IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 4, Issue 6, November 2024
Impact Factor: 7.57

Data Integrity and Security Mechanisms in Cloud-Based Relational Databases

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Abstract: *Cloud-based relational databases have redefined how modern organizations store, manage, and scale data. While the cloud offers significant benefits in terms of accessibility and cost-effectiveness, it also introduces unique security and data integrity challenges. This paper examines the strategies and technologies used to safeguard data stored in cloud-hosted relational databases. We focus on critical concerns like data consistency, confidentiality, access control, and the protection of data from unauthorized alterations. Techniques such as cryptographic hashing, role-based access control (RBAC), and integrity verification mechanisms are discussed. The paper also highlights architectural best practices, outlines current challenges, and explores recent innovations such as blockchain and AI-driven anomaly detection.*

Keywords: Cloud Database Security, Data Integrity, Encryption, Access Control, Cryptographic Hashing, RBAC, ABAC, Merkle Trees, Digital Signature, Secure Architecture, Homomorphic Encryption, Blockchain, Anomaly Detection

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