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SECURE DATA SHARING AND SEARCH FOR CLOUD-EDGE-COLLABORATIVE STORAGE

ABSTRACT

`Cloud Edge Collaborative Storage (CECS) is a promising framework to process data of the internet of things (IoT). It allows edge servers to process IoT data in real-time and stores them on a cloud server. Hence, it can rapidly respond to the requests of IoT devices, provide a massive volume of cloud storage for IoT data, and conveniently share IoT data with users. However, due to the vulnerability of edge and cloud servers, CECS suffers from the risk of data leakage. Existing secure CECS schemes are secure only if all edge servers are trusted. In other words, if any edge server is compromised, all cloud data (generated by IoT devices) will be leaked. Additionally, it is costly to request expected data from the cloud, which is linear with respect to the number of edge servers. To address the above problems, we propose a new secure data search and sharing scheme for CECS. Our project improves the existing secure CECS scheme in the following two ways. First, it enables users to generate a public and private key pair and manage private keys by themselves. In contrast, the existing solution requires edge servers to manage users' private keys. Second, it uses searchable public key encryption to achieve more secure, efficient, and flexible data searching. In terms of security, our scheme ensures the confidentiality of cloud data and secure data sharing and searching and avoids a single point of breakthrough. In terms of performance, the experimental results show that our scheme significantly reduces users' computing costs by delegating most of the cryptographic operations to edge servers. Especially, our scheme reduces the computing and communication overhead for generating a search trapdoor compared with the existing secure CECS scheme.