

Secured Blockchain Technology for Agriculture Food Supply Chain

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Abstract

As we all know when we talk about marketing the thing is it needs a plan of action that relates peer to peer relationships of farmers as well as consumers, whereas this process was followed and there will be no loss for consumers or dealers, the problem comes to only the farmer in ways of both financially and work issues during selling. so this paper proposes the work of getting more gain for cultivators by including the blockchain technology in the food chain supply by using FERNET (AES encryption algorithm) whereas this one doesn't have any vulnerabilities we know, that did it not secure and this has not been broken when compared to another popular hashing algorithms. thereafter by using a software infrastructure that includes in pre-processing of data, making transactions secure between cultivators as well as consumers/buyers, whereas blockchain is less time taken as well as a way of security for all kinds of transactions by using smart contracts for transactions for valuation of goods by using this algorithm we can securely protect digital signatures. using this model or the application we develop, all farmers are good and it is designed in such a way that every farmer can easily log in and check the details of his product and sell their crop and make secure payments.

Keywords: Fernet, AES (Advanced Encryption Standard), Blockchain, Digital Signatures.

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INTRODUCTION

The Importance of the food supply chain is most important nowadays. A lot of companies created the systems and allows the public to sell and buy using their service. The main need for this kind of platform is to avoid food contamination and deliver fresh and healthy Agri-products to the public.[1] Normally how Agri -based products entered the market is when the farmer cultivates and harvested the products, some third-party buyers buy those products, then he again sells those to another seller in the market to gain some profit. During this process some food items are spoiled, some are contaminated due to transportation, and due to some another facto. The finalizer gets spoiled or contaminated food for a high price when compared to the o farmer.

To avoid the above problem, few companies came up with a service to allow a farmer to sell their products through their app/Website. But those companies take the user data sometimes, sometimes those databases were compromised and leak all the data, sometimes lack to transparency in

orders and refunds. To avoid the above problem, we came up with a blockchain-based Agri-product website. This helps in reducing food wastage, and contamination [3] and helps if food is contaminated, we can easily find where it was contaminated. Because in blockchain for every transaction a new block is created. Hence, We can easily track down what happened or where it happened. Blockchain-based Agri-logistics also developing to avoid delays, false information regarding products because in native databases one can change products details and no one knows about it, in blockchain, it will not possible because, for every transaction, a new block is created, and those blocks are visible to everyone.

This Blockchain Technology [2]is helpful for sellers and buyers. It helps in maintaining the security, privacy, and transparency of the data. If provides results faster. Global companies are trying to improve their Agri-based services to blockchain to deliver the best outputs to the customers of their service.

RELATED WORK

First, traditionally traceability systems have issues with centralized administration, opaque information, untrustworthy data, and the ease with which information islands can be created. To solve these issues, this project proposes a blockchain-based traceability system to store and query product details in the supply chain of agriculture throughout. The transparency and reliability of traceability info gained thanks to decentralization, tamper-proofing, and features of traceability of blockchain technology. To reduce the chain load stress and gain efficient info inquiry, a dual storage structure of “database+ blockchain” off-chain and on-chain traceable info is built[1]. To realize the safe sharing of confidential info on the blockchain networks, cryptography which is combined with blockchain is preferred. Furtherly, we develop a smart contract based on reputation to elevate network branches to send traceability info. We also show performance by time and practical application; the output results show that our model gets query efficiency and private information security, ensures the accessibility and validity of data in supply-chain management, and gets genuine needs of application [4]. They discuss the research obstacles in the realm of eco-friendly IoT-based farming, including security and privacy concerns. We begin by outlining a 4-tier architecture eco-friendly IoT-based farm model and summarising the previous smart agriculture details. The danger models against eco-friendly IoT-based farming are then classified into 5 classes, they are attacks on privacy, authentication, reliability, confidentiality, availability, and integrity features. In addition, this idea presents a taxonomy as well as an adjacent comparison of state-of-art methodologies for security and confidential-preserving applications of IoT, and also how would they now be adjusted for sustainable IoT-based farming. In addition, this examines the confidential-focused techniques based on blockchain and also consensus methods for applications of IoT, as well as how would they be applied for eco-friendly IoT-based farming. We marked challenges openly in the part of our research and suggest prospective further ways for research in privacy and security of eco-friendly based IoT farming by the results of the current survey [2]. However, most existing systems are unable to match the required and important needs of ASCs. To resolve the issues in existing, our idea creates an ASC architecture based on blockchain for traceability of the item, which ensures decentralized guarding for farm-food traced information stored in ASCs. Then, for developing productive judgments on the crop and storing of farm-food goods for gaining optimization profits, a DR-SCM system is provided. [9] Increased simulation research is carried out for illustrating the efficiency of the infrastructure based on blockchain which is proposed in this paper and the deep reinforcement learning-based supply chain management approach in a variety of ASC scenarios. The output suggests that implementing this ASC architecture based on blockchain which is proposed ensures reliable product

