Research Article

An Overview of Blockchain Technology for Agro Transaction

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Abstract:

Public administration across worldwide with much increased resources demands transparency and security. As many countries started adopting smart city concepts, new technologies should be utilized to protect the several public administration services against corruption, intruders rendering active role and transparency for the public. The existing challenge of gaining trust, elimination of corruption can be achieved by integration of blockchain technology for the public administration process. The farmer personal, sensitive information's are protected using Proof of Work (PoW) concept. Smart contracts can be utilized for the governmental subsidy money distribution to the farmers providing privacy preserving. This smart contracts can be helpful in eliminating over billing, money mishandling. The transparency is achieved by using hyperledger concept. To our knowledge this work is first public Blockchain based experimental approach for public administration compared with the theoretical approaches. This work study examines the impact of blockchain technology in agriculture benefiting the farmers eliminating the mediators, agents

Keywords: Blockchain,Proof of Work, Hyperledger,.

I INTRODUCTION

Almost a decade has been passed since the paper on Bitcoin: A Peer-To-Peer Electronic Cash system was first made public by a pseudonymous author. This work set basis for the event of Bitcoin, the first cryptocurrency that allowed reliable financial transactions without the need of a trusted central authority, like banks and financial institutions. Bitcoin solved the double-spending problem (i.e. the flaw associated to digital tokens because, as computer files, can easily be duplicated or falsified), with the invention of the blockchain technology. A Block chain contains Individual blocks that transmits data without the need for a third party and also maintains the transaction history within it, through specific softwater platforms. In its original configuration, each block contains a header with a time-stamp, transaction data and a link to the previous block. A hash gets generated for every block, supported its contents, then becomes referred within the heading of subsequent block. Hence, any manipulation of a given block would end during a mismatch within the hashes of all successive blocks. Each transaction in the network runs by every node in the network and gets validated by each one of them. The key feature of a blockchain is its ability to stay a uniform view and agreement among the participants (i.e. consensus).The problem of consensus has been extensively studied by researchers within the past, however its use within the domain of blockchain has given new stimuli and motivation, resulting in novel proposals for design of blockchain systems. The most well-known, used in Bitcoin, is called Proof of Work (PoW) and it requires computer nodes, called miners during this case, to unravel difficult computational tasks before validating transactions and be ready to add them to the blockchain. The first miner to unravel the puzzle bundles the block to the chain, which is then validated by the remainder, and gets rewarded with newly minted coins plus a small transaction fee.

II RELATED WORK

The [1][2] examines the impact of blockchain technology in agriculture and food supply chain, presents existing ongoing works and initiatives, and discusses the challeges and potentials of the blockchain. This talks about transparency using bitcoin in this sector, but has many hinderance and challenges, hence we overcome this by using ethereum. [3] Discusses the mechanisms of functioning and features of the latest Internet technologies in the context of the agro-industrial complex of Russia. Their practical significance for optimizing the connection between the vendor and therefore the buyer has been investigated. In this paper the use of blockhain in the public sector is justified. The research shows the possible difficulties and shortcomings of the prevailing content system, gives recommendations on the utilization of the blockchain and its evaluation for domestic producers of agricultural products.[4][5]That the concept of Food safety is becoming more and more serious topic

worldwide. To tackle the food questions of safety from the technical aspect, people need a trusted food traceability system which will track and monitor the entire lifespan of food production, including the processes of food staple cultivation/breeding, processing, transporting, warehousing, and selling etc. This paper proposes a trusted food traceability system using blockchain which is self- organized, and also uses IOT (Internet Of Things) for smart agricultures.[6][7] discuss numerous applications in various fields and one of the promising one is agriculture. The blockchain application in agriculture includes food safety through traceability of provenance, information system, agro-trade, finance, crop certification and insurance etc. This paper reviews all the major databases of blockchain in agriculture where China is the leading example followed by USA and India. Thus we look into the possibility of a major database in blockchain for agriculture transactions.[8]The Blockchain has got numerous applications in various fields and one of the promising one is agriculture. The blockchain application in agriculture includes food safety through traceability of provenance, data system , agro-trade, finance, crop certification and insurance etc. Thus this paper aims to review the applications of blockchain in agriculture field from all major databases ranging from Web of Science to Scopus. The study shows that though there exist many blockchain based application in agriculture but only few countries are ready to grasp it where China is leader followed by USA, Italy, India and Spain. This paper also looks into the recents developments and trend in Blockchain, using it we built up a new improved and an easy access system for the transactions using ethereum. [9] Current supply chain may be a linear economy model that directly or indirectly fulfills supply needs. But this model has some disadvantages, like the relationships between the members of the availability chain or the shortage of data for the buyer about the origin of the products. In this paper we propose a replacement model of supply chain via blockchain. This new model enables the concept of circular economy and eliminates many of the disadvantages of the present supply chain. In order to coordinate all the transactions that happen within the supply chain a multi-agent system is made for this paper.

