimum price for agricultural products.

References

[1]. L. Guo, C. Zhang, J. Sun, Y. Fang. "A privacy-preserving attribute based authentication System for Mobile Health Networks", IEEE Transactions on Mobile Computing, 2014.

[2]. A. Abbas, S. Khan, " A review on the state-of-the-art privacy preserving approaches in e-health clouds", IEEE Journal of Biomedical Health Informatics,2014

[3]. J. Yang, J. Li, Y. Niu, " A hybrid solution for privacy preserving medi-cal data sharing in the cloud environment ", Future Generation Computer Systems, 2015.

[4]. Ashutosh Samantararay, Sanjay Kumar Nayak, Ashis Kumar Mishra, "Hand Gesture Recognition using Computer Vision",(2013)

[5]. V. Goyal, O. Pandey, A. Sahai, B. Waters, " Attribute-based encryption for fine-grained access control of encrypted data ", Proc. 13thm ACM Conf. Computer and Comm. Security (CCS06), 2006.

[6]. R. Ostrovsky, A. Sahai, B.Waters, " Attribute-based encryption with non-monotonic access structures ", in: Proceedings of the 14th ACM Conference on Computer and Communications Security, ACM, 2007.

[7]. J. Han, W. Susilo, Y. Mu. " Improving privacy and security in decentralized ciphertext-policy attribute-based encryption ", IEEE Transactions on on Information Forensics and Security, 2015.

[8]. M. Li, S. Yu, Y. Zheng, K. Ren, W. Lou, " Scalable and secure sharing of personal health records in cloud computing using attribute based encryption ", IEEE transactions on parallel and distributed systems, 2013.