Blockchain Technology in Agriculture Supply Field

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Abstract*— Agricultural producers have a variety of obstacles these days, ranging from seasonal changes to a broken supply chain; their labour is demanding and time-consuming. A separate information database with verified data would be quite useful in this situation. Whether it's about market trends or successful procedures, knowledge sharing is vital in all aspects of this industry. Third-party interference in this sector could lead to the dissemination of false information. Blockchain, a secure and immutable data ledger, can be used to decrease this risk. The goal of this paper is to look into the various ways that blockchain technology can be implemented into the agricultural supply chain as a transparent and dependable transaction mechanism.

Indexed Terms-- ASC, BCT, AES, visual cryptography, SHA 256, etc.

I. INTRODUCTION

In agricultural sector there is no transparency between farmers and government. Neither farmers gets reasonable price of the product from farmers nor government gets proper stock of the raw material produced by the farmers. So farmers main complaint is that they do not receive a fair price for their crops. The main reason for this is that their produce does not receive a minimum support price (MSP). The government's minimum support prices are a guarantee price for farmers' produce. The government sets a price to safeguard the producer, the farmers, from price drops that are too steep during bumper production years.. "Onion was selling for Rs 5-6 a kilo at a wholesale market in Indore (Rs 500-600 per quintal). The cost of our inputs is higher. However, since the regime change, onions are no longer being purchased at this price. Gaon Connection conducted a survey in 19 states, polling 18,267 people about the primary difficulties that farmers face in India. Farmers not receiving a fair price for their crops is a major issue that needs to be addressed, according to 43.6 percent of respondents (4,649). While 19.8% of respondents indicated they are having troubles as a result of climate change, 17% stated rising input costs are giving them restless nights. Many experts based on these findings, and they all agreed that the main reason farmers don't get a fair price is because they don't obtain the minimum support price for their produce. Farmers lost Rs 45 lakh crore between 2000 and 2017 because they didn't get a fair price for their produce, according to an OECD-ICAIR analysis. In a report published in 2015, the high-level committee for restructuring of the Food Corporation of India (FDI), chaired by Shanta Kumar, stated that just 6% of farmers gain directly from MSP. This means that 94% of people do not profit from MSP. According to a research issued by the NITI Aayog in 2016, 81 percent of farmers were aware that the government gives Minimum Support Price on several commodities, but only 10% knew the rates before harvesting season began. This raises an interesting point. How can farmers in India earn a fair price for their produce if they are unaware of the benefits of MSP. According to the research, 62% of farmers learned about the MSP after their crop was ripe. According to the research, 32 percent of farmers were paid in cash, while 40 percent were paid by check. As a result, we'll put in place a mechanism that ensures farmers receive a minimum fixed price for their produce. To make this system transparent the supply chain should be digitalized. On that digitalized platform farmers can register and fill all the details of the product that they are producing. So government can know the amount of product and can decide the fixed price . As a result farmers can get reasonable price of their product.

I. Literature Survey

This paper presents a fully decentralized blockchain based traceability that enables to build blocks for

agriculture that continuously integrate with IoT devices from provider to consumer. To implement, we introduced "Provider-Consumer Network" - a theoretical end to end food traceability application. The objective is to create distributed ledger that is accessible by all users in the network that in turn brings transparency [6][18].

To address the problems arising from the farmers related to agriculture, the blockchain technology plays a major role in the agriculture industry by improving transparency and food provenance in the supply chain, which is featured by the distributed ledger, centralized servers, P2P (Peer to Peer) networks [6] [10].

As in [1] [16] RFID (Radio-Frequency Identification) tag, consensus verification. Hence, the proposed work explores the different problems faced in agriculture production and the solutions to those problems are addressed by using blockchain technology.

