Securing Key-Value Stores in the Public Cloud using Lightweight Authentication

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Cloud computing provides a cost-effective platform for large-scale data storage and computation. By outsourcing data to the third-party cloud, it however raises concerns regarding the data security. In this talk, I will address the problem of securing outsourced key-value stores in the public cloud. Specifically, the work targets on the multi-version key-value data that is subject to continuous updates under the constraints of data authenticity and "freshness" (i.e., ensuring that the value returned for a key is the latest version). The proposed solution, INCBM-TREE, is a novel construct delivering freshness and authenticity, yet with very lightweight overhead. The core technique is to apply Merkle tree for freshness authentication in multiple levels in the system design for key-value stores. Extensive benchmark evaluations demonstrate that INCBM-TREE achieves higher throughput (in an order of magnitude) for data stream authentication than existing work. For data owners and end users that have limited computing power, INCBM-TREE can be a practical solution to authenticate the freshness of outsourced data while reaping the benefits of broadly available cloud services. Finally, I will briefly overview my other on-going research work on performance optimization in indexed big-data systems and privacy-preservation in interoperable systems.

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