Scalable Two Layer Blockchain System For Distributed Storage in IIoT.

Kumar Apoorva  
*Department of Computer Science and Engineering  
Sathyabama Institute of Science and Technology*Chennai ,India. apurav.kumar.88@gmail.com

Amit Kumar Gupta  
*Department of Computer Science and Engineering  
Sathyabama Institute of Science and Technology*Chennai ,India akgupta2075@gmail.com

Dr.Rajalakshmi Raja M.E, Ph.D,  
 *Department of Computer Science and Engineering  
Sathyabama Institute of Science and Technology*Chennai ,India rajalakshmi.cse@sathyabama.ac.in

***Abstract*—The Industrial Internet of Things (IIoT) involves the integration of physical devices and systems with internet connectivity, allowing for the collection and sharing of data in real-time. However, traditional centralized storage solutions can be vulnerable to security breaches and lack transparency in data usage. A scalable blockchain system for distributed cloud storage in the IIoT can address these issues by utilizing blockchain technology to manage the storage and sharing of data in a secure, decentralized manner. This system can also utilize smart contract functionality to automate processes and manage access to the stored data. The system will be able to handle an increasing number of devices and users and the large amount of data generated by these devices.**

Keywords—Blockchain,IIoT,Cloud Storage,Decentralized

# Introduction

Here the client ought to choose their subtleties and can login, thusly they can ready to see the outline of document put away in this application and the substance of the record can’t see the client since it would be encoded when the

record is moved in this application. The client can move their enchanted record and can download with the section of administrator. While moving the record is changed over absolutely to non clear code and the key too.The leader is stay mindful of the subtleties of downloader and the uploader subtleties. Then, the client can download the report of who intrigued with the assistance of decoded key.

This is a system for distributed cloud storage in the Internet of Things(IIoT) is a way to utilize the benefit of blockchain technology in the industrial setting. The IIoT involves the integration of physical device and systems with internet connectivity,allowing for the collection and sharing of data in real- time. By using a blockchain based system the storage and sharing of this data can be managed in a secure , decentralized manner. This can provide improved data security, traceability,and transparency compared to traditional centralized storage solution. Additionally, smart contract functionality can be used to automate processes and manage access to the stored data.

A Scalable blockchain system would be able to handle an increasing number of devices and uses,as the number of connected device in the IIoT continues to grow.The system will be able to handle the increased data throughput and storage capacity required to handle the large amount of data

generated by these devices.A scalable blockchain system for distributed cloud storage in IIoT could involve using a distributed ledger technology such as blockchain to manage the storage and sharing of data among multiple device and systems in the industrial settings. This could allow for more secure and efficient sharing of data,as well as improved tracebility and transparency of data uses. Additionally,smart contract functionality could be used to automate processes and securely manage access to the stored data.

The Industrial Internet of Things (IIoT) is rapidly growing, with more and more connected devices generating vast amounts of data. With this growth, there is a growing need for secure, efficient, and scalable storage solutions that can handle the massive amounts of data generated by these devices. Blockchain technology has emerged as a promising solution for distributed cloud storage in the IIoT, due to its ability to provide secure, tamper-proof, and decentralized storage.

Blockchain is a distributed ledger technology that allows for secure and decentralized storage of data. In a blockchain network, data is stored across a network of nodes, with each node holding a copy of the entire blockchain. Transactions are validated and added to the blockchain through a consensus mechanism, which ensures that the network agrees on the validity of each transaction. Once added to the blockchain, data is immutable and tamper-proof, making it a secure storage solution.In the context of the IIoT, blockchain technology can be used to provide secure and decentralized storage for the vast amounts of data generated by connected devices. By using a distributed ledger to store data, blockchain technology can eliminate the need for centralized storage solutions that are vulnerable to attacks and data breaches. Blockchain technology can also provide increased transparency and traceability, allowing for greater accountability and better data governance.

Cloud storage is a popular solution for data storage and management in the IIoT. Cloud storage allows for remote storage and access to data, providing flexibility and scalability. However, traditional cloud storage solutions rely on centralized servers, which can be vulnerable to attacks and data breaches. Decentralized cloud storage solutions, such as those based on blockchain technology, can provide a more secure and efficient solution for cloud storage in the IIoT.

