ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING

National Conference on Advanced Innovation in Engineering and Technology (NCAIET-2015)

Alva's Institute of Engineering and Technology, Moodbidri

Vol. 3, Special Issue 1, April 2015

Efficient Sharing of Data over Cloud by Public-Key Encryption Using KAC technique

Prithviraj[1], Arundhati Nelli[2]

M.Tech Student, Computer Science, Alvas Institute of Engineering and Technology, Moodbidri, India[1]

Assistant Professor, Computer Science, Alvas Institute of Engineering and Technology, Moodbidri, India[2]

Abstract: Cloud storage is a model of data storage where the digital data is stored. Cloud provides a suitable infrastructure for storing and accessing our sensitive data. It also facilitates the service for storing and managing the data remotely through internet. The data can be effectively shared with other users over the cloud. The public-key cryptosystem is uses asymmetric key cryptography and also provides a better way of sharing of files. The secret key is the one which is kept as secret by the data owner. These secret keys can be aggregated to form a single key, called as aggregate key. We can say that, the data owner can release the constant-size aggregate key for the set of cipher text classes. User can have access to those set of files by using a single aggregate key. The files, which are outside the set, will remain confidential.

Keywords: Data sharing, public-key cryptosystem, Aggregate key.

I. INTRODUCTION

Cloud storage allows the user to store their data online so that they can access the data from any location through internet. It also allows the user to store the data efficiently without worrying about the hardware management. Cloud storage is used as a core technology for many online services. With the wireless technology having more bandwidth user can access the data anywhere anytime they want.

Data privacy is one of the important functionality in a cloud concept. There will be lack of security for the user's data over the cloud. Different client's data have been stored in different virtual machines, within a single physical machine. Data from a target virtual machine could be stolen easily by compromising the other virtual machine which is co resident with the target machine. The third party auditor (TPA), is the one who has expertise and capabilities that cloud to assess the cloud storage service security on behalf of the user upon request. TPA checks for the availability and confidentiality of user data. TPA audits the cloud data storage without local copy of data.

However, allowing the integrity check without requiring the entire data is one more challenge in cloud computing. The verifier who verifies the data may have to download the entire data, but it is not the real case, since there will be huge amount of wastage in computation and communication resource. One approach is to have a security-mediator (SEM). This SEM should not learn anything about the uploaded data.

A cloud user cannot fully depend on the cloud in terms of data security. They would not be happy with the security of the VM or the honesty of the technical staff. For these reasons, every cloud users depends on data encryption.

The encrypted data will be stored and maintained on a server. The data owners can let their clients to view some portion of the data. Sharing these encrypted files with other users without leaking confidential data is one of the challenging task.

If a data owner wants to share some number of files with the others, then either he can encrypt all files with single key and gives corresponding key to respected user or he can encrypt the files with different keys and provide corresponding number secret keys to the data user. Both techniques are inefficient since in first method, the user can also be able to see some unwanted files. In the second method the number of keys will be equal to the number of encrypted file and it also requires large and expensive storage space for the keys.

One solution is that the data owner encrypts the files with different public keys but send the user a single decryption key of constant-size (fig 1). By using this single key the user can access only the requested files KAC.

The problem statement can be given like this, Making a decryption keys more powerful to make it to decrypt many ciphertexts, without increasing the key size. Designing a public-key encryption method that supports efficient delegation in the sense that any subset of the ciphertexts is decrypted by constant-size decryption key which is, generated by master-secret key'.

The Key Aggregate Cryptosystem (KAC) is one of the efficient technique under public-key encryption. Here the messages are encrypted under the identifier of cipher text called class. Every cipher texts are grouped into different number of classes. The master secret key is used to extract

ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING

National Conference on Advanced Innovation in Engineering and Technology (NCAIET-2015)

Alva's Institute of Engineering and Technology, Moodbidri

Vol. 3, Special Issue 1, April 2015

the aggregate key. This aggregate key is a unique key is used for a single class.

Data owner provides this aggregate key to the respected user; the user decrypts the files for that particular class or set. The files out of the set remain confidential. The cipher text, public key, master secret key and aggregate keys are all of constant size. The cipher text classes are represented in a hierarchical manner.

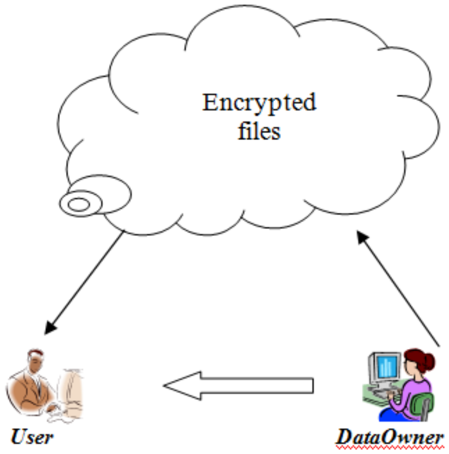


fig1. Data owner sending the aggregate key to the user for the requested set of files.

