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An Efficient Anti Collusion Data Sharing Mechanism to Maintain the Availability of Data Confidentiality for Dynamic Groups

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ABSTRACT:

Benefited from cloud computing, users can achieve an effective and economical approach for data sharing among group members in the cloud with the characters of low maintenance and little management cost. Meanwhile, we must provide security guarantees for the sharing data files since they are outsourced. Unfortunately, because of the frequent change of the membership, sharing data while providing privacy-preserving is still a challenging issue, especially for an untrusted cloud due to the collusion attack. Moreover, for existing schemes, the security of key distribution is based on the secure communication channel, however, to have such channel is a strong assumption and is difficult for practice. In this paper, we propose a secure data sharing scheme for dynamic members. Firstly, we propose a secure way for key distribution without any secure communication channels, and the users can securely obtain their private keys from group manager. Secondly, our scheme can achieve fine-grained access control, any user in the group can use the source in the cloud and revoked users cannot access the cloud again after they are revoked. Thirdly, we can protect the scheme from collusion attack, which means that revoked users cannot get the original data file even if they conspire with the untrusted cloud. In our approach, by leveraging polynomial function, we can achieve a secure user revocation scheme. Finally, our scheme can achieve fine efficiency, which means previous users need not to update their private keys for the situation either a new user joins in the group or a user is revoked from the group.

INTRODUCTION

Cloud computing, with the characteristics of intrinsic data sharing and low maintenance, provides a better utilization of resources. In cloud computing, cloud service providers offer an abstraction of infinite storage space for clients to host data. It can help clients reduce their financial overhead of data managements by migrating the local managements system into cloud servers. However, security concerns become the main constraint as we now outsource the storage of data, which is possibly sensitive, to cloud providers. To preserve data privacy, a common approach is to encrypt data files before the clients upload the encrypted data into the cloud.

Unfortunately, it is difficult to design a secure and efficient data sharing scheme, especially for dynamic groups in the cloud. A cryptographic storage system that enables secure data sharing on untrustworthy servers based on the techniques that dividing files into file groups and encrypting each file group with a file-block key. However, the file-block keys need to be updated and distributed for a user revocation; therefore, the system had a heavy key distribution overhead. However, the complexities of user participation and revocation in these schemes are linearly increasing with the number of data owners and the revoked users. The techniques of key policy attribute-based encryption, proxy re-encryption and lazy re-encryption to achieve fine-grained data access control without disclosing data contents. However, the single-owner manner may hinder the implementation of applications, where any member in the group can use the cloud service to store and share data files with others. However, the scheme will easily suffer from the collusion attack by the revoked user and the cloud.

The revoked user can use his private key to decrypt the encrypted data file and get the secret data after his revocation by conspiring with the cloud. In the phase of file access, first of all, the revoked user sends his request to the cloud, and then the cloud responds the corresponding encrypted data file and revocation list to the revoked user without verifications. Next, the revoked user can compute the decryption key with the help of the attack algorithm. Finally, this attack can lead to the revoked users getting the sharing data and disclosing other secrets of legitimate members.

Unfortunately, the secure way for sharing the personal permanent portable secret between the user and the server is not supported and the private key will be disclosed once the personal permanent portable secret is obtained by the attackers.

In this paper, we propose a secure data sharing scheme, which can achieve secure key distribution and data sharing for dynamic group. The main contributions of our scheme include:
1. We provide a secure way for key distribution without any secure communication channels. The users can securely obtain their private keys from group manager without any Certificate Authorities due to the verification for the public key of the user.
2. Our scheme can achieve fine-grained access control, with the help of the group user list, any user in the group can use the source in the cloud and revoked users cannot access the cloud again after they are revoked.
3. We propose a secure data sharing scheme which can be protected from collusion attack. The revoked users can not be able to get the original data files once they are revoked even if they conspire with the untrusted cloud. Our scheme can achieve secure user revocation with the help of polynomial function.
4. Our scheme is able to support dynamic groups efficiently, when a new user joins in the group or a user is revoked from the group, the private keys of the other users do not need to be recomputed and updated.
5. We provide security analysis to prove the security of our scheme. In addition, we also perform simulations to demonstrate the efficiency of our scheme.

