



Blockchain and Cloud Computing: A Way for The Development of Agriculture Sector and Food Supply Chain

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ABSTRACT

Agriculture is considered a source of living for every human being from the past to this age and will forever be. Agriculture is the only pursuit that generates the primary production of the food we ingest. But due to some natural and man-made reasons the son of the soil has to undergo huge losses. Blockchain technology and Cloud Computing can collectively bring a revolution by contributing their part in agriculture to solve the existing problems of agriculture marketing, production, dearth of customer trust for the product, price manipulation, and fraud of agriculture products. By combining these two technologies farmers can have an approach to access a more sustainable, secure, and reliable agriculture system. This system will play a great role in providing advanced skills to cultivators concerning appropriate fertilizers, information on the finest quality seeds, and the rise of production. These technologies can help to make access to configurable networks, services, and also for computing resources.

Keyword: - Cloud Computing, Agriculture, Blockchain technology, Agriculture system, Security, Data control, Food supply

1. INTRODUCTION

Agriculture is the most important source of income for developing countries. Mostly the developing country's income is always dependent on agriculture and its by-products. So, a large amount of development should be focused on the agricultural sector. The main aim is to track and observe the overall process of crop growth, food production, purchasing of best quality seeds and fertilizers, storing of the production, and marketing for the development of this sector by making it faster, efficient, reliable and user friendly. This paper will explain how the concept of Blockchain and Cloud Computing Technology will provide the large, customized, secured, and updated data that can help farmers to increase their yield every year. Cloud Computing Technology along with blockchain will also allow the users to access data, store it and make real-time computations. To make the country's economic conditions more secure we need to improve the agricultural sector which is highly possible by using these technologies collectively which will also provide access to configurable networks, services, applications, storage, server, and other required computing resources.

2. OBJECTIVE

The objective of this paper is to effectively implement the blockchain and cloud computing technology which will help the agricultural sector grow with the capability of enhancing the Indian economy based on the concepts of Cloud Computing, its applications, and how productively blockchain can put up to take a major part of cultivation sectors of the nation to grow rapidly.



3. WHAT IS BLOCKCHAIN?

In simple words, a blockchain is a distributed type of database where all the data can be stored and shared through a decentralized computation network which also provides privacy and security. It records the transactions between the nodes safely without the need for a third party. Due to its unique characteristics, blockchain can become an evolutionary step in the food supply chain by interchanging the data accurately between the stakeholders. It safely has a single server into prevailing technology is an effective way of exploiting and conserving resources. The functioning of blockchain technology can be described in which the first step is carried out by requesting the transaction and by creating a block. Secondly, the newly generated block is transmitted to all the nodes present in the network. All the nodes present in the network extend to a consensus about the required transaction and they get verified in the next step. Once the transaction is verified, a new block is added to the existing block in the ending step. This technology will mainly help farmers in encouraging investment by providing a secure payment method in the entire system.