The existing traditional process invokes huge manpower, third party mediators paving the way for corruption. The best example is the recent scam news of approx INR 110 crore in TamilNadu under the name of PM-Kisan scheme. Since the system was manual, officials used this covid-19 pandemic situation to sanction scheme to people without inspecting and validating the documents, farmer lands. Thus existing system lacks security, no transparency. Also as we speak about smart India, digitalization transparency, integrity, security plays an important role in gaining user trust.

Ethereum was launched in 2015 is an open-source, decentralized blockchain based platform. This is used to transfer cryptocurrency through the platform. This enables Smart Contracts and Distributed ledger to be made and to run without any fraud, downtime and interference of third party.

The disadvantage is that, ethereum acts as creation of Smart Contracts, Ledgers and also transferesCryptocurrency. Thus this makes it weak than the Bitcoin which focus only on the Peer-to-Peer transfer.

IIISYSTEM OVERVIEW

In this work, we propose public permission less block chain based smart agriculture system for the government to reduce money mishandling and benefit the farmers by establishing secure connection between the farmers and government officials without any agents. This system aims to support farmer's financial needs by the government in motivating the farmers. This automatic submission of documents, claim of subsidy directly to the farmer account with complete transparency would gain trust of the farmers towards the digital government and increases their profit margins. Blockchain based claim of subsidy and money distribution would eliminate the risk of frauds and increase the efficiency of the overall process.

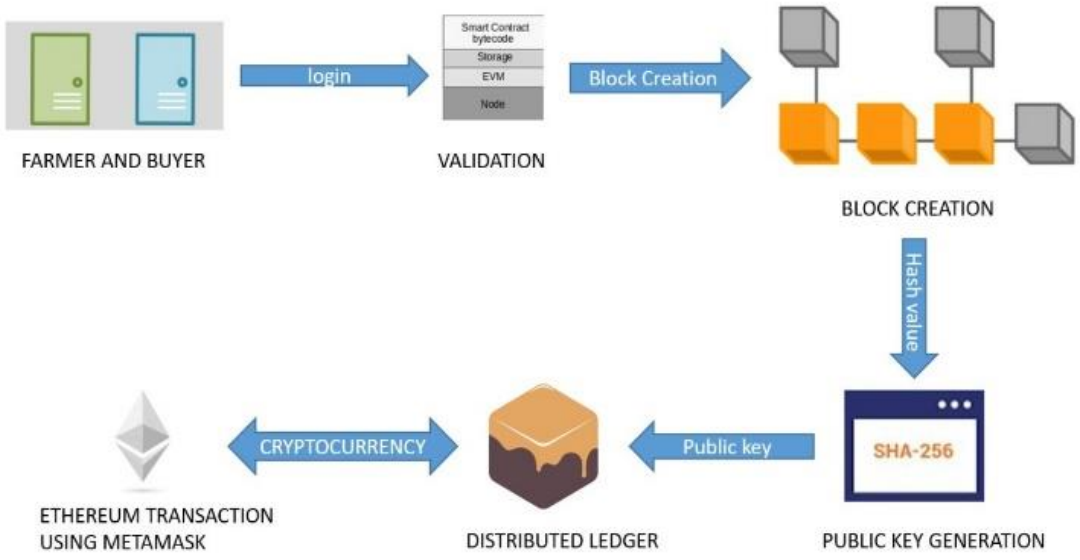

Fig 1 System Architecture

SMART CONTRACT CREATION

A smart contract is a kind of self-operating computer program, which can be executed automatically when specific conditions are met. They are a type of ethereum account which contains data and code at a specific address.. Users can use their Ethereum account to interact with smart contracts via application binary interfaces (ABI). The functions in the smart contracts can be invoked by a new transaction sent through an account. This property allows entities to implement their job functionalities such as data transmission, request handling or access management.

