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Optimizing Cloud Security Through Data Splitting and Replication

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Abstract: Outsourcing data to third-party administrative control in cloud computing introduces significant security concerns due to potential attacks from malicious users and compromised nodes within the cloud infrastructure. To address these issues, this paper proposes the Division and Replication of Data in the Cloud for Optimal Performance and Security (DROPS) methodology, which simultaneously enhances data security and system performance. In DROPS, files are fragmented into smaller pieces and distributed across cloud nodes, ensuring that no single node contains meaningful information. To further secure the data, the nodes are spatially separated using graph T-coloring, preventing attackers from deducing fragment locations. Unlike traditional cryptographic techniques, DROPS eliminates the computational overhead associated with encryption-based methods while maintaining robust security. Our analysis demonstrates an extremely low probability of compromising all nodes containing fragments of a file. Performance trade-offs, making it an efficient and scalable solution for cloud environments

Keywords: Cloud computing, data fragmentation, data replication, security, performance optimization, graph T-coloring, DROPS methodology