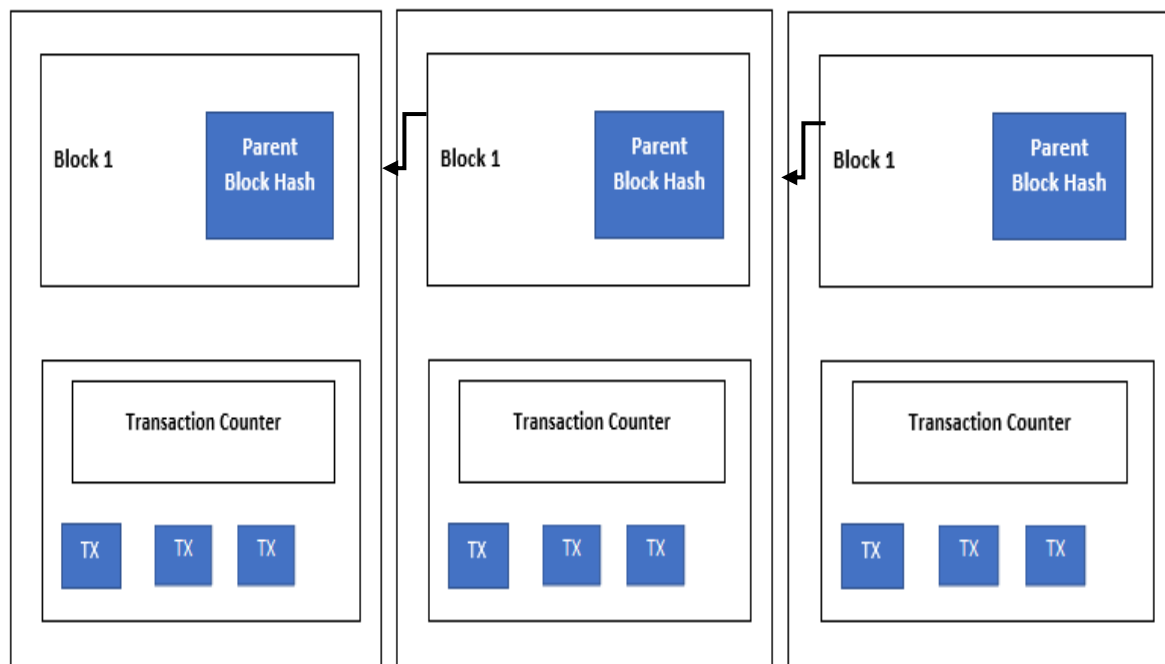


Fig-1: Simplified Blockchain Technology architecture.

4. WHAT IS THE TERM CLOUD COMPUTING?

Cloud computing is a tool that makes all the computing services available in an easy way by implementing those services, without really knowing and getting involved in the technicalities of how and what should be done in providing the required services. This term is known as “cloud computing” as the users who are using these services do not need to know from whom the services are being provided and they consider that the services are provided and maintained by the cloud itself. This technology reduces the cost of availing of those services significantly and requires very less manpower and maintenance of those services. All the issues of maintenance of data and keeping it up to date are handled by the Cloud providers. Cloud computing provides a range of models based on user requirements. By putting this together, farmers need to be aware of various factors like soil type, the amount of moisture present in it, fertilizers and pesticides, nutrient content, agricultural marketing and availability of resources, etc., Such use of cloud computing technology can provide farmers every detail by providing them the access to the collected and processed data over the internet.

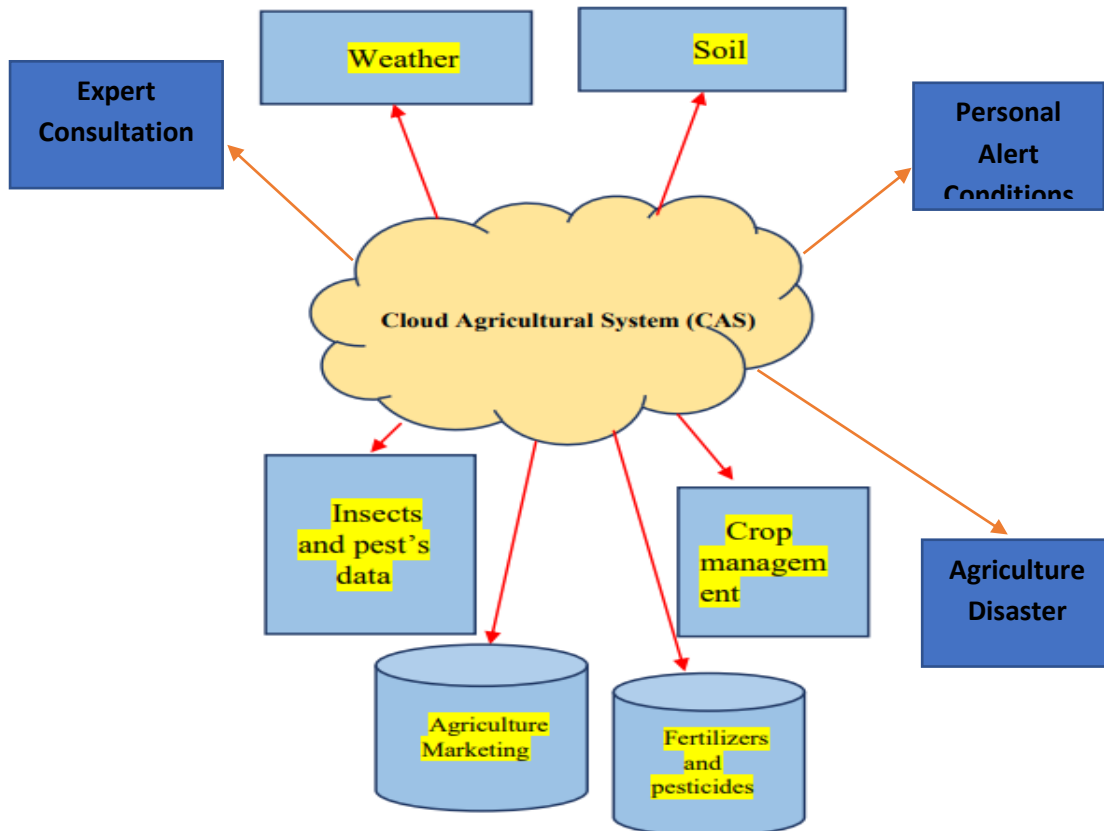


Fig-2: Usage of Cloud Computing for agricultural management.

