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Blockchain in Medical Records

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Abstract: *Blockchain technology is transforming industries like finance, supply chain, governance, and healthcare. This paper analyzes blockchain architecture, applications, challenges, and performance. Key attributes—decentralization, immutability, transparency, and security—enable secure peer-to-peer transactions without intermediaries. Consensus mechanisms such as Proof of Work (PoW) and Proof of Stake (PoS) are examined for their trade-offs in scalability, energy efficiency, and security.*

In healthcare, blockchain addresses security and interoperability issues in centralized Personal Health Record (PHR) systems. Solutions using Ethereum, Hyperledger, smart contracts, and IPFS enhance Electronic Health Record (EHR) management by improving data integrity, privacy, and access control while reducing costs. A containerized microservices architecture further enhances scalability.

Blockchain performance, evaluated using the BLOCKBENCH framework, highlights gaps in transaction throughput compared to traditional databases. Despite scalability, interoperability, and regulatory challenges, ongoing research focuses on optimizing consensus mechanisms, integrating database principles, and improving healthcare interoperability, advancing blockchain's real-world applications..

Keywords: Blockchain Medical Records Healthcare Electronic Health Record (EHR) Personal Health Record (PHR) Decentralization Immutability Data Security Privacy Interoperability Consensus Mechanisms Ethereum Hyperledger Smart Contracts IPFS Microservices Architecture Scalability BLOCKBENCH