

LiveDocs: A Peer-to-Peer Real-Time Collaborative Document Editor Using WebRTC and CRDTs

Abstract:

LiveDocs is a decentralized, real-time collaborative document editor designed to enable seamless and efficient collaboration without reliance on centralized servers. Unlike traditional cloud-based solutions such as Google Docs, LiveDocs utilizes WebRTC for direct peer-to-peer (P2P) communication and Yjs (Conflict-Free Replicated Data Types – CRDTs) for distributed data synchronization. This architecture ensures low-latency collaboration, enhanced fault tolerance, and seamless scalability, supporting millions of concurrent users.

Key features include real-time editing, role-based access control, and instant notifications, all powered by a resilient P2P network. Secure authentication is ensured through JWT-based access control, enabling efficient document indexing and user management while delivering a modern and sleek user experience.

By eliminating centralized infrastructure, LiveDocs reduces server costs, enhances scalability, and improves fault tolerance, making it an ideal solution for teams, enterprises, and large-scale applications requiring secure and real-time document collaboration.