5. BLOCKCHAIN WITH CLOUD STORAGE

Cloud computing relates to the distinctive style and offerings of recent technology that permits information to be transmitted over a number of the assigned networks, through wireless connections, to a faraway secure location. Cloud carrier vendors serve multiple customers at the identical time. They frame up the closed networks, and their information storage and records backup structures. This implies that the vendor will get all the knowledge that's sent to them and search it firmly, and at the identical time as delivering those services once more to a vendee through these fastidiously maintained connections. Implementation of Blockchain technology is simply identical to Bitcoins one will store the info in an exceedingly decentralized distributed network. a corporation will simply produce its information and store the data in an exceedingly different magnetic disc as a block. These separate block area units are then connected with hash. every block contains has its hash further because of the previous hash contained in it. Hash is often compared with a fingerprint, as every hash is different from the opposite. If a hacker tries to grab the information of a corporation, it would be tough to access all the knowledge from the blocks. And notwithstanding, if somebody tries to hack a block, it'd be risky in concert cannot amendment the hash of the opposite block because it is interlinked with one another.

6. BLOCKCHAIN AND CLOUD COMPUTING-BASED AGRICULTURE SYSTEM

Cloud computing pertains to the distinctive style of new technology and offerings that permit information to be dispatched over assigned networks, through wireless connections, to a faraway secure location that is usually maintained by way of a provider. Cloud carrier vendors typically serve multiple customers. They are set up to get entry among the patron's neighbourhood or closed networks, and their information storage and records backup structures. This suggests that the vendor will intake information that is sent to them and outlets it firmly, at the same time as delivering services once more to a vendee through these fastidiously maintained connections. we tend to will observe from cloud computing that there's a 3rd party. It is not smart to believe a treater because the trafficker may



steal the confidential knowledge or could tamper with the information. Upon implementing Blockchain technology similar to Bitcoins one will store the info within the decentralized distributed network. It works identical to cloud storage but there'll be no trafficker. An organization will produce its information and store it on totally different onerous disks as blocks. These blocks area unit connected with hash. every block contains its hash further because of the previous hash. Hash can be compared with a fingerprint, as each hash is different from another. If a hacker tries to sneak the info of a corporation, it would be onerous to access all the blocks. Though he hacks a block, it'd be risky as he cannot amend the hash of another block as a result of its interlinked. In agriculture, stakeholders would like their knowledge to be kept and maintained firmly and may not be disclosed to alternative corporations or folks. that's the precise issue that blockchain and cloud technology combined provides, the effective protection of the info and secure exchange of it between the nodes of a network. Since the knowledge within the network is written within the blocks, it cannot be simply changed or scanned by anyone unless access isn't allowable. Besides, all knowledge keeps on decentralized networks scales back the risks of hacking or any fallacious activity. However, how helpful could be the blockchain for agriculture? because it is already identified that the network will prove useful for fast and securing monetary transactions within the same approach because it could facilitate resolving issues associated with the funding and transactions in agricultural comes and result in the more development of the entire sector. These technologies permit management and acceleration of the daily agriculture-based operations of the business-like production, food process, transportation, storage, and sale.

