A SURVEY ON SECURITY AND PRIVACY ISSUES OF DECENTRALIZED CLOUD STORAGE

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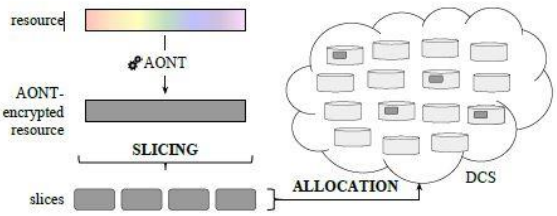
Abstract — In this paper, present an approach enabling resource owners to effectively protect and securely delete their resources while relying on decentralized cloud services for their storage. Our solution combines All-Or-Nothing-Transform for strong resource protection, and carefully designed strategies for slicing resources and for their decentralized allocation in the storage network. We address availability and security guarantees, jointly considering them in our model and enabling resource owners to control their setting.

INTRODUCTION

Protection of the encryption key is therefore not sufficient in DCS scenarios, as it remains exposed to the threats above. A general security principle is to rely on more than one layer of defense. In this paper, we propose an additional and orthogonal layer of protection, which is able to mitigate these risks. On the positive side, however, we note that the decentralized nature of DCS systems also increases the reliability of the service, as the involvement of a collection of independent parties reduces the risk that a single malfunction can limit the accessibility to the stored resources. In addition to this, the independent structure characterizing DCS systems - if coupled with effective resource protection and careful allocation to nodes in the network - makes them promising for actually strengthening security guarantees for owners relying on the decentralized network for storing their data.



PROPOSED METHOD

The proposed solution also enables the resource owners to securely delete their resources when needed, even when some of the nodes in the DCS misbehave. Second, we investigate different strategies for slicing and distributing resources across the decentralized network, and analyze their characteristics in terms of availability and security guarantees. Third, we provide a modeling of the

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problem enabling owners to control the granularity of slicing and the diversification of allocation to ensure the aimed availability and security guarantees. We demonstrate the effectiveness of the proposed model by conducting several experiments on an implementation based on an available DCS system. Our solution provides an effective approach for protecting data in decentralized cloud storage and ensures both availability and protection responding to currently open problems of emerging DCS scenarios, including secure deletion. In fact, common secret sharing solutions (e.g., Shamir [8]), while considering apparently similar requirements are not applicable in scenarios where the whole resource content (and not simply the encryption key) needs protection, because of their storage and network costs (e.g., each share in Shamir's method has the same size as the whole data that has to be protected).

LITERATURE SURVEY

A survey on security and privacy issues of bitcoin

Bitcoin is a popular cryptocurrency that records all transactions in a distributed append-only public ledger called blockchain. The security of Bitcoin heavily relies on the incentive-compatible proof-of-work (PoW) based distributed consensus protocol, which is run by the network nodes called miners. In exchange for the incentive, the miners are expected to maintain the blockchain honestly. Since its launch in 2009, Bitcoin economy has grown at an enormous rate, and it is now worth about 150 billions of dollars. This exponential growth in the market value of bitcoins motivate adversaries to exploit weaknesses for profit, and researchers to discover new vulnerabilities in the system, propose countermeasures, and predict upcoming trends. In this paper, we present a systematic survey that covers the security and privacy aspects of Bitcoin. We start by giving an overview of the Bitcoin system and its major components along with their functionality and interactions within the system. We review the existing vulnerabilities in Bitcoin and its major underlying technologies such as blockchain and PoW-based consensus protocol. These vulnerabilities lead to the execution of various security threats to the standard functionality of Bitcoin. We then investigate the feasibility and robustness of the state-of-the-art security solutions. Additionally, we discuss the current anonymity considerations in Bitcoin and the privacy-related threats to Bitcoin users along with the analysis of the existing privacy-preserving solutions. Finally, we summarize the critical open challenges, and we suggest directions for future research towards provisioning stringent security and privacy solutions for Bitcoin.

A case for redundant arrays of inexpensive disks (RAID)

Increasing performance of CPUs and memories will be squandered if not matched by a similar performance increase in I/O. While the capacity of Single Large Expensive Disks (SLED) has grown

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rapidly, the performance improvement of SLED has been modest. Redundant Arrays of Inexpensive Disks (RAID), based on the magnetic disk technology developed for personal computers, offers an attractive alternative to SLED, promising improvements of an order of magnitude in performance, reliability, power consumption, and scalability. This paper introduces five levels of RAIDs, giving their relative cost/performance, and compares RAID to an IBM 3380 and a Fujitsu Super Eagle.

