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Balancing Performance, Accuracy, and Precision for Secure Cloud Transactions

Abstract:

In distributed transactional database systems deployed over cloud servers, entities cooperate to form proofs of authorizations that are justified by collections of certified credentials. These proofs and credentials may be evaluated and collected over extended time periods under the risk of having the underlying authorization policies or the user credentials being in inconsistent states. It therefore becomes possible for policy-based authorization systems to make unsafe decisions that might threaten sensitive resources. In this paper, we highlight the criticality of the problem. We then define the notion of trusted transactions when dealing with proofs of authorization. Accordingly, we propose several increasingly stringent levels of policy consistency constraints, and present different enforcement approaches to guarantee the trustworthiness of transactions executing on cloud servers. We propose a Two-Phase Validation Commit protocol as a solution, which is a modified version of the basic Two-Phase Validation Commit protocols. We finally analyze the different approaches presented using both analytical evaluation of the overheads and simulations to guide the decision makers to which approach to use.

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