International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 04 | April - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

# A Review on the Disk Space Rental Systems

**Swanand Sao [1], Alpesh Khobragade[2], Tanmay Salwe[3], Tanmay Dhomne[4], Dr. S.P. Khandait[5]**

[1]*Information Technology, K.D.K. College of Engineering, RTMNU, Nagpur, Maharashtra, India*
[2]*Information Technology, K.D.K. College of Engineering, RTMNU, Nagpur, Maharashtra, India*
[3]*Information Technology, K.D.K. College of Engineering, RTMNU, Nagpur, Maharashtra, India*
[4]*Information Technology, K.D.K. College of Engineering, RTMNU, Nagpur, Maharashtra, India*
[5]*Professor, Information Technology, K.D.K. College of Engineering, RTMNU, Nagpur, Maharashtra, India*

---

**Abstract -** This review explores new ways to store files using blockchain instead of traditional cloud services. We examine four systems: one that manages files automatically with smart contracts, another that lets people rent out unused storage space (like Airbnb for hard drives), a third that connects users directly for secure file sharing, and a fourth designed for areas with poor internet. These systems avoid relying on big companies by spreading data across shared networks. They use blockchain to track transactions and smart contracts to enforce rules without middlemen. Users earn rewards for sharing spare storage, while encryption and unique file codes keep data safe. Challenges remain, such as slow speeds, high costs, and the need for simpler tools. New fixes, like AI helpers and faster networks, aim to solve these issues. Together, these systems show how people can control their own data, reducing risks like hacking or outages. This shift could make the internet more open and fair, where privacy and access work together, not against each other.

***Key Words*:** decentralized storage, blockchain, smart contracts, file sharing, storage rewards, offline access.

## 1.INTRODUCTION

Centralized storage systems have inbuilt security risks, are expensive, and raise privacy concerns. Decentralized storage based on Blockchain-primarily addresses this problem by taking the recordsdata and splitting it across a peer-to-peer network that's both encrypted and governed by automated contracts. In the paper, we examine recent systems that replace conventional cloud storage with decentralized (D) models of distribution. Good examples are file-sharing networks managed by self-executing contracts, market places for leasing idle storage space, and encrypted services protecting data against hosts' access. The systems lack a point of failure — when a node crashes, the other nodes hold data secure. Where problems persist, including transaction speed and energy consumption, new solutions employing AI and energy conserving protocols and designs that function even if Internet connections are patchy hold out hope. To cut out the middlemen and return data to the hands of users, decentralized storage promising to transform how we handle digital data—potentially making it less expensive, more secure, and accessible to all, from small businesses to far-flung communities.

## 2. Body of Paper

2.1 Decentralized File Storage Using Blockchain
Core Idea: Self-Enforcing File Management
Traditional cloud storage relies on centralized servers. Patil's team built a decentralized file system (DFS) using blockchain. Files are stored across a shared network, similar to a community library. The system uses Ethereum's smart contracts—self-executing code written in Solidity—to manage file uploads, sharing, and deletions without a central authority.

2.1.1 How It Works
- Pinata and IPFS: Files are split into encrypted pieces and stored across the InterPlanetary File System (IPFS). Pinata handles distribution. Each file gets a unique Content Identifier (CID), similar to a fingerprint. Changing the file changes the CID, making tampering obvious.
- MetaMask Access: Users authenticate actions (e.g., deleting files) using MetaMask, a digital wallet. Transactions require small Ethereum fees ("gas") to process.
- Four-Layer Design:
  - Application: User interface built with ReactJS.
  - Network: Distributes files evenly across IPFS nodes.
  - Storage: IPFS stores encrypted file fragments globally.
  - Consensus: Ethereum blockchain verifies actions, like a digital notary.

2.1.2 Benefits Over Traditional Storage
Centralized systems (e.g., Google Drive) risk data loss if servers fail. Patil's design spreads files across many nodes. If one node fails, others keep the data intact. CIDs let users verify file authenticity, similar to checking a painting's history.

2.1.3 Challenges Solved
- Single Point of Failure: No central server means no single crash can lose data.
- Balancing Privacy: Files are stored unencrypted on IPFS, but blockchain records ensure accountability.

2.2 Blockchain Disk-Space Rental
Core Idea: Sharing Unused Storage
This system lets users rent spare disk space to others, similar to Airbnb. Blockchain ensures fair transactions.

2.2.1 Key Components
- Proof-of-Work (PoW): Miners solve puzzles to validate transactions, preventing fraud.

- Escrow Contracts: Payments are held in smart contracts until storage is delivered. If providers fail, funds return automatically.
- Live Dashboards: Users compare prices and provider ratings, like shopping online. A farmer in India could rent laptop space; a startup in Berlin might use it for cheap storage.

2.2.2 Real-World Impact
Small businesses save on cloud costs. Individuals earn money from unused space. The model mirrors ride-sharing apps but for data.

2.2.3 Challenges Addressed
- Trust: Ratings and escrow reduce risks of dealing with strangers.
- Energy Use: PoW consumes power. Future versions may use greener methods like Proof-of-Stake.

2.3 Peer-to-Peer Storage Marketplace
Core Idea: Direct Storage Deals
A decentralized marketplace connects data owners (DOs) with storage providers (DSOs), cutting out corporate middlemen.

2.3.1 System Features
- AES-256 Encryption: Files are encrypted before storage, like sealed letters. Even hosts can't view them.
- Blockchain Escrow: Payments release only when both parties meet terms. No customer service needed.
- Reputation Scores: Providers earn ratings based on reliability. Poor performers get pushed out.

