rice2023 Proceedings of the Eighth International Conference on Research in Intelligent Computing in Engineering pp. 73–77
DOI: 10.15439/2023R74
ISSN 2300-5963 ACSIS, Vol. 38

Supply Chain for Agriculture Products Using Blockchain Technology

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***Abstract*—Nowadays, the cost of agricultural products is increasing progressively, even the farmers are not getting a sufficient enough for their production, due to the involvement of the corrupted intermediaries. Debts of the farmers have been increased, which leads to their committing suicide. As of now, no automation method exists to track the price of agricultural goods. To reduce corruption and to help the farmers to get a profit, there is a need to trace the product's costs and store them in a file starting from the product's manufacturer. Blockchain technology works as a decentralized and immutable ledger. A block chain is a sequence that maintains a list of transactions. These blocks contain information on the transactions. It protects against any critical cyber-attack, thereby providing the utmost security and encrypted data with privacy. It helps us store all the transaction history of the product from its manufacturing. Our aim is to implement a supply chain for agricultural products using Blockchain technology, to track and tackle the price fluctuation in the market.**

***Index Terms*—Blockchain Technology, cyberattacks, encryption, supply chain.**

I. Introduction

The modern supply chain has grown exceedingly intricate. At different phases, a large assortment of stakeholders is available. All of these stakeholders must cooperate with one another in a number of ways for management to be efficient and successful. False advertisement is less likely when there are effective traceability measures, in place to halt the creation and marketing of risky or inferior product. Accurate tracking and adherence to national rules are necessary for the movement of agricultural products among various nations. In the agriculture industry, by clearly identifying the source and requiring many data exchanges across the logistic network, monitoring commodities requires the collection, communication, and management of crucial data.

The main factors affecting the agriculture supply chain's current traceability measures are centralized controls with information-vulnerable centralized data fragmentation management additionally modification. In the toxic situation, we rapidly find the culprit, then remove the contaminated items out of the supply chain.

Blockchain helps us to prevent the data from contamination. Blockchain is the technology where each and every transaction is represented in the form of block and each block contains 3 parts those are -> Data of that block, both the hash codes for the current block and the previous block. If anyone tries to change or manipulate the data in any block the data from that block will be lost as each block is linked to the previous block hash code.

II. Literature Review

The main aim to bring out this article is “Food shortage during the covid-19 pandemic situation”. There are many changes in buying the food products during pandemic. Sometimes there will be shortage for the food products and sometimes there will be shortage of consumers, it creates the imbalance in the food supply chain. To tackle this problem, they should use the blockchain technology and developed a model which is used to interact with the farmers and mediators, to get the crop products which are available at them [1].

Agriculture is the backbone of a country. Population of a country increasing, steadily. To fulfil the needs of the increasing population, there is a necessity to shield the supply chain conveyance in a rectifiable manner. To overcome this situation, blockchain-supply chain management is a key-way to lead the better optimistic solution to the above cited matter [12,13].

Bitcoin was invented decades ago. Bitcoin addresses the flaws with digital tokens, which may be readily duplicated or produced, by using blockchain technology [11]. Every transaction is called as a block and these blocks are linked together, in blockchain technology. These blocks are linked by a hash code. The hash code is generated for each and every block. Hash code is generated by merging data with the previous block of hash code. If we try to change the data in one block, we lost all the data from that particular block, it provides security in that way. Every block contains [11] 3 parts (Data, Previous block Hash code, Time stamp). We generate the hash code to a particular block by merging these three [2] nodes.

III. Methodology

A distributed database calls a block chain, to stores every networked transaction. Every module of this database is a "block." Once the status of a transaction changes, accumulation of block, to the block chain in a sequential and linear way, when it has a connection to the block earlier to it. The newly formed blocks are then recreated, across the system to guarantee, that every node has recourse to the equivalent block chain. There is the identical of a block chain on everyone who takes a part in this transaction. Consequently, a specific transaction may be corroborated by any partaker.

With this strategy, there was no longer- requirement for centralized, reliable third-party confirmation of transactions. With numerous potentials use of the block chain technology, there is a tone of possibility for creativity, in the era of technology. So, corporate executives will utilize this technology to explore the variety of prospects obtainable to their organization and sector.

