

Secure Data Sharing of Electronic Health Records With Blockchain

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Abstract : The secure sharing of Electronic Health Records (EHRs) is a critical challenge in modern healthcare, demanding solutions to enhance interoperability, privacy, and data integrity. Traditional standards like Health Information Exchange (HIE) and HL7 have made significant strides in facilitating data exchange between healthcare entities. However, these approaches rely on centralized architectures that are often vulnerable to data breaches, lack sufficient privacy measures, and have scalability issues. This paper proposes a framework for secure, decentralized sharing of EHRs using blockchain technology, cryptographic tokens, and Non-Fungible Tokens (NFTs). The blockchain's immutable ledger, decentralized control, and inherent security mechanisms are leveraged to improve transparency, accountability, and auditability in healthcare data exchanges. Furthermore, we introduce the concept of tokenizing patient data through NFTs, creating unique digital identifiers for each record, which allows for granular data access controls and proof of data ownership. These NFTs can also be employed to grant access to authorized parties, establishing a secure and transparent data sharing model that empowers both healthcare providers and patients. The proposed approach addresses common privacy concerns by employing privacy-preserving techniques such as zero-knowledge proofs (ZKPs) and homomorphic encryption to ensure that sensitive patient information can be shared without exposing the actual content of the data. This ensures compliance with regulations like HIPAA and GDPR. Additionally, the integration of Fast Healthcare Interoperability Resources (FHIR) with blockchain technology allows for enhanced interoperability, enabling healthcare organizations to exchange data seamlessly and securely across various systems while maintaining data governance and regulatory compliance. Through real-world case studies and simulations, this paper demonstrates how blockchain-based EHR sharing can reduce operational costs, improve patient outcomes, and enhance the security and privacy of healthcare data. This decentralized framework holds great potential for revolutionizing healthcare information exchange, providing a transparent, scalable, and secure method for managing patient data in a highly regulated environment.

Keywords : blockchain, electronic health records (ehrs), fast healthcare interoperability resources (fhir), health information exchange (hie), hl7, interoperability, non-fungible tokens (nfts), privacy-preserving techniques, tokens, secure data sharing,

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