We provide a survey to study both techniques and applications of blockchain technology used in the agricultural sector. First, the technical elements, including data structure, cryptographic methods, and consensus mechanisms are explained in detail. Secondly, the existing agricultural blockchain applications are categorized and reviewed to demonstrate the use of the blockchain techniques. In addition, the popular platforms and smart contract are provided to show how practitioners use them to develop these agricultural applications. Thirdly, we identify the key challenges in many prospective agricultural systems, and discuss the efforts and potential solutions to tackle these problems [7][11].

This work proposes a data traceability platform architecture design plan for supply chain management based on the multi-disciplinary knowledge and technology of the Fabric Alliance chain architecture, perceptual identification technology, and cryptographic knowledge [11]. At the end of the paper, the characteristics and shortcomings of data traceability of this scheme are evaluated.

II. PROPOSED SYSTEM

Existing some papers concern about food tractability, some are referring quality, but the main concern is about the costing of farmers. Farmers are roaring and begging just to get the justice and fixed costing for their own products. We see that farmers are throwing the products like tomato, onion, sugarcane because of lack of proper rate. Here the scenario is sugar is having fixed price but sugarcane doesn't. Potato chips, tomato soup, tomato ketchup is having fixed price but tomato, onion doesn't. It's because Government does not know how much is onion, tomato, bajara in the market, how many farmers are there in the India, how many agents in India. How the communication happens between farmer and agent, nothing. So our aim is make everything Digital so that everything will be under supervision. But at the same time there should be security, transparency and hence our proposed system is to use block chain technology for agricultural supply chain. 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 application interface, it will maintain the transparency in the agricultural supply chain management.

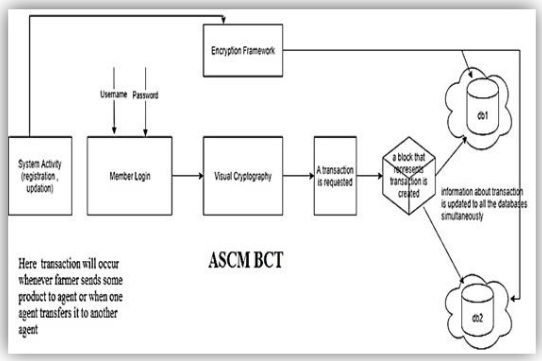


Fig: Proposed System

- Mathematical Model:

Description	Observations
Problem description and System	

Let S be Closed System defined as, S= {Ip, Op, Ss, Su , Fi, A} To select the input from the system and perform various actions from the set of actions A so that Su state can be attained.	System
S= {Ip, Op, Ss, Su , Fi, A} where , IP1= {Username ,Password , Image}	Half image part at mail.
Set of Actions = A = {F1,F2,F3,F4 } where F1 = Send mail F2 = Merge Images F3 = Encrypt Database F4 = General Hash S = Set of users Ss = {rest state, registration state , login state } Su - Success state is successful analysis Fi – Failure state	

Algorithms:

Advanced Encryption Standard (*AES):*
AES is used to encrypt the given users Credentials.
The encryption process uses a set of specially derived keys called round keys.
These round keys are applied, along with other operations, on an array of data that holds exactly one block of data, the data to be encrypted.
This array we call the state array.