traceability. Furthermore, by comparing this model with Q learning as well as heuristic approaches, the DR-SCM can yield better product profitability [3]. An IoT technology research and innovation strategy for precision agriculture (PA) is provided in this study. Several current practice trends and challenges have been identified. Some key goals for precision agricultural integrated technology research and teaching are discussed. We describe effective IoT-based communications and sensor technologies for addressing precision agriculture concerns[5]. The problems that are the safety as well as reliability of farming products, as well as environmental pollution from farming activities, should be resolved to improve the better results and safety of modern agriculture production as well as management in Korea. An architecture system that is an integrated platform includes the Internet of Things technology, computing of cloud, mining of data, and some other technologies that are studied, and a novel idea told for the model used around modern farming is presented, based on the latest generation of Information Technology (IT). The research architecture and the design of the simulated one indicate that the basic functionalities of the IoT for agriculture capturing systems may be implemented [6]. The present status of security and confidential preservation using a smart contract as well as blockchain, as applies to a variety of areas and problems domains, is described in this paper. It gives an overview of blockchain, describes the issues that blockchain poses in terms of privacy, and then categorizes how this concept might be used to gain/increase or defend privacy. Cryptocurrency, data records that are stored and managed, e-voting, the Internet of Things, and smart agriculture are among these topics. The article then suggests PPSAF, a new privacy-preserving framework created specifically for the problems that smart agriculture presents. Finally, this paper outlines further study directions in domains that combine future market technologies, privacy that needs protection, and blockchain technology[7]. As we see the pandemic crushes the importance of buying products that are high in quality from regional cultivators to the people who consume them. Naturally, we see the cultivators depend on the mediators to sell their crops at less prices and they even don't talk to the customers who buy their crops to get healthy feedback from them about the products they bought. For that issue here in this paper we develop a technology that eliminates the mediators, that is we develop a design of a product traceability system based on blockchain technology for regional cultivators to sell their products to the consumers who want healthy food and know the quality they get of the product they bought[10]. This model is a personal blockchain-based platform, Hyperledger fabric, that encourages cultivators, carriers, and buyers. Agriculture activities can be noted by cultivators. Buyers can check the product history before buying the product, and check the status of the transportation by the delivery team until it is delivered. Internet of Things is combined to note agriculture environments and the quality of the field during plantation is

evaluated. This model delivers a proof concept of how this implementation of local products using a blockchain-based model marketplace with no need for the mediatory.

PROBLEM STATEMENT

Currently, Agri-based solutions do not provide transparency and access to the data, or control over their data. And Sometimes users ser (sellers/buyers) face issues while

tracking down what happened to their food/product. A lot of times food supply got contaminated, spoiled, delayed, not issuing refunds as they stated or taking so much time to process it. So, there is no proper exchange platform for farmers to sell their products to buyers without any third-party database or human interference for claims. To no transparency or privacy for user data.

PROPOSED SYSTEM

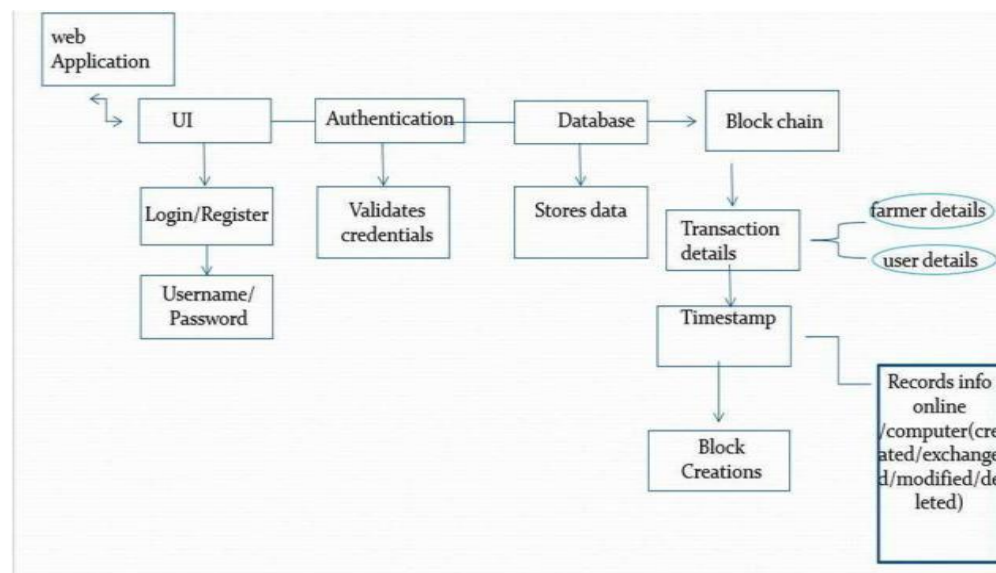


Fig. 1. System Architecture

We are proposing the system using blockchain technology. we are going to use blockchain to store the user data and user transactions. Blockchain has one important feature that is once data or transaction is stored in the blockchain no one can delete or modify the data. our system users' data is going to store ganache blockchain. which is Ethereum based blockchain technology. once data is encrypted and stored in the blockchain. When someone tries to hack or modify the data inside the blockchain it is not possible. It increases data security in a decentralized manner.