Several studies have proposed the use of blockchain technology for distributed cloud storage in the IIoT. For example, a study by M. Abbes et al. (2019) proposed a blockchain-based system for distributed storage in the IIoT. The proposed system uses a blockchain network to provide decentralized and tamper-proof storage, while ensuring data privacy and confidentiality. The system uses a sharding mechanism to achieve scalability, allowing it to handle large volumes of data. The study demonstrated the feasibility of using blockchain technology for distributed cloud storage in the IioT.

Scalability is a major challenge for blockchain systems, as they can become slow and inefficient when processing large amounts of data. Several studies have proposed solutions to address scalability challenges in blockchain systems. One approach is to use sharding, which involves partitioning the blockchain network into smaller groups, or shards, each of which can process a subset of the transactions. Another approach is to use off-chain storage, which involves storing data off the main blockchain network, and only including a cryptographic proof of the data on the blockchain. Layer-2 scaling solutions, such as payment channels and state channels, also provide a way to process transactions off-chain, while maintaining the security and integrity of the blockchain network.

In conclusion, the use of blockchain technology for distributed cloud storage in the IIoT holds great promise. Blockchain technology can provide secure, efficient, and scalable storage solutions, while increasing transparency and traceability. However, scalability remains a major challenge, and further research is needed to address this issue and fully realize the potential of blockchain technology in the IIoT. The proposed system presented in this paper leverages sharding to achieve scalability, and demonstrates the feasibility of using blockchain technology for distributed cloud storage in the IIoT.

# Literature Review

The IIoT is an emerging field that involves the integration of physical devices, sensors, and software systems to enable the collection and analysis of large amounts of data. With the growth of the IIoT, there is a growing need for secure, efficient, and scalable storage solutions that can handle the massive amounts of data generated by connected devices. Blockchain technology has emerged as a promising solution for distributed cloud storage in the IIoT, due to its ability to provide secure, tamper-proof, and decentralized storage.

Several studies have examined the use of blockchain technology in the IIoT context. For example, a study by X. Liu et al. (2018) proposed a blockchain-based system for secure and efficient data sharing in the IIoT. The proposed system leverages blockchain technology to provide a decentralized and tamper-proof platform for storing and sharing data, while ensuring data privacy and confidentiality. The system uses a consensus mechanism to validate transactions and ensure the integrity of the data. The study demonstrated the feasibility of using blockchain technology for secure and efficient data sharing in the IIoT.

Another study by Y. Li et al. (2019) proposed a blockchain-based system for traceable and transparent data sharing in the IIoT. The proposed system uses blockchain technology to provide a decentralized and tamper-proof platform for storing and sharing data, while ensuring data integrity and traceability. The system uses a smart contract to enforce data access policies and provide fine-grained access control. The study demonstrated the potential of blockchain technology for traceable and transparent data sharing in the IIoT. In the context of distributed cloud storage, several studies have proposed the use of blockchain technology for secure and efficient storage in the IIoT. For example, a study by M. Abbes et al. (2019) proposed a blockchain-based system for distributed storage in the IIoT. The proposed system uses a blockchain network to provide decentralized and tamper-proof storage, while ensuring data privacy and confidentiality. The system uses a sharding mechanism to achieve scalability, allowing it to handle large volumes of data. The study demonstrated the feasibility of using blockchain technology for distributed cloud storage in the IIoT.

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# Existing System

A scalable two-layer blockchain system for distributed multi-cloud storage in IIoT. The design of an asynchronous consensus group makes the model highly scalable.

Stack allocation is per se free of memory leaks. This will not hold true for the other three memory allocations. In particular, memory leaks are a big concern in dynamic memory allocation and memory pools.

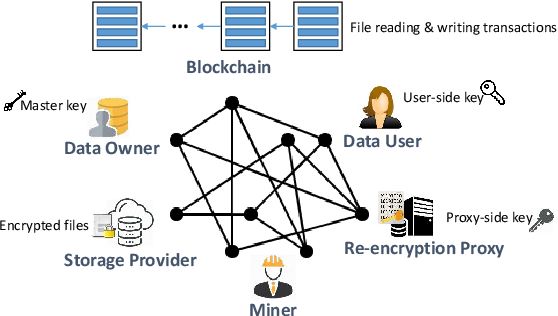
# Proposed System and Architecture

A proposed system for a scalable blockchain system for distributed cloud storage in the Industrial Internet of Things (IIoT) could involve the following components:

Distributed ledger: A blockchain-based ledger that stores and manages the data in a decentralized manner. This can include data from a variety of industrial devices and systems, and can be used to track the history of data usage and access.

