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Auditing Based Cloud Consistency as a Service for PHR data

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Abstract: **Cloud storage services have become commercially popular due to its vast advantages. To provide ubiquitous always-on access, a cloud service provider (CSP) maintains multiple replicas for each piece of data on geographically distributed servers. The main problem of using the replication technique in clouds is that it is very expensive to achieve strong consistency on a worldwide scale. In this paper, first present a novel consistency as a service (CaaS) model, which have a large data cloud and multiple small audit clouds. In the CaaS model, a data cloud is controlled and maintained by a CSP, and a cluster of users that constitute an audit cloud can verify whether the data cloud provides the promised level of consistency or not. Propose a two-level auditing architecture, which only requires a loosely integrate clock in the audit cloud. Then, design the algorithms to quantify the severity of violations with two metrics: the commonality of contravention, and the staleness of the value of a read. Finally, it devise a heuristic auditing strategy (HAS) to reveal as many violations as possible.**

Extensive experiments were performed using a combination of simulations and a real cloud deployment to validate HAS. Moreover, users should be able to just use the cloud storage as if it is local, without worrying about the need to check its integrity. Thus, enable public audit ability for cloud storage is of critical importance so that users can resort to a third party auditor (TPA) to check the integrity of outsourced data and be carefree. To securely introduce an adequate TPA, the auditing process should bring in no new vulnerabilities towards user data privacy, and introduce no additional online hardship to user. In this paper, a secure cloud storage system supporting privacy-preserving public auditing will be proposed. For further extend of result to enable the TPA to perform audits for multiple users simultaneously and efficiently, considerable security and performance analysis show the proposed schemes are provably secure and highly efficient.

Key Words**: Heuristic auditing, Extensive security.**

I.INTRODUCTION

To create Privacy-Preserving Public Auditing for Secure Cloud Storage using Homomorphism authenticator's method. A novel consistency as a service (CaaS) model, which have a large data cloud and multiple small audit clouds. The main objective of this project is to develop a cloud architecture using consistency as a service for Secure Cloud Storage. To provide ubiquitous always-on access, a cloud service provider (CSP) maintains multiple replicas for each piece of data on geographically distributed servers. Here Homomorphism authentication works as a key authenticator and Random masking technique act as a virtual proxy server (VPS).Providing integrity verification for distributed data storage systems, the issue of supporting both public audit ability and data dynamics has not been fully addressed. To achieve a secure and efficient design to seamlessly integrate these two important components for data storage service remains an open challenging task in Cloud Computing. Although the infrastructures under the cloud are much more powerful and reliable than personal computing devices, they are still cladding the broad range of both internal and external threats for data integrity. In particular, simply downloading all the data for its integrity verification is not a practical solution due to the expensiveness in I/O and transmission cost across the network. Besides, it is often insufficient to detect the data corruption only when accessing the data, as it does not give users correctness assurance for those un accessed data and might be too late to recover the data loss or damage. Encryption does not provide complete solution to the problem of protecting data privacy against third-party auditing but just reduces it to the complex key management domain. Unauthorized data flow still remains possible due to the potential exposure of decryption keys.

II. MATERIALS AND METHODS

Cloud Computing, the long-held dream of computing as a utility, has the potential to transform a large part of the IT industry, making software even more attractive as a service and shaping the way IT hardware is designed and purchased. Developers with innovative ideas for new Internet services no longer require the large capital outlays in hardware to deploy their service or the human expense to operate it. They need not be concerned about over-provisioning for a service whose popularity does not meet their predictions, thus wasting costly resources, or under-provisioning for one that becomes wildly popular, thus missing potential customers and revenue.

Moreover, companies with large batch-oriented tasks can get results as quickly as their programs can scale, since using 1000 servers for one hour costs no more than using one server for 1000 hours. This elasticity of resources, without paying a premium for large scale, is unprecedented in the history of IT.

