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EXPLORING THE IMPACT OF DATA COMPRESSION AND PARTITIONING ON SAP HANA PERFORMANCE OPTIMIZATION

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ABSTRACT

Data compression and partitioning are critical techniques for optimizing performance in large-scale data management systems such as SAP HANA. As businesses increasingly rely on real-time analytics and massive data processing, the efficiency of database operations becomes paramount. This study explores the impact of data compression and partitioning on the performance of SAP HANA, a high-performance in-memory relational database management system. Data compression reduces the amount of storage required, thus improving data retrieval times and enhancing overall system performance. Partitioning, on the other hand, involves dividing large datasets into smaller, more manageable chunks, which can be processed in parallel, further optimizing query performance and scalability. The paper investigates how different types of compression methods, such as dictionary and run-length encoding, impact both read and write performance. Additionally, it examines various partitioning strategies, including range-based, hash-based, and round-robin partitioning, and their influence on query execution time, resource utilization, and system scalability. By analyzing real-world use cases and benchmarks, this research highlights the trade-offs between compression and partitioning, offering insights into the optimal configuration for diverse workloads. The findings suggest that while compression provides significant space savings, partitioning yields higher performance improvements in large-scale applications. Ultimately, the combination of both techniques can result in a more efficient and scalable SAP HANA environment, capable of meeting the growing demands of modern enterprise applications.

KEYWORDS: *Data Compression, Partitioning, SAP HANA, Performance Optimization, In-Memory Database, Query Performance, Storage Efficiency, Scalability, Parallel Processing, Data Retrieval, Workload Management, Database Performance*