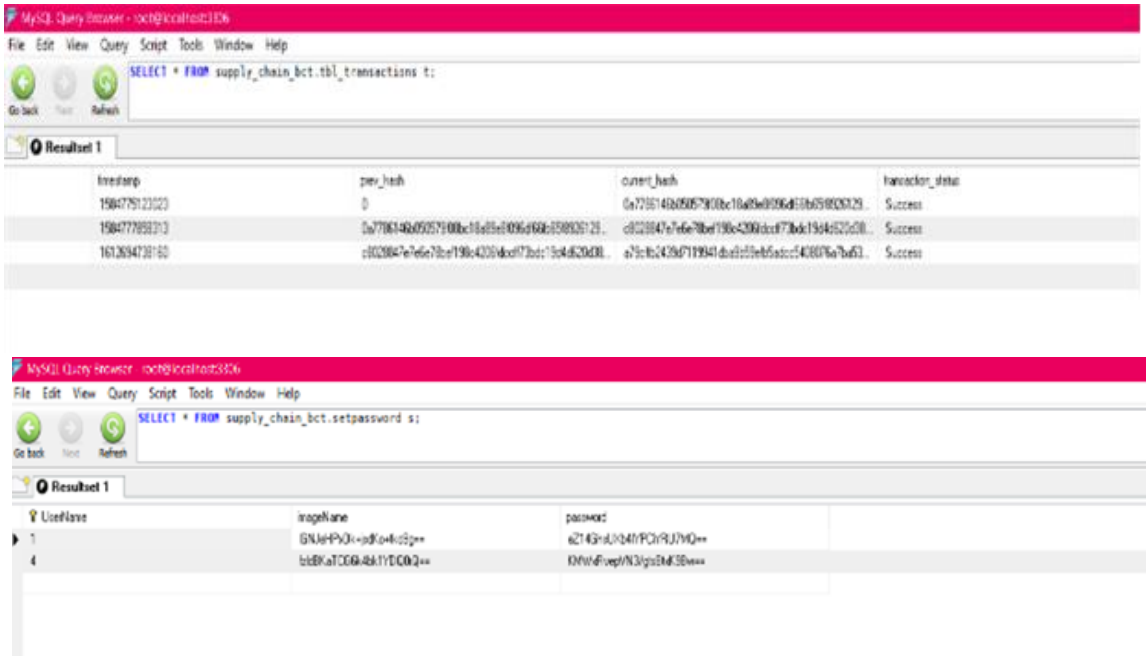
STEPS:
Step1: Derive the set of round keys from the cipher key.
Step2: Initialize the state array with the block data (plaintext).
Step3: Add the initial round key to the starting state array.
Step4: Perform nine rounds of state manipulation.
Step5: Perform the tenth and final round of state manipulation
step6: Copy the final state array out as the encrypted data (ciphertext).
Example:
Example: 128 Bit key size

Input: JSCOE
Key: COMPUTER
Output:WBHQlPquF65uxN0cuD52cw==

Input: JSCOEH
Output:zLcncQk9jUo4rSq2TWIdDw==
SHA 256:
SHA-256 (secure hash algorithm, FIPS 182-2) is a cryptographic hash function with digest length of 256 bits. It is a keyless hash function; that is, an MDC (Manipulation Detection Code).
A message is processed by blocks of 512 = 16 × 32 bits, each block requiring 64 rounds
A cryptographic hash (sometimes called ‘digest’) is a kind of ‘signature’ for a text or a data file. SHA-256 generates an almost-unique 256-bit (32-byte) signature for a text. A hash is not ‘encryption’ – it cannot be decrypted back to the original text (it is a ‘one-way’ cryptographic function, and is a fixed size for any size of source text).
This makes it suitable when it is appropriate to compare ‘hashed’ versions of texts, as opposed to decrypting the text to obtain the original version.
Example:

Input: JSCOE
Output:
ef38a455459036f42d4452f8863fa8503899051a6ca59f578e3c65904caafffa

03c1a9737e36db9e9997fb1dea689afe1d2af4f096908ef014eaa363441a811c



III. RESULTS & IMPLEMENTATION

After successfully executing the project we get the following results. Register page where users can register & Login page for users to login. Before user can successfully login they have to complete a authentication step (Visual Cryptography). All the users Credentials are getting stored in Database in Encrypted Format as Shown in Results.