A. Local Consistency Auditing

Local consistency auditing is an online algorithm. Each user will record all of his operations in his UOT. While issuing a read operation, the user will perform local consistency auditing independently. Let R(a)denote a user's current read whose dictating write is W(a), W(b) denote the last write in the UOT, and R(c) denote the last read in the UOT whose dictating write is W(c). Read-your-write consistency is violated if W(a) happens before W(b), and monotonic-read consistency is violated if W(a) happens before W(c). Note that, from the value of a read, we can know the logical vector and physical vector of its dictating write. Therefore, we can order the dictating writes by their logical vectors.

B. Global Consistency Auditing

Global consistency auditing is an offline algorithm. Periodically, an auditor will be elected from the audit cloud to perform global consistency auditing. In this case, all other users will send their UOTs to the auditor for obtaining a global trace of operations. After executing global auditing, the auditor will send auditing results as well as its vectors to all others.

C. Rule

Let L V(ei)j denote user j's logical clock in LV(ei). LV(e1) < LV(e2)if ∀j[LV(e1)j ≤LV(e2)j]∧∃j[LV(e1)j <LV(e2)j].

Given the auditor's vectors, each user will know other users' latest clocks up to global auditing. Inspired by the solution in consistency by constructing a directed graph based on the global trace. We claim that causal consistency is preserved if and only if the constructed graph is a directed acyclic graph (DAG). Each operation is denoted by a vertex.

Then, three kinds of directed edges are added by the following rules:

1) Time edge. For operationop1 andop2,ifop1 →op2, then a directed edge is added from op1to op2.
2) Data edge. For operations R (a) and W (a) that come from different users, a directed edge is added from W(a) to R(a).
3) Causal edge. For operations W(a) and W(b)that come from different users, if W(a)is on the route from W(b) to R(b), then a directed edge is added from W(a) to W(b).

Take the sample UOTs in Table I as an example. The graph constructed with Alg. 2 is shown in Fig. This graph is not a DAG. From Table I, we know that W(a)→W(d),as LV(W(a)) <LV(W(d)). Ideally, a user should first read the value of a and then d. However, user Clark first reads the value of d and then a, violating causal consistency.

D. Multi-Agent System (MAS)

Agent refers to the physical or abstract entity with the feature of autonomy, cooperation and initiative. The multi-agent system is an important branch in distributed intelligent field. MAS is a series of agents with different functions, which share information and coordinate each other to complete complicated tasks. Server agent not only collects and analyzes the information from client agents and transmits information to client agents; but also exchanges the real-time data with databases and stored and retrieved the data. Client agent always provides operations for data processing to server agent, changes system parameters in certain time and then makes corresponding management based on the received information from server agent. Route agent mainly deals with registration of clients and maintenance of databases for on-line user, user address, and news list and news buffer.

III.CONCLUSION

To achieve a secure and efficient design to seamlessly integrate these two important components for data storage service remains an open challenging task in Cloud Computing. Although the infrastructures under the cloud are much more powerful and reliable than personal computing devices, they are still facing the broad range of both internal and external threats for data integrity. A key problem of using the replication technique in clouds is that it is very expensive to achieve strong consistency on a worldwide scale, where a user is ensured to see the latest updates.

This project provide a consistency as a service (CaaS) model and a two-level auditing structure to help users verify whether the cloud service provider (CSP) is providing the promised consistency, and to quantify the severity of the violations, if any. With the CaaS model, the users can assess the quality of cloud services and choose a right CSP among various candidates. Infrastructures under the cloud are much more powerful and reliable than personal computing devices, they are still facing the broad range of both internal and external threats for data integrity. Encryption does not completely solve the problem of protecting data privacy against third-party auditing but just reduces it to the complex key management domain. Unauthorized data leakage still remains possible due to the potential exposure of decryption keys. The replication technique in clouds is that it is very expensive to achieve strong consistency.

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