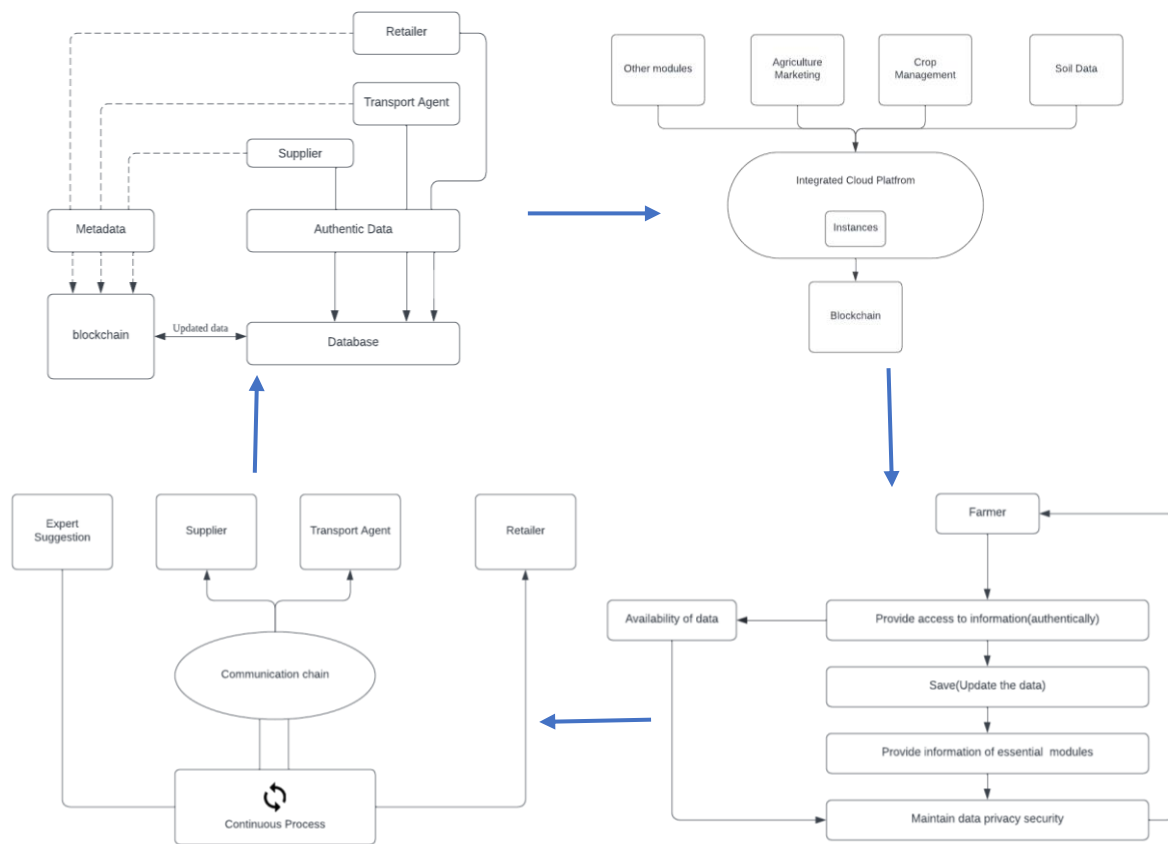


Fig.-3: Figure to demonstrate the Integration of cloud and blockchain technology for a better agricultural system.

In addition, these technologies give a clear and secure knowledge exchange network that simplifies cooperation between farmers and customers. whereas implementing this technique, the farmer can enter all the small print regarding the product they sell, as nobody can take away or modify them. These technologies area unit rather than a tool for automation, traceability, quality assurance, and responsibility. Improvements during this space are often intimated by the suitable implementation of it. The blockchain network could have some benefits once applied



properly in varied industries, together with the agricultural sector. These advantages might be explained because the following:

- i. Providing a secure system: The data present on the blockchain network cannot be changed without the permission of both the seller and the buyer. As a result, it becomes a dependable system that protects the users from fraudsters and prevents fraud is created, and is a kind of system that is trustworthy to its users.
- ii. Encouraging farmers for investment: By applying these technologies, little farm homeowners can realize investors and can facilitate to boost of their business.
- iii. A exchange for farmers: By making use of this method farmers will simply be able to trade the futures contracts at mounted costs for their crops or other agricultural merchandise. As a result of it, farmers can understand their daily updated prices, and there would be fewer probabilities of fraud to own occurred.

7. WHAT BENEFITS THESE TECHNOLOGIES WILL PROVIDE?

- 1. Interaction with farmers:** All the information such as expert consultation or other information notifications related to the farm will be provided to the farmer in their known language.
- 2. Provide the details of distribution:** All the details regarding the salesperson, dealers, and storage facilities.
- 3. Weather updates:** Crop growth is dependent on the weather conditions. It becomes very important for the farmers to get daily updates on the weather conditions of particular areas. Many of the crops get destroyed every year and the farmer has to face huge losses. This system will help farmers to get notifications of the worst weather conditions priorly.
- 4. Expert suggestions:** The farmers will be provided with the suggestions of experts for their farms regarding the usage of insecticides, pesticides, fertilizers, and details of soil conditions.
- 5. Monitoring crop growth:** This system will help to consequently track the growth of the plant and the number of nutrients required for appropriate development.

8. CONCLUSION

In the agricultural sector, the collective implementation of blockchain technology in cloud storage can extremely increase security and it'll facilitate to scale back of the threats of a selected organization. By increasing the safety levels during this agriculture system hacking knowledge of information becomes most tough to intruders as data are held on completely different several numerous blocks and each block is held on in an exceedingly different location on the disk drive. So, even though the block is tried to be hacked, there'll be an alert generated, and may be simply known that there's a threat to the information conjointly there'll be enough time out there to require necessary actions to avoid the attack on the information. this technology will prove a lot helpful. Different sectors of countries will gain profit in an exceedingly short amount. The poor economic conditions may be reduced and a speedy rise within the economy may be noticed. Several nations will currently get back their economic conditions in dreadful times by looking at this technology.

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