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A MODEL PROXIMITY-AWARE INTEREST-CLUSTERED P2P FILE SHRING SYSTEM

B MURALI[1],.KARUNAKAR REDDY[2]

[1]M.Tech Student, Sree Rama institute of technology and science Kuppenakuntla,Penuballi,Khammam,TS INDIA

[2]Asst Prof,CSE DeptSree Rama institute of technology and science Kuppenakuntla,Penuballi,Khammam,TS INDIA

ABSTRACT:

Traditional broadcast encryption (BE) schemes allow a sender to securely broadcast to any subset of members but require a trusted party to distribute decryption keys. Group key agreement (GKA) protocols enable a group of members to negotiate a common encryption key via open networks so that only the group members can decrypt the ciphertexts encrypted under the shared encryption key, but a sender cannot exclude any particular member from decrypting the ciphertexts. In this paper, we bridge these two notions with a hybrid primitive referred to as contributory broadcast encryption (ConBE). In this new primitive, a group of members negotiate a common public encryption key while each member holds a decryption key. A sender seeing the public group encryption key can limit the decryption to a subset of members of his choice. Following this model, we propose a ConBE scheme with short ciphertexts. The scheme is proven to be fully collusion-resistant under the decision n-Bilinear Diffie-Hellman

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Exponentiation (BDHE) assumption in the standard model. Of independent interest, we present a new BE scheme that is aggregatable. The aggregatability property is shown to be useful to construct advanced protocols.

Index Terms—Access control, multi-authority, CP-ABE, attribute revocation, cloud storage

INTRODUCTION:

CLOUD storage is an important service of cloud computing , which offers services for data owners to host their data in the cloud. This new paradigm of data hosting and data access services introduces a great challenge to data access control. Because the cloud server cannot be fully trusted by data owners, they can no longer rely on servers to do access control. Ciphertext-Policy Attribute-based Encryption (CP-ABE) is regarded as one of the most suitable technologies for data access control in cloud storage systems, because it gives the data owner more direct control on access policies. In CP-ABE scheme, there is an authority that is responsible for attribute management and key distribution. The authority can be the registration office in a university, the human resource department in a company, etc. The data owner defines the access policies and encrypts data according to the policies. Each user will be issued a secret key reflecting its attributes. A user can decrypt the data only when its attributes satisfy the access policies.

There are two types of CP-ABE systems: single-authority CP-ABE, where all attributes are managed by a single authority, and multi-authority CP-ABE ,where attributes are from different domains and managed by different authorities.

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Multi-authority CP-ABE is more appropriate for data access control of cloud storage systems, as users may hold attributes issued by multiple authorities and data owners may also share the data using access policy defined over attributes from different authorities. For example, in an E-health system, data owners may share the data using the access policy ‘‘Doctor AND Researcher’’, where the attribute ‘‘Doctor’’ is issued by a medical organization and the attribute ‘‘Researcher’’ is issued by the administrators of a clinical trial. However, it is difficult to directly apply these multi-authority CP-ABE schemes to multi-authority cloud storage systems because of the attribute revocation problem

Existing System:

System Model

We consider a data access control system in multi-authority cloud storage, as described in Fig. 1. There are five types of entities in the system: a certificate authority (CA), attribute authorities (AAs), data owners (owners), the cloud server (server) and data consumers (users). The CA is a global trusted certificate authority in the system. It sets up the system and accepts the registration of all the users and AAs in the system. For each legal user in the system, the CA assigns a global unique user identity to it and also generates a global public key for this user. However, the CA is not involved in any attribute management and the creation of secret keys that are associated with attributes. For example, the CA can be the Social Security Administration, an independent agency of the United States government. Each user will be issued a Social Security Number (SSN) as its global identity. Every AA is an independent attribute authority that

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is responsible for entitling and revoking user's attributes according to their role or identity in its domain. In our scheme, every attribute is associated with a single AA, but each AA can manage an arbitrary number of attributes. Every AA has full control over the structure and semantics of its attributes. Each AA is responsible for generating a public attribute key for each attribute it manages and a secret key for each user reflecting his/her attributes.

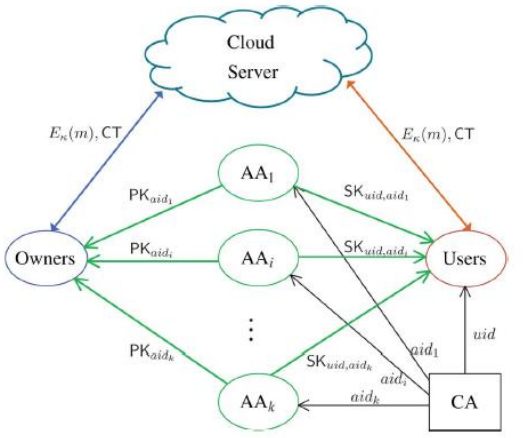

Fig. 1. System model of data access control in multi-authority cloud storage.