HAIL: A high-availability and integrity layer for cloud storage

We introduce HAIL (High-Availability and Integrity Layer), a distributed cryptographic system that allows a set of servers to prove to a client that a stored file is intact and retrievable. HAIL strengthens, formally unifies, and streamlines distinct approaches from the cryptographic and distributed-systems communities. Proofs in HAIL are efficiently computable by servers and highly compact---typically tens or hundreds of bytes, irrespective of file size. HAIL cryptographically verifies and reactively reallocates file shares. It is robust against an active, mobile adversary, i.e., one that may progressively corrupt the full set of servers.

METHODOLOGY

Protection of the encryption key is therefore not sufficient in DCS scenarios, as it remains exposed to the threats above. A general security principle is to rely on more than one layer of defense. In this paper, we propose an additional and orthogonal layer of protection, which is able to mitigate these risks.

On the positive side, however, we note that the decentralized nature of DCS systems also increases the reliability of the service, as the involvement of a collection of independent parties reduces the risk that a single malfunction can limit the accessibility to the stored resources. In addition to this, the independent structure characterizing DCS systems - if coupled with effective resource protection and careful allocation to nodes in the network - makes them promising for actually strengthening security guarantees for owners relying on the decentralized network for storing their data.

RELATED WORK

Sample results

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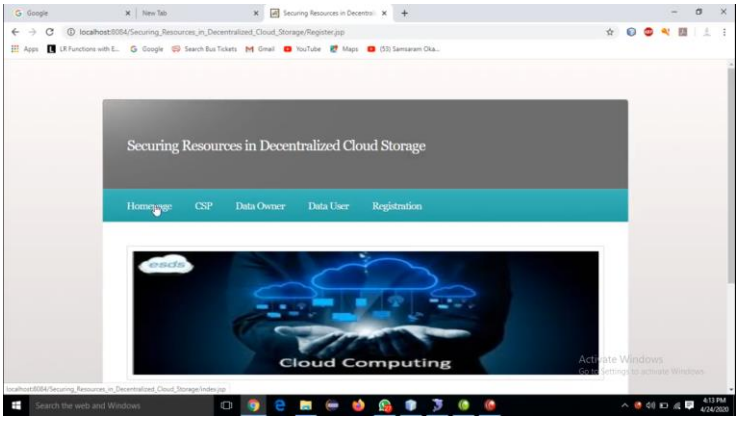

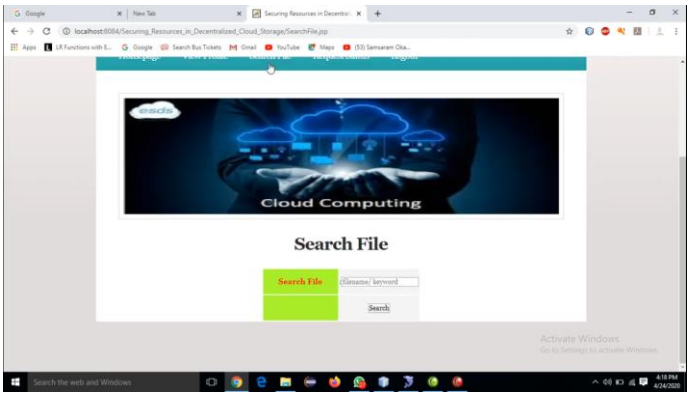

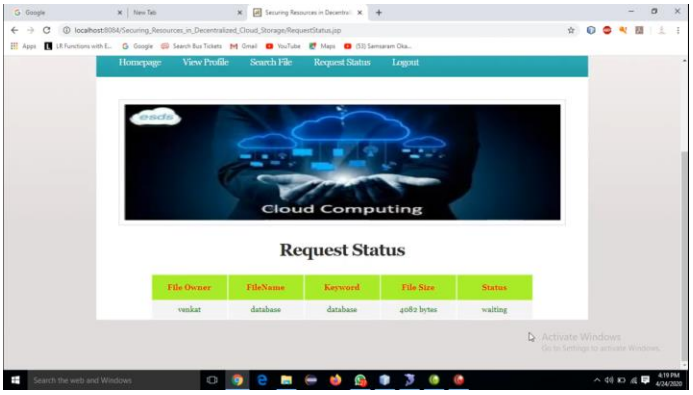

CONCLUSION

In this paper, Our approach enables resource owners to protect their resources and to control their decentralized allocation to different nodes in the network. We investigated different strategies for splitting and distributing resources, analyzing their characteristics in terms of availability and security guarantees. We also provided a modeling of the problem enabling owners to control the granularity of slicing and diversification of allocation to ensure aimed availability and security guarantees. Enabling effective control for resource owners, our solution helps in removing natural

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reluctance due to security concerns and moves a step forward in the realization of novel services effectively benefiting from technological evolution. Our work leaves room for extensions, such as the consideration of error correcting codes and information dispersal algorithms to reduce the spatial overhead.

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