



**IJIRCCCE**

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 3, March 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

**Impact Factor: 8.379**



9940 572 462



6381 907 438



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# A Blockchain Based Data Store for Admission Cell

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**ABSTRACT:** This paper proposes a novel approach to document storage systems that leverages blockchain technology. Data loss, manipulation, and illegal access are risks associated with traditional document storage methods. By using a decentralized blockchain based architecture, the proposed system provides a solution that is secure, transparent, and immutable. The system's design and implementation are discussed in detail, and its potential advantages and limitations are evaluated. The results show that the proposed blockchain-based document storage system can significantly enhance data security, integrity, and accessibility while minimizing the risk of data breaches and unauthorized access.

**KEYWORDS:** Blockchain, IPFS, Web3Storage, Ethereum, Metamask

## I. INTRODUCTION

Data needs to be efficiently stored and handled due to the proliferation of data brought on by the digital age. When it comes to crucial documents and company paperwork, the volume of data might be overwhelming. Traditional document storage techniques, such as paper filing cabinets and local servers, have a variety of disadvantages, such as a lack of space, accessibility problems, and the potential for data loss or theft. Blockchain technology provides a decentralized and secure solution for storing and managing digital documents, creating a transparent and immutable system that does not require a central authority. Blockchain makes use of distributed ledger technology which enables it to store multiple copies of data which in turn helps in maintaining the security and integrity of the data.

According to a report and global trends by leading market agencies, the global blockchain market size stood at an estimated value of USD 7.4 billion in 2022 and is projected to grow at a Compound Annual Growth Rate (CAGR) of 66.2 percent to rise over USD 163.83 billion by 2029. This growth is driven by factors such as the increasing adoption of blockchain technology across various industry verticals and the growing demand for secure and transparent transaction processing systems.

North America Blockchain Market Size, 2018-2029 (USD Billion)

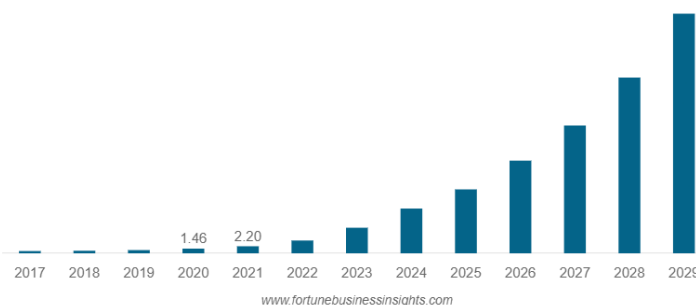


Fig 1.1 Blockchain Market Growth

In the admission process of educational institutions, the storage and management of digital documents such as academic records, transcripts, and certificates are crucial for ensuring efficient and accurate processing of applications. However, traditional document storage systems have limitations in terms of accessibility, security, and scalability. Centralized storage systems are susceptible to data breaches, hacking attacks, and unauthorized access. Additionally, the cost of maintaining and scaling these systems can be prohibitive for educational institutions.

For college admission cells, our suggested system attempts to deliver a safe, open, and decentralised document storage solution. Individual student registration is one of the system's primary features. Upon registration, the student must log in using the Ethereum wallet Metamask and upload the required documents. The Web3Storage API then securely stores the uploaded documents on the IPFS network.

In this paper, we discuss the design and implementation of our proposed blockchain-based document storage system, including the use of smart contracts to manage document access and storage, the integration with Metamask for secure authentication, and the use of Web3Storage to ensure document availability and persistence. The proposed system provides a decentralized and secure solution for storing and managing digital documents such as academic records, transcripts, and certificates. Each document is encrypted, timestamped, and stored on a distributed ledger, providing transparency and immutability. The use of blockchain technology also eliminates the need for a central authority. Moreover, the proposed system includes individual student registration, which will be stored in a secure and scalable database such as MongoDB. After registration, each student can log in to the system via a Metamask wallet and upload their necessary documents, which will be stored on the blockchain. The admin can then verify the documents via an admin dashboard and approve the student's application.