EXISTING SYSTEM:

Kallahalla et al presented a cryptographic storage system that enables secure data sharing on untrustworthy servers based on the techniques that dividing files into file groups and encrypting each file group with a file-block key.

Yu et al exploited and combined techniques of key policy attribute-based encryption, proxy re-encryption and lazy re-encryption to achieve fine-grained data access control without disclosing data contents.

DISADVANTAGES OF EXISTING SYSTEM:

- The file-block keys need to be updated and distributed for a user revocation; therefore, the system had a heavy key distribution overhead.
- The complexities of user participation and revocation in these schemes are linearly increasing with the number of data owners and the revoked users.
- The single-owner manner may hinder the implementation of applications, where any member in the group can use the cloud service to store and share data files with others.

PROPOSED SYSTEM:

In this paper, we propose a secure data sharing scheme, which can achieve secure key distribution and data sharing for dynamic group.

We provide a secure way for key distribution without any secure communication channels. The users can securely obtain their private keys from group manager without any Certificate Authorities due to the verification for the public key of the user.

Our scheme can achieve fine-grained access control, with the help of the group user list, any user in the group can use the source in the cloud and revoked users cannot access the cloud again after they are revoked.

We propose a secure data sharing scheme which can be protected from collusion attack. The revoked users can not be able to get the original data files once they are revoked even if they conspire with the untrusted cloud. Our scheme can achieve secure user revocation with the help of polynomial function.

Our scheme is able to support dynamic groups efficiently, when a new user joins in the group or a user is revoked from the group, the private keys of the other users do not need to be recomputed and updated.

We provide security analysis to prove the security of our scheme.

ADVANTAGES OF PROPOSED SYSTEM:

- The computation cost is irrelevant to the number of revoked users in RBAC scheme. The reason is that no matter how many users are revoked, the operations for members to decrypt the data files almost remain the same.

- The cost is irrelevant to the number of the revoked users. The reason is that the computation cost of the cloud for file upload in our scheme consists of two verifications for signature, which is irrelevant to the number of the revoked users. The reason for the small computation cost of the cloud in the phase of file upload in RBAC scheme is that the verifications between communication entities are not concerned in this scheme.
- In our scheme, the users can securely obtain their private keys from group manager Certificate Authorities and secure communication channels. Also, our scheme is able to support dynamic groups efficiently, when a new user joins in the group or a user is revoked from the group, the private keys of the other users do not need to be recomputed and updated.

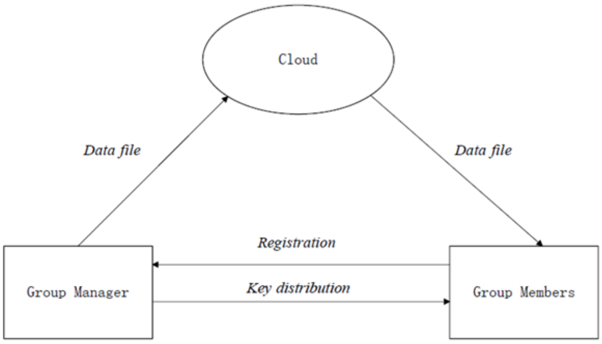
Problem Statement

Data confidentiality requires that unauthorized users including the cloud are incapable of learning the content of the stored data. To maintain the availability of data confidentiality for dynamic groups is still an important and challenging issue. Specifically, revoked users are unable to decrypt the stored data file after the revocation.

Scope

Cloud computing, users can achieve an effective and economical approach for data sharing among group members in the cloud with the characters of low maintenance and little management cost. Meanwhile, we must provide security guarantees for the sharing data files since they are outsourced. Unfortunately, because of the frequent change of the membership, sharing data while providing privacy-preserving is still a challenging issue, especially for an untrusted cloud due to the collusion attack. Moreover, for existing schemes, the security of key distribution is based on the secure communication channel, however, to have such channel is a strong assumption and is difficult for practice. In this paper, we propose a secure data sharing scheme for dynamic members. Firstly, we propose a secure way for key distribution without any secure communication channels, and the users can securely obtain their private keys from group manager. Secondly, our scheme can achieve fine-grained access control, any user in the group can use the source in the cloud and revoked users cannot access the cloud again after they are revoked. Thirdly, we can protect the scheme from collusion attack, which means that revoked users cannot get the original data file even if they conspire with the untrusted cloud. In our approach, by leveraging polynomial function, we can achieve a secure user revocation scheme. Finally, our scheme can achieve fine efficiency, which means previous users need not to update their private keys for the situation either a new user joins in the group or a user is revoked from the group. our scheme is able to support dynamic groups efficiently, when a new user joins in the group or a user is revoked from the group, the private keys of the other users do not need to be recomputed and updated. Moreover, our scheme can achieve secure user revocation; the revoked users can not be able to get the original data files once they are revoked even if they conspire with the untrusted cloud.