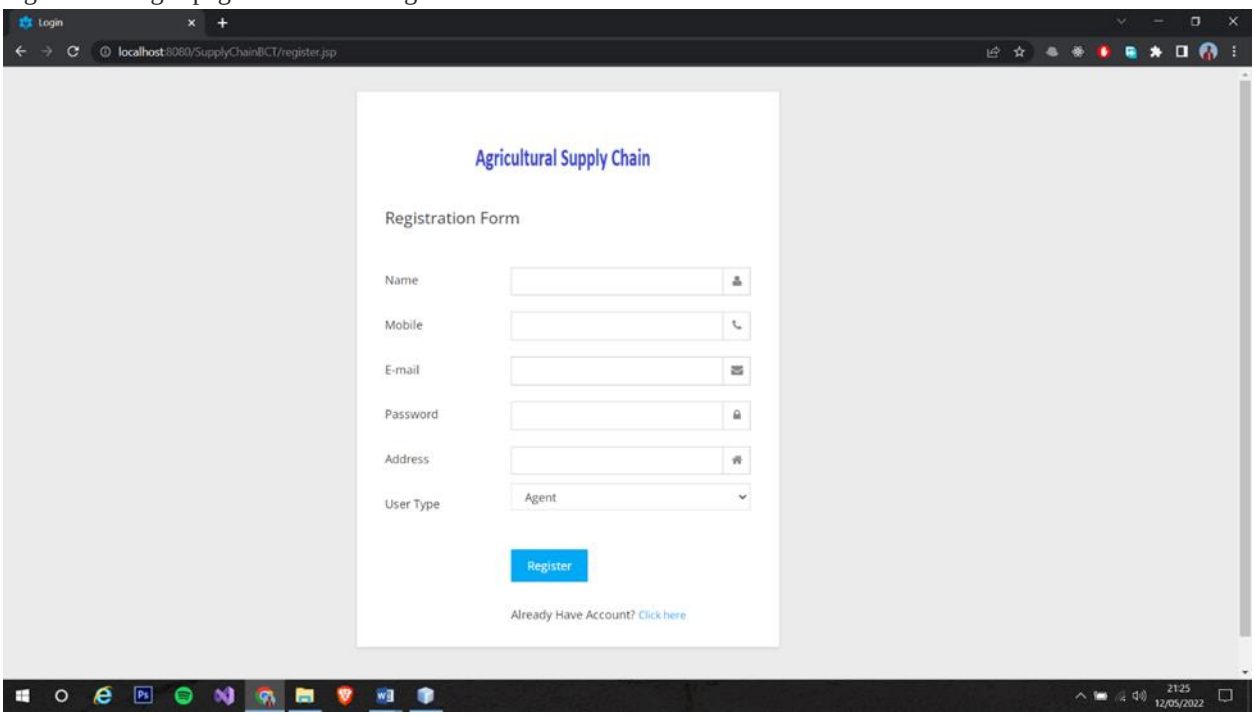


Fig: Register Page.