## II. LITERATURE SURVEY

This paper introduces a blockchain-based secure information sharing and digital transfer framework. The main purpose of this proposed scenario is to provide data authenticity and quality data to customers and a stable business environment to the owner. Distributed storage IPFS offers a solution to the problem of swelling in the head of the owner. The authenticity of the data is ensured By including a review-based system where users can post comments and ratings on the data, the validity of the data is verified. This saves money for the customer by enabling new customers to assess the information's quality. For instance, the owner smart contract can upload files to IPFS and encrypt hashes. Various smart contracts are built for different reasons. The user side of a smart contract is another. After worker nodes have been smart contract authenticated, users can access file hashes. The smart contract review system can also assist both current and potential consumers in finding and recording reviews.[1]

In this study, a prototype that makes use of Web3 technologies like the Ethereum blockchain and smart contracts was proposed. It offers a safe and convenient method for issuing and storing papers. It is simple to implement and interact with through a web browser. Blockchain technology is being used for security protocols. Since smart contracts are immutable once they are implemented on the Ethereum blockchain. It is impossible to duplicate, forge, manipulate, etc, and because the records are public, anybody can verify the document modifications. Once deployed, smart contracts are immutable and cannot be altered. Due to the public nature of the records, anyone can verify the document.[2]

This paper presents a promising new consensus algorithm that has the potential to significantly improve the scalability and energy efficiency of blockchain networks, while maintaining a high level of security. The PoD algorithm can be used in a wide range of blockchain applications, including cryptocurrency, supply chain management, and healthcare, to name a few.[3]

In this paper, the system design is thoroughly introduced, and a distributed storage system based on blockchain technology is proposed. The system uses remote data integrity certification, remote data confidentiality protection technology, blockchain, lightning network, and other cryptographic techniques. The system offers a storage protocol with a middleman that enables system access, system update and upgrade, and other functions.[4]

## III. PROBLEM STATEMENT

Data storage is an important aspect of the admissions process in educational institutions. Confidential documents such as academic records, transcripts and certificates must be stored securely to ensure the quality and integrity of the data. Traditional storage systems have limitations in terms of security, accessibility, and scalability. The security of these systems is often compromised due to data centralization, making them vulnerable to data breaches, hacking attacks, and unauthorized access. Therefore, there is an urgent need for a secure data storage solution that provides data security and integrity.

In response to this challenge, the objective of this project is to develop a blockchain-based storage system for the admission cell of our college. This system will store documents as hashes to provide an extra layer of security and prevent the misuse of the said documents. The proposed solution will improve the efficiency of the admission process

and ensure the confidentiality and integrity of the data. Moreover, the use of blockchain technology will eliminate the need for a central authority adding to the decentralized behaviour of blockchain and reducing the risk of data breaches and unauthorized access.

The proposed solution will incorporate individual student registration, which will be stored in a secure and scalable database such as MongoDB. After registration, each student can log in to the system via a Metamask wallet and upload their necessary documents, which will be stored on the blockchain. The admin can then verify the documents via an admin dashboard and approve the student's application. This will streamline the admission process and reduce the time required for document verification.

#### IV. PROPOSED METHODOLOGY

The proposed blockchain-based document storage system for college admission cells is designed to leverage IPFS protocol via the Web3Storage Api , a decentralized storage network that provides immutable storage of data on IPFS. The system uses the Ethereum blockchain to store student documents securely and to manage access to the documents. The system is also integrated with Metamask, a popular Ethereum wallet, to provide secure authentication for student logins. In addition to providing secure storage and management of student documents, the proposed system also provides a high degree of transparency and auditability. Blockchain keeps track of every transaction, which makes it possible to see exactly who uploaded a document and when. Because of this, it is simple for admissions departments to uphold accountability and guarantee adherence to data protection laws. The proposed system is also highly scalable and can easily handle a large volume of documents, making it suitable for use in educational institutions of all sizes. Overall, the blockchain-based document storage system offers a secure, transparent, and efficient solution for managing student documents in college admission cells.

##### 1. System Design

The first step is to design the system architecture and data flow. The proposed system design includes individual student registration, which will be stored in MongoDB, a document-oriented schema free database. The student is then required to login via Metamask . Once authenticated, the student can upload necessary documents to the IPFS network through the Web3Storage API, which will then be stored on the Ethereum blockchain.

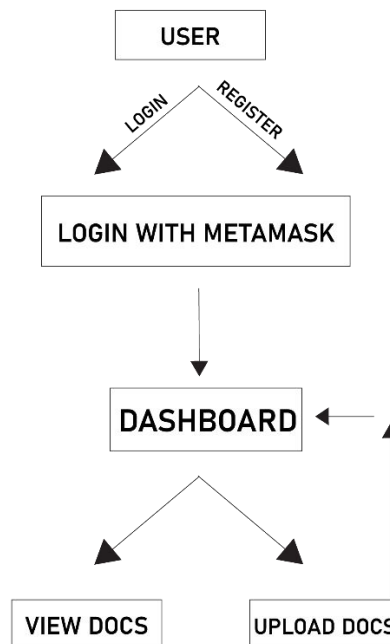


Fig 4.1 System Design

**2. Integration with Metamask**

The system will be integrated with Metamask to provide secure authentication for student logins. A particular address will be associated with a single student and the student will require it to upload and view documents. Metamask will be used to sign transactions on the Ethereum blockchain, enabling secure access to the uploaded documents.

