**Blockchain-Enabled Distributed DevOps:  
Enhancing Security, Transparency and Traceability in Software Development**

**Abstract**

Distributed DevOps is a modern software development methodology that enables teams to collaborate across different geographical locations. However, challenges such as security, transparency, and traceability persist, often leading to project delays, trust issues, and potential security vulnerabilities. Blockchain technology, known for its decentralized and immutable nature, presents a promising solution to address these challenges.This study aims to integrate blockchain technology into the Distributed DevOps pipeline to enhance security, transparency, and traceability. By leveraging smart contracts, the InterPlanetary File System (IPFS), and cryptographic hashing, the proposed framework seeks to optimize DevOps practices and provide a more reliable and secure software development environment.The research employs a framework-based approach, implementing blockchain technology within a Distributed DevOps setup. The integration of IPFS for decentralized storage, smart contracts for automation, and consensus mechanisms for security are tested in real-world scenarios. The framework was implemented and tested using Python, with performance evaluation conducted using tools like Spyder IDE and Postman.The results indicate significant improvements in security, traceability, and transparency. The blockchain-based framework enhances collaboration among distributed teams while ensuring data integrity and preventing unauthorized access.Future research may explore integrating AI and machine learning to further optimize automation in blockchain-enabled DevOps.

**Keywords:** DevOps, Blockchain, Smart Contracts, Distributed DevOps, Security, Transparency, Traceability, IPFS.

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