IV. Algorithm

As far as we are aware, hashing is not "encryption" as the original text cannot be recovered. Considering that, a hash is a unidirectional cryptographic feature with a predetermined size for every source-text size, comparing "hashed" copies of texts is simpler than decoding the text to attain the early design. SHA-256 is one of the most potent hash algorithms is in use, which replaces SHA-1 and is occasionally referred to as SHA-2. As of yet, SHA-256 has not been hacked in any manner and is not any harder to develop than SHA-1. AES is a great support function for the 256-bit key, in SHA-256 algorithm. FIPS 180-4, a NIST (National Institute of Standards and Technology) standard, has a description of it. Message Digest: A cryptographic hash technique that can engender a message, digested from binary digits, is simulated by the Java Message Digest session. After getting encrypted data, it is intolerable to verify if there was a tampering while it was being transported. With a digest message, this issue will be simplified. In order to check for data tampering during transmission, From the encrypted data, the transmitter will create a digest message, which will be sent with the data. After decrypting and analyzing the encrypted data, you may compare the measured message digest to the message digest that was included with the data.

V. Implementation

A. Algorithm of SHA-256

- The SHA-256, or Secure Hash Algorithm is a candidate of the SHA algorithm family.
- The 256 in the name refers to the maximum hash digest value; as a result, the hash value is always 256 bits, regardless of the size of the plaintext or cleartext.

B. Steps

1) Pre-processing

Transmit a message m0,m1...mb-1 (b-bit);

Step 1: Append padding bits and get m0, m1... m(b-1)10...0 (b' bits, where b'=448 mod 512);

Step 2: Add 64 bit and obtain m0, m_1... m(b-1)10... 0b0b1...b63 (b0b1 ... b63 represents b in 64-bit form);

Step 3: Make 32-bit words out of it as Mo, M1, ..., M(N-1) where (N is a multiple of 16);

2) Initialization: Initialize 8 buffers are A, B, C, D, E, F, G & H as

A = 0x578e4ab3
B= 0x642eab54
C = 0x9473eafb
D = 0xa6458cde
E = 0x54cabd3f
F = 0x8a1639ad
G = 0xabd3e231
H = 0x6458abce

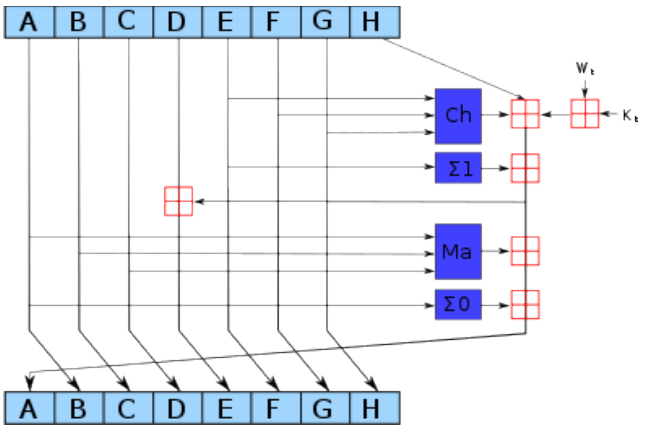


Fig. 1. SHA-256 Algorithm

3) The complete messages are separated into numerous blocks of 512 bits of each. Each block's output is used as the one's input, and that follows it in a total of 64 processing rounds for to each block.

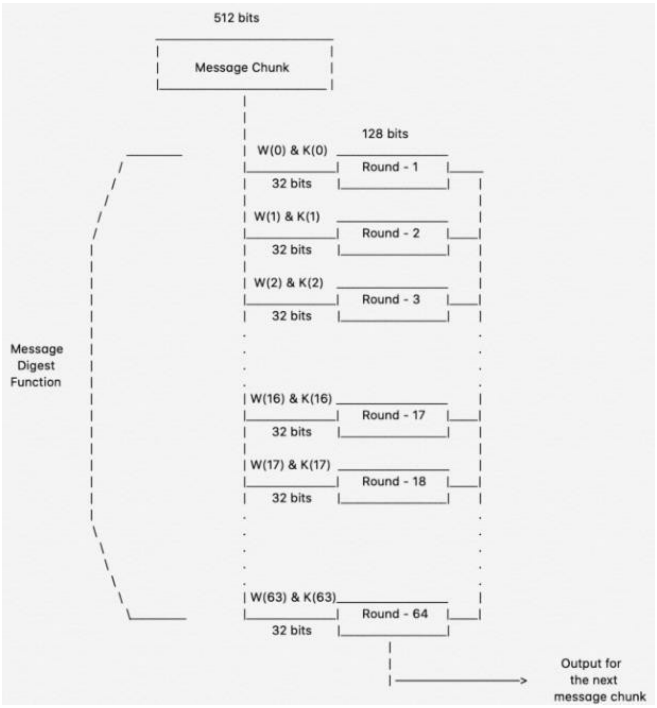


Fig. 2. SHA-256 Algorithm

Each time an iteration occurs, the final output of one block becomes the initial input of the succeeding block. the whole cycle is repeated up to the final 512-bit block, after which the outcome is taken to be the final hash digest. This digest will be 256 bits long, as the algorithm's name designates.