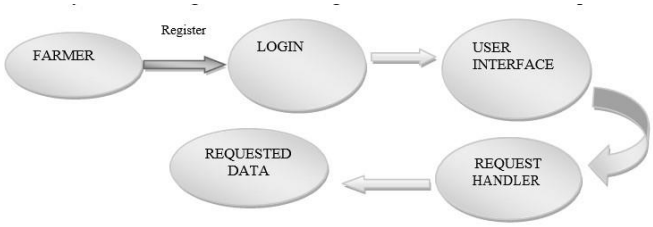

Fig 2 Registration

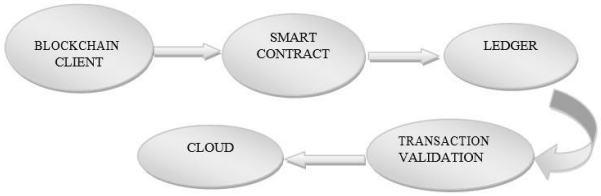

Fig 3 Smart Contract Creation

HASH VALUE CREATION:

A hash function is an cryptographic algorithm that takes an input and creates an output of fixed size that contains a mix of numbers and letters. Bitcoin, for example, uses a hashing algorithm called SHA-256. The output of the hash function is called hash or hash value. The program computes a hash and then compares it with the values of the original value.

Once the input file has been hashed the software is encrypted and it are often downloaded. So, when someone downloads software, the browser must decrypt the file and check the 2 unique hash values. The browser then runs an equivalent hash function, using an equivalent algorithm and hashes both the

file and therefore the signature again. If the browser successfully produces an equivalent hash value, it can confirm that both the signature and therefore the file are aunthentic which haven't been altered.

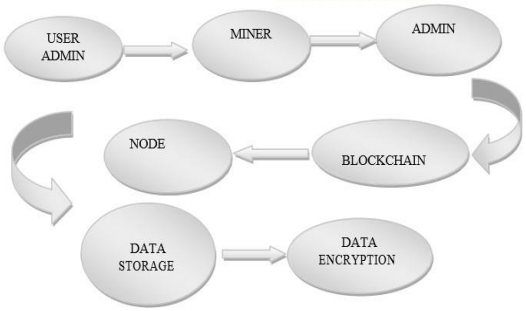

Fig 4 Hash Value Creation

BLOCK CREATION:

Agriculture ministry has to approve the farmer notification received. The farmer document verification by the central agricultural ministry avoids double-spending types of attacks. After the successful verification of farmer uploaded document, the Block Generator module generates a block containing the farmer, land details. Each block in a blockchain contains the hash of the block data. The farmer document uploaded is hashed using the key provided by the Key Generator Module.

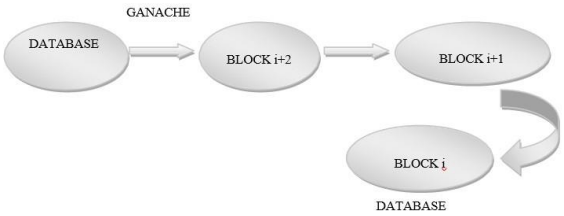

Fig 5 Block Creation

PRIVACY PRESERVING:

The solution for data privacy and security could and will alright be blockchain technology. The blocks relate to every other within the sort of a sequence . The first block of the chain is understood as Genesis. Each block consists of aTransaction Counter, Block Header and Transaction. Also the farmer data privacy is preserved using farmerpublic address. The farmercan share the public address rather than farmerdetails to other members like government officials, village offcer etc.