Proposed System:

In this section, we first give an overview of the challenges and techniques. Then, we propose the detailed construction of our access control scheme which consists of five phases: System Initialization, Key Generation, Data Encryption, Data Decryption and Attribute Revocation. To design the data access control scheme for multi authority cloud storage systems, the main challenging issue is to construct the underlying Revocable Multiauthority

CP-ABE protocol. In [6], Chase proposed a multi-authority CP-ABE protocol, however, it cannot be directly applied as the underlying techniques because of two main reasons: 1) Security Issue: Chase's multi-authority CP-ABE protocol allows the central authority to decrypt all the ciphertexts, since it holds the master key of the system;

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2) Revocation Issue: Chase's protocol does not support attribute revocationWe propose a new revocable multi-authority CP-ABE protocol based on the single-authority CP-ABE proposed by Lewko and Waters in [16]. That is we extend it to multiauthority scenario and make it revocable. We apply the techniques in Chase's multi-authority CP-ABE protocol [6] to tie together the secret keys generated by different authorities for the same user and prevent the collusion attack. Specifically, we separate the functionality of the authority into a global certificate authority (CA) and multiple attribute authorities (AAs). The CA sets up the

system and accepts the registration of users and AAs in the system.7 It assigns a global user identity uid to each user and a global authority identity aid to each attribute authority

in the system. Because the uid is globally unique in the system, secret keys issued by different AAs for the same uid can be tied together for decryption. Also, because each AA is associated with an aid, every attribute is distinguishable even though some AAs may issue the same attribute.

SECURITY ANALYSIS

We prove that our data access control is secure under the security model we defined, which can be summarized as in the following theorems.

Backward Security:

During the secret key update phase, the corresponding AA generates an update key for each non-revoked user. Because the update key is associated

with the user's global identity uid, the revoked user cannot use update keys

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of other non-revoked users to update its own secret key, even if it can compromise some non-revoked users. Moreover, suppose the revoked user can corrupt some other AAs (not the AA corresponding to the revoked attributes), the item HðxaidÞvxaid _aid_aid in the secret key can prevent users from updating their secret keys with update keys of other users, since _aid is only known by the AAaid and kept secret to all the users. This guarantees the backward security.

Forward Security:

After each attribute revocation operation, the version of the revoked attribute will be updated. When new users join the system, their secret keys are associated with attributes with the latest version. However, previously published ciphertexts are encrypted under attributes with old version. The ciphertext update algorithm in our protocol can update previously published ciphertexts into the latest attribute version, such that newly joined users can still decrypt previously published ciphertexts, if their attributes can satisfy access policies associated with ciphertexts. This guarantees the forward security.

RELATED WORK

Cipher text-Policy Attribute-Based Encryption (CP-ABE) [2]-[3] is a promising technique that is designed for access control of encrypted data. There are two types of CP-ABE systems: single authority CP-ABE where all attributes are managed by a single authority, and multi-authority CP-ABE ,where attributes are from different domains and managed by different authorities. Multi-authority CP-ABE is more appropriate for the access control of cloud storage systems, as users may hold attributes issued by multiple authorities and the data owners may

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share the data using access policy defined over attributes from different authorities. However, due to the attribute revocation problem, these multi-authority CP-ABE schemes cannot be directly applied to data access control for such multi-authority cloud storage systems.

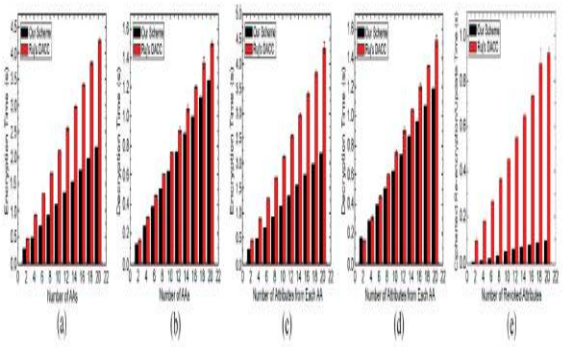

Fig. 3. Comparison of Computation Time. (a) Encryption. (b) Decryption. (c) Encryption. (d) Decryption. (e) Re-encryption.

CONCLUSION

In this paper, we proposed a revocable multi-authority CPABE scheme that can support efficient attribute revocation. Then, we constructed an effective data access control scheme for multi-authority cloud storage systems. We also proved that our scheme was provable secure in the random oracle model. The revocable multi-authority CPABE is a promising technique, which can be applied in any remote storage systems and online social networks etc.

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B MURALI is an M.Tech Department of Co mputer Science & Engineering, Sreerama Institute of Technology & science, Penuballi Mandal, Khammam, Kotha Kuppenkuntla

P. Karunakar Reddy is an efficient teacher, received M.Tech from JNTU Kakinada is working as an Associate Professor in Department of C.S.E, Sree Rama Institute of Technology & Science, Kuppenakuntla, Penuballi, Khammam, TS,India. He has published many papers in both National & International Journals. His area of Interest includes Data Communications & Networks, Information Security, Database Management Systems, Computer Organization, C Programming and other advances in Computer Applications