II. LITERATURE SURVEY

This KAC system is developed by considering some of the drawbacks occurred in previous work.

A. Fully functional identity-based encryption scheme (IBE)

The scheme has chosen ciphertext security in the random oracle model assuming an elliptic curve variant of the computational Diffie Hellman problem. It gives precise definitions for secure identity based encryption schemes and gives several applications for such systems.

In this paper it proposes a fully functional identity-based encryption scheme. The performance of this system is comparable to the performance of ElGamal encryption in Fp. The security of the system is based on a natural analogue of the computational Diffie-Hellman assumption on elliptic curves. Based on this assumption it shows that the new system has chosen ciphertext security in the random oracle model.

This system can be built from any bilinear map e : G1 x G1 → G2 between two groups G1, G2 as long as a variant of the Computational Diffie Hellman problem in G1 is hard.

B. Attribute-Based Encryption for Fine-Grained Access Control (ABE)

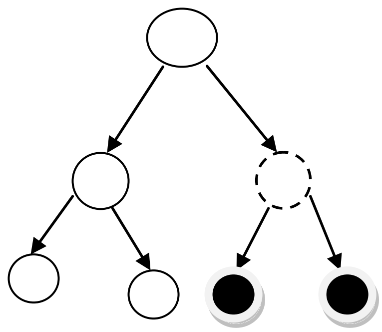
A new cryptosystem for fine-grained sharing of encrypted data that is called Key-Policy Attribute-Based Encryption (KP-ABE). In this cryptosystem, ciphertexts are labeled with sets of attributes and private keys are associated with access structures that control which ciphertexts a user is able to decrypt. Each private key is associated with an access structure that specifies which type of ciphertexts the key can decrypt. We call such a scheme a Key-Policy Attribute-Based Encryption (KP-ABE), since the access structure is specified in the private key, while the ciphertexts are simply labeled with a set of descriptive attributes

C. Scalable Hierarchical Access Control in Secure Group Communications

This technique describes the group communication systems containing multiple data streams and users with different access privileges Let {r1, r2, …}denote the set of resources in the system. In the group communication scenario, each resource corresponds to a data stream that is transmitted in one multicast session. Each multicast session is associated with a multicast address and a multicast routing tree. The routing trees for different multicast sessions can be jointly constructed. From the data transmission points of views, the users belonging to the same multicast session form a Data Group (DG). That is, one DG contains the users that can access to a particular resource. It is clear that the DGs can have overlapped membership because users may subscribe multiple resources. The users are also divided into non-overlapping Service Groups (SG) according to access privilege. One SG contains the users that are authorized to access the exactly same set of resources.

III. EXISTING SYSTEM

The data owner classifies the cipher text classes according to the subject. The nodes in the tree represent a secret key, leaf nodes represents keys for each and every cipher text classes.



(i)

The circles with dotted lines represent the key to be granted. If a data owner fig(i) wants to share all the files under the node personal with the user then he has to provide the key for that node, it automatically grants the key of its descendant nodes. In case of, fig (ii) if the data owner wants to share some of the files under the different nodes then the number of secret keys will be increases as the number of files or classes. For every files owner has to create separate keys and send them to user.This is not an efficient method.

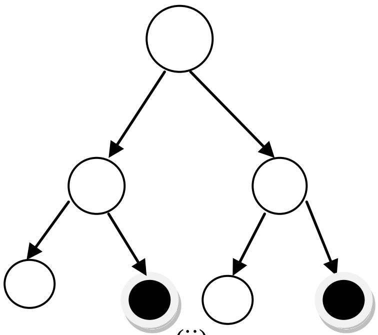
ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING

National Conference on Advanced Innovation in Engineering and Technology (NCAIET-2015)

Alva's Institute of Engineering and Technology, Moodbidri

Vol. 3, Special Issue 1, April 2015



(ii)

This technique is suitable where the owner wants to share all his files under certain branches.

Disadvantages:

- This is inadequate technique.
- Increasing in total number of keys.
- It requires secure channel to transmit and storage space to store large number of keys.

IV. PROPOSED SYSTEM

In the proposed scheme, it represents Key Aggregate Cryptosystem (KAC) under public key encryption. Here the messages are encrypted under the identifier of cipher text called class. Every cipher texts are grouped into different number of classes. The master secret key is used to extract the aggregate key. This aggregate key is a unique key is used for a single class. The Key aggregation property is especially useful when we expect the delegation to be efficient and flexible. The schemes enable a content provider to share her data in a confidential and selective way, with a fixed and small cipher text expansion. Data owner provides this aggregate key to the respected user; the user decrypts the files for that particular class or set. The files out of the set remain confidential. The cipher text, public key, master secret key and aggregate keys are all of constant size.

Advantages:

- At the same time multiple files can be extracted by using a single constant-size key.
- The number of key size will be reduced.
- It does not require much storage space to store this aggregate key.
- The files which are out of the requested set of data will remain confidential.