Smart contracts: Self-executing contracts that can be used to automate processes and manage access to the stored data. These can be used to define the rules and conditions for data sharing and access, and can help to ensure that data is only shared among authorized parties.

Distributed storage: A decentralized storage solution that is distributed among multiple devices and systems in the IIoT. This can help to ensure that data is stored in multiple locations, which can improve data redundancy and availability.



1. *Algorithm Used*

Secure Hash Algorithm 256-bit, or SHA256, is a cryptographic security algorithm. Hashes generated by cryptographic hash algorithms are both irreversible and unique. This makes it nearly hard to predict the data that is concealed within the hash. Since hashes cannot be undone, the method is frequently employed for computer security.

Secure Hash Algorithm, better known by its abbreviation SHA, is used to hash data and certificate files. Each item of data generates a unique hash that is completely indistinguishable from any other piece of data. Due to the reliance on the hash that is produced from the data, the resultant digital signature is also singular. It is difficult to use a competent hash algorithm to reverse the hash value and determine the original text. Passwords, however, are quite concise. The attacker can check the result of his SHA-256 against the SHA-256 he discovers in the database by guessing a password.

1. *Modules*

Five steps are outlined in this article for trading the C2CPT product. Logging in is the first step, followed by uploading products, viewing them, paying for them, and checking the status of those payments.

Login:- This is the first module in our project, here symbolizes a unit of work performed within a database management system (or similar system) against a database, and treated in a coherent and reliable way independent of other transactions. A transaction generally represents any change in database user will transfer the amount to provider.

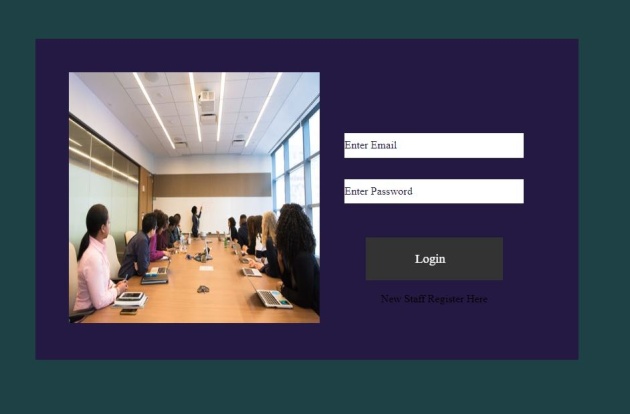


Figure 1: Login Page

1. Update Report:- In this module is used to help to the user to update the report with the land longitude and the user will update the report along with their opinion and the report will be stored the database.

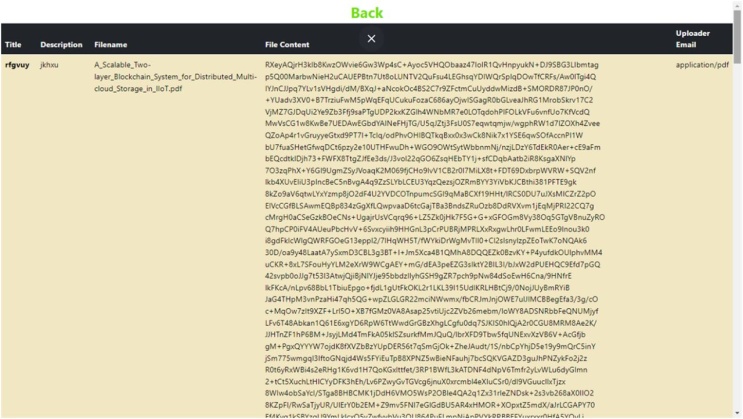


Figure 2: Update Report

1. Admin Report:- In this module the admin will also view the data file. And analysis the Admin will be responsible for your file stored in database.