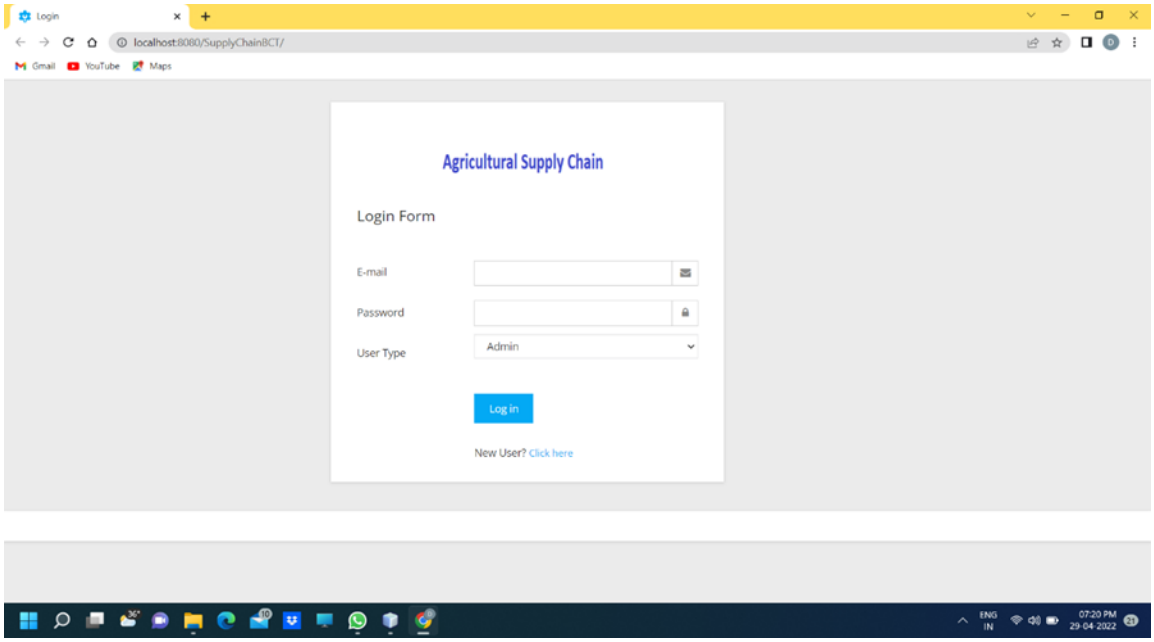


Fig: Login Page.