V. TECHNIQUES

There are five polynomial algorithms.

Setup(1^{λ},n) : This is executed by the data owner to setup an account on a server. On a security level parameter 1^{λ} and the number of cipher text class n, it generate public system parameter.

KeyGen Phase: It is executed by the data owner to generate public or master secret key pair.

Encrypt(pk,i,m): This can be executed by anyone who wants to encrypt the data. This take input as public key pk, an index i, and a message m, then it provides ciphertext C.

Extract(msk,S): It is executed by the data owner. Input the master secret key msk, ans a set S for different classes, it generates aggregate key K_S for set S.

Decrypt(K_S,S,i,C): Executed by users who want to decrypt the file. It takes the input as $K_{S,}$ the set S, an index i, and ciphertext C, then it outputs plain message m.

The aggregate key formed by combination of different master secret keys of the set together, with the index of the cipher text classes.

Algorithms

1) AES - File Encryption and decryption
2) SHA1 - Secured Hash Algorithm - for generating Digital Signature
3) Aggregate Key Generation algorithm - To generate an unique key for multiple file request
4) RSA - To generate Public Key for accessing file
5) Equation
6) For the set S of indices j's, the aggregate key is computed as

$$K_{\mathcal{S}} = \prod_{j \in \mathcal{S}} g^{\gamma}_{n+1-j}.$$

VI. METHODOLOGY

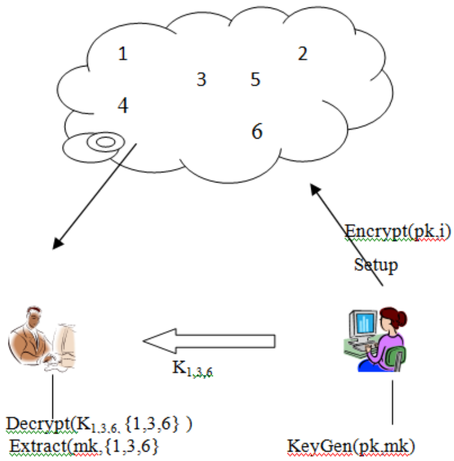


Fig 2. Extraction of aggregate key

VI. CONCLUSION

This approach is more flexible than hierarchical key assignment which can only save spaces if all key-holders share a similar set of privileges. secret keys for different ciphertext classes in cloud storage. No matter which one among the power set of classes, the delegatee can always get an aggregate key of constant size.

REFERENCES

[1]. Cheng-Kang Chu, Sherman S. M. Chow, Wen-GueyTzeng, Jianying Zhou, and Robert H. Deng, "Key-Aggregate Cryptosystem for Scalable Data Sharing in Cloud Storage" IEEE Transactions on

ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING

National Conference on Advanced Innovation in Engineering and Technology (NCAIET-2015)

Alva's Institute of Engineering and Technology, Moodbidri

Vol. 3, Special Issue 1, April 2015

Parallel and Distributed Cloud Computing Systems,Volume:25, Issue:2,Issue Date:Feb.2014

[2]. C. Wang, S. S. M. Chow, Q. Wang, K. Ren, and W. Lou, "Privacy-Preserving Public Auditing for Secure Cloud Storage," IEEE Trans. Computers, vol. 62, no. 2, pp. 362–375, 2013.

[3]. B. Wang, S. S. M. Chow, M. Li, and H. Li, "Storing Shared Data on the Cloud via Security-Mediator," in International Conference on Distributed Computing Systems - ICDCS 2013. IEEE, 2013.

[4]. R. S. Sandhu, "Cryptographic Implementation of a Tree Hierarchy for Access Control," Information Processing Letters, vol. 27, no. 2, pp. 95–98, 1988.

[5]. M. J. Atallah, M. Blanton, N. Fazio, and K. B. Frikken, "Dynamic and Efficient Key Management for Access Hierarchies," ACM Transactions on Information and System Security (TISSEC), vol. 12,no. 3, 2009.

[6]. V. Goyal, O. Pandey, A. Sahai, and B. Waters, "Attribute-Based Encryption for Fine-Grained Access Control of Encrypted data,"

[7]. D. Boneh and M. K. Franklin, "Identity-Based Encryption from the Weil Pairing," in Proceedings of Advances in Cryptology – CRYPTO '01, ser. LNCS, vol. 2139. Springer, 2001, pp. 213–229.

[8]. R. Canetti and S. Hohenberger, "Chosen-Ciphertext Secure Proxy Re-Encryption," in Proceedings of the 14th ACM Conference on Computer and Communications Security (CCS '07).

[9]. M. Chase and S. S. M. Chow, "Improving Privacy and Security in Multi-Authority Attribute-Based Encryption," in ACM Conference on Computer and Communications Security, 2009, pp. 121–130.]

[10]. Y. Sun and K. J. R. Liu, "Scalable Hierarchical Access Control in Secure Group Communications," in Proceedings of the 23th IEEE International Conference on Computer Communications.