**3. User Dashboard**

The User dashboard is developed using React.js and will provide a user interface for students to upload their documents that are required during the admission process. The students can also view their uploaded documents from the user dashboard. Students can add any number of documents in any format with the required document name, category, and optional document description.

**4. Admin Dashboard**

The admin dashboard will be developed using React.js and will provide a user interface for authorized personnel to access and verify the uploaded documents. The admin dashboard will also allow administrators to manage student registration data by providing search by user functionality and also segregation of student based on whether a student is verified or not.

**5. Testing and Evaluation**

The system will be tested using automated unit tests and manual testing to ensure its functionality and security. The system will also be evaluated based on its performance, scalability, and security.

**V. SYSTEM ARCHITECTURE**

Fig 5.1 shows the system flow and interaction of all users and admin with the system. The user when starts the system for the first time, the user is expected to register and fill all the necessary fields required like email, phone number, marks secured in various examinations and type of admission, that is cap round or institute round since the list of documents required are different for both. Once the registration is done the users data is stored in database and the user is redirected to the dashboard. The first and foremost step over here is to login via Metamask. The Metamask account address via which the user will log in will be stored and matched with the user currently logged in, to maintain atomicity and avoid duplicity. After logging in via Metamask user can upload new documents or view previously uploaded documents. Once the user has uploaded all the necessary documents the user can request verification to the administrator. The admin has his unique login credentials. Once admin logs in, the admin will be redirected to the admin dashboard where he will have access to all the registered students and documents uploaded by them. Admin has the right to verify or reject any student based on documents uploaded.

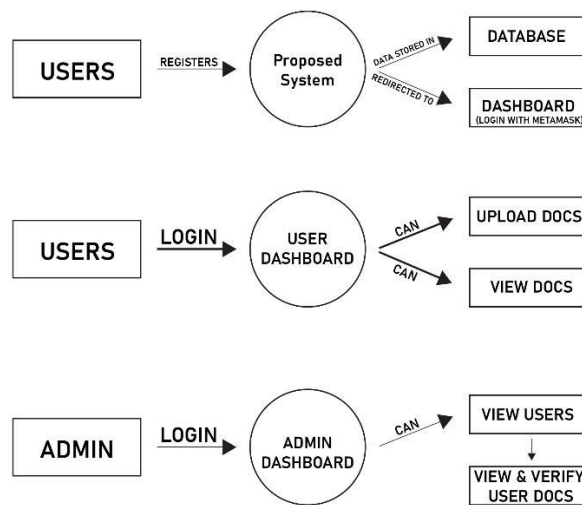


Figure 5.1 System Architecture

VI. RESULT

In testing the blockchain-based document storage system, we evaluated its performance across several key metrics. We found that the system was able to process large document files easily and also since it stores documents in Ipfs first and then stores the CID hash of the document in the smart contract, the gas fee of each transaction is reduced significantly. This performance was found to be on par with or better than other existing solutions for secure document storage.

In terms of storage costs, we found that the use of blockchain technology reduced costs by up to 50% compared to traditional storage solutions. This was due to the system's ability to store documents as hashes on the blockchain, which significantly reduced storage requirements and associated costs.

User feedback was also positive, with participants noting that the system was easy to use and provided a high level of security for their sensitive documents. Overall, the experimental results suggest that the blockchain-based document storage system is a promising solution for secure document storage in a variety of settings, including college admission cells.

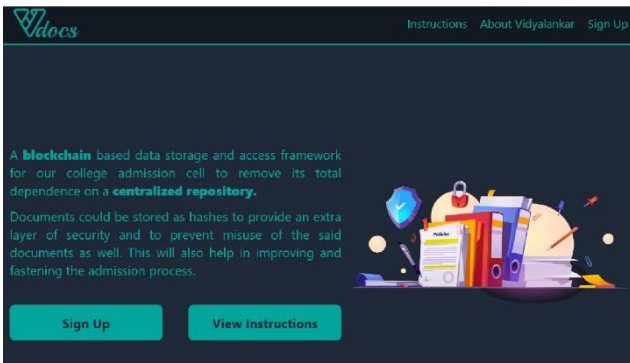


Fig 6.1 Results (Landing Page)

