Proxy Re-Encryption Implementation for Safe Blockchain Based Data Sharing

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Abstract: *The rapid expansion of Internet of Things (IoT), cloud computing, and decentralized applications has significantly increased the demand for secure and efficient data-sharing mechanisms. Traditional encryption techniques, while effective in protecting data confidentiality, face limitations in scalability, flexible access control, and secure data delegation in distributed environments. To overcome these challenges, this project proposes a Proxy Re-Encryption (PRE) based framework integrated with blockchain technology to enable secure, controlled, and transparent data sharing. Proxy re-encryption allows encrypted data to be transformed for authorized users without revealing the original plaintext, thereby ensuring strong confidentiality even in the presence of semi-trusted intermediaries.*

The integration of blockchain technology further strengthens the system by providing a decentralized, immutable, and tamper-proof ledger for managing access permissions and recording data-sharing transactions. This approach eliminates reliance on centralized authorities while enhancing auditability and trust among participants. Additionally, the use of edge computing and information-centric caching improves system performance by reducing latency, network overhead, and computational load. The proposed framework effectively balances security, scalability, and efficiency, making it suitable for real-world applications such as IoT networks, healthcare data sharing, industrial systems, and smart city infrastructures.

Keywords: Proxy Re-Encryption, Blockchain Technology, Secure Data Sharing, IoT, Edge Computing, Access Control, Decentralized Systems