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Decentralized version control systems (DVCS)

Abstract

Decentralized version control systems (DVCS) have become critical for collaborative software development. This project explores creating a decentralized version control system on the Internet Computer Protocol (ICP), leveraging its blockchain-based architecture to ensure enhanced transparency, integrity, and security in version control. Unlike centralized systems that rely on singular points of failure, this approach uses ICP's decentralized canisters for managing repositories, providing a robust and censorship-resistant platform. The project also aims to integrate blockchain-enabled user authentication, decentralized data storage, and a distributed consensus mechanism to redefine how software development workflows are managed.

The project methodology focuses on developing a DVCS that mirrors the features of Git while incorporating decentralization principles. The system uses ICP's canisters to store version-controlled files and manage commits, branches, and merges securely. By leveraging Internet Identity, the platform ensures user authentication without centralized credentials. The development process involves implementing key features like add, commit, push, and pull, etc., using Motoko, ICP's programming language, and, if needed, integrating distributed storage solutions such as IPFS for large file handling. Expected outcomes include a scalable, user-friendly, and tamper-proof DVCS with enhanced collaboration capabilities. Additionally, the project will produce detailed documentation on architecture design and implementation strategies, serving as a foundation for future research in decentralized development tools.

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