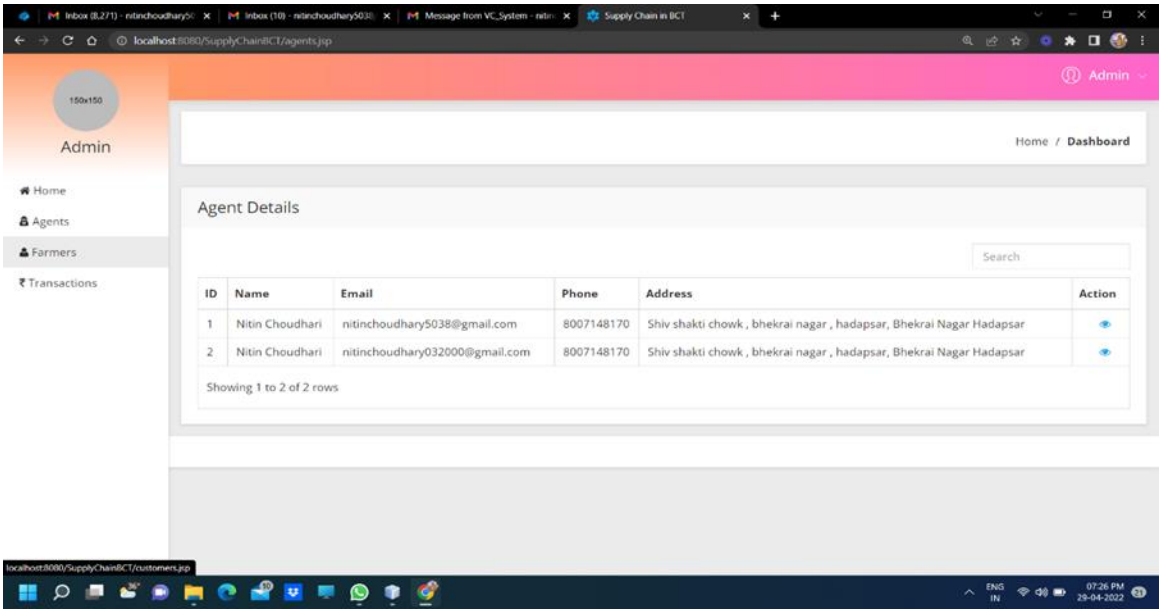


Fig: Admin View

Fig: Visual cryptography step

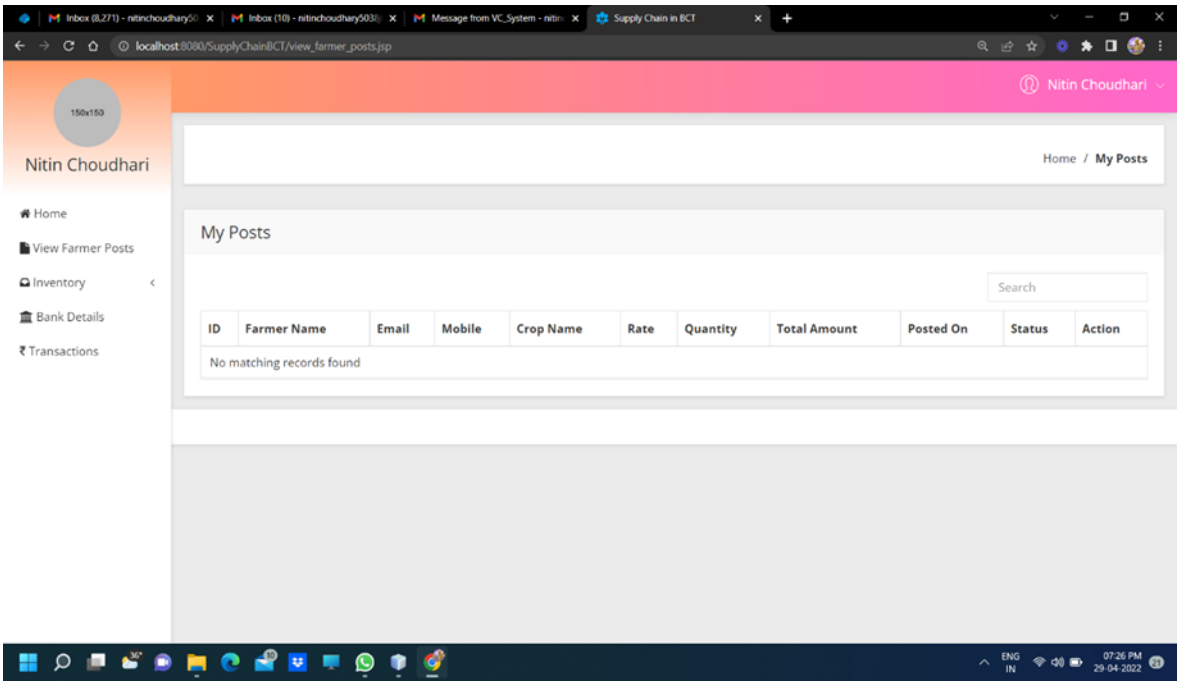


Fig: Farmer View

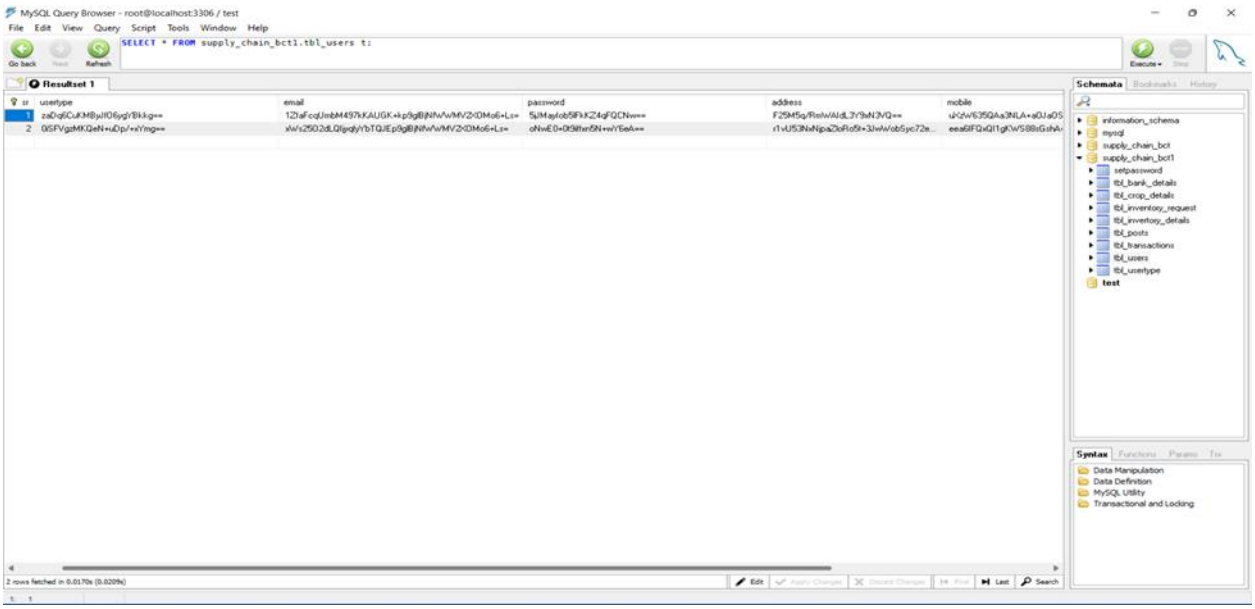
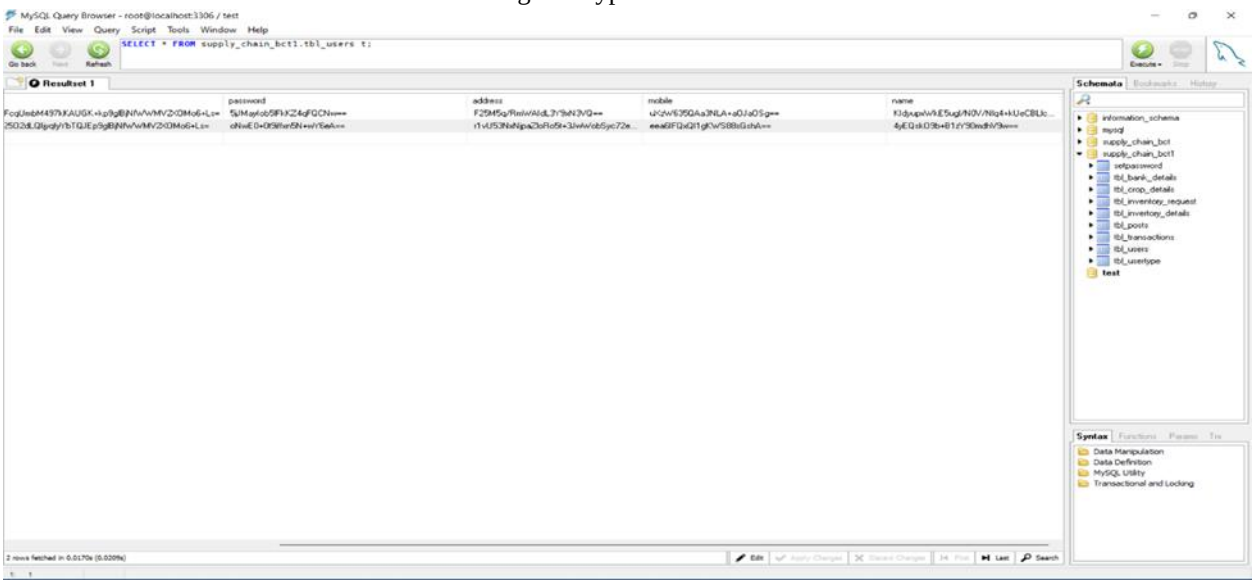


Fig: Encrypted Database



CONCLUSION

If government will implement this project, then in real time farmer will get fixed costing for their products and they will not protest further to get the loan or to minimize the loan. And then in real manner India will develop because agriculture contributes 80 % in Indian GDP. Thus we are going to implement an ASCM using BCT, the system with BCT will be an effective solution to solve the problems in ASCM. The system will be developed using java as a programming language using JSP & Servlet technology.

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