MIDDLEWARE:

This dependency may be a personal blockchain, which may be a local development blockchain which will be wont to act as a public blockchain. Ganache is employed to deploy smart contracts and for running tests. Therefore we have a distributed ledger running. Ganache provides 10 accounts with 100Ether to check our smart contracts on local blockchain bases.

CRYTOCURRENCY

A cryptocurrency may be a digital asset which will be used as a medium of exchange. The blockchain technology provides cryptocurrencies with the required level of security needed to withstand attacks on the state of the system and from preventing double spending. In cryptocurrency transactions, only the signing off of ownership of the recievers's address to sender's address is done rather than physical exchange of coins. In order to be able to access the coins being sent the receiver must hold the private key which unlocks the sender's public key. If the keys match, the transaction is recorded on the blockchain and simultaneously the balance is altered in the sender's and receiver's address. Through crytocurrency the farmer is been benefited by the subsidy schemes thus benefiting and motivating the farmers towards farming.

IV RESULTS AND DISCUSSION

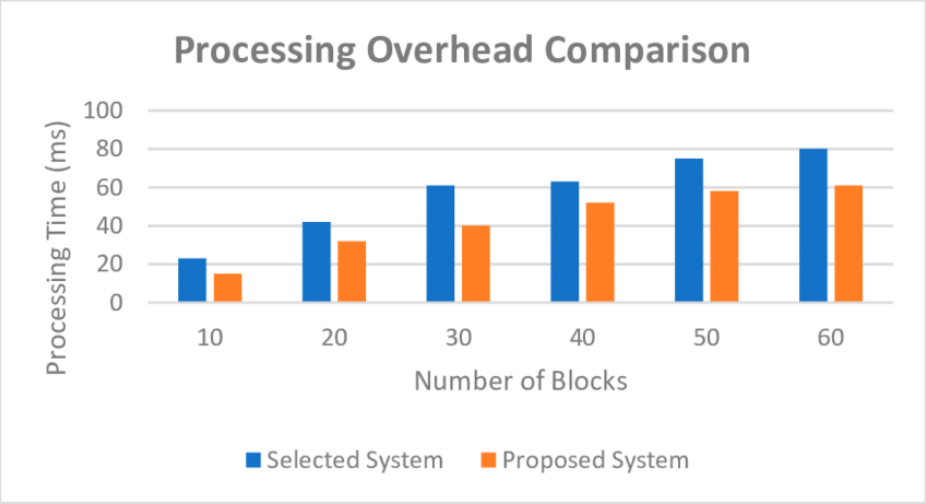

Fig 5.Figure Processing Overhead Comparison Graph

The graph shows the difference between the performance of Selected System and Proposed System, we take the two important entity which shows the difference, processing time which is measured in mille seconds and the number of blocks created. As the number of block increases the processing time increases, which means that the number of blocks created is directly professional to processing time. In the graph the blue bars represent Selected System and the orange bars represent Proposed System. As you can see the Proposed System uses less processing time as that of Selected System.
In this paper as we use Meta mask as middleware and smart contract system it helps the application to reduce the processing time or amount of time consumed to create a block. This helps the application to increase the efficiency of the work. This is the main difference between the Selected System and our System.

V CONCLUSION

Using blockchain, Agro based Transaction will be gaining numerous benefits to grow and move towards decentralization and achieve a trustful environment for all processes. However, despite the trustless nature of blockchain, it is hard to fully maintain trust between the seller and buyer of the product. This is because the entities may act maliciously and the buyer can doubt their credibility.

In this paper, we have proposed an end to end solution for blockchain-based Agro Transaction. We have provided detailed information of proposed solution in terms of traceability, trading, delivery and reputation. We have evaluated and carefully analyzed the performance of smart contracts in order to ensure that the proposed solution is efficient and robust.
In future, we plan to integrate refund and return mechanisms in Agro Transaction. Similarly, the reputation system stores reviews from end consumers which can be biased or fake. In this regard, we plan to integrate fake review detection system that will facilitate the reputation system in detecting the false reviews from the end consumers. Moreover, security analyses that will focus on attacks against reputation system will also be considered.

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