VI. System Architecture

The System architecture undoubtedly elucidates the working of the system.

The details should be uploaded by the farmer, that are encrypted and the resultant hash codes should be sent to the farmer mail and the supplier can access them by requesting the hash codes received from the farmer.

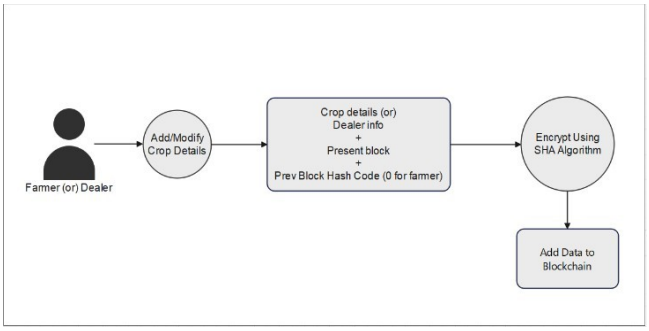
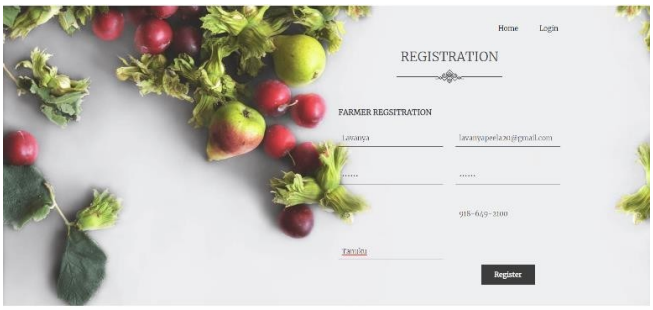


Fig. 3. System Architecture

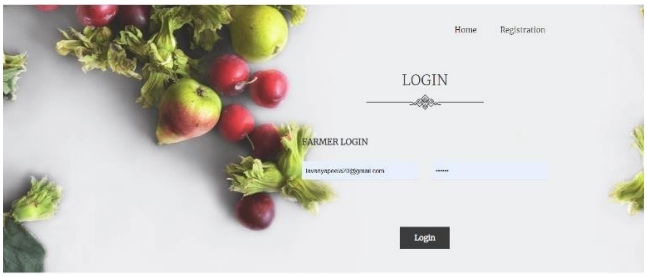
VII. Result Analysis

A. Home Page:

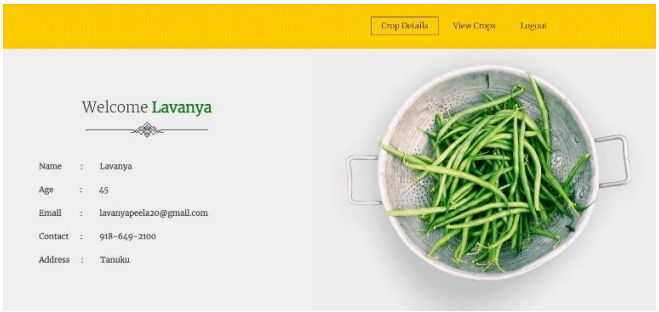
B. Farmer Registration Page:



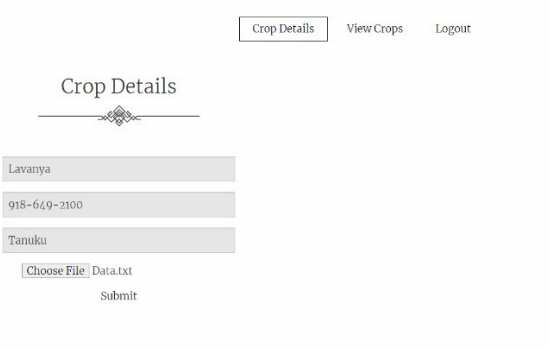
C. Farmer Login Page:



D. Farmer Home Page:



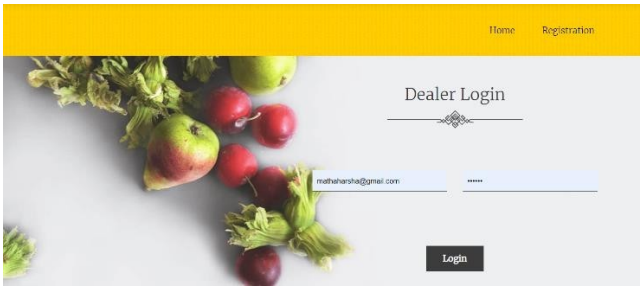
E. Uploading Crop Details:



F. After Uploading crop details:

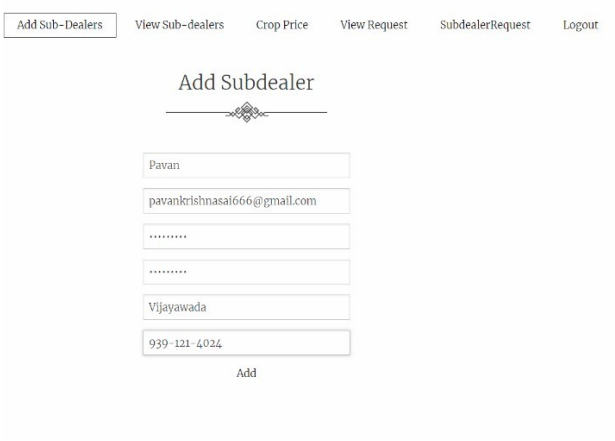
G. Dealer Registration Page:

H. Dealer Login Page:



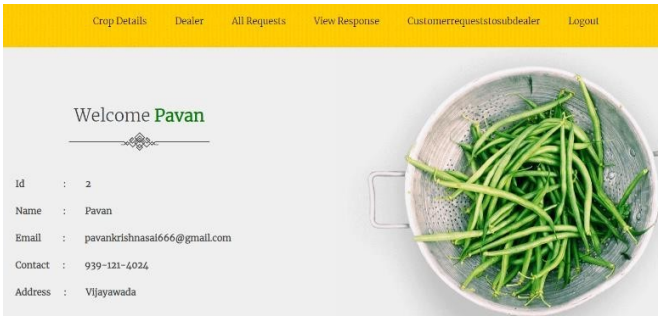
I. Dealer Home Page:

J. Adding Sub-Dealer:

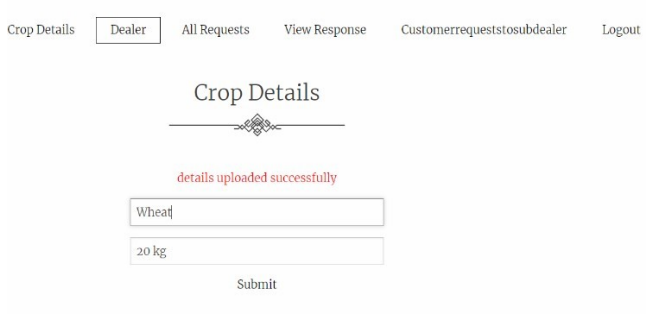


K. Sub-Dealers list:

L. Sub-Dealer Home Page:

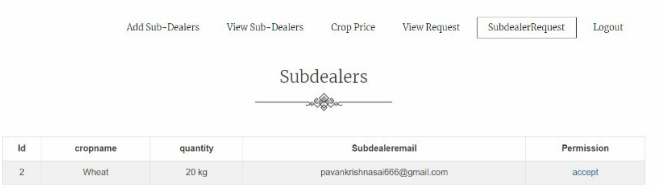


M. Sub-dealer requesting Crop:



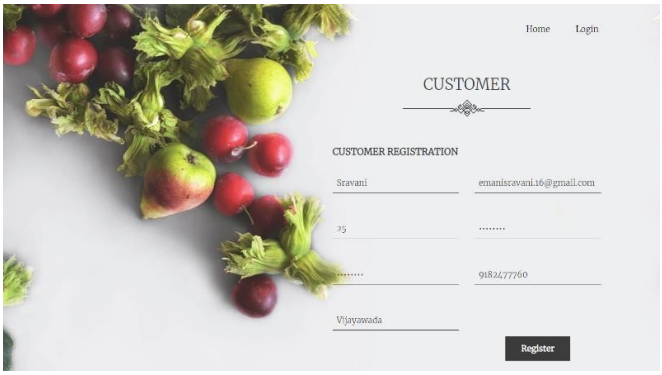
N. Sub-dealer request to dealer:

O. Dealer page: (Sub-dealer requests)

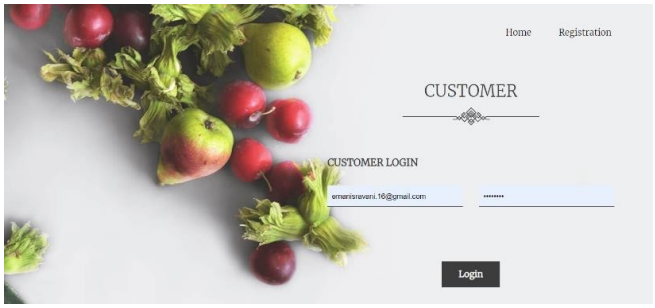


P. Responses of dealer:

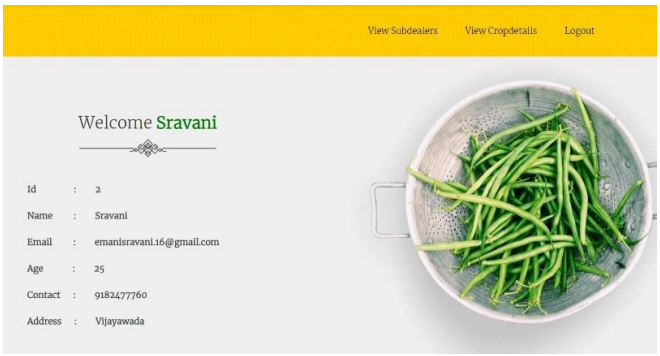
Q. Customer Registration Page:



R. Customer Login Page:



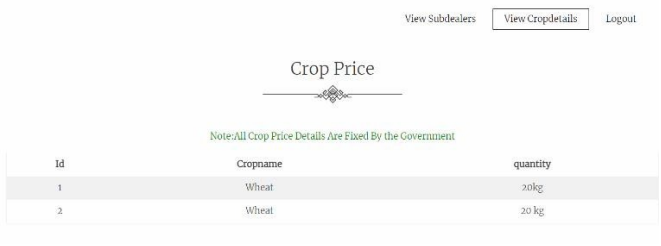
S. Customer Home Page:



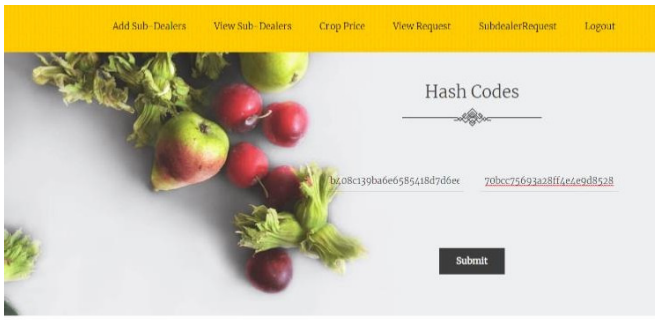
T. List of Sub-Dealers:

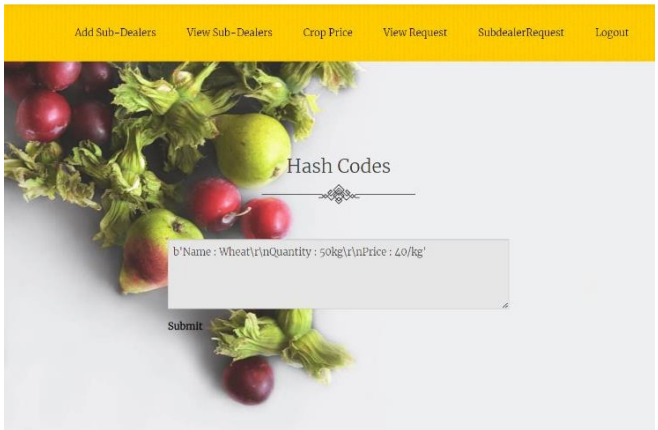
U. Request sent by Customer to Sub-Dealer:

V. Crop details in Customer Page:



W. Customer accessing data uploaded by farmer using Hash keys:





VIII. Conclusion

In this project we developed an application which is used to track the price of agriculture products in order to disregard the intercessor corrupted vendors. In this way all will get the crops with the price decided by the government and the end product price will be at a reasonable price, which helps the farmers. The data entered by the farmer should be encrypted by the blockchain technology, using cryptographic techniques. The dealer has to get the hash codes from the farmer in order to open the file and access the data from the block.

IX. Future Work

This study can be protracted to track the cost of the supplementary products in order to diminish the corruption. We can use more powerful encryption algorithms to store the data, in a secure manner. The use of blockchain (with the hash value or hask key) is explored further in other services.

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