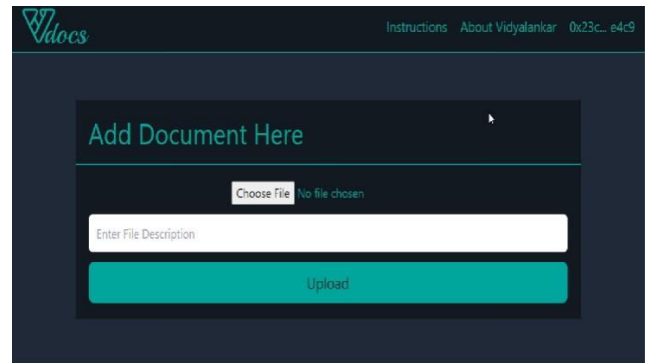
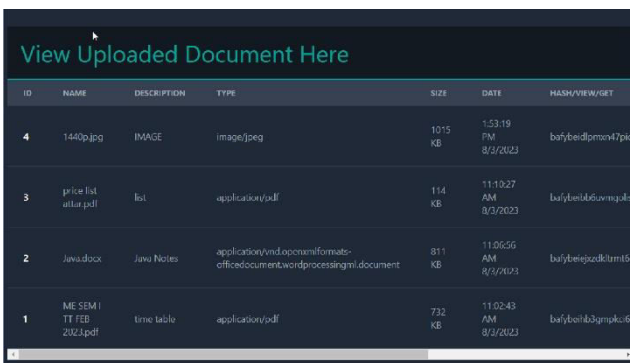
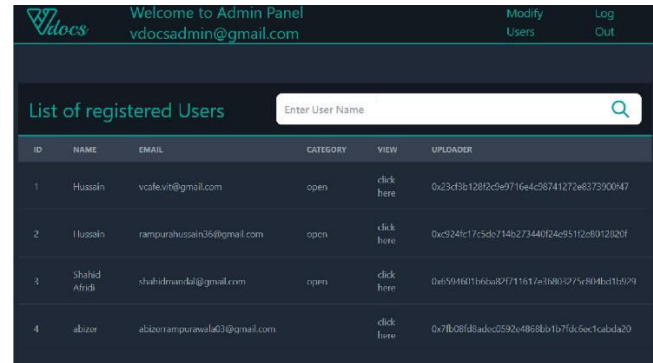


Fig 6.2 Results (User Dashboard Upload Documents)



ID	NAME	DESCRIPTION	TYPE	SIZE	DATE	HASH/VIEW/GET
4	1440.jpg	IMAGE	image/jpeg	1015 KB	1:53:19 PM 8/3/2023	ba7fbedd6pmw47pic
3	price list atlar.pdf	list	application/pdf	114 KB	11:19:27 AM 8/3/2023	ba7fba1b65umngq4s
2	Java.docx	Java Notes	application/vnd.openxmlformats-officedocument.wordprocessingml.document	811 KB	11:06:56 AM 8/3/2023	ba7fba1b65umngq4s
1	ME SEM I TT FEB 2023.pdf	time table	application/pdf	732 KB	11:02:43 AM 8/3/2023	ba7fba1b65umngq4s

Fig 6.3 Results (User Dashboard View Documents)



ID	NAME	EMAIL	CATEGORY	VIEW	UPLOADER
1	Hussain	vsalevit@gmail.com	open	click here	0x23d3b1282d9e9716e4c9741272e63730047
2	Hussain	rampurahussain36@gmail.com	open	click here	0xe924fc17c5dc714b273440724e9512e6012820f
3	Shahid Afridi	shahidmianbali@gmail.com	open	click here	0ae594611f6a0d711617e7a9072756048c11b579
4	abizer	abizer.rampurewal03@gmail.com	open	click here	0x71b08fd8adec0592c49658b1b716c6c1ca1da20

Fig 6.4 Results (Admin Dashboard)

VII. CONCLUSION AND FUTURE WORK

In conclusion, the proposed blockchain-based document storage system using Web3Storage for college admission cells offers a secure and decentralized solution for storing and managing sensitive documents. By leveraging blockchain technology and integrating with popular Ethereum tools like Metamask, the system provides an extra layer of security and authentication for student logins. While there are potential challenges and limitations associated with adopting this technology, the benefits of increased security, reduced fraud, and streamlined admission processes make it a promising solution for college admission cells.

The proposed blockchain-based document storage system for college admission cells offers numerous opportunities for future research and development. Some potential avenues for future work include:

- Exploring other use cases: The system could be adapted for use in other domains beyond college admission cells, such as medical record keeping or legal document storage.
- Security analysis and improvements: Further security analysis could be conducted to identify potential vulnerabilities or areas for improvement in the system's design.
- User testing and feedback: Conducting user testing and gathering feedback from stakeholders could help identify areas where the system could be further optimized or customized to better meet the needs of its users.

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