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Blockchain-Based Evidence Management System

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Abstract: *This project introduces a decentralized file storage system that leverages blockchain technology to create a secure, immutable, and tamper-resistant platform for file sharing. By storing files within blocks on a blockchain, the system ensures that once data is uploaded, it cannot be altered or deleted, making it ideal for applications where data integrity is critical. Users interact with the platform through a web interface, allowing them to upload, download, and share files across a peer-to-peer network. The blockchain structure used in this project employs a Proof of Work (PoW) consensus mechanism, requiring peers (miners) to solve cryptographic puzzles to validate blocks and add them to the chain. Two different PoW methods are used: one generates nonces at random, while the other increases the nonce value one after the other. By comparing the effectiveness and security of different methods, the project finds that random nonce generation outperforms them at higher difficulty levels, providing quicker block validation and more robust defense against possible assaults. On the other hand, the incremental approach is less secure over time because it is simpler to foresee. The project also covers the advantages of on-chain storage, which involves storing files directly inside blockchain blocks. This approach offers better security but comes at the expense of more processing power. Furthermore, it investigates alternatives such as off-chain blockchain architectures for more effective file storage in subsequent iterations and Proof of Stake (PoS) for lowering resource use.*

Keywords: Peer-to-peer network, On-chain storage, Cryptographic puzzle, Proof of Stake (PoS), Off-chain storage, Block validation, Blockchain technology.

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