

Enhancing Data Warehouse Queries through Intelligent Keyword Search Techniques

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Abstract: Cloud data warehouse (CDW) platforms have been offered by many cloud service providers to provide abundant storage and unlimited accessibility service to business users. Sensitive data warehouse (DW) data consisting of dimension and fact data is typically encrypted before it is outsourced to the cloud. However, the query over encrypted DW is not practically supported by any analytical query tools. The Searchable Encryption (SE) technique is palpable for supporting the keyword searches over the encrypted data. Although many SE schemes have introduced their own unique searching methods based on indexing structure on top of searchable encryption techniques, there are no schemes that support Boolean expression queries essential for the search conditions over the DW schema. In this paper, we propose a secure and verifiable searchable encryption scheme with the support of Boolean expressions for CDW. The technical construct of the proposed scheme is based on the combination of Partial Homomorphic Encryption (PHE), B+Tree and Inverted Index, and bitmapping functions to enable privacy-preserving SE with efficient search performance suitable for encrypted DW. To enhance the scalability without requiring a third party to support the verification of search results, we employed blockchain and smart contracts to automate authentication, search index retention, and trapdoor generation. For the evaluation, we conducted comparative experiments to show that our scheme is more proficient and effective than related works.

Keywords: Cloud data warehouse

