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DATA INTEGRITY PROOF (DIP) IN CLOUD STORAGE

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ABSTRACT
Nowadays, Data is rising over internet in terabytes and Exabyte. So, there is a need of storing these data which has been fulfilled by cloud computing. Though the service of cloud appear to be efficient and cost effective. Yet there are some challenges which are faced in cloud computing such as Data security and Authentication. In cloud Storage the data of Owner is stored in cloud where the cloud servers are remotely located the owner of the data does not have any direct control over the data. If the data over cloud is modified by the cloud, Third Party Auditor (TPA) or any other person there is no precision such that the owner of the data gets the information about the modification of the data. TPA is a Third Party Auditor who has
Experience in checking the integrity of data. TPA verifies the files stored over the cloud if they are modified or not. Our scheme provides the solution to this problem such that if there is any modification in the data the owner will get information about the change in the data. Our scheme only provides the information about the change in data it does not keep data intact or secure from modification over cloud.
KEYWORDS - Third Party Auditor (TPA), Cloud Storage, Cryptography, Data integrity.

INTRODUCTION

The usage of computers, mobile gadgets and social networking sites is now part of common mans day to day life. Sharing of information, photos, video and audio files have enabled user to communicate and utilize virtual storage space in the Internet without worrying to buy physical storage locally. All these data need to be stored somewhere in Internet and Cloud happens to be a default choice.
In order to reap the operational and financial benefits of Cloud, the enterprises are also storing data with third parties in Cloud. It is challenging for small and medium company to keep updating hardware according to increasing data [1]. Cloud service provides flexibility to use storage services on demand according to ever changing requirement of enterprise. Storage as service is popular model, where data storage is outsourced by enterprise to third party service provider (Cloud Provider) [2] who charges as per the usage of storage facility. On the other side of spectrum, there is increasing trend these days, in the form of ubiquitous presence of mobile devices and the wide variety of functions for which they are used. Most of these functions are data generating (like photography, video shooting etc

A. CLOUD COMPUTING

The cloud in cloud computing provides the means through which everything from computing power to computing infrastructure, applications, business processes to personal collaboration can be delivered to you as a service wherever and whenever you need.
Cloud computing is offered in different forms:

- :Public clouds
- Private clouds
- Hybrid clouds, which combine both public and private

The cloud itself is a set of hardware, networks, storage, services, and interfaces that enable the delivery of computing as a service. Cloud services provide delivery of software, infrastructure, and storage on the Internet (either as separated components or as a complete platform) based on the user demand.

B. CLOUD DATA CENTERS

cloud data centers means the data centers with 10,000 or more servers on sites, all are devoted to running very few applications that are to be built with consistent infrastructure components (such as Hardware, racks, networking, OS, and so on).

Cloud data centers are

- Constructed for different purposes.
- Created at different times than traditional data center.
- Built on a different scale.
- Not constrained by same limitations.
- Perform different workload than classic data centers.

C. DATA INTEGRITY IN CLOUD STORAGE

Integrity, in terms of Network and data security, is assurance that information could only be accessed and modified by those authorized for it. Measures are taken to ensure Data integrity includes controlling physical environment of network terminals and the servers, restricting access of data, and maintaining strict authentication practice. Data integrity can also threatened by environmental hazards, such as heat, dust, and electrical surges.

Data Integrity is most important of all security issues and privacy in cloud data storages because it not only ensures completeness and correctness of data but also ensure that data is consistent, correct, correct and of high quality.

LITERATURE REVIEW

In Literature survey the study of cloud services and study of data integrity proof in cloud storage. Many solutions have been provided to focus on resolving the issues of integrity. Juels and Kaliski[1] proposed a model Proofs of Retrievability(POR) was one of the first most important attempts to formulize the notion guaranteed remotely and reliable integrity of the data without the retrieving of data file. It is basically a data encryption mechanism which detects data corruptions and retrieve the complete the data without any damage. Shacham and Waters[2]gave a new model for POR enabling verifiability of unlimited number of queries by user with reduced overhead. Later Bowels and Juels[3] gave a theoretical model for the implementing of POR, but all these mechanisms proposed were weak from the security point because they all work for single server. Therefore Bowels [4] in their further work gave a HAIL protocol extending the POR mechanism for multiple servers. Priya Metri and Geeta Sarote[5] proposed a threat model to overcome the threat of integrity and provide data privacy in the cloud storage. It uses TPA(Third Party Auditor) and digital signature mechanism for the purpose of reliable data retrievable. The TPA being used notifies any unauthorized access attempting to make changes, avoiding the changes in data and maintaining the originality of data. Atienies and Burns[6] gave Provable Data Possession(PDP) mechanism which verifies the integrity of data being outsourced, detecting all kind of errors occurring in data but doesn't guarantee complete data retrievable. In their later work Atienies and Pietro[7] proposed a scheme which overcome all problems in PDP, but the main and basic problem on both proposed system didn't overcome was they work on single server. Therefore, later Curtmola [8].

DATA INTEGRITY PROOF SCHEMES

A. OVERVIEW OF DATA INTEGRITY SCHEMES

As the word suggests itself data integrity means completeness or wholeness and it is basic requirement of information technology [7]. Data integrity refers to maintaining and assuring the accuracy and consistency of data over its entire life-cycle [8]. Data corruption is a form of data loss and data integrity is opposite of data corruption [8]. Data integrity ensures the data is the same as it was when it was originally recorded.