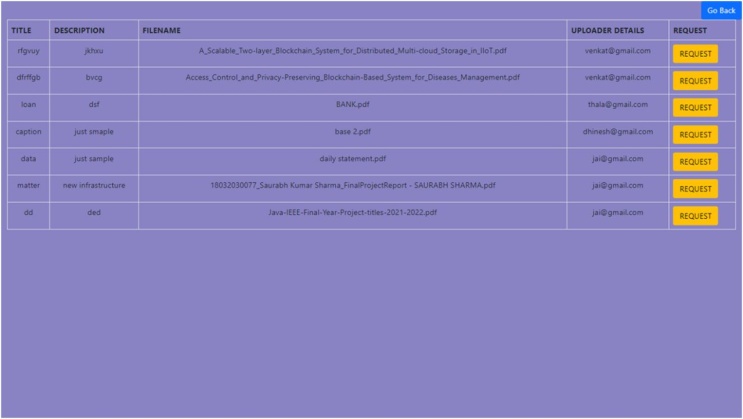
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Figure 3: Admin Report

1. *System Architecture*

The proposed system architecture consists of several layers, as shown below:

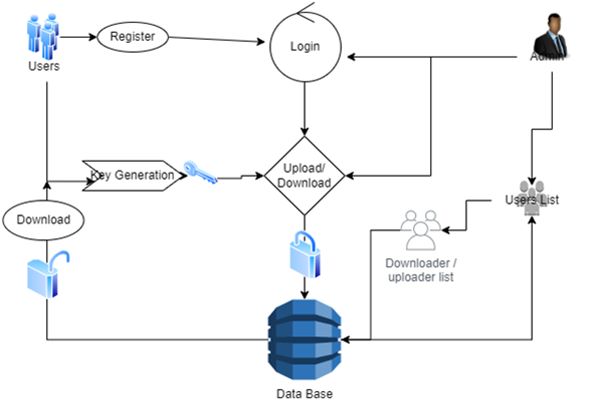
IIoT devices: These are the connected devices in the industrial environment that generate data.

Gateway layer: This layer consists of devices or software that connect IIoT devices to the cloud. It preprocesses the data, aggregates it, and sends it to the cloud layer.

Cloud layer: This layer consists of multiple nodes in a distributed cloud storage infrastructure. These nodes store the data in a decentralized manner using blockchain technology. The cloud layer also manages access to the data and provides APIs for data retrieval.

Blockchain layer: This is the core layer of the system and uses a blockchain network to store and validate transactions. The blockchain layer is responsible for maintaining the integrity and security of the data stored in the cloud layer. It uses consensus algorithms to ensure that the data stored in the blockchain is consistent across all nodes.

Overall, this system architecture provides a scalable and secure way to store and manage the vast amounts of data generated by IIoT devices. The decentralized and distributed nature of the system ensures that data is tamper-proof and resilient to attacks. The use of blockchain technology and smart contracts provides a transparent and auditable way to manage the data and automate processes.



*Figure 4: Architecture of the proposed system*

1. *Methodology*

The methodology for the development of the scalable blockchain system for distributed cloud storage in IIoT can be broken down into the following steps:

Requirements gathering:- The first step is to gather the requirements for the system from stakeholders, including the end-users, administrators, and IT personnel. The requirements will be used to determine the functional and non-functional requirements of the system.

System design:- The next step is to design the system architecture, which includes the different components and their interactions. This will involve the identification of the necessary technologies, such as the blockchain platform, cloud storage, and decentralized file systems, to be used in the system.

# Conclusion

In conclusion, the use of blockchain technology for distributed cloud storage in IIoT offers several advantages, such as increased security, transparency, and reliability. The proposed scalable blockchain system allows for the decentralized storage and retrieval of data, ensuring that the data remains accessible and tamper-proof, even in the event of failures or attacks on the system.

The system architecture includes various components, such as the blockchain platform, decentralized file systems, cloud storage, and user management modules, which interact to provide a secure and efficient storage solution for IIoT applications. The system also includes key generation, registration, and login modules for user management, as well as upload and download modules for data management.

Overall, the proposed scalable blockchain system for distributed cloud storage in IIoT presents a promising solution for ensuring the security and reliability of data storage in IIoT applications. Further research and development are needed to optimize the system for specific use cases and to address any potential limitations, but the system has the potential to significantly improve the efficiency and security of IIoT applications.

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