2.3.2 Practical Comparison
Similar to eBay: reliable sellers gain visibility. Hosts build trust over time through good service.

2.3.3 Challenges Solved
- Privacy: Encryption prevents unauthorized access.
- Disputes: Smart contracts automate refunds for broken agreements.

2.4 Decentralized Storage for Remote Areas
Core Idea: Offline-First Storage
Designed for areas with poor internet (e.g., oil rigs), this system stores data locally until connectivity returns.

2.4.1 Innovations
- Local Caching: Devices save data offline, like storing food for winter.
- Merkle Trees: Hashes verify file integrity efficiently. Checking a file's root hash confirms it's untampered.
- Cost Savings: Storing minimal data on-chain reduces Ethereum fees.

2.4.2 Use Cases
Ideal for IoT devices in harsh environments (e.g., wildfire sensors). Data survives even if the internet doesn't.

2.4.3 Challenges Addressed
- Limited Device Power: Lightweight encryption suits low-power edge devices.
- User Simplicity: Interfaces avoid technical terms for non-experts.

2.5 Shared Features Across Systems

2.5.1 Combining Strengths
All systems mix blockchain (for trust) with tools like IPFS (for efficiency). Patil's team, for example, uses Ethereum for logging actions but IPFS for storage.

2.5.2 Rewarding Participation
Users earn tokens (e.g., ETH) for sharing resources. Krishnan's model turns unused space into income.

2.5.3 Built-In Security
Encryption and hashing protect data from the start. Bahl's system encrypts files before they leave a user's device.

2.6 Current Limitations
2.6.1 Speed and Cost
Ethereum handles ~15 transactions per second. High demand slows the network and raises fees. Solutions like rollups may help.

2.6.2 User Adoption
Switching from services like Dropbox requires education. Many users still find blockchain systems complex.

## 3. CONCLUSIONS

Decentralized file storage is revolutionizing information storage and holding. Instead of depending on a single corporation and servers, such sites distribute files across global networks—a library in which every book shows up on millions of shelves, safe even if one is burned to a cinder. Projects like Patil's smart contract storage, Krishnan's disk rentals on the blockchain, Bahl and Taneja's marketplace encrypted, and Khachane's offline-first approach for remote communities all share one thing in common: they replace central control with community effort.

In short, such systems combine blockchain's openness with peer-to-peer efficiency. Smart contracts deploy trust programmatically, encryption safeguards privacy, and token rewards turn idle assets into shared value. An Indian farmer can be paid for wasted space on laptops, and a Kenyan clinic can store patient records securely without far-flung servers. High cost and technicality are still challenges, but breakthroughs—optimization with AI, more environmentally friendly consensus algorithms, and more accessible interfaces—are bridging the gaps.

## ACKNOWLEDGEMENT

We thank Department of Information Technology at K.D.K. College of Engineering for their support and resources. Special thanks to Dr. S.P. Khandait for her guidance, and our colleagues for their valuable feedback. We are also grateful to the authors of the studies reviewed and to our families for their encouragement.

## REFERENCES

1. Bhangale, Y., Bankar, S., Joshi, A., Magar, S., & Shitole, P. (2023). Development of Android Application for Maharashtra Tourism. International Journal of Innovative Research in Science, Engineering and Technology, 12(5). DOI:10.15680/IJIRSET.2023.1205025

2. Ganji, S., Ambrale, A., Bhat, A., Doiphode, R., & Bharde, V. (2024). Visit Mumbai: A Flutter Powered Tourist Guide App. International Research Journal of Engineering and Technology, 11(4), 2160-2165.

3. Badhe, D., Regundawar, P., Todkar, V., & Kale, R. (2022). An Indian Tour Advisor App. International Journal of Innovations in Engineering and Science, 7(9), 71-75. DOI:10.46335/IJIES.2022.7.9.15

4. Rakshith, A., Samhitha, V., Aravind, A., Mahto, S. K., Manjamma, C. G., Bera, A. K., & Jaison, F. (2023). Android Tourist Guide. International Journal of Advanced Research in Computer and Communication Engineering, 12(4).

5. Gore, A., Chavan, S., Nemane, P., & Kharat, U. (2022). Intelligent Tourist Guide Using Django. Journal of Emerging Technologies and Innovative Research, 9(4).

6. Ali, S. Z., Kapde, B., Poptani, K., & Ogale, S. (2021). Travel Guide Android Application. International Research Journal of Modernization in Engineering Technology and Science (IRJMETS), 3(3).

7. Thennakoon, M. S. B. W. T. M. P. S. B., Rajarathna, R. D. T. N., Jayawickrama, S. P. B., Kumara, M. P. D. S. M., Imbulpitiya, A. M., & Kodagoda, N. (2019). TourGuru: Tour Guide Mobile Application for Tourists. International Conference on Advancements in Computing (ICAC), December 5-6, 2019, Malabe, Sri Lanka.

8. Nugraha, N. B., & Alimudin, E. (2019). Mobile Application Development for Tourist Guide in Pekanbaru City. Journal of Physics: Conference Series, 1430, 012038.

9. Liu, Y., Xie, X., Lv, J., & Jie, X. (2020). Tour Guide Online Independent Learning Study from the Virtual Community Perspective. 2020 International Conference on E-Commerce and Internet Technology (ECIT), pp. 281-287.

10. Ependi, U., Muzakir, A., Fatoni, F., Bunyamin, M., Irawan, D., & Effendy, I. (2019). Model for Mobile Application Development on Travelling Guide: A General Proposal. 2019 International Conference on Electrical Engineering and Computer Science (ICECOS), pp. 122-126.