B. PROOF OF RETRIEVABILITY

In the Proof of Retrivability (POR) scheme this scheme using keyed hash function is the simplest scheme than any other scheme for proof of retrivability of data files [5]. In this scheme the data file is stored in the cloud storage but before storing it in the cloud storage that file is pre-processed and Encryption cryptographic hash is computed [5]. After calculating hash value the file is stored in the cloud storage or Data Center [5]. The Encryption cryptographic key which is used to calculate hash value is then released to cloud storage and value calculated by the cloud storage are compare with each other [5]. From that comparison final conclusion is considered [5]. The main advantage of this scheme is simple to implementation. Limitation of this scheme is, it is computational burdensome or difficult for devices like Laptops, mobile phones, PDAs etc. [5].

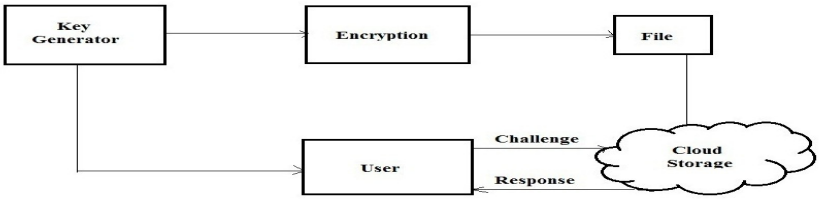

Fig.1: A Diagram of a proof of retrievability
Insert random sentinels in data files F

Next scheme for proof retrivability is using position of bits or sentinels [3].This concept is proposed by Ari Juels and Burton S. Kaliski Jr [3]. Sentinels are the special blocks which are used in this scheme to verify the integrity. Sentinels are embedded in the data blocks randomly during setup phase by the verifier in the setup phase [3]. The integrity of the data file is calculate by challenge and response. The verifier or TPA throws challenge to the cloud storage by specifying the position of the collection of the sentinels and the cloud storage has to return the associated sentinels or TPA values to the verifier[3][5]. If the file stored by the client is modified then the associated sentinels values also get changed and the cloud will return wrong values to verifier. From this integrity of the file is checked [3][5]. Limitation of this scheme is that this scheme involves encryption of file so this is computationally cumbersome for the small devices like mobile phones, PDA etc. [5].
Also Sravan Kumar R. and Ashutosh Saxena present this scheme [5] which involves selection of random bits per blocks of data due to this computational overhead of the client is reduced. File is processed by the verifier before storing it in the cloud storage [5]. After that verifier attaches some metadata to the file [5].This meta data is used at the time of verification of the integrity of the file [5]. The limitation of this scheme is this scheme applies only static data [5].

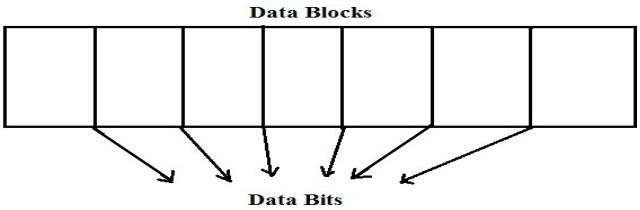

Fig.3.2: File is divided into number of Data Blocks

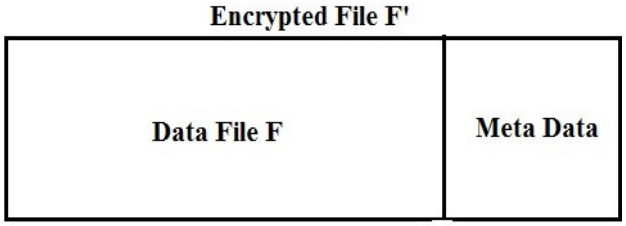

Fig.3.3: File is appending the Meta Data and made Encryption file F'

1) setup phase:

Let the verifier V wishes to the store the file F with the archive. Let this file F consist of n file blocks. We initially preprocess the file and create metadata to be appended to the file. Let each of the n data blocks have m bits in them. A typical data file F which the client wishes to store in the cloud is shown in Figure 3.2.

2) verification phase:

Let the verifier or TPA V wants to verifying the integrity of the file F. It throws challenge to archive and asks it to respond. The challenge and response are compared and the verifiers accept or reject the integrity proof. Suppose verifier wishes to check integrity of nth block. The verifier challenge cloud storage server by specify the block number i and bit number j generated by using function g which only verifier knows. The verifier also specifies position at which the meta data correspond the block i is append. This Meta data will be a k-bit number. Hence cloud storage server is required to send k + 1 bits for verification process by the client. The Meta data sent by cloud is decrypted by using number i and corresponding bit in this decrypted Meta data is

comparing with bit that is sent by the cloud. Any not match between two would mean a loss of the integrity of the client data at the cloud storage.

CONCLUSION

In this paper, we have proposed next generation for cloud storage which provides a scheme to address storage, management and the analysis of the rapidly growing machine Generated information. This paper explains about cloud storage, advantages along with its characteristics. Our scheme is proposed to reduce computational data and the storage Overhead of the cloud storage server. We also have proposed to minimize the size of proof of data integrity so that to reduce network bandwidth consumption. At client we only store the two functions, bit generator function g, and function h which can be used for encrypting data. Hence storage at client is very small as compared to other schemes that were developed. In our scheme encryption task is very limited to only fraction of whole data thus saving computational time of client. Many of schemes proposed earlier require the archive to perform processes that need lot of computation power to generate proof of the data integrity. But in proposed scheme archive just need to fetch and send few bits of data to client. And also evaluate performance of cloud storage performance.

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