The main advantage of blockchain is its special feature called transparency. so, what is this transparency means, in block chain each transaction one new block is created, and all those blocks are visible to everyone around the globe. Whereas native databases, each company should maintain a database, those databases are not safe from the hac, no transparency among the databases. Using blockchain can minimize the frauds fraud contracts in blockchain, helps in automating the process like a refund, verification of spoiled food, in such cases, when customer-submitted all the required files the claim is automatically approved and paid without any human interference.

METHODOLOGY

To Implement this, we are using ganache technology which is Ethereum based on blockchain. It contains two different logins for buyers and sellers.



Fig. 2. Ganache tool

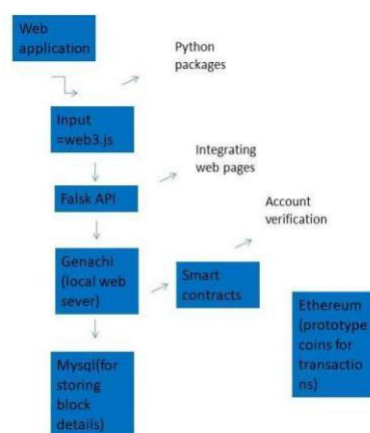


Fig. 3. Functional Architecture

Initially, users must register on the login page with a username and password, if a user is already registered means he can log in directly using their credentials. The farmer can be able to do the login/registration process. While the registration, the data will be stored in the blockchain using web3 and solidity.

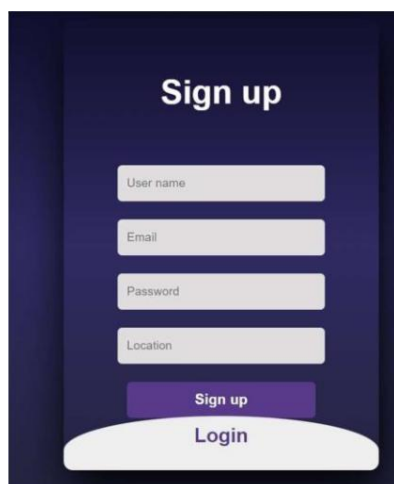


Fig. 4. Registration Page

After the registration process is done, the farmer can add his products by entering the following details: product id, name, category, product description, quantity, and price of his product. He can either modify or delete the product details whenever he needs them.



Fig. 5. Application User Interface

Same way buyers can log in after registration is completed. They can view the products, select them and buy them from the user. Whenever a transaction happened like a user uploads the products, it creates a new block, for every action a new block is going to create.

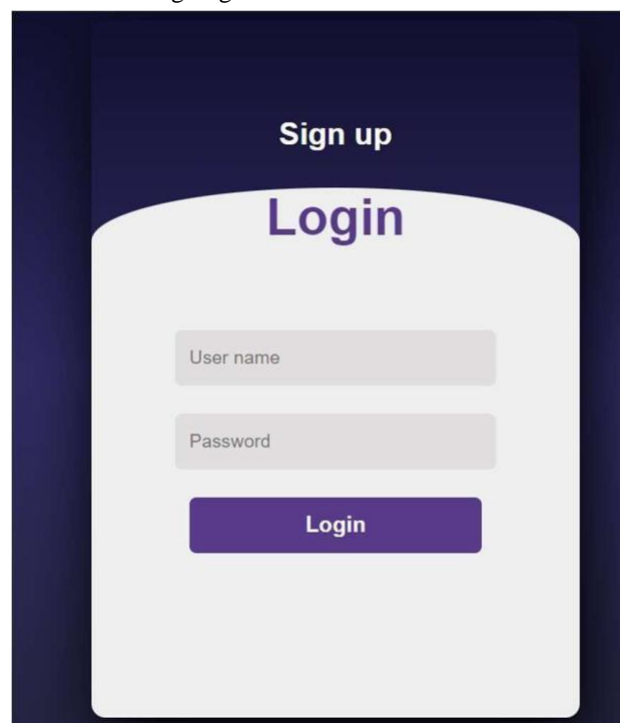


Fig. 6. User Login

The same happens with buyers. data stored in blockchain, when the user deleted means it creates another block for that operation to. we used python and node.js for the implementation of our project. all the transactions are stored in the ganache block.it contains every transaction detail, No one can delete or modify the data in ganache. modified means it creates another block.

CONCLUSION

It can be concluded from the study that this application we did, will be the innovative one because our application is different from others. Here we use blockchain for storage and also a secured way of buying was implemented while designing which does not exist in previous existed ones. We created our application in a way that anyone can easily understand the process of registration as well as buying and selling through this application.

Our solution/application will be useful for many farmers by selling their crops at the prices they want. No farmer can be fooled. The future of buying things will be online, so we develop an application for farmers to sell their products.

Using blockchain increases data security and increases data privacy. Blockchain helps in building trust between buyers and sellers. It helps in solving issues fast when compared to

native systems because no one can alter the blocks. Blockchain helps in building the best buyer and seller network without any disturbances. And it also provides the best security and privacy for user data. AND In the blockchain, we can easily identify if anything is tampered with/changed because for every transaction one block is created.

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