SYSTEM ARCHITECTURE:



Implementation of modules

Group Manager:

Group manager takes charge of system parameters generation, user registration, and user revocation. In the practical applications, the group manager usually is the leader of the group. Therefore, we assume that the group manager is fully trusted by the other parties.

Group members:

Group members (users) are a set of registered users that will store their own data into the cloud and share them with others. In the scheme, the group membership is dynamically changed, due to the new user registration and user revocation.

We describe the main design goals of the proposed scheme including key distribution, data confidentiality, access control and efficiency as follows:

Key Distribution:

The requirement of key distribution is that users can securely obtain their private keys from the group manager without any Certificate Authorities. In other existing schemes, this goal is achieved by assuming that the communication channel is secure, however, in our scheme, we can achieve it without this strong assumption.

Access control:

First, group members are able to use the cloud resource for data storage and data sharing. Second, unauthorized users cannot access the cloud resource at any time, and revoked users will be incapable of using the cloud resource again once they are revoked.

Data confidentiality:

Data confidentiality requires that unauthorized users including the cloud are incapable of learning the content of the stored data. To maintain the availability of data confidentiality for dynamic groups is still an important and challenging issue. Specifically, revoked users are unable to decrypt the stored data file after the revocation.

Efficiency:

Any group member can store and share data files with others in the group by the cloud. User revocation can be achieved without involving the others, which means that the remaining users do not need to update their private keys.

Cloud module:

cloud module plays an important role ,group managers upload some files into cloud those files are stored in encrypted format because a secure access control scheme on encrypted data in cloud storage by invoking role-based encryption technique. It is claimed that the scheme can achieve efficient user revocation that combines role-based access control policies with encryption to secure large data storage in the cloud.

Unfortunately, the verifications between entities are not concerned, the scheme easily suffer from attacks, for example, collusion attack. Finally, this attack can lead to disclosing sensitive data files. The cloud, maintained by the cloud service providers, provides storage space for hosting data files in a pay-as-you-go manner. However, the cloud is untrusted since the cloud service providers are easily to become untrusted. Therefore, the cloud will try to learn the content of the stored data.

Algorithm:

We propose a secure data sharing scheme, which can achieve secure key distribution and data sharing for dynamic group. The below steps are included in this algorithms,

1. We provide a secure way for key distribution without any secure communication channels. The users can securely obtain their private keys from group manager without any Certificate Authorities due to the verification for the public key of the user.
2. Our scheme can achieve fine-grained access control, with the help of the group user list, any user in the group can use the source in the cloud and revoked users cannot access the cloud again after they are revoked.
3. We propose a secure data sharing scheme which can be protected from collusion attack. The revoked users can not be able to get the original data files once they are revoked even if they conspire with the untrusted cloud. Our scheme can achieve secure user revocation with the help of polynomial function.
4. Our scheme is able to support dynamic groups efficiently, when a new user joins in the group or a user is revoked from the group, the private keys of the other users do not need to be recomputed and updated.
5. We provide security analysis to prove the security of our scheme. In addition, we also perform simulations to demonstrate the efficiency of our scheme.

Conclusion:

We design a secure anti-collusion data sharing scheme for dynamic groups in the cloud. In our scheme, the users can securely obtain their private keys from group manager Certificate Authorities and secure communication channels. Also, our scheme is able to support dynamic groups efficiently, when a new user joins in the group or a user is revoked from the group, the private keys of the other users do not need to be recomputed and updated. Moreover, our scheme can achieve secure user revocation; the revoked users can not be able to get the original data files once they are revoked even if they conspire with the untrusted cloud.

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